ORDINARY COUNCIL

Wednesday 17 July 2019



Ordinary Council Meeting Wednesday, 17 July 2019

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Leadership and Governance

17/07/2019

What we are trying to achieve

A community that works together in decision making that is defined as ethically, socially and environmentally responsible.

What the result will be

We will have:

- A community that has the opportunity to be involved in decision making
- Open, easy, meaningful, regular and diverse communication between the community and decision makers
- Partnerships and collaborative projects, that meet the community's expectations, needs and challenges
- Knowledgeable, skilled and connected community leaders
- Strong corporate management that is transparent

How we will get there

- 1.1 Inform and engage with the community about what Council does using varied communication channels
- 1.2 Maintain strong partnerships between all stakeholders local, state and federal so that they are affective advocates for the community
- 1.3 Demonstrate leadership
- 1.4 Use innovative, efficient and sustainable practices
- 1.5 Ensure strong corporate and financial management that is transparent and accountable



Public Sector Women in Leadership Masterclass

24 & 25 June 2019

Sydney

Mayor Peta Pinson

As part of a commitment to personal development, I recently attended the Public Sector Women in Leadership Masterclass held in Sydney on 24 and 25 June 2019.

The Australian Public Sector is in a state of constant transformation, which opens the door to exciting new opportunities for emerging women leaders to move into senior executive roles.

Navigating this complex environment however is difficult and **leaders must possess an acute understanding of the challenges facing the sector**. At the same time, they need to be clear on who they are as a leader and their influence in the wider organisation they represent.

The two-day interactive Masterclass covered such topics as:

- · Driving Organisational Change and Gender Equity
- Resilient Leadership
- Diversity in the Workplace
- Communication and its challenges

A copy of the Masterclass Program is attached to this report.

The Masterclass was attended by women who hold senior leadership roles in the Federal, State and Local public sectors.

The Masterclass was very beneficial, well run and also provided the opportunity to network with other women in leadership roles.

Public Sector Women in Leadership Masterclass

SYDNEY

Day 1

Monday 24th June 2019

√8:30 Registration, coffee & networking

√9:00 Being a Public Sector leader - putting yourself forward & projecting self-confidence

- Discover how to connect with your own personal leadership nower
- Make a positive impact and project confidence and authority (without arrogance)

10:30 Morning tea & networking

11:00 Networking & online profile building for Public Sector professionals

- · Making a good impression and building rapport
- · Creating authentic connections despite the nerves
- · Raising your profile effectively as a public sector leader

√12:15 Networking lunch

√1:15 Communication differences - understanding & decoding yourself & your team

- Identifying the different communication styles we operate as individuals.
- Effectively communicate with, and lead, your diverse teams to work collaboratively and positively together
- Understand the line between assertive and aggressive
- Setting boundaries, conversational intelligence and handling tough conversations with assertiveness and grace
- Tools for managing emotions and stress to remain calm in a crisis

3:15 Afternoon tea & networking

3:30 Building & developing active listening skills

- Exploring the CIQ 5 Levels of Listening
- Meetings using them more effectively

5:00 Closing remarks & close of Day One

Day 2

Tuesday 25th June 2019

18:30 Welcome, coffee & networking

🗜:00 Personal & social awareness

- Learn how to promote your value internally and externally Appreciate your abilities and wear them proudly
- Understand how YOU impact your own professional credibility, promotions and opportunities
 - Stepping up as a role model and mentor
- Recognising opportunities for growth and development
- Finding coaches, mentors & sponsors

10:30 Morning tea & networking

11:00 Diversity in the workplace – uncovering the biases & the benefits

- How to thrive in a multi-generational public sector work environment
- Cultural and Gender Diversity understanding, including and embracing
- · Tapping into diversity of thought

/12:15 Networking lunch

1-30

1:15 Resilient leadership

- Why resilience, adaptability and flexibility are critical skills for public sector leaders
- Being comfortable with being uncomfortable
- Keeping up with the evolving public sector

3:15 Afternoon tea & networking

3:30 Driving organisational change & gender equity

- Gender based challenges in today's public sector
- Supporting other women and creating strong networks
- How to initiate change in your workplace, in your community, and beyond

4:30 Workshop Summation

- Overview of Day 1 and Day 2
- Final Points
- Q&A

5:00 Closing remarks & end of Masterclass

#WomenLeaders19

@criterion



Item 10.04 Attachment 1

Research objectives

Provide baseline data to

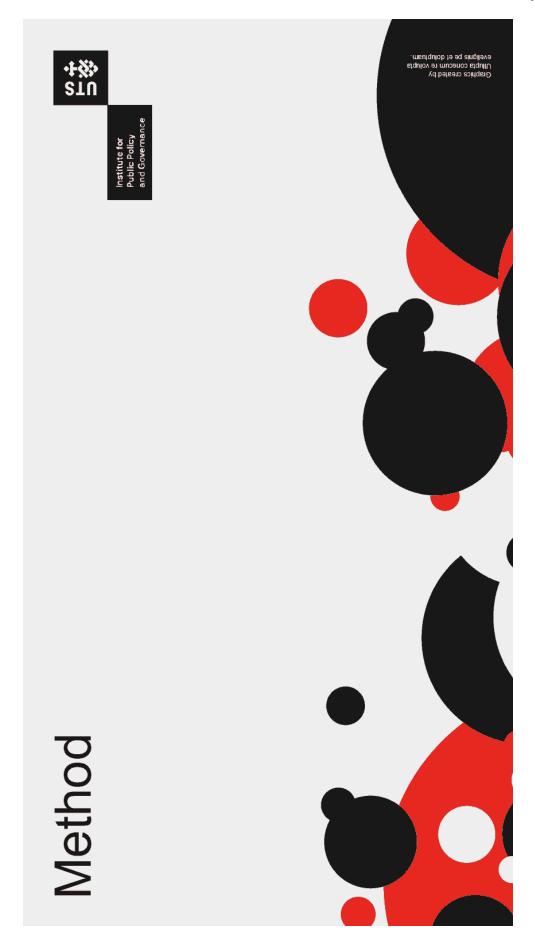
- Understand what matters about local government to Mid-North Coast locals and residents of individual LGAs
- Understand what is valued about each council, and services and services and functions that are under-valued
- Understand what matters regionally as a potential basis for MNCJO work program

Questions on

- Place attributes for each council
- What's important about place to residents
- and impactsImportance of council services and functions

Environmental problems, concerns

- Service delivery, funding and governance preferences
- Knowledge of local government

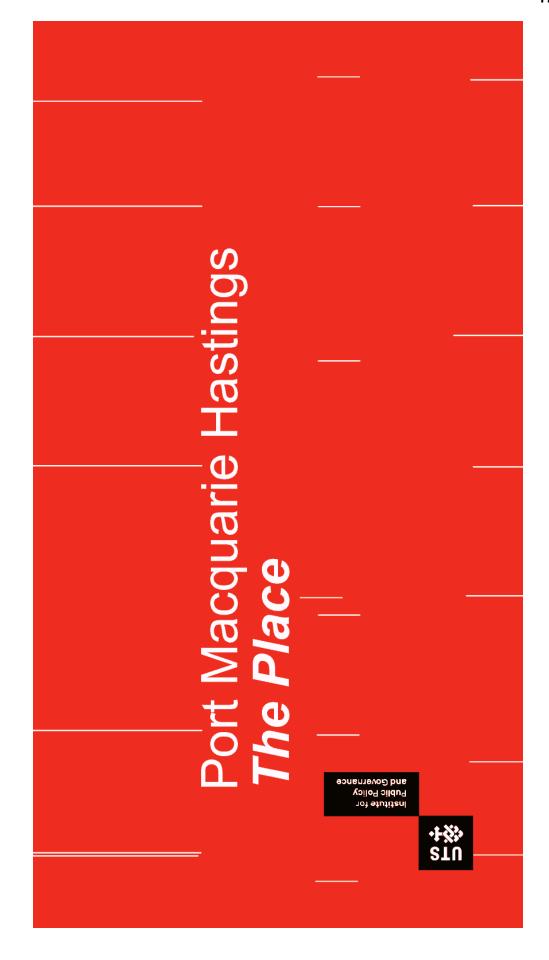


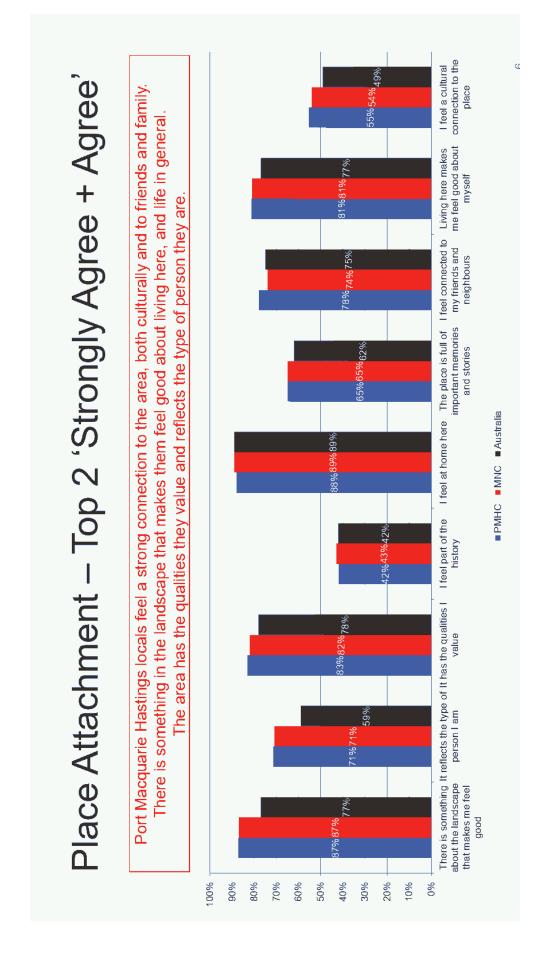
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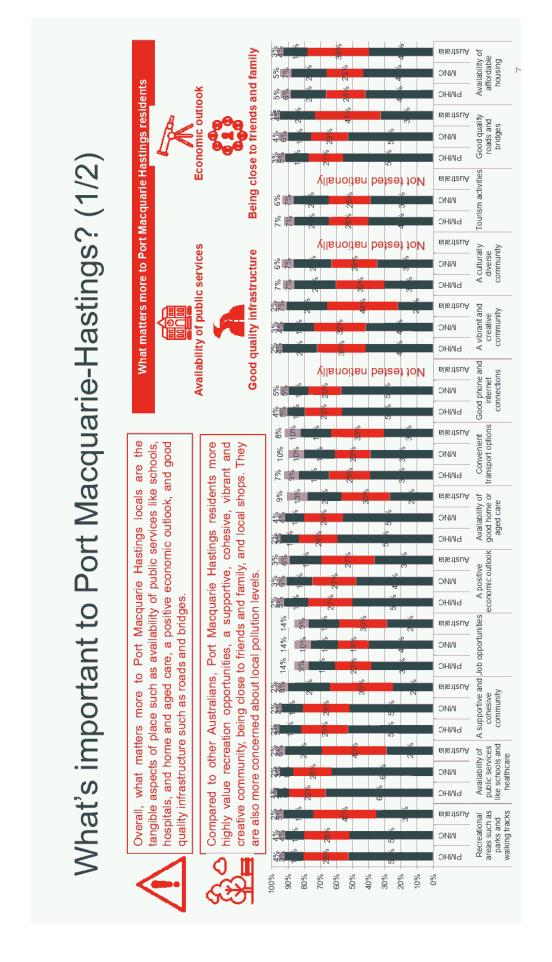
Method

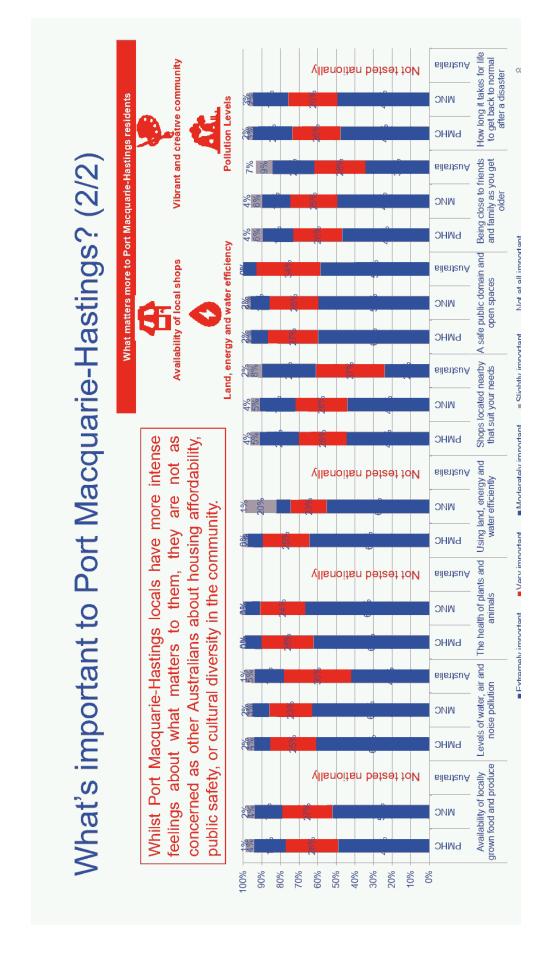
- Discussions with MNCJO Executive to scope questions
- Review MNCJO Draft Strategic Plan to align questions to priorities
- Review other surveys for comparison questions and data
- Phone survey, fieldwork late February 2019, demographically and spatially representative of LGA populations

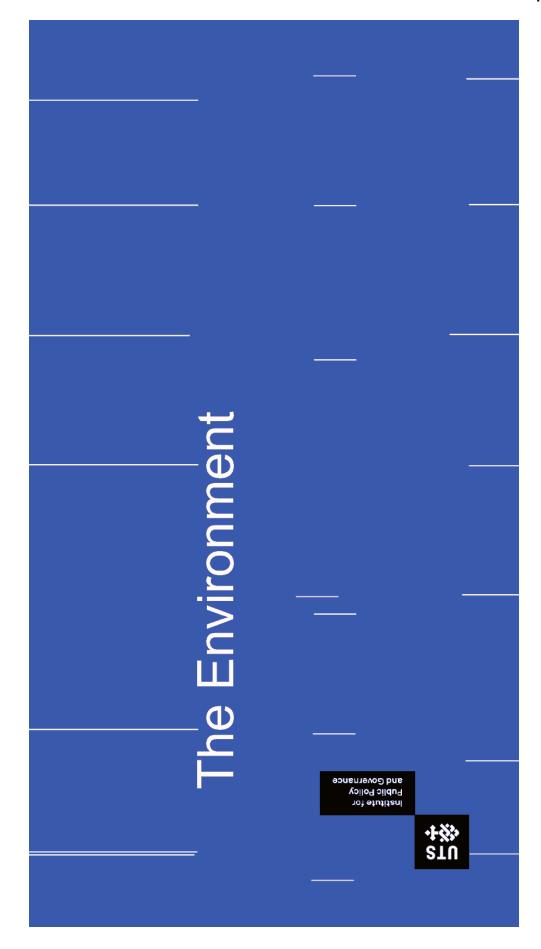


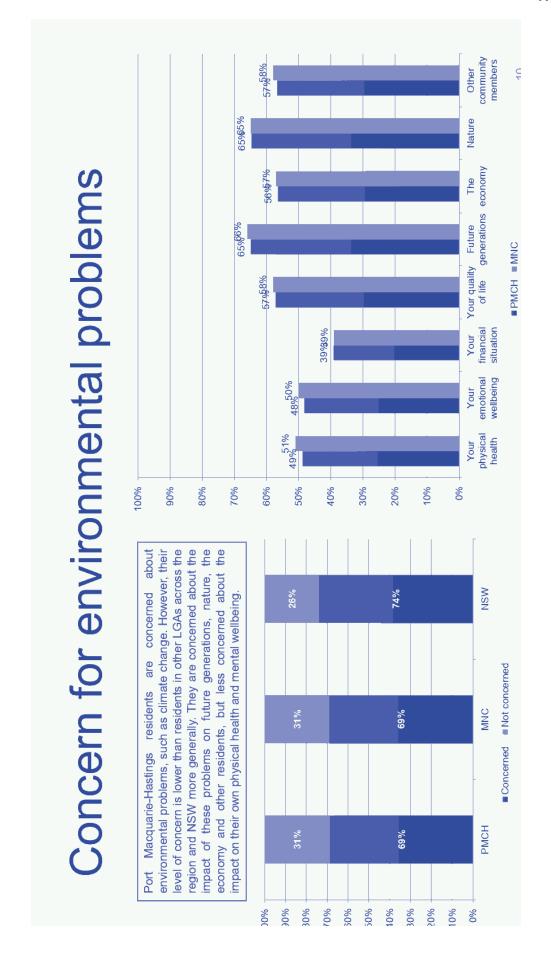








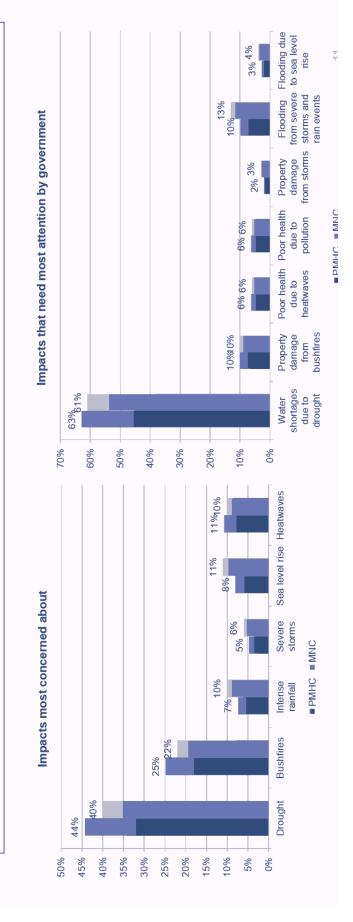




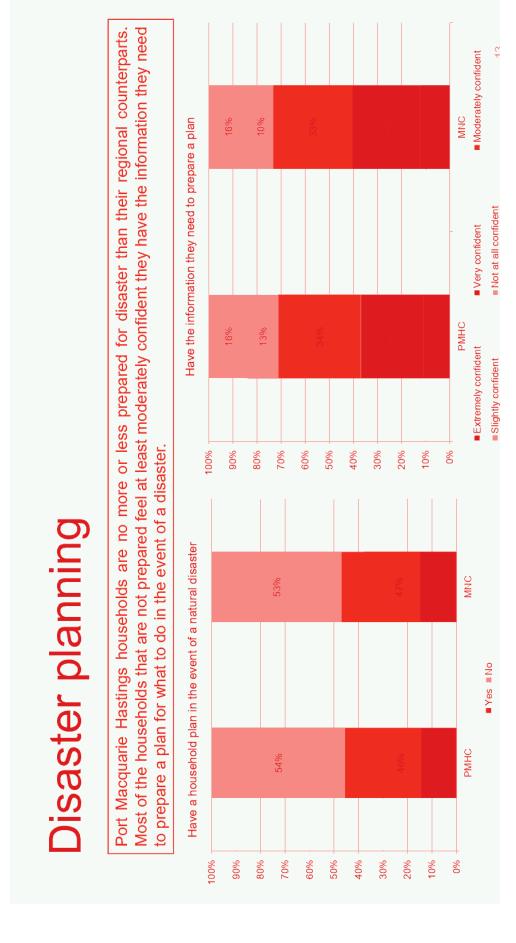
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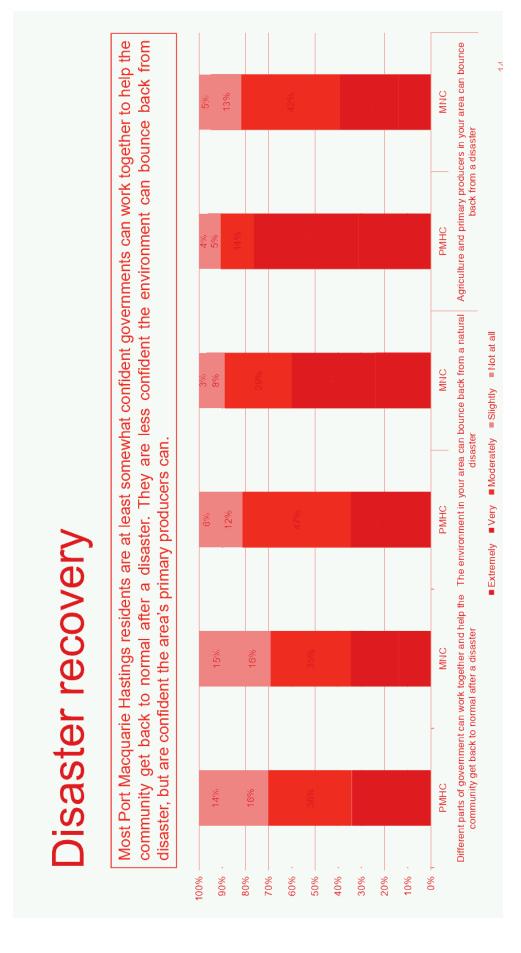
Climate change impacts

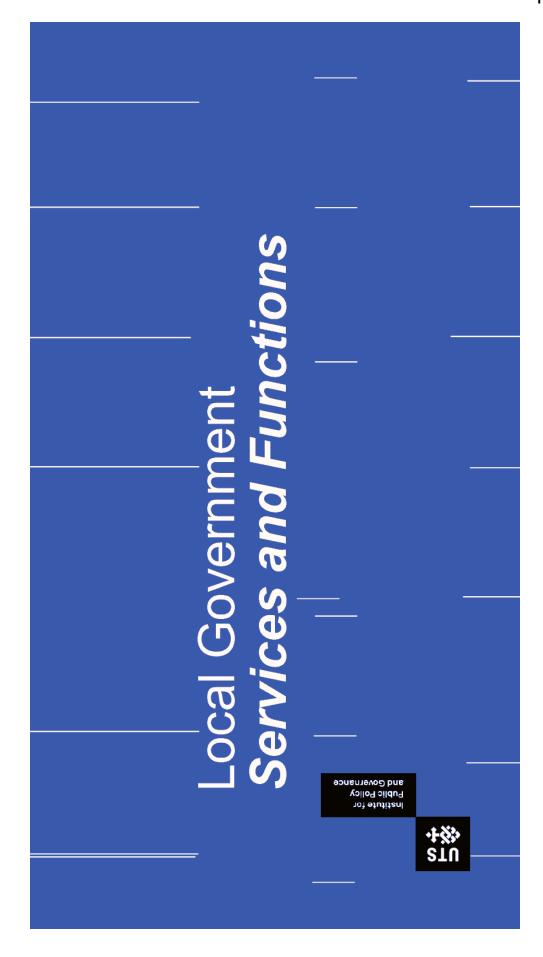
Port-Macquarie Hastings residents worry about the impact of drought, bushfires and heatwaves. They worry more about a drying continent rather than the more intense and wetter conditions that are also a feature of our changing climate. They think government has to pay greater attention and take more action on securing water, and less so on flooding

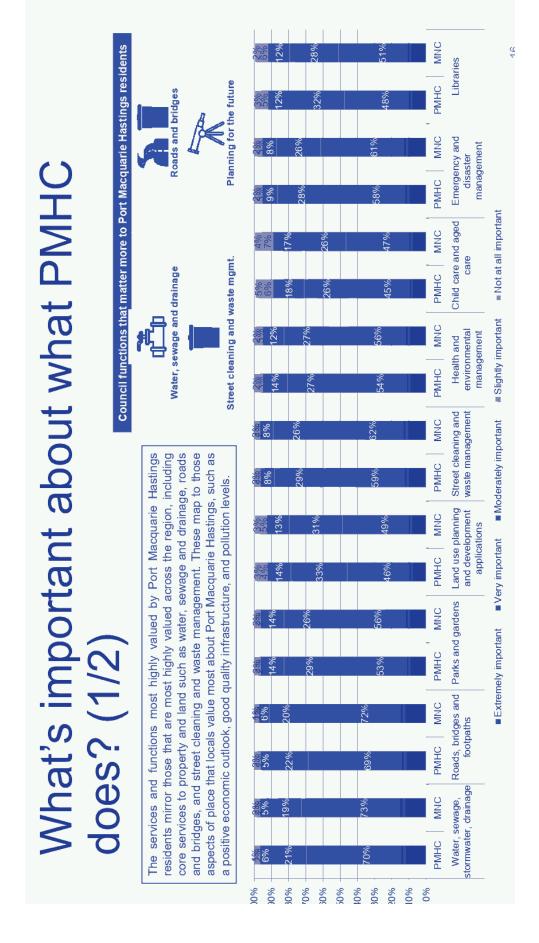






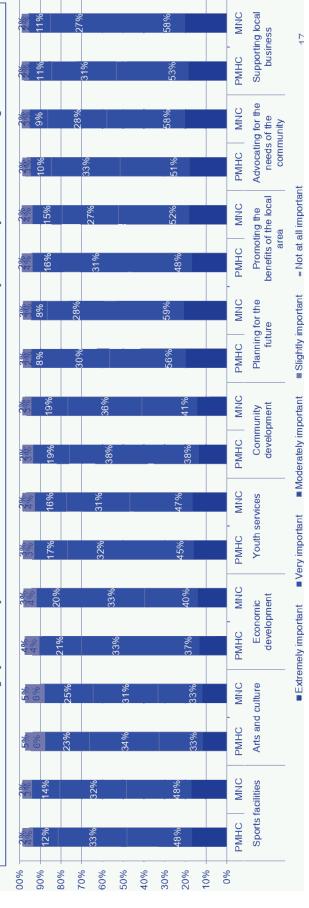


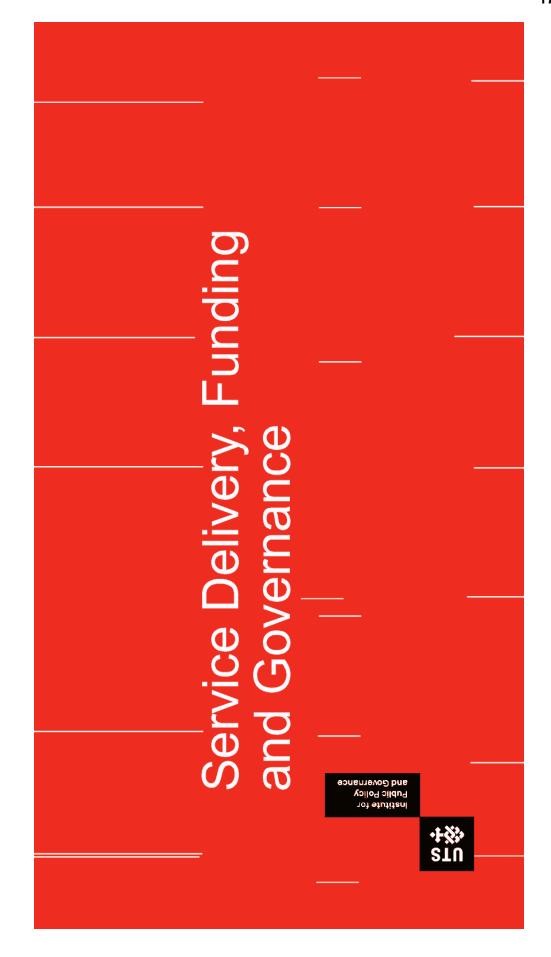




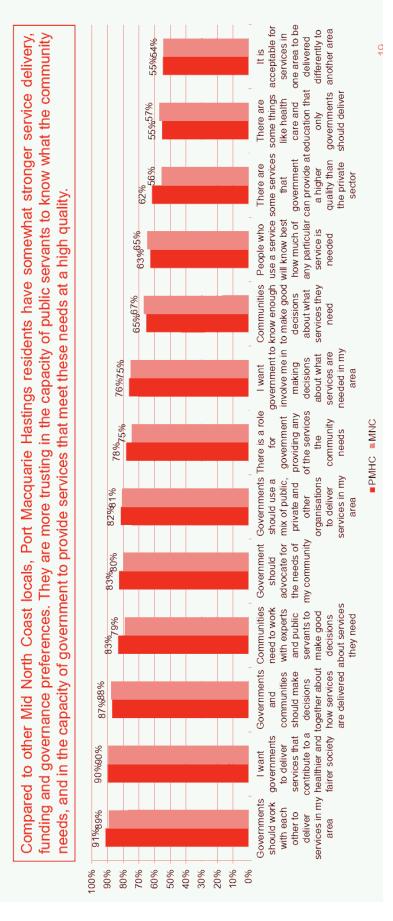
What's important about what PMHC does? (2/2)

Port Macquarie Hastings locals strongly value Council's place marketing and strategic planning role. However, in contrast to residents in disconnect with the value they place on the area's economic outlook. Generally, they also do not value Council' human and community neighbouring LGAs, they do not value as highly Council's role in economic development or supporting local businesses, which is services and functions as highly, such as youth services, arts and culture, libraries, community advocacy, and child and aged care.

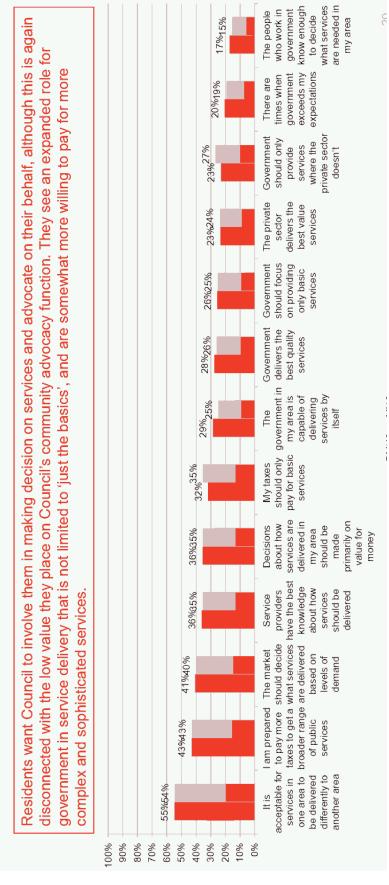




Service delivery and governance preferences (1/2) – Top 2 'Strongly Agree + Agree'



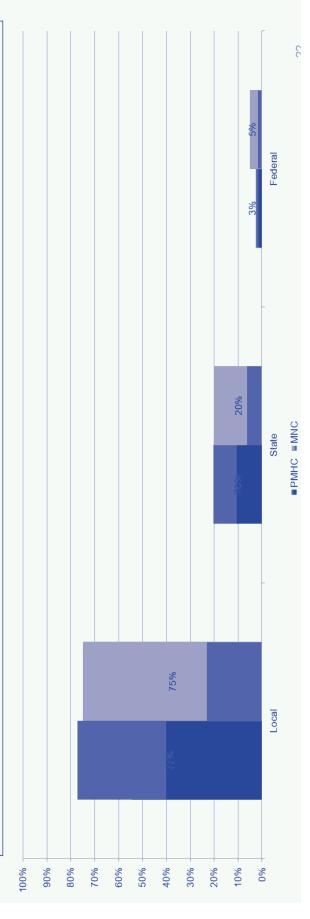
Service delivery and governance preferences (2/2) – Top 2 'Strongly Agree + Agree'





-evel of government best able to make decisions about the area

Like most Australians and other Mid North Coast locals, Port Macquarie Hastings residents think their council is best placed to make decisions about the area. Of all residents across the region, they are the most certain local government is best placed to make these decisions.

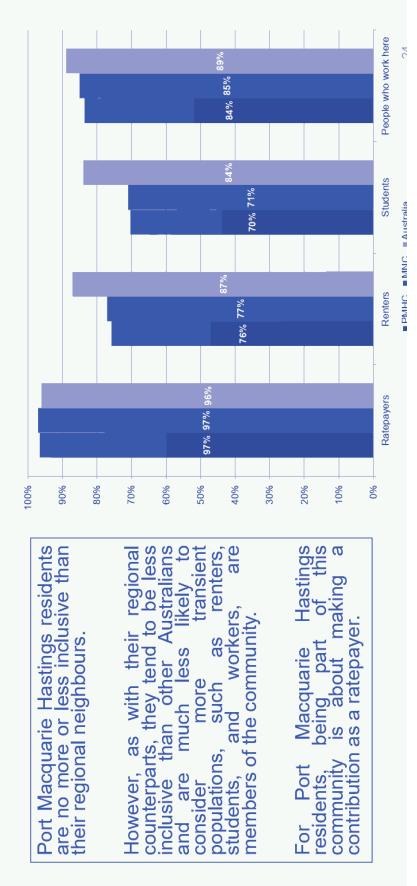


Knowledge of local government

Port Macquarie Hastings residents are more aware of their council than the average Australian. Of all Mid North Coast locals, they are also the most aware of who their elected officials area. This is characteristic of regional areas where there is less social and physical distance between communities and their council, and where local networks, including connections with council, tend to be stronger.



Who is part of this community?





Item 10.04 Attachment 2

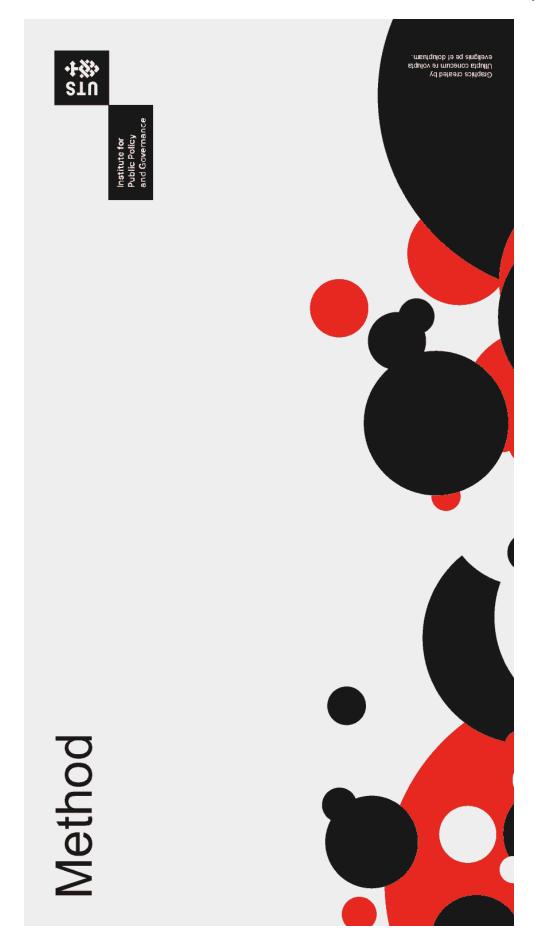
Research objectives

Provide baseline data to

- Understand what matters about local government across the Mid-North Coast
- Understand strengths of each Council
- Understand what matters regionally, as potential basis for MNCJO work program

Questions on

 Local government (knowledge, what's important about place, service delivery and governance preferences)

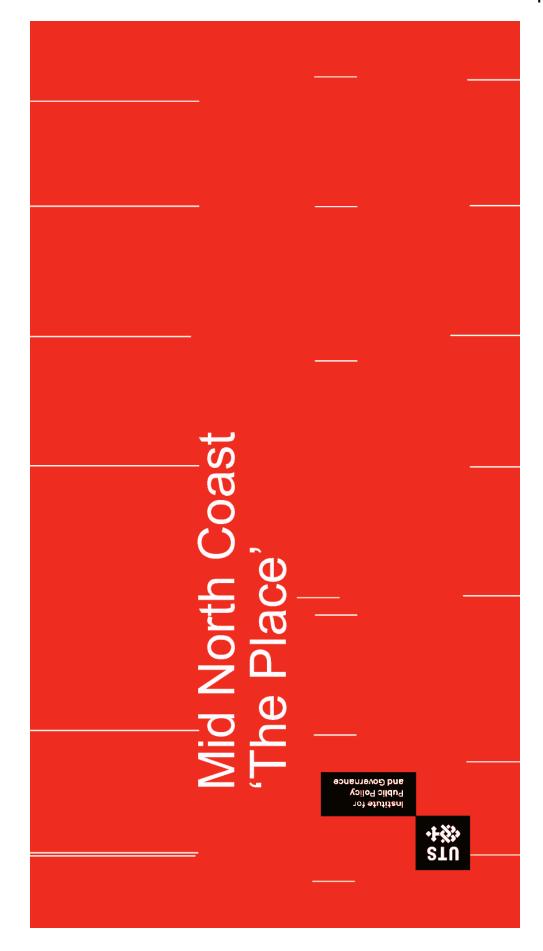


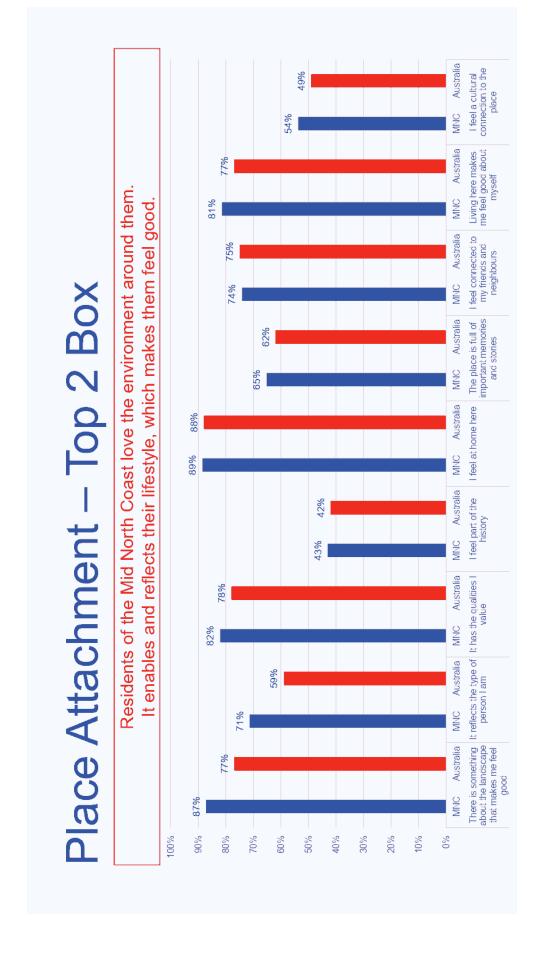
Item 10.04 Attachment 2

Methods

- Discussions with MNCJO Executive to scope
- Review MNCJO Draft Strategic Plan to align questions
- Review other surveys for comparison questions and data
- Phone survey, fieldwork late February 2019, stratified and proportionate to LGA population



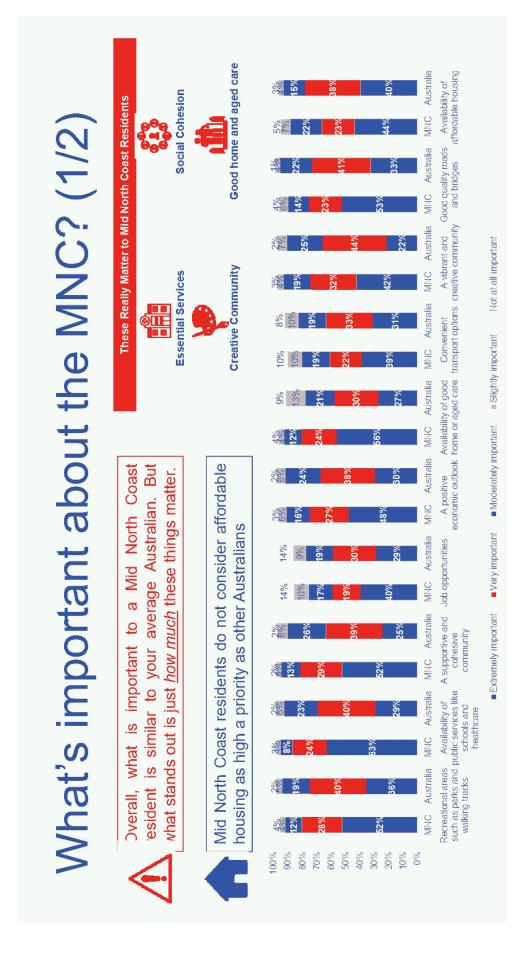




Regional Comparison

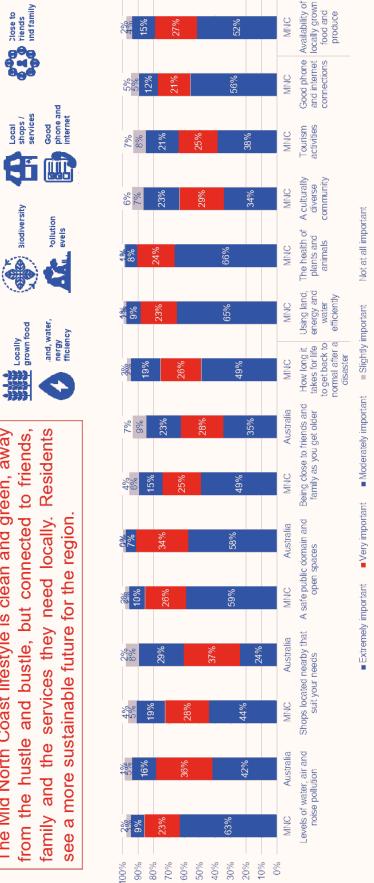
Where people live on the Mid North Coast influences their attachment to place and lifestyle connection to the region. Residents of Kempsey and coastal centres have a stronger connection compared to people living in outlying areas.

			Diffe	Difference to region	ion	
	N N N	PMHC	Bellingen	Kempsey	Coastal Centres	Outlying Areas
There is something about the landscape that makes me feel good	87%	%0	-7%		-2%	%9 -
It reflects the type of person I am	71%	%0	-1%	2%	2%	% 8 -
It has the qualities I value	82%	-1%	1%	1%	%0	-4%
I feel part of the history	43%	1%	-1%	-2%	4%	%9 -
l feel at home here	89%	%0	-5%	%9	-1%	-3%
The place is full of important memories and stories	%59	%0	-2%	3%	2%	-11%
I feel connected to my friends and neighbours	74%	-4%	3%		%9 -	-3%
Living here makes me feel good about myself	81%	%0	-4%		-2%	-3%
,		i				



What's important about the MNC? (2/2)

family and the services they need locally. Residents The Mid North Coast lifestyle is clean and green, away from the hustle and bustle, but connected to friends, see a more sustainable future for the region.



Regional Comparison

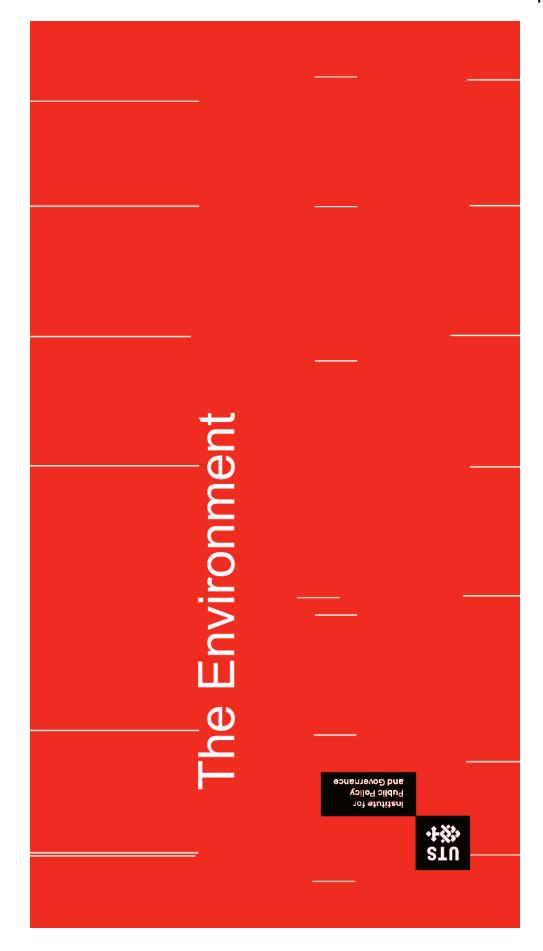
Residents in smaller communities and outlying areas are less likely to identify specific features as important place attributes. For them, it is about 'the feel' of the place.

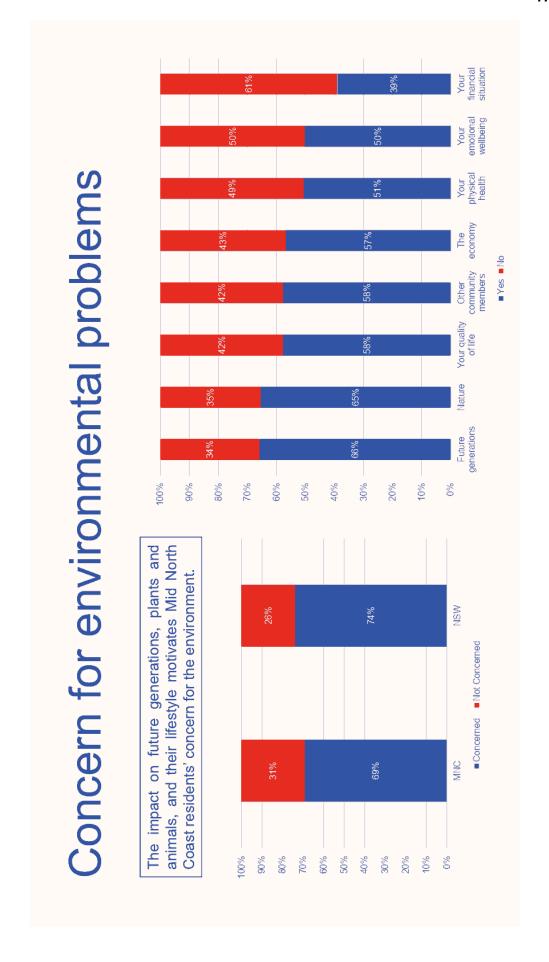
Difference to region

ciently schools and healthcare	CHYVO	Rollingon	2	
and healthcare			Kempsey	_
schools and healthcare	-1%	-1%	-2%	
schools and healthcare	2%	3%	-3%	
	3%	1%	-10%	
	-21%	-3%	%0	
Availability of allorable nousing	-19%	-3%	4%	
A supportive and cohesive community 81%	1%	1%	4%	
Availability of good home or aged care	3%	%2-	3%	
Recreational areas such as parks and walking tracks 80%	%0	%8	-14%	
How long it takes to get back to normal after a disaster	-2%	2%	3%	
Being close to friends and family as you get older	-4%	%2	%&	
A vibrant and creative community 76%	-3%	12%	-11%	
Levels of water, air and noise pollution 76%	10%	1%	-10%	
A positive economic outlook 75%	3%	-2%	-2%	
Good phone and internet connections 75%	2%	-2%	4%	
Availability of locally grown food and produce 74%	3%	%6	%&-	
Good quality roads and bridges 73%	2%	%2-	2%	
A culturally diverse community 66%	%9-	11%	% 8 -	
A safe public domain and open spaces 64%		2%	%&-	
Shops located nearby that suit your needs 63%	%2	%2	4%	
Convenient transport options 61%	4%	%2-	-5%	
Job opportunities 59%	2%	-1%	-4%	

1% 2% 2% -19% -19% -16% 1% 0% 3% -3% -21% 4% 4%

2% 9% 66% 00% 110% 22% 22% 55% 77% 55% 55% 55%





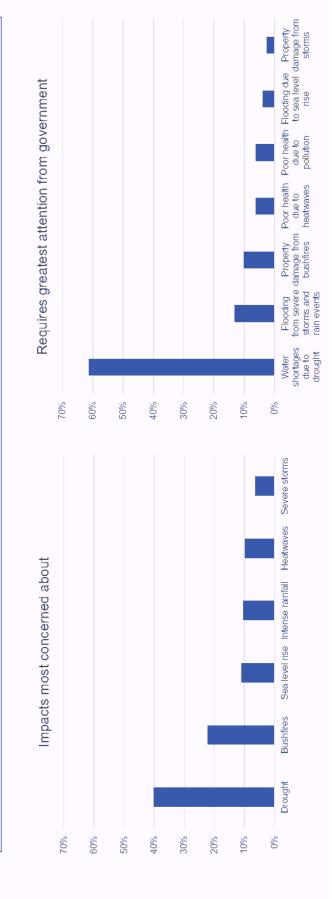
Regional Comparison

Bellingen is clearly the LGA with the strongest environmental conscience whilst residents in outlying areas No major differences in how concerned residents in different places are, or what they are concerned about. tend to be less environmentally conscious.

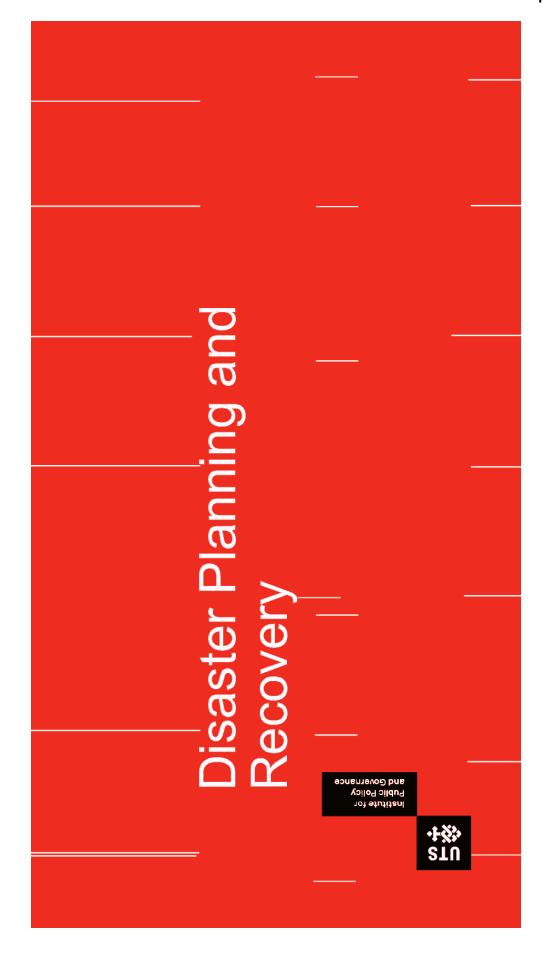
			DIff	Difference to Region	ion	
	MNC	PMHC	Bellingen	Kempsey	Coastal Centres	Outlying Areas
Concern	%69	-1%		-1%	1%	-2%
Your physical health	51%	-2%	4%	1%	%0	%0
Your emotional wellbeing	20%	-2%		%0	%0	-1%
Your financial situation	39%	%0	%0	%0	%0	-1%
Your quality of life	28%	-1%		-2%	1%	-3%
Future generations	%99	-1%	3%	-1%	1%	-3%
The economy	21%	%0	3%	-1%	2%	-4%
Nature	65%	-1%	4%	-1%	1%	-2%
Other community members	28%	-1%		-2%	1%	-2%

Climate change impacts

continent more than the more intense wetter conditions of a changing climate. They think government has to take Mid North Coast residents worry most about the impact of drought and bushfires - they worry about a drying more concerted action on securing water, and responding to flooding should be 'business as usual'.

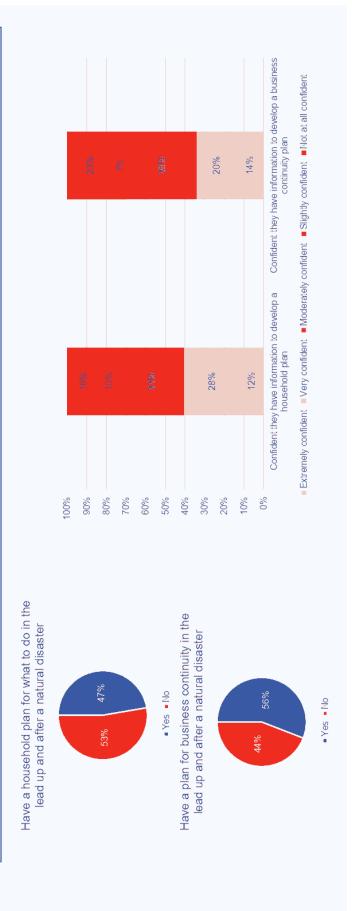


Outlying Outlying Areas Areas -2% -2% 10% 3% 1% %0 3% %0 3% 3% Coastal Centres Coastal Centres -2% -1% -1% 2% %0 %0 % %0 Difference to Region Difference to region Kempsey Kempsey -10% -2% 4% 2% -1% -4% %0 3% Bellingen Bellingen %0 3% %0 %0 3% %0 **PMHC PMHC** -3% -3% 3% 1% -3% %0 %0 %0 -1% Regional comparison 59.01% 12.69% %60.9 9.77% 3.81% 2.54% MNC 40% 22% 11% 10% MNC %60.9 10% Flooding from severe storms and rain events Property damage from bushfires Water shortages due to drought Poor health due to heatwaves Property damage from storms Flooding due to sea level rise Poor health due to pollution Intense rainfall Severe storms Sea level rise Heatwaves Bushfires Drought



Disaster planning

More businesses than households have a plan for what to do in the event of a natural disaster. More information on what to include in a plan would benefit up to two thirds of Mid North Coast residents and businesses.



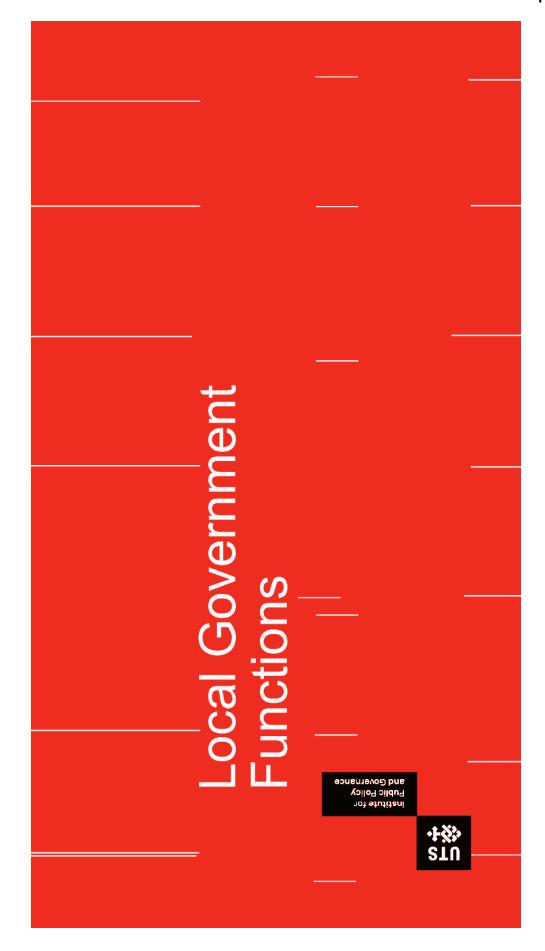
Disaster recovery

Whilst Mid North Coast residents highly value locally grown food, they are not confident the region's agriculture and primary producers can bounce back from a disaster. They are also not particularly confident governments can help The environment in your area can bounce back from a natural Agriculture and primary producers in your area can bounce back disaster 2% Not at all confident Slightly confident ■Very confident
■Moderately confident 29% 36% 24% Different parts of government can work together and help the community get back to normal after a disaster Extremely confident the community after a disaster. 15% 100% %06 %09 %08 %02 20% 20% %0 40% 30% 10%

Regional comparison

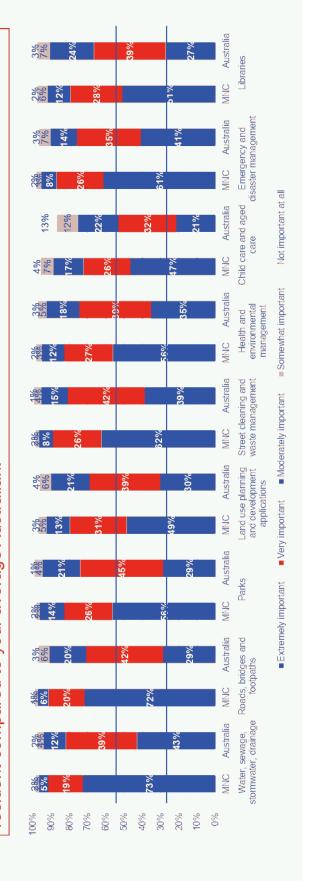
disaster. They are also the most sceptical that governments can work together to support the community during and after. Residents and businesses in outlying areas and smaller communities tend to be more prepared for what to do in a natural Those in more heavily populated coastal centres are more confident in government.

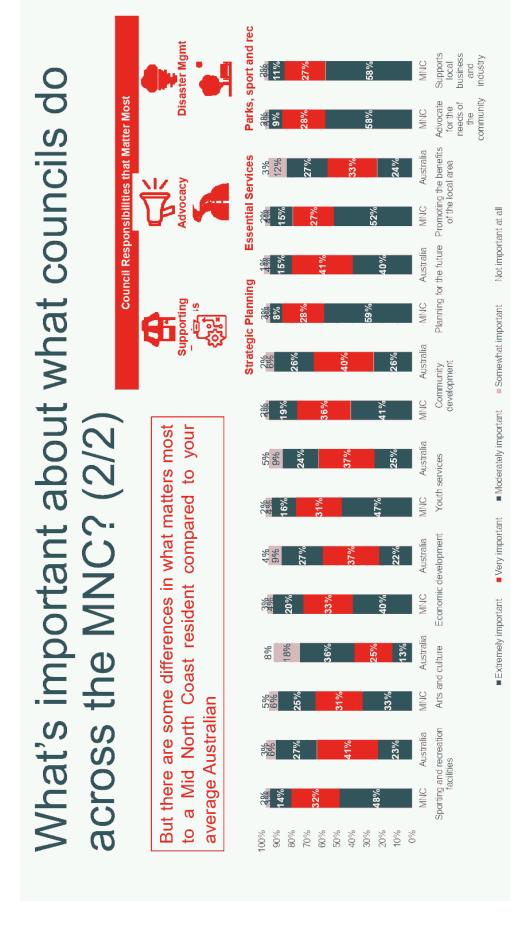
			Differen	Difference to Region	u	
	NN NN	PMHC	Bellingen	Kempsey	Coastal Centres	Outlying Areas
Has a household plan for a natural disaster	47%	-5%	-5%	%9	-4%	10%
Has a business continuity plan for a natural disaster	26%	%0	%9-	3%	-3%	3%
Have the information they need to make a household plan	73%	-2%	4%	1%	-1%	3%
Have the information they need to make a business continuity plan*	%02	-13%		3%	2%	%9-
Confident governments can work together during and after a disaster	%69	1%	-4%	1%	4%	%6-
Confident the environment can bounce back from an environment	%68	-1%	2%	1%	%0	-1%
Confident agriculture and primary producers can bounce back	81%	%0	-1%	1%	2%	-4%



What's important about what councils do across the MNC do? (1/2)

What's surprising is not so much what matters about local government to a Mid North Coast resident, but <u>how much</u>. What councils do is more likely to be <u>very</u> important to a Mid North Coast resident compared to your average Australian.





What matters more...and less.

To a Mid North Coast resident compared to your average Australian

Availability of good bome or good care	230
Availability of good Hollie of ages cale	24
A supportive and cohesive community	18
Availability of public services like schools and healthcare	179
Shops located nearby that suit your needs	129
Being close to friends and family as you get older	129
A vibrant and creative community	50
Levels of water, air and noise pollution	80
A positive economic outlook	80
Recreational areas such as parks and walking tracks	56
Good quality roads and bridges	29
Job opportunities	0
Convenient transport options	-3,6
A safe public domain and open spaces	9-
Availability of affordable housing	-129

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Regional comparison

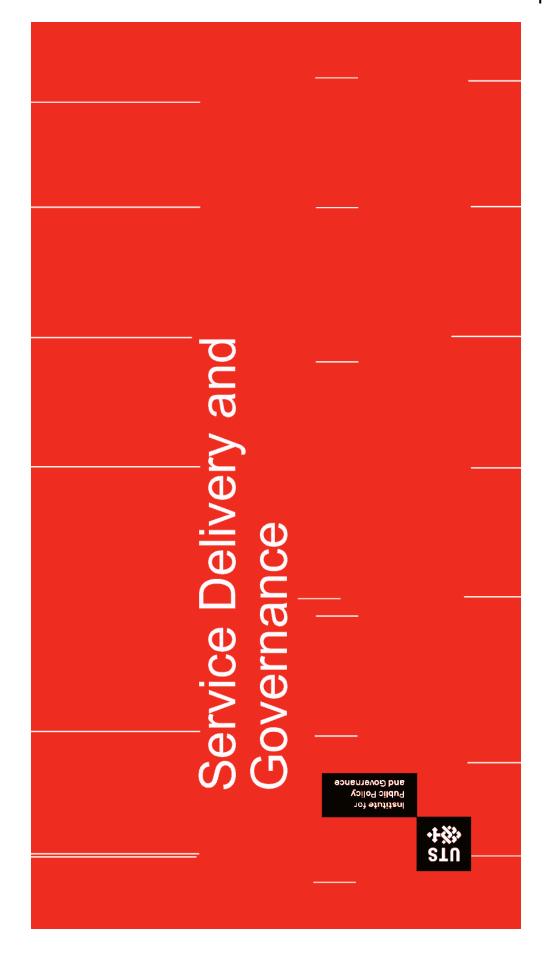
Residents in smaller communities tend to value what their council does more highly, particularly human and environmental services. Residents in outlying areas do not value it as highly. There are mixed views on the role of councils in economic development and promoting the benefits of the area.

Outlying Areas

al Centres

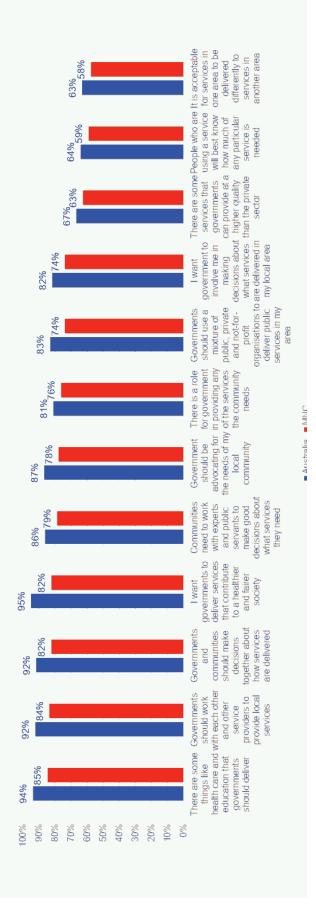
-5% -5%

development and promoting the benefits of the area.				Difference to Region	gion
	CN X	OHWI	Rellingen	Kempsey	Coasta
Water, sewaae, stormwater, drainaae	91%	-1%	1%	0%	
Roads, bridges and footpaths	91%	-1%	1%	-1%	
Street cleaning and waste management	89%	-1%	1%	3%	
Emergency and disaster management	87%	-1%	3%	4%	
Planning for the future	87%	%0	-3%	2%	
Advocating for the needs of the community	87%	-2%	%0	4%	
Supporting local business	85%	%0	-2%	2%	
Parks and gardens	83%	%0	5%	-1%	
Health and environmental management	83%	-2%	2%	4%	
Sports facilities	81%	1%	-3%	3%	
Land use planning and development applications	80%	-1%	3%	2%	
Libraries	79%	1%	4%	-1%	
Promoting the benefits of the local area	%62	-1%	-7%		
Youth services	77%	%0	%0	2%	
Community development	77%	-1%	1%	%0	
Economic development	73%	-2%	-2%		
Child care and aged care	72%	-1%	%0	-1%	
Arts and culture	64%	2%	-1%	%0	



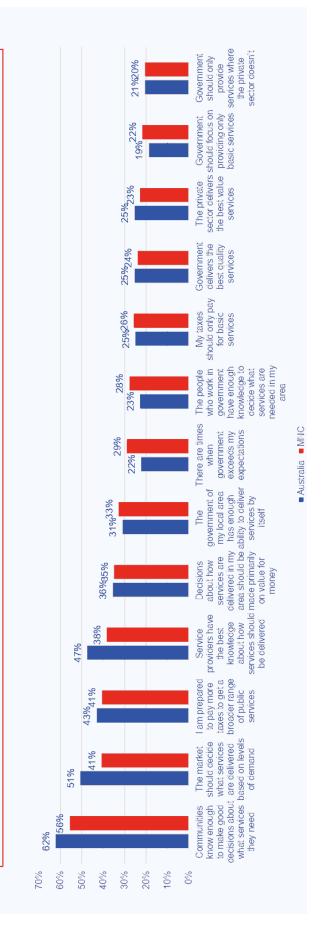
Service delivery and governance preferences (1/2) -

public servants. They are skeptical of market based service delivery models, and see an enlarged and direct role for Compared to your average Australian, Mid North Coast residents have a more positive view about government and council in service delivery. This sentiment is strongest in smaller communities and outlying areas



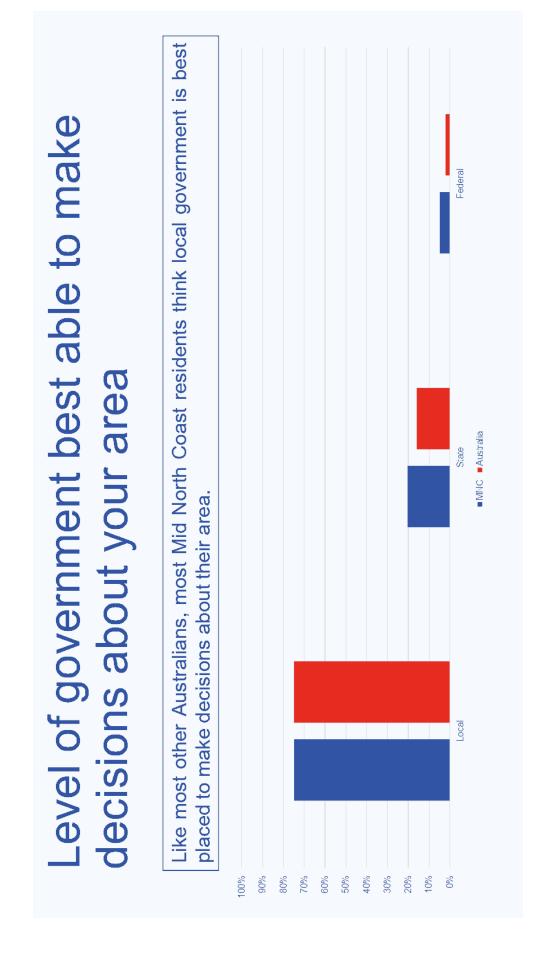
Service delivery and governance preferences (2/2) -

average Australian, particularly those living in coastal centres and Port Macquarie-Hastings. But what is surprising The preferences of Mid North Coast residents for service delivery and governance models tend to mirror your is that these preferences are not as strongly held as the rest of Australia.



Areas -4% 4% 1% 1% 2% 2% 5% 0% 8% 2% 6% %0 3% 3% Centres 2% 0% 1% 1% 2% %0 Difference to Region Kempsey 5% 4% 5% 0% 2% **9%** 2% PMHC 1% %9 %0 %0 1% 1% 1% MNC 26% 25% 25% 89% %6/ 21% 56% 54% 43% 40% 27% 88% 75% 65% 35% 35% he people who work in government know enough to decide what services are needed in my area Communities need to work with experts and public servants to make good decisions about services Governments and communities should make decisions together about how services are delivered want government to involve me in making decisions about what services are needed in my area Governments should use a mix of public, private and other organisations to deliver services in my here are some services that government can provide at a higher quality than the private sector Decisions about how services are delivered in my area should be made primarily on value for There are some things like health care and education that only governments should deliver Regional comparison want governments to deliver services that contribute to a healthier and fairer society People who use a service will know best how much of any particular service is needed Communities know enough to make good decisions about what services they need Service providers have the best knowledge about how services should be delivered for services in one area to be delivered differently to another area he market should decide what services are delivered based on levels of demand the community needs am prepared to pay more taxes to get a broader range of public services Sovernment should only provide services where the private sector doesn' Governments should work with each other to deliver services in my area he government in my area is capable of delivering services by itself Government should advocate for the needs of my community There are times when government exceeds my expectations here is a role for government providing any of the services Government should focus on providing only basic services The private sector delivers the best value services Sovernment delivers the best quality services taxes should only pay for basic services is acceptable





Incorrect / Don't Know

Correct (or reasonable attempt)

Incorrect / Don't Know

Correct (or reasonable attempt)

Knowledge of local government

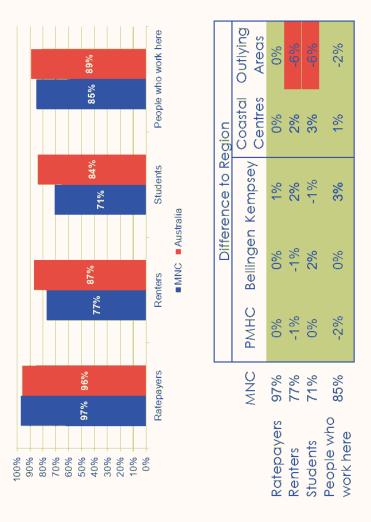
Mid North Coast residents are more aware of who represents them and who to hold to account. They Australia Port-Macquarie Hastings Knowledge of Mayor's Name are more likely to know their council and Mayor than your average Australian. %08 %02 %09 50% 40% 10% %0 Australia Knowledge of Council Name Kempsey Bellingen Port Macquarie-Hastings 30% 10% %06 %02 %09 20% 40% 20% 100% %08

Who is part of this community?

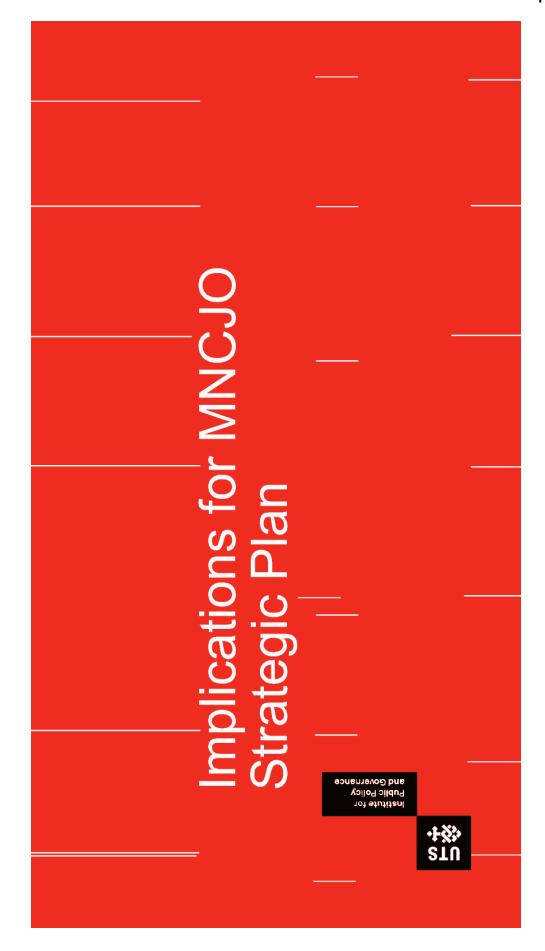
Mid North Coast residents are Vour average Australian community. as inclusive as not

large employment centres tend Those in outlying areas and to be less inclusive of renters, students and workers.

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Strategic Plan Implications

In many ways, the Mid North Coast is a bellwether for the many coastal lifestyle regions that dot the Australian coastline and have been luring people away from the hustle and bustle of big cities. Whilst there are some differences what residents of each LGA see the role of council being, their views of local government as a highly valued layer of government reflect the average Australian.

resourceful and resilient, feel forgotten by government. This does not mean they value government any less – in fact, they appear to value it more highly than their counterparts in coastal centres. This is not such a bad But when things go wrong, like a disaster, they expect government to be their. This also means good phone There are spatial differences across the region. Those in outer areas and smaller communities, whilst thing; part of why they live where they do is to be away from the hustle and bustle – including government. and web connections, local shops and services are more crucial to these community members.

- made produce, uses scarce land, energy and water resources wisely, and protects from pollution the Mid North Coast residents are eager for a more sustainable future for the region; one that supports locally unique biodiversity and pristine environment that contribute so much to what makes this a great place for those who live here.
- Whilst residents want their councils to support local business and industry, particularly agriculture and primary producers, they have not yet made the link between the crucial role of councils in supporting sustainable economic development and other industries, particularly tourism in the region's major centres.
- The strategic planning function of the MNCJO is highly supported by the community, as are regional leadership and advocacy and pursuing shared and direct service delivery between member councils, particularly for highly valued services such as aged and home care.
- There is potential for more work to be done improving social cohesion and inclusion across the region in such a way that all members of the community are valued for their unique contribution the community, not just their postcode or status as a resident

Core MNCJO Functions

Strategic planning and priority setting – based on robust processes for identifying regional goals, with the flexibility to respond to changing priorities and needs of member councils as required

Intergovernmental collaboration –building effective working relationships with other JOs, councils and the NSW and Australian Governments

Regional leadership and advocacy – creating a shared purpose and strategic direction for the region; and a commitment to constructive and cooperative implementation by all member councils

Building efficient and effective councils by examining opportunities for shared services and capacity building across the

Strategic Plan Implications The following insights from the survey can further inform the MNCJO Strategic Plan

Action	Detail	Survey insights
£.	Provide regional facilities and services for recreation, sports, arts and culture within the context of a changing population	Parks, sports and rec amongst the most highly valued council functions
1.2	Build capacity in the regional community to deal with severe weather events and natural disasters	Half the community do not have a disaster plan, and up to two thirds would benefit from information on how to make one
1.3	Plan for the regional impact of ageing populations on health services, accessible and affordable housing and employment	Aged and home care amongst the most important council functions
2.1	Plan for the regional impact of climate change on the community, environment, economy and council services	Intergenerational, biodiversity and community impacts most concerning to residents – particularly drought, bushfires and water security
2.2	Preserve strategic biodiversity and identify land with high environmental value and biodiversity corridors across the region	Unique biodiversity and pristine natural environment free of pollution are major place qualities
3.1	Assess the availability of land across the region for different purposes and instigate cross-council planning where land is scarce/unavailable for a specific purpose	Using land, energy and water resources efficiently important to this environmentally conscious region
3.3.	Continue to support industries which deliver food security for the region and support a focus on agriculture and agriculture-related industries	Locally grown food and supporting local business and industry, particularly agriculture and primary producers, highly valued
3.4	Continue to support tourism as a main regional industry and explore options to 'keep tourists in the region' for longer	Tourism under-valued across the region, particularly major centres
4.	Support the roll-out of reliable telecommunications and internet access across the region	Good phone and internet considered an essential service across the region, particularly outlying areas
4.2	Design and create safe public places and preserve the unique regional/local character of cities, towns and villages	Design of safe public spaces particularly important in major centres
6.1	Effectively work with state and federal governments to ensure resources are available for the Mid North Coast	The regional leadership and advocacy function of MNCJO is supported, but this should not dwarf the importance of shared, direct service delivery

Smart Cities Conference Melbourne, 30th & 31st May 2019 Councillor Geoff Hawkins

GENERAL:

Overall, this was an excellent conference with many leading practitioners and advisors present and actively participating. The standard of presentations (both content and communication effectiveness) was outstanding; possibly the highest that I have ever come across in 40+ years in business and 6+ years as a PMH Councillor. The interaction between speakers, panel members and audience was also of a very high & effective level and this meant that there was ample engagement between "theorists" and "practitioners". In effect, we both felt well exposed to the cutting edge theory as well as the hands on experience of councils (particularly Regional Councils) who have been down the path before us - and all of whom are continuing on that path.

Smart City strategy commenced around 16 years ago in San Francisco in the United States and was driven by the major US IT companies. Initially, because it was largely driven by IT companies and not communities, the results were generally poor. However, it has evolved enormously since those early days and is today much better understood and accountable.

KEY POINTS / THEMES / INSIGHTS (In no particular order or priority):

- * "Smart Cities" are, in reality "Smart Communities". We heard the phrase several times in various contexts from multiple speakers: "It's all about the people front and centre. Its not about the technology."
- * To align "Smart" with Technology" or "Innovation" or indeed any single skill, capacity or concept is not just untrue and unwise; in many ways it's actually misleading. "Smart does not = Tech"; it's much bigger & broader.
- The beginning and end is "to know who you are". This is impossible without
 a highly developed understanding and practise of "community engagement." Central
 to success in this space is a council philosophy and practice of being customercentric.
- * Every community shares common ground, common issues and, within its state operates under & within common legislative frameworks. However, without exception, each community is unique in its circumstances & the issues before it. Even large cities are not homogenous; they comprise numerous different districts, enclaves and sub-communities. This all translates into a situation, whereby *no single shoe fits all*.
- * For many decades modern cities have been sculptured via "Automobile Centred Design" whereas it's now accepted that a core concept of a Smart city is to update this with "Human Centred Design" principles.
- * The concept of "Civic Engagement" was raised on multiple occasions throughout and, in fact, was put foreword as a point in itself as "Civic Engagement" links everything and is central to binding it all together. (Refer also to dot points 3 & 4 above).

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- * Another key theme was "*Collaboration*". Indeed, collaboration between all three levels of Government (Federal, State and Local) was seen as a condition precedent for a Smart City strategy to be successfully developed and implemented. Collaboration with other key stakeholders was also seen as critical and these groups included Utilities, Institutions (especially Universities) and Business ...plus, of course, the community generally.
- "Competition" has been replaced by "Collaboration" resulting in multiple win / win / situations. This was particularly true when all three levels of government go out of their way to mutually co-operate.
- **Technology, Data and Innovation** although all essential elements were seen more as tools and enablers of solutions than as ends in themselves. Several councils spoke of the huge value in (eventually) acquiring this insight. Gaining that understanding was transformational in itself.
- * However it is defined and whatever are the agreed critical success factors, much was made of the fact that *creating a smart city is a process, not an event in itself.* Its a journey to a higher, better place; it's not a destination in itself. Several councils commented that this distinction is critical to make and understand early and, if they changed one thing about their journey, it would be around effectively communicating this from day 1 and reinforcing it at every step along the journey. In effect, there is no such thing as a "Smart City" communities get better and more efficient & effective in recognising and servicing their needs in a logical, coherent & sustainable manner that is consistent with their brand image. (Of course, this presupposes that the community does indeed have a brand image or profile. It therefore begs the question: What is the brand image of the Regional Smart City of Port Macquarie? How does this relate to the brand of the governing body "Port Macquarie Hastings Council"? An interesting point to ponder.....)

2019 Smart Cities Conference Report Councillor Rob Turner - June 2019

The conference was presented by Monkey Media and was very well organised, featuring presenters who are at the leading edge of smart cities thinking in Australia.

It was an excellent conference. There was a lot to learn, and all the sessions over the 2 days were really interesting. Whilst there was a group attending from Melbourne City Council, most conference attendees were from suburban or regional council areas, who were all looking to learn more about smart city philosophy to help solve similar problems to PMHC.

Smart cities began as a marketing and commercial concept as a mechanism for tech companies such as Cisco and IBM to sell their products to cities who wanted to create futuristic cities.

In a lot of ways the term smart cities is a misnomer and not helpful in engaging smaller and medium-sized communities like Port Macquarie-Hastings. Cities are really just "neighbourhoods or communities". And smart really means "innovative ways of solving problems".

Smart city thinking can be described as a journey or a process to better decision-making and problem-solving to make our communities better.

It is not some mythical destination we magically arrive at in some point in the future, and it is not tech-driven. Technology can be a very useful tool, but not a driver of initiatives.

After some initial spectacular failures as a result of allowing tech companies to design 'solutions' for cities of the future, the concept has evolved into what can broadly be described as 3 key areas:

- Different ways of thinking about, and approaches to design of, places and infrastructure
- 2. An explosion in the collection, sharing, and use of data in decision-making
- 3. Collaboration and co-operation between council, community, business/industry, university, research, and government

1. Different ways of thinking about, and approaches to design of, places and infrastructure

- There is a large movement towards human-centred design, rather than car-centred design
- Use of innovative engagement processes to ensure that redevelopment and design
 of public spaces and new infrastructure delivers the best possible solution for the
 community, and is exactly fit-for-purpose.
- A key "smart" principle is using technology (apps and other digital processes such as 3-D modelling) to get more valuable input from the community to aid better decision-making.
- Highlights the success of solving problems and designing infrastructure solutions from the ground up, instead of from the top down.
- For councils, it is a logical extension of a focus on customer experience.

2. An explosion in the collection, sharing, and use of data in decision-making

- Greater grassroots-based community engagement in the design process is assisted and informed by more and more available data from multiple sources.
- Increasing opportunities for primary data collected by Council, via traditional methods, and more use of IoT technology (such as car-parking sensors)
- The increase in sophistication of using shared social data, google maps data, etc.
- A key challenge with data is to develop governance structures and a usability
 framework around the sharing of data for the public good, with its associated privacy,
 cyber security and cyber-resilience issues.

3. Collaboration and co-operation between council, community, business/industry, university, research, and government

- Successful outcomes have support, buy-in, and funding from multiple sectors. (win-win-win)
- Engaging multiple sectors requires authentic engagement and good decision-making (no-one wants to be associated with a poor or unpopular outcome)
- Important that State and Federal Govt's understand the enormous benefits in allocating funding towards local place-based 'smart' initiatives as distinct from centralised decisions.

Most of the smart city principles are really evolutionary, not revolutionary, and should be viewed in the context of a shift in people's attitudes and preferences, as well as the changes due to the growing influence and change in preferences of millennials as a distinct demographic group.

Aside from the presentations, the conference networking was invaluable as we spoke with people from other Councils, from industry, conference presenters, planning and urban design professionals, and academics... each of whom had a slightly different perspective and was at a different point along the smart city journey.



Circular to Councils

Circular Details	Circular No 19-11 / 21 June 2019 / A646642
Previous Circular	14-23
Who should read this	Councillors / General Managers
Contact	Policy Team / 02 4428 4100 / olg@olg.nsw.gov.au
Action required	Response to OLG

Release of IPART Reports into rating and compliance matters for consultation

What's new or changing

- The Government is releasing the final reports on three IPART reviews for feedback prior to developing final responses including:
 - 1. Review of the Local Government Rating System,
 - Review of Reporting and Compliance Burdens on Local Government, and
 - 3. Review of Local Government Compliance and Enforcement.

What this will mean for your council

 Councils are encouraged to provide feedback on the recommendations in each report by the relevant closing dates to further inform the Government's response.

Key points

- The reviews focused on complex areas of government regulation that require detailed consideration.
- Together the recommendations propose changes to local government which, if implemented, will have a significant impact on councils and communities.
- Some of the recommendations have already been implemented through other reform initiatives. These are clearly identified in the consultation materials.
- There are also a number of recommendations that the government has ruled out, because they may have adverse impacts on vulnerable members of the community, affect regional jobs and economies, or substantially increase costs for taxpayers and the broader community.
- These matters are marked "Not for consultation" on the feedback form.
- Closing dates for submissions have been staggered to allow councils, businesses and other community members time to consider each report individually.

IPART Review report	Consultation closes	Contact email address (for queries)
Review of the local government rating system	13 September 2019	lgratingsystem@olg.nsw.gov.au
Review of reporting and compliance burdens on local government	25 October 2019	lgregburdens@olg.nsw.gov.au
Review of local government compliance and enforcement	15 November 2019	lgenforcement@olg.nsw.gov.au

Where to go for further information

- Further information can be found on OLG's website at <u>www.olg.nsw.gov.au/strengthening-local-government/ipart-local-government-reports-consultation-2019</u>, including links to the reports, a short Consultation Guide on each report and online feedback forms.
- Feedback should be provided via the feedback form on the website.
- Questions on the consultation process for each report may be sent to the relevant email address above or by contacting OLG's Policy Team on 02 4428 4100.

Tim Hurst Chief Executive

adopted)	Minor amendments (GM/Exec approved)	
	Aug-18	
	Aug-18	
	t & Environment	

ATTAC	ATTACHMENT 1 - COUNCIL ADOPTED POLICIES	ADOPT	ED PO	LICIES		
Title	Responsible Division	Last Council Adoption Date	Last Review Date	Last Review Outcome	Comments for 2019 review	Review Stage
A Frame Sign	Development & Environment	Feb-13	Feb-13	New Policy (Council adopted)	Only minor amendments considered required. To be submitted to Executive this calendar year.	Review
Action Requests and Complaints	Strategy & Growth	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	This is currently still being reviewed in lines with the recommendation of the Customer Experiemce Project. The development of new measures for customer service as well as technics to understand the customer will be developed to assist in informing a new policy that will meet the legislative needs of customer complaints but have meaning to the new Customer Experience journey.	Deferred
Activities in Public Places	Development & Environment	Feb-13	Feb-13	Major amendments (Council adopted)	Only minor amendments considered required. To be submitted to Executive this calendar year.	Review
Airport Leasing of Land and Buildings	Corporate Performance	Aug-17	Aug-17	Major amendments (Council adopted)	Only minor amendments considered required. To be submitted to Executive this calendar year.	Review
Alcohol Use on Public Reserves and Beach	Strategy & Growth	Nov-18	Nov-18	New Policy (Council adopted)		Current
Art in Public Places	Strategy & Growth	May-03	Oct-10	Minor amendments (GM/Exec approved)	The consultants behind in the delivery of this policy. Expect a draft policy to go to Council meeting in August with adoption by December	Review
Asset Disposal	Strategy & Growth	Feb-13	Feb-13	New Policy (Council adopted)	Policy will be combined with the Asset Capitalisation Policy to become the Asset Recognition, Capitalisation and Disposal Policy. Further engagement with the Asset Team and Asset Owners is requirement and reduce to ensure this policy meets requirements as this has not been done. Finance will also need to approve the proposed capitalisation thresholds. As an internal policy it will be submitted to the Executive Group for approval by December 2019	Review
Asset Management	Strategy & Growth	Apr-17	Apr-17	Major amendments (Council adopted)		Current
Beach Driving	Development & Environment	Aug-18	Aug-18	Minor amendments (GM/Exec approved)		Current

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Title	Responsible Division	Last	Last	Last Review Outcome	Comments for 2019 review	Review
		Council Adoption Date	Review Date			Stage
Bushfire Risk Mitigation on Public Land	Development & Environment	Jun-11	Jun-11	Jun-11 New Policy (Council adopted)	Major review underway to determine need for policy given changes to overarching bushfire legislation. Review being coordinated with Parks and Reserves Use policy which is to be reported to December Council meeting with public exhibition period to follow.	Review
Cattle Grids on Roads in Rural Areas	Infrastructure	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Review is complete with only minor changes required. Revised target to Exec is July 19.	Review Complete
Commercial Activities on Council-managed Land	Strategy & Growth	Apr-17	Apr-17	Major amendments (Council adopted)	Comments on Policy currently being sought with review to be complete and reported to July 2019 Council meeting. Draft report in agenda for July Council meeting.	Submitted to Council
Community Engagement	Strategy & Growth	Jul-14	Jul-14	Major amendments (Council adopted)	We continue to work through the 'Working Together' document and the development of new policy and procedures for engagement is a priority. We have also over recent times been testing and trailing new approached and process for engagement including embedding into the PMF and this will form part of the new policy. A review approach to engagement is a key identified project in the CxP.	Review initiated
Complaints Against and Compliments in Favour of Staff	Strategy & Growth	Jan-12	Jan-12	Major amendments (Council adopted)	This is currently still being reviewed in lines with the recommendation of the CxP. The development of new measures for customer service as well as technics to understand the customer will be developed to assist in informing a new policy that will meet the legislative needs of control of the new CxP journey.	Deferred
Compliance	Corporate Performance	Oct-10	May-17	Minor amendments (GM/Exec approved)	Deferred pending consideration of ARIC recommendation for further consideration to be given to the reporting of legislative compliance	Deferred
Contaminated Land	Development & Environment	May-17	May-17	Minor amendments (GM/Exec approved)		Overdue
Construction of Infrastructure Works on Public Property by Contractors	Infrastructure	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Review not commenced. Target to submit to Executive Group Dec 2019.	Overdue
Contributions for Footpath and Kerb and Gutter Construction	Infrastructure	Dec-11	Dec-11	Major amendments (Council adopted)	Review ongoing. Target to submit to Executive Group Dec 2019.	Review
Control of Burning	Development & Environment	Jun-18	Jun-18	Minor amendments (GM/Exec approved)		Current
Councillor Induction	Corporate Performance	Sep-13	Sep-13	Major amendments (Council adopted)	Policy will be reviewed prior to Council elections in Sept 2020	Deferred

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Title	Responsible Division	Last Council Adoption Date	Last Review Date	Last Review Outcome	Comments for 2019 review	Review Stage
Councillor Portfolio Protocol	Corporate Performance	Dec-18	Dec-18	Major amendments (Council adopted)		Current
Councillor Professional Development	Corporate Performance	Jul-12	Dec-13	Minor amendments (GM/Exec approved)	Policy will be reviewed prior to Council elections in Sept 2020	Deferred
Crematorium and Cemeteries	Corporate Performance	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Policy deferred until current EOI/negotiation process regarding Innes Gardens is complete.	Deferred
Customer Service	Strategy & Growth	Jul-13	Jul-13	Major amendments (Council adopted)	This is currently still being reviewed in lines with the recommendation of the CxP. The development of new measures for customer service as well as technics to understand the customer will be developed to assist in informing a new policy that will meet the legislative needs of customer complaints but have meaning to the new CxP journey	Review
Debt Recovery	Corporate Performance	Aug-17	Aug-17	Major amendments (Council adopted)	Review not commenced. Recommend revised target date of Dec-19	Overdue
Development Applications Conflict of Interest	Development & Environment	Jul-18	Jul-18	Minor amendments (GM/Exec approved)		Current
Development Contributions Assessment	Development & Environment	Oct-16	Oct-16	Major amendments (Council adopted)	Scheduled for completion in conjunction with Planning Agreements and Works in Kind policies by 30-06-2020.	Current
Dogs in Public Spaces	Development & Environment	Apr-11	Apr-11	New Policy (Council adopted)		Overdue
Foot paving of Roads in Retail and Commercial Areas	Infrastructure	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Minor amendments (GM/Exec Review ongoing. Target to submit to Executive Group Dec approved)	Review initiated
Fraud Prevention	Corporate Performance	Oct-10	May-17	Minor amendments (GM/Exec approved)		Overdue
Gifts and Benefits	Corporate Performance	Aug-17	Aug-17	Major amendments (Council adopted)		Current
Investment	Corporate Performance	Feb-19	Feb-19	Major amendments (Council adopted)		Current
Loans to Incorporated Sporting Bodies and Incorporate Community Groups	Corporate Performance	Jul-12	Apr-17	Minor amendments (GM/Exec approved)	To revise before end of calendar year.	Overdue

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Title	Responsible Division	Last Council Adoption Date	Last Review Date	Last Review Outcome	Comments for 2019 review	Review Stage
Local Orders Policy: Restrict Keeping of Dogs in Koala Habitat Areas - Thrumster	Development & Environment	Dec-17	Dec-17	Major amendments (Council adopted)	Next review scheduled to take place in 2020/21.	Current
Making of Council Policy	Corporate Performance	Sep-15	Sep-15	New Policy (Council adopted)	Policy will be reviewed within 12 months after the next election.	Deferred
Markets Policy	Strategy & Growth	Nov-18	Nov-18	New Policy (Council adopted)	Review on track for reporting to December 2019 Council meeting, as per existing Council resolution.	Current
Mayoral Discretionary Fund	Corporate Performance	Jul-12	Jul-12	Major amendments (Council adopted)	To be reviewed prior to Council Elections in Sept 2020	Deferred
Media Relations	Strategy & Growth	Sep-18	Sep-18	Major amendments (Council adopted)		Current
Mobile Food Vending Vehicles and Temporary Food Stalls in a Public Place	Development & Environment	Sep-18	Sep-18	Minor amendments (GM/Exec approved)		Current
Mooring Agreement for Lady Nelson Wharf	Development & Environment	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Review impacted by new sport and recreation grants programme rollout during 2018 and 2019. Revised timeline for completion of policy review June 2020.	Review
Naming and Renaming of Reserves	Corporate Performance	Dec-17	Dec-17	Major amendments (Council adopted)		Current
Naming and Renaming of Roads	Corporate Performance	Dec-17	Dec-17	Major amendments (Council adopted)		Current
Outdoor Dining	Corporate Performance	Jul-18	Jul-18	Minor amendments (GM/Exec approved)		Current
Parking	Infrastructure	Jul-11	Jul-11	(Council adopted)	To be reviewed in conjunction with Parking Strategy as contained in 2019/2020 Operational Plan.	Deferred
Parks and Reserves Use	Development & Environment	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Review impacted by new sport and recreation grants programme rollout during 2018 and 2019. Revised timeline for completion of policy review June 2020.	Review
Payment of Expenses and Provision of Facilities to Councillors	Corporate Performance	Oct-17	Oct-17	Minor amendments (GM/Exec approved)		Current

Title	Responsible Division	Last	Last	Last Review Outcome	Comments for 2019 review	Review
		Council Adoption Date	Review Date			Stage
Payment of Late Rate Instalment Due Death of Ratepayer's Spouse	Corporate Performance	Oct-10	Apr-17	Minor amendments (GM/Exec approved)	To revise before end of calendar year.	Overdue
Pensioner Concession Rebates	Corporate Performance	Jul-15	Apr-17	Minor amendments (GM/Exec approved)	To revise before end of calendar year.	Overdue
Placement of Recycled Clothing Collection Bins on Council Owned Land	Infrastructure	Dec-11	Dec-11	Major amendments (Council adopted)	Review commenced with a broader "Management of Road Reserve" policy.	Review
Planning Agreements	Development & Environment	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Minor amendments (GM/Exec Delayed due to vacant Manager Contributions Planning approved) position. Now scheduled for completion by 30-06-2020.	Deferred
Port Macquarie Entertainment Precinct Event Use	Development & Environment	Aug-18	Aug-18	Minor amendments (GM/Exec approved)		Current
Port Macquarie-Hastings Council Flood	Development & Environment	Dec-18	Dec-18	Major amendments (Council adopted)		Current
Privacy Management Plan	Corporate Performance	Aug-17	Aug-17	Major amendments (Council adopted)		Current
Procurement	Corporate Performance	May-13	Jun-14	Minor amendments (GM/Exec approved)		Overdue
Project Management	Corporate Performance	Feb-17	Feb-17	New Policy (Council adopted)		Current
Property Investment	Strategy & Growth	Dec-17	Dec-17	New Policy (Council adopted)		Current
Providing Funding and Support to the Community	Strategy & Growth	Jul-13	Jul-13	New Policy (Council adopted)	We are currently reviewing the Community Grants process as well as the other areas of funding support that we provide. There are a number of historical processes that will require time to unravel.	Overdue
Provision of Information and Interaction Between Councillors and Staff	Corporate Performance	Oct-17	Oct-17	Major amendments (Council adopted)		Current
Public Interest Disclosure – Internal Reporting	Corporate Performance	Dec-18	Dec-18	Major amendments (Council adopted)		Current
Rates and Charges Hardship Assistance	Corporate Performance	Aug-17	Aug-17	Major amendments (Council adopted)	Review not commenced. Recommend revised target date of Dec-19	Overdue
Regulatory Enforcement	Development & Environment	Aug-17	Aug-17	New Policy (Council adopted)		Current
Risk Management	Corporate Performance	Feb-19	Feb-19	Major amendments (Council adopted)		Current

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Title	Responsible Division	Last	Last	Last Review Outcome	Comments for 2019 review	Review
		Council Adoption Date	Review Date			Stage
Smoke Free Outdoor Areas	Strategy & Growth	Nov-18	Nov-18	Nov-18 New Policy (Council adopted)	This was adopted in September 2018 and does not require review for 4 years	Current
Social Impact Assessment	Strategy & Growth	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Still determining if this policy is required in conjunction with D&E	Review
Sponsorship	Corporate Performance	Feb-13	Feb-13	New Policy (Council adopted)	To revise before end of calendar year.	Overdue
Staff and Consultant Access to Development & Private Property	Development & Environment	Oct-10	May-17	Minor amendments (GM/Exec approved)	Minor amendments (GM/Exec No change considered to be required, to be considered by Exec.	Review initiated
Statement of Business Ethics	Corporate Performance	May-13	Jun-14	endments (GM/Exec		Overdue
Street lighting on Public Roads Infrastructure	Infrastructure	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Minor amendments (GM/Exec Review commenced. Working with Essential Energy to approved)	Review initiated
Tendering Local Preference	Corporate Performance	Oct-18	Oct-18	Major amendments (Council adopted)		Current
Tounism Community and Service Signage	Infrastructure	Feb-12	Feb-12	Major amendments (Council adopted)	Review ongoing. Target to submit to Executive Group Dec 2019.	Review initiated
Unsealed Roads	Infrastructure	Nov-18	Nov-18	New Policy (Council adopted)		Current
Liquid Trade Waste Regulation	Infrastructure	Aug-18	Aug-18	Minor amendments (GM/Exec approved)		Current
Volunteer	Strategy & Growth	Oct-15	Oct-15	Major amendments (Council adopted)	A redefine volunteer policy and process currently underway	Review initiated
Water Supply	Infrastructure	Dec-18	Dec-18	Minor amendments (GM/Exec approved)	Minor amendments (GM/Exec Whilst policy is still current, a major review is ongoing. approved) Target to submit to August 2019 Council Meeting.	Current
Works In Kind	Development & Environment	Oct-10	Oct-10	Minor amendments (GM/Exec approved)	Delayed due to vacant Manager Contributions Planning position. Now scheduled for completion by 30-06-2020.	Deferred



Monthly Investment Report June 2019

IMPERIUM MARKETS

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Executive Summary

Compliance

Compliance Measure	Within Policy Limits (Y/N)	Reason if Not Compliant
Term to Maturity	Yes – Compliant	n/a
Counterparty	Yes – Compliant	n/a
Credit Quality	Yes – Compliant	n/a

<u>Performance</u>

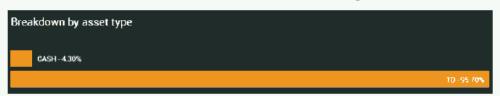
As at 30/06/2019	1m (actual)	1m (% p.a.)	FYTD (actual)	FYTD (% p.a.)
AusBond Bank Bill Index	0.13%	1.62%	1.97%	1.97%
Council's Portfolio^	0.25%	3.05%	3.00%	3.00%
Outperformance	0.12%	1.43%	1.03%	1.03%

[^]Total portfolio performance excludes Council's cash account holdings. Overall returns would be lower if cash was included.

Council's Portfolio

Asset Allocation

The entire portfolio is directed to fixed term deposits (95.70%) and the cash account with Westpac (4.30%). Should credit securities become more attractive relative to deposits, we would consider introducing liquid senior floating rate notes (FRNs) into the portfolio. This will not only offer additional upside with regards to the portfolio's investment returns, but also provide additional liquidity (FRNs are saleable – generally accessible within 2 business days). FRNs are also dominated by the higher rated ADIs which allows Council to maintain a bias towards to the higher rated banks.



Term to Maturity

All maturity limits (minimum and maximum) comply with the Investment Policy. Medium-Term (3-5 years) assets account for around 8% of the total investment portfolio, with capacity of around \$96m at month-end.

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Where there is (counterparty) capacity to invest in attractive 3-5½ year investments, we recommend this be allocated to new senior FRN issues and fixed or floating rate term deposits (refer to respective sections below).

Compliant	Horizon	Invested (\$)	Invested (%)	Min. Limit (%)	Max. Limit (%)	Available (\$)
✓	0 – 365 days	\$125,809,729	42.25%	0%	100%	\$172,000,000
✓	1-3 years	\$149,000,000	50.03%	0%	60%	\$29,685,837
✓	3 – 5.5 years	\$23,000,000	7.72%	0%	40%	\$96,123,892
✓	5.5 – 10 years	\$0	0.00%	0%	20%	\$59,561,946
		\$297,809,729	100.00%			

Monthly Investment Report: June 2019



Counterparty

As at the end of June, Council did not have an overweight position to any single ADI. Overall, the portfolio is diversified across the investment grade credit spectrum (rated BBB- or higher), with no exposure to unrated ADIs.

Compliant	lssuer	Rating	Invested (\$)	Invested (%)	Max. Limit (%)	Available (\$)
✓	CBA	AA-	\$3,000,000	1.01%	30.00%	\$86,342,919
✓	NAB	AA-	\$51,000,000	17.13%	30.00%	\$38,342,919
✓	WBC (St George)	AA-	\$87,809,729	29.49%	30.00%	\$1,533,190
✓	Rabobank	A+	\$13,000,000	4.37%	20.00%	\$46,561,946
✓	AMP	Α	\$5,000,000	1.68%	20.00%	\$54,561,946
✓	ICBC Sydney	Α	\$42,000,000	14.10%	20.00%	\$17,561,946
✓	ING Bank	Α	\$38,000,000	12.76%	20.00%	\$21,561,946
✓	BOQ	BBB+	\$26,000,000	8.73%	10.00%	\$3,780,973
✓	Bendigo	BBB+	\$4,000,000	1.34%	10.00%	\$25,780,973
✓	Auswide	BBB	\$5,000,000	1.68%	10.00%	\$24,780,973
✓	ME Bank	BBB	\$2,000,000	0.67%	10.00%	\$27,780,973
✓	Newcastle PBS	ввв	\$21,000,000	7.05%	10.00%	\$8,780,973
			\$297,809,729	100.00%		

We remain supportive of the regional and unrated ADI sector (and have been even throughout the GFC period). They continue to remain solid, incorporate strong balance sheets, while exhibiting high levels of capital – typically, much higher compared to the higher rated ADIs. Some unrated ADIs have up to 25-40% more capital than the domestic major banks, and well above the Basel III requirements.

APRA's Chairman affirmed that the banks had satisfactorily moved towards an 'unquestionably strong' capital position and that bank's stress testing contingency plans were now far better positioned that was previously the case years ago. APRA's stress test which hypothetically increased the unemployment rate to 11% (more than double the current rate) and for house prices to fall 35% showed the banks remained above the minimum capital levels. We note that APRA's latest discussion paper also highlighted that the domestic major banks were required to raise more capital while the lower rated ADIs were already deemed to be at a satisfactory level.

Overall, the lower rated ADIs (BBB and unrated) are generally now in a better financial position then they have been historically (see the Capital Ratio figure below). We believe that deposit investments with the lower rated ADIs should be continued going forward, particularly when they offer 'above market' specials. Not only would it diversify the investment portfolio and reduce credit risk, it would also improve the portfolio's overall returns.

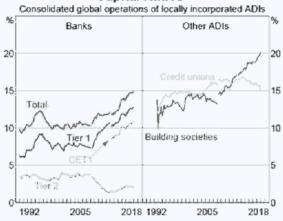
In the current environment of high regulation and scrutiny, all domestic ADIs continue to carry high levels of capital, particularly amongst the lower ("BBB") and unrated ADIs. There is minimal (if any) probability of any ADI defaulting on their deposits going forward – this was stress tested during the GFC.

Monthly Investment Report: June 2019



The biggest single risk that depositors face in the current low interest rate environment is not credit risk, but reinvestment risk.





 Per cent of risk-weighted assets; break in March 2008 due to the introduction of Basel II for most ADIs; break in March 2013 due to the introduction of Basel III for all ADIs
 Source: APRA

Credit Quality

The portfolio remains lightly diversified from a credit ratings perspective. The portfolio is entirely directed to the investment grade ADIs (BBB- or higher), with zero allocation to unrated ADIs. There is high capacity to invest in the higher rated ADIs (A or higher), particularly after the downgrades of BoQ and Bendigo-Adelaide Bank in May 2017, which now fall back into the "BBB" rated category.

There is also considerable capacity to invest with the "BBB" rated ADIs following the adoption of a new policy.

Given the large number of "BBB" rated ADIs currently in the market (and conversely, the low number of "A" or higher rated ADIs), we suggest Council direct new funds into this sector. We note that it is within this category where the most value is currently experienced. The difference in pricing can amount up to 10-20bp on any day.

All ratings categories are within the Policy limits:

Compliant	Credit Rating	Invested (\$)	Invested (%)	Max. Limit (%)	Available (\$)
√	AA Category	\$141,809,729	47.62%	100%	\$156,000,000
✓	A Category	\$98,000,000	32.91%	60%	\$80,685,837
✓	BBB Category	\$58,000,000	19.48%	30%	\$31,342,919
✓	Unrated ADIs	\$0	0.00%	10%	\$29,780,973
		\$297,809,729	100.00%		

Monthly Investment Report: June 2019



Performance

Council's performance for the month ending 30 June 2019 is summarised as follows:

Performance	1 month	3 months	6 months	FYTD	1 year
Official Cash Rate	0.10%	0.35%	0.72%	1.48%	1.48%
AusBond Bank Bill Index	0.13%	0.45%	0.97%	1.97%	1.97%
Council's Portfolio^	0.25%	0.74%	1.48%	3.00%	3.00%
Outperformance	0.11%	0.29%	0.51%	1.03%	1.03%

[^]Total portfolio performance excludes Council's cash account holdings. Overall returns would be lower if cash was included.

For the month of June, the deposit portfolio provided a solid return of +0.25% (actual), outperforming the benchmark AusBond Bank Bill Index return by +0.11% (actual). The strong performance continues to be driven by the handful of deposits still yielding above 3% p.a. However, most of these individual deposits have now matured and will be reinvested at lower prevailing rates.

Over the 2018-2019 financial year, the deposit portfolio returned +3.00% p.a., outperforming bank bills by 1.03% p.a. and more than double the official cash rate of 1.48%. This has been very strong given deposit rates reached their all-time lows and margins have generally contracted over the past 3 years.

Investors using the Imperium Markets platform have reduced the invisible costs associated with brokerage, and thereby lift client portfolio returns as investors are able to deal in deposits directly with the ADIs and execute at the best price possible. Council has experienced this over the past 18 months, receiving on average, 2-4bp higher for every deposit dealt on the platform.



Council's Term Deposit Portfolio & Recommendation

As at the end of June 2019, Council's deposit portfolio was yielding 2.94% p.a. (down 1bp from the previous month), with an average duration of ~1½ years. Where possible, we recommend Council extends or at least maintains this average duration. In the low interest rate environment, the biggest collective risk that the local government sector has faced over the post-GFC era has been the dramatic fall in interest rates - from 7½% to the current historical low levels of 1½% (potentially lower over coming months).

As the past decade has highlighted (post-GFC era), we have seen too many portfolios' roll a high proportion of their deposits between 3-6 months, resulting in their deposits being reinvested at lower prevailing rates. That is, depositors have generally not insured themselves against the low interest rate environment by diversify their funding across various tenors (out to 5 years) but rather placed all their 'eggs in one basket' and kept all their deposits short. Reinvestment risk has collectively been and continues to be the biggest detriment to depositors' interest income over the post-GFC period. Another interest rate cut is currently factored in over coming months.

At the time of writing (early July), we see value in:

ADI	LT Credit Rating	Term	T/D Rate
Judo Bank	Unrated ADI	3 years	~2.30% p.a.
BoQ	BBB+	4 years	~2.15% p.a.
BoQ	BBB+	3 years	~2.05% p.a.
BoQ	BBB+	2 years	~2.00% p.a.

For those investors that have capacity issues with the "BBB" and unrated ADI sector, we see value in:

ADI	LT Credit Rating	Term	T/D Rate
AMP	A-	5 years	^2.40% p.a.
AMP	A-	1½ years	^2.35% p.a.
AMP	A-	4 years	^2.35% p.a.
AMP	A-	2-3 years	^2.30% p.a.

[^] AMP T/Ds — these are grossed up rates which includes a 0.20% p.a. rebated commission from Imperium Markets. Temporarily lift to around \$7m cap (requires approval), applies per individual investor.

The above deposits are suitable for investors looking to provide some income protection and mitigate reinvestment/rollover risk in the low interest rate environment, and particularly with further interest rate cuts imminent on the horizon.

Monthly Investment Report: June 2019



For terms under 12 months, we believe the strongest value is currently being offered by a number of lower and unrated ADIs offering above-market specials (dependent on daily funding requirements):

ADI	LT Credit Rating	Term	T/D Rate
Judo Bank	Unrated ADI	6 months	2.45% p.a.
Bank of Sydney	Unrated ADI	3 months	2.42% p.a.
Bank of Sydney	Unrated ADI	3 months	2.31% p.a.
Judo Bank	Unrated ADI	12 months	2.30% p.a.
Australian Military Bank	Unrated ADI	3 months	2.29% p.a.
BoQ	BBB+	6 months	2.05% p.a.
BoQ	BBB+	3-5 months	2.00% p.a.
Auswide Bank	BBB	3, 6-12 months	2.00% p.a.

Excluding AMP (A-), we note the spread between the higher rated ADIs and the lower rated regional and unrated ADIs is becoming wider. Amongst the higher rated ADIs ("A" rated or higher), the following deposits remain attractive for terms under 12 months:

ADI	LT Credit Rating	Term	T/D Rate
AMP	A-	5-11 months	^2.40% p.a.
AMP	A-	3 months	^2.35% p.a.
AMP	A-	12 months	^2.35% p.a.
NAB	AA-	3-7 months	2.00% p.a.
NAB	AA-	12 months	1.95% p.a.

[^] AMP T/Ds - these are grossed up rates which includes a 0.20% p.a. rebated commission from Imperium Markets. Temporarily lift to around \$7m cap (requires approval), applies per individual investor.



Senior FRNs & Recommendations

Over June, amongst the senior major bank FRNs, physical credit securities remained relatively flat across the long-end of the curve. During the month, NAB (AA-) issued a new 5 year senior 'benchmark' deal at +92bp, which was offered at a generous premium to secondary market equivalents at the time of issuance.

Despite interest rates falling, we continue to see good value for a new 5 year senior major bank FRN (offered around +88bp), given the slight premium offered in the primary market, and particularly once factoring in the potential capital gains which could be realised from as early as two years after being launched. The grossed up return would be closer to around +125-130bp over a 2 year holding period in a relatively stable credit environment, over and above where the highest margins are paying compared to the medium to longer-dated deposits.

We continue to see better value in longer tenors (i.e. favour 5 year terms over 3 year terms) amongst the "AA" rated ADIs due to their high liquidity and ability to 'roll down the curve' over a 2-2½ year holding period.

Collectively over the month, the "A" rated cohort remained relatively flat at the 5 year part of the curve. In mid-June, Macquarie Bank (A) issued a dual 1 and 3 year benchmark issue at +43bp and +75bp respectively. We thought the deal was issued at relatively tight levels, noting the spread to international ADI equivalents with similar credit rating. Later in the month, China Construction Bank (A) issued a 3 year senior FRN deal at +93bp, printing \$400m, tightening from initial guidance of +98bp.

Meanwhile, the "BBB" rated ADIs was marked around +5p wider to +110bp over the 3 year part of the curve. There remains very little turnover (traditionally) in the secondary market amongst the lower regional ADIs.

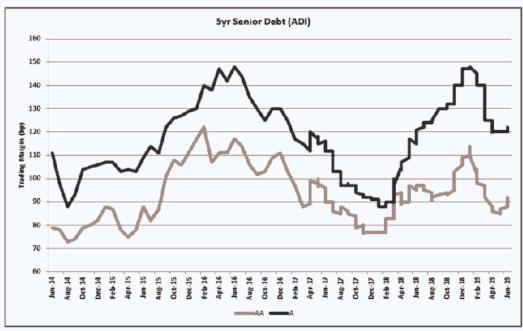
Overall, credit remains tight on a historical basis but much more attractive after the earlier correction experienced in credit markets over December 2018 / early January 2019. While further rate cuts are now expected in the immediate future, FRNs continue to play a role once factoring in their liquidity and the ability to roll down the curve and gross up returns in a relatively stable credit environment.

Senior FRNs (ADIs)	30/06/2019	31/05/2019
"AA" rated – 5yrs	+88bp	+87bp
"AA" rated – 3yrs	+63bp	+63bp
"A" rated – 5yrs	+120bp	+120bp
"A" rated – 3yrs	+93bp	+95bp
"BBB" rated – 3yrs	+110bp	+105bp

Source: IBS Capital

Monthly Investment Report: June 2019





Source: IBS Capital

We now generally **recommend switches** ('benchmark' issues only) into new primary issues, out of the following senior FRNs that are maturing:

- On or before mid-2022 for the "AA" rated ADIs (domestic major banks);
- On or before 2020 for the "A" rated ADIs; and
- Within 12 months for the "BBB" rated ADIs (consider case by case).

Investors holding onto the above senior FRNs ('benchmark' issues only) in their last 1-2 years are now generally holding sub-optimal investments and are not maximising returns by foregoing realised capital gains. In the current low interest rate environment, any boost in overall returns should be locked in when it is advantageous to do so.

We recommend Council starts introducing liquid senior FRNs into the portfolio, potentially starting with the domestic major banks when a new attractive issue is launched. We will inform Council when there is an opportunity to do so.

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Economic Commentary Review

International Market

Global equity markets rebounded in June, partially driven by expectations of further stimulus from global central banks. In the US, the S&P 500 Index gained +6.89% for the month, while the NASDAQ surged +7.42%. Across Europe, the main economies also rebounded, led by France's CAC (+6.36%), Germany's DAX (+5.73%) and UK's FTSE (+3.69%), largely erasing the previous months losses.

The US unemployment rate was unchanged at 3.6% in May, while average earnings rose by +0.2%. US headline CPI came in at +0.2% m/m, which pushed down the annual rate to +1.8% from +2.0%. Core inflation (ex food and energy) rose just +0.1% m/m, pulling the annual rate down to +2.0% from +2.1%.

The US FOMC delivered a pleasing outcome for markets, shifting it patient policy stance to a clear easing bias. The FOMC left the funds rates unchanged, but it also signalled for the first time since mid-2007, its willingness to ease potentially as soon as July. Fed Chair Powell said that "many FOMC participants judge that the case for somewhat more accommodative policy has strengthened." On the ongoing trade wars, US Treasury Secretary Mnuchin stated "we were about 90% of the way there [with a deal with China] and I think there's a path to complete this".

India was targeted in the broadening US led trade war with the administration announcing its intention to end the country's special trade treatment. India was no longer considered a developing country, effectively cancelling the tariff exemption for Indian products worth billions of dollars.

Eurozone inflation (both headline and core) missed by a tenth in May. Headline inflation was +1.2% y/y against +1.3% expected, while core inflation was +0.8% y/y, against +0.9% expected.

The ECB's forward guidance suggests it will keep rates "at their present levels at least through the end of 2019 and in any case for as long as necessary to ensure continued sustained convergence of inflation" to target.

The EU's 5-year/5-year forward inflation swap, Draghi's preferred market inflation reading, hit a new record low of just below 1.12%. **ECB President Draghi said**, "In the absence of improvement, such that the sustained return of inflation to our aim is threatened, additional stimulus will be required."

China's industrial output hit a 17 year low in May, showing further signs that the outlook for global growth remains weak.

The MSCI World ex-AUS gained +6.49% for the month of June.

Index	1m	3m	1yr	3yr	5yr	10yr
S&P 500 Index	+6.89%	+3.79%	+8.22%	+11.91%	+8.46%	+12.33%
MSCI World ex-AUS	+6.49%	+3.28%	+4.33%	+9.72%	+4.75%	+8.64%
S&P ASX 200 Accum. Index	+3.70%	+7.97%	+11.55%	+12.88%	+8.85%	+10.02%

Source: S&P, MSCI

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Domestic Market

The RBA cut interest rates by 25bp to a record low of 1.25% in its meeting in June, its first move since August 2016. The main motive behind their decision was to support employment growth in order to boost wage growth and inflation. RBA Governor Lowe indicated that reducing the unemployment rate to the bank's new 4½% estimate of the NAIRU should return inflation back to their 2-3% target band.

Governor Lowe followed up by saying "it is not unreasonable to expect a lower cash rate" and forecasts were conditioned on a technical market rate assumption of 1%. He also jawboned the Federal government to boost economic activity through fiscal support and structural policies, suggesting they could reduce the burden on monetary policy.

The RBA's June Board Minutes concluded "given the amount of spare capacity in the labour market and the economy more broadly, members agreed that it was more likely than not that a further easing in monetary policy would be appropriate in the period ahead".

The unemployment rate remained unchanged at 5.2% in May, with employment up +42k after an upwardly-revised gain of +43k in April. The participation rate rose from 65.8% to 66.0%. Given the RBA's reassessment for the NAIRU, this increased the chances of the next rate cut before August.

Q1 GDP came in at +0.4% q/q and +1.8% y/y, which was well below the estimates of trend growth at around +2.5%. The economy was running at its slowest pace since the September quarter of 2009, at the end of the GFC. This was a further sign that spare capacity has likely increased in the economy.

Retail sales remained weak in April, declining by -0.1% (market expecting +0.2%). The trade surplus was unchanged in April at \$4.9b, just shy of the record \$5b surplus in February. Both exports and imports recorded strong growth in the month, coming at 2.5% and 2.8% respectively.

Housing arrears have risen, returning to 2010 levels, but remain well below the 1990s recessionary levels. Arrears are well below levels threatening financial stability and are expected to remain so provided unemployment remains low.

The Australian dollar rebounded this month, gaining +1.4% this month, finishing at US70.13 cents (from US69.16 cents the previous month), on the back of the US Fed signalling its easing bias.

Credit Market

The main global credit indices were marked significantly tighter (between 18-27%) across the board over June. Credit spreads are now back to where they were in early 2018 and remain relatively tight on a historical basis:

Index	June 2019	May 2019
CDX North American 5yr CDS	54bp	70bp
iTraxx Europe 5yr CDS	52bp	71bp
iTraxx Australia 5yr CDS	63bp	78bp

Source: Markit

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Fixed Interest Review

Benchmark Index Returns

Index	June 2019	May 2019
Bloomberg AusBond Bank Bill Index (0+YR)	+0.13%	+0.15%
Bloomberg AusBond Composite Bond Index (0+YR)	+1.04%	+1.70%
Bloomberg AusBond Credit FRN Index (0+YR)	+0.25%	+0.17%
Bloomberg AusBond Credit Index (0+YR)	+0.89%	+1.19%
Bloomberg AusBond Treasury Index (0+YR)	+1.12%	+2.09%
Bloomberg AusBond Inflation Gov't Index (0+YR)	-0.16%	+3.09%

Source: Bloomberg

Other Key Rates

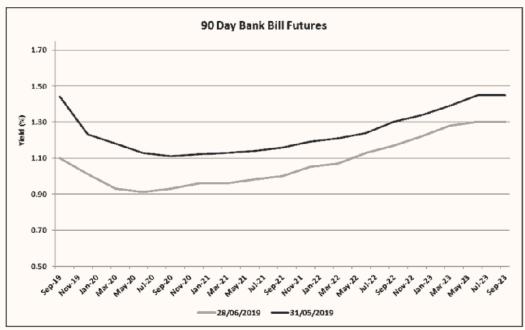
Index	June 2019	May 2019
RBA Official Cash Rate	1.25%	1.50%
90 Day (3 month) BBSW Rate	1.20%	1.42%
3yr Australian Government Bonds	0.96%	1.10%
10yr Australian Government Bonds	1.32%	1.46%
US Fed Funds Rate	2.25%-2.50%	2.25%-2.50%
10yr US Treasury Bonds	2.00%	2.12%

Source: RBA, AFMA, US Department of Treasury



90 Day Bill Futures

Over June, bill futures fell across the curve on pricing expectations of further RBA rate cuts. At month-end, the futures market was factoring a 70% chance of a 25bp rate cut on 2nd July 2019, while fully pricing in a further 25bp rate cut by February 2020.



Source: ASX



Fixed Interest Outlook

With global inflation and the global economy showing signs of softening, along with the ongoing trade wars, several central banks (US Fed and ECB) have now moved towards an easing bias. The market is currently factoring in around a 65% chance that the US Fed will cut rates in September.

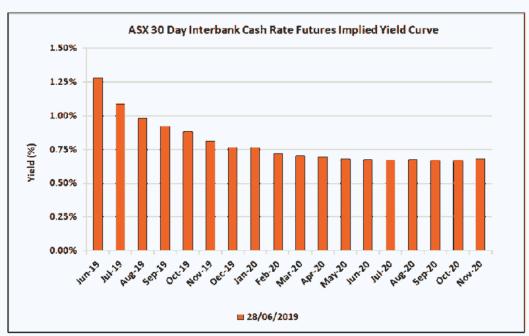
Domestically, the RBA has signalled for a further rate cut over coming months identifying 'spare capacity' in the economy. For inflation, wage growth and employment to pick-up, the RBA has suggested that additional stimulus through official rate cuts is warranted, while welcoming supplementary fiscal support from the government.

Housing concerns are closely being monitored with the fall in house prices (mainly in Sydney and Melbourne) being acknowledged as having an impact on the 'wealth effect' towards consumers, although the Coalition's surprise election win may steady the correction being felt in the housing market.

The global key risks for the RBA stem from the impact of international trade wars and a slowdown in the Chinese economy, US inflation and a broader slowdown in the global economy. Domestically, they are focused on employment, inflation, wage growth, housing and consumption. As a result of these uncertainties, the RBA has signalled for a further adjustment in the official cash rate.

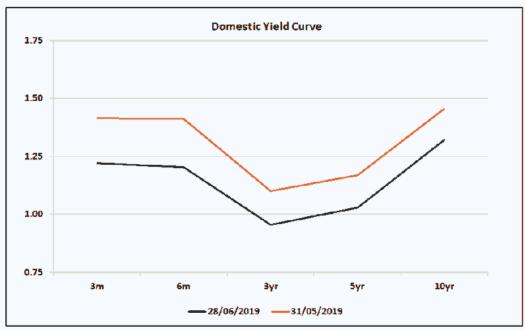
The futures market continues to price in additional rate cuts with the prospect of a 25bp cut on 2nd July 2019 seen as an 70% scenario. Economists are now predicting the RBA will be forced to cut multiple times this year on expectations of a slowdown in the domestic and global economy, household finances impacting consumer confidence and further softening in the residential property market. The market is fully pricing in an additional 25bp rate cut by February 2020, potentially taking the official cash rate to 0.75% by early 2020:





Source: ASX

Over the longer-term, the domestic bond market continues to suggest a 'lower-for-longer' period of interest rates. Over the month, yields fell up to -15bp at the longer end of the curve:



Source: AFMA, ASX, RBA

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ATTACHMENT

ORDINARY COUNCIL 17/07/2019



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PORT MACQUARIE-HASTINGS

Monthly Investment Report

01/06/2019 to 30/06/2019

IMPERIUM MARKETS

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Portfolio valuation

As at 30/06/2019

Seller	Pating	Type	Interect	Purchase	Maturity	Pate	Value	Accrised	AccrMTD	Ref
Rendino and Adelaide	RRR+		Annual	07/07/2016	08/07/2019	3 1500	2 000 000 00	61 619 18	5 178 08	198640
NAB	AA-	: P	Maturity	17/07/2018	16/07/2019	2.7800	2,000,000.00	53,162.74	4,569.86	GMI-DEAL-10549241
Westpac	AA-	2	Annual	24/07/2017	24/07/2019	2.9400	4,000,000.00	110,189.59	9,665.75	032-697 114230
Westpac	AA-	2	Annual	15/08/2016	15/08/2019	3.1000	3,000,000.00	81,534.25	7,643.84	032-586 511-284
Newcastle Permanent	BBB	2	Annual	15/08/2016	15/08/2019	3.0000	2,000,000.00	52,602.74	4,931.51	31125
Westpac	AA-	2	Annual	22/08/2017	22/08/2019	2.9000	3,000,000.00	74,605.48	7,150.68	032-697 115436
ING Direct	⋖	욘	Annual	22/08/2017	22/08/2019	2.7500	5,000,000.00	117,910.96	11,301.37	26932
Commonwealth Bank	AA-	2	Annual	04/09/2017	29/08/2019	2.7300	3,000,000.00	67,315.07	6,731.51	B37942904.6
Westpac	AA-	₽	Annual	04/09/2017	04/09/2019	2.9600	3,000,000.00	72,986.30	7,298.63	032-697 115 794
St George Bank	AA-	₽	Annual	08/09/2016	08/09/2019	3.2000	5,000,000.00	128,876.71	13,150.68	355290684
St George Bank	AA-	₽	Annual	27/09/2016	27/09/2019	3.2000	4,000,000.00	97,139.73	10,520.55	355333138
NAB	AA-	2	Annual	11/07/2018	15/10/2019	2.8500	3,000,000.00	83,157.53	7,027.40	GMI-DEAL-10547992
ICBC Sydney Branch	۷	₽	Annual	31/10/2018	29/10/2019	2.8300	4,000,000.00	75,363.29	9,304.11	00001
ICBC Sydney Branch	۷	₽	Maturity	20/11/2018	12/11/2019	2.8600	5,000,000.00	87,367.12	11,753.42	0125001100000186702
ICBC Sydney Branch	⋖	₽	Annual	13/11/2018	19/11/2019	2.8600	4,000,000.00	72,087.67	9,402.74	00003
AMP Bank	-\	₽	Maturity	29/05/2019	25/11/2019	2.4500	5,000,000.00	11,075.34	10,068.49	TD341584423
ICBC Sydney Branch	⋖	₽	Annual	28/11/2018	26/11/2019	2.8200	5,000,000.00	83,054.79	11,589.04	90000
Westpac	AA-	₽	Qtly	14/12/2018	10/12/2019	2.7300	3,000,000.00	3,814.52	3,814.52	7389786
Westpac	AA-	₽	Qtly	14/12/2018	17/12/2019	2.7300	4,000,000.00	5,086.03	5,086.03	7389774
Westpac	AA-	₽	Qtly	14/01/2019	14/01/2020	2.7200	5,000,000.00	28,690.41	11,178.08	7448784
Members Equity Bank	BBB	₽	Annual	24/01/2017	24/01/2020	3.2600	2,000,000.00	28,223.56	5,358.90	22835
ICBC Sydney Branch	∢	₽	Maturity	20/02/2019	04/02/2020	2.7200	1,000,000.00	9,762.19	2,235.62	00010
ING Direct	∢	₽	Annual	15/02/2018	17/02/2020	2.8700	4,000,000.00	42,774.79	9,435.62	30810
ING Direct	⋖	2	Annual	28/02/2018	03/03/2020	2.8900	4,000,000.00	38,955.62	9,501.37	378133
Newcastle Permanent	BBB	욘	Annual	10/03/2016	10/03/2020	3.7000	2,000,000.00	22,706.85	6,082.19	29843
ING Direct	⋖	욘	Annual	02/03/2018	17/03/2020	2.8800	4,000,000.00	37,558.36	9,468.49	378677
Rural (Bendigo Group)	BBB+	욘	Maturity	18/04/2019	14/04/2020	2.5500	2,000,000.00	10,339.73	4,191.78	2952006
Auswide Bank	BBB	욘	Maturity	30/04/2019	29/04/2020	2.4500	5,000,000.00	20,808.22	10,068.49	
BOQ	BBB+	2	Annual	19/05/2017	19/05/2020	3.0000	3,000,000.00	10,356.16	7,397.26	453470
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Issuer	Rating	Type	Interest	Purchase	Maturity	Rate	Value	Accrued	AccrMTD	Ref
ING Direct	Α	ΔL	Annual	22/05/2018	26/05/2020	2.9400	4,000,000.00	12,887.67	9,665.75	403498
ING Direct	٧	2	Annual	29/05/2018	09/06/2020	2.8800	3,000,000.00	7,811.51	7,101.37	6775257
Westpac	AA-	2	Qtly	06/06/2018	16/06/2020	2.9100	5,000,000.00	9,965.75	9,965.75	6795148
NAB	AA-	1	Annual	03/07/2018	07/07/2020	2.9000	5,000,000.00	144,205.48	11,917.81	10545823
NAB	AA-	1	Annual	11/07/2018	14/07/2020	2.9200	3,000,000.00	85,200.00	7,200.00	GMI-DEAL-10547993
ING Direct	۷	1	Annual	21/08/2018	25/08/2020	2.8500	4,000,000.00	98,071.23	98'69'86	424329
ING Direct	۷	1	Annual	13/09/2018	08/09/2020	2.8700	4,000,000.00	91,525.48	9,435.62	429068
Westpac	AA-	1	Annual	13/09/2017	14/09/2020	3.1700	3,000,000.00	75,819.45	7,816.44	032-697 116017
ING Direct	٧	1	Annual	13/09/2018	22/09/2020	2.8700	4,000,000.00	91,525.48	9,435.62	429067
NAB	AA-	1	Annual	17/10/2018	13/10/2020	2.7800	4,000,000.00	78,296.99	9,139.73	GMI-DEAL-10573417
ICBC Sydney Branch	٧	2	Annual	31/10/2018	27/10/2020	2.9300	6,000,000.00	117,039.45	14,449.32	00002
ICBC Sydney Branch	٧	1	Annual	13/11/2018	10/11/2020	2.9300	5,000,000.00	92,315.07	12,041.10	00004
ICBC Sydney Branch	٧	1	Annual	05/12/2018	08/12/2020	2.8600	2,000,000.00	32,596.16	4,701.37	0125001100000186702
ICBC Sydney Branch	٧	1	Annual	14/12/2018	15/12/2020	2.8900	6,000,000.00	94,538.63	14,252.05	60000
ВОД	BBB+	2	Annual	24/01/2017	25/01/2021	3.6500	2,000,000.00	31,600.00	6,000.00	438425
Westpac	AA-	1	Annual	21/02/2017	22/02/2021	3.3900	2,000,000.00	24,147.95	5,572.60	032-586 519825
ВОД	BBB+	₽	Annual	10/03/2016	10/03/2021	3.8000	3,000,000.00	34,980.82	98'698'6	391843
ING Direct	A	₽	Annual	20/02/2019	16/03/2021	2.8200	2,000,000.00	20,242.19	4,635.62	475707
Westpac	AA-	2	Qtly	22/03/2018	23/03/2021	3.0200	4,000,000.00	2,316.71	2,316.71	6791206
Westpac	AA-	2	Qtly	22/05/2018	25/05/2021	3.1000	4,000,000.00	13,589.04	10,191.78	6927394
ВОД	BBB+	₽	Annual	29/05/2019	31/05/2021	2.3000	3,000,000.00	6,238.36	5,671.23	167170
Rabobank Australia	A+	₽	Annual	08/06/2017	07/06/2021	3.0200	5,000,000.00	8,273.97	8,687.67	25359
Westpac	AA-	₽	Qtly	06/06/2018	15/06/2021	3.1000	3,000,000.00	98.698'9	6,369.86	6795153
NAB	AA-	₽	Annual	03/07/2018	22/06/2021	3.0000	4,000,000.00	119,342.47	9,863.01	10545826
NAB	AA-	1	Annual	03/07/2018	06/07/2021	3.0000	3,000,000.00	89,506.85	7,397.26	083-375 99-999-9947
Westpac	AA-	₽	Qtly	17/07/2018	13/07/2021	3.0400	5,000,000.00	31,232.88	12,493.15	7052868
NAB	AA-	₽	Annual	26/07/2018	20/07/2021	3.0400	4,000,000.00	113,271.23	9,994.52	GMI-DEAL-10552065
NAB	AA-	1	Annual	02/08/2018	03/08/2021	3.0700	5,000,000.00	140,042.47	12,616.44	GMI-DEAL-10554251
Westpac	AA-	₽	Qtly	13/09/2018	14/09/2021	2.8800	5,000,000.00	7,101.37	7,101.37	7180013
NAB	AA-	₽	Annual	27/09/2018	28/09/2021	3.0500	5,000,000.00	115,732.88	12,534.25	GMI-DEAL-10568550
Westpac	AA-	₽	Qtly	13/09/2018	12/10/2021	2.8900	5,000,000.00	7,126.03	7,126.03	7179943
ICBC Sydney Branch	٧	₽	Annual	05/12/2018	07/12/2021	3.0100	4,000,000.00	68,611.51	9,895.89	0125001100000186702
Newcastle Permanent	BBB	₽	Qtly	07/02/2019	08/02/2022	3.0500	4,000,000.00	18,383.56	10,027.40	1381/37459
NAB	AA-	2	Annual	21/02/2017	21/02/2022	3.4600	5,000,000.00	61,616.44	14,219.18	10420935

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tic A4- TD Annual 17/02/2017 17/02/2022 3:6100 2,000,000.00 25,715.07 17/02/2022 3:8000 2,000,000.00 22,487.67 17/02/2018 15/03/2019 15/03/2012 2.8000 2,000,000.00 22,487.67 17/03/2019 12/03/2019 22/03/2022 2.8000 4,000,000.00 22,487.67 17/03/2019 12/03/2019 22/03/2022 2.8000 4,000,000.00 22,487.67 17/03/2019 18/04/2019 19/04/2022 2.8000 4,000,000.00 21,895.89 18/04.47 17D Annual 28/05/2019 3/05/2022 2.4000 4,000,000.00 21,895.89 18/04.47 17D Annual 16/08/2017 17/06/2022 3.2200 4,000,000.00 117,507.95 17/06/2019 17/06/2019 3/000,000.00 117,507.95 17/06/2019 17/06/2019 2/06/2022 3.2200 4,000,000.00 117,507.95 17/06/2019 17/06/2019 2/06/2022 3.2000 3/000,000 09,501.37 17/06/2019 17/06/2019 2/06/2023 2.2000 5/000,000 00 1/205.48 17/06/2019 2/06/2023 2.2000 5/000,000 00 1/205.48 17/06/2019 2/06/2023 2.2000 5/000,000 00 1/205.48 17/06/2019 2/06/2023 2.2000 5/000,000 00 1/205.48 17/06/2019 2/06/2023 2.2000 5/000,000 00 1/205.48 17/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019 2/06/2019	ssuer	Rating	Type	Interest	Purchase	Maturity	Rate	Value	Accrued	AccrMTD	Ref
BBB+ TD Annual 15/03/2012 3.8000 2,000,000.00 22,487.67 castle Permanent BBB TD Qtty 12/03/2019 22/03/2022 2.9000 4,000,000.00 6,038.36 castle Permanent BBB TD Qtty 12/03/2019 22/03/2022 2.9000 4,000,000.00 6,038.36 castle Permanent BBB TD Qtty 18/04/2019 19/04/2022 2.7000 4,000,000.00 21,895.89 1 castle Permanent BBB TD Annual 28/05/2019 30/05/2022 2.7000 4,000,000.00 21,895.89 1 bank Australia A+ TD Annual 08/06/2017 07/06/2022 3.2200 4,000,000.00 117,507.95 1 pac AA- TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 117,507.95 1 pac AA- TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 11,505.48 pac	Westpac	AA-	1	Annual	21/02/2017	21/02/2022	3.6100	2,000,000.00	25,715.07	5,934.25	23294
castle Permanent BBB TD Qtty 12/03/2019 22/03/2022 2.9000 4,000,000.00 6,038.36 castle Permanent BBB TD Annual 27/03/2019 29/03/2022 2.8000 5,000,000.00 36,821.92 1 castle Permanent BBB TD Annual 27/03/2019 19/04/2022 2.7000 4,000,000.00 21,895.89 1 castle Permanent BBB TD Annual 28/05/2019 30/05/2022 2.7000 4,000,000.00 21,895.89 1 bank Australia A+ TD Annual 08/06/2017 07/06/2022 3.2200 4,000,000.00 117,507.95 1 pac AA- TD Annual 13/09/2017 13/09/2022 3.0500 4,000,000.00 117,507.95 1 bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.050 4,000,000.00 10,6524.66 1 bank Australia A+ TD Annual 13/09/2017 13/09/2023	BOQ	BBB+	1	Annual	15/03/2017	15/03/2022	3.8000	2,000,000.00	22,487.67	6,246.58	445483
castle Permanent BBB TD Annual 27/03/2019 29/03/2022 2.8000 5,000,000.00 36,821.92 1 castle Permanent BBB TD Qtty 18/04/2019 19/04/2022 2.7000 4,000,000.00 21,895.89 1 bank Australia A+ TD Annual 28/05/2019 30/05/2022 3.2200 4,000,000.00 8,942.47 bank Australia A+ TD Annual 02/08/2018 02/08/2022 3.2200 4,000,000.00 117,507.95 1 pac AA- TD Annual 16/08/2018 16/08/2022 3.2200 4,000,000.00 117,507.95 1 bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.2500 4,000,000.00 9,501.37 back AA- TD Annual 13/09/2017 13/09/2022 3.2500 4,000,000.00	Newcastle Permanent	BBB	10	Qtly	12/03/2019	22/03/2022	2.9000	4,000,000.00	6,038.36	6,038.36	1684
castle Permanent BBB TD Qtly 18/04/2019 19/04/2022 2.7000 4,000,000.00 21,895.89 bank Australia A+ TD Annual 08/06/2017 07/06/2022 2.4000 4,000,000.00 8,942.47 bank Australia A+ TD Annual 02/08/2018 02/08/2022 3.2200 4,000,000.00 177,507.95 1 pac AA- TD Annual 16/08/2018 16/08/2022 3.2200 4,000,000.00 117,507.95 1 bac AA- TD Annual 13/09/2017 13/09/2022 3.2400 4,000,000.00 106,624.66 1 bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 9,501.37 BBH TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 BBB+ TD Annual 27/06/2019 29/05/2023 2.2000 5,000,000.00 1,205.48 A- CASH	Newcastle Permanent	BBB	ᄋ	Annual	27/03/2019	29/03/2022	2.8000	5,000,000.00	36,821.92	11,506.85	
bank Australia A+ TD Annual 28/05/2019 30/05/2022 2.4000 4,000,000.00 8,942.47 bank Australia A+ TD Annual 08/06/2017 07/06/2022 3.2200 5,000,000.00 8,942.47 AA- TD Annual 16/08/2018 16/08/2022 3.2200 4,000,000.00 117,507.95 11 pac AA- TD Annual 13/09/2017 13/09/2022 3.0500 4,000,000.00 106,624.66 1 bbank Australia A+ TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 1 BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 BBB+ TD Annual 27/06/2019 27/06/2023 2.2000 5,000,000.00 1,205.48 pac AA- CASH Month 30/06/2019 27/06/2019 2.2000 12,809,729.10 23,162.80	Newcastle Permanent	BBB	1	Qtly	18/04/2019	19/04/2022	2.7000	4,000,000.00	21,895.89	8,876.71	1978
beank Australia A+ TD Annual 08/06/2017 07/06/2022 3.2200 5,000,000.00 8,821.92 AA- TD Annual 02/08/2018 02/08/2022 3.2200 4,000,000.00 117,507.95 1 pac AA- TD Annual 16/08/2018 15/09/2022 3.4100 3,000,000.00 106,624.66 1 pac AA- TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 bbank Australia A+ TD Annual 13/09/2017 13/09/2022 3.3800 3,000,000.00 80,842.19 BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 pac AA- CASH Month 30/06/2019 27/06/2023 2.2000 12,809,729.10 23,162.80 ALS AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 84,091,777.32 866	BOQ	BBB+	1	Annual	28/05/2019	30/05/2022	2.4000	4,000,000.00	8,942.47	7,890.41	167130
AA- TD Annual 02/08/2018 02/08/2022 3.2200 4,000,000.00 117,507.95 1 pac AA- TD Annual 16/08/2018 16/08/2022 3.4100 3,000,000.00 106,624.66 1 bbank Australia A+ TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 pac AA- CASH Month 30/06/2019 27/06/2023 2.2000 12,809,729.10 23,162.80 ALS AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80	Rabobank Australia	A+	1	Annual	08/06/2017	07/06/2022	3.2200	5,000,000.00	8,821.92	9,263.01	25360
pac AA- TD Annual 16/08/2017 16/08/2022 3.0500 4,000,000.00 106,624.66 1 bank Australia AA- TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 81,559.73 bbank Australia A+ TD Annual 13/09/2017 13/09/2022 3.3800 3,000,000.00 80,842.19 BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 pac AA- CASH Month 30/06/2019 27/06/2019 2.2000 12,809,729.10 23,162.80 ALS AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 84,091,777.32 \$66	NAB	AA-	1	Annual	02/08/2018	02/08/2022	3.2200	4,000,000.00	117,507.95	10,586.30	GMI-DEAL-10554252
pac AA- TD Annual 13/09/2017 13/09/2022 3.4100 3,000,000.00 81,559.73 bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.3800 3,000,000.00 80,842.19 BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 pac AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 ALS AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80	NAB	AA-	1	Annual	16/08/2018	16/08/2022	3.0500	4,000,000.00	106,624.66	10,027.40	GMI-DEAL-10557367
bank Australia A+ TD Annual 13/09/2017 13/09/2022 3.3800 3,000,000.00 80,842.19 BBH TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 pac AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 2 ALS AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 2	Westpac	AA-	ᄗ	Annual	13/09/2017	13/09/2022	3.4100	3,000,000.00	81,559.73	8,408.22	032-697 116 009
BBB+ TD Annual 28/05/2019 29/05/2023 2.5500 4,000,000.00 9,501.37 BBB+ TD Annual 27/06/2019 27/06/2023 2.2000 5,000,000.00 1,205.48 pac AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 2 ALS \$297,809,729.10 \$4,091,777.32 \$66	Rabobank Australia	A+	1	Annual	13/09/2017	13/09/2022	3.3800	3,000,000.00	80,842.19	8,334.25	27388
BBB+ TD Annual 27/06/2019 27/06/2023 2.2000 5,000,000.00 1,205.48 Tpac AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 2	B0Q	BBB+	1	Annual	28/05/2019	29/05/2023	2.5500	4,000,000.00	9,501.37	8,383.56	167127
AA- CASH Month 30/06/2019 30/06/2019 2.2000 12,809,729.10 23,162.80 33,162.80 34,091,777.32 \$6	BOQ	BBB+	T C	Annual	27/06/2019	27/06/2023	2.2000	5,000,000.00	1,205.48	1,205.48	
\$297,809,729.10 \$4,091,777.32	Westpac	AA-	CASH	Month	30/06/2019	30/06/2019	2.2000	12,809,729.10	23,162.80	23,162.80	WESTPAC COMMERCIAL BANK 31 DAY NOTICE SAVER ACCOUNT
	TOTALS							\$297,809,729.10		\$665,545.81	

2 Your Community Life

17/07/2019

What we are trying to achieve

A healthy, inclusive and vibrant community.

What the result will be

We will have:

- Community hubs that provide access to services and social connections
- A safe, caring and connected community
- A healthy and active community that is supported by recreational infrastructure
- A strong community that is able to identify and address social issues
- Community participation in events, programs, festivals and activities

How we will get there

- 2.1 Create a community that feels safe
- 2.2 Advocate for social inclusion and fairness
- 2.3 Provide quality programs, community facilities and public spaces, for example, community halls, parks and vibrant town centres
- 2.4 Empower the community through encouraging active involvement in projects, volunteering and events
- 2.5 Promote a creative and culturally rich community





MINUTES
Mayor's Sporting Fund Sub-Committee Meeting
20/06/2019

11.01 MSF APPLICATION - LLEYTON WALL - TRIATHLON

A MSF application was received from Lleyton Wall after the MSF Agenda was compiled. Application tabled at meeting for consideration by Sub-Committee Members present. Consensus reached that Lleyton Wall receive \$1500.00 to assist with the expenses he will incur travelling to and competing as member of the Australian (16 - 19 years) Team at the ITU World Triathlon Championships to be held in Lausanne, Switzerland from 20th August - 1st September 2019 inclusive.

Draft Sign Format

ALCOHOL-FREE ZONE Zone 1

CONSUMPTION of ALCOHOL PROHIBITED





From: 1/10/19 To: 1/10/23

Non-compliance may result in immediate seizure and disposal of alcohol

Draft Sign Format

ALCOHOL-FREE ZONE Zone 2

CONSUMPTION of ALCOHOL PROHIBITED

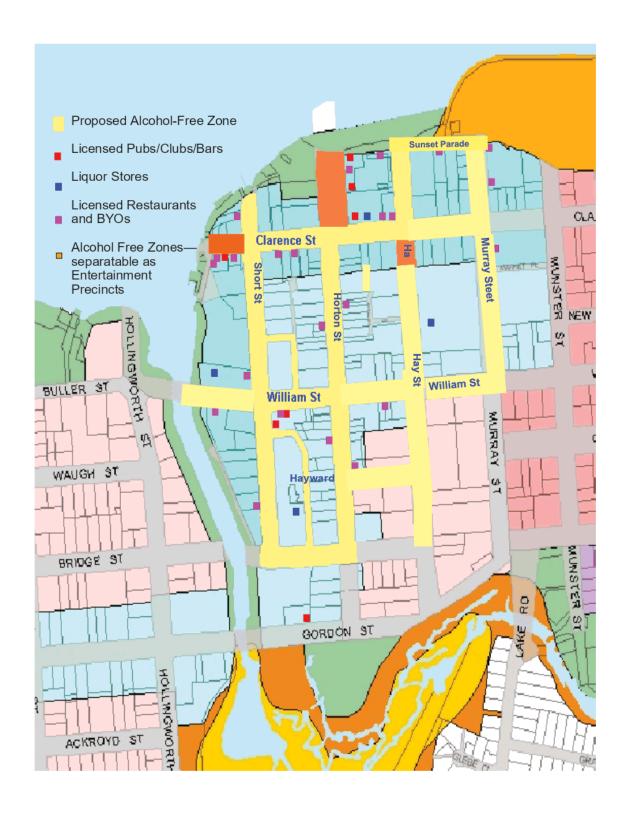




From: 1/10/19 To: 1/10/23

Non-compliance may result in immediate seizure and disposal of alcohol

Port Macquarie CBD Map - Alcohol Free Zone - 2019- 2023





8th July 2019

Port Macquarie-Hastings Council
Group Manager – Community Place
Strategy and Growth

Dear Ms Lucilla Marshall,

Please be advised that the Hastings Liquor Accord endorses the Reestablishment of the Alcohol-Free Zone in the CBD for a further four years from October 2019 to October 2023.

Please to do not hesitate to contact us if you require any further information.

On behalf of the Hastings Liquor Accord.

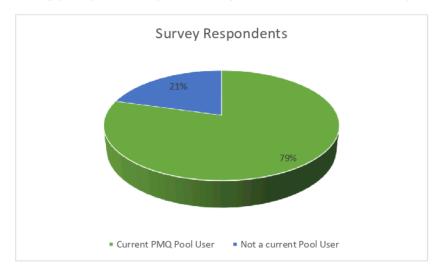
Kindest Regards,

Mrs Nacqueline Cudmore

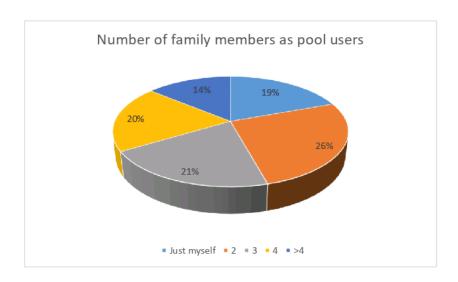
Respondent Data

1. Pool Use

Survey participants were predominantly current users of the Port Macquarie Pool.

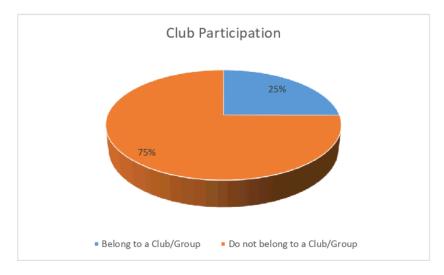


Survey participants responded on behalf of family members, with 80% having multiple family members using the current facility.



2. Club Participation

Approximately one quarter of all Port Macquarie pool users belong to an organised club or group.

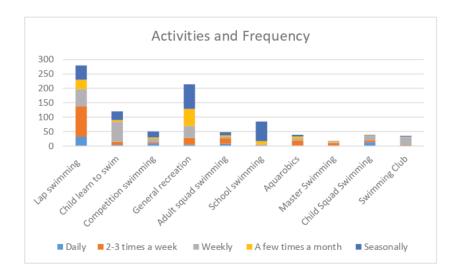


Of those that belong to a club, nearly 90% are members of a swimming club, triathlon club, masters group or aquarobics.



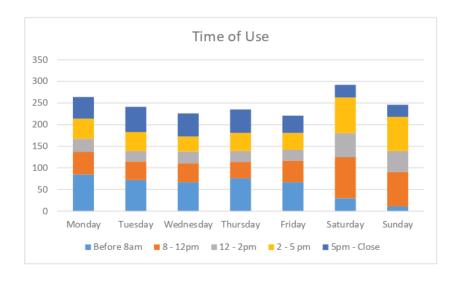
3. Activities

Lap swimming and general recreation were the predominant activities undertaken at the Port Macquarie Pool. More than 100 users, or approximately 25% of those surveyed, swim laps two-three times per week.



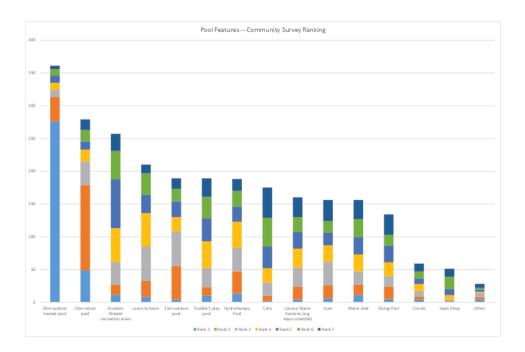
4. Time of Use

The total number of users was relatively consistent across the week, with most respondents indicating that Saturday was the most popular day to use the pool. During the week, users were most likely to visit the pool prior to 8am, whereas on the weekend, the 8am-12pm timeslot was the most popular.

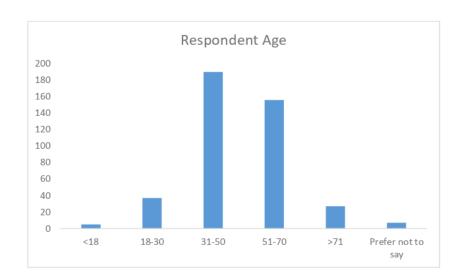


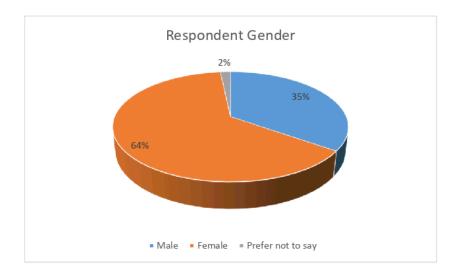
5. Desired Facilities

Approximately 90% of respondents nominated a 50 metre pool as a desired facility. Nearly three-quarters of participants also indicated that a 25 metre indoor pool should be included in a new aquatic facility.

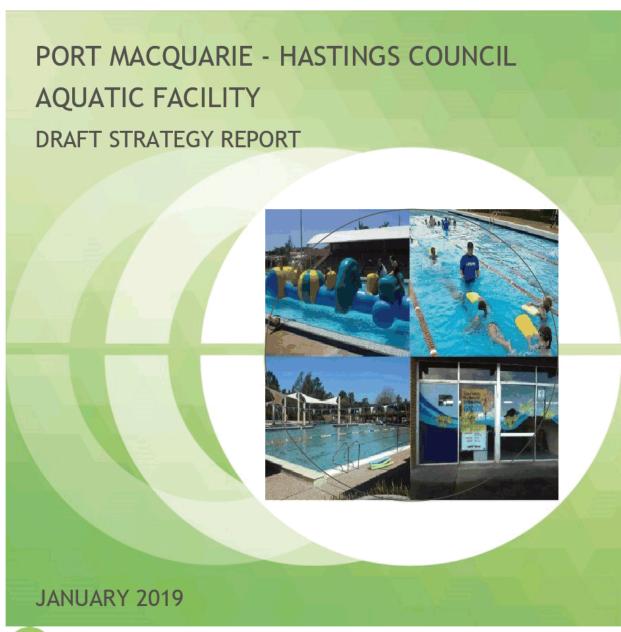


6. Demographics of respondents









OTIUM

SPORT+LEISURE

Page 1

Introduction

The Port Macquarie Aquatic Facility Strategy will inform Council of the future aquatic facility development options required to provide for Port Macquarie – Hastings future population estimated to increase to 103,993 by 2036.

Port Macquarie - Hastings Council has four aquatic facilities and these are currently managed on behalf of Council through a facility management contract:

- · Port Macquarie Olympic Pool (Regional size facility and user catchment)
- · Wauchope Memorial Olympic Pool (District size facility and user catchment)
- Laurieton Memorial Swimming Pool (Local size facility and user catchment)
- Kendall Swimming Pool (Local size facility and user catchment).

This strategy is a blueprint for delivering a high quality and economically sustainable facility which responds to current and future demand whilst also fulfilling community expectations of providing accessible swimming facilities to the community. The key project objective was to determine the aquatic facility requirements to meet Port Macquarie- Hastings population of 103,993 by 2036.

Project Methodology

The following table details the methodology used to undertake the aquatic facility review.

Table 1: Project Staging and Tasks

Stage	Task
Phase 1 Situation Analysis	Project Clarification Meeting
	Site Inspections
	Literature Review
	Review Current Facilities and Operations
Phase 2: Future Aquatic Strategy	Demographic Profile
	Aquatic and Leisure Facility Trends Linked to Future Aquatic Demand
	Competitor Facility Review
	Potential New Aquatic Facilities for Port Macquarie
	Port Macquarie Aquatic Facility Overview
	Draft Future Aquatic Strategy
	Review of Draft Future Aquatic Strategy
	Complete Final Aquatic Strategy

Completed tasks and next steps

The green shaded boxes cover the stage one tasks completed and the black shaded boxes cover the stage two aquatic strategy.

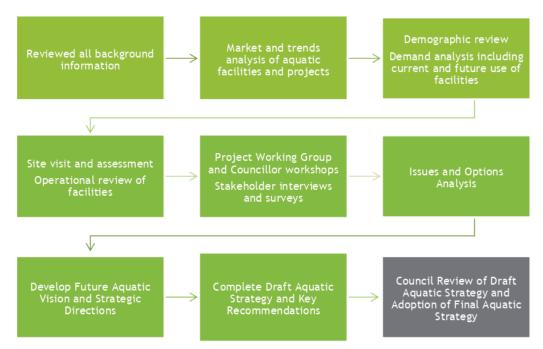


Figure 1 Project Process Steps and Progress

Who are we planning for?

This section profiles the project area and demographic characteristics of the Port Macquarie - Hastings community.

The Project Area

Port Macquarie - Hastings Council is located on the Mid North Coast of New South Wales, 420 km north of Sydney and 510 km south of Brisbane. Port Macquarie is a popular tourism destination for holidaying located on the Hastings and Camden Haven Rivers that stretch from stunning beaches to the Great Dividing Range hinterland.

Other townships within the municipality include Wauchope (major inland township considered the gateway to 40,000 ha of National Parks and State Forests), Dungbogan, Kendall, Kew, Laurieton, North Haven and West Haven.

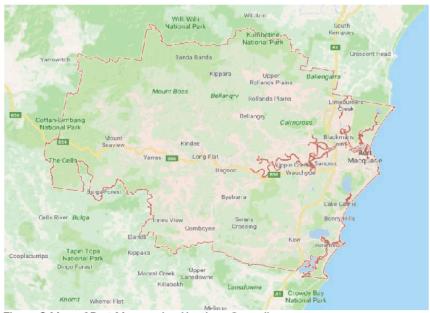


Figure 2 Map of Port Macquarie - Hastings Council area

Resident Profile

The following section summarises the key population and demographic characteristics and trends likely to impact future participation in sport and recreation within the Port Macquarie – Hastings Council area.

The population and demographic profile are based wherever possible on the 2016 ABS Census data and has been sourced from .id, an online company that analyses ABS Census data. The following provides a snapshot of the current demographic and population characteristics.

Population

 The Port Macquarie - Hastings Council has an Estimated Resident Population for 2016 of 79,905 people (i.d. profile 2016). The Council area population by 2018 was estimated to have increased to 82,370 people.

- Analysis of the five-year age groups of Port Macquarie Hastings Council area in 2016 (ABS)
 compared to Regional NSW shows that there was a lower proportion of people in the younger age
 groups (under 15) and a higher proportion of people in the older age groups (65+)
- The largest population groups fall into the 34-49 years followed by the 50-84 years and 10-34 years age groups.
- The Port Macquarie Hastings Council has a larger percentage of residents aged 70 to 74 years
 (7.0%) and 65 to 69 years (8.0%) than there is in Regional NSW (5.0% and 6.4% respectively). These
 two age groups also experienced the largest growth in numbers between 2011 and 2016 (+1,409
 and +1,091 respectively)
- It is expected that the population within the Port Macquarie Hastings Council area will increase by 30.1% from 79,905 in 2016 to 103,993 in 2036. The largest annual average rate of change is predicted to occur between 2016 and 2021 before slowing down
- Port Macquarie is the largest town with a population of over 45,000 people in 2016
- These most active age groups that are high users of aquatic facilities are between 5 and 49 years). It
 is estimated that the active years segment will grow by 28.1% between 2016 and 2036 and consist
 of 48.652 people or 46.8% of the total proportion of population.

Diversity

- Cultural diversity is relatively low with 4.0% being born in a non-English speaking country, and 3.0% speaking a language other than English at home, compared to 5.8% and 5.8% in Regional NSW
- Aboriginal and Torres Strait Islander people made up 4% (3,174) of the population in 2016, slightly
 higher than the national average. There is a high proportion of Aboriginal and Torres Strait Islander in
 the 0 to 17 years and 25 to 34 years age groups suggesting a high number of young families

Disadvantage and Social Capital

- Individual income levels of residents in the Port Macquarie Hastings Council area in 2016 compared
 to Regional NSW shows that there was a lower proportion of people earning a high income (those
 earning \$1,750 per week or more) and a higher proportion of low income people (those earning less
 than \$500 per week).
- There is a moderate level of disadvantage in Port Macquarie Hastings area with the municipality ranking 61st on the SEIFA Index of Relative Social-Economic Disadvantage with a score of 976 in 2016
- There is an increasing and high proportion of people reporting a need for assistance due to disability.
 5,797 people or 7.4% of the population in Port Macquarie Hastings Council area in 2016, reported needing assistance due to disability, compared to 6.3% in Regional NSW.

Housing and Transport

There are 85.4% of households that own one or more vehicles, which is higher than the Regional NSW population where 84.7% own one or more motor vehicles.

Population Distribution

The table below details the Council area population distribution as detailed on Councils id profile web pages by suburb or planning areas.

Table 2: Port Macquarie Hastings Population by Area 2016

Council Area	2016 Population	Land Area (hectares)	Density of Population (persons/ha)
Town Beach/CBD	1,098	92ha	11.92
Lord Street	1,721	85ha	20.10
Flynn's Beach	2,202	93ha	23.82
Gordon Street	2,299	96ha	25.33
Westport	7,402	1,253ha	6.17
Council Area	2016 Population	Land Area (hectares)	Density of Population (persons/ha)
Hasting River Canals	2,794	266ha	9.93
Shelly Beach/Bellevue Hill	11,465	664ha	17.47
Lighthouse Beach/Green Meadows	12,184	1,240ha	9.94
Innes Peninsula	4,483	1,314ha	3.30
Thrumster	505	550ha	1.00
Lake Cathie/Bonny Hills	6,344	7,423ha	0.88
Camden Haven East	6,020	6,351ha	0.97
Camden Haven West	3,427	3,701ha	0.95
Port Macquarie Rural Fringe	3,713	19,000	0.19
Wauchope	7,423	3,701ha	2.03
Rural	6,825	322,760ha	0.02
Total	79,905	368.610ha	0.22/ha

Source: i.d. profile 2017. Yellow shading denotes majority of the urban area of Port Macquarie

The population distribution is important to where facilities are located and where the future population expansion is likely to occur. The urban area of Port Macquarie (listed in yellow shading) caters for the Council areas main population. It covers 10 planning/suburb areas and had a projected population in 2016 of 46,153 people.

Coastal areas outside of the Port Macquarie urban area cover 2 planning areas (listed in blue shading) and had a projected population in 2016 of 12,364 people. Inland areas adjacent to coastal areas and Port Macquarie (listed in orange shading) cover 2 planning areas and had a projected population of 7,140 people.

Rural areas and inland towns cover 2 planning areas (listed in green shading) and cover the balance of areas and had a projected population of 14,248 people.

Population Distribution Change 2017 to 2036

The following table highlights projected population change in the Council area between 2016 and 2036 based on the current planning areas.

Table 3: Port Macquarie Hastings Population Change by Area 2016 to 2036

Council Area	2016 Population	2036 Projected Population	Change in Population 2016 to 2036
Town Beach/CBD	1,098	1,573	+475
Lord Street	1,721	2,448	+728
Flynn's Beach	2,202	2,411	+209
Gordon Street	2,299	3,055	+706
Westport	7,402	7,596	+194
Hasting River Canals	2,794	2,848	+53
Shelly Beach/Bellevue Hill	11,465	11,910	+445
Lighthouse Beach/Green Meadows	12,184	13,308	+1,124
Innes Peninsula	4,483	7,617	+3,134
Thrumster	505	7,695	+7,190
Lake Cathie/Bonny Hills	6,344	9,898	+3,554
Camden Haven East	6,020	6,553	+532
Camden Haven West	3,427	4,927	+1,500
Port Macquarie Rural Fringe	3,713	5,588	+1,875
Wauchope	7,423	8,895	+1,472
Rural	6,825	7,722	+897
Total	79,905	103,993	+24,089

Future population trends to 2036 indicate an estimated 24,089 residents (+30.1%) with the largest future population growth areas are likely to be Thrumster (+7,190 people), Lake Cathie/Bonny Hills (+3,554) & Innes Peninsula (+3,134). Population growth is also projected to occur in the Port Macquarie Rural Fringe (+1,875), Camden Haven West (+1,875), Wauchope (+1,472) and Lighthouse Beach/Green Meadows (+1,124).

The map below demonstrates the predicted change in population within Port Macquarie - Hastings Council between 2016 and 2036. The red and yellow areas show the greater population density while blue and green demonstrated areas of lower population density. We have also plotted the four Council swimming pools on the map as well as private aquatic centres.

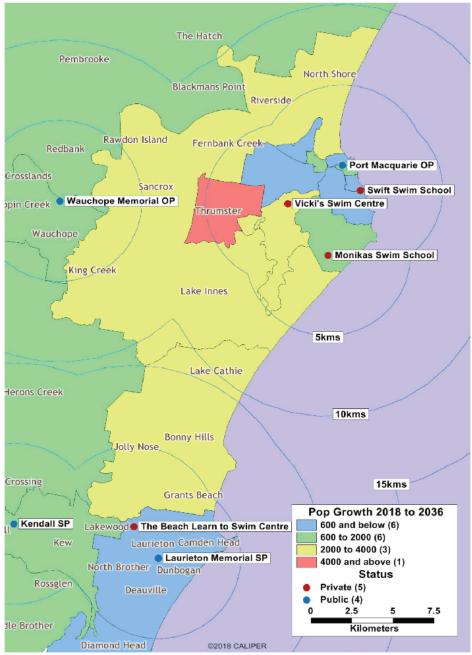


Figure 3 Population growth between 2018 and 2036 maps and facility catchment areas

The map below shows the largest population areas predicted in 2036.

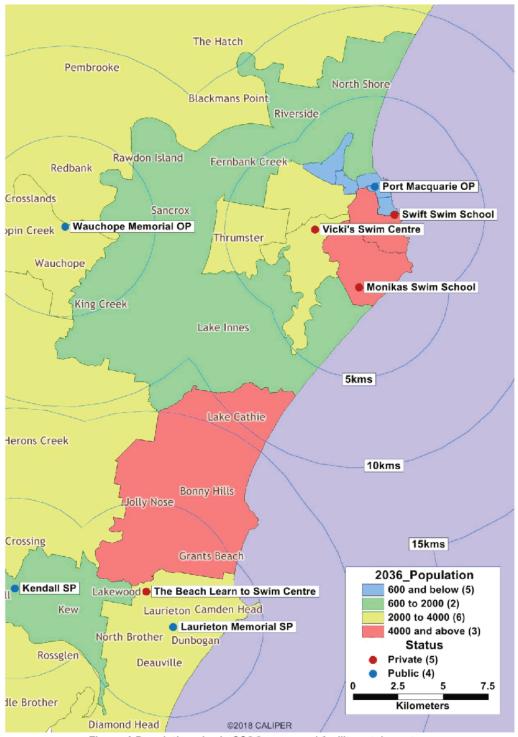


Figure 4 Population size in 2036 maps and facility catchment areas

Key Findings from Resident Profile

Demographic characteristics have implications on the provision of aquatic facilities in the municipality including the following:

- The resident population in 2016 was estimated at 79,905 people.
- It was estimated that just over 46,000 people lived in the Port Macquarie urban area which was being serviced by the Port Macquarie Olympic Pool.
- A total of 7,423 were estimated to live in the Wauchope Town area and surrounds with a further 6,825 people living in rural areas. Wauchope Memorial Olympic Pool and Kendall Swimming Pool provided facilities for the majority of these people.
- Coastal areas away from the Port Macquarie area were estimated to have 12,364 people (Camden Haven East/Lake Cathie/Bonny Hills) and Laurieton Memorial Swimming Pool provided facilities for the majority of these people.
- In 2016, there was an increasing number of young people and families, which means there will be a
 greater demand for facilities targeting children and families such as waterslides and learn to swim
 programs
- There is a high percentage of the population with a low income indicating the importance of reasonable fees and charges
- Port Macquarie Hastings Council have a higher proportion of people in older age groups (60+).
 Providing 'active ageing' programs, therapy facilities and services and accessible facilities will become increasingly important
- There is an increasing and high proportion of people reporting a need for assistance due to disability showing the need to provide accessible aquatic facilities and services
- Port Macquarie Hastings Council residents will primarily access aquatic facilities by car with over 85% of residents owning one or more cars. It is therefore important to strategically place aquatic facilities across the municipality to service all community members and where there are large population areas.
- The Council areas population is projected to increase from 79,905 people in 2016 to 103,993 people in 2036 which is an estimated 24,089 more people (+30.1%).
- The largest future population growth areas are likely to be South and West of the Port Macquarie urban area being Thrumster (+7,190 people), Lake Cathie/Bonny Hills (+3,554) & Innes Peninsula (+3,134).
- Population growth is also projected to occur in the Port Macquarie Rural Fringe (+1,875), Camden Haven West (+1,875), Wauchope (+1,472) and Lighthouse Beach/Green Meadows (+1,124).
- Port Macquarie Hastings Council area has been nominated as one of the fastest growing regional area in NSW.

Council Aquatic Facilities - Operational Review

The Port Macquarie - Hastings Council has four aquatic facilities, managed on behalf of Council through a facility management contract including:

- · Port Macquarie Olympic Pool (Regional user catchment)
- · Wauchope Memorial Olympic Pool (District user catchment)
- · Laurieton Memorial Swimming Pool (Local user catchment)
- Kendall Swimming Pool (Local user catchment)

Whist these facilities are contracted out to a commercial management company, Council has the responsibility for major facility maintenance, capital works and future planning for the Centres.

The following table lists the location, components, main programs and operating details for each aquatic facility

Table 4 Port Macquarie - Hastings Council Aquatic Facilities Overview

Facility	Location	Components		Operating
Port Macquarie Olympic Pool	28 Gordon Street Port Macquarie NSW 2444	Heated Outdoor 50m pool, 25m x 18m pool and toddler's pool & Indoor LTS pool. Kiosk facilities	Learn to Swim Squad Swimming Functions Fitness (Cross Training) Aqua classes Swim Club School Parties Birthday Parties Sporting Events	11 months of the year (Closed July)
Wauchope Memorial Olympic Pool	3 Cameron Street Wauchope NSW 2446	50 metre heated pool with accessible ramp entry with 1 metre & 3 metre diving boards An outdoor toddlers pool with shade cover Change room facilities and public toilets Waveless lane ropes and wave starting blocks Kiosk facilities Electric BBQ Children's Splash pad	Learn to Swim Squad Swimming Functions Fitness (Cross Training) Aqua classes Swim Club Diving Club School Parties Birthday Parties Sporting Events	Seasonal
Kendall Swimming Pool	1 Orara Street Kendall NSW 2439	25mt, 6 lane solar heated pool that has a wheelchair accessible ramp. Toddler's area with water feature. Half-Court Basketball Kiosk Electric BBQs	Learn to Swim Squad Swimming Fitness (Cross Training) Aqua Classes School Parties Birthday Parties Sporting Events	Seasonal
Laurieton Memorial Swimming Pool	1 Laurie Street Laurieton NSW 2443	33m Lap Pool Toddler's Pool Kiosk	Learn to Swim Squad Swimming Functions Fitness (Cross Training) Aqua classes Swim Club School Parties Birthday Parties Sporting Events	Seasonal

Port Macquarie Olympic Pool

The Port Macquarie Olympic Pool was officially opened in 1966 and is now 52 years old. The Centre hosts a range of programs including learn to swim, squad training, fitness sessions, school parties, birthday parties and sporting events.

Located off Gordon Street, Port Macquarie the facilities include heated outdoor 50m, 25m and toddlers pool and an indoor program pool (owned by the contractor).

These facilities have allowed the centre to host major events including the 2017 NSW Country Championships which ran for 2 days hosting 280 athletes.

Attendance at Port Macquarie Olympic Pool averages around 135,000 visits per annum with main usage being casual swimming, learn to swim (LTS) program and squad training.

A local Swim Club and Triathlon Club operate from the facility. Both clubs have strong memberships and seek additional pool lane space in peak times of use.

Visitation Trends

The following graph shows the attendance at Port Macquarie Olympic Swimming Pool over the 2014/15 to 2017/18 period.

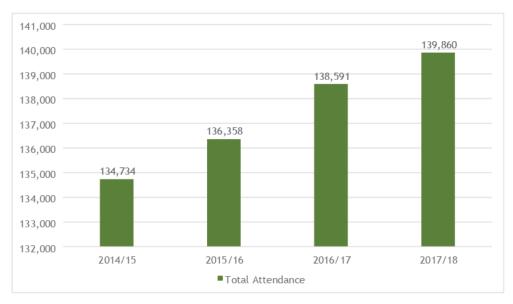


Figure 5 Total Attendance at Port Macquarie Olympic Pool 2014/15-2017/18

A review of the Port Macquarie Olympic Pool total highlights attendances have increased from 134,734 in 2014/15 to 139,860 in 2017/18, an increase of 4%.

The review has identified that the increase in use of the 50m pool and Learn to swim program have been the main activities that have impacted usage increases. Most users reside in the Port Macquarie urban area with a total of 89% of the learn to swim program participants come from Port Macquarie (postcode 2444).

Technical and Asset Renewal Reviews

In 2010, Geoff Ninnes Fong and Partners (GNFP) completed a comprehensive structural review of Port Macquarie Olympic Swimming Pool. This report included the assessment of:

- · Current structural condition and adequacy
- Pools' filtration and water treatment plant performance and condition and its compliance with the NSW Health Department's "Public Swimming Pool and Spa Pool Guidelines".

The report found:

- The pools, tanks and joints are in very poor structural condition in terms of adequacy to resist applied loads and in terms of water loss, having cracked and undergone deformations and settlements under the various loads noted
- The pools turnover periods and rates fall far short of the recommendations of the NSW guidelines and the performance of the pools is considered unacceptable and in significant non-compliance with the NSW guidelines
- The pools require separate filtration and water treatment systems to comply with the NSW guidelines, and in their current situation are non-compliant, given only a common filtration and water treatment system
- The overall condition of the pools are considered unacceptable in terms of the pools' retention and upgrading. GNFP recommends that the pools be removed and replaced with new pools which would have a future life expectation of at least fifty years
- The pools have experienced considerable settlement, both general and differential, and have been structurally damaged by these movements, mainly due to soil movements. The shells have been fractured, the joints significantly damaged, and the surface treatment (tiles) deleteriously affected. Increasing corrosion of reinforcement and consequential spalling of concrete and tiling damage will occur as an on-going process over the life of the pools, increasing in severity as time passes. If no rectification work is carried out.
- GNFP believes the effective functional life of the pools is within the maximum range 5 to 10 years, but stresses that ongoing repairs and maintenance costs will be significant and will be increasing in cost and severity each year
- GNFP does not believe repair of the pools in their current location will be a practical or cost efficient long-term solution, given the very poor site conditions in which the pools are located.
- The required repairs will be expensive, and highly likely to cost as much or more (given the extra costs
 of repair/rectification in a very low-grade site) than new pools on a much more amenable site.
- The indicative costs for upgrade works were \$4,905,000.

Since completing this report, Council has continued to repair and maintain the pools, regularly monitoring the impact of the ground movement on the pools and high water consumption due to leakage of the 50m and 25m pools.

Key Operational Review Findings

- Currently, the Port Macquarie Pool generates no financial return to Council and are experiencing significant rising energy and water costs.
- Rising energy use and the high levels of water loss at Port Macquarie Olympic Pool show a very high
 environmental impact due to leaking pool structures. All future developments should consider
 environmental sustainable design and water sensitive urban design features to minimise energy and
 water use

- Port Macquarie Olympic Pool usage focuses on mainly training/competition in the 50 m pool and learn to swim in the indoor learn to swim building. The learn to swim program peaks in the warmer months with 600 students enrolled at the Port Macquarie Olympic Pool each week. This is having an impact on other users with squad swimmers seeking more time for training but unable to obtain access to the pool and restricted laps and times for the general public use
- Port Macquarie Olympic Swimming Pool is currently in very poor condition and near the end of its
 functional life. Council will need to make a decision on the pool's future in the short to medium term
 for the renewal of existing assets will be a substantial cost.

Market Research Analysis

This section analyses the current and future demand and supply of facilities. It considers the impact of participation, recreation and facility trends and compares other like facilities.

Previous Reports and Strategies

A review of previous reports and strategies is covered in this section

Port Macquarie Aquatic Facility Feasibility Study (Thompson Tregear) 2000

The study investigated the feasibility of developing a modern, multipurpose aquatic centre for year-round use in Port Macquarie.

The study recommended the development of a new indoor / outdoor complex on either two sites being the existing Port Macquarie Olympic Pool site (Council's preference in 2000) or at Macquarie Park.

The project was proposed over five stages:

- Stage 1: Indoor pool hall; Reception, catering, administration block; Change rooms and toilets in the new grandstand; Additional parking facilities for 42 cars; The existing 50 m outdoor pool is retained pending replacement in stage 4; Other existing outdoor pools are removed
- · Stage 2: Fitness centre
- · Stage 3: Indoor hydrotherapy / spa area
- · Stage 4: Reconstruction of the outdoor pool and plant to FINA competition dimensions
- Stage 5: Development of the remaining outdoor area as an aquatic theme park.

The study highlighted the significant community pressure on Council to provide a 'quick fix' solution to the lack of indoor heated water through an interim upgrade to the existing 25 m outdoor pool.

The report was also set up to review the findings of the 1999 operational review of existing pool facilities.

The key recommendations of the 1999 review were:

 That Council investigate the prospects of replacing the Port Macquarie Olympic Pool with a modern, year-round operating facility designed specifically to meet the needs of the communities

The study concluded that there was a strong, unsatisfied demand for year-round 'new generation' modern aquatic and leisure centre. A purpose-built hydrotherapy pool was also recommended to complement the hospital pool.

There was a latent learn to swim market with a potential market at the time of 800 enrolments. The Port Macquarie primary catchment area could support a viable modern aquatic and leisure facility. A fitness gym and aerobics room was recommended to complement the aquatic facilities to provide revenue to the facility.

In the 1999 review there were sixteen sites that were identified and investigated for a new aquatic and leisure facility. Four sites were recommended for future consideration:

- Existing Port Macquarie pool site Council's preference in 2000
- Macquarie Park Consultant's preference in 2000
- Stuart Park
- · Westport Park

Port Macquarie Aquatic Facility Council Report 2005

The Council resolved to endorse Macquarie Park as the preferred site for a new Port Macquarie Aquatic Facility and for the preparation of a preliminary design for the new facility as part of this studies key objectives.

The recommendation followed four years (since 2001) of investigations by an Aquatic Facilities Working Party. The proposed scope of the new facility would require a 2.4 ha site (1.5 ha building and 0.9 ha car parking) and include:

- Outdoor 10 lane 50 m pool
- Diving pool
- Indoor 25 m pool
- · Program pool (hydrotherapy)
- Recreation pool / children's play area
- · Water slide and water features
- Professional consulting suites
- 1000 m² gymnasium
- Aerobics room
- · Foyer / Reception
- Retail Space
- Creche
- Food outlet / coffee shop
- · Car parking

The report found that the existing Port Macquarie Olympic Pool site was not large enough to include all proposed facility components and the cost of adjacent land, zoned Special Business was significantly higher than alternative close by sites located on land zoned for Open Space.

The Macquarie Park site was recommended for it was a greenfield site on Crown Land zoned for Open Space that permits the construction of car parking, community facilities, recreation areas, recreation facilities (including swimming pools) and utility installations.

A preliminary concept plan for the new facility on Macquarie Park was prepared. The plan provided for the proposed scope of the new facility and retained the existing netball courts. The sport oval would be lost resulting in Council actively investigating the feasibility of providing sporting fields on land owned by Council in the Greenmeadows area to relocate existing sports use on fields at Macquarie Park.

An approach to the Department of Lands was made at the time. Advice to Council was that the acquisition of Macquarie Park was preferred rather than Council continue as Trust Manager of the Crown Land Reserve.

Status: This project has not proceeded since this Council resolution and is now being revisited as part of this Aquatic Facility Strategy Review.

Three sites were considered and concept plans prepared. These are listed on the following pages.

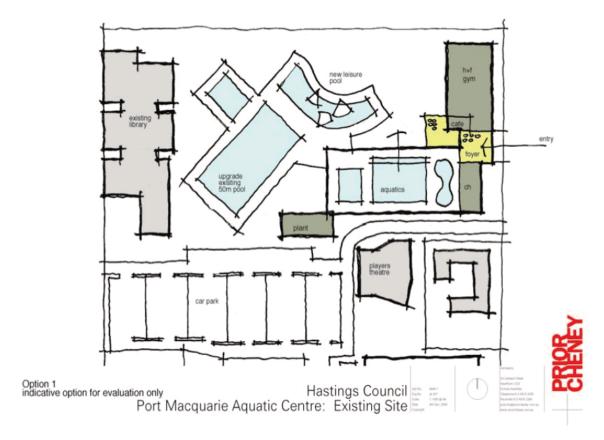


Figure 13 Concept Plan for Existing Port Macquarie Olympic Pool Site

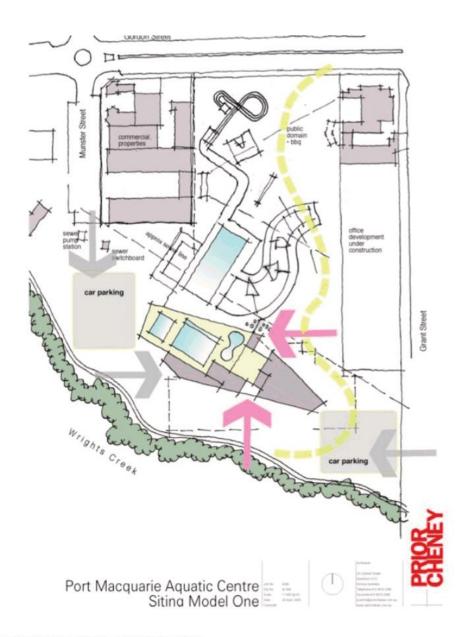


Figure 14 Concept Plan for Macquarie Park Site

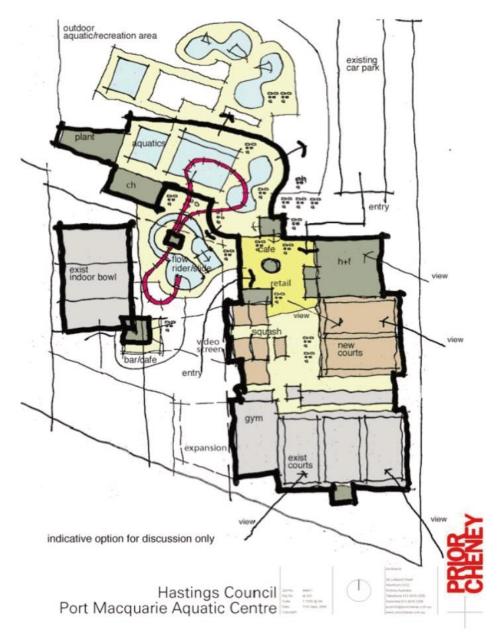


Figure 15 Concept Plan for Stuart Park Site

Aquatic Facilities Structural Report (Geoff Ninnes Fong Partners) 2010

In 2010, Geoff Ninnes Fong and Partners (GFNP) completed a comprehensive structural review of Port Macquarie Olympic Pool. This report included the assessment of:

- Current structural condition and adequacy
- Pools' filtration and water treatment plant performance and condition and its compliance or otherwise with the NSW Health Department's "Public Swimming Pool and Spa Pool Guidelines".

This report followed a subsequent structural report in 1999.

Key findings about the structural condition of the report have been reported under the operational review section of this report. The reports listed the following recommendation:

Port Macquarie Olympic Pool: GNFP recommends finding an alternative site for a new aquatic centre
in Port Macquarie for the repair or upgrade of the pools in their current location would not be a
practical or cost-efficient long-term solution, given the very poor site conditions.

Status: A series of upgrade works have been undertaken to keep the pools operational. Council has now commissioned the Aquatic Facilities Strategy to determine future aquatic facility priorities and strategies.

Physical Activity Participation Rates

AusPlay is the national population tracking survey funded and led by the Australian Sports Commission (ASC) and follows on from the previous Exercise, Recreation and Sport Survey (ERASS) and Australian Bureau of Statistics, 'Children's Participation in Cultural and Leisure Activities, Australia'.

Key participation statistics from the 2015-2016 survey show:

- 87% of people aged 15 and over participated in organised sport and physical activity
- 69% of children aged 0 to 14 years participated in some form of organised sport or physical activity outside of school hours
- 59% of people aged 15 and over participate in sport or non-sport related physical activity three or more times per week
- 54% of children aged 0 14 years are active at least once a week through organised sport or
 physical activity outside of school hours. Only 19% of children are active at least three times per
 week, highlighting the critical role of school physical activity programs
- Physical health or fitness is the strongest motivation for non-sport related physical activity followed by fun and enjoyment
- Adults up to middle-age identify time pressure to be the main barrier to participation. Poor health or injury then become main factors
- The main barrier to young children's participation is their parents' perception that they are too
 young to start playing
- The use of technology for sport or physical activity is gaining in popularity with 39% of adults using Apps for tracking activity and wearable technology
- Fitness/gym (32.1% and ranked 2) and swimming (14.5% and ranked 4) were in the top 20
 activities for adults. They were also ranked 1 and 2 respectively for adults participating through
 organisation/venue.
- Swimming is ranked 1 (30%) in the top 20 activities for children participating in organised sport
 out of school hours activities.

In 2013, The Australian Sports Commission commissioned the CSIRO to research future sports trends, including the impact of megatrends – patterns of social, economic or environmental changes that influence sports participation (Future of Australian Sport: Megatrends shaping the sports sector over the coming decades, Australian Sports Commission, 2013).

The research found activities supported by aquatic and leisure facilities including swimming, aerobics and fitness/gym participation rates per capita have increased in recent years and remains within Australia's top 10 sport and recreational activities.

The key megatrends profiling the types of participant identified in the Australian Sports Commission's the Future of Australian Sport report that can support greater participation in swimming and fitness/gym include:

- · A perfect fit personalised sport for health and fitness
- More than a sport achieving health, community and overseas aid objectives via sport
- · Everybody's game sports that respond to demographic, generational and cultural change.

Aquatic, Leisure and Health and Fitness Facility Trends

This section draws together a large range of information on aquatic, leisure, health and fitness and associated wellness facility trends.

Leisure Facility Catchments

Leisure and sporting facility trends and benchmarking generally indicates that local or municipal facilities have a primary catchment radius of approximately 5 km and a secondary catchment radius of 10 km.

User catchment research trends indicate approximately 75% to 85% of users normally reside within a 0 km to 5 km radius of a facility with the remaining 15% to 25% coming from areas within the 5 km to 20 km radius of the facility.

Local small facilities will have a smaller secondary user catchment whilst larger regional facilities that provide larger and more facility components and usually a larger number of programs and services will draw users from a much wider catchment than a local/municipal facility.

The size and shape of the catchment area will be influenced by several factors including the range and quality of facilities and services offered, natural and built barriers i.e. waterways, beaches, rivers, freeways, travel times and the availability of competing facilities.

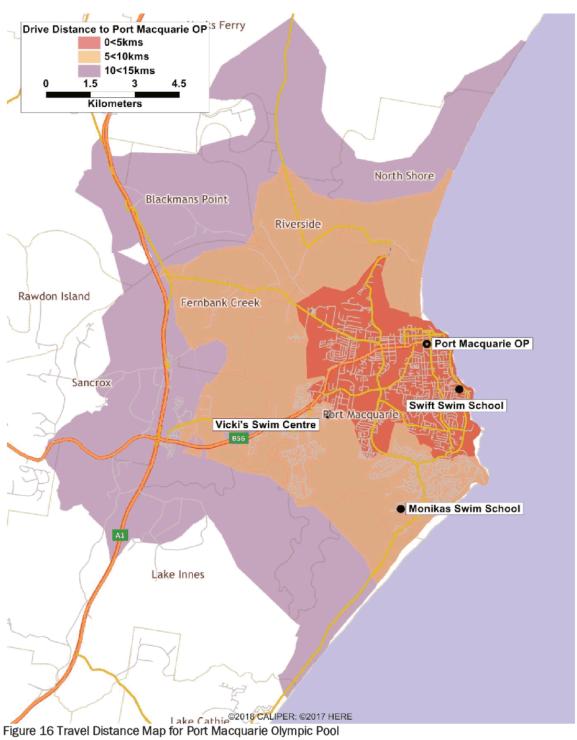
In metropolitan cities, it is not uncommon for facilities to share catchment areas, particularly the secondary catchment areas. In regional areas this will depend on distance to closest competing facility.

The maps on the following pages show the travel distances for each facility demonstrating the reach of the primary (5 km) and secondary (10 km) catchment areas.

Private swimming facilities are also identified on the travel distance maps and show particularly in the Port Macquarie urban area a competitive learn to swim market place.

The user catchment mapping indicates:

Port Macquarie Olympic Pool: Has the largest population within the 5km primary catchment zone. It also has 2 private swim school pools in the primary catchment zone and 2 private swim school pools in its secondary catchment zone. The estimated population in the primary and secondary catchment zones is in excess of 46,000 people and this is adequate to service a regional facility.



Aguatic and Leisure Facilities Trends

This section highlights the range of general sport and recreation trends that are likely to impact on local communities and facilities in the future.

A gradual ageing of the population.

As life expectancy increases, birth rates stay low and the "baby boomers" of the 1950s and 1960s grow older, this is placing a demand on providing specific older persons programs. In aquatic and leisure facilities, this includes programmed hotter water areas as well as pools suitable for therapy and older adult exercises. This is contributing to a need for aquatic facilities to have a range of pools with different water depths and temperatures, as well as for services and programs both water and gym/health and fitness based to meet their needs.

Flexibility in the times when people recreate.

As demands on people's time increases and work practices change, people are seeking to take their sport and recreation at different times, over a broad spread of hours and at facilities that offer a variety of activities under the one roof. Indoor pools and health and fitness facilities are particularly attractive and becoming easier to use, as many are open 12 to 16 hours per day, 7 days a week, with some now also open 24/7.

Increased variety in leisure options.

People's sport and recreation options are changing towards newer more varied activities offered over a greater range of timeframes compared to previous decades where limited variety in activities and scheduling occurred. This has supported the trend to more multi-use facilities to attract a broader range of users as well as multiple programs to meet different needs at the one facility.

Constraints to leisure participation.

Lack of time, lack of facilities close by, family and work constraints, health problems and cost of service or use of facilities are the main constraints to many people's leisure participation. The development of targeted markets of users, programs and services at many aquatic and health and fitness centres has assisted in reducing some of these participation constraints.

Changing employment structures, trading and work hours.

These trends often make participation in traditional sport and recreation activities difficult and therefore people are looking for facilities that are open longer hours and have a lot of activity options at the one site. This makes opportunities such as indoor pools and health and fitness centres and indoor sports courts attractive as their long opening hours and days open per year means usage can be made in a wide range of social, training, competition and educational settings.

Different people want different activities.

The different population characteristics such as age, gender and cultural background of the population sees the need for facilities to offer potential users a much more varied range of programs and services than previously offered. All year round available indoor and outdoor aquatic and leisure facilities also provide the greatest diversity of activities throughout the different seasons impacted by the areas weather.

Provision of high standards and quality of facilities and services.

People are increasingly seeking high standard, high quality facilities and services to meet their sport and recreation needs. This has also seen the trend for indoor facilities becoming very popular

as they allow activity in safe and secure spaces in all weather and environmental conditions. Providing low standard, low cost facilities will not attract the maximum user market.

· Desire for activities to be affordable.

The development of multi-purpose aquatic, fitness and indoor sport centres has enabled the high operating cost activities, such as aquatics, to be cross subsidised by more profitable activity areas such as health and fitness, food and beverage and entertainment areas. This has enabled many facilities to keep general entry fees low to encourage use whilst seeking users who want special services to contribute at a greater level to the cost of such activities. In general, there is a greater reliance on locally accessed and lower cost opportunities by those without the resources to travel and pay for more expensive activities.

Recognition of strong links between physical activity and health.

Preventative health care and active lifestyles are very important to many people and aquatic, health and fitness and indoor sport activities are becoming a large part of people's activity choices. There is increased recognition of the strong links between involvement in recreational activity and good health, and the development of appropriate activities and services, which support this.

Expectations of equity and access.

People with special needs must be catered for in public aquatic and leisure facilities. This has seen improved design features to increase accessibility to and within such facilities. Added to this is the growing array of programs and activities offered to people of all abilities, physical condition and skill levels.

· Sustainable Development

In addition to the trends above there are specific trends relating to recreation and sporting facility development such as facility planners and operators need to respond to community demand for more sustainable and ecofriendly infrastructure.

Sport and Recreation - Changing Environment

All sports and recreation providers are operating in an environment of change. There are many challenges that will need to be dealt with for future facility planning including:

- Consumer Expectations: Because of consumers being exposed to high quality programs, events
 and services through the media and other leisure industry providers they are expecting more and
 more from their sport and recreation programs. This includes quality of facilities, support amenity,
 player and spectator comfort, quality of service, coaching and expecting the service to be provided
 when they want it. However, this has meant that significantly less program space can be achieved
 per investment dollar.
- Changing population demographics: Australia's population is ageing. The percentage of population
 of 5 to 14-year olds will continue to decrease with the greatest growth in the 55+ age group. This
 will create a demand for programs and services in sport that go well beyond a focus on junior sport.
- Competition for participants: All Australia's sporting codes have recognised the need to recruit
 young players into their sport at an early age. Many of the sports face competition from large,
 wellfunded junior programs and high-profile sports as well as other forms of entertainment
 competing for the time and interest of young people. A key challenge for many sports and
 recreational activities is the retention of those recruits beyond their early to mid-teen years.
- Reliance on external revenues: Participants provide a large proportion of funding for most sport
 and recreation activities, programs and services. Competition is intense for funding, sponsorship,
 spectators, profile and members. Providers will need to clearly differentiate and market products

- and benefits to seek to access other revenue streams. This is particularly important in the development and upgrade of facilities and equipment.
- Facilities: Maintaining and developing new facilities is a major challenge for the sport and
 recreation industry. The future may require sporting and recreation providers to partner in
 multisport/recreational developments either in local government or commercially built complexes.
- Well-trained personnel: Volunteers predominantly service most sports. Recruiting and retaining
 paid staff/volunteers are critical to operations. In our regulated world, volunteers need and
 demand access to training and education in a flexible delivery model that responds to their busy
 lives. Coaches, officials and administrators must be supported to ensure the delivery of quality
 programs and competitions. Supporting and recognising volunteers is a task not to be
 underestimated.

Successful Aquatic Leisure Facility Components

Industry trends indicate the components that will contribute to future successful contemporary aquatic and leisure facilities are listed in the figure adjacent.

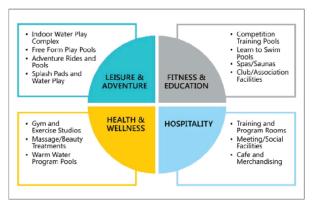


Figure 20 Successful Aquatic Leisure Facility Components

Aquatic Facility User Markets

Traditionally many local government aquatic leisure facilities were built for specialist or limited market users (i.e. competitive swimmers or high-level sport participants). Detailed planning and comprehensive feasibility studies now are able to show more targeted user profiles.

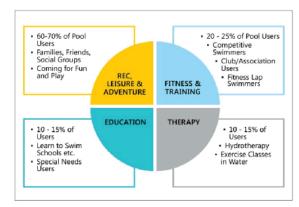


Figure 21 Aquatic Leisure Centre User Markets

Such studies usually identify the demographic profile of residents in the project area, their current aquatic and leisure participation patterns and use of surrounding aquatic and leisure facilities that provide a sound base for more user-friendly facilities.

Most aquatic facility market research indicates complexes must equally cater for four distinct aquatic user markets as outlined in the figure adjacent.

The main aquatic leisure facility user markets have been defined as:

- Recreation and Leisure Market usually made up of families, people coming with friends and groups for fun, relaxation, social activity and low-level competition/ participation.
- Competitive/Training/Fitness Market usually made up of people predominantly attending facilities alone for structured fitness or competition activities.
- Education Market usually made up of children and adults wishing to increase water safety and survival skills. Includes Learn to Swim classes, school and club use and individuals improving their skills and techniques. They require hot water pools and water depths with some straight edges and easy water access, etc.
- Health and Therapy Market usually made up of children, adults and older adults wanting to relax
 or exercise in hot water. This market also includes specialist health condition groups such as
 arthritis, asthma suffers, etc. They require hot water pools and associated health relaxation areas,
 i.e. spa/saunas, etc.

Previous studies have indicated that the recreation and leisure market will usually be the largest as it contains people of all ages, ability, types, interest and gender. The competitive/ training/fitness market is a more specialist market as it usually contains younger, fitter and more active people who have made time to train and compete.

Benchmarking studies have indicated that in many cases 60% to 70% of facility users come from the recreation/leisure sector with 20% to 30% coming from the competitive/training/fitness markets. The health and therapy and education markets can range from 10% to 20% of the market subject to the age and health profile of the community in which the facility is located.

The most successful centres attract all user markets and should be set up to allow people to participate in a range of activities at the one site. The further addition of health and fitness facilities, spas and saunas and social areas have been very successful at many aquatic facilities, as they add to the user experience and contribute to people being attracted to attend these facilities more often.

Aquatic Facility Activities

Industry trends indicate that in most current indoor standalone aquatic facilities, revenue does not meet annual operating costs. While some Centres may have the capacity to return an operational surplus, they show minimal return on capital investment.

A review of successful Centres demonstrates that they have the following characteristics:

- · High visits per square metre
- · High expense recovery ability including capital repayment
- · High operating profits per visit
- Excellent program range returns and attendances
- · High secondary spend returns
- Excellent range of attendance types (adult/child ratio)
- · Draws users from a large catchment area
- High revenue returns from health and fitness.

Traditionally, commercial investment in aquatic facilities has been in specialist pools such as learn-to-swim or as additions to health and fitness clubs. High capital cost and limited financial returns have contributed to this situation. Some aquatic facility management groups are prepared to invest capital funds in return for longer-term agreements.

Health and Fitness Activity Areas

Industry trends indicate that users of aquatic facilities are also significant users of health and fitness facilities. Location of each of these activity components at the one site improves financial viability. Health and fitness components have the capacity to record high expense recovery returns, with many centres returning 125% to 180% of expenditure. Traditionally these returns can also attract commercial investors and operators to health and fitness facilities.

Locating these facilities at aquatic centres increases the potential of cross-selling and spinoff use. It also improves the membership/program user and casual user ratio.

Current Trends

- 24/7 gyms will continue to have a presence and cater for those who are "time poor during regular business hours, self-motivated and fitness-confident" gym users.
- Demand will continue for "personal full-service model" that provides "sufficient flexibility".
- Demand for online fitness services direct customer-based programs through social media have risen over the past few years.

Future Trends

- Efficient fitness such as body weight training and high intensity interval training (refer below) are ideal for the time poor.
- Population changes provide opportunities such as:
 - Ageing population may be directed to fitness by health professional; may also be increase in "older" fitness professionals.
 - Increasing number of unhealthy with high rates of overweight/obese requiring fitness professionals to help improve their health.
- Expectation for higher standards of fitness trainers and professionals qualifications will be expected for those referred by health professionals.
- Technology advances including wearables; connectivity to internet and apps is providing increased
 opportunities to bypass going to the gym or using a personal trainer in person to engage in fitness
 activities; opportunity for real time delivery of fitness programs which could enable expansion of
 programs to remote areas where access to a gym or instructors may not be available or for those
 who have difficulty leaving home.

Factors Impacting on Participation

- Convenience of location followed by what services are provided are the highest factors in determining what gym, with location and value for money the key factors impacting on long term commitment
- Reasons for discontinuing include conflicting time commitments and changed circumstances.
- Affordability is a major issue in committing to a gym.
- Personal training short term interactions up to six months were the most common type, whilst reasons for discontinuing was cost and achieving initial goal.

The Worldwide Survey Fitness Trends for 2017 aims to assist the health and fitness industry with decisions regarding programming and business.

The top twenty trends for 2017 include continued support for some new trends from 2016 such as wearable technology and body weight training whilst sport specific training and core training dropped out of the top twenty trends. The top twenty 2017 trends as identified in the survey with the 2016 ranking are provided in the table on the next page.

For the second year in a row wearable technology such as activity trackers, smart watches, smart glasses, smart fabrics and interactive textiles, is ranked as the number one trend.

Wearable technology can motivate people to increase physical activity and exercise and have potential to make programs "fast, clear and enjoyable". This is followed by body weight training (2), high intensity interval training (3) and educated fitness professionals (4). High intensity interval training which typically takes 30 minutes to perform, potentially meets the needs of those time poor/too busy, providing a time efficient exercise option.

New to the Top 20 for 2017 is group training (6) which is classified as more than five participants. The reason for this increase in popularity was not able to be identified through the research.

A continued interest in "strength training and functional fitness" is also reflected in the trends. A gap in the trends identified by one of the expert reviewers was the lack of interest in programs targeting childhood obesity.

In terms of the ongoing impact of technology, The Club of 2020 (2016), identifies a number of ways that technology may continue to change the fitness industry, with technology (wearables, mobile app and social media) being important to success.

The following key themes are raised:

- Business Model new models include premium classes, pay-as-you-go options (e.g. younger members able to select different package options such as total club visits), at home services (e.g. could include workout at centre and virtual personal training, or trainers going to a person's home, more services provided outside the centre) and time based pay (depending on times use centre, off-peak and peak); demand for personalised service – pay premium for personalised service.
- Personalisation key is availability of data which will enable personalised experiences that are tailored for each member.
- Wearables growing at 35% (annual compounding rate); includes smart clothing, linkages to mobiles
 - (messages to apps); points and rewards programs Internet smarter equipment (e.g. preventative maintenance, automated replacement ordering; automated touchless check-in (e.g. iBeacon technology with mobile app).
- Optimisation capacity utilisation providing real time information on classes, centre usage, etc.; dynamic pricing.

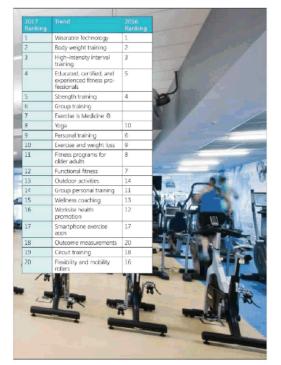
A US based study by Technogym4 of 5,000 Millennials (those aged 14 - 34 years) found that:

• Millennials would like to exercise more often however indicated that they are often too busy and unable to properly devote the time they needed resulting in a growing wellness deficit. As such

"short, sharp exercise formats that fit into their everyday busy schedules" are generally sought.

- Technology has ability to assist in overcoming the wellness deficit, and social media has power to motivate to exercise more often.
- Key barriers are too busy (50%) and lack of motivation (30%).
- Preferences of Millennials included:
 - Tracking and monitoring fitness programs are important (65%).
 - Mobile technology benefits include tracking progress wherever and whenever (72%) with use likely to rise (56% to 74%).
 - Group exercise benefits include increased motivation (70%) and more enjoyable sessions (65%).
 - Physical competitions are a good way of keeping fit whilst socialising (69%). o Workout should be interactive, fun (77%) and personalised to meet individual goals (77%).

Figure 22 Technogym4 Fitness Trends Study



Ancillary Services and Activity Areas

In recent years, there has been a trend to develop a range of complementary businesses in conjunction with aquatic and leisure facilities. These include:

- Wellness Centres/Day Spas: There is an emerging trend of adding in an area for specialist wellness
 activities, services and merchandising. The key services found at successful wellness centres
 include massage, beauty therapy treatments, gentle exercise classes and relaxation and time out
 activities.
- Inclusion of such facilities offers a broader range of activities to a larger age profile of people. The
 massage and beauty therapy are high yield sales activities and can have high linked merchandising
 product sales.
- It is essential in developing such areas that they are located with good views, away from general
 public noise and viewing areas and have very good finishes and fittings. There needs to be a close
 by lounge for relaxation after treatment or classes.
- Sports Medicine: Development of consulting rooms, with patient access to health and fitness and pools, have been excellent revenue generators.
- Health and Therapeutic Services: Health consultancies, weight loss and therapeutic services linking in worker and accident rehabilitation patients to use the range of facilities with centre memberships paid by relevant authorities.

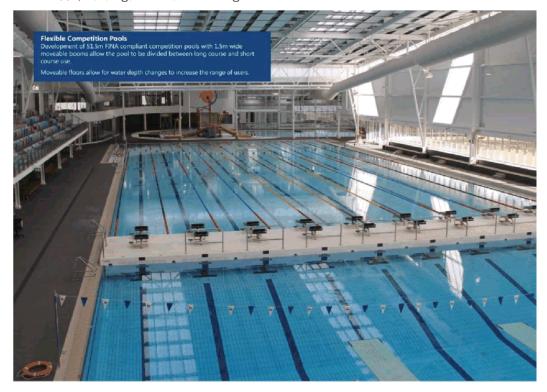
 Health and Beauty Services: Leased areas to services such as beauticians, hair salons and body toning.

Future Aquatic & Leisure Facility Trends

Aquatic and Leisure Facility reviews in Australia, North America, Canada, the Middle East and China in recent years along with research into health and fitness trends provides a guide to potential aquatic and leisure facility innovations and trends.

These are summarised in the graphics on the following pages for:

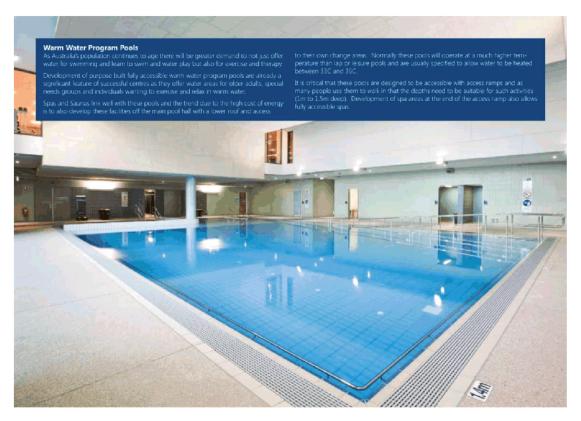
- · Flexible Competition Pools
- · Leisure and Waterplay Equipment
- Major Attraction Leisure Features
- · Warm Water Program Pools
- · Wellness Centres and Allied Health Services
- Special Effects and Digital Technology
- · Food, Beverage and Merchandising.







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Key Findings from Market Research Analysis

There has been a long history of investigations and community consultations into the future of the Port Macquarie Olympic Pool and the development of a new generation, modern aquatic and leisure centre.

The feasibility studies and working group discussions show the strong community push for a new facility. They also provide sufficient justification for an improved facility based on population growth, demand generated by existing swimming and triathlon clubs and a latent demand for learn to swim programs, primary facility catchment in Port Macquarie that is able to support a viable aquatic and leisure centre and poor asset condition of existing pools and plants.

Asset condition assessments conducted on Port Macquarie Olympic Pool and Wauchope Memorial Olympic Pool confirm significant site and facility issues. The pool shells are reaching the end of their functional life with significant water being lost. Wauchope Memorial Olympic Pool has recently been upgraded and therefore this is not a concern at the district pool site now. Port Macquarie Olympic Pool issues continue.

The market research trends support demand for aquatic, health and fitness and water play facilities is expected to increase and this is supported by the continued high popularity of this activity amongst adults and children for swimming and fitness/gym activities. Trends also indicate facilities and services for therapy will also be important with the high proportion of older adults in Port Macquarie - Hastings Council.

Trends also indicate in active coastal and regional communities demand for learn to swim programs, warm water programs and health and fitness programs is increasing. The current facilities and programs either don't provide for these business and participation streams or cannot provide for growth due to the poor condition or functionality (not fit for purpose or small size pools).

Generally, it is noted, 75 to 85% of a facility's attendance and catchment is drawn from 5km from a facility (primary catchment), whilst the remainder usually reside within 10km of the facility (secondary catchment). This statistic is consistent across Australia and settlement types, whether it is in urban, peri-urban or regional areas. People tend to travel longer distances to access aquatic and leisure facilities in rural areas.

Council's regional aquatic centre – Port Macquarie Olympic Pool provides for the largest population within its facility catchment area (46,000 people +). The demand on this facility will increase as forecast population growth is realised across the local government area.

There has been a much greater emphasis in the development of a variety of water spaces within public aquatic centres including:

- · Program pools designed for learn to swim and a variety of aquatics programs
- Warm water pools which are used for rehabilitation and therapy, one of the highest use spaces within public aquatic and leisure centres, and
- · Water play including large enclosed slides, water jets and other leisure play opportunities.

A large number of aquatic facilities in NSW are first- and second-generation pools due to the mild to hot climate whilst in Victoria fourth generation aquatic and leisure centres are now being constructed because the cooler climate has demanded this approach.

The most successful aquatic and leisure facilities attract all user markets. They draw users from a large catchment, clustering and connecting services rather than dispersing smaller facilities across a region; and should be set up to allow people to participate in a range of activities at the one site including for leisure and adventure, fitness and education, health and wellness and hospitality.

There is a significant number of private businesses for 'learn to swim' and fitness/gym, Pilates and yoga. These facilities and businesses have increased the competition for public aquatic and leisure facilities.

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Water play parks are becoming more popular and are successful in attracting families of all cultures and backgrounds on a regional scale.

Stakeholder and Community Engagement

This section includes an overview of community and stakeholder engagement and the issues raised for future aquatic facilities and services from stakeholder and community engagement undertaken.

Who was consulted?

A series of interviews were undertaken with key stakeholder groups as part of this study, together with a review of recent surveys conducted by Port Macquarie - Hastings Council and the Port Macquarie Community Aquatic Committee.

The Council's survey received 400 responses and the Action Group's survey received 600 responses. The surveys were consistent in approach and questions and received a good representation from across the demography of Port Macquarie - Hastings Council.

The key findings from these consultations are summarised below.

Council Swimming Pool Survey

The survey was conducted over a four-week period at the end of 2017. Over 400 people responded to the survey. 64% of respondents were female and 35% male and 2% preferred not to say. Survey participants were mostly current users of the Port Macquarie Olympic Pool and responded on behalf of family members, with 80% having multiple family members using the facility. 25% of respondents belonged to a club.

Key findings:

- Lap swimming, general recreation and child learning to swim were the predominant activities undertaken by respondents
- Most lap swimmers swam two to three times per week, whilst general recreation swimmers swam seasonally and children learning to swim weekly.
- Every day was heavily used by people with most people likely to visit before 8am and after 5pm during the week and between 8am to 12pm and 2pm to 5pm on the weekends
- The most desired facility by respondents were: a 50 m outdoor heated pool; 25 m indoor pool, outdoor shaded recreation areas and learn to swim pool. These facility components recorded more than 200 responses
- There was however a strong response rate across other facility components often provided in a
 new generation aquatic and leisure centre. Recording over 150 responses were: a 25 m outdoor
 pool, water play / splash pad, hydrotherapy / warm water pool café, leisure water features, gym
 and water slide.

Port Macquarie Olympic Pool Action Group Survey

The survey was conducted over a two-week period from 30 September to 13 October 2017. A total of 651 people completed the survey. 85% of these were from the 2444 Port Macquarie post code. 72% of respondents were female and 28% male and most respondents did not belong to a club or group.

Key findings:

· Most respondents (98%) support a year-round aquatic centre for Port Macquarie

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- Most respondents use the pool for lap swimming, general recreation and learn to swim
- The most popular facility components identified were a 50 m outdoor pool, 25 m indoor pool, learn to swim and children's play area, café and outdoor shaded area and hydrotherapy / rehabilitation warm water pool
- A range of funding avenues were identified for a new aquatic facility including seeking Federal and State Government grants, ancillary businesses to be allowed on the site and the community being 'willing to donate'.

Stakeholder Interviews

OPG completed a range of stakeholder interviews and key issues raised are listed under each stakeholder group.

Port Macquarie Olympic Pool Action Group

The Action Group has been formed for 18 months and is represented by the swimming club, squad swimming, pool users, triathlon club, masters swimming, disability groups and schools. They have met five times

The Action Group took OPG through the journey to get to this point with investigating a new aquatic and leisure centre for Port Macquarie. The most serious review was the Thompson and Tregear Strategic Review of Pool Needs that recommended a multifunction aquatic facility proposal.

There has been a long history of discussions about the future of the Port Macquarie Olympic Pool and the Action Group is frustrated with no decisions made. The Action Group has however been positive with how Council has been working with the groups and is interested in continuing this partnership to progress the proposal.

Summary notes were provided by the Action Group outlining the history of strategic work, Council resolution in 2015, consultation results, profile of demand and business case opportunities.

Key reasons identified by the Action Group for a new facility.

- Population has grown to now over 100,000 since the 2000 feasibility study and over 160,000 visits to swimming pools.
- Very serious issues with asset condition together with parking and site constraints of existing facilities
- Community consultation process of over 1,000 responses support a new generation modern
 aquatic and leisure centre with outdoor 50 m pool, indoor 25 m pool, warm water / hydrotherapy
 pool, learn to swim pool, café and outdoor shaded recreation / children water play area
- Council is unaware of the potential of a new Centre There is strong justification and business
 case for the facility with a supporting population size and current use profile.
- · Action Group is seeking an inclusive facility for everybody
- There is an older adults' community that isn't using the current facility at all. A warm water program
 pool would encourage and support their activity
- Council is promoting an influx of single businesses and young people, promoting an affordable housing option and lifestyle benefits
- There is a demand for all schools in the municipality with substantial growth in student numbers.
 For example, the combined Catholic School System has more than 5,000 students and 500 staff
 that could use the facility for school swimming programs and carnivals. It should also be noted that
 the Catholic Parish has just bought land in Bonny Hills to cater for new student school high
 demand.
- Swimming Club has high membership numbers and has had to turn people away from carnivals due to the high popularity

 Triathlon Club has high membership numbers with the Ironman event supporting participation growth and the sports strength in Port Macquarie.

Other comments discussed with the Action Group include:

- There is a proposal for a new Tidal Pool. The Action Group believe addressing the new aquatic and leisure centre is the priority. There are now challenges with a Tidal Pool given the possible impacts on the coast line with legislation and planning controls now restricting development
- · The facility will encourage partnerships with health and wellness services in Port Macquarie
- The schools identify occasional care for a growing early year learning sector as a key facility component
- Funding ideas are being discussed amongst the Action Group including: recreating the fundraising
 wall and respecting this past initiative in the design of a new facility; and a legacy funding model
 from a major businesses' development
- · Action Group supports the current contractors but seek longer opening hours
- Action Group is seeking a timeframe and implementation plan as part of the strategy
- · Seeing a FINA compliant pool to support competition swimming and triathlon
- There was concern on the impact of the St Columba Anglican School proposal for a 50 m pool if it
 proceeds, including private money into a public / school facility and available use by community
- Site review is needed as part of the strategy to determine the best location for a new facility in Port
 Macquarie. The geotechnical analysis of the sites will be important and the facility should serve a
 regional population catchment.

Port Macquarie Swimming Club

The Swimming Club operate from 1 October to 1 April with 10 sessions per week. There are two carnivals each year held between September and Christmas. All competitions are well attended but at capacity

There are 247 registered members ranging between 5 to 18 years old. The club offers competitive swimming and is one of the strongest outside of Wollongong, Newcastle and Sydney. The club has recently established a Junior Dolphins program.

The regional championships carnival in 2017/18 attracted 3000 entries and people were unfortunately turned away due to the capacity of the venue. Received positive feedback from competitors with comments like "I need to come back to have a holiday here" from visitors.

The Swimming Club seeks access to more times and use opportunities to support the growth of the club and new programs.

The facility is on its last legs, but we need to keep it going whilst a new pool is being built to limit the impact on existing users.

A heated pool will attract greater use.

Six lanes are just not enough for championships because the Swim Club couldn't turn races around fast enough. Currently employing creative programming to manage high demand including starting earlier. Coaches are finding it hard to promote good children swimmers into senior squads because there is no room. Swim club can't grow. They have reached capacity and need an expanded facility.

The grandstand is a huge plus and a key attractor for swim events to the region. The club has invested in the grandstand, barbecue and with plans to install a shade structure.

The regional events attract large numbers of swimmers and families to the area. There are 1 day competition events but people stay two nights and competitors often bring two spectators with them. Average spend of \$1000 per week / \$20 per spectator / registration fee of \$30 per race by 12 = \$360 / \$110 in fuel / other travel costs of \$50 to \$100 / food costs of \$200 per day/night).

There is high demand by triathlon as well. We see Swim Club members when they reach 18 years transition to the Triathlon Club. The Swim Club seeks a year-round facility, 10 lane FINA compliant pool (allows for full programming), grandstand, warm water pool (to support athlete rehabilitation), health and fitness facilities (for strength and conditioning of athlete), occasional care, café (very important for coffee is required at 5am in the morning for parents) and a club rooms with store room.

Port Macquarie Masters Swimming Club

The Masters Swimming Club started 20 to 25 years ago at the indoor 50 m pool in Acacia Avenue. The club currently has 35 active swimmers and is largely made up of older age groups of 40+ years.

The club is actively recruiting for young people to the club that are seeking a progression from the swimming club (up to 18 years) to Masters level (18 years and above).

The club meets Saturday mornings and the venue is opened specifically for their activity at 7:30am. Members swim informally during the week in small groups, usually once or twice per week but up to four times. The club hosts one carnival each year and attracts 120 entries. Considered a very competitive event in the region and attracts swimmers from Hunter and Central Coast regions. Entrants stay for one or two days / pay an entry fee of \$30 / Fuel costs \$50 to \$100 / Food costs \$50 to \$100 / Accommodation \$200 to \$300.

The July closure of the facility is a big issue for the Masters Swimming Club because July is the period to train for the State relay championships.

The Masters Club believes a better facility would attract more members. The club seeks an additional lane during the week for long distance swims and would be introduced if membership increases.

Oldest member of the club is 90 years old. Older members of the club would benefit from improved disabled access and a warm water pool for therapy and rehabilitation treatment.

The Masters Club supports a central location and seeks a FINA compliant pool, café and lounge areas, health and fitness facilities and access to a meeting room and storage area. The facility should be universally designed.

Port Macquarie Triathlon Club

The Triathlon Club has been established for 20 to 25 years and is now one of the biggest tri regional clubs in NSW with 150 members. The club is affiliated with Triathlon Australia.

The age profile of the club is between 18 to 50 years old. This is unusual because there are fewer people in the age group in Port Macquarie. The club promotes a family environment.

The club runs short distance racing, with training and competition operating between October and April 2018. There are 15 events per year in addition to the Ironman Race, where in November there is a high amount of training with elite athletes in town in lead up to the event.

When in season, triathletes train for specific events. In off season, this is the time triathletes train. Training consists of very long distances and timeframes from 30 min to 2 hours. Triathletes are high users for early

morning and lunch time and evening – outside working days. Triathletes usually cycle first (in dark) and then swim in the morning.

The Triathlon Club support the Action Group to push for a new facility development. Key reasons include:

- The pool is old and in poor condition
- It is a seasonal pool. The club seeks a year-round facility and access to additional lanes for training and meets
- Long-time swimming can cause conflict with other users due to occupying lanes
- Only six lane pool and can be very crowded in peak times. A 10-lane pool would alleviate this issue
- Pool is not lit so use is restricted. Triathlon club seek floodlighting of pool that would benefit competitive clubs
- Triathlon athletes have children and are encouraged to swim safely and properly and become
 power users of the facility.

Aquatic Facility Management Contractor Interview

Swimwell formed 16 years. They are experienced managers and recruit experienced staff.

Swimwell managed the Port Macquarie Olympic Pool between 2003 and 2009.

All pools have achieved growth in attendances.

The contractor is committed to high aesthetics of pool sites to improve the standard for patrons. They have invested in infrastructure improvements to lift the standards of pools. They conduct a six-month audit of all pools and discuss issues with Council's Facilities Coordinator and suppliers

The contractor operates pools from 5:30am and run after hours events for schools and clubs. Squad programs are being run after hours to public. The website has all programming information, times and lanes.

The contractor has an adequate number of pool staff and actively recruit older life guards with experience to support junior staff that undertake rigorous training and are used in holiday period. The minimum age of staff is 18 years old. Royal Life Saving is used for training. The following comments were made in response to questions about the existing aquatic facilities:

Port Macquarie Olympic Pool

- The pool is 60 years old. There is always works that need to be done due to the age and condition
 of the pool
- · A major upgrade of pools is required
- The learn to swim pool has been operating for ten years. The program is very popular Presently 600 enrolled in peak period and at capacity with 200 people on waiting list
- The current site is not the best site due to the water course and land ownership issues. There is a high amount of movement in pools
- · The contractor seeks an indoor program pool component
- Adult swimmers have high use and particularly in morning. Port Macquarie is a very fit town with a
 high concentration of triathletes. The contractor needs to run three lap lanes at all times and all
 days to meet this demand.
- Squad programs are being run after hours to public (11 sessions)
- · Masters Squads from 7am to 9am on Saturdays
- The asset register list of ownership is important for Port Macquarie Olympic Pool given the investment into the facilities made by the contractor.

The future growth in attendances will be in learn to swim with 200 people presently on a waiting list to join. A future facility needs more program pool space to meet the demands of a growing population. The facility catchment for Port Macquarie will reach 70,000 people and demand a regional size aquatic and leisure centre.

The contractor supports water play parks and highlight the popularity of inflatables when put in in holiday periods.

St Columba Anglican School

The Principal of the St Columba Anglican School presented a master plan with a proposal for a 50 m pool on the school grounds to service the students, staff as well as provided for community use.

This concept is being revisited following a conversation with the Consultant about the costs and programming requirements of a 50 m pool. Contacts were provided to the school of other private schools with swimming pool facilities in Sydney and Melbourne so development and operating costs can be better understood.

Council staff and School representatives have met since this consultation. The pool proposal was noted as moving from a short-term priority project to a longer term project with school administration now addressing:

- Proposed land area will be too small for development and its rectangular configuration restrict pool layouts that will require higher staff supervision than if pools were laid out next to each other.
- · The need to add other activity and water areas to a 50 m pool to make it viable.
- The school, together with Council are now discussing a precinct master plan with the University (CSU) and shared facilities, but not a pool. The proposal is now considered long-term, needs further development and would only complement what Council will provide.

Key Findings of Stakeholder and Community Engagement

Two community surveys were conducted in late 2017. Over 1,000 people completed the surveys. Most respondents (98%) support a year-round aquatic centre for Port Macquarie. The most popular facility components identified were a 50 m outdoor pool, 25 m indoor pool, learn to swim and children's water play area, café and outdoor shaded area and hydrotherapy / rehabilitation warm water pool.

An Action Group has been formed across key user groups of Port Macquarie Olympic Pool. They are advocating for a new multi-functional aquatic and leisure centre and have conducted research and a survey to demonstrate the needs for the facility. Key reasons include:

- Population has grown to now over 100,000 since the 2000 feasibility study and over 160,000 visits
- Very serious issues with asset condition together with parking and site constraints of existing facilities
- Community consultation process of over 1000 responses support a new generation modern
 aquatic and leisure centre with outdoor 50 m pool, indoor 25 m pool, warm water / hydrotherapy
 pool, learn to swim pool, café and outdoor shaded recreation / children water play area.

There is an older adults' community that isn't using the current facility at all. A warm water program pool would encourage and support their activity.

There is a demand for all schools in the municipality with substantial growth in student numbers. For example, school system and 500 staff that would use the facility for school swimming programs and carnivals.

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All clubs currently using Port Macquarie Olympic Pool have healthy and growing memberships and are requesting more access to lanes to accommodate more swimmers. In particular:

- The Swimming Club has high membership numbers (270) and has had to turn people away from carnivals due to the high popularity.
- The Triathlon Club has high membership numbers (150) with the Ironman event supporting participation growth and the sports strength in Port Macquarie.

The Contractor believes future growth in attendances will be in learn to swim with 200 people presently on a waiting list to join. A future facility needs more program pool space to meet the demands of a growing population. The facility catchment for Port Macquarie will reach 70,000 people and demand a regional size aquatic and leisure centre.

All stakeholders and community were supporting of a new aquatic and leisure centre in Port Macquarie and assessment of alternative sites due to the poor site conditions at Port Macquarie Olympic Pool.

Future Aquatic Strategy Key Issues

This section identifies the key issues from the market research and engagement stages.

Key Issues to Help Guide Councils Future Aquatic Strategy

The following key issues have been summarised to help guide the future aquatic strategy.

Long history of strategic investigations supporting a new aquatic and leisure centre in Port Macquarie

There has been a long history of investigations and community consultations into the future of the Port Macquarie Olympic Pool and the development of a new generation, modern aquatic and leisure centre.

The feasibility studies and working group discussions show the strong community push for a new facility. They also provide sufficient justification for an improved facility based on population growth, demand generated by existing swimming and triathlon clubs and a latent demand for learn to swim programs, primary facility catchment in Port Macquarie that is able to support a viable aquatic and leisure centre and poor asset condition of existing pools and plants.

Poor condition of Port Macquarie Olympic Pool

Asset condition assessments conducted on Port Macquarie Olympic Pool confirm significant site and facility issues. The pool shells are reaching the end of their functional life with significant water being lost.

Port Macquarie Olympic Pool is currently in very poor condition and near the end of its functional life. Council will need to make a decision on the pool's future in the short to medium term for the renewal of existing assets will be a substantial cost.

High population, attendances and membership growth fuelling demand for aquatic and leisure facilities

Demand for improved/expanded and new aquatic facilities is being fuelled by more than 80,000 current residents and projected continued growth in population that will reach over 100,000 by 2036. There are a range of established aquatic groups and memberships of the swimming and triathlon clubs and a learn to swim program of 600 swimmers and 200 people on a waiting list.

Pool visitation trends have increased. Visitation at Port Macquarie has increased by 4% since 2014/15. This is well below the population growth of the area and is concerning when the facility reports of capacity challenges and increasing demands, particularly from the Swim Club and Triathlon Club. This shows the current facilities need a significant upgrade to meet future demands of the community

All clubs currently using Port Macquarie Olympic Pool have growing memberships and are requesting more access to lanes to accommodate more swimmers. In particular:

- The Swimming Club has high membership numbers (270) and has had to turn people away from carnivals due to the high popularity.
- The Triathlon Club has high membership numbers (150) with the Ironman event supporting
 participation growth and the sports strength in Port Macquarie.

There is large older adults' community that isn't using the current facility at all. A warm water program pool would encourage and support their activity needs and interests

There is a demand for all schools in the municipality to increase their learn to swim and water familiarization classes with substantial growth in student numbers.

Recreation trends show a demand for program pools, health and fitness facilities and water play

The market research confirm demand for aquatic, health and fitness and water play facilities is expected to increase and this is supported by the continued high popularity of this activity amongst adults and children for swimming and fitness/gym activities. Facilities and services for therapy will also be important with the high proportion of older adults in the Port Macquarie - Hastings Council area.

There is a particular demand for learn to swim program, warm water programs and health and fitness programs. The current facilities and programs either don't provide for these business and participation streams or cannot provide for growth due to the poor condition or functionality (not fit for purpose or small size pools).

There has been a much greater emphasis in the development of a variety of water spaces within public aquatic centres including:

- Program pools designed for learn to swim and a variety of aquatics programs
- Warm water pools which are used for rehabilitation and therapy, one of the highest use spaces within public aquatic and leisure centres, and;
- · Water play including large enclosed slides, water jets and other leisure play opportunities.

Water play parks are becoming more popular and are successful in attracting families of all cultures and backgrounds on a regional scale.

Facility catchment supports a regional aquatic and leisure facility in Port Macquarie

Generally, it is noted, 75% to 85% of a facility's attendance and catchment is drawn from 5km from a facility (primary catchment), whilst the remainder usually reside within 10km of the facility (secondary catchment).

This statistic is consistent across Australia and settlement types, whether it is in urban, peri-urban or regional areas. People tend to travel longer distances to access aquatic and leisure facilities in rural areas.

Council's regional aquatic centre – Port Macquarie Olympic Pool provides for the largest population within its facility catchment area with over 70,000 people. The demand on this facility will grow with the key urban growth areas in the municipality within this facility primary and secondary catchment area.

The most successful aquatic and leisure facilities attract all user markets. They draw users from a large catchment, clustering and connecting services rather than dispersing smaller facilities across a region; and should be set up to allow people to participate in a range of activities at the one site including for leisure and adventure, fitness and education, health and wellness and hospitality.

Growing number of private businesses in Port Macquarie increasing competition

There is a significant number of private businesses for 'learn to swim' and fitness/gym, Pilates and yoga in Port Macquarie. These facilities and businesses have increased the competition for public aquatic and leisure facilities.

Capital cost escalation for new aquatic facilities

The upfront construction cost of facilities has risen significantly over the last 10 years, changing the viability of many proposals. Municipalities are now spending \$20M to \$25M for a district aquatic and

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leisure facility which services a catchment population of 40,000 to 70,000 people. A regional facility is now costing in the order of \$40 to \$55M and services a catchment population of 100,000 to 150,000 people.

Operating cost Increase Impacts

Currently, the pools generate no financial return to Council and operating costs are increasing annually. Review of the combined four Council Aquatic Centres operating expenditure indicates expenditure has increased annually from \$615,102 in 2014/15 to \$907,477 in 2017/18.

This is an increase of \$292,375 or a 47.5% increase in operating expenditure. The main items of expenditure are services, maintenance and management contract fees. Energy, chemical and water costs at Port Macquarie Olympic Pool are impacted by the significant pool leakage and this is going to get worse as the facilities further age.

Environmental Impacts

Rising energy use and the high levels of treated heated water loss at Port Macquarie Olympic Pool are causing a very high environmental impact.

All future developments should consider environmentally sustainable design and water sensitive urban design features to minimise energy and water use.

Government Regulation Impacts

Council's aged pools at Port Macquarie do not meet many of the key compliance requirements that have been brought in since their construction.

Local Government Authorities must meet many legislative requirements including Australian and State legislation and State regulations.

Summary of Aquatic Strategy Key Learnings

The following graphic summarises the studies key learnings.

What have we learnt?



Poor condition of Port Macquarie Swimming Pool Port Macquarie Pool Condition Assessment shows significant structural issues with swimming pools







Future Aquatic Leisure Centre Management Trends

The key issues facing Council in future management of aquatic facilities including:

- · Increasing labour costs
- · Increasing energy costs
- · Aging and single use facilities

Port Macquarie - Hastings Aquatic Facility Strategy

This section of the report documents the recommended Final Draft Council Aquatic Facility Strategy as developed by Otium Planning Group Pty Ltd.

Councils Future Aquatic Strategy Vision

High quality & accessible aquatic & leisure facilities that provide improved financial & environmentally sustainable outcomes & diverse participation opportunities for the expanding population with facilities managed to encourage greater participation so all users can be more active & healthy.



Future Aquatic Leisure Facility Hierarchy and Provision

The recommended Port Macquarie – Hastings Aquatic Facility Strategy provides all residents access to an integrated network of quality aquatic and leisure facilities that are located in the areas of greatest population growth and catchment.

The strategy will include an integrated combination of facilities being:

- One Regional Aquatic Centre located in Port Macquarie to cater for people city wide and open all
 year round with indoor and outdoor aquatic and leisure facilities, program and services for a broad
 range of user markets.
- One District Aquatic Centre located at Wauchope to cater for the township and district rural areas.
- Two Local Aquatic Centres located at Kendall and in the Laurieton area to cater for local users.
 When the Laurieton facilities are renewed, they should offer different and complementary functions and be located in a community hub precinct.

Table 11 Proposed Aquatic Facility Service Hierarchy

	Service Level Objective	Port Macquarie - Hastings Facilities	Other Facilities
Local 10,000 - 20,000 Catchment Population	Ability to provide limited program water combined with leisure water Limited dry/gym facilities	Kendall Swimming Pool Laurieton Memorial Swimming Pool	Private Swim Businesses including: Vicki's Swim Centre, Port Macquarie Swift Swim School, Port Macquarie The Beach Learn to Swim Centre, Camden Haven Monikas Swim School, Port Macquarie
District 20,000 - 30,000 Catchment Population	Ability to separate program and leisure water Larger dry/gym facilities Additional limited facilities	Wauchope Memorial Olympic Pool	None
Regional 50,000 – 70,000 Catchment Population	Extensive and varied program leisure water and attractions Inclusion of indoor 50m pool and separate warm water pools Wellness/health club and extensive program room inclusions Complementary services and amenities, crèche, food and beverage	Port Macquarie Olympic Pool Replacement to become the Port Macquarie Aquatic Leisure Centre	None

Estimated Future Aquatic Facility Population User Catchments

The following graphic on the next page highlights the estimated future aquatic facility population user catchments.

Estimated future aquatic facility user catchments



Strategic Objectives

Council's strategic objectives that will guide the current and future provision of aquatic facilities, services and programs include:

Objective One: High quality network of aquatic facilities with capacity to grow

Develop a network of complementary facilities that are of high quality and service all contemporary aquatic leisure facility markets. The facilities will provide for Port Macquarie - Hastings population growth, complementing other community facilities and businesses.

Objective Two: Accessible, affordable and inclusive facilities

Council's aquatic and leisure facilities will be accessible, affordable and inclusive to all ages, abilities and cultures and will support more residents to become more active participants.

Objective Three: Well planned, maintained and managed.

Future facilities will be well planned and maintained so they are safe and attractive to use. Council will develop asset management plans for each facility and these will inform Councils annual investment in the maintenance and renewal of aquatic and leisure facilities to maximise the benefits for the community.

Integrated management systems that maximise use, minimise costs and ensure facilities are highly programmed to support ongoing regular activities will also be supported.

Appendix 1 - Facility Design Components Schedule

PORT MACQUARIE REGIONAL AQUATIC CENTRE FACILITY DESIGN COMPONENTS SCHEDULE

BASE FACILITY AREA (m²)	625m² (25m x 25m)	(Approx.)	620m² (31m² x 20m²)
AREA SCHEDULES	+ Pool – 25m x 20m + Ramp 1.5m wide down side line + Wet Deck – 0.5m around pool edge + Water depth 1.4m to 2.1m + Concourse TBD in design – consider average 3m around pool area	+ LTS pool 20m x 10m (600mm to 900mm deep) = 200m2 + Beach entry/free form water 100m² Interactive leisure/play pool 200m² + Toddlers Pool 60m² + Concourse TBD in design - consider average 3m around pool area	+ Pool/spas - 25m x 12m. + Ramp 1.5m wide down sideline. + Wet Deck - 0.5m² around pool edge + Concourse TBD in design - consider
OTHER FEATURES TO CONSIDER	Disabled access via ramp on side of pool closest to amenities and children's water	+ Water sprays and leisure water features added. + Wet lounge/cafe area adjoining. + Ensume that the activities within the water areas do not conflict i.e. LTS area located away from toddler's pool/leisure water. + Access via beach entry.	Requires access ramp for entry to pool and spa.
FUNCTIONAL RELATIONSHIPS	+ Deep pool areas located away from shallow water pools. + 25m pool needs to be isolated from other pools during competition use (noise factor).	+ Adjacent to 25m pool + Close to change rooms + Close to wet lounge and cafe. + Locate to ensure vision from foyer/reception + Locate to provide vision to main centre entry	+ Adjacent to separate change areas. + Separated by glass walls with door access from other pools. + Accessible spa at end of ramp and separate concourse access spa
FACILITY OBJECTIVES	+ Provide indoor activity areas for residents, schools and leisure users. + Provide club and fitness activity area.	+ Provides a combined leisure/LTS pool to attract families and young children + Provide broad leisure and education experiences + Provide program area for exercise/swim lessons. + Provide safe toddler water area with clear vision barrier to deeper water areas	• Cater for large range of older adults, therapy classes and casual users.
TARGET MARKETS	+ Education + Health and fitness + Training + Programs	+ Leisure activities + Social groups + Entertainment + Education/LTS + Programs + Infants + Families	+ Programs + Therapy + Education + Wellness + Relaxation
FACILITY COMPONENTS	Program / Lap Pool with 25m x 8 lanes (2.5m/lane plus 1.5m width) with access ramp	Leisure Water/Learn to Swim Program Pool (catering for interactive Leisure and learn to swim areas)	Warm Water Program Pool with Adjoining Spas
ACTIVITY AREA	Indoor Aquatic Hall		

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ACTIVITY AREA	FACIUTY COMPONENTS	TARGET MARKETS	FACILITY OBJECTIVES	FUNCTIONAL RELATIONSHIPS OTHER FEATURES TO CONSIDER	OTHER FEATURES TO CONSIDER	AREA SCHEDULES	BASE FACILITY AREA (m²)
						3m down one side and 3m down other (ramp side) 3m ends. + Depth 900mm to	
	Water Play Unit and Splash Pad	+ Children + Youth + Families	Provide a play space with water and sprays	+ Adjacent to the leisure/LTS pool	+ Nii depth access to splash pad. + Consider options for access to water play unit	+ 23m x 23m splash pad area based on + AP850 Unit	530m²
	Covered in Water Slides and Tower	+ Children + Youth + Families	Provide an adventure water area.	+ Need to be located adjacent to the main pool hall with closed in tower and fully enclosed sildes that are outside but crash down zone is inside the pool hall	+ Consider future slide installation to increase number of slides.	+ 2 slides 120m to 130m long off 12m high towner. + Crash down area on concourse via flumes with step out. + Provide crash down area 10m x 10m and tower footplate 10m x 10m	200m²
	Other support facilities - Storage - First aid room - Pool office - Wet lounge - Party Room - Plant rooms	+ Service areas	+ Service areas	+ Storage adjacent to program pool + First aid providing direct concourse access and external ambulance access + Pool office close to program pool + Wet lounge adjoins café and leisure pool	+ Link circulation and wet lounge areas exposite issues of access to outdoor pools + Provision of security lockers on the concourse.	+ Storage - 80m ² + First aid - 15m ² + Pool office - 20m ² - Wet lounge and Party room - 130m ² Circulation allow 10% (270m ²) + Plant - 300m ²	545m²
Subtotal Indoor	Aquatic Hall						3,320m²

ACTIVITY AREA	FACILITY COMPONENTS		ES	FUNCTIONAL RELATIONSHIPS OTHER FEATURES TO CONSIDER	OTHER FEATURES TO CONSIDER		BASE FACILITY AREA (m²)
Health Fitness & Weliness	Weights Room (requires 24-hour access design)	+ Health and fitness + Therapy + Competition / clubs + Industry training	+ Provide general fitness area incorporating weights, cardio equipment and circuit area. + Major revenue area.	Located close to reception Located close to dry Change Change Charge Coom Shared storage Requires 24-hour access design for gym and change areas	Ensure provision for future extension opportunities	+ Gym - 700m² + Office - 20m² + Fitness test X 2 - 40m² + 24-hour access corridor - 30m² + Store - 30m²	820m²
	Multipurpose Rooms / Function Rooms	+ Health and fitness + Therapy + Competition / clubs + Industry training + Social group + Events/social	+ Provide multi-use timber floor area suitable for classes and functions. + Major revenue area.	+ Locate close to reception + Locate close to dry change + Adjacent to weights room + Shared storage + Close to meeting/club room	+ Kitchenette with servery to multipurpose and meeting/training room + Provision of acoustic treatment to imit sound breakout.	+ Group fitness room 1 250m² + Group fitness room 2 (dividable) 200m² - Stores - 40m²	490m²
Subtotal Health Fi	Subtotal Health Fitness and Wellness						$1,310\mathrm{m}^2$

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ACTIVITY AREA	FACILITY COMPONENTS	TARGET MARKETS	FACILITY OBJECTIVES	FUNCTIONAL RELATIONSHIPS	OTHER FEATURES TO CONSIDER	AREA SCHEDULES	BASE FACILITY AREA (m²)
Outdoor Aquatic Areas	Outdoor Competition Pool with 51.5m x 8 lanes (2.5m/lane plus 1m width) with moveable boom and access ramp	+ Education + Competition + Health and fitness + Events + Training + Programs	+ Provide indoor activity areas for residents, schools and leisure users. + Provide club and fitness activity area. + Provide Events Pool	+ Adjacent to spectator areas. + Deep pool areas located away from shallow water pools. + 50m pool needs to be isolated from other pool areas during competition use (noise factor).	Disabled access via ramp on side of pool closest to amenities	+ Pool - 51.5m x 21m + Ramp 1.5m wide down side line + Wet Deck - 0.5m around pool edge + Concourse TBD in design - consider 3.0m sides, 4.0m ends + Water depth 1.4m to 2.1m	1,830m² (60m x 30.5m)
	Spectator Area for 51.5m pool	+ Education + Competition + Events + Casual spectator	Provide basic seating provision (150) with option to add temporary seating to adjoining concourse for special events (250).	+ Adjacent to side of 51.5m pool. + Ensure no columns in vision lines. + Consider temporary spectator area clear of columns.	+ Add temporary seats (250) to provide total capacity of 400 adults for special events. + Consider range of options for providing spectator seating	Seating area down sideline of pool plus walkways etc.	200m²
	Landscaping	All customers and staff	Provide attractive social areas for customers	• Links to outdoor 50m pool and spectator seating areas	Linkage to external café servery	+ Open grassed landscaped areas with shade trees with shade trees areas for formal shade structure + Pathway connecting pool area with picnic areas.	Determined by site
Subtotal Outdoor Aquatic Areas	Aquatic Areas						2,030m²

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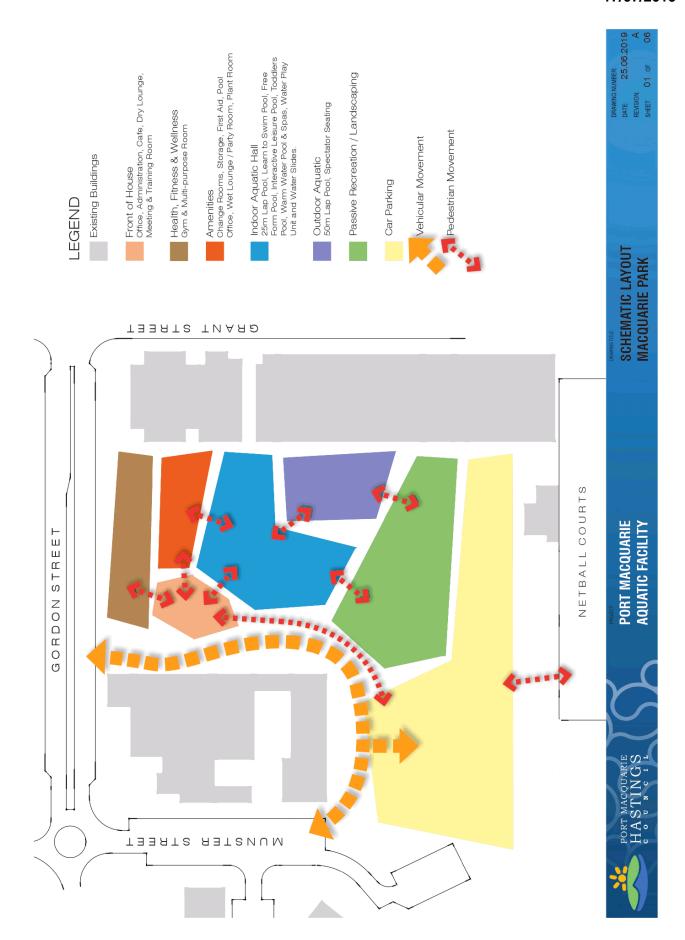
ACTIVITY AREA	FACIUTY COMPONENTS	TARGET MARKETS	FACILITY OBJECTIVES	FUNCTIONAL RELATIONSHIPS	OTHER FEATURES TO CONSIDER	AREA SCHEDULES	BASE FACILITY AREA (m²)
Front of House Areas	Offices/Administration/ Staff Rooms	Centre staff	Provide areas for staff and centre administration.	+ Close to reception + Vision into activity circulation spaces.	• Possible extension of areas if further centre activity areas added	+ Offices x 4 - 60m ² + Work area - 50m ² + Storage - 40m ² + Staff room - 50m ² + Staff amenities - 25m ²	225m²
	Café/Dry Lounge	All customers and staff	+ Provide high quality food area that attracts high secondary spend. + Key socialisation.	+ Links to foyer and dry lounge (servery) + Links to wet lounge and pool hall (servery)	Linkage to other activity areas for sales	+ Dry lounge - 100m ² + Café serveries - 40m ² + Kitchen - 40m ² + Store/other - 40m ²	220m²
	Meeting/Training Room	+ Centre management and staff + Swim Clubs + Training orgs	Provide a flexible multi- use space that can be used for meetings and functions	Need to be located close to centre entry	+ Trophy cabinet for swimming club's memorabilia. + Lock up cupboard kitchenette	• Meeting area 10m x 8m	80m²
Subtotal Front of House	House						725m²

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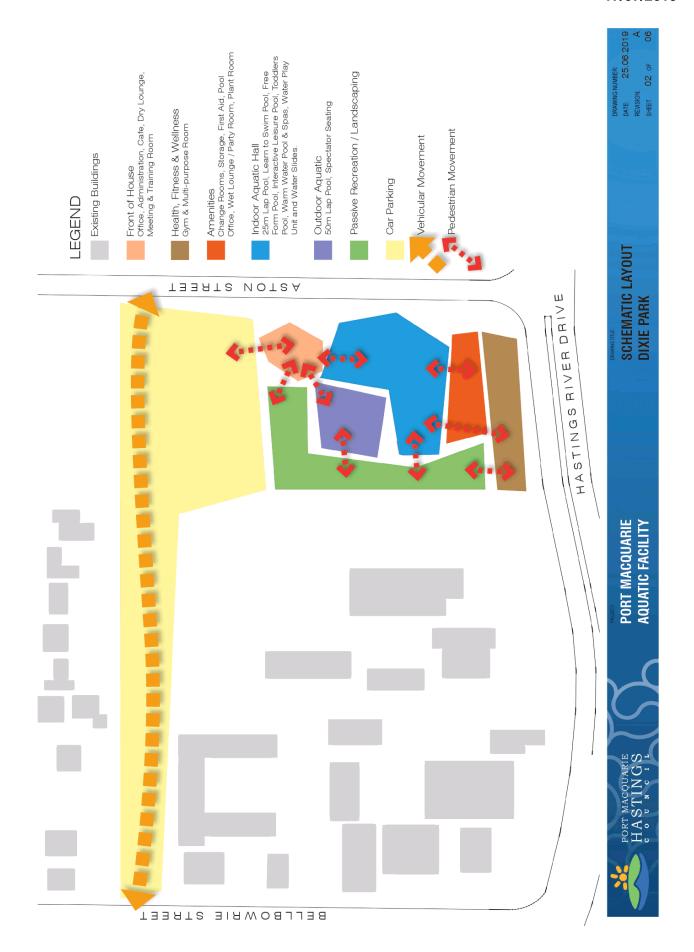
ACTIVITY AREA	FACILITY COMPONENTS	TARGET MARKETS	FACILITY OBJECTIVES	FUNCTIONAL RELATIONSHIPS	OTHER FEATURES TO CONSIDER	AREA SCHEDULES	BASE FACILITY AREA (m²)
Amenities / Change	Main Pool Hall / Change Rooms and Amenities	Aquatics hall users	Provide modem amenities easily maintained	Adjoining pool concourse and close to reception	- Lockable links to dry facilities to open up all amenities for major events	+ Male - 100m² + Female - 100m² + Service areas - 10m²	210m²
	School/Event Change Rooms	+ Schools + Event Users + Swim Club	Provide separate change areas for groups i.e. 1 x male and 1 x female	+ Close to group entry doors + Possibly located below Spectator area.	• Minimal Shower / Toilet provision.	• Male Group change - 50m² - Female Group change - 50m²	100m²
	Warm Program Pool Change	Program Pool users	Provide separate change for Program Pool users.	+ Close to Program Pool + Within enclose Program Pool zone.	Ensure fully accessible	+ Male Program Pool change - 40m² + Female Program Pool change - 40m²	80m²
	Dry Change Rooms and amenities	+ Health and fitness users + Meeting room users + Café users	Provide modem amenities easily maintained	 Adjoining weights and aerobics room 	• Use as group change in high user periods	+ Male - 60m² + Female - 60m² + Service areas - 10m²	130m²
	Family Change	+ Families + People with disabilities + Older adults + Special needs groups	Provide range of family/disabled cubides	+ Next to wet and dry amenities + Set of 2 near Leisure Pool + Set of 2 near Program Pool	Open all times pool is open	• 6 cubicles @ 12m²	72m²
Subtotal Amenities / Lounge	s/Lounge						592m²

Other Areas Dry Plant Room - Communication Room Communication Room Store General Circulation Allowance (10%) – all dry areas Subtotal Other Areas Total Dry Areas (Health and Fitness and Front of House, Amenities and Total Indoor Aquatic Areas (Indoor Pools and Support Areas).				
Communication Room Cleaners Room / Store General Circulation Allowance (10%) – all dry areas Subtotal Other Areas Total Dry Areas (Health and Fitness and Front of House, Amenities and Frotal Indoor Aquatic Areas (Indoor Pools and Support Areas).			 Allowance 	200m²
Cleaners Room / Store General Circulation Allowance (10%) – all dry areas Subtotal Other Areas Total Dry Areas (Health and Fitness and Front of House, Amenities and Total Indoor Aquatic Areas (Indoor Pools and Support Areas).			- Allowance	20 m²
General Circulation Allowance (10%) – all dry areas Subtotal Other Areas Total Dry Areas (Health and Fitness and Front of House, Amenities and Other Areas) Total Indoor Aquatic Areas (Indoor Pools and Support Areas).			- Allowance	30m²
Subtotal Other Areas Total Dry Areas (Health and Fitness and Front of House, Amenities and Total Indoor Aquatic Areas (Indoor Pools and Support Areas). ESTIMATED TOTAL INDOOR BUILDING AREA			- Allowance	300 m²
Total Dry Areas (Health and Fitness and Front of House, Amenities and Total Indoor Aquatic Areas (Indoor Pools and Support Areas). ESTIMATED TOTAL INDOOR BUILDING AREA				550m²
Total Indoor Aquatic Areas (Indoor Pools and Support Areas). ESTIMATED TOTAL INDOOR BUILDING AREA	ities and Other Areas)			3,957m²
ESTIMATED TOTAL INDOOR BUILDING AREA				3,320m²
				7,277m²
Total Outdoor Aquatic Areas (Outdoor Pool Areas and Surrounds).	ds).			2,030m²
ESTIMATED TOTAL INDOOR AND OUTDOOR DEVELOPMENT AREAS	IEAS			9,307m2

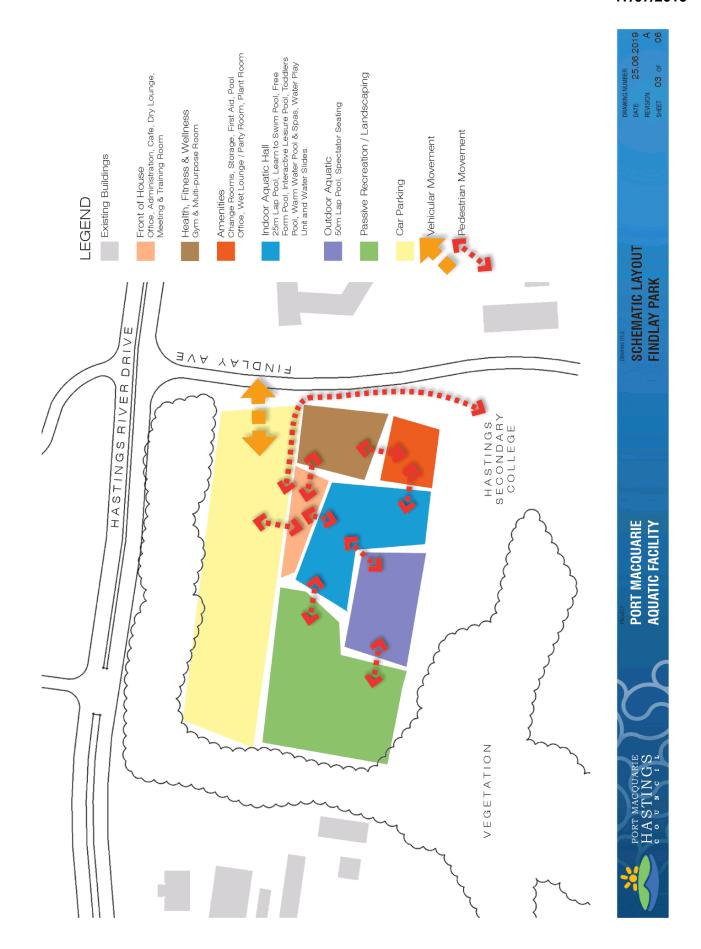
Note final car parking requirements will be determined by the development size. Similar sized facilities in regional areas have provided 200 to 250 car spaces but the final requirements will need to relate to local planning requirements.

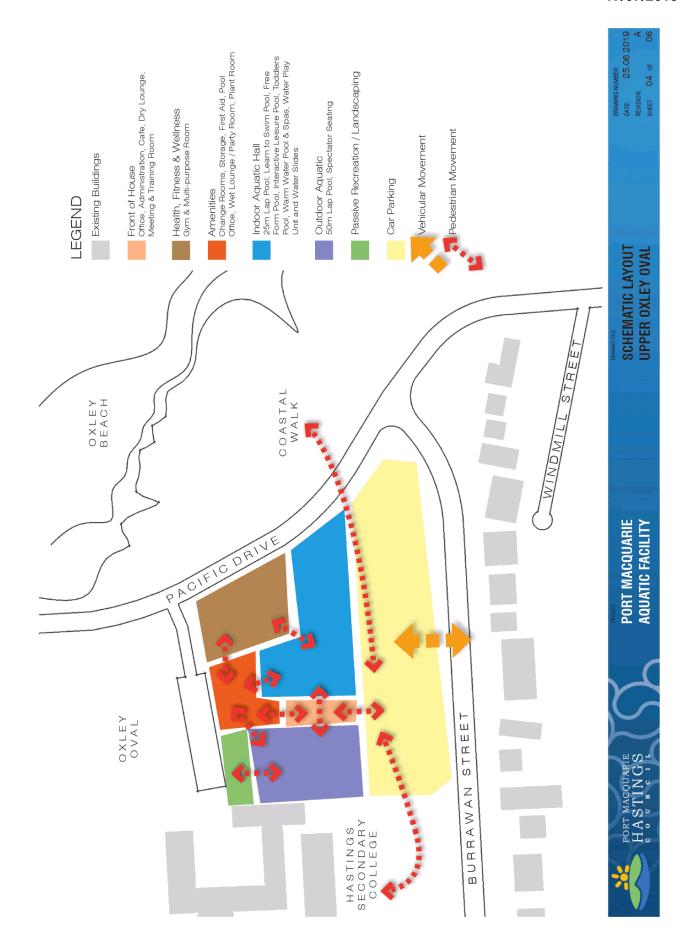


Item 11.04 Attachment 3

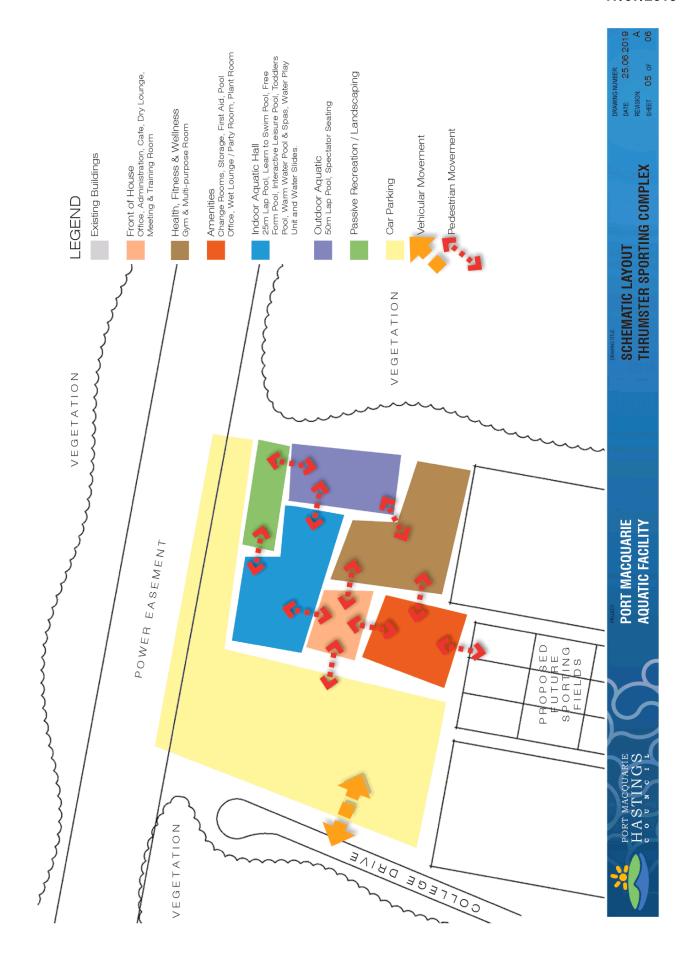


Item 11.04 Attachment 3

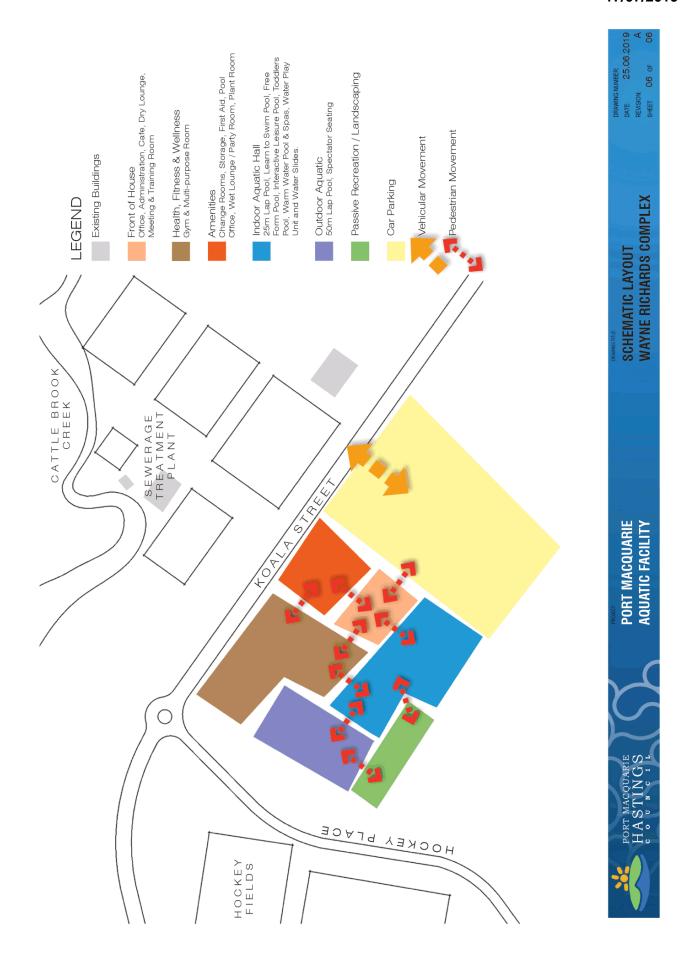




Item 11.04 Attachment 3

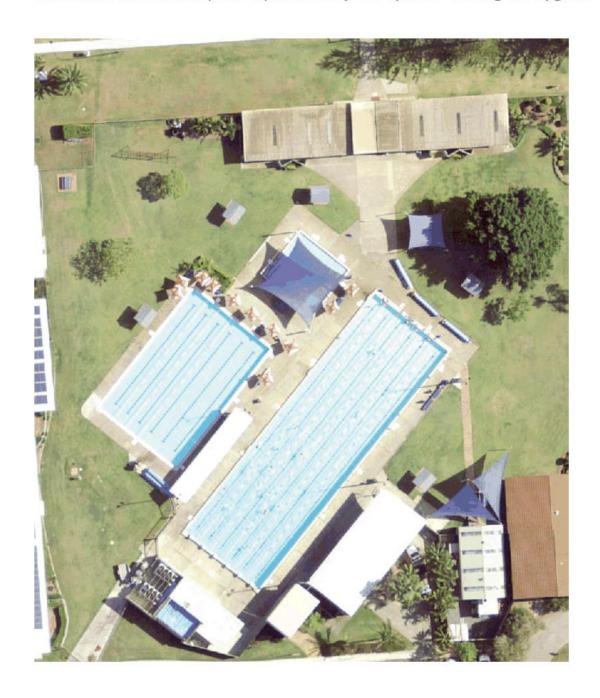


Item 11.04 Attachment 3





Attachment 3A: Port Macquarie Aquatic Facility Site Options - Existing Site Upgrade





Attachment 4: Port Macquarie Aquatic Facility Site Options - Positives and Constraints

Location	Positives	Constraints	ints
Macquarie park	Existing power / water / sewer utility / storm	• Displ	Displacement of sporting users
	water / recycled water provisions within close	• Pres	Pressure on Munster Street
	proximity to site	Nativ	Native title status to be determined (land tenure)
	 Zoned as RE1 (permissible under current zoning) 	• Pum	Pump station constrains access at Munster street
	 Low bushfire risk 	• Pum	Pump station visual impact at Munster street
	 Central location and close proximity to existing 	• Sewe	Sewer main traverses south of site
	pool site	• Ex-la	Ex-landfill site therefore cost for disposal of excess soil
	 Public transport access 	mate	material is high and additional structural requirements
	 Larger space to play with configuration 	 Adja 	Adjacent to an area mapped as Endangered Ecological
	 Linkages with existing recreational site (netball), 	Com	Community
	still space for future growth	• Sout	South of the site in 1:100 year flood zone - flood assessment
	 Low impact to adjacent land use 	to be	to be undertaken as part of the development
	 Previously identified by the community as 	• Build	Building height restriction of 11.5m
	preferred site	• Envir	Environmentally sensitive areas adjacent to site
	 Low vegetation impacts 		
	 Close to other community facilities 		
	 Parking to complement existing infrastructure 		
	 Exposure for existing businesses within close 		
	proximity		
Upper Oxley	 Destination site - prominent location with ocean 	• Envir	Environmental considerations
	views	• Cut	Cut and fill required
	 School linkage 	 Pote 	Potential impacts to residents - noise and/or visual
	 Reasonable public transport linkages 	 Pote 	Potential impact to culturally sensitive plantings
	 Pedestrian linkages 	Nativ	Native title status to be determined (land tenure)
	 Reasonably central 	• Incre	increased traffic likely to require upgrade to intersection of
	 Existing power / water / sewer utility / storm 	Burr	Burrawan & Pacific drive intersection
	water / recycled water provisions within close	• Storr	Storm water management considerations
	proximity to site	 Pote 	Potential to encounter naturally occurring asbestos
	 Zoned as RE1 (permissible under current zoning) 	• Visua	Visual impact assessment required to determine appropriate
	 No building height restrictions in place 	heigl	height for built forms

	 Low bushfire risk area (vegetation buffer) Potential to capitalise of views from site for integration of other commercial activities i.e. function space etc. 	Impacts from pre	Impacts from prevalent NE winds / salt spray during summer
Findlay Park	 Existing power / water / sewer utility / storm water / recycled water provisions within close proximity to site Zoned as RE1 (permissible under current zoning) Linkage with school More space on site to play with configuration and opportunity for public park space Relatively flat site Good public transport connectivity Low impact on existing vegetation Relatively central 	Displacement of existing user Traffic congestion at peak sch Change in use concerns - lanc public/school/park space use Change form visual use Noise issues for residents in c Previously a land fill site Bus interchange would need a Native title status to be deter Medium bushfire risk (catego west of site Vegetation to north and west Endangered Ecological Comm with runoff from site) Flood assessment to be under development Building height restriction of Ex-landfill site therefore cost material is high Water supply line 100mm - m supply line	Displacement of existing users (longstanding soccer club) Traffic congestion at peak school hours Change in use concerns - land originally donated for public/school/park space use Change form visual use Noise issues for residents in close proximity Previously a land fill site Bus interchange would need to be relocated Native title status to be determined (land tenure) Medium bushfire risk (category 3) to vegetation at north and west of site Negetation to north and west of site mapped as an Endangered Ecological Community (constraints associated with runoff from site) Flood assessment to be undertaken as part of the development Building height restriction of 18.5m Ex-landfill site therefore cost for disposal of excess soil material is high Water supply line 100mm - may require connection to larger supply line
Dixie Park	 Good public transport connectivity and traffic 	Displacement of	Displacement of existing users (longstanding soccer club)
	access Relatively central	Least amount of area to (configuration options)	Least amount of area to work with out of all sites (configuration options)
	 Not a previously land fill site 	Vegetation considerations	derations
	 Close proximity to schools 	Proximity to residents	lents
	 Relatively flat site 	Storm water issues	sa
	 Adjoining industrial sites 	No linkages with	No linkages with other recreational facilities
	 Lower likelihood of cultural significance 	Partial site mappe	Partial site mapped as coastal SEPP buffer
	 More than one entry/exit point 		

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• • •	Existing power / water / sewer utility / storm water / recycled water provisions within close proximity to site Zoned as RE1 Council owned / managed land	Easement to west of site has potential to encounter acid sulphate soils during excavations. Flood assessment to be undertaken as part of the development. Overland flow path running along western boundary to be addressed. Building height restriction of 18.5m. Water supply line 100mm - may require connection to larger supply line.
Wayne Richards	School linkages Minimal residential impact Connection with existing recreational facilities Existing power / water / sewer utility / storm water / recycled water provisions within close proximity to site Zoned as RE1 Council owned / managed land Low bushfire risk area (vegetation buffer)	Earthworks required (sloping site) Impact on an existing planned facility (athletics) Decentralised Public transport access considerations Vegetation at west of site is coastal SEPP Koala Plan Of Management at south of site Prevalent NE winds during summer carry smell from Sewer Treatment Plant Building height restriction of 8.5m
Thrumster	Growth area School linkage Opportunities for linkages with planned facility (co-location of regional sports facilities) Existing power / water / sewer utility / storm water / recycled water provisions within close proximity to site Zoned as RE1 (permissible under current zoning)	Impact on existing planned facility (soccer - with proposed high performance facility) Access for southern Port Macquarie residents Distance from Port Macquarie CBD Within close proximity to recently redeveloped Wauchope Pool Extensive fill required Developer owned - yet to be dedicated to Council Creek at west of site is key fish habitat Koala Plan Of Management & core Koala Habitat areas Flood assessment to be undertaken as part of the development Site has potential to encounter acid sulphate soils during excavations

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan



COMMUNITY ENGAGEMENT PLAN

Project:	Port Macquarie Aquatic Facility – Site Selection & Concept Plan
Author:	Lucilla Marshall
Document Location:	

Approvals						
Name	Signature	Title	Issue Date	Version		
Liam Bulley		GM Recreation &				
		Buildings				
Lucilla Marshall		GM Community Place				
Liesa Davies		GM Economic				
		Development &				
		Communications				

Project Roles					
Role	Name	Title			
Project Owner	Liam Bulley	Group Manager Recreation and			
		Building Services			
Project Owner/Lead	Amanda Hatton	Recreation and Facilities Manager			
Project Design Lead	Craig Luff	Senior Landscape Architect			
Community Engagement	Lucilla Marshall/ Sandra Wallace	Group Manager Community Place			
Lead		Community Participation Manager			
Communications Lead	Andy Roberts	Communications Manager			

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

1 Introduction

This Engagement Plan provides specific information in relation to proposed community and stakeholder engagement activities during the concept design and site selection phase for the construction of a new aquatic facility for Port Macquarie.

1.1 Background

The proposed Port Macquarie Aquatic Facility continues to be a key priority for Council with inclusion in Council's Recreation Action Plan (2017-2025). Further to this, Council's 2019/2020 Operational Plan contains provisions for detailed design of the facility.

This project has been a long-standing item for Council and has been discussed with the community on several occasions over the past 20 years. The identification of Macquarie Park being a suitable site is consistent with community feedback from site selection processes previously undertaken with the community in 2000, 2005 and 2011.

Council undertook an additional round of community engagement with key stakeholders and the broader community in late 2017 to understand what type of facilities should be included in a new aquatic centre. This information has then been used to further develop the project and review site options for the next stage of engagement. Council reviewed six sites that meet the requirements for a new aquatic facility base on best practice and community feedback. The six sites are based on the criteria listed below, all have merits and challenges and to ensure clear and transparent engagement it was determined to engage with the community on all six sites. Council is aware that some of the sites will be considered unacceptable and that there are community groups that will be particularly interested or not in seeing some of the sites developed for an aquatic facility. As part of the project and the engagement, Council will also be including as an option the upgrade of the existing pool site and what it can contain given the site constraints. By engaging on the proposed six options and the upgrade of the existing pool site it will assist Council in understanding the community's desired level of investment for this important recreation facility.

Selection criteria for the proposed sites was based on the following:

- Council-owned land (to reduce overall cost);
- Accessibility from a traffic and parking perspective, as well as proximity to population;
- Size/area of available land;
- Impact on existing user groups.

In order to progress the project and meet the delivery timeframes contained within the Operational Plan the selection of a site for the facility needs to be determined and discussions undertaken with the community to confirm the preferred site. To assist with this process, staff have developed concept plans for each site identified at a December 2018 Councillor briefing. The concept plans contain facility design components that were identified by Otium, a consultancy group engaged to inform facility inclusions of a contemporary aquatic facility. Additionally, an analysis of the advantages and disadvantages of each site was undertaken. From this process, staff have identified Macquarie Park and Thrumster as being the most suitable site for the new facility. Through the engagement (once endorsed by Council) Council will share all reviewed options as well as the preferred options with the reasoning behind the decisions.

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

1.2 Intent of Engagement

The **overarching intent** of the community engagement process will be to promote a high level of community input into the facilities to be included in the design of the new aquatic facility and the selection of an appropriate site. The engagement will endeavour to:

- Raise community and stakeholder awareness of the project and communicate the ways they can contribute to the design and site selection;
- Reinforce that this project will have ongoing engagement through the life of the planning and design of the Aquatic Facility
- Provide opportunities for community to influence design decisions and site location;
- Build relationships with stakeholders and members of the community to encourage direct communication / identification of issues, concerns or preferences;
- Ensure appropriate and effective communications and engagement methods are utilised throughout the project;
- Establish an open, honest, transparent approach when dealing with all groups or individuals;
- Provide feedback to community on how input into the engagement process has influenced the outcomes;
- Provide factual, accurate and regular information to the local community to help improve understanding of the project and any constraints, and thereby increase community understanding of the budgetary implications of the design and site chosen;
- Ensure consistent messages are conveyed to all stakeholders; and
- Generate positive media coverage of the project.

1.3 Key Messages

The following key messages will be reinforced where appropriate through the engagement process:

Port Macquarie-Hastings Council is planning and providing infrastructure to support our growing region. This includes providing a range of inclusive sporting and recreational facilities to encourage a healthy and active lifestyle.

Secondary messages are as follows:

- The Port Macquarie Pool is a major health and recreation facility for the region and caters for a wide range of both competitive and recreational swimmers.
- Port Macquarie is undergoing unprecedented growth with its population forecast to reach more than 100,000 by 2030. This growth is expected to lead to a significant increase in the number of visits to the Port Macquarie Pool.
- The Port Macquarie Pool was built in 1966 and whilst fit-for-purpose when it was built, the pool's structure is deteriorating and no longer meets the needs of the fast-growing Port Macquarie community.
- The growth in both the number of residents and visitors to the region in recent years has resulted in user congestion during peak periods. A new facility is required to handle the forecast increases in residents and visitors.
- The construction of a new aquatic facility will be an important investment in infrastructure for the enjoyment and health and wellbeing of the whole community.
- This project was identified as a key project in Council's Recreation Action Plan adopted in 2017. The development of a detailed design for the Port Macquarie Pool, is a key action in Council's 2019/20 Operational Plan.
- This is a staged project that Council will engage on with the community across all the stages.

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

- Council is planning ahead to ensure the Port Macquarie Aquatic facility can meet the needs of the region for at least 50 years into the future.
- The community's priorities and usage patterns will help inform the design of the new facility and the site selection.
- Council is aware of the proposed Tidal pool project and recognises it as a community driven project and the Aquatic Facility is still required for our future recreation needs.

2 Stakeholders

A stakeholder is defined as someone who can impact upon the success of the project or who will be impacted by the project.

This section outlines stakeholders and community members that will need to be considered for the site selection and design of the new aquatic facility.

Internal Stakeholders are those who would not otherwise be informed of the project via project meetings or other regular communication via their team.

2.1 Stakeholder Identification

Internal Stakeholders:

- Recreation & Buildings
- Community Place Staff (including Council front desk & call centre)
- Economic Development & Communications Staff
- Infrastructure Delivery
- The Executive
- Councillors
- Economic Development Steering Group (EDSG)

External Stakeholders:

- · Potential Funding Partners (via local members of Parliament)
 - o State MP Leslie Williams
 - o Federal MP Pat Conaghan & MP David Gillespie
- Bluefit Port Macquarie Olympic Pool Managers
- · Coaches using the current facility
- Clubs & Schools using the current Pool
- Swimming Pool Users/Visitors
- Special Interest Groups (e.g. The Tidal Pool Committee & Pool for Port Macquarie Group (PPMG)
- Existing user groups of sites
- Broader Port Macquarie Community

A list of identified stakeholders and their contact details is supplied in Attachment A.

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

3 Community Engagement Action Plan

A proposed Community Engagement Action Plan for the next stage - Site Selection and Initial Concept Review is shown overleaf. It is important to note that this project has and will have many stages of engagement due to its community use and potential impacts. It is also important to note that this plan may change throughout the project subject to feedback from stakeholders and the level of success with proposed engagement actions.

Stages of Engagement and Key Project Decision-points for the Port Macquarie Aquatic Facility (2017 - June 2020):

 Stage 1 - September to November 2017 - Council engaged with the community on the components that should be considered as part of a new aquatic facility - completed

(December 2017 - June 2019 - 18-month review of community requirements and selection of suitable Council-owned sites for further consideration and review)

July 2019 - Decision by Council to engage with the community on site selection options

- Stage 2 late July to August 2019 Council to engage with the community on the preferred 6 sites and concept design elements. This will include:
- A list of pros and cons for each site
- General concept plan for each site.
- Examples of pools and associated costs will be used to show the community what level of
 investment would be for feasible for a new aquatic facility.
- · Explanation of what is feasible if the existing site is upgraded like for like; and
- Explanation on why the existing site is not being considered an option for the future.

September 2019 - Council decision on preferred site and move to Strategic Concept development based on community feedback on preferred site.

Procurement for Strategic Concept Plan and Detailed design to be developed and be presented to the February Council meeting

• Stage 3 - February to March 2020 - Engagement on concept design of proposed Aquatic Facility

April 2020 - Council decision to endorse Strategic Concept Design and move to Staging Development

 Stage 4 - April 2020 - Engagement on possible staging of the strategic concept design of Aquatic Facility

Detailed Design development based on community feedback and run in parallel with the staging works

Mid to late 2020 - Detailed Design endorsed by Council and shared with the community (inform only)

All stakeholder engagement will be recorded in the Stakeholder Engagement Register – refer Attachment A. The Community Engagement Lead will be responsible for the register but input into the register is open to anyone who engages with stakeholders on the project.

Port Macquarie Aquatic Facility Concept Plan & Preferred Site Selection - Community Engagement Plan

Project Owner/ CE lead and General manager, Director CE lead/ Project Manager CE lead/ Comms/Project CE Lead/ Project Owner CE Lead/ Project Owner CE Lead/ Comms Manager Comms D&E Engagement Consult/ Collaborate Level of Inform and Consult Collaborate Consult/ Inform Inform Inform **Engagement Technique** Media release/Social Fact Sheet/Face to Information at CSC Face as required Media Release and Libraries Face to Face Face-to-face media posts Face to Face Face-to-face Website Discuss site selection proposed with PPMG's and future path for working with group on engagement with the community/progressing the project. Discuss the project to date and the proposed site selection that will be community to progress the project. Provide update on the project and outline engagement opportunities Encourage broader community to including communications on the Have their Say and come along to including communications on the engaged on and future path for engagement intent and timing engagement intent and timing Stage 2 - Engagement Action plan - July to September 2019 working together with the Commence discussions on Commence discussions on engagement sessions engagement process engagement process and seek feedback discussion re proposed Stakeholder Group/(s) Existing user groups Broader community Federal Members Macquarie Group Key Stakeholder Key Stakeholder Local State and Pool for Port (PPMG) Groups groups sites w/c 22 July 2019 When w/c 30 June w/c 22 July w/c8 July w/c8 July w/c8 July

Printed 9/07/2019

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

w/c 29 July – 28 August	All Stakeholder Groups/ Broad Community	Inform about the project, invite submissions via Have Your Say	Survey (hard copy) Have Your Say Facebook posts	Consult	CE Lead
w/c 29 July – 28 August	Pool Managers Coaches using Pool Sporting Group Users	Inform about the project, invite submissions via Have Your Say	Email to sporting user groups	Inform/ Consult	CE Lead / Project Owner
Regular Updates	Councillors	Inform on engagement about the project	Via Councillor Newsletter	Inform	CE Lead
w/c 12 August	All stakeholders	Inform about the project, invite submissions via Have Your Say	Pop ups in shopping centres - Port Central, Settlement City and in Libraries	Inform/Consult	CE Lead/Project Owner and CSC
w/c 12 August	Pool Managers Coaches using Pool Sporting Group Users Schools	Discussion on project and site location from a user's point of view at Club Level	Survey	Consult	CE Lead / Comms
w/c 19 August	Pool Users	Reminder about having your say and encouraging attendance at pop ups at Pools	Pop up sessions at Pool	Consult	CE Lead + Project Owner and CSC
Late August	Councillors	Provide feedback on community engagement and preferred location	Briefing	Inform/Consult	Project manager/ CP Manger
13 September	All submitters and key stakeholder groups	Invite to Council meeting regarding decision point and invite to speak in the public forum	Letter	Inform	CE Lead
Late September	All Stakeholder Groups	Following closure of engagement and Council decision point	FAQ document posted on Have Your Say re Council's decision	Inform	Project Owner / CE Lead
Late September	All Stakeholder Groups	Provide update on Council decision	Email to Have your say database Letter to Submitters Media release	Inform	CE Lead / Comms / Project Owner

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Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

General Manager, Director	D&E, CE Owner and Project	Owner
Inform		
r and face-to-face	ting	
Letter a	meeti	
Update on the project and	engagement occurring	
State & Federal MP's		
w/c 28 October		

Stage 3 Engager	Stage 3 Engagement - Concept Plan	Development - February - June 2020	2020		
w/c 3 February	Stakeholder groups and interested parties	Invite to a stakeholder workshop on design development	Design workshop	Involve	CE lead + Project Manager
w/c 17 February	All Stakeholder Groups	Conduct Community Workshops to develop possible concept designs	Community Think Tank Workshops	Consult/ Collaborate	CE Lead
w/c 23 March	Exec and Councillors	Briefing on Strategic Concept plan	Briefings	Consult/ Collaborate	Project Owner/Project Manager and CE Lead
10 April , 2020	Key Stakeholder groups including user groups	Continue discussions project and provide information on the Strategic Concept plan and timing on the next stage of engagement	Face to Face	Inform/Consult	Project Owner/Project Manager and CE Lead
15 April 2020	All Stakeholder Groups	Present developed draft Master Concept Plan to April Council Meeting	Report to Council Meeting	Inform	Project Owner
w/c 20 April - 21 May	All Stakeholder Groups	Provide community with opportunity to view and give feedback on Concept Plan	Public exhibition Media Release Have Your Say Banner at pool Pop ups Facebook	Inform/Consult	Project Owner CE Lead
May - June	All stakeholder groups	Staging workshops to understand level of investment	Workshop Survey Face to face	Inform Consult	Project Owner CE Lead
17 June 2020	Councillors	Presentation of Final Concept Plan and tender for detailed design	Council Report	Inform	Project Owner

Port Macquarie Aquatic Facility Preferred Site Selection & Concept Plan - Community Engagement Plan

w/c 22 June 2020	w/c 22 June 2020 All Stakeholder Groups	Provide feedback to public on	Media Release	Inform	CE Lead / Comms / Project
		outcome of Meeting and Final	Facebook		Owner
		Strategic Concept Plan, staging and	Email to user groups		
		level of investment and inform of	Website Projects Page		
		next steps			
w/c 22 June 2020	w/c 22 June 2020 State & Federal MP's	Update on the project, engagement Letter and face-to-face Inform	Letter and face-to-face	Inform	General Manager, Director
		to date and preferred site, design,	meeting		D&E, CE Owner and Project
		staging and level of investment.			Owner

Move to Detailed Design development.

Additional engagement plan and stages will be developed as required, and be based on feedback from the community and lessons learnt through each stage.

Communications package will be required to support the engagement process including, but no limited to:

Fact sheets

History/timeline of Port Macquarie pool upgrade/renewal and works done to date

Existing Pool issues and challenges

Engagement to date - facilities required and why

Engagement to date - facilities required and wny
 Six pool sites - pro and cons with design elements

Examples of Aquatic centres and levels of investment to provide context for community

Community Survey

Have your Say -page

Posters

Communication tactical plan - with marketing campaign to get the broader community involved.

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Port Macquarie Aquatic Facility Concept Plan & Preferred Site Selection - Community Engagement Plan

4 Evaluation

4.1 Data Collection & Analysis

All stakeholder engagement will be captured in the Stakeholder Engagement Register and the Project Team will implement a continual process of monitoring and evaluation to ensure the Community Engagement Plan is meeting its objectives.

The following activities will take place:

- enquiries and complaints will be monitored to determine the effectiveness of communication activities and indicate direction for additional activity.
- monitoring of media coverage
- review of key messages analysis in media coverage

At the conclusion of the project a Stakeholder Engagement Summary Report will be produced which will include the following:

- Summary of Engagement Activity
- Summary of any feedback received from stakeholders including key issues and/or topics raised
- The differences in views/ideas across stakeholders/groups
- Analysis of enquiry/complaint via number of customer enquiries to be logged
- Success of media coverage

5 Attachments

Attachment A - Stakeholder Contact List & Engagement Register



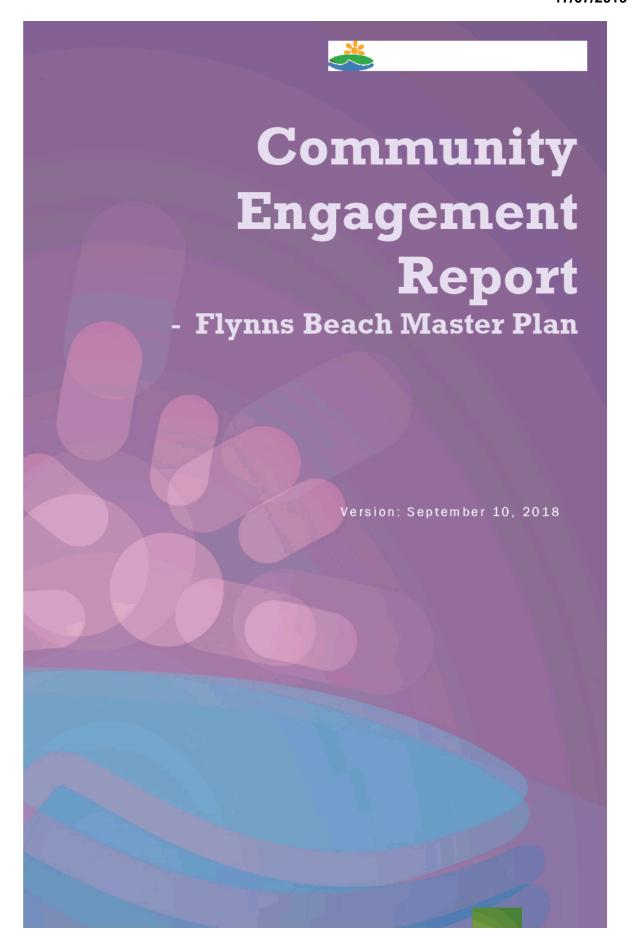
Attachment 5: Port Macquarie Aquatic Facility Stakeholder Engagement List

Stakeholder Name	Contact Name	Role/Title
Pool for Port Macquarie Group	Greg Freeman	Spokesperson
Port Macquarie Swim Club	Warren Phillips	President
Port Macquarie Tri Club	Andrew Lister	President
Tacking Point Surf Lifesaver Club	Mick Lang Mitchell Dawson	President Vice President
Port Macquarie Surf Club	Bill Amy Rick Rolff	President Vice President
Hastings Valley Vikings	Fiona McCormack Mick Aldridge	President Vice President
Port Macquarie Football Club	Chris Barlow Catherine Cornish	President Secetary
Port Macquarie Army Cadets	David Coffey	
Hastings Valley Netball Association	Cathy Glover Rosemary Miller	President Secretary
Port Saints Football Club	Greg Bell Laura Noble	President Secretary
Port Macquarie Softball	Lea Smith Rowena Meers	President Secretary
Hastings Secondary College (Westport Campus)	Christian Pettitt Ben Johnston	Assistant Principal Sports Coordinator
Port United Football Club	Peter Moore Gregg McDondal	President Secretary
Port Macquarie Little Athletics	Trudi Wilmot Gavin Thompson	President Secretary
Port Pacers Running Club	Jon Binskin Kylie Brown	President Secretary
Football Mid North Coast	Bruce Potter Larry Budgen	General Manager Secretary
Tidal Pool for Port Macquarie Group	Kathryn Butler	Spokesperson



Item 11.05 Attachment 1







Community Engagement Report – Flynns Beach Master Plan

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1 INTRODUCTION

1.1 BACKGROUND

Flynns Beach is a significant recreation asset for the region. Council embarked on a range of comprehensive community engagement activities in order to determine the most appropriate use for the site and prepare a Master Plan to guide future development.

In addition to the development of the Master Plan, the construction of part of Flynns Beach Sea Wall is due to commence in 2018/19 and a traffic study is taking place regarding the management of parking on Pacific Drive in the Flynns Beach business area.

Development of a Master Plan for Flynns Beach Reserve will consider areas from the beach to the eastern curb on Pacific Drive. The Plan will also consider the access to and from the Flynns beach shops and across Pacific Drive for all visitors.

1.2 ENGAGEMENT APPROACH

This Community Engagement Report provides a summary of the community engagement activities carried out by the Community Participation Team during the period 6th March to 3rd April 2018.

The intent of the community engagement was to:

- Find out how the community uses the Flynns Beach space and how they would like to see this space developed into the future;
- Inform the community about the upcoming construction of the Flynns Beach Sea Wall; and
- Gain feedback from the community about any issues and suggestions for improvement regarding parking in the Flynns Beach area (particularly on Pacific Drive).

2 ENGAGEMENT OVERVIEW

2.1 ENGAGEMENT TIMELINES

Date	Activity
6 th March 2018	Post card campaign collecting information from the local community.
14 th March 2018	Community Engagement Pop-Up Session (afternoon)
18 th March 2018	Community Engagement Pop Up Session (morning)
19 th March 2018	Community Engagement Pop-Up Session (weekend)
24 th March 2018	Community Think Tank

Table 1: Community engagement timeline



2.2 ENGAGEMENT SCOPE

The Master Plan will provide a design for the future development of Flynns Beach.

The Master Plan will incorporate the structural sea wall between the surf lifesaving club ramp and car parking area on Tuppeny Lane including vehicle and mobility access ramp, footpath connection through Flynns Beach Reserve, onto the beach and to Pacific Drive, additional car parks/reconfiguration of existing car parks and road way and concepts for furniture, signage and lighting.

2.3 ENGAGEMENT METHODOLOGY

Community were invited to participate in a variety of engagement methods during the period 6th March to 3rd April 2018. Community members were encouraged to provide their feedback to Council, leave comments and make submissions at the pop-up engagement sessions; via post card campaign, via mail, email or online via Council's *Have Your Say* website.

Council held a community think tank session on the 24th March 2018 for the community to meet the project team and work through an enquiry by design process to assist in developing the draft master plan.

The following communication channels were used:

Project FAQ's	Available at the community information sessions and online.
Community Think Tank nomination	Community including key stakeholders were invite to nominate to participate in the Community Think Tank session community.
Webpage – Have Your Say	Project page updated 6 th March 2018, FAQ's, key dates for engagement and opportunity to provide feedback.
Post Card Campaign	Community we able to submit a post card which asked two questions regarding Flynns Beach.
Pop Up Engagement Sessions	Three pop up engagement sessions were held at various times to capture uses of the space between 14 th and March 18 th 2018
Community Think Tank Session	Held on 24 th March 2018. Community stakeholders engaged in an enquiry by design workshop to develop a draft concept master plan which will be partnered with the other information received through the other community engagement feedback received.

Table 2: Communication channels



3 ENGAGEMENT RESULTS

3.1 FEEDBACK RECEIVED

A total of 80 pieces of feedback were received from the community:

- 46 were received via postcards, email and CRM's;
- 27 were received from Have your Say;
- 7 conversation points were recorded at the pop-up engagement sessions.

In general there was a high level of support for the development of the Flynns Beach Master Plan with 80% of the submissions received specifically providing positive feedback in addition to constructive feedback on the concept design which was provided for comment.

The following is a summary of the feedback received:

PROPOSED IMPROVEMENTS	DESCRIPTION
UPGRADE FURNITURE	More bench seats, tables and chairs with shade, additional BBQ's spread across the green area from north to south.
UPGRADE AMENITIES	Toilet facilities currently outdated and very dark.
PLAYGROUND	Installation of small playground at the northern area of the beach.
FITNESS STATION	For active community users at the Northern end
UPGRADE SURF CLUB	Multi-story to accommodate: SLSC requirements Amenities toilets and showers with hot water (solar or user pay) Cafe Storage for both Surf Schools Hire Venue Restaurant/ Bistro Pedestrian bridge Disability access
FRESH WATER BUBBLERS AND BOTTLE FILLERS	Currently there is only one bottle filler.
ACCESS PATHS	Pedestrian walkway down the eastern side of Tuppeny Rd from north to south to assist in keeping pedestrians safe. Widen footpaths to better meet user requirements – wheelchairs, prams and pedestrians. Direct pedestrians to edge of seawall pathway / boardwalk.



	Steps from Tuppeny road down to Surf Club need to be upgraded. Footpaths along Pacific Drive especially eastern side.
INSTALL STAIRS SOUTHERN END OF BEACH	Stair access to the southern end of the beach. This will prevent people trying to navigate their way down the embankment. This will also assist people walking their dogs over to Nobbys Beach.
BEAUTIFICATION OF THE AREA	Maintain natural beauty of the area Bush regeneration Clearing/ tidy up of entrance to Tuppeny Road Generally overgrown and needs maintenance.
DROP-OFF ZONE	To allow users (parents with children, people with disability) to drop people and beach items prior to finding a park. A space of approximately two parking spaces.
AREA IN FRONT OF NORM MORGAN ROW	Timber deck. The grass doesn't grow in this area and it looks unattractive. This would also improve access as this area is uneven.
EXTRA BEACH SHOWER	Installation of another beach shower at another exit point from the water that accessible for all users.
MEMORIAL FOR BRONSON	Installation of seat and public art sculpture in memory of Bronson the young man who drowned at Flynns Beach in December 2017.
TULLY'S HEADLAND	Creation of a lookout with picnic tables Pathway from north to south for pedestrian access. Beautification of the area.
INDIGENOUS SIGNAGE	To identify the cultural significance and use of the area.
CREATION OF FRIENDS OF FLYNN'S	Voluntary team who could tackle basic maintenance e.g. rubbish collection, planting and watering of new plantings etc.
TIDAL POOL	Strong support for a tidal pool at Flynns Beach was received, as was strong support against the tidal pool saying Flynns Beach is not the ideal/ appropriate beach for a tidal pool.

Feedback was also gathered regarding traffic management in the foot print of the Master Plan.

торіс	DESCRIPTION
PARKING	Formalise southern car park. Line mark all parking spaces identified in Flynns Beach



	Install pedestrian crossing at the base of the stairs from Pacific Drive and back of the Surf Club on Tuppeny Road.
PEDESTRIAN SAFETY	Reduce the speed limit to 40km on Tuppeny Road and install speed humps to slow traffic.
SAFETT	Install flashing warning lights at the Pacific Drive crossing for pedestrian safety.
	Install signage to alert traffic to slow down for pedestrian crossings.
	The southern end of Tuppeny Road is too wide and sometimes confusing to tourists or first time users to the beach. Suggest creating left and right turning lanes on the exit of Tuppeny Road.
	Intersection of Home St & Pacific Drive – Rocky Beach Due to the inclusion of a Median Refuge Island on Eastern Side of Pacific Drive:
	 Old line marking is confusing to motorists. No "End of Cycleway" signage in either direction. No "Shared Path" markings or signage. Potential need for edge line in this location.
ROAD ACCESS	Tuppenny Rd – Flynns Beach – At Pedestrian Crossing Location behind the Surf Club:
	 Vehicles not slowing down – driving well above 40! Existing line marking faded – insufficient pedestrian refuge zones
	Poor sight distance for crossing especially on route from Beach to Walkway – where you have zero line of sight.
	 Little to no signage at this location emphasising shared path arrangement or potential crossing at this point.
	Path is funnelling pedestrians to this point – without safe
	crossing conditions at bottom of stairs children in haste to get to beach just cross road without even knowing this is a roadway.
CYCLE PATH	Suggest a line-marked cycle path on Pacific Drive



4 COUNCIL'S RESPONSE

4.1 RESPONSES TO ISSUES RAISED DURING ENGAGEMENT

The concerns raised by the community during the engagement and Council's response to these concerns are shown below:

TOPIC	RESPONSE:
OCEAN/ TIDAL POOL	Council acknowledges community support for development of a tidal pool in the Port Macquarie-Hastings. Council's current focus in relation to swimming facilities is on the completion of the upgrades to Wauchope Pool, and planning for a new aquatic facility in Port Macquarie which has commenced this year. These projects have been prioritised over development of a tidal pool as both existing facilities were known to have significant structural issues.

The feedback regarding TRAFFIC MANAGEMENT in the area has been passed on to Council's Traffic Management engineers for consideration in future traffic management planning.

4.2 DESIGN CONSIDERATIONS

Council has developed a draft Master Plan the inclusion of the following elements raised as a result of the engagement with the community:

- Upgrade of furniture and BBQs;
- Upgrade of amenities;
- Installation of a playground;
- · An upgrade of the Surf Club;
- · Freshwater bubblers and bottle fillers;
- · Improved access paths;
- Installation of stairs at the southern end of the beach;
- · Beautification of the area;
- Safe drop off zone (2 car spaces);
- · Beautification of the area in front of Norm Morgan Row;
- Extra beach shower;
- Memorial for Bronson to be considered as part of the seawall artwork
- Improvements to Tully's Headland;
- Indigenous Interpretive Signage to be integrated into the Coastal Walk Interpretative Signage strategy.

The development of a Friends of Flynns Beach volunteer group is under discussion with Council's Volunteer Co-ordinator. However the master plan addresses some of these issues/ opportunities.



COMMUNITY ENGAGEMENT PLAN

Project: Flynns Beach Master Plan
Kelly O'Brien

SF14/1585: PARKS AND RESERVES - DESIGN - Flynns Beach Reserve - Administration Document Location:

Version 04/07/2019 04/07/2019 Issue Date Group Manager Community Place **GM Recreation & Buildings** Signature Lucilla Marshall Liam Bulley Approvals Name

Project Roles		
Role	Name	Title
Project Manager	Liam Bulley	Group Manager Recreations and Buildings
Project Owner	Craig Luff	Landscape Architect
Community Engagement Lead	Kelly O'Brien	Engagement Lead
Communications Lead	Andy Roberts	Communications Manager

This Engagement Plan provides specific information in relation to proposed community and stakeholder engagement activities during the concept design and site selection phase for the development of Flynns Beach master plan. This plan will guide the future of Flynns Beach, a site that is significant to the Port Macquarie- Hastings community. Flynns Beach is a significant recreation asset for the area. Council will be embarking on a range of comprehensive community engagement activities in order to determine the most appropriate use for the site and prepare a Master Plan to guide future development of this reserve.

Intent of Engagement

outcomes of their input, generate positive media and develop, deliver a place that the community are proud of, meets user requirements, and adds recreation The intent of the engagement is to develop a range of ideas, based on community feedback, for consideration within the creation of the Flynns Beach Master Plan. This will provide direction into the design, help build relationships with stakeholders and community members, provide feedback to community on

The initial phase of engagement was undertaken during 2018 and informed the development of the draft master plan. This phase of community engagement will see the draft master plan publically exhibited so that the community can provide feedback to Council staff regarding:

- Plan inclusions they support, and
- Modifications they would like to see in the final document.

1.2 Key Messages

The following key messages will be reinforced where appropriate through the engagement process:

- Council continues to plan and create great recreation infrastructure for our growing community
- Council will continue to engage with the community as funding for further improvements at Flynns Beach become available.
- Port Macquarie's beaches and reserves are vital to our community's health and wellbeing and provide important leisure and recreation spaces
- This is an opportunity to ensure the future development of this key recreational site is managed over time in accordance with a shared vision for this

4/07/2019

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and mobility access ramp, footpath connection through Flynns Beach Reserve, onto the beach and to Pacific Drive, additional car parks, reconfiguration The master plan will incorporate the structural sea wall between the surf life saving club ramp and car parking area on Tuppeny Lane including vehicle of existing car parks and road way and concepts for furniture, signage and lighting.

Stakeholders

A stakeholder is defined as someone who can impact upon the success of the project or who will be impacted by the project.

This section outlines stakeholders and community members that will need to be considered for the design and site selection of the new aquatic facility.

Internal Stakeholders are those who would not otherwise be informed of the project via project meetings or other regular communication via their team.

2.1 Stakeholder Identification

Internal Stakeholders:

Recreation and Buildings

Infrastructure Division

Community Participation and Engagement team

Communications Team

Councillors

External Stakeholders:

Flynns Beach Surf Life Saving Club

Residents

Surf Schools – Port Macquarie Surf School and Soul Surfing

Personal trainers

Business owners/ operators

Schools - sports and excursions

Wider community

A list of identified stakeholders and their contact details is supplied in Attachment A.

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Community Engagement Action Plan

A proposed Community Engagement Action Plan is shown overleaf. It is important to note that this plan may change throughout the project subject to feedback from stakeholders and the level of success with proposed engagement actions.

All stakeholder engagement will be recorded in the Stakeholder Engagement Register – refer Attachment A. The Community Engagement Lead will be responsible for the register but input into the register is open to anyone who engages with stakeholders on the project.

The engagement has and will be over several stages:

- Stage 1 Seek feedback from the community to understand what they want Flynns Beach to look like in the future.
- Stage 2 Testing and Refining the Draft Master Plan.

engagement. There has been some shared messaging/engagement where there has been crossover between the master planning and seawall projects, and this There has also been engagement with the community regarding the design and construction of Flynns Beach Seawall that preceded master planning will continue wherever opportunities present themselves.

age 4

Flynns Beach Master Plan - Community Engagement Plan

Stage 1 Engagement - Master Plan Development

Status COMPLETE COMPLETE COMPLETE COMPLETE COMPLETE COMPLETE COMPLETE Think Tank team Place Team (CP) Recreation and max number of Responsibility Community & stakeholders CP and R&B CP and R&B Community identified Buildings (R&B) R&B 24 СР СР СР Engagement Level of Collaborate Collaborate Consult, Consult, Consult Consult Inform, Inform, Consult Inform, Inform Inform Inform Inform Postcard Campaign Review and refine Inform, Consult Have Your Say Development Master Plan Master Plan Pop ups Inform Inform Letter, Engagement Report and Draft Develop Master Plan (options) based Develop draft Master Plan based on usage is and potential opportunities for use and activity into the future Develop Community Engagement Collate feedback from Think Tank discussions for the ideas with the A post card campaign will collect community on what the current community on what they think infrastructure for Flynns Beach Collect information from local would be the uses/activities/ information from the local on Community Think Tank Flynns Beach Master Plan community feedback and CRM submission whole community. for Flynns Beach. Report Stakeholder Group/(s) Councillor workshop Think Tank and CRM Think Tank and CRM Holiday Apartments Personal Trainers Community Think Community Place Community - key **Business Owners Buildings and** Surf Schools submissions submissions Community **Tank Team** Recreation Residents Schools groups 5 March 2018 1 March 2018 24 April 2018 28 June 2019 28 May 2019 1 April 2018 When 15 March 2018

Flynns Beach Master Plan - Community Engagement Plan

Stage 2 Engagement - Master Plan Broad Community Engagement

Level of Responsibility Engagement	СР	R&B	Communications/ CP	CP	d.D	R&B	R&B	R&B/Communications
Leve	Inform	Inform	Inform	Inform	Inform	Inform	Inform	Inform
Engagement Technique	Email copy of plan	Council Report	Have Your Say Media Posters Face to Face with Key Stakeholders	Feedback Collated	Feedback review	Final Document for Master Plan	Council Report	Media release; communication with
Purpose	Provide a copy of the draft Flynns Beach Master Plan	Report to Ordinary Council Meeting - Final Draft for Public Exhibition	Draft Master Plan on Exhibition 28 days 22 July – 18 August 2019	Feedback through variety of engagement methods collated	Develop Community Engagement Report	Council report due for finalisation - Review and refine Master Plan document for endorsement at the Ordinary Council Meeting.	Review and refine Master Plan document for endorsement at the Ordinary Council Meeting.	Inform stakeholders of the outcome of the Master Plan report following
Stakeholder Group/(s)	Community Think Tank Team	Recreation and Buildings	All Stakeholders	Exhibition Closed	Community Place	Recreation and Buildings	Recreation and Buildings	All Stakeholders
When	June 2019	17 July 2019	22 July 2019 - 28 days	18 August	20 August 2019	4 September 2019	18 September 2019	19 - 27 September 2019

Additional engagement processes will be undertaken through all stages of the project and be based on feedback from the community throughout the process.

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Stakeholder Contact List & Engagement Register

	act List & Engag		Empil Address
Name/	Contact	Phone/	Email Address
Business Elympa Baseb	Name(s)	Mobile	
Flynns Beach	Bill Amy		
Surf Life Saving Club	President		
Sand Box	1 - 4:6 1111:		
Café	Latif Ucdereli		
Cale			
Port	Wayne & Amy		
Macquarie	Hudson		
Surf School	Tiduson		
Soul Surfing	Corey & Loren		
Surf School	Enfield		
GI Jones	Kylie Jones		
Fitness	,		
trainer			
Outdoor	Haley Hyde		
Fitness with	. ,		
Haley			
Swimming,			
Multisport	Ben and		
and Running	Belinda		
Tailored	Johnson		
Coaching			
Surfing for	Gary Blaschke		
the Disabled	President		
Hastings	Willem Holvast		
Secondary College	Executive		
_	Principal		
St Joseph's	Jim Dempsey		
Regional High School	Principal		
St Pauls High	Tony Watts		
School	Principal		
Campus	Tillicipal		
Newman	Stephen Pares		
Senior	Principal		
Technical			
College			
St Columba	Terry Muldoon		
Anglican	Principal		
School			
Port	Brett Thurgate		
Macquarie	Principal		
Primary			
School	Tanan Ial		
Westport Public School	Tony Johnson		
	Principal		
Hastings Public School	Jody Pattison		
	Principal		
Tacking Point Public School	Phil Harris		
Fubile School	Principal		

04		
St Joseph's	Geoff Leary,	
Primary	Principal	
School		
St Agnes	Ginaya Yarold	
Primary	Principal	
School		
Port	Phillip	
Macquarie	Lillehagen	
Adventist	Principal	
School	Timepai	
Port	Geoff Brisby	
Macquarie	Principal	
Christian	Fillicipal	
Heritage		
School		
	The Ourse	
Flynns Beach	The Owner	
Takeaway		
Coffee and	The Owner	
More		
Poco Loco	The Owners	
Mexican		
Restaurant		
Margaret &	The Owners	
Sons Pasta		
Place		
Flynns Beach	The Owners	
Pharmacy		
Flynns Beach	The Owners	
Cellars		
Australia Post	The Owners	
Flynns Beach		
Hair Artistry	Katrina Lee	
on Flynn	Proprietor	
Flynns Book	The Owner	
Cafe	The Owner	
Blue Whale	The Owner	
	The Owner	
Asian Eatery		
and Bar		
Blue Water	Cheryl Pavey	
Bar and	Co- Owner	
Restaurant		
Flynns Beach		
Resort		
Beachside		
Holiday		
Apartments		
South Pacific		
Apartments		
Ramada		
Resort Flynns		
Beach		
Beaches		
Holiday		
Resort		
1.C3OIT		

Flynns	Beach	Master	Plan -	Community	Engagement	Plan

Flynns on		
Surf Beach		
Apartments		
Flynns Beach		
Caravan Park		
Residents		
Owners and		
rental tenants		
in the Flynns		
Beach Area		

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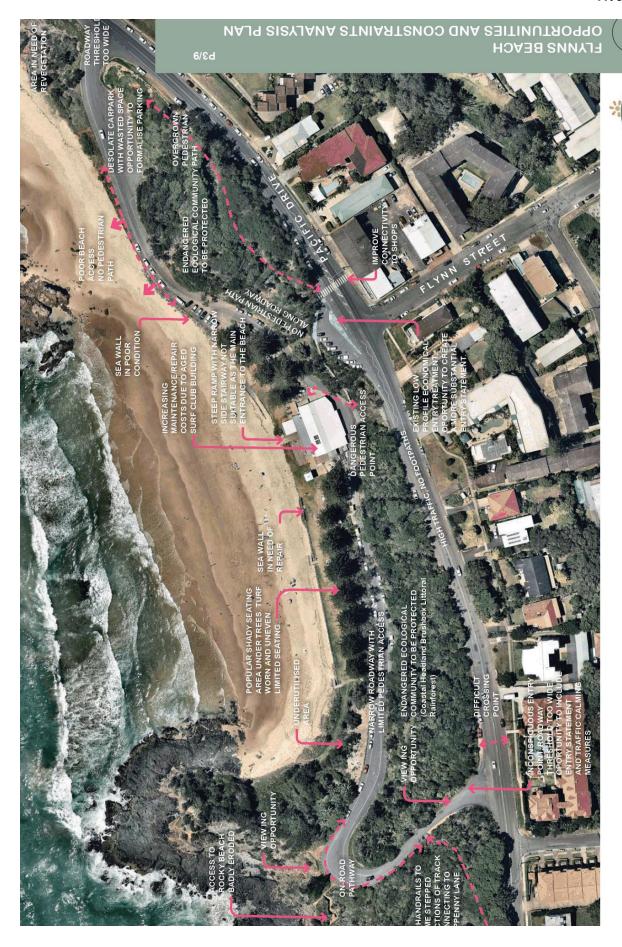
Item 11.05 Attachment 4





REVIS	REVISION HISTORY			
ISSUE		DATE	AUTHOR	APPROVED
_	DRAFT MASTER PLAN	28 August 2018	Rebecca Doblo	Liam Bulley
2	DRAFT MASTERPLAN	05 July 2019	Michael Nunez	Liam Bulley

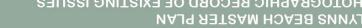
Item 11.05 Attachment 4



Item 11.05 Attachment 4



PHOTOGRAPHIC RECORD OF EXISTING ISSUES















Item 11.05 Attachment 4



PHOTOGRAPHIC RECORD OF EXISTING ISSUES





















Item 11.05 Attachment 4

SECTIONS

FLYNNS BEACH MASTER PLAN OPTION 2 NEW CLUBHOUSE





LEGEND

(1) New Surf Club. Current clubhouse has some structural and services issues. Additional space is required for all users. A new Clubhouse creates opportunities for level access from Pacific Drive.

Potential uses of the new building include:

Conference Facilities / Hire Venue

Cafe

Restaurant / Bistro Surf Life Saving Club requirements Improved amenities toilets and show

Continuous footpath. A continuous footpath provided throughout the parkland.

(5) New picnic facilities and open space in place of existing surf club Tiered seating

Footpath along Tuppenny Lane

Public viewing deck and shelter

(3) New beach access ramp 4 9 (5) Storage & Park Level Entry Cale / Restaurant



SECTION B-B

Your Business and Industry

17/07/2019

What we are trying to achieve

A region that is a successful place that has vibrant, diversified and resilient regional economy that provides opportunities for people to live, learn, work, play and invest.

What the result will be

We will have:

- A strong economy that fosters a culture supportive of business and ensures economic development of the region
- Townships, villages and business precincts that are vibrant commercial, cultural, tourism, recreational and/or community hubs
- A region that attracts investment to create jobs
- Partnerships that maximise economic return and create an efficient and effective business environment

How we will get there

- 3.1 Embrace business and a stronger economy
- 3.2 Create vibrant and desirable places
- 3.3 Embrace opportunity and attract investment to support the wealth and growth of the community
- 3.4 Partner for success with key stakeholders in business, industry, government, education and the community





Authorised date: 19/04/2017
Effective date: 19/04/2017
Next review date: 19/04/2019
File Number: D2017/104851

COMMERCIAL ACTIVITIES ON COUNCIL MANAGED LAND

1. INTRODUCTION

This Policy has been developed in response to the increasing number of commercial activities being conducted and proposed for beaches, headlands, parks, gardens and public spaces under the care, control and management of Port Macquarie-Hastings Council.

The purpose of this Policy is to implement an approval process for all commercial activities. Activities likely to have a high impact, involve high levels of risk or those deemed by the State Planning Scheme will require Development Approval while those activities likely to have minimal impact can be accessed via the Commercial Activity on Council-managed Land Licence process.

2. POLICY STATEMENT AND SCOPE

This policy is designed to:

- Manage commercial and recreational activities on Council-managed land while not detracting from the amenity and natural environment enjoyed by both visitors and residents.
- Establish an application and approval process for the sustainable use of public land for commercial purposes.
- 3. Provide equitable access for the general community and commercial activities.

This Policy applies to all beaches, headlands, parks, gardens and public spaces under the care, control and management of Port Macquarie-Hastings Council (excluding the Port Macquarie Entertainment Precinct).

Commercial Activities Covered by this Policy

A Commercial Activities on Council-managed Land Temporary Licence is required under this Policy if:

- A commercial or business activity is proposed or being undertaken on Council-managed land that Council actively manages.
- A commercial or business activity is proposed or being undertaken in a way that impacts on Council-managed land.

Activities may include (but not limited to):

- beach or water operators including surf schools, stand up paddle board hire, kayak or canoe hire
- personal trainers
- group trainers, boot camps and fitness centres
- · adventure tour operators or visitor attractions
- semi-permanent food or mobile food vendors with the reserve (to be considered in conjunction with Mobile Food Vendors Policy)

This Policy does not apply to wharf leases, fishing tours or similar activities on open waters.

Activities on waterways may require an aquatic licence through Roads and Maritime Services (RMS).

Other Approvals

The following activities do not require a Commercial Activities on Public Land Licence but require approval under another Policy of Council:

- filming
- markets
- special and major events
- weddings, parties or private functions

Activities which involve a temporary or permanent structure will require Development Approval.

Commercial Activities Permitted on Council-managed Land

The following activities can be carried out on public land without obtaining a Commercial Activities on Council-managed Land Temporary Licence:

- · Any activity of a non-commercial, passive nature.
- Any activity coordinated by a not-for-profit organisation for not-for-profit purposes.
- Any activity by sporting or social groups on a not-for-profit basis.
- Any activity performed by a recognised emergency service organisation.
- Any activity of a social, informal nature.

However, special conditions may apply to these activities.

Number and Type of Commercial Activities Permitted

There is generally no limit to the number of licences which Council may issue (excluding surf schools).

The number of commercial activities approved at a particular location may be reviewed if:

- Public areas are becoming overused and/or capacity is reached.
- Complaints are received relating to level of activity in a specific area.
- Public assets or the environment are being damaged by multiple users.
- · Commercial harmony within the space is untenable.
- Public safety is compromised.

Surf Schools

Location	Maximum Surf School Licences to be Issued
North Wall	2
Town Beach	2
Flynns Beach	2
Tacking Point	1
Lighthouse	1
Shelly Beach	1
Lake Cathie	2
Bonny Hills	3
Pilot Beach	1
North Haven	2
Dunbogan	1

Surf schools will be expected to operate with a teacher/student ratio that is consistent with industry standards.

Council may amend the number of licences issued at the above beach locations as part of any review process.

A Commercial Activities on Council-managed Land Temporary Licence:

- Is not transferable. In the event a business operating under a Licence is sold, the new owner must apply for a new Temporary Licence and under these circumstances the issue of a licence is not guaranteed.
- Must be operational or in use on a regular basis. A Temporary Licence cannot be dormant, nonoperational or unused, for a period exceeding three (3) months.
- May cover multiple locations.

Application Procedure

The application for a Commercial Activities on Council-managed Land Temporary Licence must be on the prescribed form.

The Licence, if granted, shall include the following provisions:

- a) The duration of the agreement (maximum 12 months).
- b) That the licensee secure public risk liability insurance (for cover in the amount not less than that prescribed in the policy for this purpose) in respect of the use of the prescribed area and to furnish evidence, to Council's satisfaction, that such insurance has been obtained.
- c) The licensee to fully indemnify Council, and where appropriate, the Minister for administering the Crown Lands Acts, against any claim for damage that may arise out of the conduct of the activity proposed.
- d) Any specific conditions relating to the activity or approval including approved locations.

Assessment Criteria

In considering an application, Council shall take into account:

- a) Whether the proposal is ancillary to normal public activities and enjoyment of the public reserve
- Provides suitable additional facilities or services at that location to enhance the safety or variety of recreational activities without undue intrusion into or interference with those other recreational activities;
- c) What other activities, including existing approved licensed enterprises, are carried out on or adjacent to that particular part of the public land under consideration, to avoid excessive or conflicting commercial use of that area and undue interference with the public's use and enjoyment of that area;
- d) The area within which the activity should be restricted;
- e) Whether the purpose requires the public reserve land as an essential part of its operations and cannot reasonably be carried out elsewhere;
- f) Section 68 of the Local Government Act, 1993 and Section 108 of the Crown Lands Act 1989.
- g) Commercial and/or recreational activation of the public space.
- h) Integrity, professionalism and ethics of the activity.
- i) Best use and enhancement of the location.
- j) The appropriateness of the product/service, design and appearance of the proposal.

Application Assessment

All applications will receive an initial preliminary assessment within 7 days from the date of receipt to determine if any additional information is required and a final assessment within 30 days from the date of receipt of the application or amended application.

All applications will be assessed by the Commercial Activities on Council-managed Land Temporary Licence Review Panel (see Temporary Licence Review Panel Terms of Reference) consisting of representatives from the following Departments of Council:

- Recreation and Buildings
- · Economic Development
- · Community Participation and Engagement

Commercial Activities on Council Managed Land

- Property
- · Other departments as co-opted

Applications may be assessed by Council's Executive Group if exceptional circumstances exist.

The Temporary Licence Review Panel may consider preliminary Temporary Licence proposals with the view to providing feedback prior to the formal application process.

Review of An Assessment

An applicant may request a review of a Temporary Licence decision by making a request in writing to the General Manager within 7 days of being notified of a decision.

Licence Period and Renewal

The Temporary Licence period is a maximum of twelve (12) months as required by State Legislation. A Temporary Licence may be issued for 6, 9 or 12 months to meet the needs of seasonal businesses and will be charged on a pro rata basis.

Licence Conditions

Council will assign conditions to the Commercial Activities on Council-managed Land Temporary Licence if warranted.

The issue of a Temporary Licence does not imply the exclusive use of an area of public land.

A Licence must be furnished on request by a Council official.

Temporary Licence holders acknowledge that from time to time public events or activities may impact on the business/licence conditions and no compensation for loss of trade is claimable. A Temporary Licence holder may request or be allocated a licence extension to cover an alternative location during public events or activities. Temporary Licence holders are responsible for regularly checking Council's website for any events or activities that may potentially be impacted upon by this activity.

The Temporary Licence holder cannot erect any permanent signs or advertising material (excluding the approved identification piece and business promotional flag) within the nominated public space. A frame signs are permitted, subject to the appropriate approvals, however must not cause an obstruction to other users of the space.

Any equipment used must not present a danger to other users of the space.

Temporary Licence holders must only use fixed equipment specifically related to the activity e.g. exercise equipment. Other community assets such as benches, tables and chairs must not be used for commercial purposes.

Other users of the space must be given due consideration and the activity must not be detrimental to other users or the public land.

Licence Breaches and Revocation

Where there is a breach of a Temporary Licence Council will take all necessary steps to remedy the breach. This may consist of:

- a) Written or verbal warning
- b) Notice to cease the activity
- c) Notice to amend the activity
- d) Legal proceedings

Council reserves the right to revoke a Commercial Activities on Council-managed Land Temporary Licence and a Licence may be terminated under the following circumstances:

a) If all applicable fees are not paid in advance.

Commercial Activities on Council Managed Land

- advance of the Licence commencement.
- If there is a breach of the Licence, Licence conditions or the requirements of any other relevant authority.
- d) If the Licence is non-operational or unused for a period exceeding three (3) months.

The Commercial Activities on Council-managed Land Temporary Licence Panel will assess any licence breaches and has the power to revoke a Temporary Licence.

Any breaches of the Temporary Licence agreement will be advised in writing. A licensee has the right to provide a written response to a notice of breach within 30 days.

Enforcement

All commercial operators utilising public land must have a Commercial Activities on Council-managed Land Temporary Licence. Failure to hold a licence or take reasonable steps to obtain a Licence when instructed will result in the issue of a notice to cease the activity or the issue of a fine under Section 626 of the Local Government Act for "engaging in trade or business without approval".

All commercial operators must clearly identify themselves as licence holders either by displaying their approved operator sign or producing the approved operator card on request.

Licence Fees and Charges

- Council will determine the fees and charges applicable to this Policy as part of annual budget deliberations and development of the Port Macquarie-Hastings Council Schedule of Fees and Charges.
- b) An application fee, as per the Schedule of Fees and Charges, applies to the annual Temporary Licence application.
- c) The Temporary Licence fee is for 12 months. Applications for 6 and 9 months will be charged on a pro rata basis.
- d) The Temporary Licence application fee must be paid when an application is submitted to Council. The application fee is non-refundable.

The Licence fee will be invoiced following the execution of the Licence.

All revenue (excluding application fees) will be reinvested in the maintenance and improvement of public spaces impacted by this Policy and Council will communicate the expenditure plan on an annual basis.

Activities, such as fitness businesses, which pass through multiple locations can nominate and pay for a single location being that area where the session begins.

Should the Temporary Licence application remain predominately unchanged from year to year a renewal fee will apply instead of the full application fee (see Schedule of Fees and Charges). This does not imply Temporary Licence continuity.

In return for the payment of the Temporary Licence fee licence holders will:

- Be entitled to operate in the nominated location/s.
- Be listed on Council's website as licence holders.
- Receive a Temporary Licence agreement, "Approved Operator" card and Approved Operator conflute sign.
- Have permission to display one business promotional flag.
- Have the nominated location/s maintained in a safe condition.
 Have permission to use the "Approved Operator" logo in advertising or promotional materials.

3. RESPONSIBILITIES AND AUTHORITIES

The Director Community and Economic Growth is responsible and accountable for the implementation of this policy.

Commercial Activities on Council Managed Land

A business which operates on Council-managed land is required to comply with this Policy by holding a temporary licence.

4. REFERENCES

Commercial Activities on Council-managed Land Temporary Licence Application Form Temporary Licence Review Panel Terms of Reference Council Fees and Charges Port Macquarie Entertainment Precinct Event Policy Port Macquarie Hastings Council Filming Protocol Procurement Policy

5. DEFINITIONS

Council officer: A member of Council staff.

Director: A 1st tier management position and titled as such. Group Manager: A 2nd tier management position and titled as such.

6. PROCESS OWNER

Director Strategy and Growth.

7. AMENDMENTS

This Policy was amended following an internal review in December 2016 and subsequent public exhibition period from 24 February to 26 March 2017.

Project Report

09 July 2009 - 23 June 2019

Port Macquarie-Hastings Council Have Your Say

Commercial Activities on Council-managed Land Policy

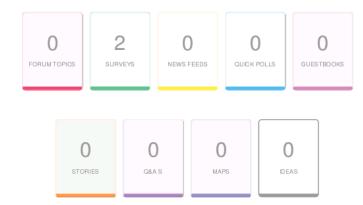




Aware Participants	180	Engaged Participants		9	
Aware Actions Performed	Participants	Engaged Actions Performed	Registered	Unverified	Anonymous
Visited a Project or Tool Page	180		rtogiotoroa	Olivelilled	Allonymous
Informed Participants	52	Contributed on Forums	0	0	0
Informed Actions Performed	Participants	Participated in Surveys	9	0	0
Viewed a video	0	Contributed to Newsfeeds	0	0	0
Viewed a photo	0	Participated in Quick Polls	0	0	0
Downloaded a document	24	Posted on Guestbooks	0	0	0
Visited the Key Dates page	3	Contributed to Stories	0	0	0
Visited an FAQ list Page	26	Asked Questions	0	0	0
Visited Instagram Page	0	Placed Pins on Places	0	0	0
Visited Multiple Project Pages	43	Contributed to Ideas	0	0	0

Port Macquarie-Hastings Council Have Your Say: Summary Report for 09 July 2009 to 23 June 2019

ENGAGEMENT TOOLS SUMMARY



Tool Type	Engagement Tool Name	Tool Status	Visitors	Contributors		
	2.1949011011.10011142110			Registered	Unverified	Anonymous
Survey Tool	Commercial Activities on Council-managed Land Policy	Published	14	7	0	0
Survey Tool	Commercial Activities on Council-managed Land Policy	Archived	12	2	0	0

Port Macquarie-Hastings Council Have Your Say: Summary Report for 09 July 2009 to 23 June 2019

INFORMATION WIDGET SUMMARY



Widget Type	Engagement Tool Name	Visitors	Views/Downloads
Faqs	faqs	26	28
Document	Commercial Activities on Council-managed Land Policy	24	24
Key Dates	Key Date	3	3
Photo	Yoga at the beach	0	0

Community Member

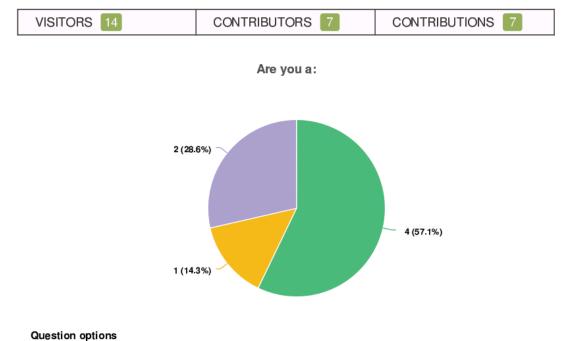
Port Macquarie-Hastings Council Have Your Say: Summary Report for 09 July 2009 to 23 June 2019

ENGAGEMENT TOOL: SURVEY TOOL

Commercial operator licenced under the Policy

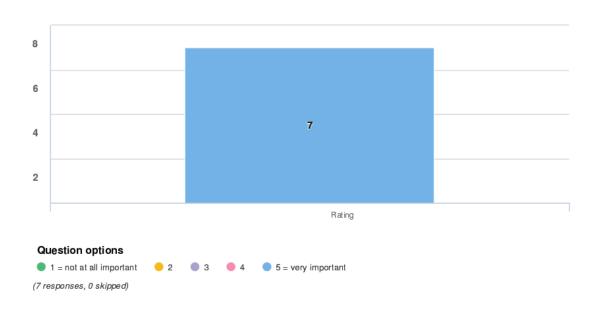
(7 responses, 0 skipped)

Commercial Activities on Council-managed Land Policy



If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activi...

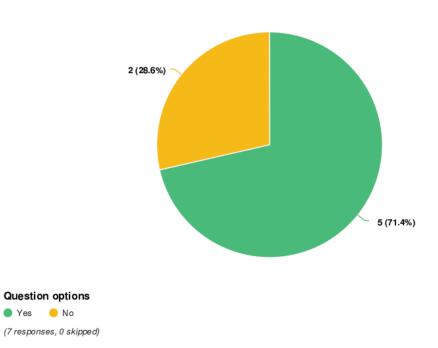
Commercial operator not licenced under the Policy



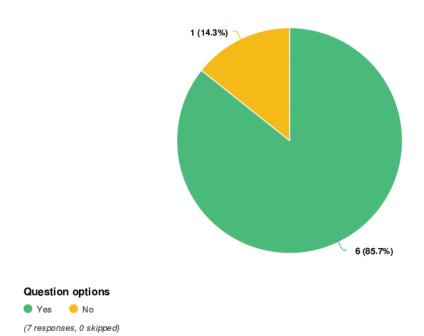
Page 4 of 7

Port Macquarie-Hastings Council Have Your Say: Summary Report for 09 July 2009 to 23 June 2019

Have you read the current Policy?

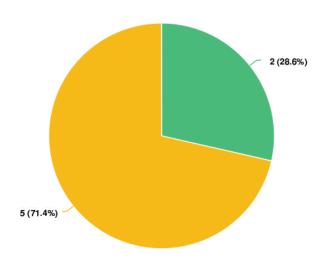


Do you feel it is effective in providing a management approach to commercial activities on Council-managed land, and balanc...



Page **5** of **7**

Would you suggest Council amend the policy?





Port Macquarie-Hastings Council Have Your Say: Summary Report for 09 July 2009 to 23 June 2019

ENGAGEMENT TOOL: SURVEY TOOL

Commercial Activities on Council-managed Land Policy

VISITORS 12 CONTRIBUTIONS 2 CONTRIBUTIONS 2

No Graphs to show

Pro Tip:

The following types of questions are shown here as graphs.

Dropdown Type Question

Checkbox Type Question

Radio Type Question

Region Type Question

Number Type Question

Text based responses are not shown in this report.

Survey Responses

09 July 2009 - 23 June 2019

Commercial Activities on Council-managed Land Policy

Port Macquarie-Hastings Council Have Your
Say

Project: Commercial Activities on Council-managed Land Policy





Respondent No: 1
Login: Evan Humble

Email: evanhumble7@gmail.com

Responded At: Mar 07, 2017 10:54:23 am

Last Seen: Apr 04, 2017 08:12:31 am

IP Address: 203.129.147.18

Q1. Name Evan Humble

Q2. Address 35 Chalmers Street

Q3. Email evanhumble7@gmail.com

Q4. Please share your thoughts and ideas here.

I see few conflicts of use in open spaces, and in Australia I see little chance of this happening anytime soon due to over regulations against street food sellers and other small enterprise activities, where in some countries these unregulated activities create a can do buzz atmosphere in a city that attracts people to want to stay, live and buy realestate that is most easily and fairly taxed to provide infrastructure for the small enterprises that give these cities their soul.

Q5. If you have any files or images that support your views, upload them here.

not answered

Respondent No: 2

Login: Guru

Email: mattyc72@gmail.com

Responded At: Mar 08, 2017 12:18:02 pm

Nov 08, 2017 05:12:28 am

IP Address: 112.141.11.141

Last Seen:

Q1. Name Matthew Connors

Q2. Address 205/20 Mort St

Q3. Email mattyc72@gmail.com

Q4. Please share your thoughts and ideas here.

This is so wrong on so many levels. I am not a user of public space and have no vested interest, but I severely object to this impost and money grab by council. 1. It is not councils job to Police people's freedom and require licences, fees and administration for everything. You are here to serve not hinder . 2. The people using these services of Public spaces are either tourists here on holiday, already contributing and paying or locals who pay rates or live in houses paying rates, they should not have to pay again simply because council wants to be greedy 3. Small business already face ridiculous red tape, ridiculous costs and ridiculous hurdles, they do not need another one. 4. Then it becomes another hurdle to stop entrepreneurs providing services to locals, we should be encouraging the use of our public spaces... I mean seriously from a health and community sense wouldn't the best thing ever be if every public space was full of people enjoying themselves and being social and active, why on earth would we want to do anything to discourage that This is so so so dumb on so many levels.... abandon it

Q5. If you have any files or images that support your views, upload them here.

not answered

Survey Responses

09 July 2009 - 23 June 2019

Commercial Activities on Council-managed Land Policy

Port Macquarie-Hastings Council Have Your
Say

Project: Commercial Activities on Council-managed Land Policy





Respondent No: 1 Login: SuzanneWilliams

Email: suzanne3012@live.com.au

Responded At: May 30, 2019 14:33:38 pm Last Seen: May 30, 2019 04:11:24 am

IP Address: 110.150.47.85

Q1. Name suzanne Williams Q2. Email suzanne3012@live.com.au Q3. Are you a: Commercial operator licenced under the Policy Q4. If other, please specify not answered

Q5. If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activities on our beaches, parks and reserves

5 = very important

Q6. Please explain why you chose this rating

We have the most beauiful area in Port Macquarie what better place to have a outdoor business but It is important that the council continue to charge operators to use the land otherwise everyone will be out running business on council land, some not even qualified to do so putting the public at risk making the areas overrun with people.

Q7. Have you read the current Policy? Yes Q8. Do you feel it is effective in providing a Yes management approach to commercial activities

on Council-managed land, and balances the interests of local business, the community and Council?

Q9. Please explain why

Yes i think its a good policy but it needs to be implemented by the council, they need to be out early morning and night making sure the non council operated businesses are being stopped. Lots of trainers doing the wrong thing everyday and its not fair on the ones doing the right thing, they say the are not training people for money but thats a lie and all it takes is a phone call to the business to check this out!

Q10. Please explain why

not answered

Q11. Would you suggest Council amend the policy?

No

Q12. Please explain why

not answered

Q13. Please explain why

not answered

Q14. Is there any other feedback you would like to provide with regard to this Policy?

Please send a copy of the list of council registered businesses so we know who is registered and not. Please start checking people moming and night for their licence and fining them and maybe offer a discount or something for the ones that are actually doing the right thing by the council policy. It's not far on the ones paying for the land if we cant use it if another non registered trainer is on it! Thanks Suzie

Respondent No: 2 Login: Linda Mueller

Email: linda.mueller@bigpond.com

Responded At: May 30, 2019 16:40:23 pm Last Seen: May 30, 2019 06:34:20 am

IP Address: 120.154.90.34

Q1. Name Linda Mueller

Q2. Email linda.mueller@bigpond.com

Q3. Are you a: Community Member

Q4. If other, please specify not answered

Q5. If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activities on our beaches, parks and reserves

5 = very important

Q6. Please explain why you chose this rating

If they are not licensed, then every trader can set up and take their activities wherever and people fight for space or not respect it. certain parks become favoured over others and creates crowding and this may have a detrimental affect on the park space/environment.

Q7. Have you read the current Policy? No

Q8. Do you feel it is effective in providing a management approach to commercial activities on Council-managed land, and balances the interests of local business, the community and

Yes

Q9. Please explain why

Council?

If their is no management who allocates which service provider to use certain spaces. It helps with supply and demand issues. also who then monitors parking issues?

Q10. Please explain why

not answered

Q11. Would you suggest Council amend the policy?

No

Q12. Please explain why

not answered

Q13. Please explain why

I just think council should find a method to police it so licensed operators who do the right thing and pay for that privelege don't then feel like it is a waste of money.

Q14. Is there any other feedback you would like to provide with regard to this Policy?

Consistency with policing the policy needs to be addressed

Respondent No: 3 Login: Israel Redfern

Email: israel@rugbytots.com.au

Responded At: May 31, 2019 09:25:23 am Last Seen: May 30, 2019 23:03:33 pm

IP Address: 172.199.183.191

Q1. Name Israel Redfern Rugbytots Mid North Coast

Q2. Email israel@rugbytots.com.au

Q3. Are you a: Commercial operator licenced under the Policy

Q4. If other, please specify not answered

Q5. If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activities on our beaches, parks and reserves

5 = very important

Q6. Please explain why you chose this rating

It is very important to manage the activities to avoid overcrowding. It is also important to allow small business operators an affordable way to grow their businesses in the area.

Q7. Have you read the current Policy? Yes

Q8. Do you feel it is effective in providing a Yes management approach to commercial activities on Council-managed land, and balances the interests of local business, the community and

Q9. Please explain why

Council?

It gives small business the confidence to run their ventures on specific areas at specific times without interference.

Q10. Please explain why

not answered

Q11. Would you suggest Council amend the policy?

Q12. Please explain why

I would like to see locations that can be selected in the area listed, we are looking at expanding our classes but don't know what public areas are available so we have to drive around to find areas and then search the website to see if they are managed by the council. Ideally 3 locations included in the licence would be ideal, with extra fees for more.

Q13. Please explain why

not answered

Q14. Is there any other feedback you would like to provide with regard to this Policy?

A list of park/area name and location with the application would be really helpful or a link on the website to all locations you can apply for.

Respondent No: 4
Login: Louise Bisaro
Email: bisaro4@msn.com

Responded At: Jun 02, 2019 18:17:37 pm **Last Seen:** Jun 02, 2019 08:11:59 am

IP Address: 101.176.212.10

Q1.	Name	Louise
Q2.	Email	bisaro4@msn.com
Q3.	Are you a:	Community Member
Q4.	If other, please specify	not answered
Q5.	If you are a customer of a licenced operator, please activities on our beaches, parks and reserves 5 = very important	e tell us whether you believe it is important to allow commercial
	Please explain why you chose this rating So paid users can utilise their designated areas without	having issues of people being in the wrong place
Q7.	Have you read the current Policy?	No
Q8.	Do you feel it is effective in providing a management approach to commercial activities on Council-managed land, and balances the interests of local business, the community and Council?	Yes
	Please explain why Needs to be monitored more	
	. Please explain why not answered	
Q11	. Would you suggest Council amend the policy?	No
	. Please explain why not answered	
	. Please explain why not answered	
	. Is there any other feedback you would like to provi	,

Respondent No: 5

Login: soulsurfing

Email: corey@soulsurfing.com.au

Responded At: Jun 06, 2019 12:11:54 pm Last Seen: Jun 06, 2019 01:59:09 am

IP Address: 220.233.199.10

Q1. Name	Corey Enfield
Q2. Email	corey@soulsurfing.com.au
Q3. Are you a:	Commercial operator licenced under the Policy
Q4. If other, please specify	not answered
Q5. If you are a customer of a licenced operator, ple activities on our beaches, parks and reserves 5 = very important	ase tell us whether you believe it is important to allow commercial
Q6. Please explain why you chose this rating not answered	
Q7. Have you read the current Policy?	Yes
Q8. Do you feel it is effective in providing a management approach to commercial activities on Council-managed land, and balances the interests of local business, the community and Council?	Yes
Q9. Please explain why I see no issue	
Q10. Please explain why not answered	
Q11. Would you suggest Council amend the policy?	No
Q12. Please explain why not answered	
Q13. Please explain why i see no issue	

Q14. Is there any other feedback you would like to provide with regard to this Policy?

There is still a real lack of monitoring and policing the licences. From what i understand monitoring by rangers was only taking place during the busier months and nothing was ever done to those breaking licence guidelines which continue today. So unless someone dobs in another operator nothing is ever done. This simply is not adequate.

Respondent No: 6

Login: VO2Performance

Email: coach@vo2performance.co

m

Responded At: Jun 19, 2019 08:55:48 am

Last Seen: Jun 18, 2019 22:24:06 pm

IP Address: 203.219.48.100

Q1. Name	Michael Maher
Q2. Email	coach@vo2performance.com
Q3. Are you a:	Commercial operator not licenced under the Policy
Q4. If other, please specify	not answered

Q5. If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activities on our beaches, parks and reserves

5 = very important

Q6. Please explain why you chose this rating

I do also use the services of several operators, both licenced and unlicenced. Without these having access to beaches parks and reserves I believe the community will not have easy access to opportunities in the community to help improve their mental and physical well being.

Q7. Have you read the current Policy?

Yes

Q8. Do you feel it is effective in providing a management approach to commercial activities on Council-managed land, and balances the interests of local business, the community and Council? No

Q9. Please explain why

not answered

Q10. Please explain why

VO2 Performance is currently not operating on Council Managed Land due to the policy being implemented. Instead, activities are provided on private lands in the region. I don't believe the interests of local business (trainers), the community and Council is balanced through the implementation of the policy. Those businesses that have registered are discriminated as their is no complinace for those that have not. The community is discriminated as some businesses have had to stop providing their service (some trainers literally have 2 or 3 clients and it is not cost effective to pay for a licence. And Council is likely expending alot of time and rate payers funds for little return.

Q11. Would you suggest Council amend the policy?

Yes

Q12. Please explain why

I would suggest Council ammend the policy, unless it is able to demonstrate that full compliance can be achieved. My suggested ammendment would be that instead of having licenced operators, Council have 'registered' operators. A single page n the PMHC website that shows businesses that Council Ideem fit to provide services in the community by providing certification and insurance documentation. Those that demonstrate this can use the "PMHC Registered Operator' status on their advertising and business materials.

Q13. Please explain why

not answered

Q14. Is there any other feedback you would like to provide with regard to this Policy?

It should not cost businesses a fee to register. This will discriminate against those that have 1-2 clients that are trying to provide a service to a small amount of the community.

Respondent No: 7

Login: Shane4

Email: shanestelzer@hotmail.com

Responded At: Jun 21, 2019 12:27:54 pm

Jun 21, 2019 02:36:43 am

IP Address: 110.150.196.84

Last Seen:

Q1. Name Shane Stelzer t/as Port's Mr Ice Cream

Q2. Email shane@portsmisterwhippy.com

Q3. Are you a: Commercial operator licenced under the Policy

Q4. If other, please specify not answered

Q5. If you are a customer of a licenced operator, please tell us whether you believe it is important to allow commercial activities on our beaches, parks and reserves

5 = very important

Q6. Please explain why you chose this rating

The occasional presence of the iconic Port's Mr Ice Cream (previously Port's Mister Whippy) van at our beaches, parks, caravan parks, reserves and sporting fields provides not only delicious Soft Serve Ice Creams and frozen Slushy Drinks but also a welcome reminder of a different time and an exciting NEW experience for adults, children and visitors who rarely see an Iconic Ice Cream Van or hear the memorable tones of the Greensleeves music.

Yes

Q7. Have you read the current Policy? Yes

Q8. Do you feel it is effective in providing a management approach to commercial activities

on Council-managed land, and balances the interests of local business, the community and

Council?

Q9. Please explain why

I have been liscenced under this Policy (Section 68, renewed annually) since 2005 and have operated very succeesfully and never had a complaint issued regarding my activities. (as far as I am aware)

No

Q10. Please explain why

not answered

Q11. Would you suggest Council amend the policy?

Q12. Please explain why

not answered

Q13. Please explain why

I have been liscenced under this Policy (Section 68, renewed annually) since 2005 and have operated very succeesfully and never had a complaint issued regarding my activities. (as far as I am aware) However......please see my submission under the next question:

Q14. Is there any other feedback you would like to provide with regard to this Policy?

Regarding operating under section 68 of this Policy as a mobile operator, I am not allowed to operate "within 300m of a premises that sells a similar product". (perhaps not the exact wording) I would seek a clarification of the word "similar" in relation to my major product- Soft Serve Ice Cream. The aim of my request is to work towards being able to operate at the Skate Park end of the Town Beach car park. Under the current rules I am precluded from operating here because of the Breakwall HQ business that sells frozen Ice Cream products. I had operated at this location prior to (and since) the opening of the Breakwall HQ for the last 14 years but am now unable to do so under the existing interpretation of "similar". The operators of the Breakwall HQ had "allowed" me to trade there up until February 2019, but upon the opening of the new "Little Shack" business at the other end of the caravan park they have experienced a decline in trade and have decided to go with a stricter interpretation of the word "similar" and requested that I no longer trade at the site. I contend that while "similar", my product is not the same as a frozen Ice Cream product and services a different customer base. I also sell frozen Slushy Drinks, which the Breakwall HQ does not and this experiences a high demand in the area, particularly in the warmer months. Further to this, the very nature of my business (mobile) means that my products are a "spur of the moment" purchase and I believe that this means the revenue of the Breakwall HQ would not be affected to any great extent by my occasional presence. Many previous customers from the Skate Park, Town Beach, the Breakwall and the adjacent Caravan Park have expressed their disappointment at my absence from this location. I have also, as a result, lost considerable revenue. I am respectfully requesting a clarification of the word "similar" in relation to Soft Serve and Frozen Ice Cream products, preferably changing the wording to "the same" products, which would allow me to again service this location - to the delight of many locals and visitors!

4 Your Natural and Built Environment

17/07/2019

What we are trying to achieve

A connected, sustainable, accessible community and environment that is protected now and into the future.

What the result will be

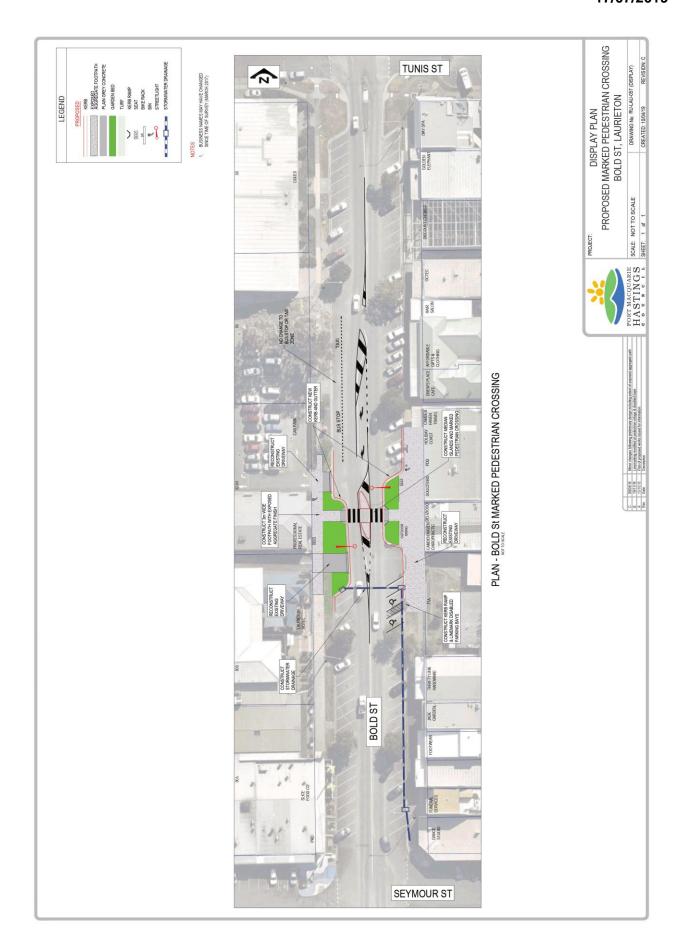
We will have:

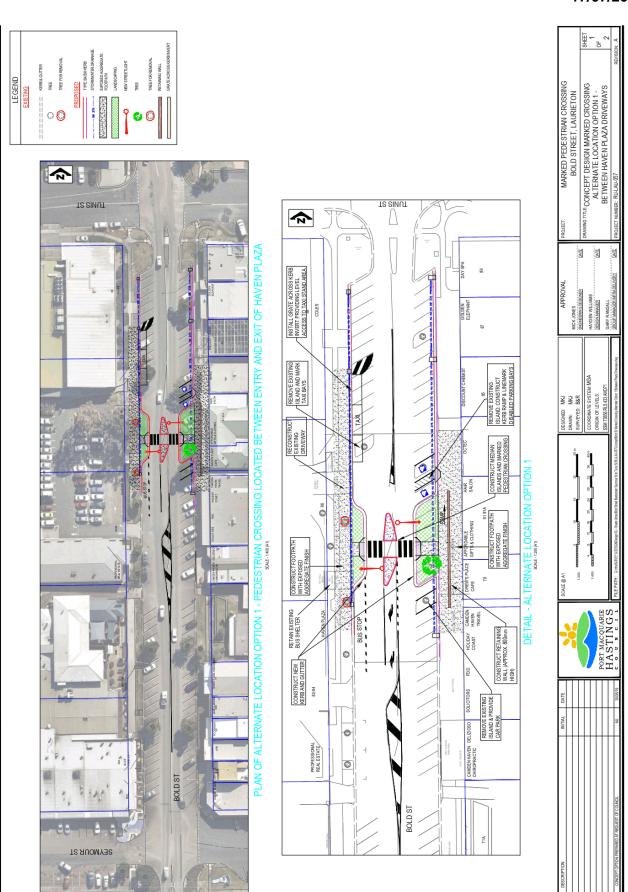
- Effective management and maintenance of essential water, waste and sewer infrastructure
- A community that is prepared for natural events and climate change
- Sustainable and environmentally sensitive development outcomes that consider the impact on the natural environment
- Accessible transport network for our communities
- Infrastructure provision and maintenance that meets community expectations and needs
- Well planned communities that are linked to encourage and manage growth
- Accessible and protected waterways, foreshores, beaches and bushlands
- An environment that is protected and conserved for future generations
- Renewable energy options that are understood and accessible by the community

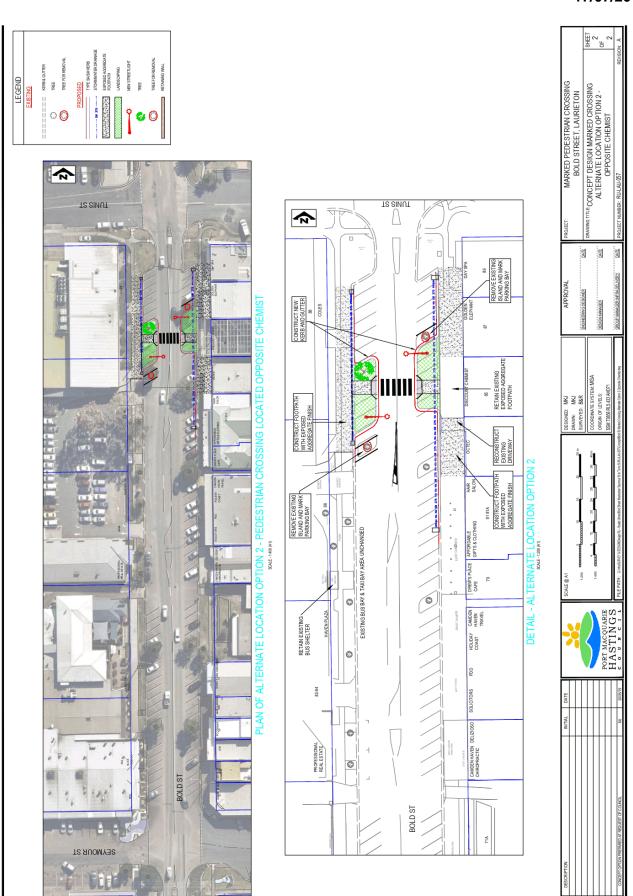
How we will get there

- 4.1 Provide (appropriate) infrastructure and services including water cycle management, waste management, and sewer management
- 4.2 Aim to minimise the impact of natural events and climate change, for example, floods, bushfires and coastal erosion
- 4.3 Facilitate development that is compatible with the natural and built environment
- 4.4 Plan for integrated transport systems that help people get around and link our communities
- 4.5 Plan for integrated and connected communities across the Port Macquarie-Hastings area
- 4.6 Restore and protect natural areas
- 4.7 Provide leadership in the development of renewable energy opportunities
- 4.8 Increase awareness of issues affecting our environment, including the preservation of flora and fauna









JACOBS

North Brother Local Catchments Flood Study

Port Macquarie Hastings Council

Draft Flood Study Report

Version A

14 January 2019

IA157500





North Brother Local Catchments Flood Study

Project no: IA157500

Document title: Draft Flood Study Report

Document No.: 1 Revision: A

Date: 14 January 2019

Client name: Port Macquarie Hastings Council

Project manager: Lih Chong Author: Lih Chong

File name: J:\IE\Projects\04_Eastern\IA157500\21 Deliverables\R03_Draft FS\IA157500_R03 North

Brother Draft Flood Study Report_A.docx

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Document history and status

Revision	Date	Description	Ву	Review	Approved
А	14/01/2019	Draft Report	L Chong	A Hossain	A Hossain

North Brother Local Catchments Flood Study



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Foreword

The primary objective of the New South Wales Government's Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods, wherever possible. Under the Policy, the management of flood prone land remains the responsibility of local government.

The policy provides for a floodplain management system comprising the following five sequential stages:

1.	Data Collection	Involves compilation of existing data and collection of additional data
2.	Flood Study	Determines the nature and extent of the flood problem
3.	Floodplain Risk Management Study	Evaluates management options in consideration of social, ecological and economic factors relating to flood risk with respect to both existing and future development
4.	Floodplain Risk Management Plan	Involves formal adoption by Council of a plan of management for the floodplain
5.	Implementation of the Plan	Implementation of flood, response and property modification measures (including mitigation works, planning controls, flood warnings, flood preparedness, environmental rehabilitation, ongoing data collection and monitoring by Council

Port Macquarie Hastings Council is undertaking this study for the North Brother Local Catchments study area to investigate the existing and future flood risks in accordance with the NSW Government's *Floodplain Development Manual*. The study identifies and assesses potential flood mitigation options and guides land use planning and future development on the floodplain in the study area.

This study represents Stages 1 to 4 of the management process and has been prepared for Council by Jacobs. This is the Draft Report of the Stage 1 and Stage 2 of the study.



Executive Summary

Background

Jacobs was engaged by Port Macquarie Hastings Council (Council) to undertake a flood study and a floodplain risk management study of the North Brother Local Catchments area. The study area is located on the Mid North Coast of NSW, and includes parts of the villages of Kew, Lakewood, West Haven, Laurieton and Deauville which are situated at the foot of North Brother Mountain.

Study Area

The study area comprises the northern and eastern faces of the North Brother Mountain and the associated urban areas between the foot of the mountain and the adjoining receiving waters. It has an approximate area of 1,852ha, with the North Brother Mountain extending to a height of 490m AHD, dominating the landscape. The upper reaches of the study area are predominantly the Dooragan National Park, containing the North Brother Mountain itself, below which is situated the Laurieton CBD, various vegetated natural gullies and flow paths as well as significant established low and medium density residential, caravan parks and holiday accommodation precincts. The topography within the catchment varies significantly with the upper parts of the catchment being very steep in nature (grades of up to 50%), the mid zone is moderately graded (slopes in the order of 10-15%), and lower areas adjoining the Camden Haven River floodplain being reasonably flat (grades averaging 5%). The relatively short flow path lengths between the foot of the North Brother Mountain and the adjoining downstream receiving waters mean that stormwater flows are fast flowing.

Development of the study area has been occurring from the early 1900's through to the present day with the majority of development having occurred between 1970 - 2000. The construction of associated drainage infrastructure has also primarily dated from this time, with the result being that the majority of watercourses stemming from the North Brother Mountain have either been built over, filled, redirected, piped or crossed by road embankments, often resulting in urban development occurring on flood prone lands. Urban development at the foot of the Mountain is typically bounded by diversion drains and largely natural gullies which generally direct large volumes of stormwater runoff safely around developed lands and into the downstream waterways. However, developments have occurred in some locations in close proximity to natural watercourses and manmade surface drainage and are at risk to flooding when the drainage capacities are exceeded. In addition, localised flooding in some areas are exacerbated by mainstream flooding in Queens Lake, Stingray Creek and Camden Haven River.

Available DataA range of data was obtained by Jacobs or provided by Council and other agencies for this study. The data includes reports of studies that have been undertaken in the area; spatial data including stormwater assets, aerial photography and other GIS layers; recorded rainfall, water level and tide data; and flood modelling data including drainage models of West Haven. Additional topographic survey as collected of selected hydraulic structures, open channels and other topographic features in January – February 2018

Community Consultation

Community consultation undertaken for the study included overviews and updates of the study posted on Council's website, a newsletter and questionnaire mailed out to the community, and community information sessions during the calibration stage of the flood model.

Hydrologic and Hydraulic Modelling

The hydrologic modelling adopted in the study to estimate rainfall-runoff involved lumped catchment modelling approach for the watercourses draining off the mountain, and a direct rainfall approach for the more dispersed overland flow catchment areas at the foot of the mountain. The lumped catchment modelling was undertaken in DRAINS software with the RAFTS hydrologic module estimates inflow hydrographs (flow versus time) which were input into the hydraulic model for the watercourses and overland flow paths. The direct rainfall approach input rainfall versus time data onto the modelled catchment surface in the hydraulic model itself, which then generated estimated flows internally in the model.



A TUFLOW combined one-dimensional (1D) and two-dimensional (2D) hydrodynamic model was developed for this study. The TUFLOW model is comprised of:

- A 2D domain of the study area surface reflecting the catchment topography, with varying roughness as
 dictated by land use. The watercourses are in general modelled in 2D and diversion drains are modelled in
 2D
- A 1D network of pits, pipes and culverts representing the stormwater network. The pits have a defined inflow capacity as dictated by their type and size.
- Obstructions to flow are represented as 2D objects, including existing buildings.

The flood model was calibrated and verified to the historic flood events of April 2008 and March 2013, based on residents' observations during these flood events reported in the community questionnaire.

Design flood events including the 0.2EY and 5%, 2%, 1% and 0.5% AEP and the Probable Maximum Flood (PMF) events were analysed for current climate conditions. Flood behaviour was estimated for a climate change scenario comprising the 1% AEP plus 10% increase in rainfall plus 0.9m sea level rise. Flood mapping of depth and flow velocity was undertaken for all event AEPs.

Flood Behaviour

Overland flow depths on properties are typically up to 0.3m in the 1% AEP event. Depths exceed 0.5m in a number of locations in the 0.2EY event, and exceed 1m in the 5% and 1% AEP events. Areas of deeper flows include main flow paths and drainage low points in a number of roads. During the PMF event, property and road flooding exceeding 0.5m depth is widespread, with property and road flooding of 1m depth also common. Depths of flooding exceeding 2m occur on approximately 20 properties in the study area.

Flow velocities are fast in a number of overland flow paths through properties and particularly on roads. Typical flow velocities are 0.5 – 1m/s in the 0.2EY event, and 1 – 1.5m/s in the 1% AEP event. High flow velocities of 2 – 3m/s occur in a number of locations including roads and properties. These flows are likely to be highly hazardous to people and risk significant damage to buildings and property. Flow velocities of 3 – 4m/s are commonplace in the PMF, with some locations experiencing velocities over 4m/s.

Overland flooding in the study area is generally a result of intense short-duration rainfall events. As a result, the duration of inundation of roads and built areas is typically short, limited to 1-2 hours in up to the 0.5% AEP event. Flood storage areas such as road sag points in Sirius Drive and Lilli Pilli Close in Lakewood may be inundated for longer durations of up to 3 hours due to constrained capacities of stormwater drainage servicing these areas. Durations of inundation are likely to be 1-4 hours in the PMF with longer durations affecting some flood storage locations and roads including Botanic Drive and Ocean Drive west of Lakewood shopping centre. Note that the duration of flooding for depths greater than 0.3m, at which stage floodwaters become impassable for most passenger vehicles, is generally limited to approximately 1 hour duration in most roads. A river flooding event may occur shortly after overland flooding in the study area, in which case the low-lying areas of the study area may experience extended durations of flooding.

In the climate change scenario, most areas affected by overland flow experience flood level increases of up to 0.1m due to increased rainfall and reduced drainage capacity from higher tailwater levels caused by sea level rise. Locations along the river and lakes would be impacted by 0.9m increases in flood levels directly due to sea level rise, while adjacent areas would be impacted typically by up to 0.5m increases in flood level. Note that these impacts are estimated based on the overland flooding assessment of North Brother. Increases in flood levels due to climate change effects on riverine flooding may be different, refer to the Camden Haven River and Lakes Flood Study (Worley Parsons, 2013).

Flood Hazard and Flood Planning Mapping

The flood hazard categories were defined based on the Australian Institute of Disaster Resilience (AIDR) categories and mapped for the 1% AEP current climate and climate change scenarios. There are numerous areas of high flood hazard (>H5) typically reflect the swift overland flows in watercourses and flow paths including roadways.



Flood hydraulic categories were mapped for the 1% AEP current climate and climate change scenarios. Floodway areas are generally located within the natural watercourses and flow paths, although there are a number of roads which contain floodways throughout the study area. Floodways pass through properties on Black Swan Terrace, Koonwarra Street, Pelican Court, Elouera Place, Flinders Drive, St Joseph's School, Peach Grove, Gow Place, Kew Road and in Laurieton between Quarry Place and Bold Street, among others.

The flood planning area is defined by the extent of the area below the flood planning level, which for Port Macquarie Hastings Council is the 1% AEP flood with climate change, plus freeboard. A freeboard of 0.5m was selected for defining the flood planning level, in accordance with Council's Flood Policy, with the flood planning level and area being limited to the PMF level and extent. Flood development controls would typically not be implemented for areas above and outside the PMF. In shallow overland flow areas, the PMF is generally 0.2 – 0.4m above the 1% AEP flood with climate change level, hence less than the 0.5m freeboard. Significant manual review and adjustments were made in deriving the flood planning area and levels given the complex flood patterns in the study area.

Flood Problem Areas

Since properties outside of the defined FPA are susceptible to sheet flow drainage off the Mountain, it would be prudent to apply a minimum floor level height to all properties of 0.3m above the finished ground level. Given the typical increment of 0.3m from the 1% AEP climate change flood level up to the PMF level, a higher floor level height of 0.5m would seem excessive.

As the flood planning area, flood planning levels and mapping are likely to be a sensitive issue to the community, it is recommended that the preliminary flood planning area mapping not be published in the Final Draft Flood Study.

Flooding hot spots are identified in the flood study, confirming problem areas previously identified by Council. The hot spots are summarised in Table 1 below. Critical areas with consideration of high flood depths, velocities or hazard are highlighted with orange cell or text shading. In summary, the identified critical locations include:

- Black Swan Terrace, West Haven
- Kirmington Terrace, Koonwarra Street, Captain Cook Drive villas and Ocean Street property and Pelican Court, West Haven
- Bold Street, Laurieton
 - Laurieton Hotel and adjoining areas
 - Harbourside Crescent villas
- · Lake Street property, Laurieton. Comer Seymore Street
- St Joseph's School, Laurieton
- Lilli Pilli Close, Lakewood (road flooding).
- Sirius Drive, Honeysuckle Avenue and Mahogany Close, Lakewood (road flooding).
- Ocean Drive between Fairwinds Avenue and Mission Terrace (road flooding).
- Pelican Court, West Haven (road flooding).
- Waterview Crescent, Kirmington Terrace and Koonwarra Drive, West Haven (road flooding).
- · Bold Street between Laurie Street and Mill Street (road flooding).
- Lord Street at Seymour Street, Laurieton (road flooding).



Table 1 Description of Flooding Hot Spots

Location	Description		
Property flooding			
Black Swan Terrace, West Haven	Flow depths on properties of up to 0.5m in the 0.2EY event and up to 0.7m in the 1% AEP event. Swift flows of 2m/s. Flood hazard up to H5 rating in the 1% AEP event.		
Ringtail CI, Lakewood	Overflows from open channel onto properties with flooding in backyards to depths 0.2 – 0.3m in the 1% AEP event. Relatively low flooding impact.		
Lilli Pilli Cl, Lakewood	Flooding in backyards to depths of 0.3 – 0.5m in the 1% AEP event from open drain overflows. Flooding in cul-de-sac to depths up to 0.8m.		
	Also significant flooding of car park around Lakewood shopping centre.		
Mission Terrace, Lakewood	Overflows with depths of 0.1 – 0.3m in the 1% AEP event from cul-de-sac onto downhill property. Overflows from the overland flow path on to uphill side properties with depths up to 0.2m		
Kirmington Terrace to Pelican Court, West Haven	Flows through properties on low side of Koonwarra Street of 0.3m in the 0.2EY event and exceeding 0.5m in the 1% AEP event. Velocities up to 2m/s in the 1% AEP. Flood hazard up to H4 (some localised H5) rating in the 1% AEP.		
	Flow depths 0.5m in the 0.2EY event and up to 0.8m in the 1% AEP event on Captain Cook Bicentennial Drive villas and Ocean Drive property, at dwellings. Flood hazard up to H4 rating in the 1% AEP event.		
	Flood depths of 0.6 – 0.8m in the 0.2EY event within Pelican Court roadway and pedestrian walkway. Depths up to 0.6m at dwellings in 1% AEP event. Flood hazard up to H4 rating on properties and H5 in roadway in the 1% AEP event.		
	Groundwater springs occur in this area but are not directly related to the surface water flood risk. These springs appear to be a spatially random occurrence.		
Flinders Dr Estate, Laurieton	Overflows from drainage easement swale onto properties with depths to 0.3m in the 0.2EY event and 0.5m in the 1% AEP event.		
	Overflows from Reliance Crescent sag point onto properties to depths of 0.2m in the 0.2EY event and 0.4m in the 1% AEP event.		
Bold Street area, Laurieton	Significant flows through Laurieton Hotel with H4 hazard rating.		
	Trapped drainage point on western side of commercial properties with significant depths, though local drainage may be present which would mitigate the flood depths.		
	Overflows down fire trail at Norman Street/ Mill Street affecting properties with depths up to 0.3m in the 1% AEP.		
	Overflows onto units on Harbourside Crescent from trunk drainage channel to depths exceeding 0.5m in the 1% AEP event, with H5 hazard rating.		
Quarry Way, Laurieton	Overflows from flow diversion drain to depths of 0.5m in the 1% AEP event on properties. The drain is reported to be affected by significant debris blockage.		



Lake Street, Laurieton	Flood depths up to 1m in the 1% AEP event affecting dwelling corner Lake Street and Seymour Street, unsure if above floor flooding. To be confirmed.		
	Overflows from Lake Street onto properties between Ocean Drive and Castle Street to depths of 0.3m in the 1% AEP.		
St Joseph's School, Laurieton.	Swift flows in overland flow paths to depths of 0.8m and velocities exceeding 2m/s in the 1% AEP event.		
	Flows between buildings are 0.4m in the 0.2EY event and 0.6m in the 1% AEP event, with velocities up to 2m/s. Flood hazard rating of H4 in pedestrian walkways and H5 in overland flow paths in the 1% AEP event.		
Properties adjacent to Stingray Creek and Camden Haven River, Laurieton	Numerous properties on low-lying land at risk of oceanic inundation during storm surge events. Estimated depths on the flood mapping expected to be conservative due to likely attenuation of ocean inflows through the river mouth.		
Blackbutt Crescent and Peach Grove, Laurieton	Overflows from flow diversion drain to depths of 0.5m in the 1% AEP event on properties. The drain form and capacity significantly reduces near its discharge point onto Peach Grove at Tunis Street. Flows into the drain originate from natural watercourse further uphill, which is significantly affected by rubble and debris blockage.		
Elouera Place, West Haven	Overflows from watercourse and diversion drain. Depths over 0.3m in the 0.2EY event and 0.5m in the 1% AEP event.		
Sirius Drive, Honeysuckle Avenue and Mahogany Close, Lakewood	Flood depths on properties 0.3 – 0.5m in the 1% AEP event, built up from road ponding areas.		
Sirius Drive and Oak Close, Lakewood	Depths 0.3 – 0.4m and velocities 1m/s in the 1% AEP event.		
Sandpiper Close	Overflows from concrete channel along Ocean Drive. Depths 0.3 – 0.4m and velocities 1m/s in the 1% AEP event.		
Properties on lower side of Ocean Drive, 200m east of Hoschke Road, West Haven	Road low point overflows onto properties with depths of 0.5m and velocities of 1m/s in the 1% AEP event.		
Roads			
Ocean Drive west of Lakewood shopping	5% AEP event flood depths of 0.4m		
centre	1% AEP event flood depths of 0.5m, H3 hazard rating		
Botanic Drive, Lakewood	1% AEP event flood depths of 0.4m, H2 hazard rating		
Lilli Pilli Close, Lakewood	5% AEP event flood depths of 0.6m		
	1% AEP event flood depths of 0.7m, H3 hazard rating		
Ocean Drive east of Lakewood shopping	5% AEP event flood depths of 0.3m		
centre	1% AEP event flood depths of 0.35m, >H4 hazard rating		
Sirius Drive, Honeysuckle Avenue and	0.2EY event flood depths of 0.6 – 0.7m		
Mahogany Close, Lakewood	1% AEP flood depths 1m, H3 hazard rating		
Ocean Drive between Fairwinds Avenue and	0.2EY events flood depths of 0.5m		
Mission Terrace	1% AEP event flood depths of 0.7m, >H4 hazard rating		
Ocean Drive and Mission Terrace intersection	0.2EY event flood depths of 0.4m		
	1% AEP event flood depths of 0.6m, H3 hazard rating		
Ocean Drive near Waterview Crescent	5% AEP event flood depths of 0.2 – 0.3m		

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	1% AEP event flood depths of 0.3m, low hazard rating but long section of flooding
Ocean Drive near Pelican Court	5% AEP event flood depths of 0.3m
	1% AEP event flood depths of 0.4m, H3 hazard rating
Pelican Court, West Haven	0.2EY event flood depths 0.6m
	1% AEP event flood depths of 1m, H5 hazard rating
Waterview Crescent, Kirmington Terrace and Koonwarra Drive, West Haven	0.2EY event flood depths of 0.2m with 2m/s velocity; max 0.6m depths (low velocity)
	1% AEP event flood depths up to 0.7m, H5 – H6 hazard rating
Ocean Drive east of Hoshcke Road	0.2EYevent flood depths of 0.4m
	1% AEP event flood depths of 0.5m, H3 hazard rating
Ocean Drive east of Flinders Drive	5% AEP event flood depths of 0.3m
	1% AEP event flood depths of 0.4m, H3 hazard rating
Kew Road/Bold Street near Tunis Street, Laurieton	1% AEP event flood depths of 0.5m, H2 hazard rating
Bold Street between Laurie Street and Mill	0.2EY event flood depths over 0.5m
Street	1% AEP event flood depths 0.6 – 0.8m, H5 hazard rating
Bold Street north of Hanley Street, Laurieton	0.2EYevent flood depths of 0.3m with 1m/s velocity
	1% AEP event flood depths up to 0.5m, H3 hazard rating
Lord Street at Seymour Street, Laurieton	0.2EY event flood depths of 0.5m
	1% AEP event flood depths up to 0.7m, H3 hazard rating
Flinders Drive, Laurieton	H5 hazard rating on steep sections of road (1% AEP event)
Tunis Street, Laurieton	
Rosewood Court and Mission Terrace, Lakewood	
Diamentina Way, Lakewood	

Recommendations

Recommendations from this flood study include:

- It is recommended that this report be reviewed by Council prior to being placed on public exhibition for feedback from the community.
- Council should review the proposed approach in deriving the flood planning levels (FPLs) and the flood
 planning area (FPA). Council should also consider the omission of the flood planning area mapping from
 the Final Draft Report which is to be placed on public exhibition.
- It is recommended that Council considers the adoption of this Flood Study and the outputs including FPLs
 to guide floodplain management and land use planning in the North Brother local catchments study area.
 The subsequent Floodplain Risk Management Study should consider the management of flood risk in the
 catchment, particularly at the identified flooding "hot spots", which may include the development of flood
 mitigation strategies.
- Council should consider geological and geotechnical investigations to assess the groundwater spring
 issues in the study area which result in surface water discharge and subsequent property damage or are
 otherwise nuisance occurrences.



Important note about this report

The sole purpose of this report and the associated services performed by Jacobs is to undertake a flood study for the North Brother Local Catchments study area located in New South Wales in accordance with the scope of services set out in the contract between Jacobs and Port Macquarie Hastings Council (the Client). That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client, third parties, and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

Topographic data used in this study included that sourced from a LiDAR survey and ground survey which were undertaken by third parties. Undertaking independent checks on the accuracy of the data was outside Jacobs's scope of work for this study.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs's Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.



1. Introduction

1.1 General

Jacobs was engaged by Port Macquarie Hastings Council (Council) to undertake a flood study and floodplain risk management study of the North Brother Local Catchments area. The study area is located on the Mid North Coast of NSW, and includes parts of the villages of Kew, Lakewood, West Haven, Laurieton and Deauville which are situated at the foot of North Brother Mountain. Development in the area has occurred in sometimes unsuitable locations as a result of poor drainage planning, leading to localised nuisance flooding on residential properties at a number of locations on a regular basis. Numerous gullies and watercourses drain from the North Brother Mountain through the developed areas, which over time have been piped, filled, crossed by road embankments or redirected, contributing to the existing flooding problems. Localised flooding in some areas may interact with and be exacerbated by mainstream flooding in Queens Lake, Stingray Creek and Camden Haven River.

Objectives of the study include:

- Develop and calibrate hydrologic and hydraulic models to estimate flooding conditions for a range of design events
- Identify flood problem priority areas and identify and assess structural and non-structural mitigation measures to manage flood risk.
- Review existing planning, policy and emergency management for gaps and inconsistencies relating to floodplain planning, then develop proposed amendments to address residual flood risk.
- Prioritise the works and measures, including economic and multi criteria appraisal of options.
- Develop an implementation program for recommended works and measures including timing, responsibility and sources of funding.
- Conduct consultation with the community and key stakeholders throughout the study to obtain information
 and intelligence for input into the study. Gauges the perceptions of the community on flooding matters.
 Obtain feedback on the findings and recommendations of the study.

This Draft Flood Study Report documents the collection and review of relevant data and the development and calibration of hydrologic and hydraulic models for the purpose of defining flood behaviour for the full range of design flood events in the study area. The design flood conditions, the flood risk and flood hazard are estimated, and flooding trouble areas confirmed. Note that this study focusses on overland flooding resulting from runoff from North Brother Mountain and surrounding areas. Riverine flooding is addressed separately in the Camden Haven and Lakes System Flood Study (Worley Parsons, 2013), prepared for Council.

The outcomes from this flood study will form the basis for the identification, assessment and prioritisation of management measures during the subsequent floodplain risk management study and plan.

1.2 Floodplain Risk Management

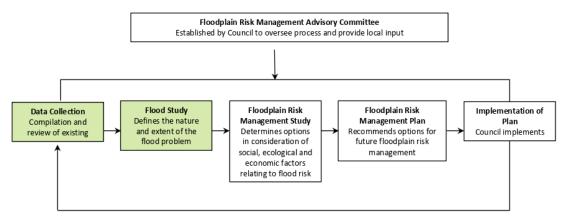
Council is responsible for managing the existing, continuing and future flood risk for its Local Government Area (LGA). The floodplain risk management planning process, as set out in the *Floodplain Development Manual* (NSW Government, 2005) has a number of steps which are illustrated in Figure 1-1. The current Flood Study phase of this study defines the flooding problem. Once the Flood Study has been endorsed by Council, the study moves to the Floodplain Risk Management Study and Plan phase, which seeks to identify and prioritise feasible options for mitigating the flood risk.

The Floodplain Risk Management Advisory Committee for Council was established in 2018 and includes a number of Council Representatives, staff from the Office of Environment and Heritage (OEH), the State Emergency Services (SES), in addition to local stakeholders including community representatives.

Draft Flood Study Report

JACOBS

Figure 1-1 Floodplain Risk Management Process



1.3 Structure of this Report

This report is structured by the following sections:

- Section 2 provides background on the study area.
- Section 3 reviews and describes relevant aspects of the available data
- Section 4 describes the hydrologic modelling undertaken for this study.
- · Section 5 details the development of the hydraulic model.
- Section 6 discusses the calibration of the flood modelling to historic flood events, including sensitivity testing of key model parameters and assumptions.
- Section 7 discusses the approach in estimating the design flooding conditions.
- Section 8 describes the study results and flood mapping, including the scale of the flooding problem in the
 area.
- Section 9 provides conclusions and recommendations to this phase of the study.
- Section 10 acknowledges those agencies and organisations who assisted with the study.
- Section 11 cites the literature references.
- · Section 12 provides a glossary of terms.



2. Background on the Study Area

2.1 Catchment Description

The study area is shown on Figure 2-1 and generally comprises the northern and eastern faces of the North Brother Mountain and the associated urban areas between the foot of the mountain and the adjoining receiving waters.

The study area has an approximate area of 1,852ha, with the North Brother Mountain extending to a height of 490m AHD, dominating the landscape. The upper reaches of the study area is predominantly the Dooragan National Park, containing the North Brother Mountain itself, below which is situated the Laurieton CBD, various vegetated natural gullies and flow path as well as significant established low and medium density residential, caravan parks and holiday accommodation precincts.

From the North Brother Mountain, stems a number of small, steep and unnamed local catchments which discharge to one of the many waterways surrounding the mountain:

- On the north side of North Brother Mountain is Queens Lake,
- On the east is the Pacific Ocean.
- To the south is Watson Taylors Lake (through which Camden Haven River flows), and
- On the west is the Camden Haven River

The topography within the catchment varies significantly with the upper parts of the catchment being very steep in nature (grades of up to 50%), the mid zone is moderately graded (slopes in the order of 10-15%), and lower areas adjoining the Camden Haven River floodplain being reasonably flat (grades averaging 5%).

Ground cover within the study area also varies considerably and is generally varied in accordance with slope changes. The upper portions of the catchment are heavily forested, with the mid and lower areas consisting of lawns, residential gardens, pavements and roof areas. The relatively short flow path lengths between the foot of the North Brother Mountain and the adjoining downstream receiving waters mean that stormwater flows are characteristically high energy and fast flowing.

The study area experiences overland flooding originating from North Brother Mountain runoff, while areas at lower elevations are also at risk from riverine flooding from the Camden Haven River and lakes system.

2.2 Existing Development

Development of the study area has been occurring from the early 1900's through to the present day with the majority of development having occurred between 1970 - 2000. The construction of associated drainage infrastructure has also primarily dated from this time, with the result being that the majority of watercourses stemming from the North Brother Mountain have either been built over, filled, redirected, piped or crossed by road embankments, often resulting in urban development occurring in unsuitable locations.

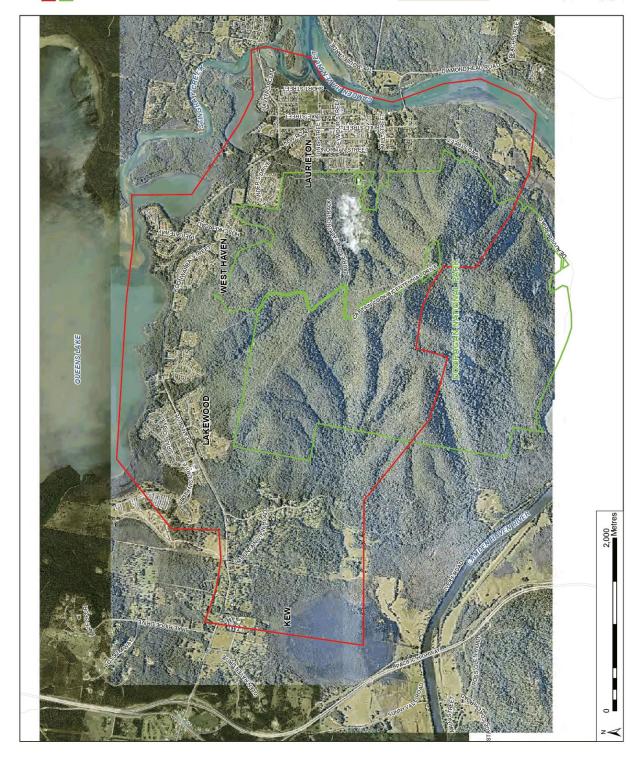
Urban development at the foot of the North Brother Mountain is typically bounded by diversion drains and largely natural gullies which direct the large volumes of stormwater runoff generated safely around developed lands and into the downstream waterways. However as mentioned above, development has occurred in some location in close proximity to natural watercourses and man-made surface drainage and is at risk to flooding when the drainage capacity is exceeded.

Development in the study area is predominantly low-density residential, with some higher density developments located in West Haven and Laurieton, including retirement villages. Residential development is ongoing, notably in parts of Lakewood. Commercial areas are located in Lakewood and Laurieton.

Legend
Study Area
National Park

CDA 1994 MGAZone 56
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Data Sources LPI, OEH, Council
LMINTATIONS: This rapping is based on
a data and assumptions fertified in the
North Benother Local cathraments Rood
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not warrant, guanantee or make
prepared by Jacobs. Jacobs does
not warrant, guanantee or make
and accuracy of information contained in
this map.

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2.3 History of Flooding

A number of trouble spots and significant drainage locations were identified by Council based on previous flooding and include:

- Black Swan Terrace, West Haven
- Ringtail Cl, Lakewood
- Lilli Pilli Cl, Lakewood
- Mission Terrace, Lakewood
- · Kirmington Terrace, and Pelican Ct, Westhaven
- · Flinders Dr Estate, Laurieton
- Bold Street, Laurieton
- Quarry Way, Laurieton
- · Lake Street, Laurieton
- St Joseph's School, Laurieton.

In several locations there are localised existing features such as open drains and diversion berms which are not currently performing properly. The heavily-vegetated upper catchments contribute significant volumes of flood debris which impacts on the capacity of the existing drainage and hydraulic structures.

Overland flooding was experienced in numerous times in recent history, with events occurring in 2002, 2004, 2008, 2011, 2013, 2015 and 2016, among others. Photos of previous flooding are shown in Section 3.7.



3. Review of Available Data

3.1 Summary of Data

A range of data was obtained by Jacobs or provided by Council and other agencies in July/August 2017 and is summarised in Table 3-1 below. The data includes reports of studies that have been undertaken in the area, drainage models, spatial data including stormwater assets, zoning and other GIS layers, photographs and resident reports of previous flooding in the study area. Discussion on key datasets is provided in Section 2.

Table 3-1 Data inventory

Data	Description	Source			
Reports					
West Haven System Analysis report	Hydrologic and hydraulic analysis of West Haven stormwater system and catchment	GHD 2007			
West Haven Concept Design Report	Concept design report of proposed mitigation works in West Haven	GHD 2007			
Camden Haven and Lakes System Flood Study	Mainstream flood study - river design flood levels Adopted 2013.	Worley Parsons 2013			
Port Macquarie Hastings Council Flood Policy	PMHC flood policy adopted 2015. Includes guidelines for development, hydraulic classification, climate change, flood planning level allowances for different development, development controls.	РМНС			
Spatial and Design Data					
Study area	Study area extent	РМНС			
LiDAR data	Classified C3 LAS and thinned ground point data	NSW LPI 2012 (via PMHC)			
LiDAR data	1m gridded DEM obtained for LPI dataset (available within Jacobs). Merged for study area	NSW LPI 2012 (via Jacobs)			
Aerial photography	Nearmap 7cm res. Use this for existing case modelling	NearMap May 2017(via PMHC)			
Aerial photography	Other older datasets available, varying resolution	NearMap, LPI (via PMHC)			



	Bridges	
	Culverts Stormwater Box Culvert	
	Stormwater Box Curvert Stormwater End Structure	
	Stormwater Junction Sideline	
Stormwater infrastructure		PMHC
	Stormwater Open Drain	
	Stormwater Pipe Stormwater Pit	
	Stormwater SQID (Stormwater Quality	
	Improvement Device)	
Zoning	Land use zoning	PMHC
Zoning	Land 430 Zormig	T WITO
Cadastre	Lot parcels	PMHC
	Endangered ecological communities 2014	
Ecology	Vegetation Management Plans	PMHC
	SEPP14 Coastal Wetlands	
Erosion risk	Soil Erosion Risk	PMHC
	Road Surface (road centreline)	
Road feature	Kerb/Gutter line	PMHC
Road leature	Kerb/Gutter line	PINITIC
	Footpaths	
Flood and sea level rise	Camden Haven River flood and sea level rise extents	Flood and sea level rise
Drainage plans - Historic	Various drainage/stormwater/WQ designs, various locations and ages	РМНС
Hydrographic and Dredging Plans - Camden Haven Area - historic	River bathymetry, dredging, tidal analysis. 1970s 1980s.	PMHC
Parks and Reserve Plans	Parks and reserves layouts 1980s - 2000	РМНС
Rural roads plans	Ocean Drive - historical plans	PMHC
Subdivision plans	Historic subdivision plans dated 2006 and 2010	РМНС



Urban Roads	Urban roads- historic plans	PMHC			
Hydrologic Soil Group	NSW wide GIS layer on hydrologic soils group (classification A to D reflecting permeability and runoff potential)	OEH (online)			
Recorded Data					
Daily Rainfall Data	Daily rainfall data for five stations in the vicinity of North Brother	ВоМ			
Pluviograph Data	Pluviograph data 5 minute intervals 1/03/2012 to 1/02/2016 at various sewage treatment plants and pumping stations in Port Macquarie Hastings LGA	РМНС			
	Pluviograph data is also available from Manly Hydraulics Laboratory (MHL) for Locans Crossing	MHL			
Modelling Data					
West Haven DRAINS models	DRAINS models of existing and mitigated cases relating to West Haven System Analysis report and West Haven Concept Design Report	GHD 2007			
Historic Flooding					
Flood mapping	Historic flood outlines and flood prone land/ flood planning mapping for mainstream flooding	РМНС			
Flood marks	Historic flood marks for Camden Haven River flooding	РМНС			
Photographs	Photos of previous flooding (various locations and events)	PMHC			
Flooding complaints	Flooding and drainage complaints from residents and logged on Council register	PMHC			

3.2 Port Macquarie Hastings Council Flood Policy (2015)

Council's Flood Policy (adopted 21 October 2015) outlines the considerations to be made by Council in exercising its environmental assessment and planning functions in relation to development in the Port Macquarie Hastings Local Government Area (LGA). It reflects the direction of flood risk management in NSW



Government's Flood Prone Land Policy and draws on the guidance on this provided in the Floodplain Development Manual (2005). It outlines a number of objectives in achieving sound flood management, namely:

- To maintain the existing flood regime and flow conveyance capacity:
- to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property;
- III. to reduce private and public losses resulting from floods;
- IV. to increase public safety with respect to flood events;
- to protect the operational capacity of emergency services and emergency response facilities during flood events;
- to increase public awareness of the potential for flooding across the range of flood events up to the Probable Maximum Flood level;
- VII. to inform the community of Council's policy in relation to the use and development of flood prone land;
- VIII. to ensure that planning and development of essential services and land use makes appropriate provision for flood related risk;
- IX. to utilise best engineering practice for determination of flood conditions, impact and risk.
- X. to utilise ecologically positive methods of flood protection wherever possible;
- XI. to ensure that any new development or modifications to existing development must, as far as practical, result in a reduction in the existing flood risk, and in no circumstances should the flood risk be made worse; and,
- XII. to deal equitably and consistently with all matters requiring Council approval on land affected by potential floods, in accordance with the principles contained in the NSW Government's Floodplain Development Manual (2005).

The flood policy provides definitions for the different hydraulic classifications of the floodplain, flood planning level categories and provisions for different types of development (permissible development types, minimum floor levels), filling, fencing, boundary adjustments, rezoning and subdivision in the different hydraulic zones in the floodplain.

3.3 Previous Studies

3.3.1 GHD Stormwater Analysis and Design Studies (2007)

In response to previous poor performance of the drainage system, a stormwater hydrologic and hydraulic study was undertaken by GHD for Council for the West Haven area, and a concept design prepared for a proposed drainage upgrade and flood mitigation program. These are documented in the following reports:

- West Haven Stormwater Study Area Final Systems Analyses Report (GHD, April 2007)
- Report for Buller Street and West Haven Stormwater Catchment Studies S.600.110.05.61 Concept Design Report - West Haven Study Area (GHD, September 2007).

DRAINS models were developed for the study for the existing and proposed design cases to quantify system flows and identify/confirm system constraints. The models were not calibrated to historic flooding events. Design event flows were validated against rational method estimates. Relatively conservative hydrologic parameters were assumed for the catchment hydrology, including assumptions on the soil type (soil type 4 or D, high runoff and very low infiltration rates).



The existing case modelling indicated flood problem areas in the following locations

- South of No. 9 Black Swan Terrace / No. 20 Kirmington Terrace;
- Koonwarra Street drainage easement Lot 29:
- Ocean Drive cross culverts adjacent No. 374 No. 384 Ocean Drive; and
- DRAINS also indicated problems with the Elouera Place cross culvert.

The concept design proposed a range of pit and pipe network upgrades and modifications, formalisation of two existing flood storages (referred to as "detention basins" in the GHD study) and construction of a large diversion channel upstream of Black Swan Terrace. The works were designed to achieve compliance for the minor (5 year) storm event with a review of the effect on the 100 year capacity.

The works were costed with a Net Present Value of \$4.7 million (2007 dollars) excluding GST. It has not been confirmed with Council if any of the proposed mitigation works were implemented.

Sub-catchment boundaries are not available as spatial layers. The pit and pipe names in the DRAINS model are not consistent with the drainage asset layer provided by Council. Hence, the DRAINS model data is not directly suitable for the development of flood models in this study, but the results may be useful for model validation purposes.

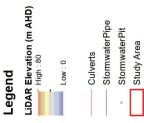
3.3.2 Camden Haven and Lakes System Flood Study (Worley Parsons, 2013)

This flood study estimated existing flooding conditions for mainstream flooding in Camden Haven River, Camden Haven Inlet, Queens Lake, Stingray Creek and Watsons Taylor Lake in the study area. The study was based on hydrologic and hydraulic modelling in XP-RAFTS and RMA-2, respectively, for the 5, 20, 50, 100 and 200 year floods and Probable Maximum Flood (PMF). The study estimated 100 year flood levels of approximately 2.9 – 3m AHD in Camden Haven Inlet, Stingray Creek and Queens Lake affecting parts of the study area, and 4.3m AHD in Camden Haven River near the Pacific Highway bridge, potentially affecting the south-western portion of the study area.

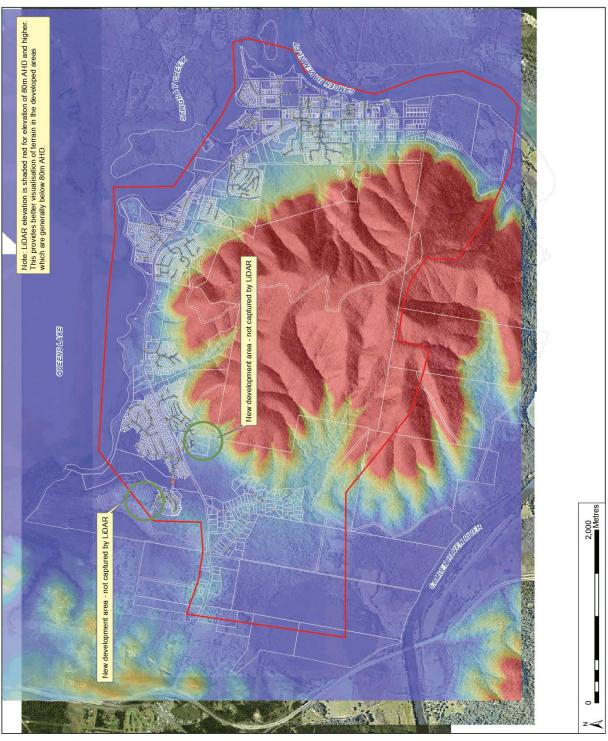
3.4 Spatial and Design Data

3.4.1 Topographic Data

Topographic data across the study area consists of LiDAR data captured by NSW Land and Property Information (LPI) in 2012. The dataset has a vertical accuracy of 0.15m (one standard deviation). Council provided classified and thinned ground point data for the study. Jacobs obtained the 1m digital elevation model (DEM) grid developed by LPI from this data, which is held in-house. The data tiles were merged together by Jacobs to form a continuous DEM across the study area and surrounds. The DEM showing the study area terrain is presented on Figure 3-1.



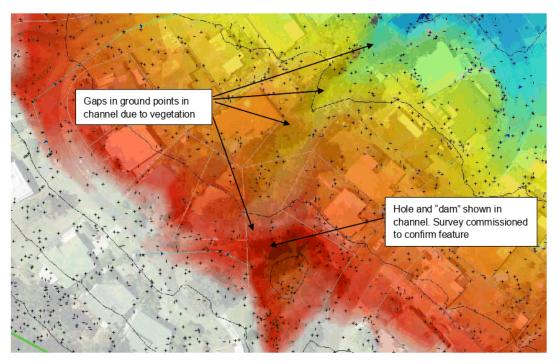






The thinned ground points data set was reviewed for key drainage areas, and it was observed that in areas with a thick tree canopy or in-channel vegetation there was generally a low density of data points. This indicates that the LiDAR was only able to penetrate the tree canopy in sparsely spaced locations, and that the DEM is unlikely to accurately represent any drainage features which may be beneath the tree canopy. A similar issue is expected for channels with standing water or in-channel vegetation. Review of the DEM confirmed that some channel and drainage features are not represented in detail and do not match site observations.. Examples are shown on Figure 3-2 below. Ground survey was commissioned to collect more accurate topographic information of the study area terrain and features.

Figure 3-2 Example – sparse LiDAR ground points in vegetated areas and potentially inaccurate channel definition. Kirmington Terrace – Koonwarra Street, West Haven



3.4.2 Aerial Photography

Several different aerial photograph data sets were provided by Council, the most recent and highest resolution being NearMap imagery (May 2017, 7cm resolution). This imagery covers the developed areas at base of North Brother Mountain, and is supplemented with other imagery supplied by Council (dated 2012 and 2013) to cover the entire study area and surrounds.

3.4.3 Stormwater and Drainage Infrastructure

Layers for a range of stormwater drainage assets and features have been provided by Council including pits, pipes, culverts, headwalls and water quality improvement devices. Details (dimensions and levels) are missing for a number of the drainage assets and require survey. The source and accuracy of those assets with details is not known, although it is noted that the network layout is consistent with recent subdivision road layouts (e.g. Fairwinds Avenue detention basin and Wedgetail Drive, both in Lakewood). Data entry dates are also observed to be recent (up to 2015). The locations and details of open drains and swales in the study area are not included in the spatial layers.



3.4.4 Historical Subdivision Design

Sub-division designs are available from Council for a number of developments in the study area as pdf files. Most are dated pre-2010 and review of the locations of these developments against recent aerial photos indicates that the majority have been constructed.

Designs for drainage features including the flow path and berms downstream of the Fairwinds Avenue detention basin are reflected in the LiDAR and stormwater spatial layers.

3.4.5 Additional GIS data

Additional GIS layers obtained include:

- Road centrelines, kerb/gutter lines, footpaths
- Cadastre
- · LEP and zoning
- Land use
- Ecological features.

3.5 Recorded Data

3.5.1 Rainfall Data

3.5.1.1 Daily Rainfall

Historic daily rainfall data was obtained from the Bureau of Meteorology's (BOM) website. Data from five sites in the vicinity of North Brother was obtained and is summarised in Table 3-2: Site locations for the selected gauges and other regional gauges are shown on Figure 3-3. It is to be noted that all five sites are located at or below RL 55m and the sites are unlikely to represent rainfall on the 490m high North Brother Mountain due to orographic effects.

The steep and smaller nature of the catchments in the study area mean that intense short duration (sub-daily) storm events or storm bursts are more likely to be critical in causing peak flooding during flash flood events. Mainstream flooding is more likely to result from multi-day duration events. Hence, the reported daily rainfall depths may not indicate the critical historic storm events which resulted in peak flash flooding. Those short (say, less than 6 hours in duration) and intense rainfall events may result in the worst flash flooding conditions but are not reflected by exceedingly high daily rainfall depths. The daily rainfall data is therefore of limited use in indicating when the worst flash flooding events occurred, although it is useful for showing general trends of when wet periods occurred, during which the critical storm events may have happened. The data is also useful for validating any recorded sub-daily rainfall data.



Table 3-2 Daily Rainfall Data

Gauge Number	Gauge Name and Elevation	Distance from Study Area (km)	Start Date	End Date	Length of record (years)	Completeness (%)
060022	Laurieton (Eloura St) 12m AHD	0	1/1/1885	31/07/2017	132.7	87.0
060027	Lorne (Lorne Rd) 55m AHD	17	1/01/1938	30/06/2016	78.6	97.5
060024	Moorland (Denro-an) 5m AHD	19	1/11/1885	31/07/2017	131.8	90.3
060017	Hannam Vale (Hannam Vale Rd) 33m AHD	21	1/02/1926	31/07/2017	91.6	97.1
0600139	Port Macquarie Airport AWS 4m AHD	25	26/07/1995	17/08/2017	22.1	98.0

Figure 3-3 BOM Rainfall Gauges in Laurieton region (source: BoM website. http://www.bom.gov.au/climate/data/index.shtml?bookmark=136)



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The daily rainfall data from the BOM Laurieton rainfall gauge was analysed and summarised for the top-ranking 1-day and 2-day recorded rainfall depths in Table 3-3. Rainfall values are based on daily rainfall recorded to 9am as per BOM convention. Hence, the peak flooding may occurred one day prior to the reported rainfall depth.

Table 3-3 Highest ranked recorded 1-day and 2-day rainfall depths at Laurieton rainfall gauge (060022).

Rank	1 day		2 day	
	Start date	Depth (mm)	Start date	Depth (mm)
1	29/04/1963	448.3	29/04/1963	462.3
2	5/01/1959	325.1	28/04/1963	448.3
3	22/1/1895	310.6	12/03/1974	389
4	20/03/1978	279.6	21/1/1895	384.8
5	28/02/1983	250	27/2/1892	377.7
6	16/3/1887	241.3	11/03/1974	368.6
7	28/03/1978	232	22/1/1895	328.4
8	6/02/2002	232	4/01/1959	325.1
9	9/11/2004	222	5/01/1959	325.1
10	6/04/1934	217.9	2/8/1899	318.7

3.5.1.2 Pluviograph data

Pluviograph data for specific historic storm events was obtained from Council for model calibration. The historic storm events of interest were identified from the responses from the community survey. Pluviograph data is available from Council-operated sewage treatment plants (STP) and sewer pumping stations (SPS), with the closest and most relevant gauge locations to the study area including:

- Camden Haven SPS #1 (Wharf Street, Laurieton)
- Camden Haven STP (Dunbogan), and
- Kew Kendall STP (Pacific Highway, Herons Creek).

The pluviograph stations are in the immediate vicinity (up to 3km) from the study area. Manly Hydraulics Laboratory (MHL) operates as pluviograph station at Logans Crossing, approximately 6km from the study area. This site is located further away from the study area than the Council STP gauge sites. The data from this gauge was obtained for selected storm events for comparison purposes. Refer to Figure 3-4 for locations of pluviograph stations in the vicinity of the study area.



Figure 3-4 Pluviograph locations in vicinity of the study area



3.5.2 Water Level Data

Water levels are recorded by MHL at several locations in the vicinity of the study area:

- Lakewood (Queens Lake)
- West Haven (Stingray Creek)
- Laurieton (Camden Haven River).

Data from these sites will be obtained for model calibration to historic storm events.

3.6 Topographic and Hydraulic Structures Survey

Survey of drainage and topographic features and hydraulic structures was commissioned for this study and undertaken in January – February 2018. The survey data was incorporated into the hydraulic modelling of the study area. Features surveyed included selected stormwater pits, pipes and culverts, earthen diversion drains and berms, natural channels and concrete channels. A summary map of surveyed features is provided in Appendix B.

Survey of drainage and topographic features in the vicinity of Black Swan Terrace was previously undertaken and supplied by Council.

3.7 Reports and Photographs of Historic Flooding and Drainage Issues

Council provided a number of photographs and written submissions from residents reporting drainage and flooding problems during historic storm events. Dates of the reported events are listed below. The Annual Exceedance Probability (AEP) of the 2013 and 2016 storm events were estimated by Jacobs from the Council pluviograph data from Camden Haven sewer pumping station.

- 18 October 2004. 127mm recorded daily depth.
- 25 February 2008.112mm recorded daily depth.
- 24 April 2008 (10% AEP event). 49mm in 45minutes; 65mm in 60 minutes; 136mm in 24 hours.



- 14 June 2011. 96mm recorded 2-day depth.
- 2 March 2013 (20% AEP) 61mm in 1.5 hours; 152mm in 24 hours.
- 5 January 2016 (20 50% AEP) 54mm in 1.5 hours.

Rainfall data for the 2008, 2013 and 2016 events was analysed and is plotted in Appendix A. Notable flooding reports are from locations including:

- Black Swan Terrace and Waterview Drive. Watercourse is piped through properties. The existing pipe inlet
 is undersized and the inlet debris screen regularly blocks. Overflows pass through residential yards, with
 paling fences washed away in previous floods.
- St Josephs's School, Laurieton. Video footage taken of significant flows along walkways between school buildings in the March 2013 event, which was a relatively frequent flood event.
- Ocean Drive. Flooding in numerous locations where a number of flow paths draining off North Brother
 Mountain cross this main road through the study area. Significant amount of cobblestones and other debris
 washed from watercourses and deposited on road.
- Flooding to depths of up to 1m in low points in roads at a number of locations in the study area. This was
 reported at Lilli Pilli Close, Sirius Drive, Mahogany Close and Honeysuckle Avenue, Lakewood; and
 Pelican Court, West Haven, among others.
- Flooding through Laurieton town centre including Bold Street, Lake Street and Tunis Street.
- Kirmington Terrace. Storm flows occurring within adjacent diversion drains further up the mountain
 infiltrated into the soil and then resurfaced as groundwater "springs" in residential yards and under
 buildings. Note that the flood models developed in this study would not be able to represent this
 phenomenon as a flood flow. However, remediation measures may be suggested as a part of the study.
- Numerous photos of overland flooding were captured by Murray Dalton surveyors during the April 2008 storm, summarised in Table 3-4 below.

It is noted that the storm events resulting in the reported flooding and drainage complaints and problems were relatively frequent and smaller magnitude events. Local flooding events of similar frequency and magnitude to planning flood events (i.e. the 1% AEP) or even moderate frequency (e.g. 5% AEP) are yet to be experienced in the study area in recent times.



Table 3-4 Summary list of photographs taken during 24 April 2008 storm event by Murray Dalton Surveyors

LAURIETON LOCAL STORM EVENT 24th APRIL, 2008 @ 8 am

Photo catalogue

2008_010	Queens Lake Village - flow down pathway		
2008_011	Queens Lake Village - western grated inlet pit		
2008_012	Queens Lake Village - pathway flow		
2008 013	Queens Lake Village - culvert flows		
2008 014	Queens Lake Village – Eastern Culvert		
2008 015	Mission Terrace - Gutter in front of Anglican Rectory		
2008_016	Ocean Drive looking west to Flinders Drive		
2008 017	Culvert east of Flinders Drive		
2008 018	2 nd Culvert east of Flinders Drive		
2008 019	Creek at 416 Ocean Drive, West Haven		
2008 020	Ocean Drive intersection with Mission Terrace		
2008 021	Mission Terrace - gutter in front of Anglican Rectory		
2008_022	Ocean Drive looking at Laurieton Cemetery		
2008 023	Ocean Drive looking east at Flinders Drive, Laurieton		
2008 024	Flinders Drive intersection with Ocean Drive		
2008_025	Culvert at St Josephs		
2008_026	Western culvert above Queens Lake Village		
2008_027	Wollworths culvert at Lakewood		
2008_028	Sirius Drive from temporary access to Ringtail, Lakewood		
2008_029	Drain above Woolworths culvert from Ringtail Access		
2008_030	Drain above Woolworths culvert		
2008_031	Sag pit in Ringtail Close		
2008_032	Ringtail Close looking towards cul-de-sac		
2008_033	Ocean Drive culverts west of Woolworths - looking east		
2008_034	Creek below Fairwinds at Ocean Drive		
2008_035	Creek below Fairwinds at Ocean Drive – watermain		
2008_036	Flow above Amaroo detention basin – headwall blocked by ply		
2008_042	Creek at 416 Ocean Drive, West Haven		
2008_043	View up driveway at 414 Ocean Drive, West Haven		
2008_044	Western culvert at St Josephs		
2008_045	Sewer Manhole at Laurieton Caltex		
2008_046	Sewer Manhole at Callex		
2008_047	Rosewood Court and Mission Terrace Intersection		
2008_048	Rosewood Court at top of hill		
2008_049	Queens Lake village drains		



Figure 3-5 Infiltrated floodwaters emanating as a "spring" from the ground in residential yard, Kirmington Terrace, June 2011.



Figure 3-6 Residents unblocking culvert inlet upstream of Black Swan Terrace properties, April 2008.





Figure 3-7 Overland flows from creek across Ocean Drive, West Haven, April 2008



Figure 3-8 Overland flows, Ocean Drive at Flinders Drive, April 2008



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3.8 Floor Level Survey

Floor level survey is currently not available for residential and commercial buildings in the study area. These data are required for the flood damages assessment to be undertaken during this study, and will be collected for selected properties based on their flood affectation and historic flooding.

3.9 Site Inspections

Site inspections were undertaken on 27 July 2017. The purpose of the site inspection was to gain a further understanding of the catchment characteristics, the nature of existing development and hydraulic conditions (including flow patterns, drainage arrangements, hydraulic features etc.) in known flood problem areas, and likely flood risk. Members of the Jacobs project team were accompanied by Council officers. Locations inspected on the site visit included those flood problem areas previously identified by Council and described in Section 2.3.

Observations made during the site visit included:

- The terrain in the developed sections of the study area, at the foot of North Brother Mountain, was generally flat to moderately sloped (grades of 5 – 15%) with elevations from less than 2m AHD up to 50m AHD.
- The middle and upper catchment areas, upstream of the developed areas, were densely forested and generally within Dooragan National Park. Terrain was generally very steep, with watercourse grades of up to 50% and ground elevations up to 490m AHD.
- There were no permanently flowing watercourses observed at the time of the site visit, which occurred
 following a month of dry weather conditions. Most minor flow paths were piped to pass through residential
 development. The larger watercourses were maintained in a generally natural state and development did
 not encroach these watercourses. All of the flow paths and watercourses were crossed by Ocean Drive
 and other roads with culverts as they drain to Queens Lake and Stingray Creek.
- Many watercourses and other drainage features were covered by dense rainforest vegetation.
- Soil landscapes along watercourses were observed to include high permeability gravel and rubble beds in
 the stream beds and along some stream banks. Council officers described that during storm events, in
 some locations the stream flows infiltrate into these gravel and rubble beds, flowing sub-surface and then
 resurfacing in different locations. This is reflected in residents' reports and accompanying photos.

An additional site visit was undertaken on 30 April 2018 during the model setup and calibration to inspect selected drainage features and confirm the model performance and representation of flood behaviour.



Figure 3-9 Eastern side of north Brother Mountain, illustrating steepness of the terrain



Figure 3-10 Shotcrete-lined informal channel in Lakewood



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Figure 3-11 Natural flow path through forested area in West Haven





Figure 3-12 Driveway crossing of flow path, which passes next to dwelling, West Haven

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Figure 3-14 Upstream side of flow path road crossing, West Haven



Figure 3-15 Trunk drainage open channel through property, Laurieton



North Brother Local Catchments Flood Study



Figure 3-16 Trunk drainage culvert discharging to open channel next to development, Laurieton

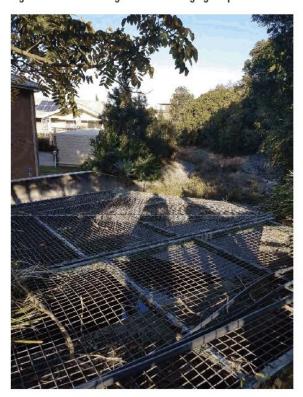


Figure 3-17 Flow diversion berm and swale upstream of development, Laurieton





3.10 Community Consultation

3.10.1 Initial Consultation

Community consultation was undertaken throughout this study, including distribution of newsletters and media releases and the hosting of a website on Council's webpage to announce the commencement and provide background on the study.

3.10.2 Community Survey

A community survey was mailed out to residents with the study newsletter asking residents for information on previous flooding events that they experienced in the study area, refer to Appendix B for the survey. A total of 302 responses were received. The responses assisted the project team in identifying the most significant flooding events in recent history which would be suitable for model calibration and verification. Observations including noted flood depths, flow patterns and durations of flooding were reported. Residents also submitted photographs and videos of flooding during the events.

The survey identified numerous flooding events over the past 20 years with no particular standout events. The March 2013 event was reported in six responses, while the April 2008 event, which resulted in the most intense rainfall for the storm event data available, was reported two times. The February 2002 event was reported four times, however, sub-daily rainfall data is not available for that event.

3.10.3 Community Information Sessions

Two community information sessions were held at Laurieton Library in August 2018. Residents were invited to view flood mapping for the model calibration and provide feedback on the results and other general concerns relating to flooding in the study area. Approximately 40 residents attended over the two sessions. The modelling was updated based on several resident comments for the final model calibration runs and design flood estimation.



4. Hydrologic Modelling

4.1 Modelling Approach

A hydrologic model was required to estimate storm and flood flows for the study area for the historic and design rainfall storm events. The terrain of the study area is such that:

- There are numerous natural watercourses and gullies which flow down the face of North Brother Mountain
 and then through the developed areas of the study area.
- On the flatter areas at and below the foot of the mountain and away from the watercourses, drainage paths
 are often less defined, with more dispersed overland flows affecting existing development.

The hydrologic modelling adopted involved lumped catchment modelling approach for the watercourses draining off the mountain, and a direct rainfall approach for the more dispersed overland flow catchment areas at the foot of the mountain. The lumped catchment modelling estimated inflow hydrographs (flow versus time) which were input into the hydraulic model in the watercourses. The direct rainfall approach input rainfall versus time data onto the modelled catchment surface in the hydraulic model itself, which then generated estimated flows internally in the model. This report section describes the lumped hydrologic modelling. Refer to Section 5.3.2 for further discussion.

The lumped hydrologic modelling was undertaken using the RAFTS hydrology module in the DRAINS modelling software. The RAFTS module is suitable for assessment of sub-catchments with areas up to 100 hectares and permits routing of runoff through the catchment. The DRAINS software is one of the few modelling packages that currently incorporate Australian Rainfall and Runoff 2016 (ARR 2016) design rainfalls and procedures.

4.2 Sub-Catchment Data

The catchment areas on North Brother Mountain were divided into 56 sub-catchments which drain to the gullies and watercourses running off the mountain through the study area. Mapping of the sub-catchment boundaries is shown on Figure 4-1. These sub-catchments are natural vegetated areas and a nominal impervious fraction of 5% was assumed

Sub-catchment flow path slopes are steep to very steep, with catchment flow path slopes ranging from 15 – 70%. DRAINS/RAFTS and most other hydrologic models have an upper limited slope parameter value of 30%, and this is adopted for the sub-catchments with slopes exceeding this value. It is likely that that catchment slopes steeper than 30% would result in faster catchment flow travel times producing higher peak flows. However, limited information is available rainfall runoff generation from very steep catchments.

A PERN catchment roughness value of 0.1 was adopted for the forested sub-catchment areas.

Legend
Study Area
Sub-Calchment Areas
Drainage Links

GDA 1994 MGA Zone 55
Scale: A3
Data Sources: LP, OEH, Council
LIMITATIONIS: This mapping is based on
data and assumptions tentified in the
North Brother Local Catchments Flood
Study prepared by Jacobos, Jacobs does
not warrant, guarantee or make
strong warrant, guarantee or make
representations regarding the currency
and accuracy ofinformation contained in
this map.

TITLE
Sub-Catchments
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FIGURE 4-1

FIGURE 4-1

FIGURE 4-1





4.3 Hydrologic Parameters

4.3.1 Rainfall Losses

An initial and continuing loss model was utilised in the RAFTS module which represented rainfall losses during storm events such as depression storage and soil infiltration. The following loss values were adopted for the design event runs:

- Pervious areas: Initial loss 15mm, continuing loss 2.5mm/hr
- · Impervious areas: Initial loss 1mm, continuing loss 0mm/hr.

Soil characteristics on the mountain were observed and reported to be very impermeable, and lower rainfall losses could normally be considered for such soils. Due to the steepness of the catchment areas and limited slope parameter values in the modelling these moderately low rainfall losses were retained.

Rainfall losses adopted for the calibration events are discussed in Section 6.3.1.

4.3.2 Storage Routing Factor

RAFTS includes the "Bx" storage routing factor which can be adjusted to change the runoff response of the catchment. With a default value of 1.0, the factor can be reduced to increase the runoff response, resulting in a more peaky flood. It is usually adjusted when there is sufficient data, such as flow gauging, to validate the adjustments.

Reducing the Bx value was considered to account for the very steep slopes on North Brother Mountain and the limited slope parameter value of 30% in the hydrologic modelling. However as there were no flow gauging data for the mountain, an adjustment of the Bx factor could not be justified for this study. Sensitivity runs also indicated minimal increases in peak flows for sample sub-catchments for Bx values of down to 0.2, which was not considered to be a reasonable adjusted value for this parameter. Modest increases in peak flows were observed for a Bx value of 0.1, but this was also considered a highly unreasonable value.



5. Hydraulic Modelling

5.1 Model Selection

A TUFLOW combined one-dimensional (1D) and two-dimensional (2D) hydrodynamic model was developed for this study. TUFLOW is an industry-standard flood modelling platform, which was selected for this assessment as it has:

- Capability in representing complex flow patterns on the floodplain, including flows through street networks and around buildings.
- Capability in representing the stormwater drainage network, including pit inlet capacities and interflows between the network and floodplain including system surcharges.
- Capability in accurately modelling flow behaviour in 1D channel, bridge and culvert structures and interflows with adjacent 2D floodplain areas.
- Easy interfacing with GIS and capability to present the flood behaviour in easy-to-understand visual outputs.

The model was developed and run in TUFLOW 2018-03-AA-iDP-w64, in the Heavily Parallelised Compute (HPC) module. The HPC module was preferred over TUFLOW "Classic" as it permits significantly faster model run times, which was required for this relatively large model extent and with direct rainfall being applied.

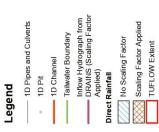
5.2 Configuration of Hydraulic Model

5.2.1 Extent and Structure

The TUFLOW model comprised of:

- A 2D domain of the study area surface reflecting the catchment topography, with varying roughness as dictated by land use. The watercourses were in general modelled in 2D. Diversion drains are in 2D.
- A 1D network of pits, pipes and culverts representing the stormwater network. Inflow capacities for pits
 were defined based on their type and size.
- Obstructions to flow are represented as 2D objects, including existing buildings.

The model extent covered an area of 12.6km² and includes the foot of the North Brother Mountain along its western, northern and eastern sides and the adjacent developed lower-lying areas down to the receiving waters at Camden Haven River, Queens Lake and Stingray Creek. Refer to the following report sections for details on these features. The model domain and locations of various features in the TUFLOW model are shown on Figure 5-1



GDA 1994 MGA Zone 56
Scale: A3
Data Sources: LPI, OEH, Council
LIMITATIONS: This mapping is based on
data and assumptions identified in the
North Brother Local Cardinaries Hood
Study prepared by Jacobs. Jacobs does
not warrant, gulantified on make
presentations regarding the currency
and accuracy ofinformation contained in
this map.

TUPLOW Model

TUPLOW Model

TITLE

Configuration

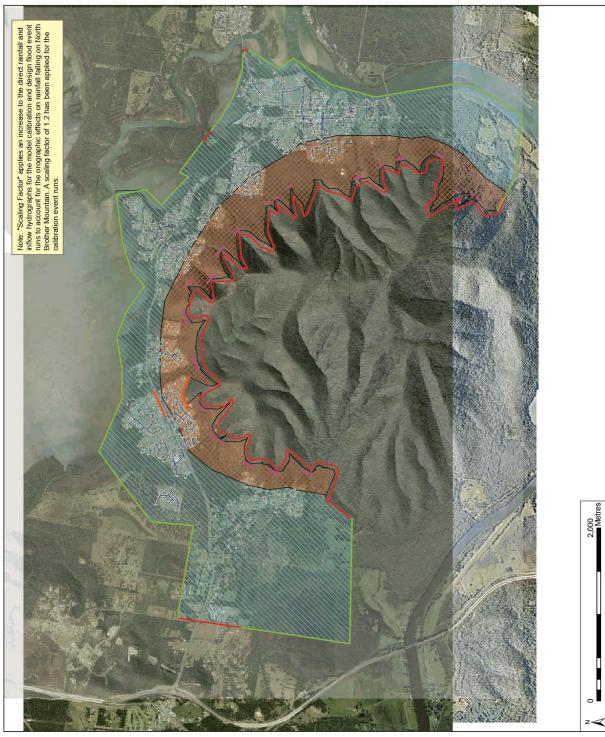
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5.2.2 Model Topography

The topography of the catchment was represented in the model using a 2m grid. This level of precision in the grid was considered necessary in order to represent detailed flood behaviour in a fully developed catchment. Finer model grid sizes such as 1m grid were not considered practical given the large size and expected excessively long computing times. The basis of the topographic grid used in the TUFLOW model was the LiDAR data set in addition to ground survey.

5.2.3 Stormwater Pits

The stormwater pits provide a dynamic linkage between the underground drainage network and the 2D TUFLOW model domain, representing the floodplain. Water is able to flow between the drainage network and floodplain, depending on the hydraulic conditions.

The location of the stormwater pits and associated attributes were available from Council in GIS format. Pit inflow relationships were defined in terms of flow depths versus pit inflow.

TUFLOW automatically calculates hydraulic energy losses in the pits based on the alignment of pipes connected to each pit and the flows in each pipe. The calculations are based on the Engelhund manhole loss approach (*TUFLOW User Manual*, BMT WBM, 2017).

5.2.4 Stormwater Conduits

Stormwater pits and pipes identified in Council's data base and from survey were also modelled in the TUFLOW models. Several pipes down to a diameter of 225mm were represented but are typically larger than 300mm. The conduits were represented as circular pipes or rectangular culverts with dimensions matching those adopted in the DRAINS models.

5.2.5 Building Polygons

This study considered buildings as solid objects in the floodplain. This means that buildings form impermeable boundaries within the model, and while water would flow around buildings, it could not flow across their footprints. The building footprints in the TUFLOW model were digitised based on the 2017 aerial imagery. The building polygons were superimposed on the model grid to make model computational cells under the footprints inactive.

5.2.6 Surface Hydraulic Roughness

All parts of the study area within the TUFLOW model were assigned hydraulic roughness values in a "materials layer" according to the LEP zoning and ground cover. These were based on engineering experience and typical values used in previous flood studies undertaken in the Sydney Region by Jacobs and other consultants. A moderately high Manning's n value of 0.05 for the residential land use accounts for expected obstructions such as minor features (steps, planter boxes etc.) and landscaping, which are typically not detected by LiDAR survey. The adopted Manning's n values are mapped on Figure 5-2 and summarised in Table 5-1.

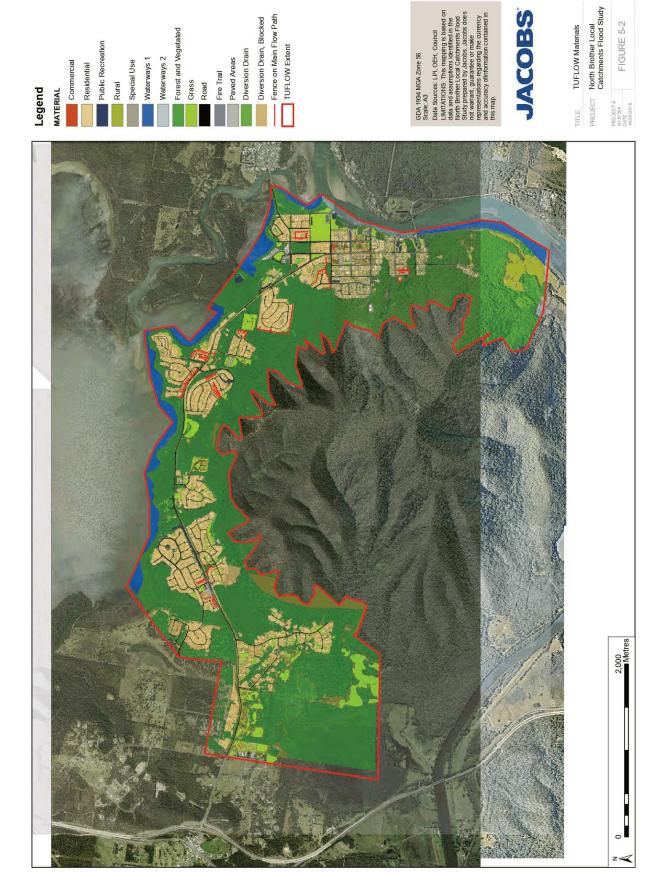




Table 5-1 TUFLOW Model Grid Hydraulic Roughness Values

Land Use Type/Material	Manning's n	Comment
Commercial	0.035	Zoning B2, B4
Residential	0.05	Zoning R1, R2, including schools
Public Recreation	0.1	Zoning RE1
Rural	0.035	Zoning RU1
Special Use	0.05	Zoning SP2. Cemetery, water supply
Waterways 1	0.05	Zoning W1
Waterways 2	0.035	Zoning W2
Forest and vegetated areas	0.1	Zoning E1, E2, E3 and E4 and other vegetated areas
Road	0.025	Where present, overwrites land use zoning areas listed above
Paved areas	0.02	Where present, overwrites land use zoning areas listed above
Fire Trail	0.035	Where present, overwrites land use zoning areas listed above
Diversion drain	0.04	Diversion drain, maintained, clear
Diversion drain with blockages	0.20	Unmaintained, heavy vegetation and fallen trees etc. Prone to further blockages from flood-borne debris
Property fence lines	0.30	Paling and Colourbond fences which are initially solid but prone to failure and flow-through

5.2.7 Property Fence Lines

Fence lines were typically not explicitly represented in the model and floodwaters were allowed to flow across them freely. Although fences would obstruct overland flood flows in some parts of the catchment, experience indicates that representing fences in the hydraulic model requires making unvalidated assumptions about flood depths at which fences would overflow or fail.

The potential obstruction to flow caused by fences was represented in the model by increasing the cell roughness (Manning's n values) along selected property fence lines on and adjacent to main flow paths to a value of n=0.3. This approach would provide some resistance to flows against and along a fence, although it probably would not represent the full obstructing effect of a fence before it fails under the force of flood flows. There are other approaches which could represent a fence as a solid obstruction which would dynamically fail in the model once flow depths become great, but this approach was considered somewhat impractical to implement on a catchment scale, requiring significant effort and detail. The adopted approach was considered a more practical means of representing the hydraulic effects on flood flows. The modelled fence lines are shown on Figure 5-2.

5.3 Boundary Conditions and Tailwater Conditions

5.3.1 Model Inflows

The inflow hydrographs from the DRAINS/RAFTS model were input into the watercourses and gullies upstream of the developed areas of the study area. The inflow boundaries are shown on Figure 5-1.



5.3.2 Direct Rainfall

A rainfall hyetograph (rainfall depth per time interval) was directly input into the TUFLOW model in the areas where direct rainfall applied. Similarly to the catchment hydrologic modelling discussed in Section 4.3.1, rainfall losses were applied in the conversion of direct rainfall to runoff in the TUFLOW model. The rainfall losses proposed for design flood estimation were:

- Pervious areas: Initial loss 15mm, continuing loss 2.5mm/hr
- · Impervious areas: Initial loss 1mm, continuing loss 0mm/hr.

Most impervious areas in the study area were explicitly represented including road areas, roof areas and other large paved areas. The remaining developed areas for which impervious areas were not digitised were assumed to be 20% impervious to account for driveways and other small paved areas, and the rainfall losses were reduced accordingly to account for this partial imperviousness.

As discussed in Section 5.2.5, the model cells covering building footprints were made inactive. The rainfall falling on the roof areas of these buildings was therefore applied to the area immediately surrounding each building. Roofs were considered to be impervious areas with the corresponding rainfall losses applied.

Areas where direct rainfall was applied are shown on Figure 5-1. The areas where direct rainfall was scaled up for orographic effects (refer Section 6.3.2 for discussion) are also indicated.

5.3.3 Tailwater Boundaries

Tailwater boundaries were located along the shoreline on the receiving waterways including Camden Haven River, Stingray Creek, Queens Lake and Watsons Taylor Lake. Refer to the discussion in the subsequent model calibration section and the design event modelling section for details on the adopted tailwater levels.



6. Model Calibration and Verification

6.1 Overview

Rigorous model calibration of overland flood models cannot generally be carried out because direct measurements of overland flows and accurate measurements of flood levels are usually not available. Localised features may also be present which influence flow patterns but are not detected in the catchment-scale topographic data. Hence, overland flood models are often verified using observations of flood depths and flood behaviour as a way of "sanity-checking" the modelling and confirming its reliability.

This study relied mainly on observed depths of flooding during past flood events given by local residents. This anecdotal information was generally considered indicative as often only the general location of the observation was usually given, and approximate depths of flooding. The reported flood observations were also from numerous separate storm events, while the model calibration focussed on only two events selected based on availability and quality of observed data. However, the reported flood depths were still useful information for validating the general behaviour of flooding simulated by the flood models.

Photographs and video of flooding were also provided which offer more detailed information of the flooding behaviour at specific locations. Consideration was needed on whether the photos were taken at the peak of the flooding.

The general approach involved running the hydrologic and hydraulic models and comparing the flood depths and flow patterns to reported observations. The model configuration and parameter values were adjusted as necessary with the aim of achieving a satisfactory fit to the observations.

6.2 Selection of Verification Events

Flooding was reported for numerous individual storm events occurring over the last 20 years from the community survey responses. Two historic storm events were selected for model calibration and verification based on the number of responses for each event and the magnitude of the storm event. These events included:

- 24 April 2008. The most intense rainfall recorded based on the available data. Significant number of photographs are available with Council for this event.
- 2 March 2013. This is a relatively intense storm with the majority number of survey responses.

Characteristics of the selected storm events are provided in Table 6-1. The cumulative rainfall depths are plotted in Appendix A. A comparison of the recorded rainfall against the design IFD is also shown in Appendix A. Although the April 2008 storm event resulted in a lower daily rainfall depth than the March 2013 event, it produced a significantly more intense burst of rainfall over a period of one hour. Given the nature the flash flooding catchments in the study area these short duration bursts are the critical events for peak flooding. Hence, the April 2008 storm is considered to be a rarer and greater magnitude event than the March 2013 event, based on rainfall records.



Table 6-1 Calibration storm event characteristics

Event Date	Daily Rainfall Depth	Main Storm Burst Rainfall Depth and Duration	Approximate Event AEP	Comment
24 April 2008	136mm	49mm in 45 mins 65mm in 60 mins	10% AEP	Rainfall data available from Camden Haven SPS (Laurieton)
2 March 2013	152mm	43mm in 60 mins 61mm in 1.5 hrs	20% AEP	Rainfall available from Camden Haven STP (Dunbogan)

Note that several storm events in circa 2000 and 2002 were reported by long-term residents as being the most severe that they experienced. However, suitable rainfall data for the model calibration were not available for these earlier storm events and hence these were not selected for the model calibration and verification.

6.3 Adopted Parameter Values for Model Verification

6.3.1 Rainfall Losses

Rainfall losses reflect the ability for the catchment to absorb some rainfall during a storm event due to capture on vegetation and trapped low points and from infiltration into the soil. The magnitude of the rainfall losses depends largely on how wet the catchment is due to preceding rainfall and the soil types in the catchment, with sandy soils generally being more permeable and hence water can infiltrate into the soil column at faster rates.

The assumed rainfall loss parameter values were selected based on a review of daily rainfall records and initial runs of the modelling for the calibration events. Both the April 2008 and the March 2013 storm events occurred after significant preceding rainfall:

- Approximately 200mm of rainfall was recorded in the week before the 24 April 2008 flood event.
- Over 280mm of rainfall was recorded approximately two weeks before the 2 March 2013 flood (from 17 27 February) followed by an additional 39mm rainfall on 28 February and 1 March, prior to the main flood event on 2 March.

Hence it is highly likely that the catchment was saturated prior to the two calibration storm events with little to no capacity to absorb further rainfall. The following rainfall loss values are therefore adopted for the model calibration and verification:

- Pervious areas: Initial loss 0mm, continuing loss 2.5mm/hr
- Impervious areas: Initial loss 0mm, continuing loss 0mm/hr.

Higher initial losses were initially tested in the hydrologic and hydraulic modelling. However, sufficiently high rates and volumes of runoff could not be produced to achieve a good match to the reported flooding at several locations. Other hydrologic factors such as the methods for representing the high catchment slopes and runoff, blockages, drainage patterns etc. were also considered and trialled but did not produce reasonable matches for observed flood behaviour, and hence were discounted from the model calibration process and informed the selection of the assumed rainfall losses.

6.3.2 Orographic Rainfall Scaling

The North Brother Mountain, being a significant topographic feature of over 450m elevation and with steep slopes, has the potential to result in orographic enhancement of rainfall during storm events as the wind flow carrying rain-bearing clouds rises over the mountain and results in increased precipitation. Hence, rainfall



intensities on the mountain, away from the rainfall gauge locations, may be higher than those at the gauge locations situated on lower areas at some distance away from the mountain.

BMT WBM (2018) has undertaken the Coffs Creek and Park Beach Flood Study at Coffs Harbour, where the catchment is bounded by a steep escarpment along its western and north-western sides to elevations over 400m. As a part of the model calibration for that study rainfall data from numerous rain gauges in the catchment were analysed for the March/April 2009 flood event, and a marked rainfall gradient was observed between the coastal part of the catchment and the middle and upper sections of the catchment. Rainfall depths recorded for the 24 hours to 9am on 1 April 2009 ranged from 260 – 280mm in the coastal areas, up to 530mm at gauges in the upper section of the catchment, with maximum estimated rainfall depths in this zone of up to 560mm (or double the rainfall recorded in the coastal areas). Analysis of the November 1996 storm event observed rainfall depths 2.5 times higher in the upper section compared to the coastal zone.

As a result of the rainfall analyses and model calibration in the Coffs Creek study, BMT WBM (2018) adopted scaling factors of 1.2 to 1.6 for the design flood estimation in that study, whereby the design rainfall intensities adopted for the coastal areas were increased by 1.2 to 1.6 times for application on the escarpment areas and foothills of the catchment. The study cited that the previous Coffs Creek Flood Study (WMA, 2001) adopted significantly higher scaling factors of up to 2.25, depending on the ground elevation of a particular location.

The topography for the North Brother Mountain differs from Coffs Creek catchment, in that the Coffs Creek catchment is an incised valley which would funnel wind flows up the valley, concentrating the rain clouds. The same funnelling effect is unlikely to occur at the North Brother Mountain due to its shape as a peak protruding from the surrounding coastal plain rather than a valley feature. To account for the orographic effects in the study area and to provide a better calibration fit the catchment inflows from the North Brother Mountain and the rainfall on the foothills of the mountain were increased by 20% (i.e. an orographic scaling factor of 1.2),based on the recorded rainfall and design rainfall being derived for the coastal plains area. Accordingly, rainfall on the low areas below the foot of the mountain was not adjusted from the recorded depths.

As per the selection of rainfall losses, other model parameters and assumptions were initially tested and analysed in the calibration process but could not replicate the observed flooding depths and flow patterns, as the model was generally less sensitive to these other parameters. Hence these preliminary runs informed the scaling of rainfall for the model calibration. There was some uncertainty about the actual increased rainfall depths and spatial distribution of the increases during the historic events since there were no rainfall gauges on the North Brother Mountain, however, a uniform scaling factor of 1.2 appeared to provide the best fit to observed flooding across the study area for the calibration events.

6.3.3 Blockage of Hydraulic Structures

Guidance on blockage of hydraulic structures was generally sought from Australian Rainfall and Runoff Revision Project 11– Blockage of Hydraulic Structures Stage 2 (Engineers Australia, 2013).

Culverts were generally assumed to be 50% blocked for the model calibration events. There are photos and observations during historic flood events of large gravel and rocks being washed down the watercourses and deposited in drainage lines, and recurring blockage due to debris. Blockages at a few specific structures were reduced or increased to provide a better calibration fit.

Assumed blockage of stormwater pit inlets are generally consistent with guidance in ARR 2016. The large majority of pits in the study area were observed to be combination kerb inlet and grated pits. The assumed blockages were:

- Sag pits: kerb inlet assumed clear and grate 100% blocked.
- On-grade pits: 90% of the combined kerb inlet and grate flow capacity (i.e. 10% blockage factor).

6.3.4 Blockages in Flow Diversion Drains

Several respondents reported and provided photographs of overgrown vegetation and fallen trees in adjacent flow diversion drains at the foot of the mountain contributing to the drains overflowing and causing flooding of



properties and dwellings. Observations on site also indicated localised build-up of rock rubble and tree trunks in the larger drains and watercourses. Blockages of these drains were represented in the model to replicate these flooding patterns.

6.3.5 Tailwater Conditions

Recorded water level hydrographs for the receiving waterways were adopted as tailwater boundaries for the calibration events.

6.4 Comparison to Observed Flooding

The community survey responses were reviewed for observations of flooding behaviour including dates of storm events, depths of flooding, flow patterns and resulting damage to property. Photos and videos provided with the responses or separately were also reviewed. Notes from Council on flooding problem spots were also considered.

The modelled flood behaviour was compared to the residents' observations and were generally found to be consistent with the observations. Refer to Table D-1 in Appendix D for comparison of modelled flood behaviour to the reported observations. Mapping of flood depths for the historic events is also shown in Appendix D.

The modelling generally produced reasonable matches to the observed flood behaviour along main flow paths and ponding/storage areas. Areas affected by shallow sheet overland flows were more difficult to replicate observations during previous storms, as such shallow flows are more sensitive to small-scale ground and built features which could not be picked up in the topographic model on a catchment-wide scale. The main flow paths and storage areas are the focus of the flood study as this is where flood risk and hazards are greatest.

There are some locations where a good match could not be achieved and this may be attributed to localised factors which may have occurred such as blockages of drains and drainage infrastructure by debris and sediment but which were omitted from the modelling if there were no specific reports of blockages. Information was sought whether any maintenance or upgrade works were conducted on the flow diversion drains uphill of the residential properties at the foot of the mountain which may have altered flow capacities and behaviour. Drains could be cleared in recent times and reflected in survey of the drains, but could be blocked by debris and vegetation at the time of historic flood events. However, Council and National Parks and Wildlife Service (NPWS) stated they did not undertake works in recent years. Council advised that Crown Lands Department may have had undertaken works but no specific information was available.

There is also some uncertainty in the exact rainfall which fell on the mountain catchments as the orographic effects are likely to have caused localised and non-uniform enhancement of rainfall. While the rainfall data is sourced from gauges which are in or relatively close to the study area, these are located relatively at lower elevations in or to the east of the study area and may have varied from rainfall in the west of the study area or on the mountain

Overall, the TUFLOW model provides a reasonable agreement to the observed flood behaviour in the historic events and is therefore considered to be suitable for the estimation of design flood behaviour in the study area.

6.5 Sensitivity Testing of Calibration Parameters

A number of scenarios were assessed for the April 2008 flood event to test the sensitivity of the model results to changes in the adopted parameter values. The tested parameters included:

- · Rainfall and flow Scaling
- Rainfall losses
- Blockage of hydraulic structures
- Surface hydraulic roughness



The scenarios are described and the impacts summarised in Table 6-2. Flood levels and depths are relatively sensitive in particular to the changes in rainfall scaling (both increase and decrease) with changes of +/- 0.2m, and to blockages (both fully open and fully blocked) with changes of up to +/- 0.7m, mainly upstream and downstream of culvert structures. The flood levels are also moderately sensitive to the assumed changes in Manning's n on the main flow paths, which are assumed to be of high roughness in forested areas, with resulting changes in flood levels of +/- 0.15m. Flood levels are typically insensitive to changes in rainfall losses (+/- 0.03m), although flooding in selected storage areas are more sensitive to the increased rainfall losses (- 0.28m) than to the decreased losses (+0.8m).



Table 6-2 Sensitivity Analysis Description and Results

Scenario	Description	Change in Flood Level
Rainfall and Flow Scaling – Zero	Scaling factor of 1.0. (Base case adopts scaling factor of 1.2)	 Up to -0.15m on major flow paths Typically less than -0.05m on other flow paths.
Rainfall and Flow Scaling – Increase by 20% points	Scaling factor of 1.4. (Base case adopts scaling factor of 1.2)	 Up to +0.15m on major flow paths (east of Ellerslie Cres and south of Brotherglen Dr) Typically less than +0.05m on other flow paths. +0.1m to +0.2m in some storage areas (between Botanic Dr and Ocean Dr, Lakewood shops car park, car park west of Laurieton Hotel) and isolated areas on some properties.
Rainfall Losses – Increase	Pervious area: 15mm initial loss (burst loss: define burst as starting at 7AM 24 April 2008. Peak intensity at 8:35AM), 4mm/hr continuing loss. Impervious area: 2mm initial loss, 0mm/hr continuing loss.	 Typically less than -0.03m in most flow paths and overland flow areas. Up to -0.28m in storage area between Botanic Dr and Ocean Dr.
Rainfall Losses – Decrease	Pervious area: 0mm initial loss, 0mm/hr continuing loss. Impervious area: retain calibration values (0mm initial loss, 0mm/hr continuing loss.)	 Typically less than +0.02m in most flow paths and overland flow areas. Up to +0.08m in storage area between Botanic Dr and Ocean Dr.
Blockage of Hydraulic Structures – Fully Blocked	All pipes, culverts and pits 100% blocked.	 Typically +0.15m to +0.3m in main road low points and storage areas (between Botanic Dr and Ocean Dr, Sirius Dr, Pelican Crt, and others) Up to +0.4m in Lakewood shops car park, car park west of Laurieton Hotel. Decreases of -0.1m in some locations downstream of the storage areas

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Typically less than +/-0.05m on other flow paths.	 Typically less than +/-0.1m in affected areas. Localised reductions of up to -0.7m upstream of culverts. Localised increases of up to +0.3m downstream of culverts including on properties in Pelican Crt. 	Up to +0.15m on major flow paths (east of Ellerslie Cres and south of Brotherglen Dr) Typically less than +0.05m on other flow paths. Less than +/-0.02m in other overland flow areas.	 Up to +-0.05m on major flow paths (east of Ellerslie Cres and south of Brotherglen Dr) Typically less than -0.03m on other flow paths and overland flow areas.
•		-	
	All pipes, culverts and pits 0% blocked.	Surface Manning's n values increased by 20%.	Surface Manning's n values decreased by 20%.
	Blockage of Hydraulic Structures – All Clear	Surface Hydraulic Surface Manning's n Roughness – Plus 20% values increased by 20%.	Surface Hydraulic Roughness – Minus 20%



7. Estimation of Design Floods

7.1 Adopted Model Parameters for Design Events

7.1.1 Design Rainfall

This flood study is based on Australian Rainfall and Runoff (ARR) 2016 design rainfalls and procedures. Each design storm AEP and duration consists of an ensemble of 10 storm temporal patterns which define the timing and intensity of rainfall throughout a given storm event. Each storm in the 10 temporal pattern ensemble has an equal probability of occurring.

Design rainfall data was downloaded from the Bureau of Meteorology website, including ARR 2016 design rainfall depths and temporal patterns relevant to the study area. The data was extracted for a representative location in the study area (West Haven; 31.6375° S, 152.7875° E).

Design rainfall time series were derived for the Probable Maximum Precipitation (PMP) events, based on the Generalised Short Duration Method (GSDM) in *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short Duration Method* (BOM, 2003).

The design rainfall depths for design events up to 0.5% AEP adopted in this study are summarised in Table 7-1. The PMP depths for the events assessed with durations up to 1 hour are summarised in Table 7-2.

Table 7-1 Design Rainfall Depths for Selected Storms

Storm	Rainfall Depth (mm)					
Duration	0.2EY	5% AEP	2% AEP	1% AEP	0.5% AEP*	
15 minute	28.9	39.3	46.7	52.4	57.6	
30 minute	40	55.1	65.9	74.5	82.0	
1 hour	52.7	73.8	89.5	102	112.2	
1.5 hour	61.4	86.6	106	122	134.2	
2 hour	68.4	97	119	137	150.7	
3 hour	80.1	114	140	161	177.1	

^{*} Initially estimated for sub-daily durations as 10% greater than the 1% AEP design rainfall depths, based on BOM data for 24 hour and longer durations. Sub-daily design rainfall depths for the 0.5% and other rare storms were released by BOM in November 2018 which confirmed this assumption. The design rainfall depths in the above table were retained.



Table 7-2 Probable Maximum Precipitation Event Rainfall Depths

Storm Duration	Rainfall Depth (mm)
15 minute	190
30 minute	280
45 minute	350
1 hour	440

7.1.2 Rainfall Losses

An initial and continuing loss model was utilised in the RAFTS module which represents rainfall losses during storm events such as depression storage and soil infiltration. The adopted loss values are summarised for the design event runs.

Table 7-3 Adopted Rainfall Losses

	Up to 1% AEP event	PMF event
Pervious areas	Initial Loss: 15mm	Initial Loss: 0mm
	Continuing Loss: 2.5mm/hr*	Continuing Loss: 1mm/hr
Impervious areas	Initial Loss: 1mm	Initial Loss: 0mm
	Continuing Loss: 0mm/hr	Continuing Loss: 0mm/hr

^{*} Pervious area continuing loss estimated during model calibration and verification.

ARR 2016 recommendations for rainfall losses are also based on an initial loss/continuing loss model, with storm loss depths (pre-burst + burst losses) prescribed by the ARR Datahub for the study area as:

- Storm initial loss: 37mm, with median pre-burst loss of 0mm for a 1% AEP 1 hour storm. Therefore, burst loss = 37mm. Rainfall losses are not provided in DataHub for sub-hourly storm durations.
- Continuing loss: 5.5mm/hr.

The above rainfall losses are applicable to pervious areas in rural catchments. DataHub states that these are *not* for use in urban areas.

The initial loss values from DataHub need to be treated with caution, with consideration of the limitations of the data. The ARR 2016 losses are derived from analysis of main river catchment streamflow data, with different rainfall-runoff characteristics to local overland flow catchments such as around North Brother. The high initial loss depth of 37mm (burst only) appears exceedingly high compared to values previously used for pervious areas in similar overland flow studies (typically up to 15mm). It is not expected that in a storm event in this study area, a pervious area would only begin to generate runoff after the first 37mm of rainfall, particularly for the short-duration storm events being considered for the local overland flow areas. For these reasons the ARR 2016 initial losses are not considered appropriate for this study, and a more conservative initial loss of 15mm is adopted for pervious areas for the design flood estimation.

Similarly, the continuing loss of 5.5mm/hr from DataHub was considered relatively high for the study area. While there are likely to be areas on the mountain with highly permeable soils, the infiltrated water re-emerges as spring flows in certain locations, and hence the infiltrated water is not lost to deep groundwater and may



contribute to flood flows. The adopted continuing loss of 2.5mm/hr, estimated during the model calibration and verification, attempts to strike a balance between the potentially high infiltration rates and re-emergence of spring flows.

7.1.3 Orographic Rain Scaling

As per the model calibration and verification, an orographic rain scaling factor of 1.2 was applied to areas on the North Brother mountainside, refer to Figure 5-1.

7.1.4 Blockage of Hydraulic Structures

Similar to the model verification (refer Section 6.3.3), guidance on blockage of hydraulic structures was generally sought from *Australian Rainfall and Runoff Revision Project 11– Blockage of Hydraulic Structures Stage 2* (Engineers Australia, 2013). Blockages of stormwater pits and culvert inlets were assumed as per below:

- · Sag pits: kerb inlet assumed clear and grate 100% blocked.
- On-grade pits: 90% of the combined kerb inlet and grate flow capacity (i.e. 10% blockage factor).
- Culverts were generally assumed to be 50% blocked for design event runs.

7.1.5 Blockages in Flow Diversion Drains

Blockage condition of flow diversion drains due to unmanaged vegetation, based on resident reports and site observations and adopted in the model verification, was retained for the design runs.

7.1.6 Tailwater Conditions

Selection of tailwater conditions was based on the OEH guidance in "Modelling the Interaction of Catchment Flooding and Oceanic Inundation in Coastal Waterways" (OEH, 2015). Recommended combinations of flooding and tailwater is summarised below in Table 7-4 (excerpt from the document).

Table 7-4 Combinations of Catchment Flooding and Oceanic Inundation Scenarios

Design AEP for peak levels/velocities	Catchment Flood Scenario	Ocean Water Level Boundary Scenario	Comment/ Reference	
50% AEP	50% AEP	HHWS(SS)	Dynamic hydrograph can be taken from Appendix C	
20%	20% AEP	HHWS(SS)	with peak flood to coincide with HHWS(SS) highest	
10%	10% AEP	HHWS(SS)	peak for highest water levels Peak HHWS(SS) 1.25m AHD	
5%	5% AEP	HHWS(SS)	Peak HHWS(SS) 1.25m AHD	
2%	2% AEP	5% AEP	Dynamic ocean water level boundary hydrograp Appendices A or B for relevant waterway type	
1% Envelope level	5% AEP	1% AEP	Envelope provides 1% AEP design flood estimate Dynamic ocean water level boundary hydrograph Appendices A or B for relevant waterway type	
1% Envelope level	1% AEP	5% AEP		
1% Envelope velocity	1% AEP	ISLW	Dynamic hydrograph can be taken from Appendix with peak flood to coincide with ISLW lowest trougl for peak velocities in entrance. Fixed ISLW approx0.95m AHD	
0.5%	0.5% AEP	1% AEP	Dynamic ocean water level boundary hydrograph	
0.2%	0.2% AEP	1% AEP	Appendices A or B for relevant waterway type	
PMF	PMF	1% AEP		
1% Catchment	1%	HHWS(SS)	Suggested envelopes for analysis of catchment	
PMF Catchment	PMF	HHWS(SS)	flooding only	

Note: Individual projects are likely to specify the use of only a select number of AEPs outlined in the table

In the design flood estimation for North Brother overland flooding, local catchment flood events were coincided with elevated ocean water level, rather than a coinciding river flood event. There is considered to be a higher probability that the local catchment storm would coincide with a storm surge event. Local catchment flooding



occurred sometime (0.5-2 days) before the river flooding occurred or peaked during the flood events of 2008 and 2013. Hence, peak river flood levels as coinciding tailwater conditions is considered overly conservative.

The adopted tailwater levels for the local catchment flood modelling are summarised in Table 7-5. Given the short duration of the local catchment flood events, a constant tailwater level was assumed.

Table 7-5 Adopted tailwater levels for North Brother local catchment flooding

Design Flood	North Brother Local Catchment Flood Event	Tailwater Condition (Ocean Water Level)	Comment	
0.2EY	0.2EY	HHWS(SS)* 1.25m AHD	HHWS in the river/lakes system is 0.2 – 0.6m AHD (ref: MHL,	
5% AEP	5% AEP	HHWS(SS) 1.25m AHD	2012).	
2% AEP	2% AEP		Estuary Type B entrance.	
1% AEP (local flood) ¹	1% AEP	5% AEP: 2m AHD	River 5% AEP flood level is higher than adopted TWL ² , at 2.3 – 2.4m AHD.	
1% AEP (storm surge) ¹	5% AEP	1% AEP: 2.1m AHD	Estuary Type B entrance. River 1% AEP flood level is	
0.5% AEP	0.5% AEP	1% AEP: 2.1m AHD	significantly higher than	
PMF	PMF	1% AEP: 2.1m AHD	- adopted TWL ² , at 2.9 – 3m AHD ref: Worley Parsons, 2013).	
1% AEP Climate Change Scenario	1% AEP (+10% increase in rainfall)	1% AEP + 0.9m sea level rise: 3.0m AHD		

^{1.} Maximum envelope derived from 1% AEP local catchment flood and storm surge scenarios to define 1% AEP design flood.

2. HHWS(SS) = High High Water Spring (Summer Solstice) i.e. "king" tides. TWL = Tailwater Level.

7.2 Simulated Design Events

The storm events modelled include the 0.2 Exceedances per Year ("EY"), 5%, 2%, 1% and 0.5% AEP and PMF events for current climate conditions. The storm durations that were initially assessed include the 15 and 30 minute and 1, 1.5, 2 and 3 hour durations for up to the 0.5% AEP events. The critical durations (those that gave the maximum flood levels) varied for the different AEPs.

The 15, 30 and 45 minute and 1 hour durations were modelled for the PMF event. The critical duration for the PMF varies throughout the catchment.

A climate change flood scenario was also assessed, consisting of the existing 1% AEP storm plus a 10% increase in rainfall intensity, combined with a 1% AEP ocean level with a 0.9m sea level rise.



8. Design Flood Results

8.1 Final Model Runs and Processing of Results

ARR 2016 guidelines stipulate that for each ensemble of 10 storm temporal patterns it is the storm producing the just above the median flow or flood level which should be considered as the "representative" storm temporal pattern. The flood study modelling is based in part on direct rainfall hydrology, hence the selection of a median flood level from the TUFLOW results is appropriate. The TUFLOW model results for up to the 0.5% AEP were processed in the following manner:

- Review the preliminary model results to identify the critical storm durations and representative temporal
 patterns for each AEP. That is, for each 10 storm ensemble identify the storm just-above median and the
 durations which give the maximum flood level. The representative storms are summarised in Table 8-1.
- 2) Undertake final model runs for the selected representative storms
- For each storm AEP, the maximum envelope of the flood level from each representative storm is derived to define the design flood level surface.
- 4) Steps 3 repeated for the flood depth, velocity and flood hazard results, and other parameters.

The PMF was run for the 15, 30 and 45 minute and 1 hour durations. Only one storm temporal pattern was applied to each PMF duration, hence only a maximum envelope of the results from each duration was derived to define the design PMF flood surface.

Table 8-1 Selected ARR 2016 Representative Storms for Design Flood Definition

AEP	Representative Storms	
0.2EY	30min (TP10), 1hr (TP8), 2hr (TP10)	
5%	1hr (TP10), 2hr (TP6), 3hr (TP4)	
2%	30min (TP5), 1hr (TP6), 2hr (TP8)	
1%	30min (TP5), 2hr (TP6) Also 5% AEP 3hr (TP4) for coincident ocean inundation flood event. Refer Table 7-5 for adopted coincident flood scenarios.	
1% Climate Change	Adopt same as 1% AEP	
0.5%	Adopt same as 1% AEP	
PMF	All storms selected	

8.2 Flood Mapping

Design flood mapping is presented in Appendix E for flood depths/extent and velocities. The flood mapping filters out areas with flood depths less than 0.05m (50mm) to exclude areas of shallow sheet flow.

8.3 Description of Flooding Conditions

8.3.1 Flood Depth

Overland flow depths on properties are typically up to 0.3m in up to the 1% AEP event. Depths exceed 0.5m in a number of locations in the 0.2EY event, and exceed 1m in the 5% and 1% AEP events. Areas of deeper flows include main flow paths and drainage low points in a number of roads.



During the PMF event, property and road flooding exceeding 0.5m depth is widespread, with property and road flooding of 1m depth also common. Depths of flooding exceeding 2m occur on approximately 20 properties in the study area.

The flood depth mapping shows relatively high depths of ponding on the upstream sides of many buildings. In most cases this is due to the model terrain not allowing free drainage of water around the buildings. In real life the ground surface around buildings is usually graded to allow water to drain off and not form trapped points. There may also be property stormwater drainage present which is not included in the model. Some care therefore needs to be taken in the review of the flood depth mapping.

8.3.2 Flow Velocity

Flow velocities are swift in a number of overland flow paths through properties and particularly in roads. Typical flow velocities are 0.5 – 1m/s in the 0.2EY event, and 1 – 1.5m/s in the 1% AEP event. High flow velocities of 2 – 3m/s occur in a number of locations including roads and properties. These flows are likely to be highly hazardous to people and risk significant damage to buildings and property.

Flow velocities of 3 - 4m/s are commonplace in the PMF, with some locations experiencing velocities over 4m/s.

8.3.3 Duration of Flooding

Overland flooding in the study area is generally a result of intense short-duration rainfall events. As a result, the duration of inundation of roads and built areas is typically short, limited to 1 – 2 hours in up to the 0.5% AEP event. Storage areas such as road sag points in Sirius Drive and Lilli Pilli Close in Lakewood may be inundated for longer durations of up to 3hrs due to constrained capacity of stormwater drainage servicing these areas.

Durations of inundation are likely to be up to 4 hours in the PMF event particularly in some flood storage locations, affecting roads including Botanic Drive and Ocean Drive west of Lakewood shopping centre.

Note that the duration of flooding for depths greater than 0.3m, at which stage floodwaters become impassable for most passenger vehicles, is generally limited to approximately 1 hour duration in most roads.

A river flooding event may occur shortly after overland flooding in the study area, in which case the lower-lying areas of the study area may experience more extensive durations of flooding. River flooding was not assessed in this study.

8.3.4 Climate Change Impacts

The change in flood levels in the 1% AEP event due to climate change are presented on Figure E-15 in Appendix E. Most areas affected by overland flow experience flood level increases of up to 0.1m due to increased rainfall and reduced drainage capacity from higher tailwater levels caused by sea level rise. Locations along the river and lakes would be impacted by 0.9m increases in flood levels directly due to sea level rise, while adjacent areas would be impacted typically by up to 0.5m increases in flood level.

Note that these impacts are estimated based on the overland flooding assessment of North Brother. Increases in flood levels due to climate change effects on riverine flooding may be different, refer to the Camden Haven River and Lakes Flood Study (Worley Parsons, 2013).

8.4 Summary of Flood Levels and Flow Conditions

Table F-1 in Appendix F summarises the peak flood levels and flow velocities at locations throughout the study area. Table F-2 in Appendix F summarises the peak flow rates for selected locations in the study area.



8.5 Provisional Flood Hazard Mapping

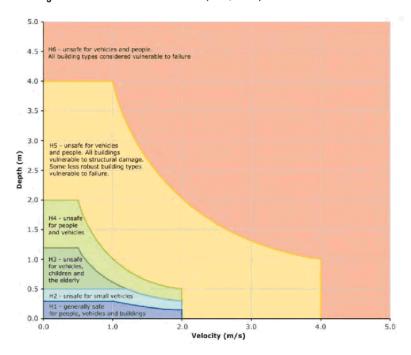
Flood hazard mapping was prepared for the 1% AEP event for current climate conditions and for the 1% AEP event under the adopted climate change scenario (increased rainfall intensity by 10% and with 0.9m sea level rise). Recent research has been undertaken into the hazard that flooding poses and the vulnerability of the public and assets when interacting with floodwaters. A combined flood hazard classification is presented in *Australian Disaster Resilience Handbook 7. Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia* (AIDR, 2017a) and *Guideline 7-3 Flood Hazard* (AIDR, 2017b) based on this research, and is illustrated in Figure 8-1. The flood hazard categories according to the AIDR definition are:

- H1 Generally safe for people, vehicles and buildings;
- H2 Unsafe for small vehicles;
- . H3 Unsafe for vehicles, children and the elderly;
- H4 Unsafe for people and vehicles;
- . H5 Unsafe for people and vehicles. Buildings require special engineering design and construction; and
- H6 Unsafe for people or vehicles. All buildings types considered vulnerable to failure.

The flood hazard classification is more discrete and provides guidance on flood hazard thresholds to different members of the community (e.g. children and elderly) and different assets (small versus larger vehicles, standard versus specialised engineered buildings). The AIDR flood hazard definition potentially provides a more suitable guideline for assessing flood hazard on the floodplain from an emergency management perspective.

The flood hazard mapping is provided in Appendix G and is denoted provisional. The provisional mapping is based on direct flood modelling outputs and was not updated to reflect the "true" flood hazard to take into consideration evacuation, isolation and other emergency management aspects. There are numerous areas of high flood hazard (>H5) typically reflect the swift overland flows in watercourses and flow paths including roadways.

Figure 8-1 General flood hazard vulnerability curves, Australian Institute for Disaster Resilience (AIDR) definition. Reproduced from Figure 6 in *Guideline 7-3: Flood Hazard* (AIDR, 2017b)





8.6 Provisional Hydraulic Categories Mapping

Three flood hydraulic categories identified in the *Floodplain Development Manual* (NSW Government, 2005). These are also defined in Council's Flood Policy (2015):

- Floodway, where significant discharge of water occurs during floods and blockage could cause redirection
 of flows. Generally characterised by relatively high flow rates; depths and velocities;
- Flood storage, characterised by relatively deep areas of floodwater and low flow velocities. Floodplain filling
 of these areas can cause adverse impacts to flood levels in adjacent areas; and
- Flood fringe, areas of the floodplain characterised by shallow flows at low velocity.

There is no firm guidance on hydraulic parameter values for defining these hydraulic categories, and appropriate parameter values may differ from catchment to catchment. For example, the minimum threshold flows and depths which might define a floodway in an overland flow catchment may be markedly lower than those for a large lowland river due to the different scale of flooding. The category definition adopted in the Hastings River Flood Study (PBP, 2006) and Hastings River Floodplain Risk Management Study (Worley Parsons, 2012) was initially considered for this study. For the Hastings River the floodways were defined as areas in the 1% AEP flood with flows greater than 2m, velocities greater than 0.5m/s and velocity x depth greater than 1m²/s. This does not agree with the flooding conditions in the North Brother study area, where 1% AEP flows are generally less than 1.5m deep. Hence, an alternative hydraulic category system is required.

Howells et. al. (2003) suggest that consideration of flow depths, velocities and velocity x depth of flood flows can be used to help define the hydraulic category areas. Various combinations of flow, depth and velocity were trialled for appropriate threshold values for the hydraulic categories. For the purposes of this study, the hydraulic categories were defined as per the criteria in Table 8-2, which were selected following trials of different criteria values and categorisation methods. These criteria are consistent with those adopted by a number of other councils in NSW for overland flooding.

Table 8-2 Hydraulic Categories Criteria

Hydraulic Category	Criteria
Floodway	Area within the flood extent where: • Velocity x Depth > 0.3m²/s AND • Velocity > 0.5m/s AND • Depth > 0.15m.
Flood Storage	Remaining area within 1% AEP flood extent where Depth > 0.15m
Flood Fringe	Remaining area in the floodplain (i.e. area within PMF extent) outside the Floodway and Flood Storage areas.

The provisional hydraulic categories mapping is presented in Appendix G for both the 1% AEP design flood for current climate, and for the 1% AEP event with climate change. The mapping is treated as provisional and may need to be considered in further detail to ensure a continuous floodway strip (where appropriate) and to remove/reclassify isolated areas which currently meet the floodway criteria to either flood storage or flood fringe categories. This would be achieved by manual inspection and adjustment of the mapped floodway areas.

Floodway areas are generally located within the natural watercourses and flow paths, although there are a number of roads which contain floodways throughout the study area. Floodways pass through properties on Black Swan Terrace, Koonwarra Street, Pelican Court, Elouera Place, Flinders Drive, St Joseph's School, Peach Grove, Gow Place, Kew Road and in Laurieton between Quarry Place and Bold Street, among others.



8.7 Provisional Flood Planning Area

The flood planning area (FPA) is defined by the extent of the area below the flood planning level (FPL), which for Port Macquarie Hastings Council is the 1% AEP flood with climate change, plus a freeboard. A freeboard of 0.5m was adopted for defining the flood planning level, in accordance with Council's Flood Policy.

The FPA delineates the area and properties where flood planning controls are proposed, for example, minimum floor levels to ensure that there is sufficient freeboard of building habitable floor levels above the design flood. Other controls may be considered, such as policies on suitable land uses or rezoning.

The FPA is easily delineated where flood flows are confined to well-defined gullies or valleys, by adding the freeboard to the design flood level and then extending the flooding extent laterally until it intersects the valley sides. However, overland flow patterns in the study area are particularly complex, with numerous flow paths occurring in shallow swales and in roadways that traverse the catchment slope. This presents challenges in defining the flood planning level and flood planning area.

To address these issues, for the purposes of this study the FPL and the FPA were defined by applying the 0.5m freeboard to the 1% AEP plus climate change flood surface, then limiting them in level and extent to that where the PMF was greater than 0.15m depth. This limits the FPA extent to what could be described as the "floodplain". There is justification in applying the PMF level as a limit on the FPL, as it is not always appropriate to apply a 0.5m freeboard for areas subject to flooding from overland flows. Much of the study area is affected by overland flooding for which depths are characteristically lower than mainstream flooding, and the increment between the 1% AEP climate change flood level and the PMF is generally small (typically 0.2 – 0.4m) in the shallower overland flow areas, hence less than the 0.5m freeboard. Further, flood related development controls would typically not be implemented for areas above and outside the PMF

Manual trimming of the FPA was undertaken using engineering judgment to further refine the FPA to areas affected by overland flooding in the 1% AEP climate change event. The resultant provisional flood planning area is mapped in Appendix H.

Since properties outside of the defined FPA are still susceptible to sheet flow drainage, it would be prudent to apply a minimum floor level height to all properties of 0.15m above the finished ground level. This is consistent with Building Code of Australia (ACBC, 1996) for drainage purposes for slab-on-ground dwellings,

As the flood planning area and flood planning levels and mapping are likely to be a sensitive issue to the community it is recommended that the flood planning area mapping not be published in the Final Draft Flood Study or Floodplain Risk Management Study reports.

8.8 Flooding Hot Spots

This study confirms flooding issues at the locations identified by Council and listed in Section 2.3. It also identifies a number of additional locations where there is elevated potential for flooding to cause a hazard to people, damage to properties and disruption to transportation routes. These are described in Table 8-3. Critical areas with consideration of high flood depths, velocities or hazard are highlighted with orange cell or text shading.



Table 8-3 Description of Flooding Hot Spots. Critical locations are highlighted orange

Location	Description			
Property flooding				
Black Swan Terrace, West Haven	Flow depths on properties of up to 0.5m in the 0.2EY event and up to 0.7m in the 1% AEP event. Swift flows of 2m/s. Flood hazard up to H5 rating in the 1% AEP event.			
Ringtail CI, Lakewood	Overflows from open channel onto properties with flooding in backyards to depths 0.2 – 0.3m in the 1% AEP event. Relatively low flooding impact.			
Lilli Pilli Cl, Lakewood	Flooding in backyards to depths of $0.3-0.5 m$ in the 1% AEP event from open drain overflows. Flooding in cul-de-sac to depths up to $0.8 m$.			
	Also significant flooding of car park around Lakewood shopping centre.			
Mission Terrace, Lakewood	Overflows with depths of 0.1 – 0.3m in the 1% AEP event from cul-de-sac onto downhill property. Overflows from the overland flow path on to uphill side properties with depths up to 0.2m			
Kirmington Terrace to Pelican Court, West Haven	Flows through properties on low side of Koonwarra Street of 0.3m in the 0.2EY event and exceeding 0.5m in the 1% AEP event. Velocities up to 2m/s in the 1% AEP. Flood hazard up to H4 (some localised H5) rating in the 1% AEP.			
	Flow depths 0.5m in the 0.2EY event and up to 0.8m in the 1% AEP event on Captain Cook Bicentennial Drive villas and Ocean Drive property, at dwellings. Flood hazard up to H4 rating in the 1% AEP event.			
	Flood depths of 0.6 – 0.8m in the 0.2EY event within Pelican Court roadway and pedestrian walkway. Depths up to 0.6m at dwellings in 1% AEP event. Flood hazard up to H4 rating on properties and H5 in roadway in the 1% AEP event.			
	Groundwater springs occur in this area but are not directly related to the surface water flood risk. These springs appear to be a spatially random occurrence.			
Flinders Dr Estate, Laurieton	Overflows from drainage easement swale onto properties with depths to 0.3m in the 0.2EY event and 0.5m in the 1% AEP event.			
	Overflows from Reliance Crescent sag point onto properties to depths of 0.2m in the 0.2EY event and 0.4m in the 1% AEP event.			
Bold Street area, Laurieton	Significant flows through Laurieton Hotel with H4 hazard rating.			
	Trapped drainage point on western side of commercial properties with significant depths, though local drainage may be present which would mitigate the flood depths.			
	Overflows down fire trail at Norman Street/ Mill Street affecting properties with depths up to 0.3m in the 1% AEP.			
	Overflows onto units on Harbourside Crescent from trunk drainage channel to depths exceeding 0.5m in the 1% AEP event, with H5 hazard rating.			
Quarry Way, Laurieton	Overflows from flow diversion drain to depths of 0.5m in the 1% AEP event on properties. The drain is reported to be affected by significant debris blockage.			



Lake Street, Laurieton	Flood depths up to 1m in the 1% AEP event affecting dwelling corner Lake Street and Seymour Street, unsure if above floor flooding. To be confirmed.
	Overflows from Lake Street onto properties between Ocean Drive and Castle Street to depths of 0.3m in the 1% AEP.
St Joseph's School, Laurieton.	Swift flows in overland flow paths to depths of 0.8m and velocities exceeding 2m/s in the 1% AEP event.
	Flows between buildings are 0.4m in the 0.2EY event and 0.6m in the 1% AEP event, with velocities up to 2m/s. Flood hazard rating of H4 in pedestrian walkways and H5 in overland flow paths in the 1% AEP event.
Properties adjacent to Stingray Creek and Camden Haven River, Laurieton	Numerous properties on low-lying land at risk of oceanic inundation during storm surge events. Estimated depths on the flood mapping expected to be conservative due to likely attenuation of ocean inflows through the river mouth.
Blackbutt Crescent and Peach Grove, Laurieton	Overflows from flow diversion drain to depths of 0.5m in the 1% AEP event on properties. The drain form and capacity significantly reduces near its discharge point onto Peach Grove at Tunis Street. Flows into the drain originate from natural watercourse further uphill, which is significantly affected by rubble and debris blockage.
Elouera Place, West Haven	Overflows from watercourse and diversion drain. Depths over 0.3m in the 0.2EY event and 0.5m in the 1% AEP event.
Sirius Drive, Honeysuckle Avenue and Mahogany Close, Lakewood	Flood depths on properties 0.3 – 0.5m in the 1% AEP event, built up from road ponding areas.
Sirius Drive and Oak Close, Lakewood	Depths 0.3 – 0.4m and velocities 1m/s in the 1% AEP event.
Sandpiper Close	Overflows from concrete channel along Ocean Drive. Depths 0.3 – 0.4m and velocities 1m/s in the 1% AEP event.
Properties on lower side of Ocean Drive, 200m east of Hoschke Road, West Haven	Road low point overflows onto properties with depths of 0.5m and velocities of 1m/s in the 1% AEP event.
Roads	
Ocean Drive west of Lakewood shopping centre	5% AEP event flood depths of 0.4m
	1% AEP event flood depths of 0.5m, H3 hazard rating
Botanic Drive, Lakewood	1% AEP event flood depths of 0.4m, H2 hazard rating
Lilli Pilli Close, Lakewood	5% AEP event flood depths of 0.6m
	1% AEP event flood depths of 0.7m, H3 hazard rating
Ocean Drive east of Lakewood shopping centre	5% AEP event flood depths of 0.3m
	1% AEP event flood depths of 0.35m, >H4 hazard rating
Sirius Drive, Honeysuckle Avenue and Mahogany Close, Lakewood	0.2EY event flood depths of 0.6 – 0.7m
	1% AEP flood depths 1m, H3 hazard rating
Ocean Drive between Fairwinds Avenue and Mission Terrace	0.2EY events flood depths of 0.5m
	1% AEP event flood depths of 0.7m, >H4 hazard rating
Ocean Drive and Mission Terrace intersection	0.2EY event flood depths of 0.4m
	1% AEP event flood depths of 0.6m, H3 hazard rating
Ocean Drive near Waterview Crescent	5% AEP event flood depths of 0.2 – 0.3m



	1% AEP event flood depths of 0.3m, low hazard rating but long section of flooding
Ocean Drive near Pelican Court	5% AEP event flood depths of 0.3m
	1% AEP event flood depths of 0.4m, H3 hazard rating
Pelican Court, West Haven	0.2EY event flood depths 0.6m
	1% AEP event flood depths of 1m, H5 hazard rating
Waterview Crescent, Kirmington Terrace and Koonwarra Drive, West Haven	0.2EY event flood depths of 0.2m with 2m/s velocity; max 0.6m depths (low velocity)
	1% AEP event flood depths up to 0.7m, H5 – H6 hazard rating
Ocean Drive east of Hoshcke Road	0.2EYevent flood depths of 0.4m
	1% AEP event flood depths of 0.5m, H3 hazard rating
Ocean Drive east of Flinders Drive	5% AEP event flood depths of 0.3m
	1% AEP event flood depths of 0.4m, H3 hazard rating
Kew Road/Bold Street near Tunis Street, Laurieton	1% AEP event flood depths of 0.5m, H2 hazard rating
Bold Street between Laurie Street and Mill Street	0.2EY event flood depths over 0.5m
	1% AEP event flood depths 0.6 – 0.8m, H5 hazard rating
Bold Street north of Hanley Street, Laurieton	0.2EYevent flood depths of 0.3m with 1m/s velocity
	1% AEP event flood depths up to 0.5m, H3 hazard rating
Lord Street at Seymour Street, Laurieton	0.2EY event flood depths of 0.5m
	1% AEP event flood depths up to 0.7m, H3 hazard rating
Flinders Drive, Laurieton	H5 hazard rating on steep sections of road (1% AEP event)
Tunis Street, Laurieton	
Rosewood Court and Mission Terrace, Lakewood	
Diamentina Way, Lakewood	

8.9 Groundwater Springs in the Study Area

There are a number of reports of groundwater springs occurring in the study area, with infiltrated rainwater discharging to the surface and in some cases causing damage to property. These appear to be spatially random and due to the particular soil structure on the North Brother Mountain, where accumulated groundwater causes piping through the soil and then eventually washing out the soil to form a discharge point at the ground surface. Similarly, there are locations where surface water can be observed to rapidly percolate via fissures in the ground surface.

While these groundwater springs may result in surface water discharge and subsequent property damage or are otherwise nuisance occurrences, characterising this problem was outside the scope of this flood study which deals primarily with surface runoff and flooding. Further geological and geotechnical investigations may be required to address these groundwater spring issues.



9. Conclusions and Recommendations

9.1 Conclusions

Hydrologic and hydraulic computer models for the North Brother Local Catchments study area were developed based on available data from Council and other sources, and topographic and hydraulic structures survey collected during this study. The models were developed with a focus on local catchment and overland flooding originating from runoff from the North Brother Mountain and from within the study area itself. The modelling did not focus on mainstream flooding from the Camden Haven River and other waterways.

The models were calibrated to the April 2008 and March 2013 local catchment flood events based on responses to the community consultation survey and other reports and flooding complaints lodged with Council. Model parameters were adjusted to achieve a satisfactory fit to historic flood observations include rainfall losses, hydraulic roughness of the floodplain surface and blockages of hydraulic structures and of diversion drains. An orographic scaling factor of 1.2 was adopted to increase rainfall and catchment flows by 20% to achieve a satisfactory calibration. This factor accounts for increased rainfall intensities during storm events due to the orographic effects resulting from the North Brother Mountain topography, and is relative to the unscaled recorded rainfall from gauges on the coastal plain away from the mountain.

A number of sensitivity analyses were undertaken for the April 2008 flood event to test the sensitivity of the model results to changes in the adopted parameter values. The tested parameters include:

- Rainfall and flow scaling
- Rainfall losses
- · Blockage of hydraulic structures
- Surface hydraulic roughness

Flood levels and depths were relatively sensitive in particular to the changes in rainfall scaling (both increase and decrease) with changes of +/- 0.2m, and to blockages (both zeroed and fully blocked) with changes of up to +/- 0.7m, mainly upstream and downstream of culvert structures. The flood levels were also moderately sensitive to the assumed changes in Manning's n on the main flow paths, which were assumed to be of high roughness in forested areas, with resulting changes of +/- 0.15m. Flood levels were typically insensitive to changes in rainfall losses (+/- 0.03m), although flooding in selected storage areas was more sensitive to the increased rainfall losses (-0.28m) than to the decreased losses (+0.08m).

Community information sessions were held in August 2018 with feedback from the community incorporated into the final model calibration and design flood simulations. Design flood conditions were estimated based on the updated model for a range of flood events from the 0.2EY event up to the PMF event. A climate change scenario comprising the 1% AEP design event plus 10% increase in rainfall depth and 0.9m sea level rise was assessed.

Flood behaviour in the design events is characterised by typically swift flows with depths of flow in roads and properties of 0.3m in the 0.2 EY event and up to 1m in the 1% AEP event being common. During the PMF event, property and road flooding exceeding 0.5m depth is widespread, with property and road flooding of 1m depth also common. Depths of flooding exceeding 2m occur on approximately 20 properties in the study area.

Flow velocities are swift in a number of overland flow paths through properties and particularly in roads. Typical flow velocities are 0.5 – 1m/s in the 0.2EY event, and 1 – 1.5m/s in the 1% AEP event. High flow velocities of 2 – 3m/s occur in a number of locations including roads and properties. These flows are likely to be highly hazardous to people and risk significant damage to buildings and property. Flow velocities of 3 – 4m/s are commonplace in the PMF event, with some locations experiencing velocities over 4m/s.

Flood levels increase due to climate change by up to 0.1m in areas affected mainly by overland flows, grading up to 0.9m in low-lying areas directly impacted by sea level rise. Transition areas experience increases in flood



levels between 0.1m and 0.9m due to varying degrees of interaction between increased overland flows and the increased sea levels

Provisional flood hazard mapping and hydraulic categories mapping were prepared based on the 1% AEP design flood event and the 1% AEP event with climate change. The flood hazard mapping was based on hazard categories defined in the Australian Emergency Management Handbook which describes safe and hazardous flooding conditions for pedestrians, vehicles and buildings. The hydraulic category definitions were tailored to suit the overland flooding behaviour in the study area.

Provisional flood planning area mapping was prepared based on the 1% AEP flood event with climate change, and incorporates a 0.5m freeboard, and was limited to the PMF level and extent. The flood planning area was defined for areas of more significant flooding and excluded areas of shallow drainage flows. A minimum floor height of 0.15m above finished ground level is recommended for all residential dwellings, consistent with Building Code of Australia (ACBC, 1996) for drainage purposes for slab-on-ground dwellings, as the large majority of properties are susceptible to sheet flow drainage.

Flooding problem areas previously identified by Council were confirmed in the study and flooding behaviour described. Additional locations with flooding issues were also identified. Roads where flooding is likely to affect vehicular traffic were identified. Durations of flooding due to overland flows were identified as being short (2-3 hours) owing to the nature of the flash flooding which occurs in the study area.

9.2 Recommendations

- It is recommended that this Draft Report be reviewed by Council prior to being placed on public exhibition for feedback from the community.
- Council should review the proposed approach in deriving the flood planning levels and area. Council
 should also consider the omission of the flood planning area mapping from the Final Draft Report which is
 to be placed on public exhibition.
- It is recommended that Council considers the adoption of this Flood Study and the outputs including the
 Flood Planning Levels (FPLs) to guide floodplain management and land use planning in the North Brother
 local catchments study area. The subsequent Floodplain Risk Management Study should consider the
 management of flood risk in the catchment, particularly at the identified flooding "hot spots", which may
 include the development of flood mitigation strategies.
- Council should consider geological and geotechnical investigations to assess the groundwater spring
 issues in the study area which result in surface water discharge and subsequent property damage or are
 otherwise nuisance occurrences.



10. Acknowledgements

This study was undertaken by Jacobs on behalf of Port Macquarie Hastings Council. Council prepared this document with financial assistance from the NSW Government through its Floodplain Management Program. This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

A number of organisations and individuals contributed both time and valuable information to this study. The assistance of the following in providing data and/or guidance to the study is gratefully acknowledged:

- · Residents of the study area;
- Manly Hydraulics Laboratory, NSW Department of Finance, Services and Innovation;
- · Council officers; and
- NSW Office of Environment and Heritage.



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12. Glossary

Annual Exceedance Probability (AEP)

The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. In this study AEP has been used consistently to define the probability of occurrence of flooding. It is to be noted that design rainfalls used in the estimation of design floods up to and including 100 year ARI (ie. 1% AEP) events was derived from 1987 Australian Rainfall and Runoff. The following relationships between AEP and ARI applies to this study (AR&R, 2016).

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI
	12			
	6	99.75	1.002	0.17
Very frequent	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.50
	1	63.2	1.58	1.00
Frequent	0.69	50.00	2	1.44
	0.5	39.35	2.54	2.00
	0.22	20.00	5	4.48
	0.2	18.13	5.52	5.00
Infrequent	0.11	10.00	10.00	9.49
	0.05	5.00	20	20.0
	0.02	2.00	50	50.0
	0.01	1.00	100	100
Rare	0.005	0.50	200	200
	0.002	0.20	500	500
	0.001	0.10	1000	1000
	0.0005	0.05	2000	2000
Extremely Rare	0.0002	0.02	5000	5000
			1	
			V	
Extreme			PMP	

Australian Height Datum (AHD)

A common national surface level datum approximately corresponding to mean sea level.

Average Annual Damage (AAD)

Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would



occur in a nominated development situation from flooding over a very long period of

Average Recurrence Interval (ARI)

The long-term average number of years between the occurrences of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event

Catchment

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Development

Is defined in Part 4 of the FP&A Act

<u>In fill development</u>: refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development.

New development: refers to development of a completely different nature to that associated with the former land use. Eg. The urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of exiting urban services, such as roads, water supply, sewerage and electric power.

Redevelopment: refers to rebuilding in an area. Eg. As urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either re-zoning or major extensions to urban services.

DRAINS

DRAINS is a computer program which is used to simulate local catchment rainfallrunoff and stormwater system hydraulics and is widely used across Australia.

Effective Warning Time

The time available after receiving advise of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.

Flood

Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.

Flood fringe areas

The remaining area of flood prone land after floodway and flood storage areas have been defined.

Flood liable land

Is synonymous with flood prone land (i.e.) land susceptibility to flooding by the PMF event. Note that the term flooding liable land covers the whole floodplain, not just that part below the FPL (see flood planning area)

North Brother Local Catchments Flood Study



Floodplain Area of land which is subject to inundation by floods up to and including the

probable maximum flood event, that is flood prone land.

Floodplain risk management

options

The measures that might be feasible for the management of particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed

evaluation of floodplain risk management options.

Floodplain risk management plan

A management plan developed in accordance with the principles and guidelines in

this manual. Usually include both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve

defines objectives.

Flood plan (local) A sub-plan of a disaster plan that deals specifically with flooding. They can exist at

state, division and local levels. Local flood plans are prepared under the leadership

of the SES.

Flood planning levels (FPLs)

Are the combination of flood levels (derived from significant historical flood events

or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the "designated flood" or the "flood standard" used in earlier

studies.

Flood proofing A combination of measures incorporated in the design, construction and alteration

of individual buildings and structures subject to flooding, to reduce or eliminate

flood damages.

Flood readiness Readiness is an ability to react within the effective warning time.

Flood risk Potential danger to personal safety and potential damage to property resulting from

flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and

continuing risks. They are described below.

Existing flood risk: the risk a community is exposed to as a result of its location on

the floodplain.

Future flood risk: the risk a community may be exposed to as a result of new

development on the floodplain.

Continuing flood risk: the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For

an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.

Flood storage areas Those parts of the floodplain that are important for the temporary storage of

floodwaters during passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is

necessary to investigate a range of flood sizes before defining flood storage areas



Floodway areas Those areas of the floodplain where a significant discharge of water occurs during

floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood

flow, or a significant increase in flood levels.

Freeboard Provides reasonable certainty that the risk exposure selected in deciding on a

particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc.

Freeboard is included in the flood planning level.

Hazard A source of potential harm or situation with a potential to cause loss. In relation to

this manual the hazard is flooding which has the potential to cause damage to the

community.

Local overland flooding Inundation by local runoff rather than overbank discharge from a stream, river,

estuary, lake or dam.

m AHD Metres Australian Height Datum (AHD)

m/s Metres per second. Unit used to describe the velocity of floodwaters

m³/s Cubic metres per second or "cumecs". A unit of measurement of creek or river

flows or discharges. It is the rate of flow of water measured in terms of volume per

unit time.

Mainstream flooding Inundation of normally dry land occurring when water overflows the natural or

artificial banks of a stream, river, estuary, lake or dam.

Modification measures Measures that modify either the flood, the property or the response to flooding.

Overland flow path The path that floodwaters can follow as they are conveyed towards the main flow

channel or if they leave the confines of the main flow channel. Overland flow paths

can occur through private property or along roads.

Probable Maximum Flood (PMF)

The largest flood that could conceivably occur at a particular location, usually

estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the

extent of flood prone land, that is, the floodplain.

Probable Maximum Precipitation

(PMP)

The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of

the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to PMF estimation.

Risk Chance of something happening that will have an impact. It is measured in terms of

consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the

environment.



Runoff The amount of rainfall which actually ends up as a streamflow, also known as

rainfall excess.

Stage Equivalent to water level (both measured with reference to a specified datum)

TUFLOW TUFLOW is a computer program which is used to simulate free-surface flow for

flood and tidal wave propagation. It provides coupled 1D and 2D hydraulic solutions using a powerful and robust computation. The engine has seamless interfacing with

GIS and is widely used across Australia.

XP-RAFTS XP-RAFTS is a computer program which is used to simulate catchment rainfall-

runoff and is widely used across Australia.



Appendix A. Analysis of Historic Rainfall Event Data

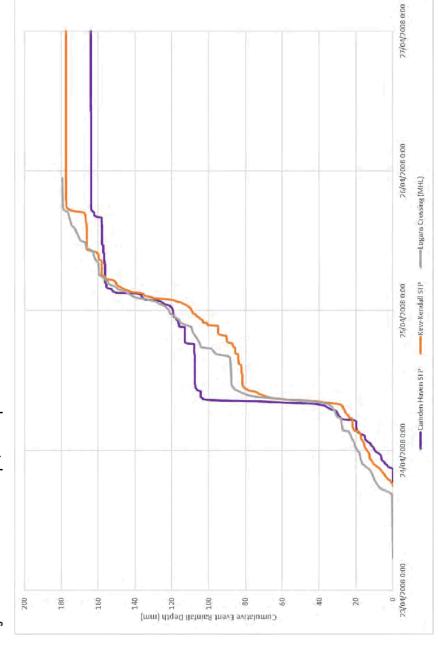
Cumulative rainfall depths have been plotted for two recent storm events for which data is currently available. These include:

- 24 April 2008 (10% AEP) 49mm in 45minutes; 65mm in 60 minutes; 136mm in 24 hours.
- 2 March 2013 (20% AEP) 61mm in 1.5 hours; 152mm in 24 hours.
- 5 January 2016 (20 50% AEP) 54mm in 1.5 hours.

JACOBS

Draft Flood Study Report

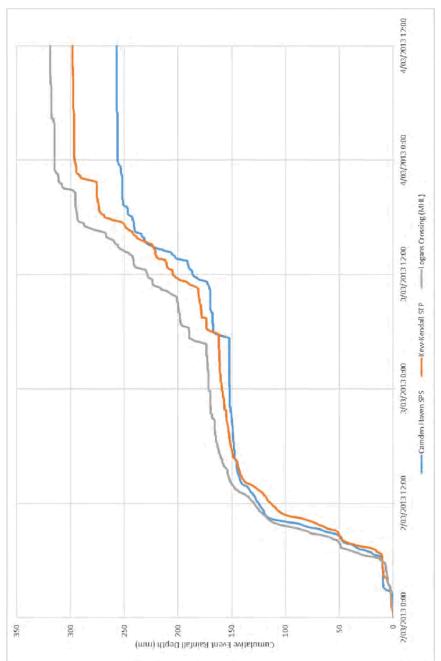
Figure A-1 Cumulative event rainfall depth, 24 – 26 April 2008



North Brother Local Catchments Flood Study



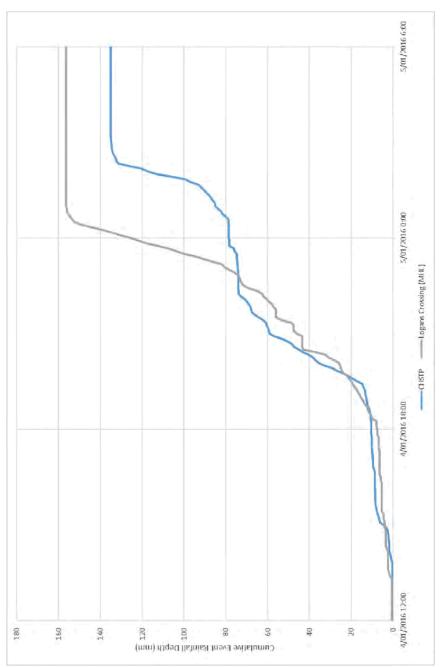
Figure A-2 Cumulative event rainfall depth, 2-3 March 2013



North Brother Local Catchments Flood Study

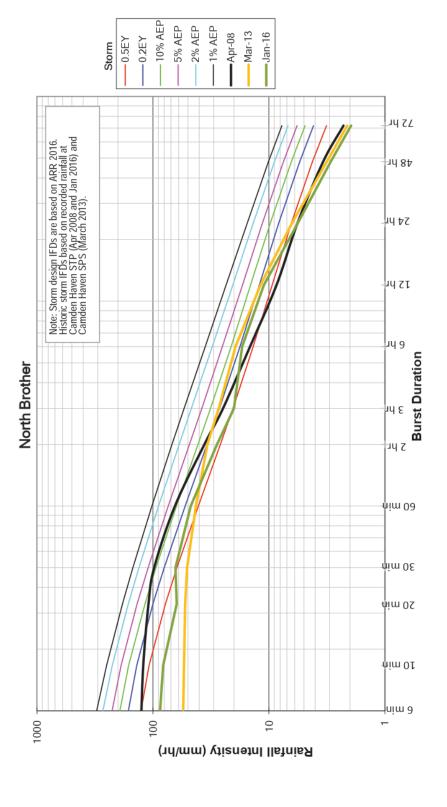


Figure A-3 Cumulative event rainfall depth, 4 – 5 January 2016



North Brother Local Catchments Flood Study

Figure A-4 North Brother Design Rainfall Intensity-Frequency-Duration versus Historic Storm Events



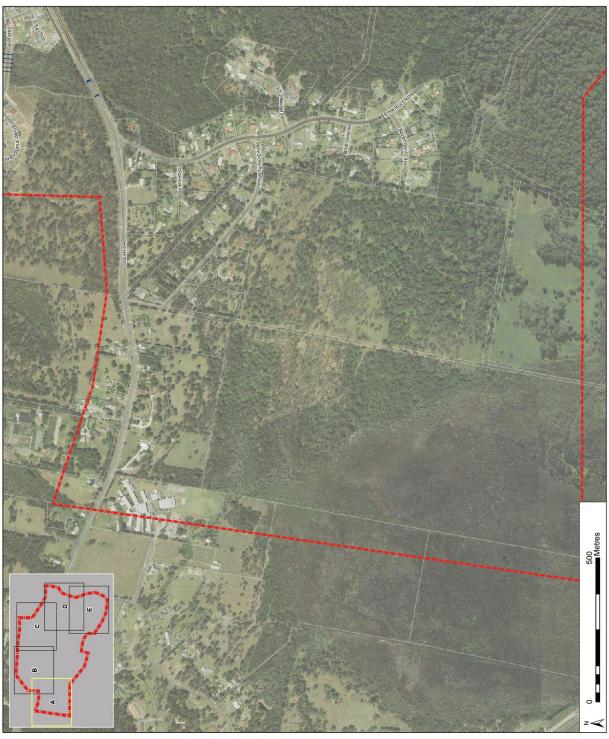


Appendix B. Summary of Topographic Survey

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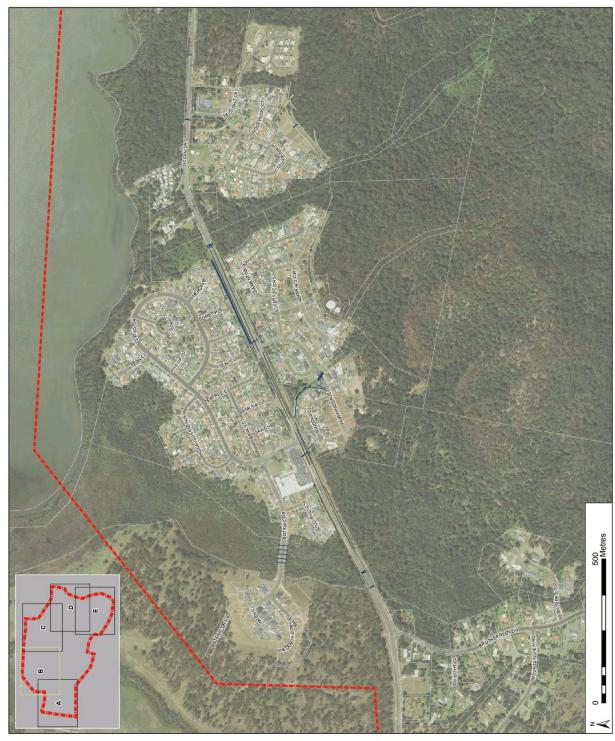




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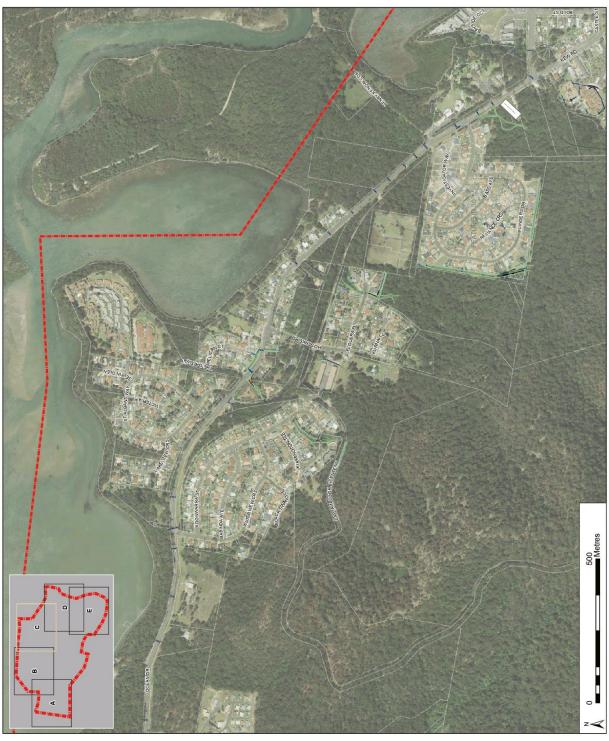




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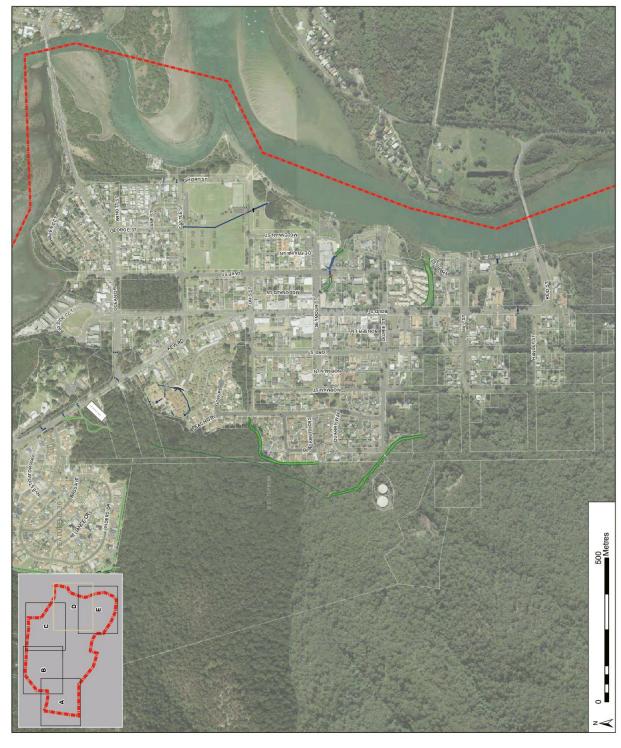




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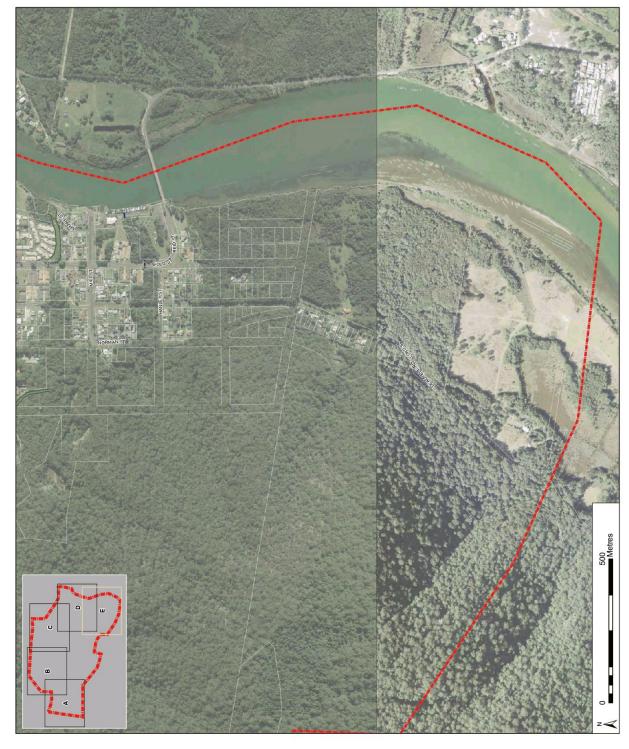




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Appendix C. Community Consultation



Community Bulletin No. 1 - October 2017

JACOBS

North Brother Local Catchments Flood Study

Port Macquarie Hastings Council is currently conducting the North Brother Local Catchments Flood Study. This Community Bulletin is the first in a series of Bulletins aimed at informing residents of the status of the project and how they can be involved in the process. Council has engaged consultants, Jacobs Group Australia, to undertake the Study.

The focus of the study is to understand the behaviour of local catchment flash flooding from North Brother Mountain and the flood risk that it poses to the community. This will assist Council to develop measures to manage the impact of flooding and guide strategic planning for future development of the area. It includes areas of the villages of Laurieton, West Haven, Lakewood, Kew and Deauville.

An integral part of the study process is community consultation and involvement. This element of the process aims to inform the community of the study and invite residents to provide information on their views and experiences with flooding in the area. The management of flood prone land is primarily the responsibility of Councils and follows a number of stages as shown below. The project is currently in the Flood Study stage, and will later move to the Floodplain Risk Management Study and Floodplain Risk Management Plan stages as the project progresses.

The Stages of Floodplain Risk Management



Objectives of the Study

The objectives of the study are to:

- Define the overland and flash flooding behaviour in the study area. Computer flood modelling will be undertaken to do this during the current flood study stage.
- 2. Identify and evaluate possible flood mitigation and management measures to reduce the flood risk. These may be structural and planning measures or "response" measures.
- 3. Develop a staged plan for implementing these measures.



Community Survey

We are seeking feedback from the community on previous flooding events in the area and views on possible management measures via the attached survey. The results of the survey will help inform a flood study for the area, which will be placed on public exhibition in early 2018, and a subsequent floodplain risk management study. The information that you provide will improve the flood model being developed.

PAGE 1



Study Area



The Flood Problem

The study area typically experiences short duration flooding, which occurs when intense rainfall exceeds the capacity of the stormwater network or creek channel. In urbanised areas, this flooding has the potential to cause major damage to property and risk to life. Notable local flash flooding in the study area recently occurred in:

- April 2008
- June 2011
- March 2013
- January 2016.

How can you get involved?

Engagement of the community in the floodplain risk management process is very important to Council. We will be providing a number of opportunities for the community to have input during the course of this study.

Some of the most important information for the study is collected from residents and local business operators. We would be very interested to receive records of flooding in your area including photographs, observations of flood depths or some comments on your experience. You can help us with this

Background to the study and context
 Bulletins to update community on the project progress

 An opportunity to tell us about flooding in your area (via the attached survey)

 Opportunity to find out more about flood studies for your area and provide some feedback

Council
 And how you can be involved.

information by completing the questionnaire for your area and returning the completed community survey by 31 October 2017. The questionnaires can be found in Council's web site www.haveyoursay.pmhc.nsw.gov.au/ Port Macquarie Hastings Council appreciates your cooperation and will keep you informed with ongoing community bulletins.

ommunit Forums

For more information contact Port Macquarie Hastings Council on (02) 6581 8111 or visit **haveyoursay.pmhc.nsw.gov.au**

PAGE 2



Summary of key survey questions and responses

* Note, not all responses have been included in this summary. Responses mentioning specific locations and addresses have been omitted for privacy reasons.

Do you live in the study area?

Res	sponse	Count	% of responses
No		15	5%
Yes	;	276	95%

Do you own or rent in the study area?

Response	Count	% of responses
Own and occupy	280	98%
Rent	6	2%

Do you own or manage a business in the study area?

Response	Count	% of responses
No	264	94%
Yes	17	6%

What kind of business?

Response	Count
Home based	6
1101110 100000	0
Shop/ commercial premises	0
Industrial	1
Other	3

Are you aware of flooding in the Study Area?

Response	Count	% of responses
Aware	136	48%
Some knowledge	77	27%
Not aware	71	25%

When have you experienced significant flooding in the area?

Response	Count	% of responses
Not affected	142	51%
Property Flooded	43	15%
Minor Disruption (roads flooded by driveable)	69	25%
House or business flooded	17	6%
Access cut off	9	3%

North Brother Local Catchments Flood Study



What damage resulted from this flood in your residence?

Response	Y - no rating	Minor	Moderate	Major	None or Not Aware
Damage to garden, lawns or backyard	32	28	6	3	39
Damage to external house walls	4	1	3	1	46
Damage to internal parts of house (floor, doors, walls etc)	8	6	1	4	46
Damage to possessions (fridge, television etc)	0	0	0	5	7
Damage to car				1	49
Damage to garage	11	10	3	0	46
Other	"Minor road damage" "Back sunroom was flooded" "Had to put a drain under the garden bed to the stormwater drain" "Dirt washed into pool"				
What was the cost of repairs, if any?	Covered by inst Up to \$1000: 7 \$1000 - \$5000: \$5000 - \$10000 \$10000 - \$2000 >\$20000: 2 (\$50	6 : 2 0: 3			

What damage resulted from this flood in your business?

Response	Y - no rating	Minor	Moderate	Major	None or Not Aware
Damage to					
surroundings	3	6	1	0	24
Damage to					
Building	3	2	0	0	25
Damage to Stock	2	1	1	0	24
Other	1	_	_	_	25



Please rank the following development types according to what you consider should be assigned greatest priority in protecting from flooding (1 = greatest priority). Please identify specific items if necessary.

				Count						%	% of Responses	ses		
Rating	-	2	ю	4	5	9	7	-	2	8	4	5	9	7
Commercial	12	-	71	62	8	က	138	4%	%0	24%	21%	3%	1%	47%
Heritage items	13	_	12	24	43	92	28	1%	1%	%9	12%	22%	39%	14%
Residential	86	22	71	30	7	2	0	42%	%6	30%	13%	2%	1%	%0
Community Facilities	22	13	48	62	48	26	2	10%	%9	22%	28%	22%	12%	1%
Critical utilities	69	94	40	19	8	3	0	76%	42%	18%	%6	4%	1%	%0
Emergency Facilities	110	62	24	15	80	က	2	49%	28%	11%	7%	4%	1%	1%
Recreation areas and facilities	5	2	4	5	12	46	138	2%	1%	2%	2%	%9	22%	%59

Please rank the following by placing numbers from 1 to 6 (1 = greatest priority to 6 = least priority)

	ပိ	Count					% of Responses	ponses		
1 2 3 4	4		2	9	_	2	3	4	5	9
135 30 21 19	19		27	12	92%	12%	%6	8%	11%	2%
24 60 24 31	31		33	63	10%	26%	10%	13%	14%	27%
55 43 73 32	32		29	7	23%	18%	31%	13%	12%	3%
16 28 26 34	34		43	88	7%	12%	11%	14%	18%	37%
27 44 48 63	63		36	16	12%	19%	21%	27%	15%	7%
59 28 29 46	46		42	34	25%	12%	12%	20%	18%	13%

North Brother Local Catchments Flood Study



Are you aware of any works that have been carried out near you that you believe have negatively impacted on the flood behaviour at your property? (Tick all boxes that apply)

Response	Count	% of responses
A) Not aware of any measures	215	70%
B) Building or renovation activities	14	5%
C) Fencing	5	2%
D) Creek works	14	5%
E) Upgraded roads, culverts	20	6%
F) Overland flow obstructions	22	7%
G) Other (please specify)	18	6%

Comment responses

Aged Council drain does not comply with current standards & industry specification. see Council minutes 20th March, 2013.

Uphill development

- Y- New bridge- sections impact on flow on Laurieton side.
- Y- Rear boundary neighbour has shadehouse against back fence. This has resulted in the way the water flows, it does not follow the land contour, it hits the shadehouse and all water from surrounding properties come onto our property.
- Y- We have a creek at the back of us which needs to be fixed every year this needs to be done last time they did it they enclosed the poor birds that live in the walls of the creek.
- We don't have enough drainage in the street of Honeysuckle.

Footpath has been raised in front of our house for the sake of the units built next door, the footpath has been partly done but still not finished and we are still getting water. Also our neighbours right through their ground floor Council was going to extend the footpath and raise the level up to the same as the units.

- Y stormwater getting into sewage pipes and overflowing sewerage problem is very bad in our Lakewood area.
- Y Laurieton reservoirs/stormwater drain see atachments
- Y nature strip falling toward smy house and not away to the main road

erosion out front increasing in stormwater water drainage re rain driveway access affected from north brother runoff and subdivision runoff

- Y new developments have increased storm water runoff with NO increase in storm pipes lower in the system
- Y land use planning

Silting of Camden Haven River heads/bar

Stormwater drainage on eastern side of Quarry Way inadequate

Easement drains under property now out of alignment

Refer to my letter, apply better cleaning of drainage under Kew Road to allow flow to the lake

Road drainage and easements directed onto our property.



Are you aware of any works that have been carried out near you that you believe have improved the flood behaviour at your property? (Tick all boxes that apply)

Response	Count	% of responses
A) Not aware of any measures	205	68%
B) Building or renovation activities	8	3%
C) Fencing	3	1%
D) Creek works	19	6%
E) Upgraded roads, culverts	39	13%
F) Overland flow obstructions	12	4%
G) Other (please specify)	15	5%

Comment responses

Council has made efforts to improve situation but so with no success.
New stormwater drain.
The creek to creek walkway has improved our access out of town
None, no work done
Water diversion swale on crown land
Y - concrete drain installed behind our property (but it is inadequate to cope with volumes of water in heavy rain)
Y - culverts in reserve, no footpath provided for elderly
Council drainage is the only time I have concern for flooding
Y - reservoirs/stormwater drain. Lack of maintenance has caused serious concerns of flooding
River walls to improve depth of river bar
Y - foot paths
Y - nearby creek cleared of plant debris and plastic bottles etc.
Cleaning of existing storm drains
Very little of any

JACO

Draft Flood Study Report

Which of the following measures do you think Council should consider for reducing the floodrisk at your property? (1 = greatest priority to 7 = least priority).

			Count				%	% of Responses	ses	
Rating	1	2	3	4	5	1	2	3	4	2
A) Zoning, building & development controls, including fencing	38	46	51	23	8	24%	29%	32%	14%	2%
B) Upgrading stormwater drainage	167	33	10	0	0	80%	16%	2%	%0	%0
C) Upgrading roads	29	99	53	22	3	17%	38%	31%	13%	2%
D) Public awareness & education	13	18	36	85	7	8%	11%	23%	53%	4%
E) Other (please specify)	0	0	0	4	39	%0	%0	%0	%6	91%

Comment responses

Publish max flood line not just the 100 year flood line on maps on NSW Planning Portal.

How about a levee if there is a perceived problem

Walkway to main road for elderly who can't drive and rely on walking and mobility scooter to town along the lake and public access to main road.

MAINTAIN DRAINS, EASEMENT

Planting trees on the streetside providing more parklands.

KEEP STORM DRAINS CLEAR BY REGULAR INSPECTIONS & CLEARING IF NECESSARY

Fixing the creek so the water will flow out to the lake

Keep culverts clear of vegetation and rubbish on southern side of Ocean Drive opposite the Gateway Road

Installing kerb and gutter to our street.

Clean out drains and creeks

New kerb and gutter on low side of roads.

Trees in drain behind xx, xx and xx Koonwarra Street at bend of drain blocks up. I have to keep cleaning it out, Council won't.



House's have bene built about 60 years but no kerb and gutter. Would be good to have to get rid of the water instead of having stagnant water and lots of mosquitoes The open drain on Lord Street Laurieton, between Laurie Street and Seymour Street should be replaced with pipes. Lift/build up the verge outside my house to the equivalent height to recent building adjacent to my property Cleaning gutters and weed growth at joints and any other blockages on a regular basis Carry out drainage maintenance work as per letter dated 13/6/13 - see attached Putting kerb and guttering from Ocean Drive into Lake Street and Castle Street. Better drainage of water coming off the mountain. Something to slow the flow. Inappropriate building on wetlands or flood prone areas don't believe my property is under threat of flooding Actually putting in place stormwater drainage Dredging the river beds Not a risk



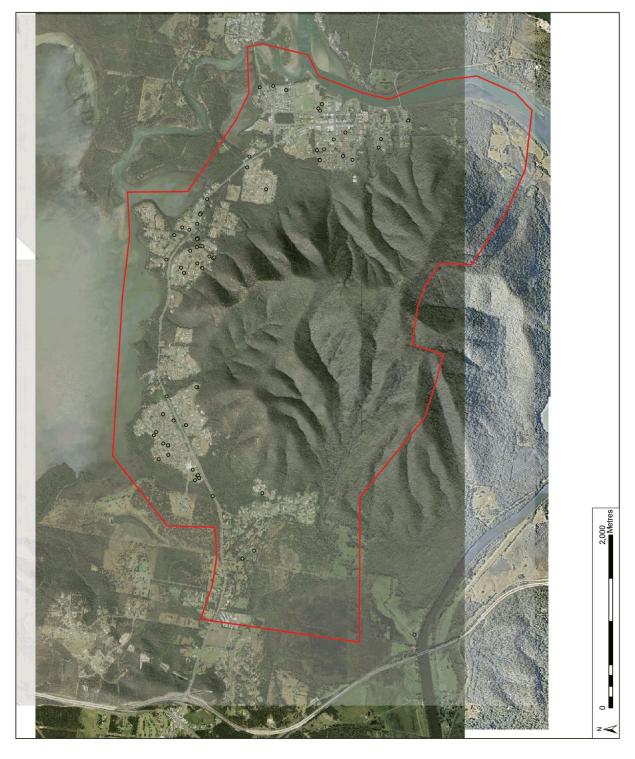
Appendix D. Verification of Model Flood Behaviour

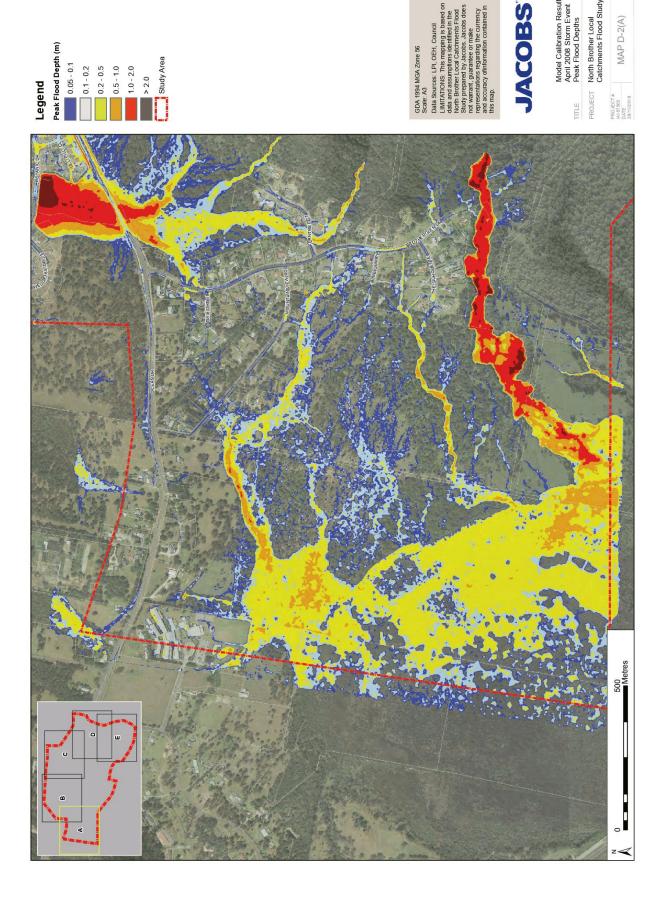
Legend

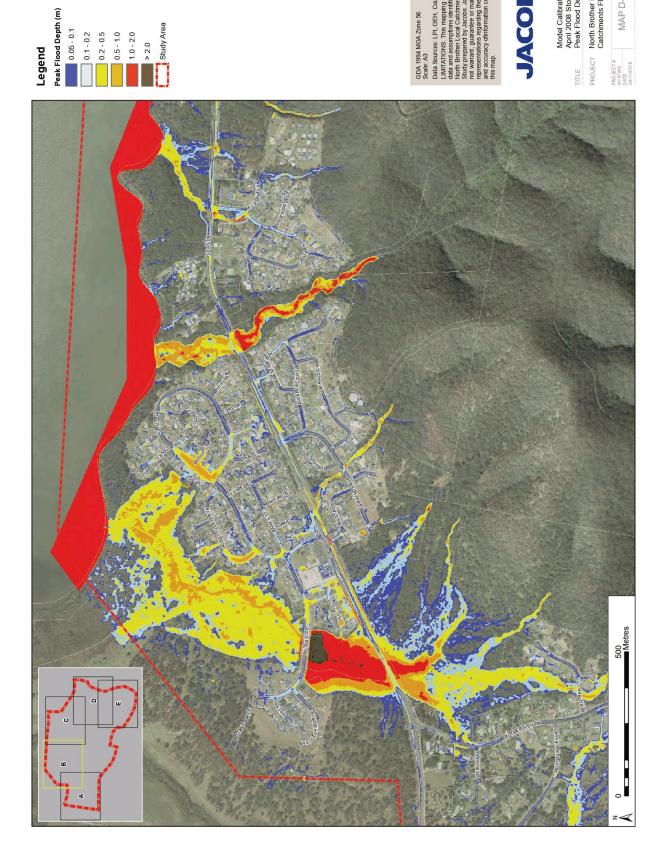
Model Calibration & Verification Points

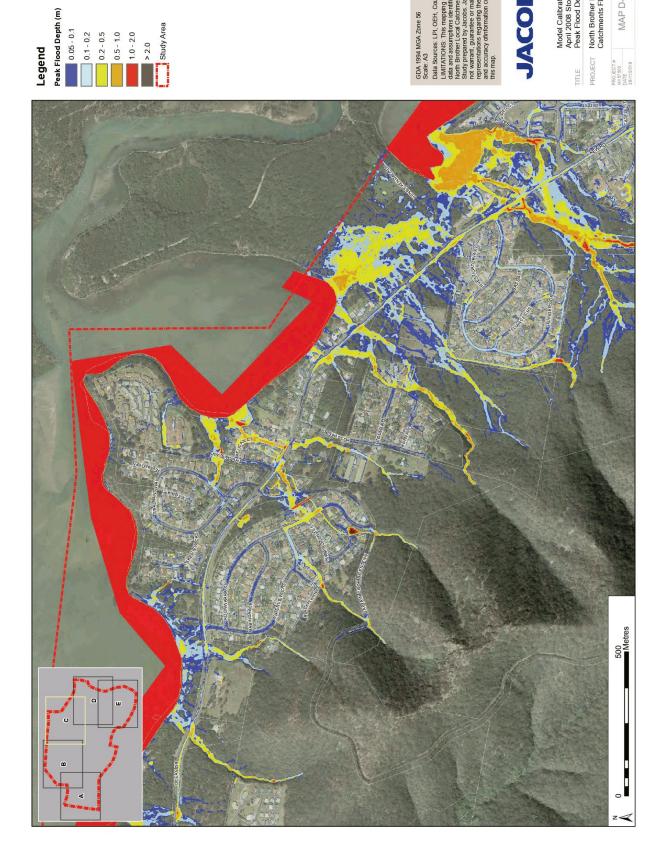
Study Area

Seach 1984 MGAZone 56
Seach 1984 MGAZone 56
Seach 1984 MGAZone 56
Seach 1985 MGAZONE LPI, OEH, Council
LIMITATIONS This mapping is based on address of the seach of the seach



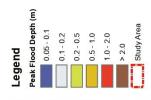


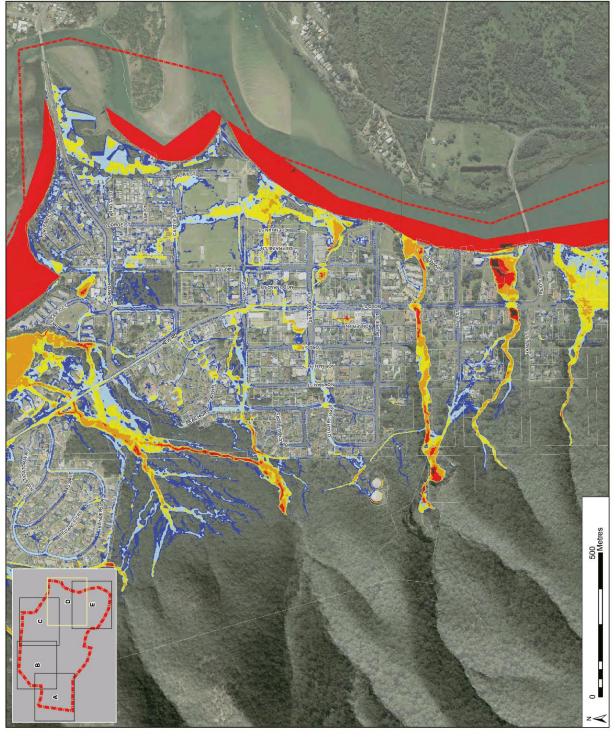




CDA 1994 MCA Zone 56
Data Sources: LPI, OEH, Council
LIMITATIONS: This rapping is based on
data and assumptions iteritied in the
North Borber Local Catchments Flood
data and assumptions iteritied in the
North Borber Local Catchments Flood
Study prepared by Jacobs. Jacobs does
not warrant, guarantee or make
representations regarding the currency
and accuracy ofinformation contained in
this map.

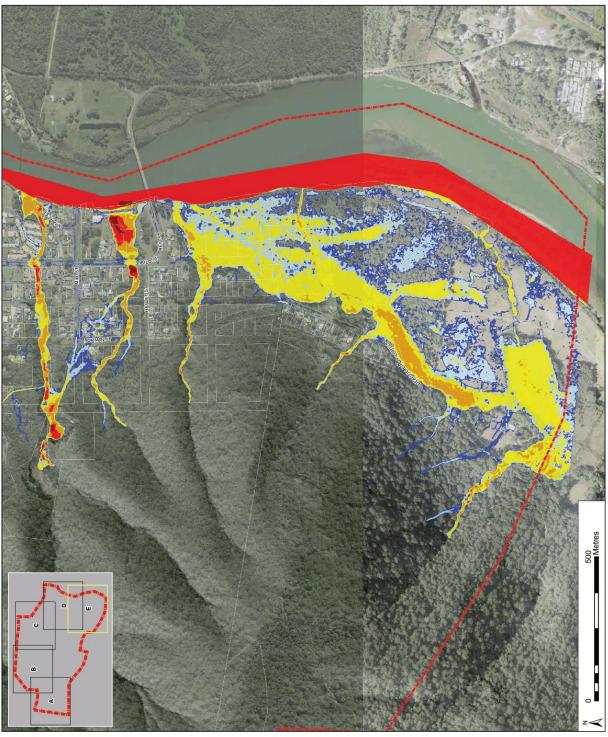
Model Calibration Result
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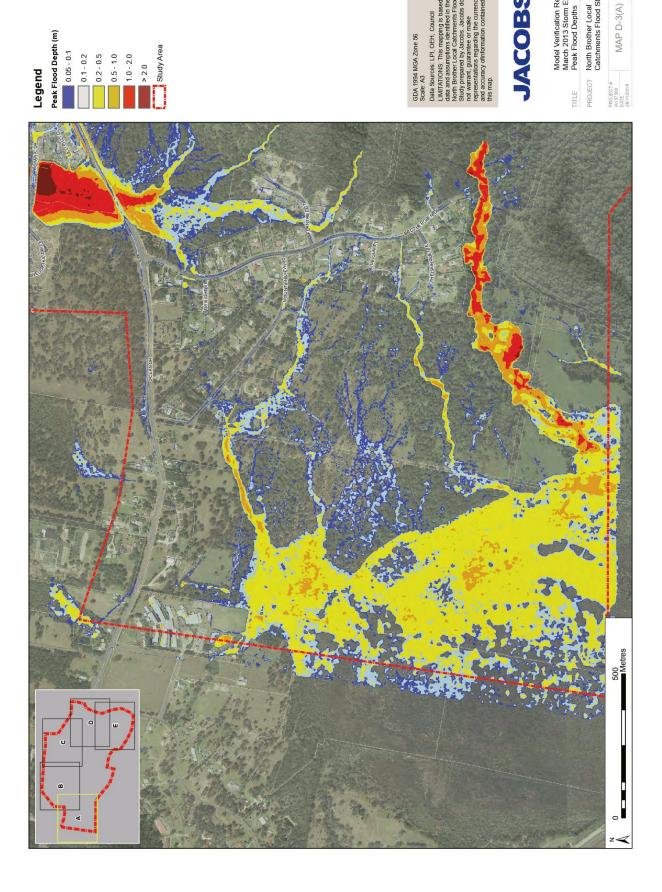




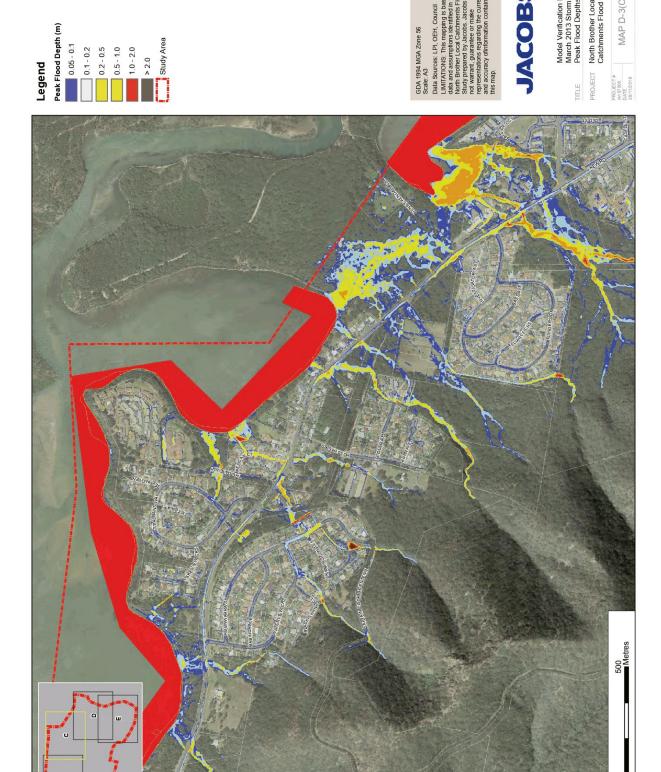
Legend
Peak Flood Depth (m)



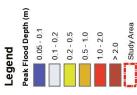


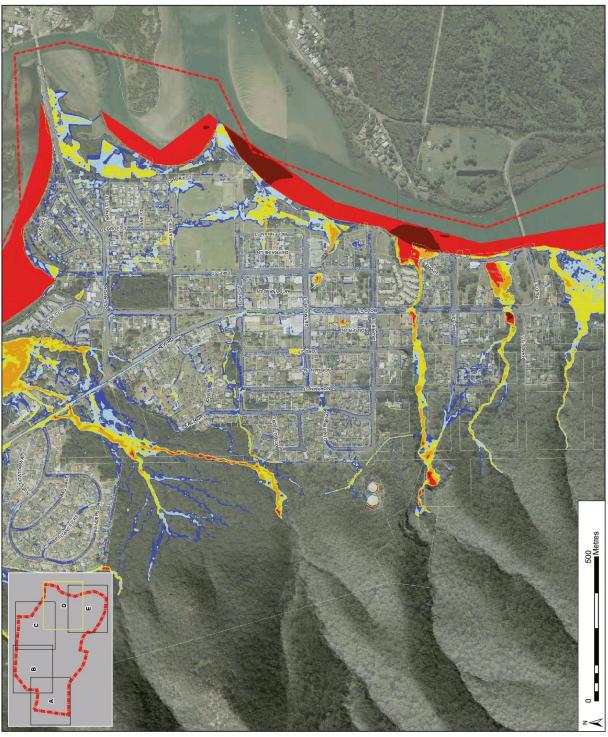




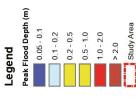












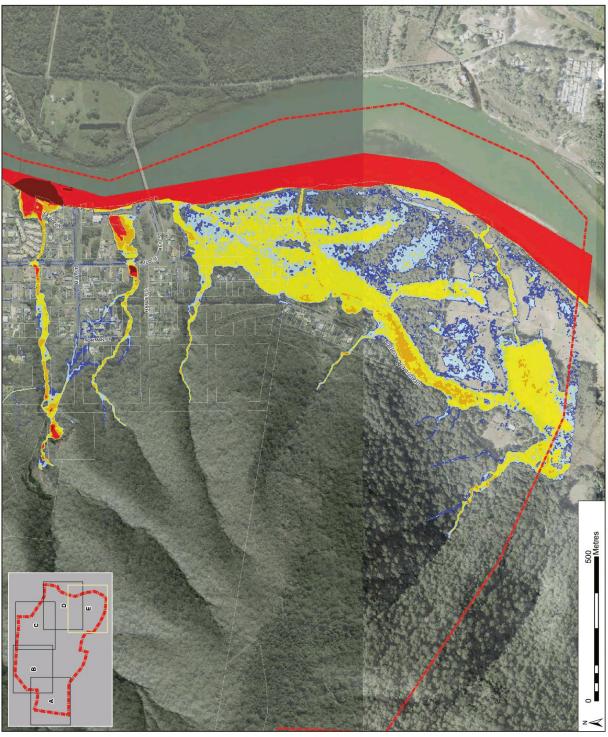




Table D-1 Verification of Model to Flooding Reports and Observations

Note - Addresses of properties with flooding generally have been suppressed in case of community sensitivity to such information being released.

Q	Event date/s	Description of Previous Flooding	Modelled Flood Behaviour
2	2004, 2008, 2011, 2013, 2015, 2016	Depths about 2/3 metre with exceedingly strong flow. Duration from 2 to 5 hours approx. depending on strength of storm. Locations from blocked drain - around and under house with sandbags keeping water out. Flooding around and in house on at least 3 occasions with major water damage	OK, 0.55m in 2008 simulation
n	2015?	"Moderate" damage to garage, garden/yard, photos show large flow of water through garage and trying to exit via closed roller door. Door panel is bowing due to force of water. Approx. 1-2 brick courses deep at front/leeward side of house/garage	Model shows flows 0.2m deep at west side of house
4	No flood event specified	Some flood dates: 5/11/2010, 13/6/2011, 8/10/2011, 28/1/2013.Had to sandbag near garage door. Photo of 8/10/2011 shows shallow ponding, to say 50mm deep in backyard.	Model results show 0.05 - 0.12m ponding in backyard
5	No flood event specified	Property reported as flood affected	Affected by overflows from fire trail. Shallow depths
6	No flood event specified	Have installed extra drainage and downpipes and regraded concrete driveway to try to improve drainage but has not been enough.	Overflows from grassed swale in street into driveway and property
10	No flood event specified	Shallow sheet flow on front lawn. Retaining wall collapse	Model shows shallow flows on lawn. Retaining wall collapse appears to be due to slumping of saturated soil.
18	2002, 2004, 2013	Photos March 2013, 2002 and 2004 of flow through yard and down dinveway of neighbouring property then down road. 100-200mm deep at hills hoist in 2004 flood. Approx. 500mm deep against fence in 2004 flood. Timber paling fence panels washed out. 100 - 200mm diameter rock rubble deposited in yard.	160mm at hills hoist, 400mm at fence in 2008 simulation. Flood pattems similar to 2013 simulation. Photos including depths and flows from front of property around side of house to back, also swift flows in next door driveway
23	5/2/2002, 11/2004, 2011, 2013	There is a creek/waterhole at the back fence and in June our yard went under as this broke its banks and flowed across the property to the drain which was in when I bought the place in 2013.	Flow breaks out of flow path and moves overland across property
26	No flood event specified	Carpets replaced in 2000 due to flooding, no flooding reported for other years.	Model shows flood depth of 0.2m at the front of the house in 2008 simulation. OK, probably not high enough to get into house.
34	Mar 2013, June 2017	NONE- PARKED CAR MOVED WITH WATER ON ROAD-MARCH 2013	Significant depths in 2008 simulation
38	March 2013	back patio approx. 50mm depth, sandbagged to prevent ingress to house. Backyard to 100mm approx.	Modelled depth of flooding 50 - 100mm in backyard and patio



42	2001 (not consistent with BOM daily), 30/11/2011	2001-313mm in one hour. End house (No 8) had water right through- ruined floor coverings, about 0.5m to 0.6m of water over the street, and Honeysuckle Ave as well. 30/10/2011- Huge storm- hail and rain	0.5 - 0.6m in street in 2008 simulation, reasonable match
09	2015	There was also 2 black plastic grated pits that also could not cope with this deluge resulting in water 4 - 6 inches deep running over pebblecrete and concrete. Internal damage. The water entered through weep holes in lounge room only.	Report appears mostly property drainage related. Some localised ponding around dwelling
61	2-3/3/2013	water rushing through and down properties next door and down the street flooding, the water was coming down from across Ocean Drive into the back of said properties. Houses down the street were being	Depths 0.2 - 0.4m in the area
65	No flood event specified	Reports of significant surcharge from stormwater pit	Model shows surcharge flows of 0.9m³/s
89	2013?	Road was flooded approx. 6 years ago due to very heavy rain and blocked storm drains.	Flooding 0.3 - 0.5m deep in 2013 event
79	June 2008	The water from no. 7 unit 2, then streamed down in front of unit 2 and into no. 6, which together with the water from no. 1 flooded unit 2. (SES attended, leaving sandbags). Resulting in resident in 2.06 getting out of bed into 10cm of water. Carpet was replaced throughout and some lounge furniture was ruined.	Model shows overflow from drain and flooding around Unit 2 to depths of 0.3m and adjacent properties but no overflows through no 7 (or 5). Possibly improvements made to drain in recent years
98	No flood event specified	Flows emerge into yard via piping in subsoil from drain uphill of property	TUFLOW model does not simulate subsoil flows but shows surface flows overflowing from drain
87	5/02/2002	There has only been one occasion that water has gone through my yard, that was due to a coud burst that produced around 10 inches in a short amount of time. The gully above me could not cope with this downfall. Not sure of the year, think it was either 2002 or 2003. Date of downpour 5th Feb 2002- record from local historians.	Minimal overflow in 2008 sim. Observation was 2002. Condition of gully may have changed over time
88	No flood event specified	Overflowing drainage at Ocean Drive past Christmas Cove Caravan park and before Fairwinds on Southside of road. Threatening water just east of Brother Glen Road on south side of road. See markings on map I have made to indicate where flooding has occurred.	Significant flooding over Ocean Drive west of Lake
06	2001	The February 2001 event was the worst one we have had with the stormwaler rushing down the Pelican Court extension road halfway up my thighs, about 2'6" deep.	0.6m in walkway. unsure if current drainage <mark>was th</mark> e issue
93	03/2013, 3/2014	Both March 2013 and 2014 the reserve was flooded behind us, see photos.	Model shows similar flood behaviour.
95	15/03/2017	No problems observed in 6 years of residing at this address.	No flooding - ok



Whole property flooded including depths of up to 0.3m around the dwelling in 2008, $0.2\ \mathrm{in}\ 2013.$ Ok Model shows overflows from Peach Grove and through adjacent property with depths over 200mm in 2008 Model indicates flood flows from fire trail and adjacent areas 3cumecs in 2008 TUFLOW model does not simulate subsoil flows but shows surface flows overflowing from drain Significant flooding in Bold St and at Seymour/Lord St in 2008 simulation Flood depths to 1m in road sag nearby. Minor ponding at subject house. Not on flow path. Model shows ponding to 0.2m on high side of house Not on flow path. Minor ponding of local runoff on uphill side of house Not on flow path. Minor ponding of local runoff on uphill side of house Model shows flooding into backyard and also overflows from street, Significant depths of flow against fence likely to result in damage Model shows ponding and overflows from roadside drain Model replicates observed flood behaviour Model shows flooding of property 1m in road in 2008 sim Map indicates flooding around Quarry and Mill Street area House #1 has had water lapping their premises and I have seen photo's of #3 flooded. The last flood we had seen the water lapping the fence lines and flooding the Haven Caravan Park. Everyone moved their cars in our drive. We need something done with the open gully running down the Street to the river. As we live on the corner of Laurie Street and Quarry Way we only suffered surface water on the lawn. however, units on the corner of Lord Street and Seymour Street had a brick fence washed away, the Hotel bottle shop, as well as the shops in the arcade were flooded and Bold Street was underwater. Flooded several times in the past. Washed away reconstructed bitumen driveway next door. In 16 years of living in the said address I have experienced flooding of the road on 2 occasions. Water to the base of my dwelling to a depth of 1m on the road. In the past damage has occurred to the cyclone mesh fence parallel to the gateway Rd in the vicinity top side of land adjoining house about 15cm Garage floods every time there is heavy rain- suspected underground watercourse When heavy rain is falling consistently, our courtyard floods from the house behind our villa April 2000. Approx. 1/2 metre deep in roadway. Did not get into our house but came close The block where the units are was taking all the water into its yard, is coming our way more than ever. Property reported as flood affected. No specific observation given. Trees and debris in drain behind house contribute to flooding into Marked as property flooded but no specific report Marked as property flooded but no specific report Property Almost flooded -deep in water backyard No flood event specified April 2000 100 102 114 124 129 132 142 157 159 167 170 176 183 187 199



202	No flood event specified	Overflows from laneway resulting in damage and damp in the house	Not adjacent to a flow path or significant drain. May be local or road runoff directed to the path a
205	March 2016	March 2016 the street outside my property was under approx. 500mm water. The easement down the side was a river. This occurred about 2 am. By 9am the water had subsided. Following the drain being cleared of debris the drain has been flowing OK since then however the event happened again around the same time this year.	0.5-0.6m in street 2008, significant flow in easement, ok
209	No flood event specified	Creek through property between villas breaks banks and floods through properties, debris blockages of channel.	Model replicates flooding of property in each calibration event
215	No flood event specified	Property reported as flood affected.	Flooding of property and road
		The fire trail behind this property was flooded twice after two separate rain storms when 250mm of rain fell about 2011 and 2013.	
218	2011 2013	The fire trail was overgrown with vegetation and tree branches which resulted in water about 100mm deep running over the bank and into adjacent properties. This runoff ran under the homes and into the garages, the water in the side of my house banked up and ran into the weep holes in the brickwork.	Flows down side of house. Shallow to 0.1m, some localised higher depths
219	No flood event specified	Stormwater drain on Peach Grove (located on the kerb closest to the reserve and opposite the intersection often floods in heavy rain	Sag is flooded to depths of 0.3m in the 2008 simulation
222	No flood event specified	Stormwater overflows from road	Model reflects observations
228	No flood event specified	Nuisance flooding apart from river flooding	Shallow ponding and model matches observations
232	No flood event specified	Flooding damage required repairs by insurer	Model shows flooding at rear of house to 0.3m
252	No flood event specified	Photos will show as the watercourse is not sufficient to handle the amount of water and bursts its banks and floods several properties	Model replicates this flood behaviour in 2008 and 2013 simulations.
256	No flood event specified	Property flood affected - minor	Shallow ponding in backyard 0.05 - 0.1m
262	No flood event specified	The corner intersection of Tunis Street and Lake Street always has problems with flooding.	Widespread shallow flooding at intersection of Lake St and Tunis St and flooding of adjacent property
280	No flood event specified	Creek through property between villas breaks banks and floods through properties	Model replicates flooding of property in each calibration event
285	No flood event specified	Property flooded	Significant flooding of property
1001	March 2013 daytime	Swift flows in walkways between buildings. Approx. 300mm deep, >1m/s down walkway	Flow depths 0.3m and velocities 1.5-2m/s in 2013 simulation

Flinders Drive Laurieton	No flood event specified	Previous work done with drainage and regrading verge. Flooding Feb 2008 into garage and nearly front door. Concern that runoff from next door new development is being directed to subject property.	Overflows from road and ponding in driveway and front yard to 0.3-0.4m. in April 2008 simulation.
Lake Street Laurieton	No flood event specified	Water covering Lake Street, Ocean Drive. 50-100mm in car port of property. Five properties in Lake St and Laurieton Gardens Caravan Park also Ocean Dr affected. Photos provided.	100mm flood depths in the driveway of property and car port
Lake Street Laurieton	No flood event specified	Property has flooded 4 times since 2010. Not until units next door were built 2 properties up the street.	Model replicates observed flood behaviour
Flinders Drive Laurieton	2008	Photos attached. Significant flows in rear swale and through fences into property, rubble deposited	Model results of flow depths up to 0.3 – 0.5m with flow patterns (flows through fence) match the April 2008 photos.
Quarry Way Laurieton	2013	Heavily overgrown, many trees down in drain. Reported up to 1m depths in March 2013 on adjacent properties. Sections very porous with springs popping up	Flows in drain immediately behind properties to 0.2m in the March 2013 event, maximum depths of 0.7m on properties.
Castle Street Laurieton	No flood event specified	Excessive stormwater onto property, lapping at back steps and under house	Flood depths $0.2-0.3 \mathrm{m}$ on low side of house. Reasonable match to observation.
Dalton photo 2008_010 to 014, 049	2008	Flows in swales draining to Pelican Court appear to be 0.3 – 0.5m deep but after peak of storm	Model shows depths of 0.7 – 1.2m at peak of stom.
Dalton photo 2008_015	2008	Photo shows flooding over road verge to property fence line, depths of 0.1-0.2m against brick wall	Model shows depths to 0.1m and similar extent
Dalton photo 2008_019	2008	Photo shows large quantity of rubble and gravel deposited on driveway from adjacent creek	Good match by model to observed flood behaviour with depths 0.3-0.4m in peak
Dalton photo 2008_016	2008	Photo shows S/W side of Ocean Drive east of Flinders Drive flooded, flows just overtopping crown of road, after peak of storm	Peak depths overtopping crown are 0.15m in 2008 simulation
Dalton photo 2008_024	2008	Flooding of Flinders Drive/Ocean Drive intersection to estimated 0.2-0.3m after peak of storm	Peak depths overtopping crown are 0.3-0.4m in 2008 simulation
Dalton photo 2008_047	2008	Rosewood Court at Mission Terrace, flows in road up to approx. 0.2m	Peak depths in intersection 0.3-0.4m in 2008 simulation

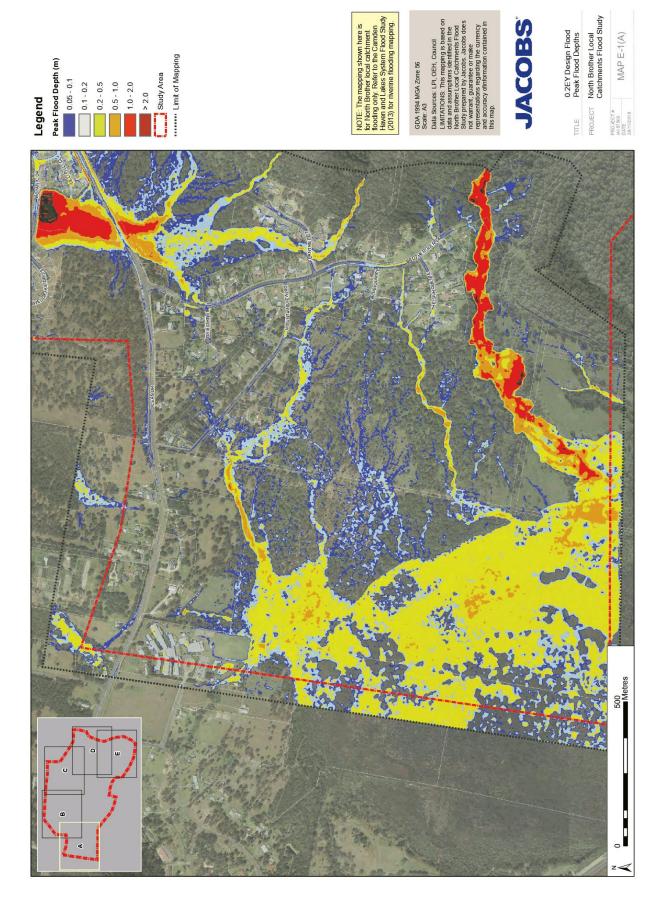


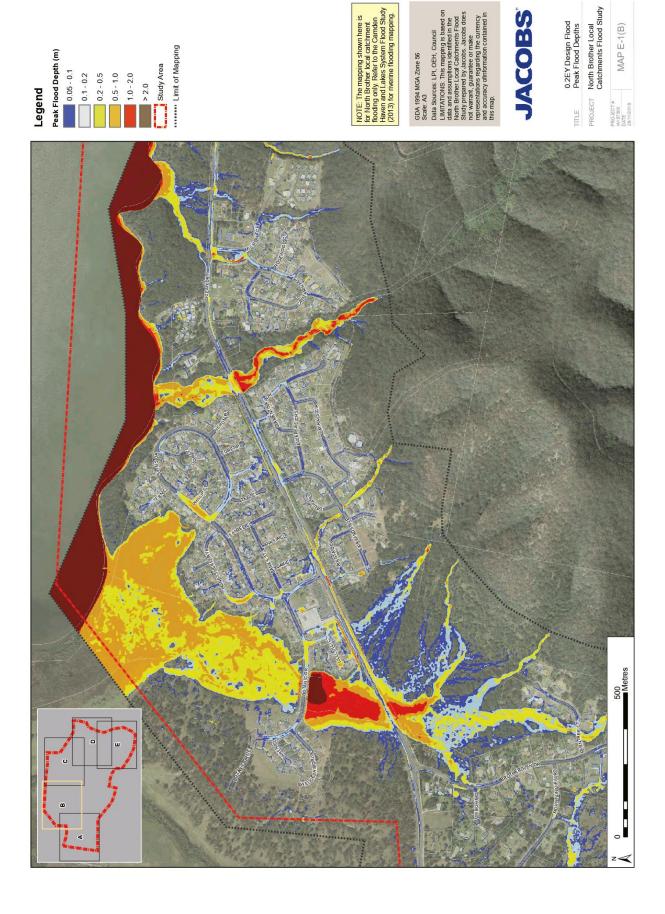
Appendix E. Design Flood Mapping

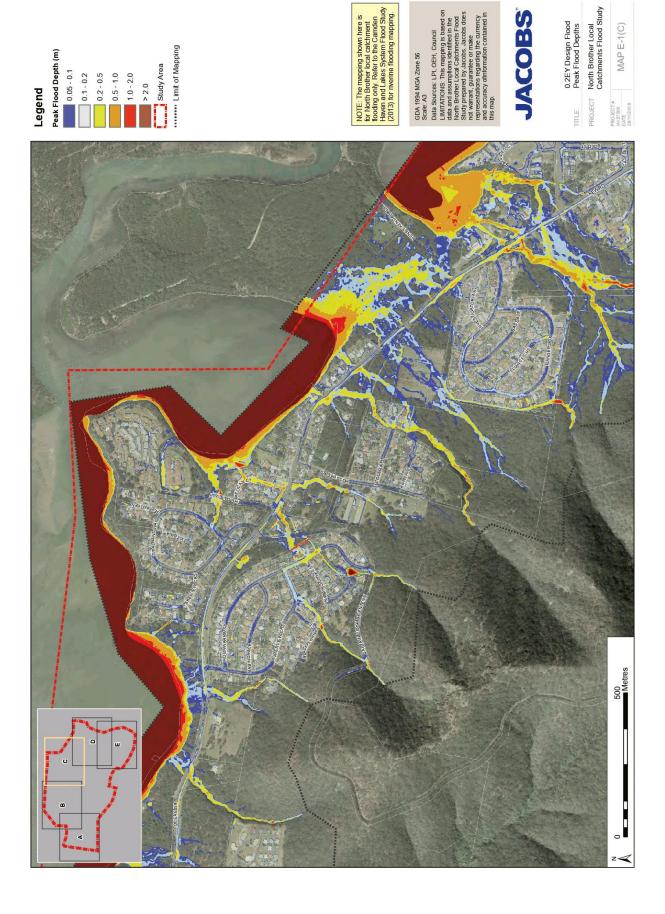
- Figure E-1 0.2EY Design Flood Peak Flood Depths
- Figure E-2 5% AEP Design Flood Peak Flood Depths
- Figure E-3 2% AEP Design Flood Peak Flood Depths
- Figure E-4 1% AEP Design Flood Peak Flood Depths
- Figure E-5 0.5% AEP Design Flood Peak Flood Depths
- Figure E-6 Probable Maximum Flood Peak Flood Depths
- Figure E-7 1% AEP Design Flood Climate Change Scenario Peak Flood Depths
- Figure E-8 0.2EY Design Flood Peak Flow Velocity
- Figure E-9 5% AEP Design Flood Peak Flow Velocity
- Figure E-10 2% AEP Design Flood Peak Flow Velocity
- Figure E-11 1% AEP Design Flood Peak Flow Velocity
- Figure E-12 0.5% AEP Design Flood Peak Flow Velocity
- Figure E-13 Probable Maximum Flood Peak Flow Velocity
- Figure E-14 1% AEP Design Flood Climate Change Scenario Peak Flow Velocity
- Figure E-15 1% AEP Design Flood Climate Change Impact : Change in Flood Level

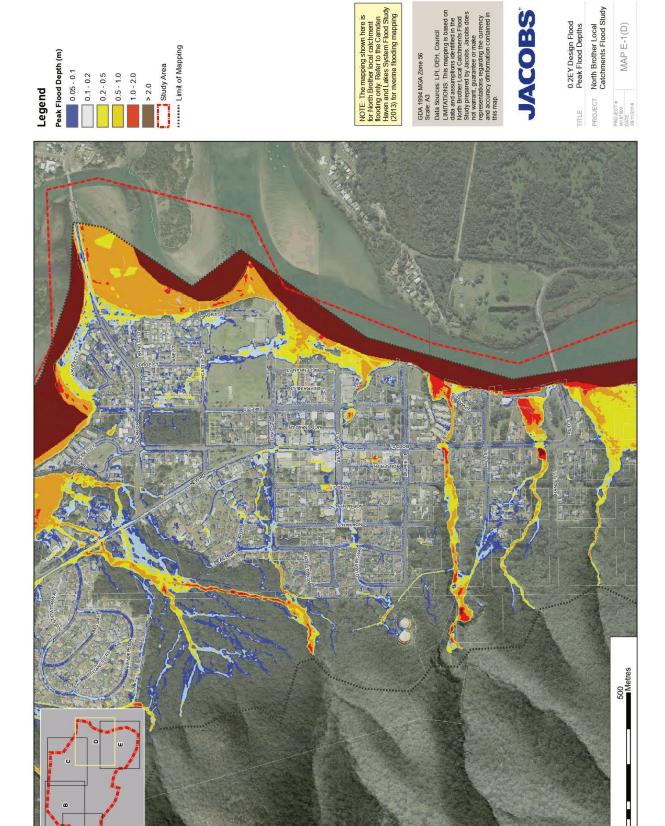


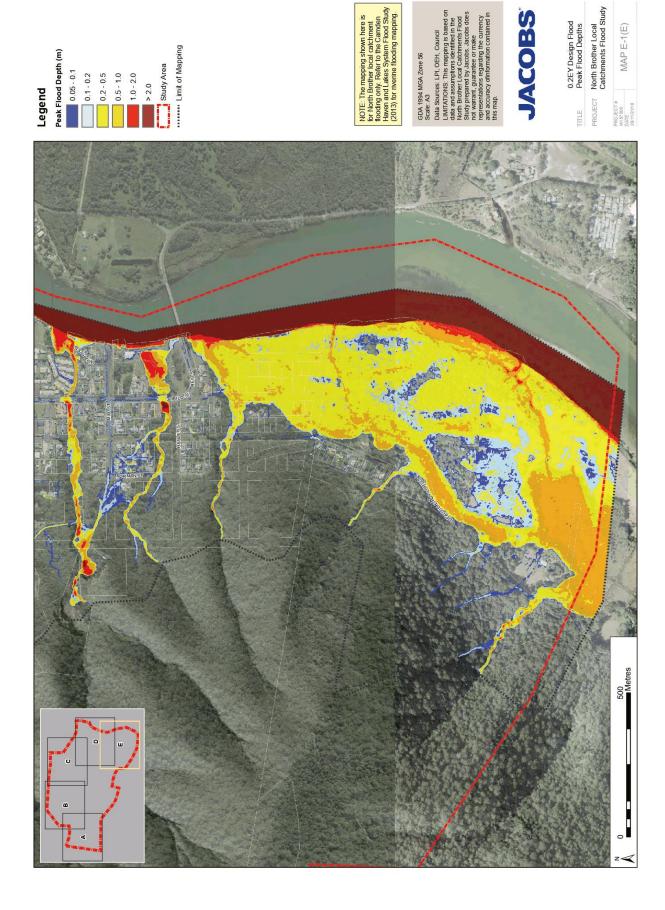
Insert flood mapping

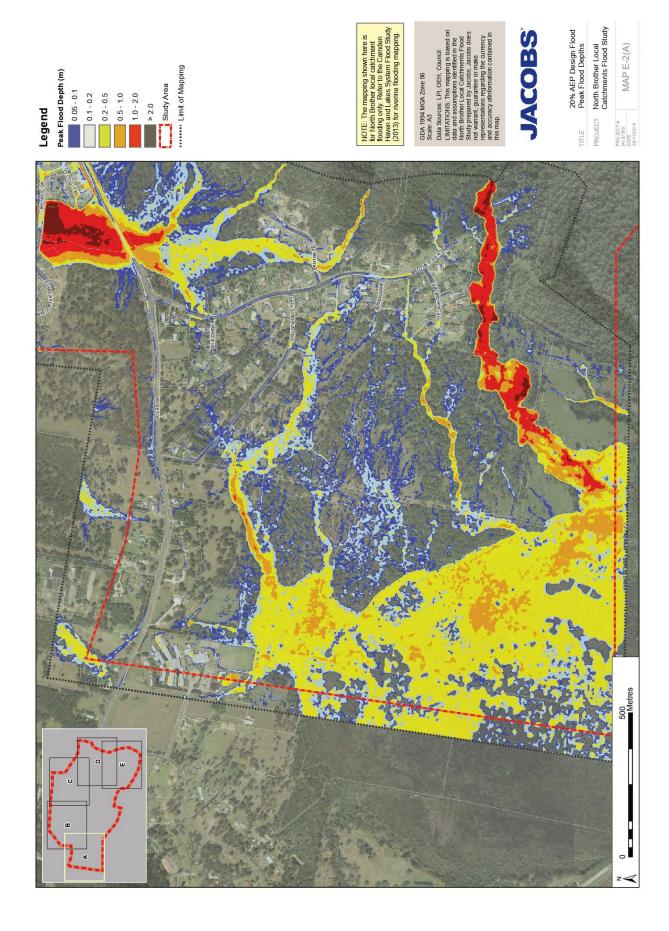


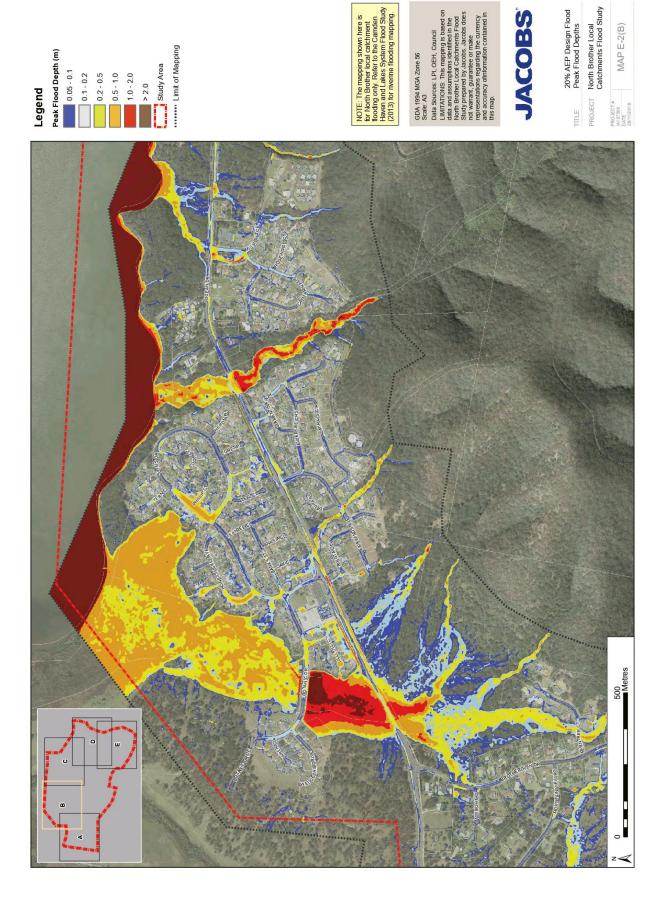


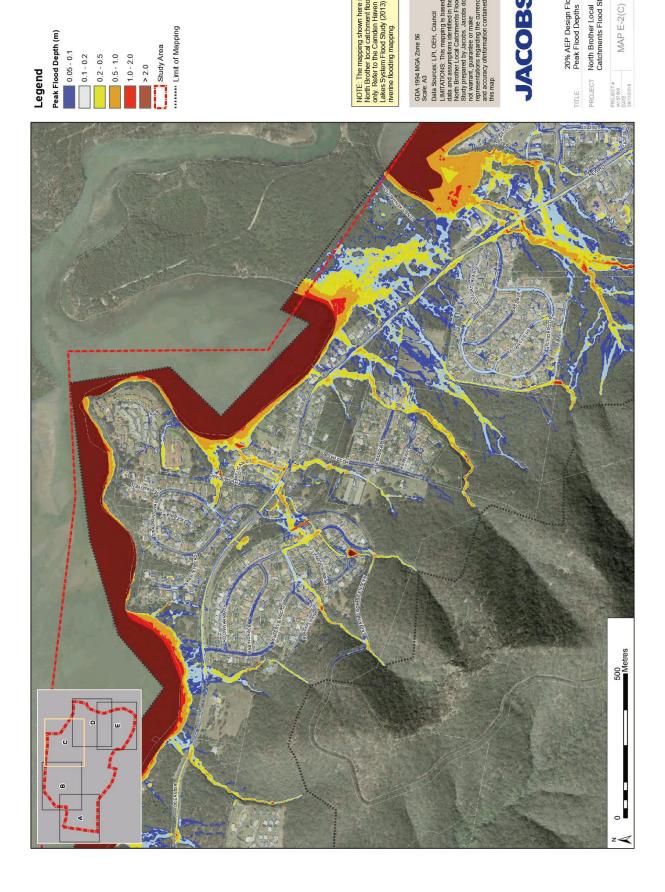


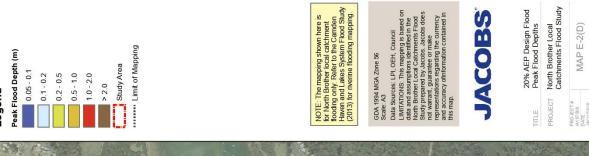


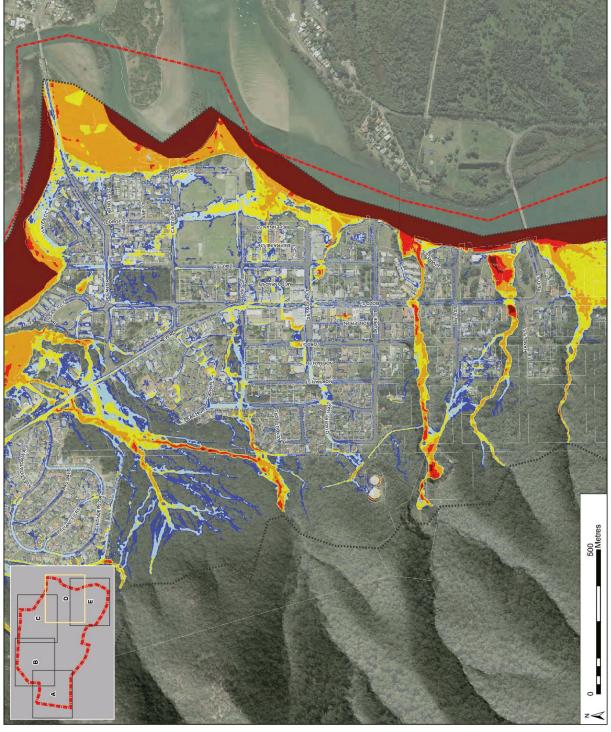


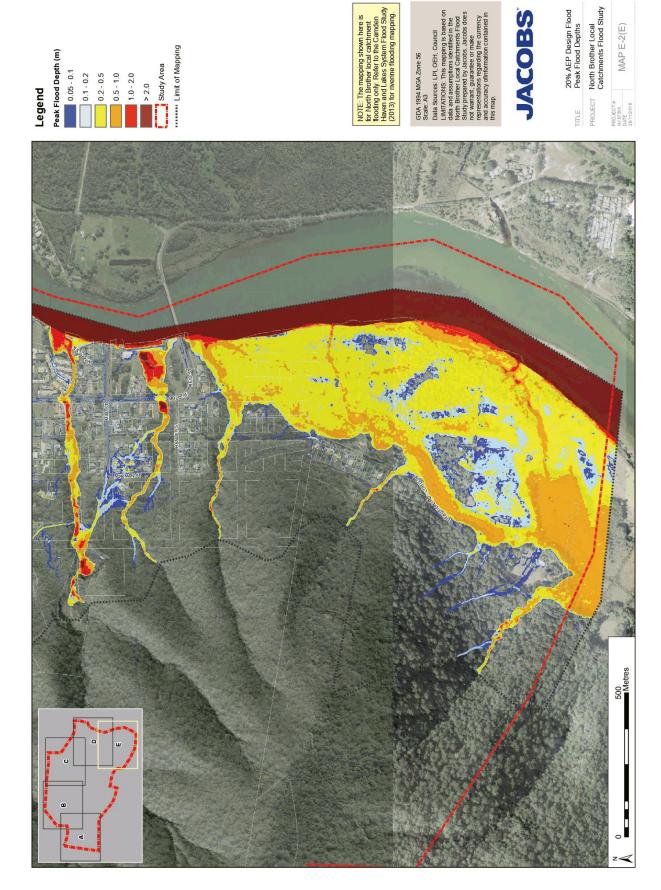


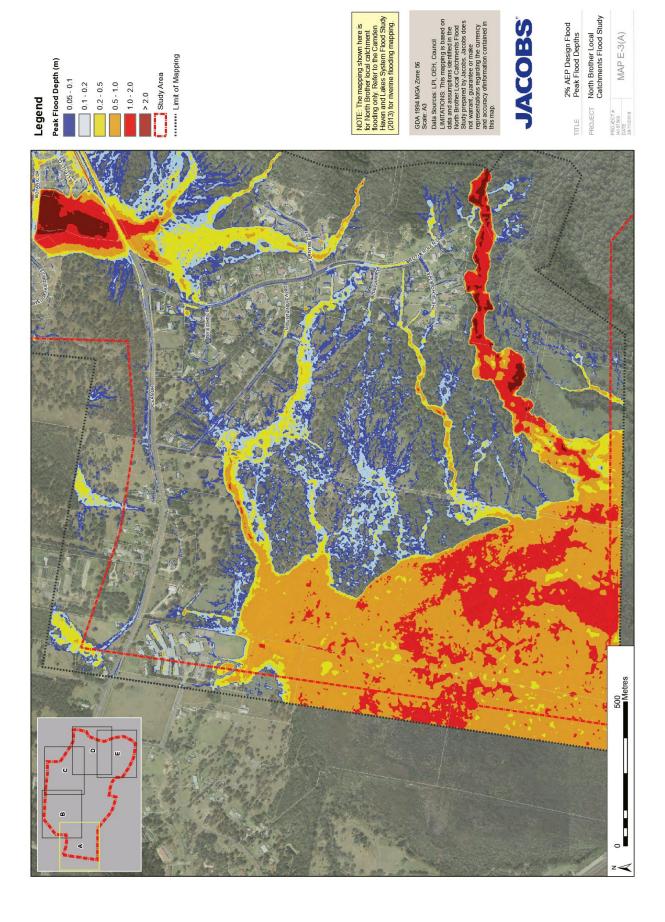


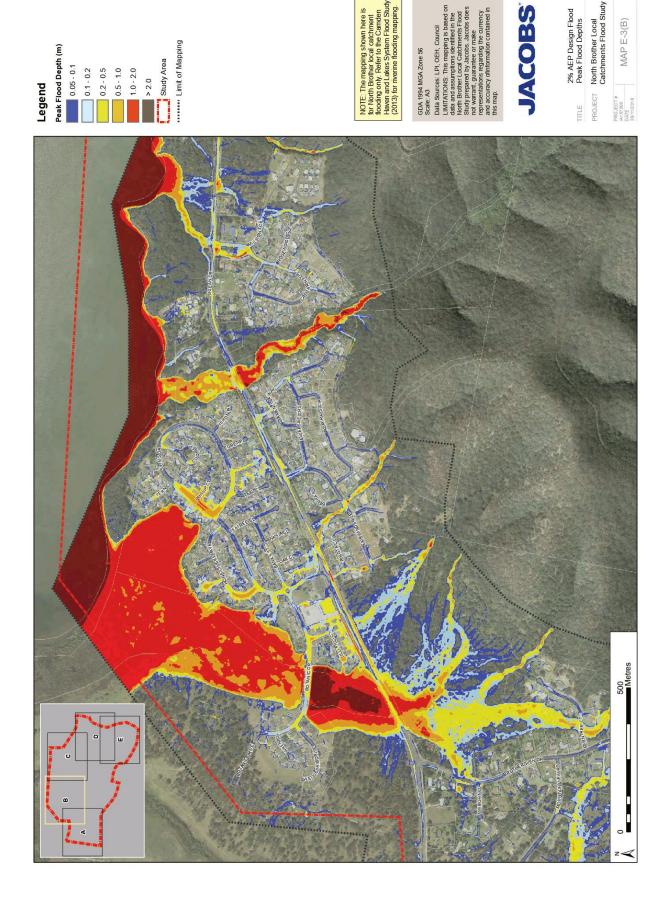


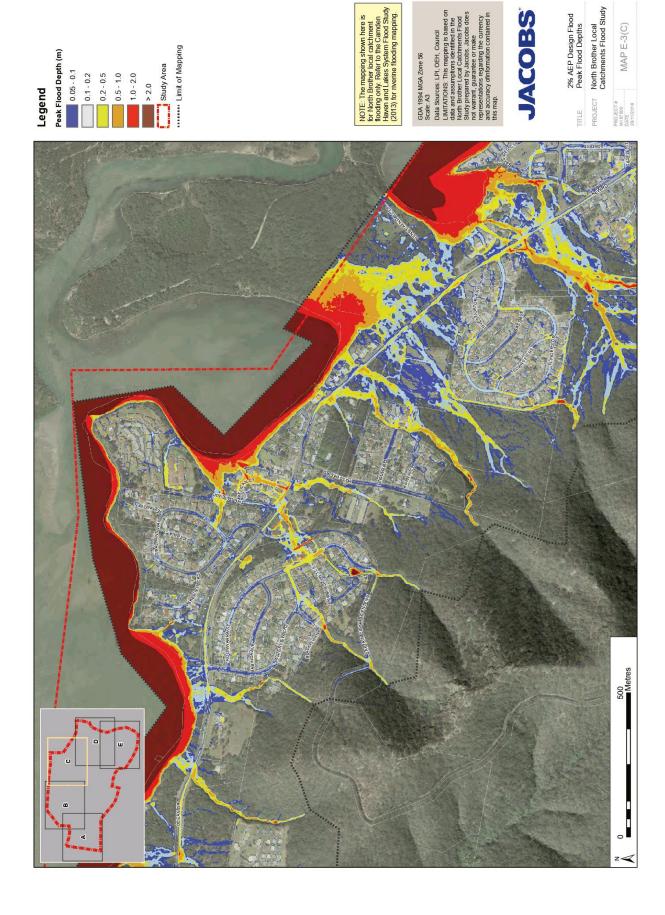


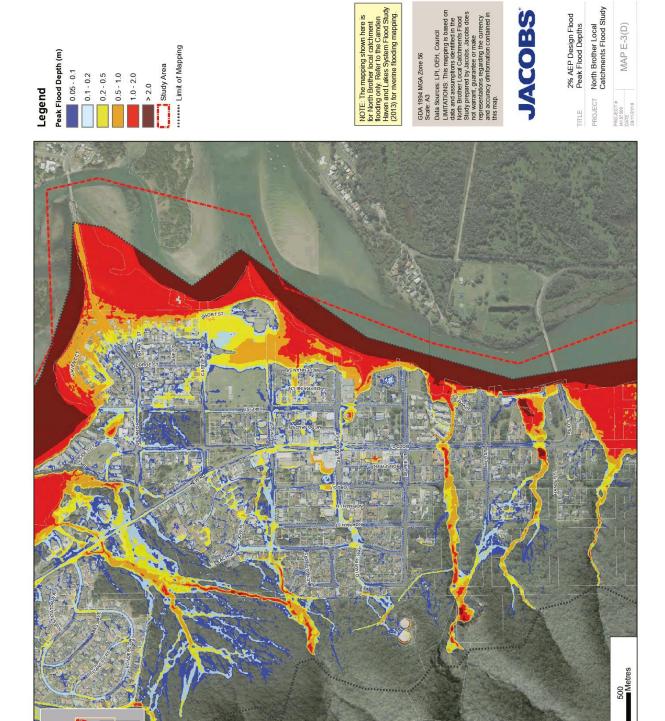




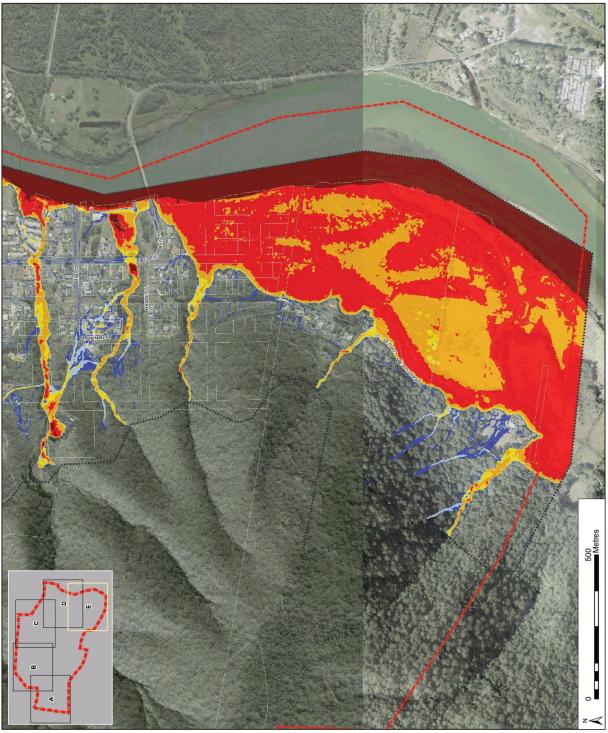


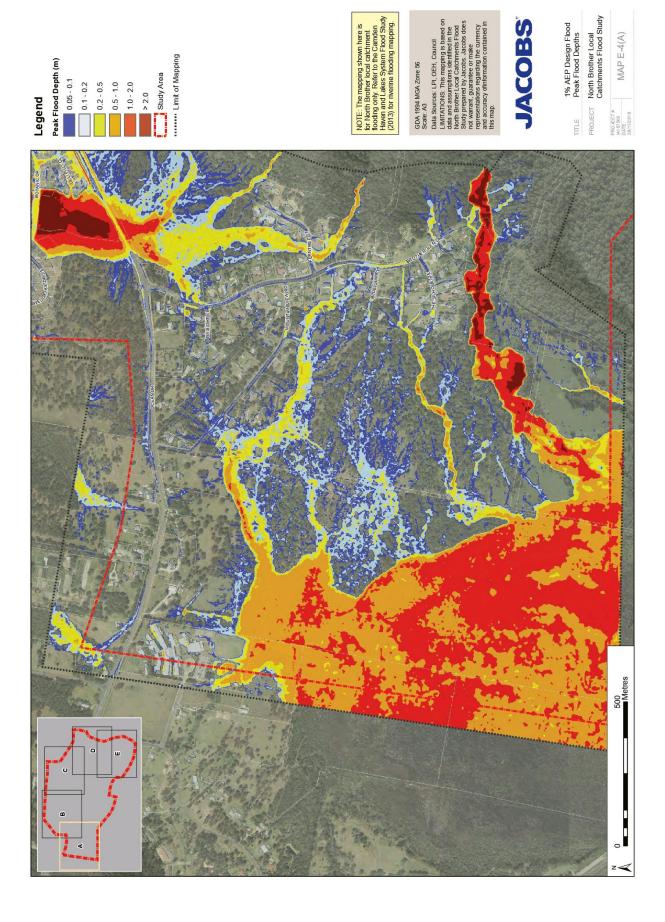


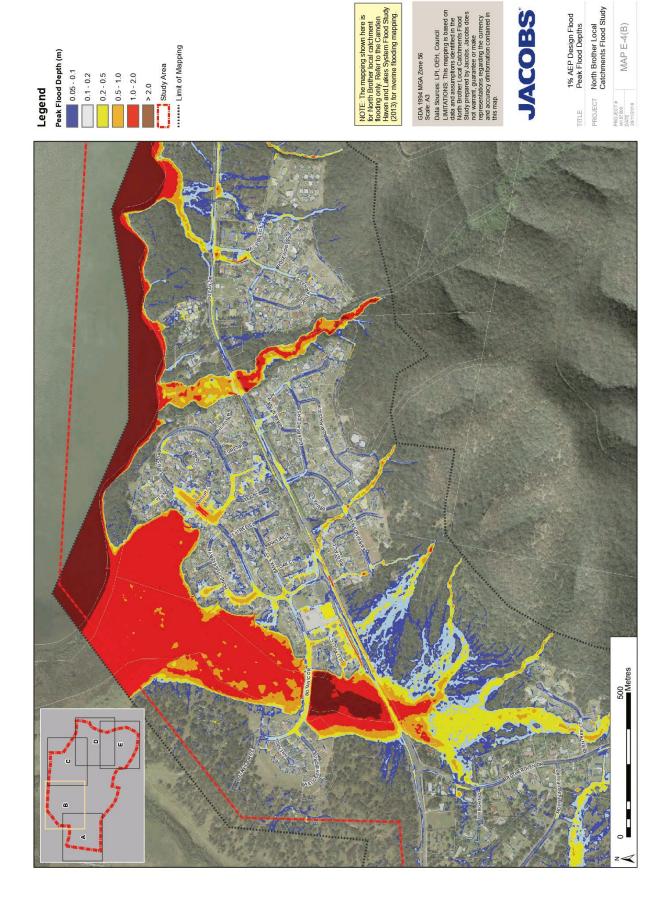


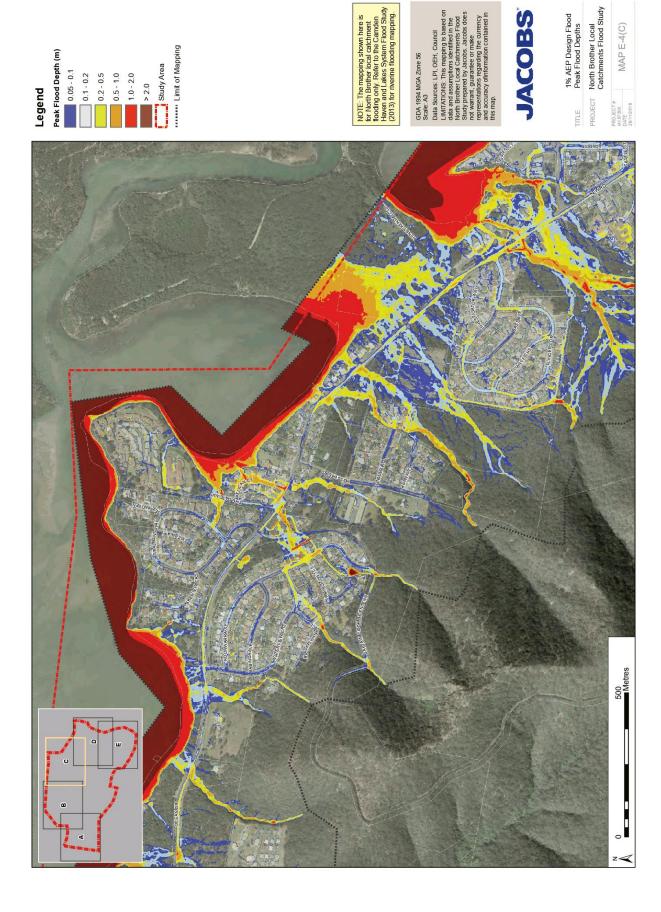












NOTE. The mapping shown here is for North Border act ment fooding only. Refer to the Camben Haven and Lakes System Flood Study (2013) for riverine flooding mapping.

Social Association fooding mapping.

Social Association fooding mapping.

Social Association fooding mapping.

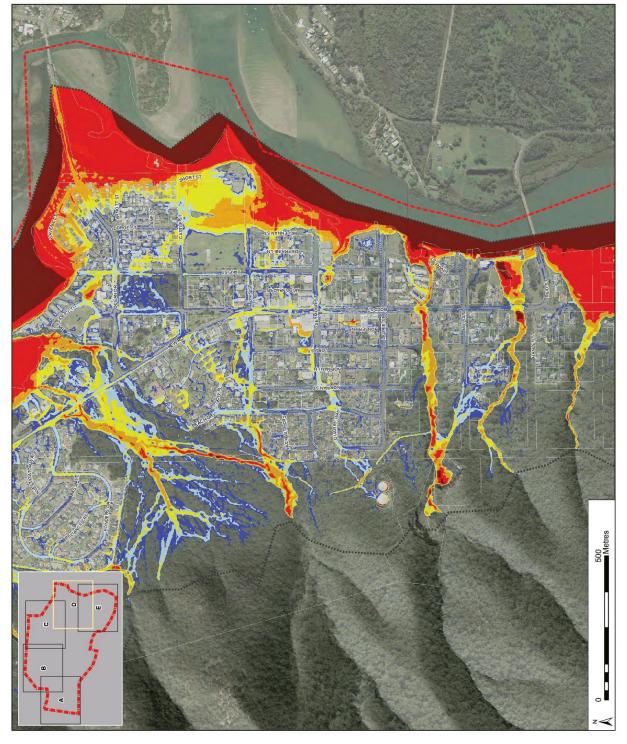
AACO BSS System Flood Study (2013) for riverine flooding mapping.

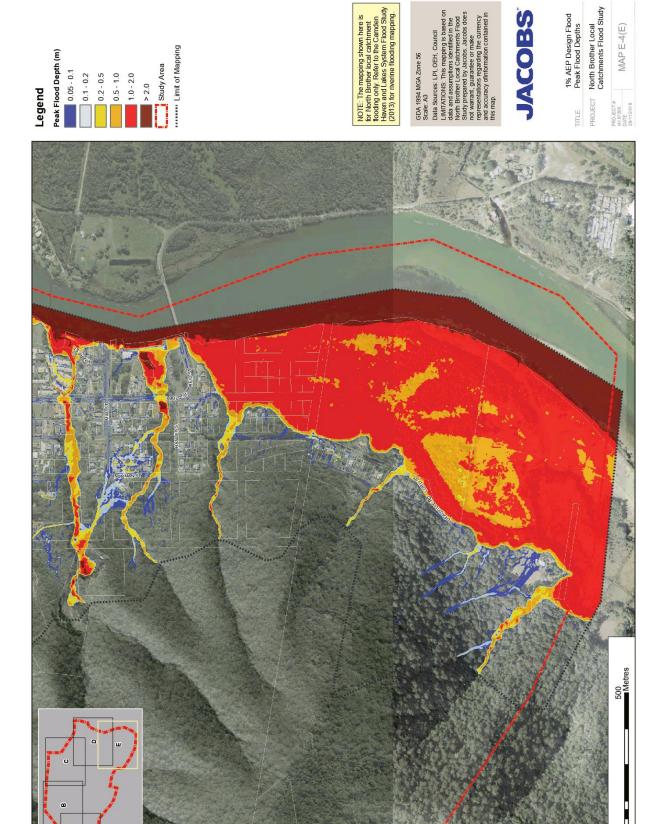
Social Association fooding mapping.

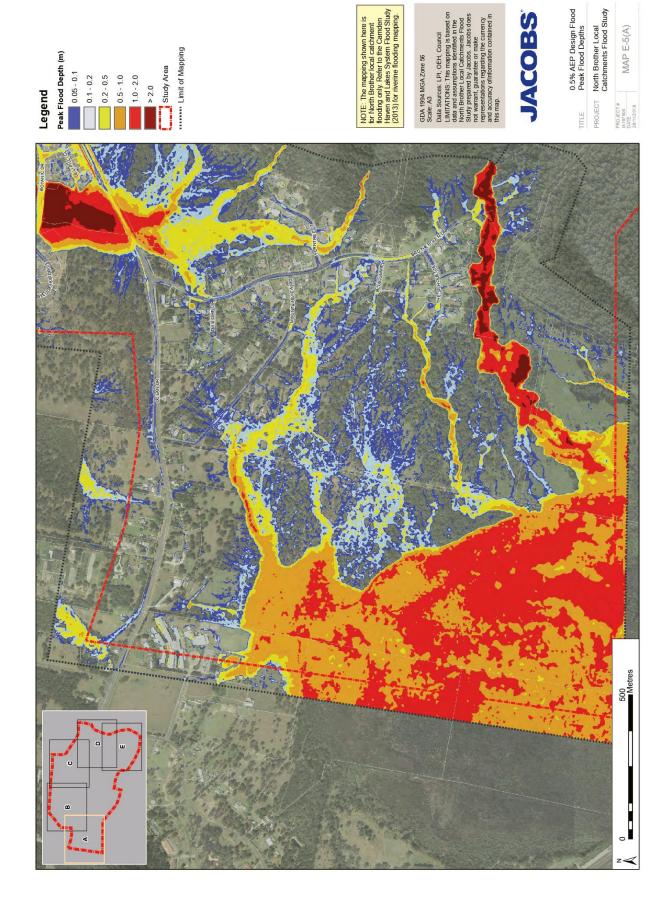
Social Asociation fooding mapping.

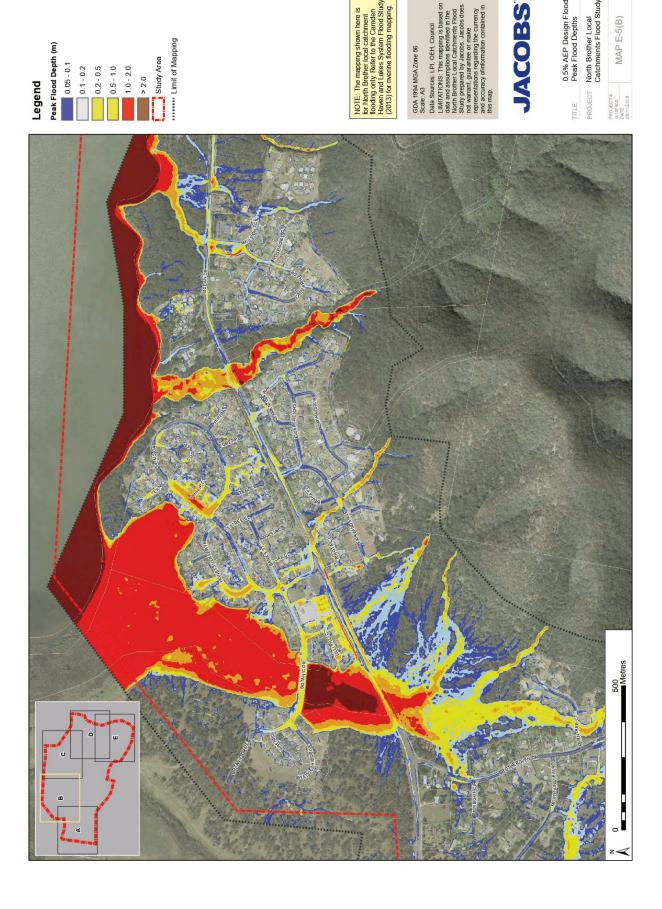
Social Association fooding mapping.

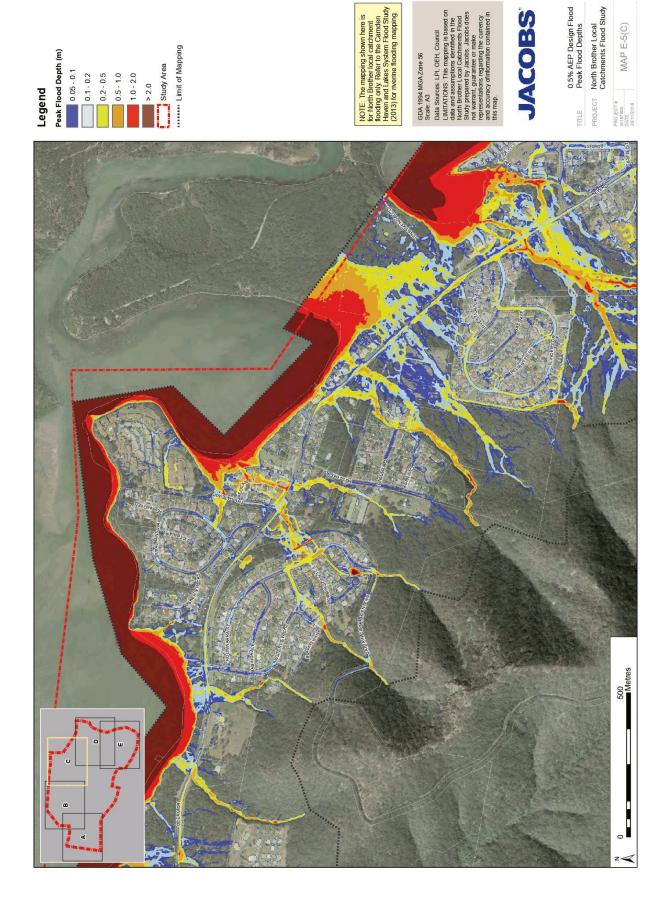
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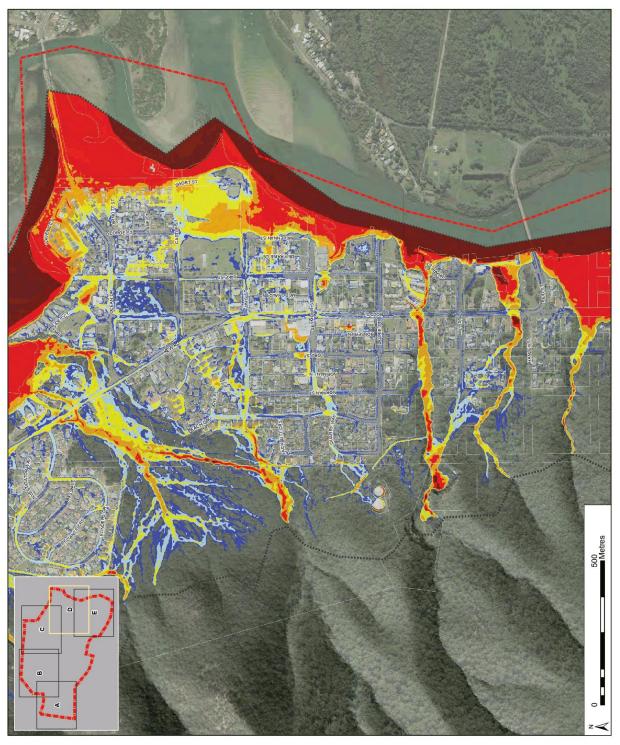


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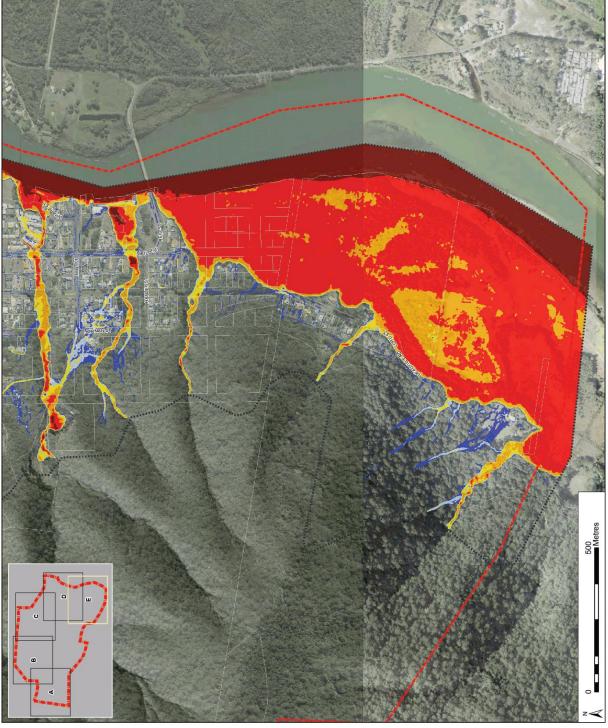
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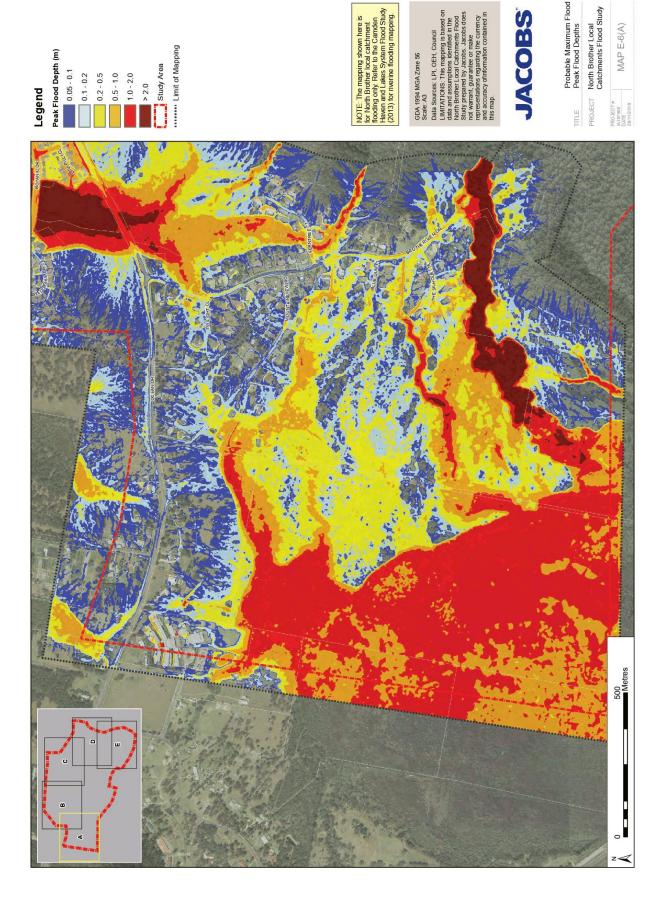
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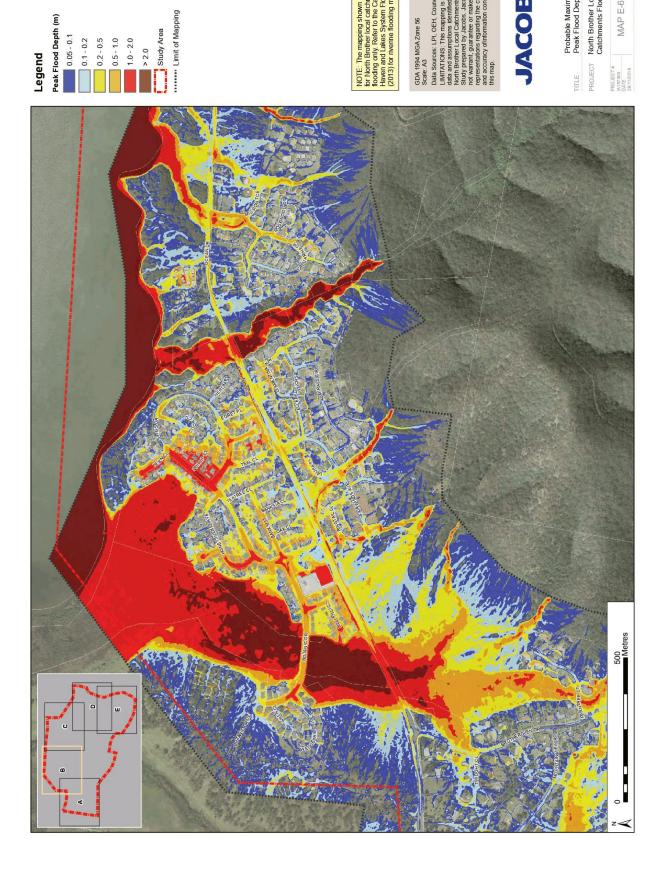
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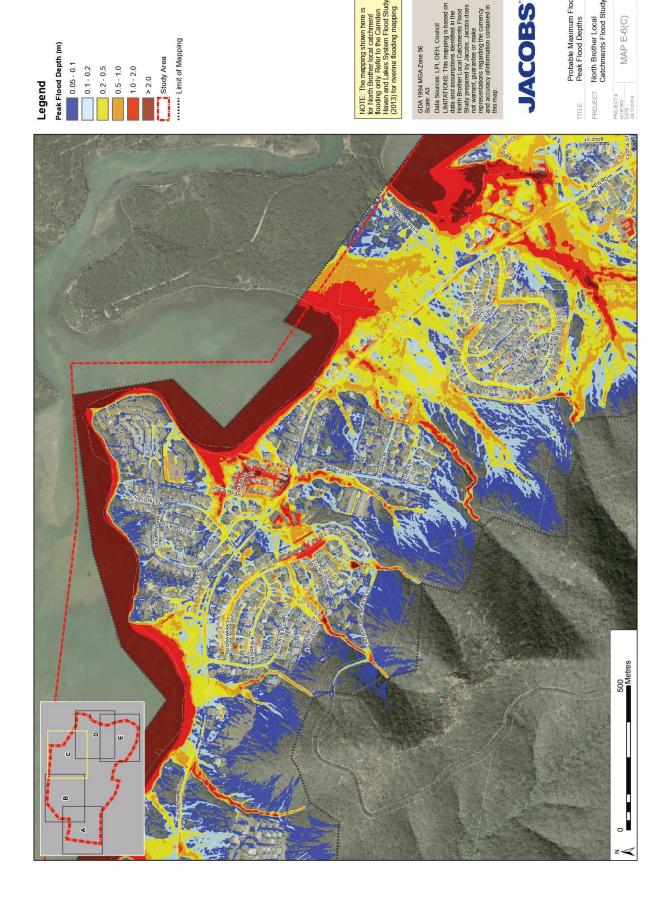












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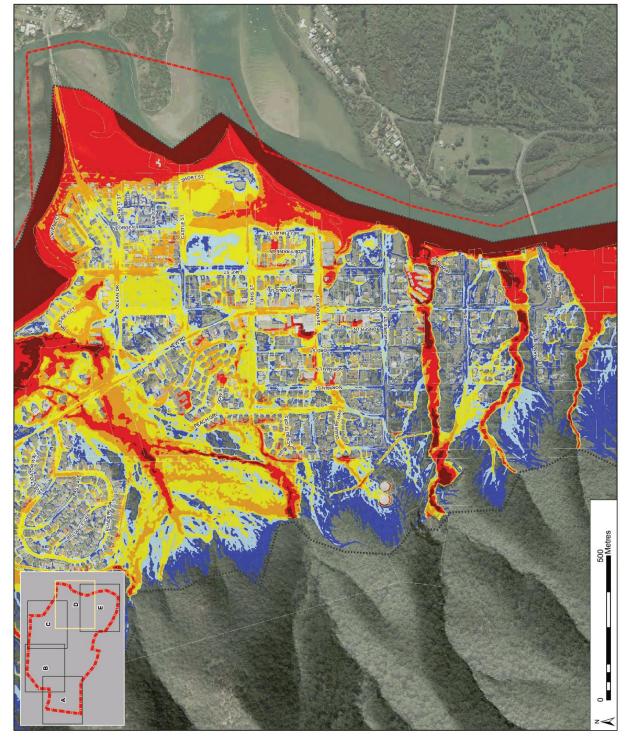
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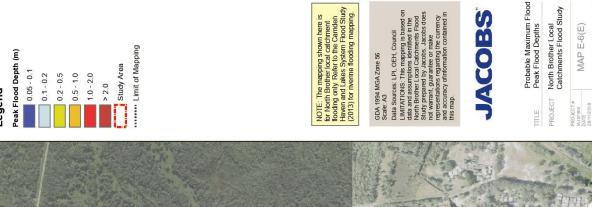
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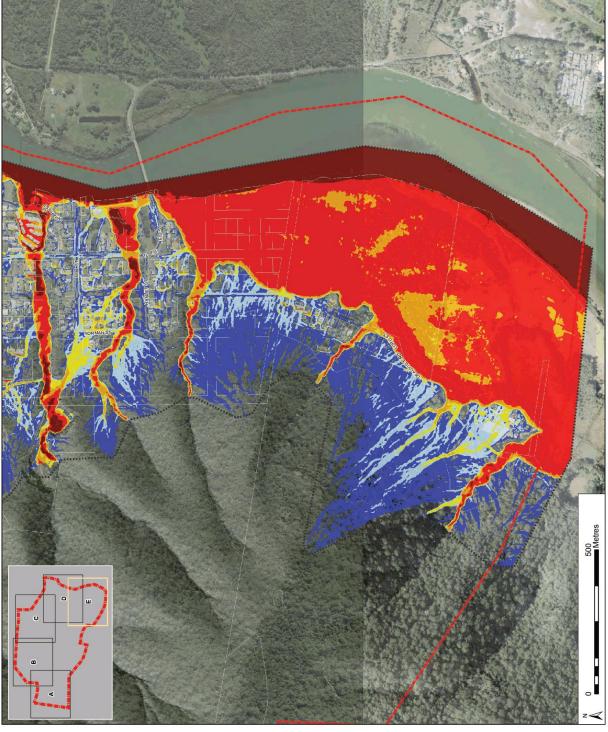
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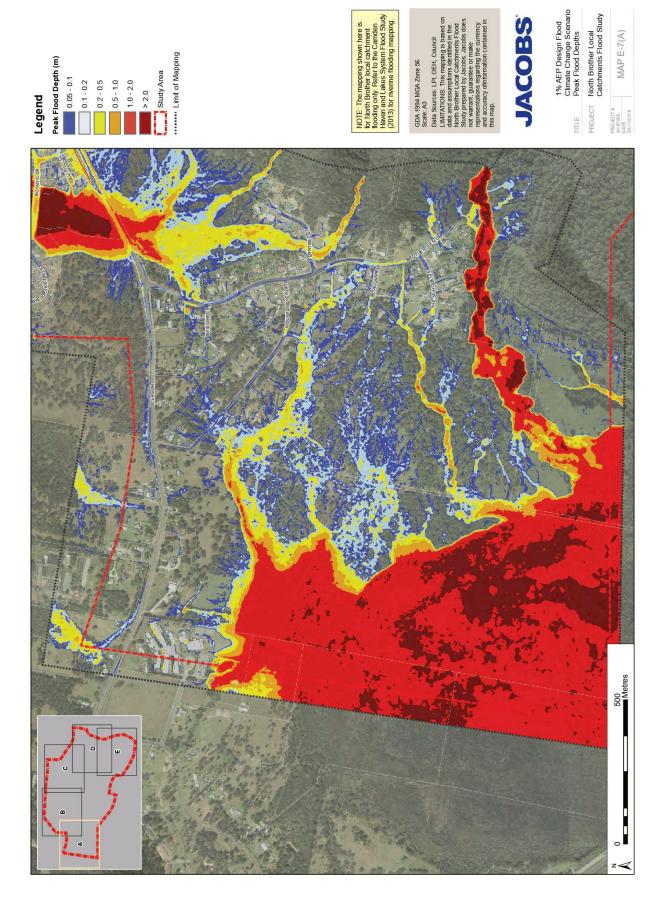
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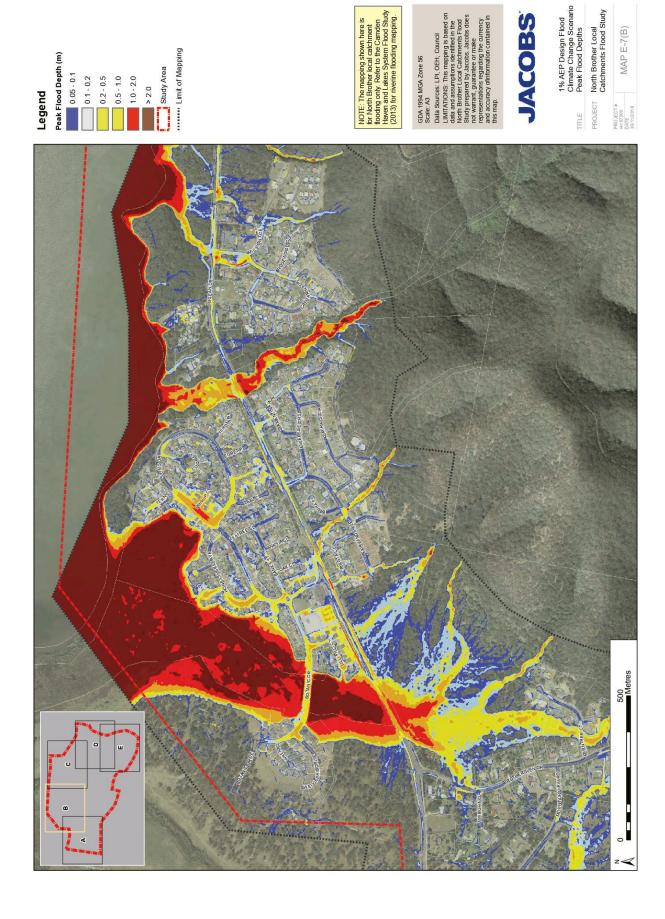
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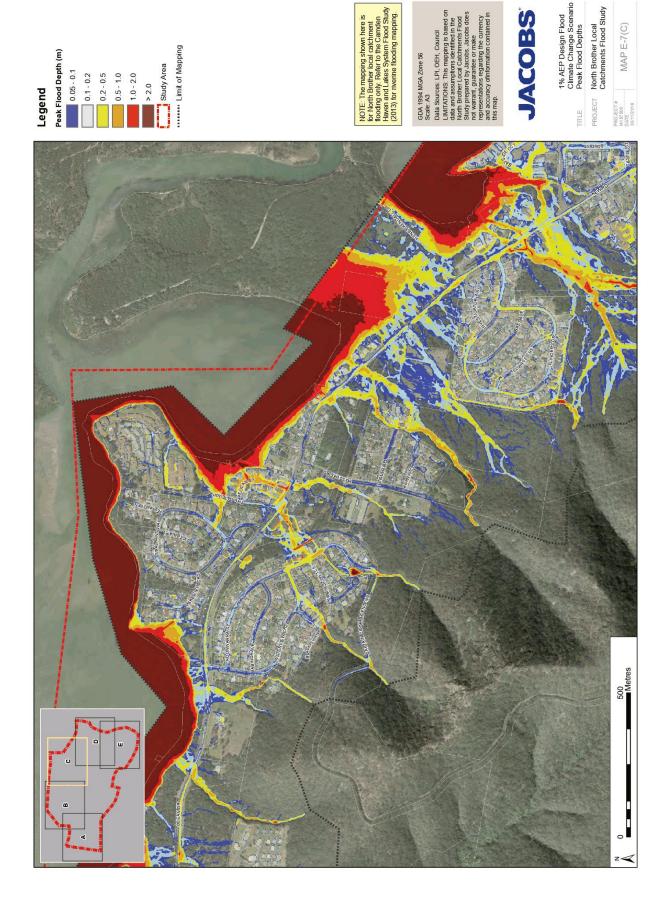


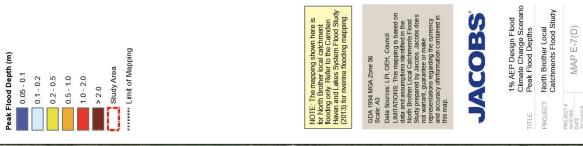


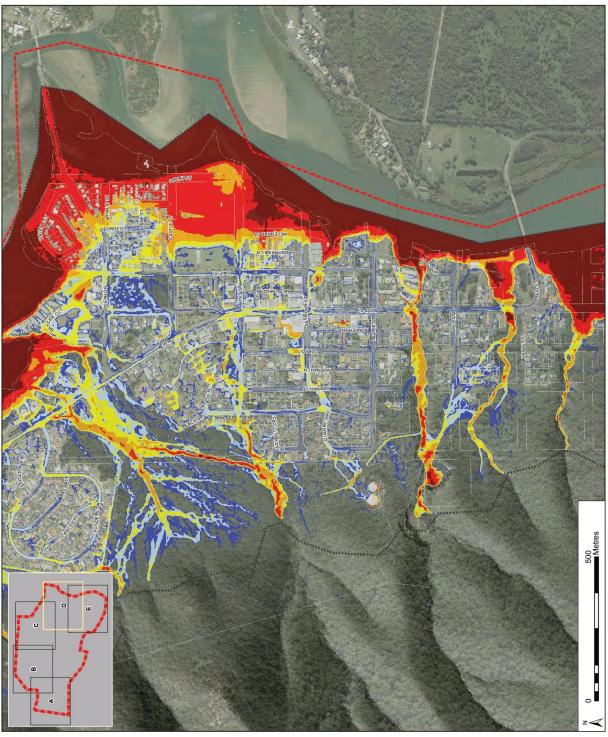




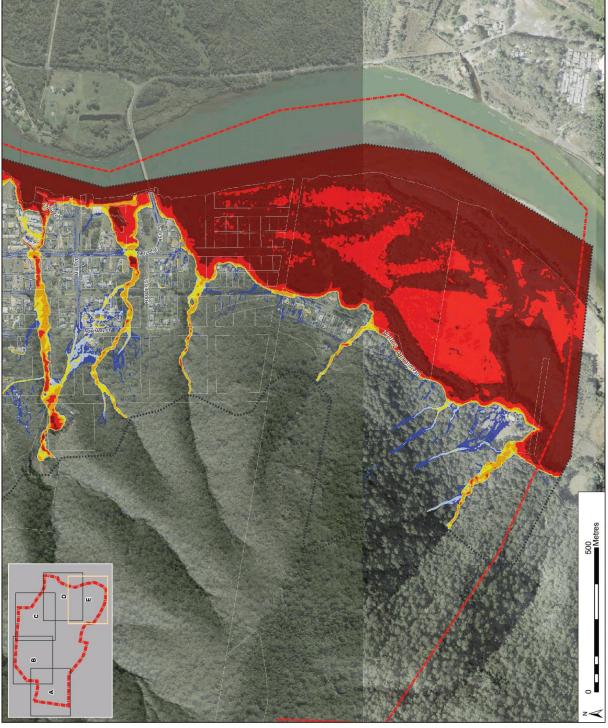


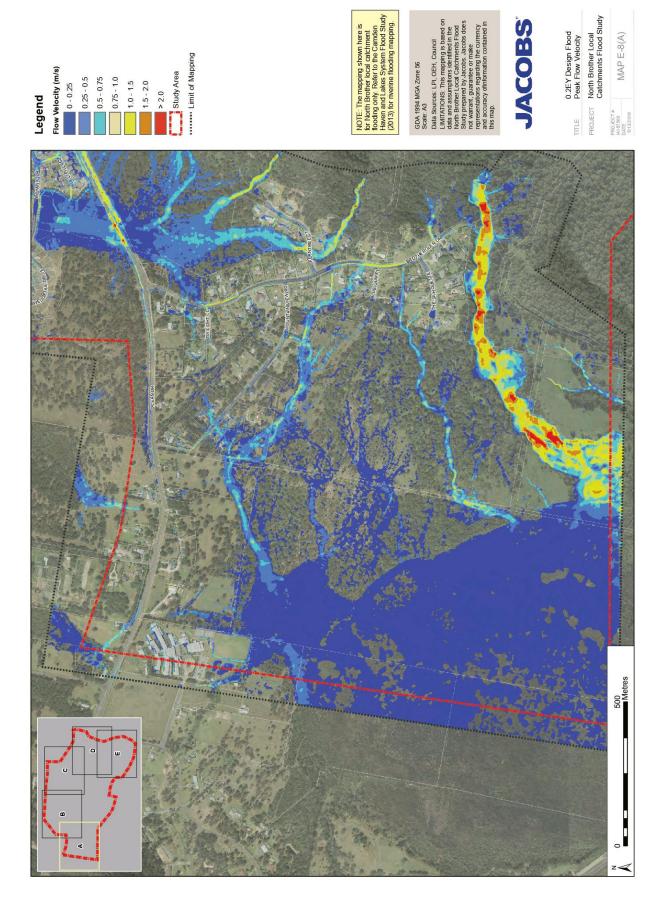


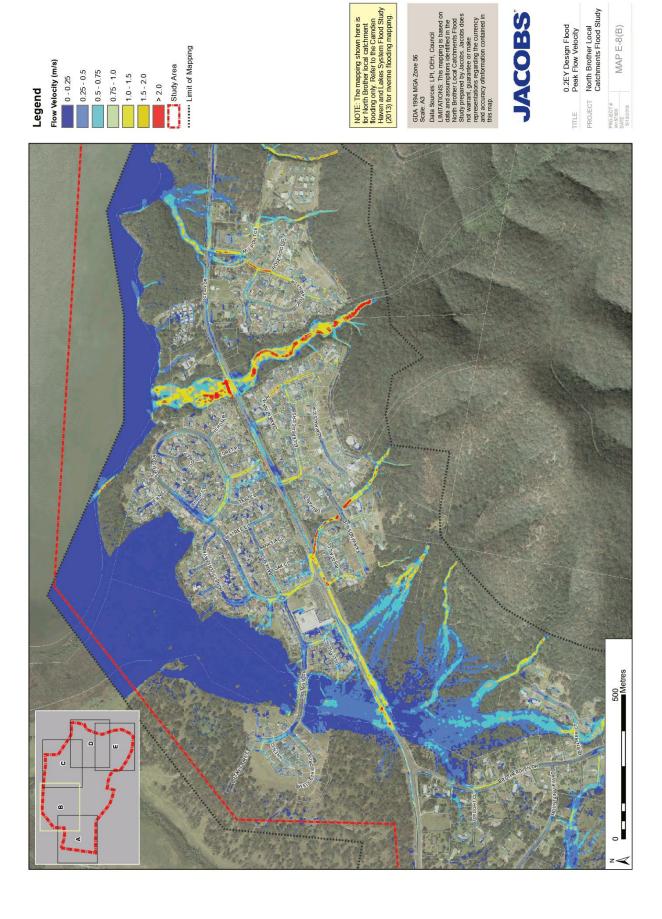


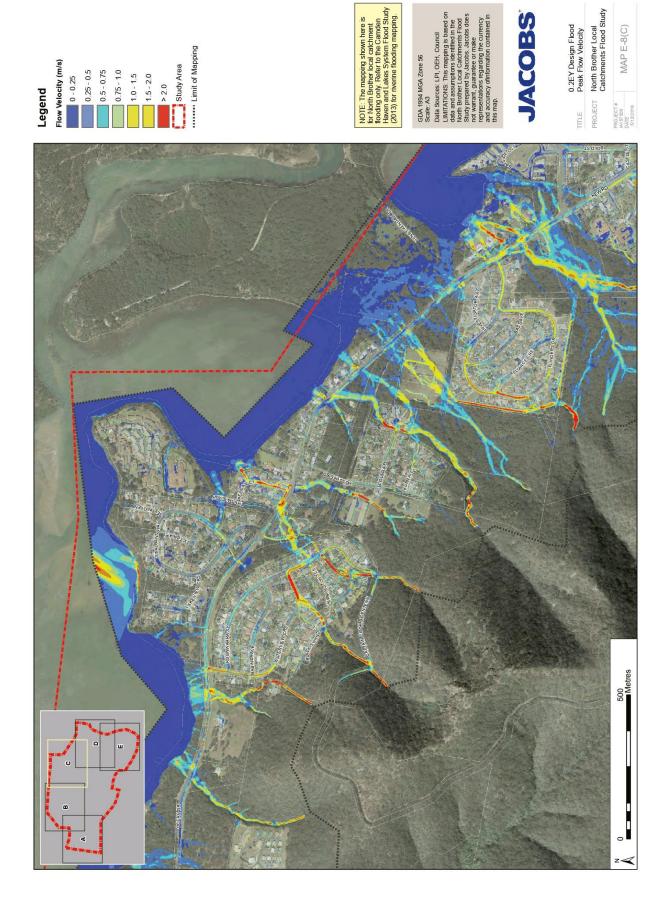






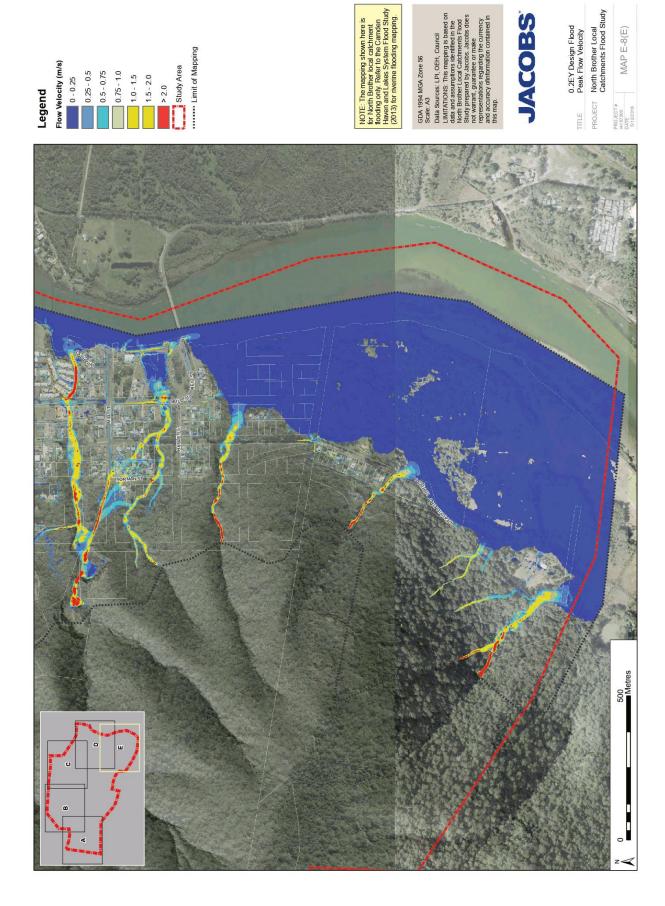


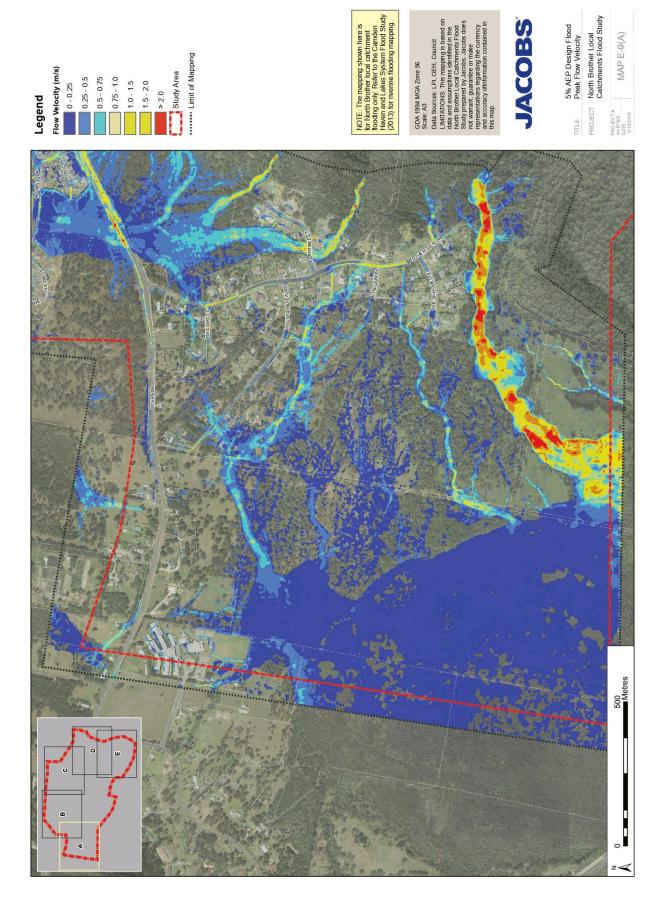


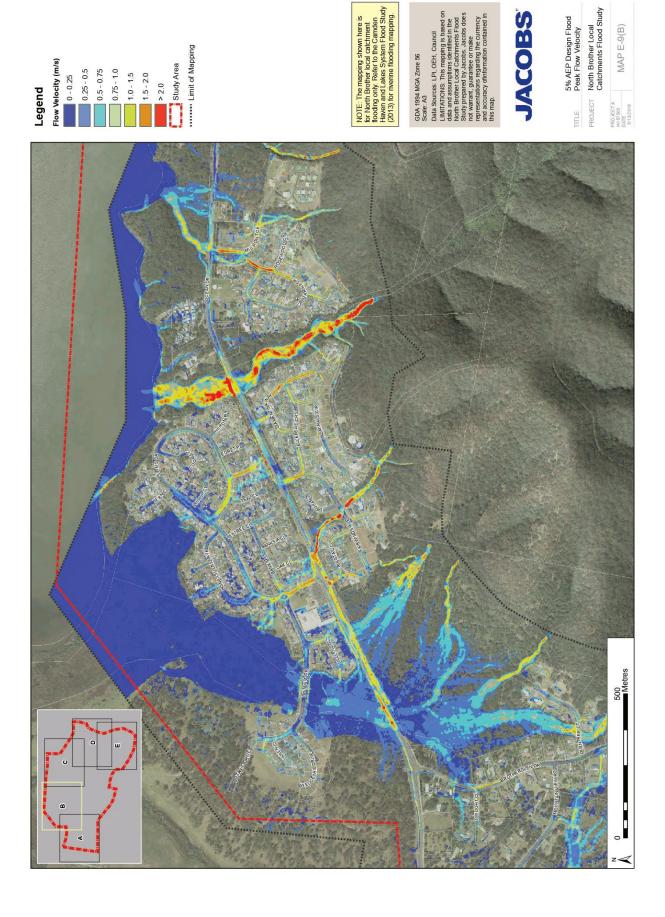


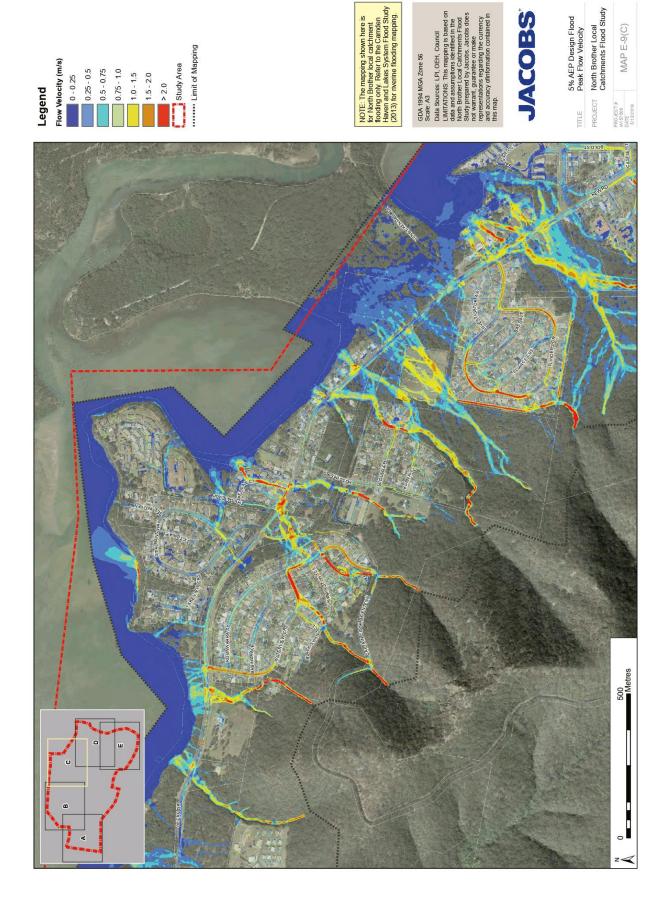


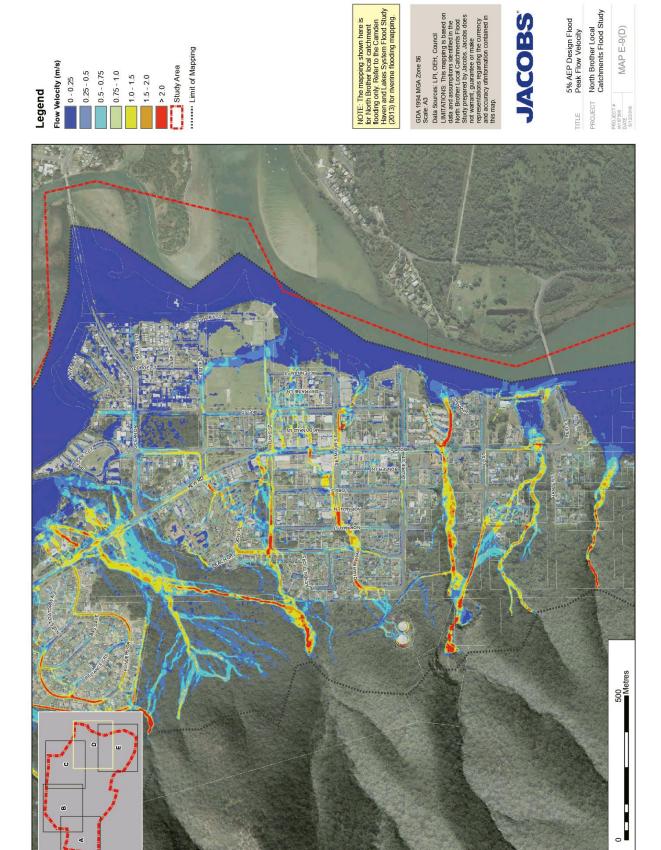


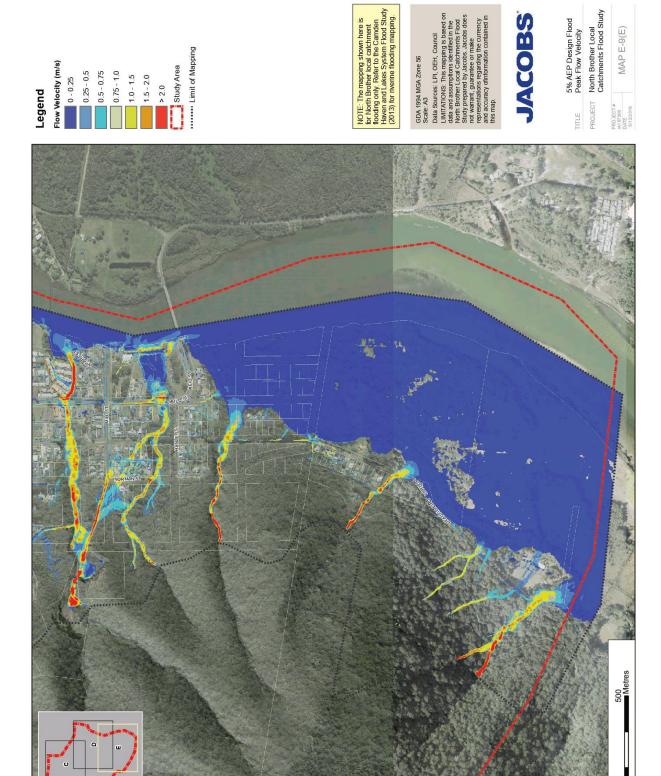


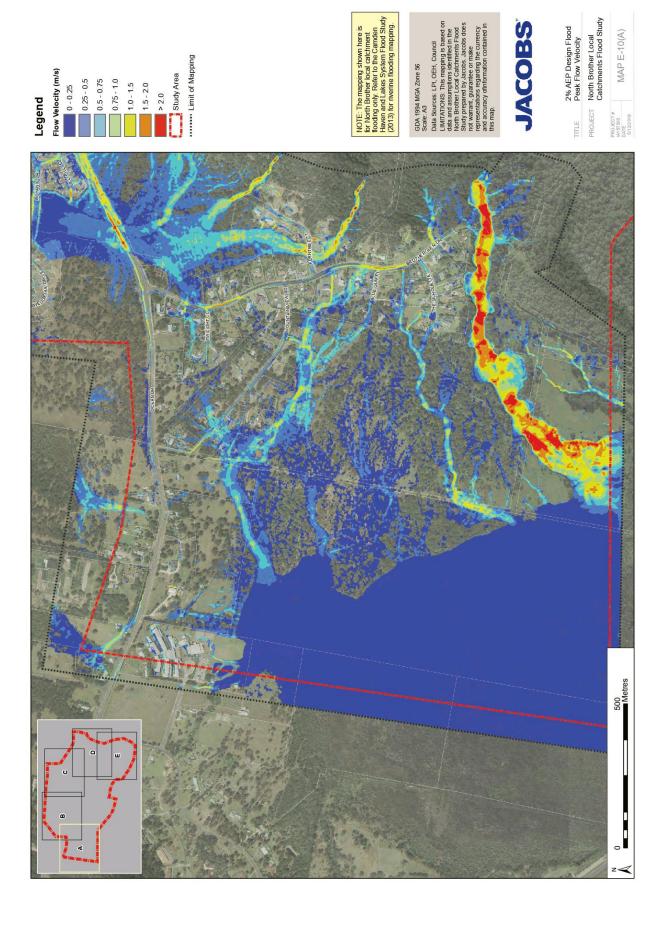


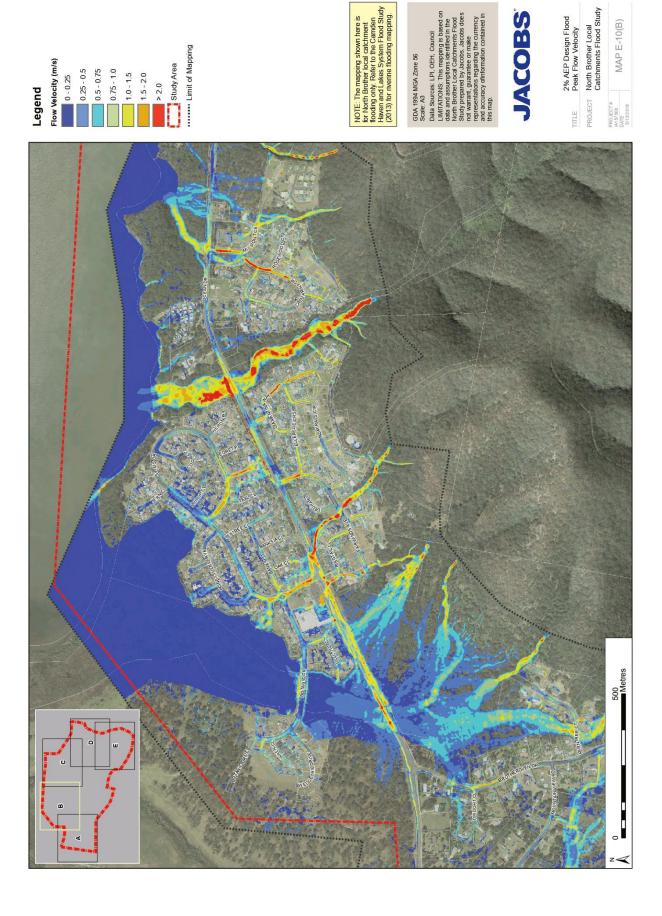


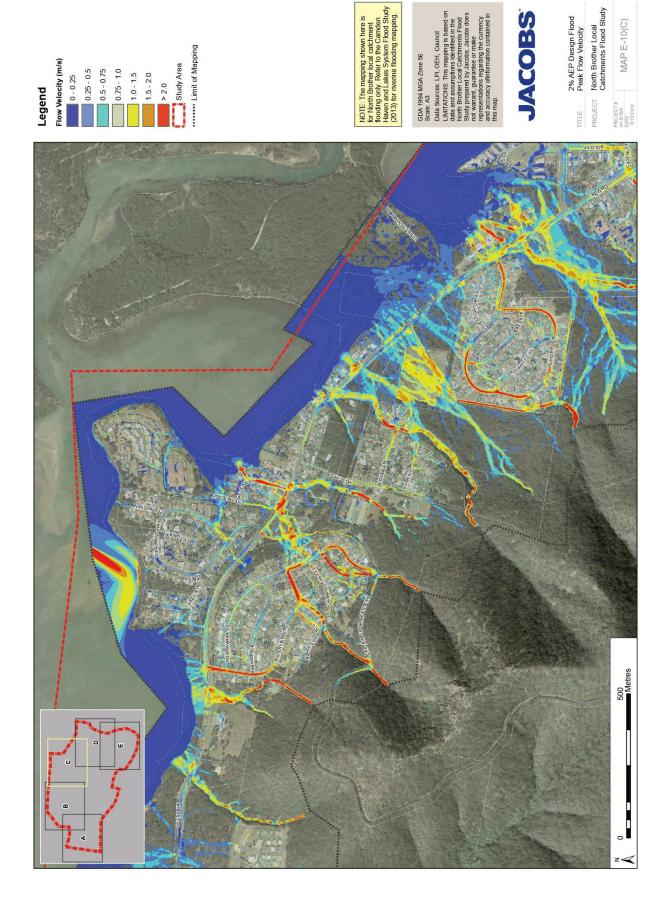




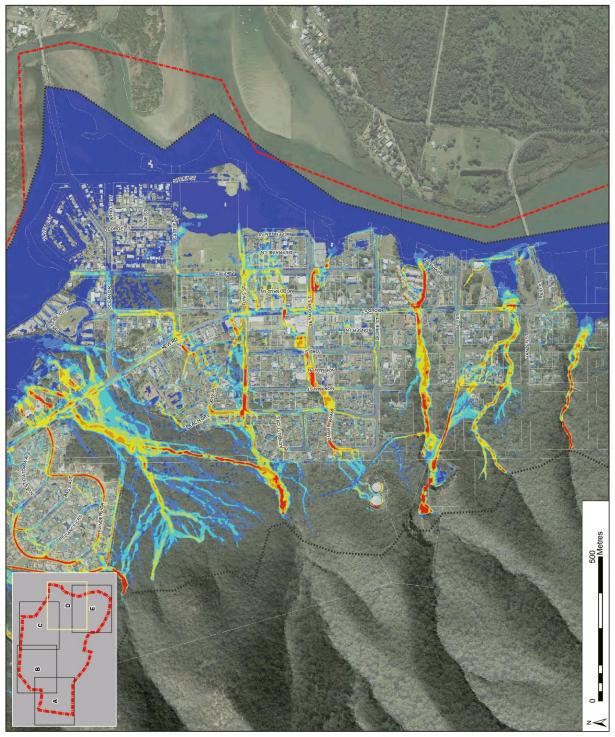


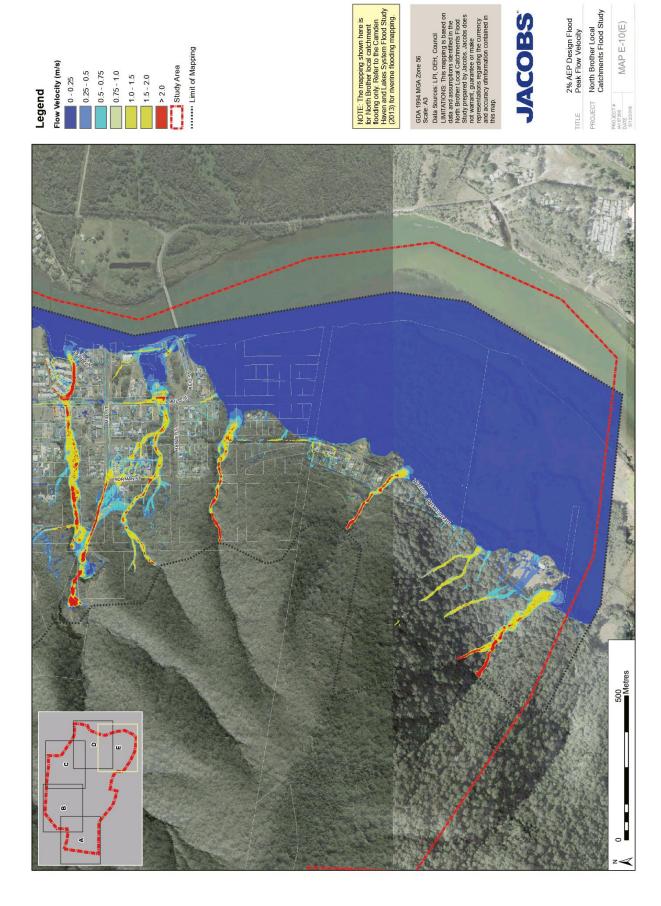


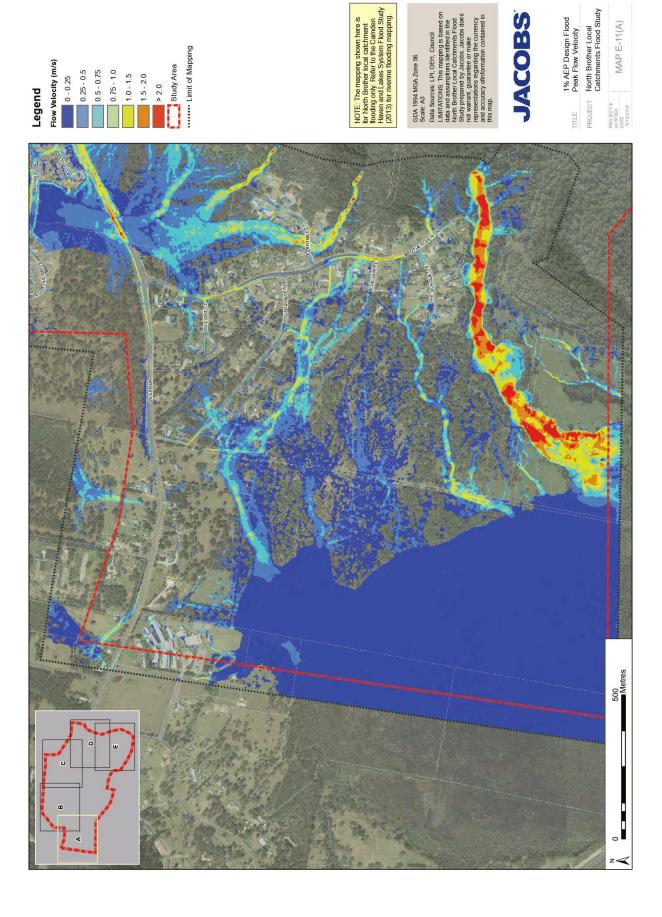


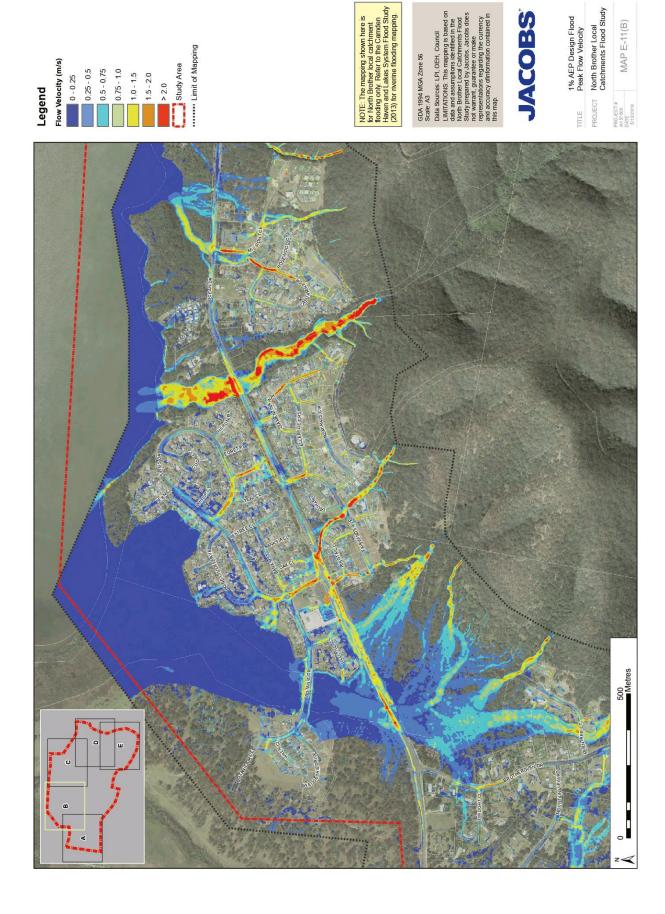


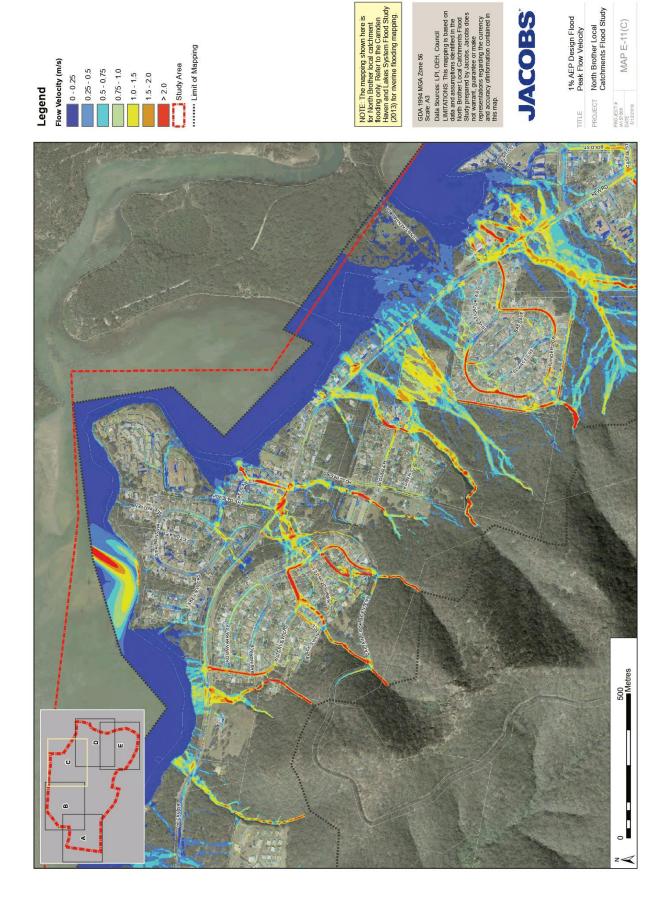
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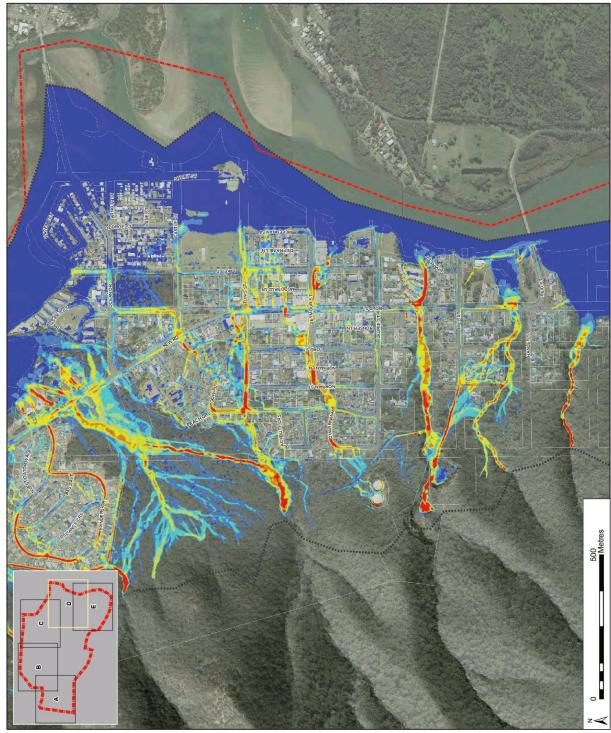
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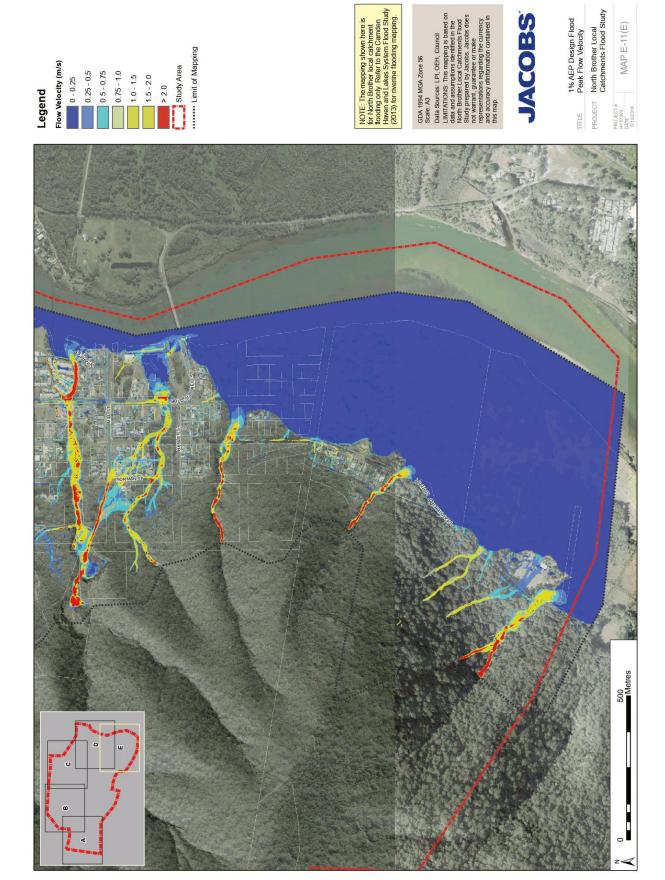
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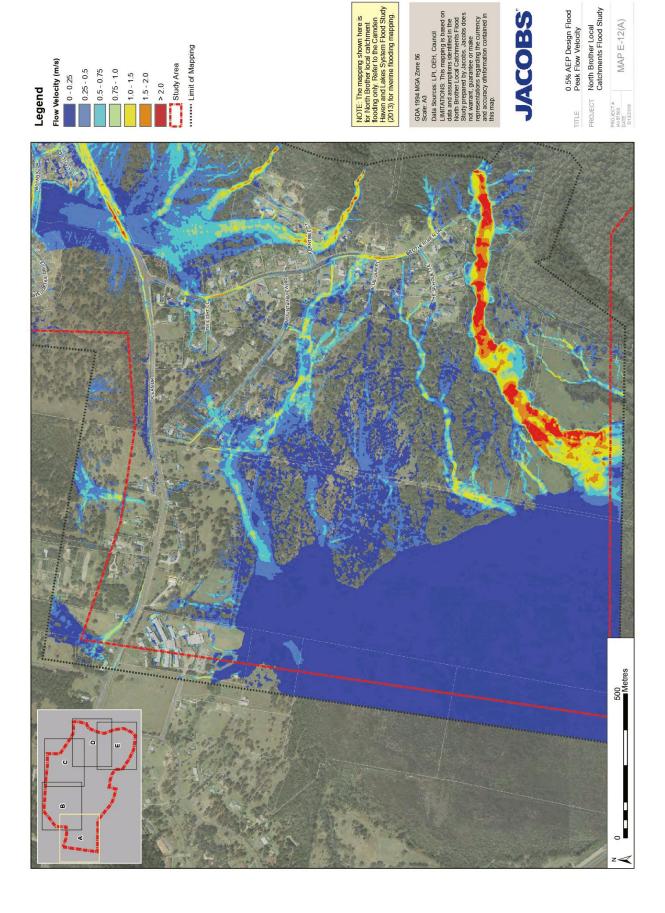
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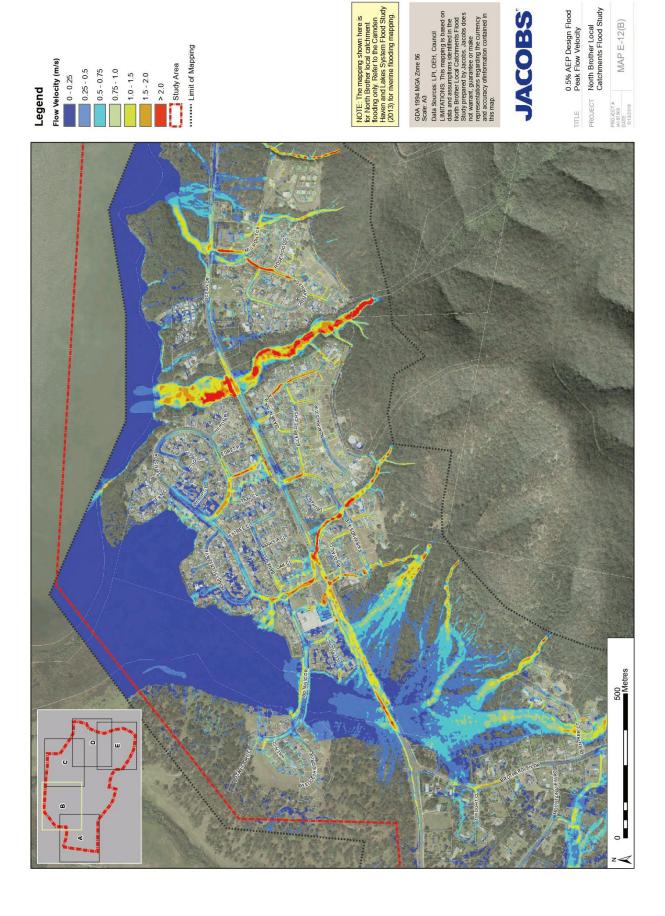
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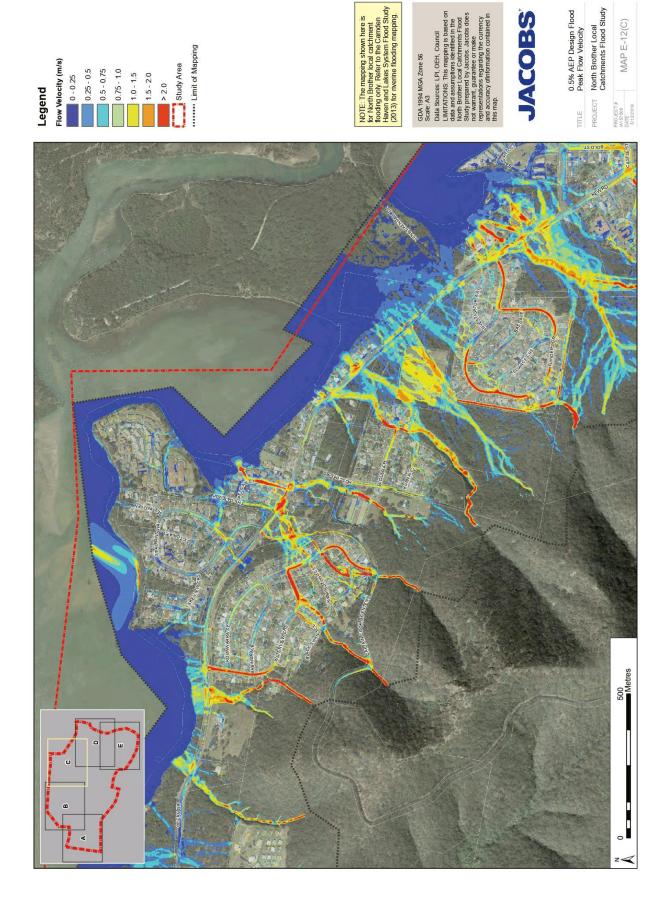
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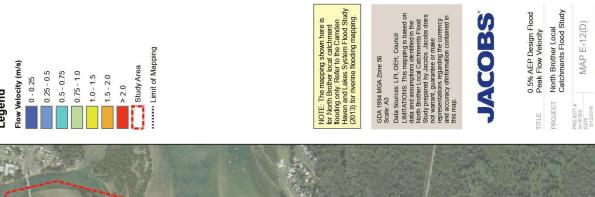


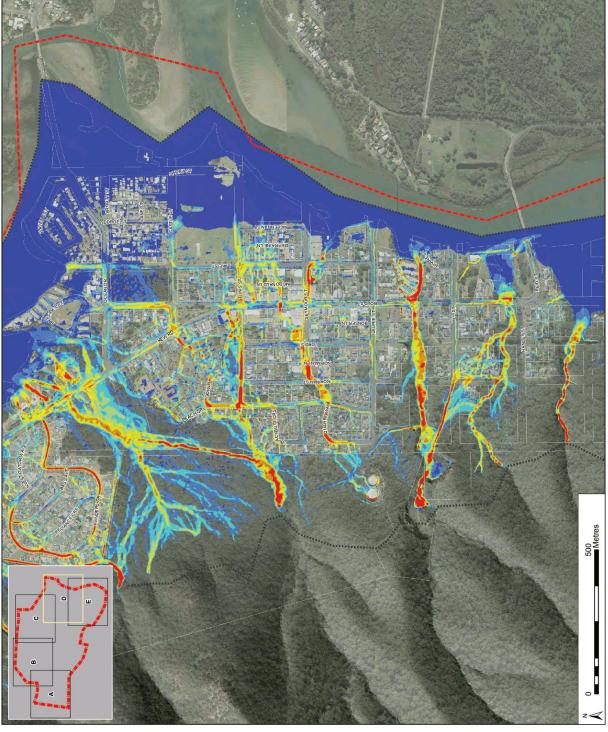


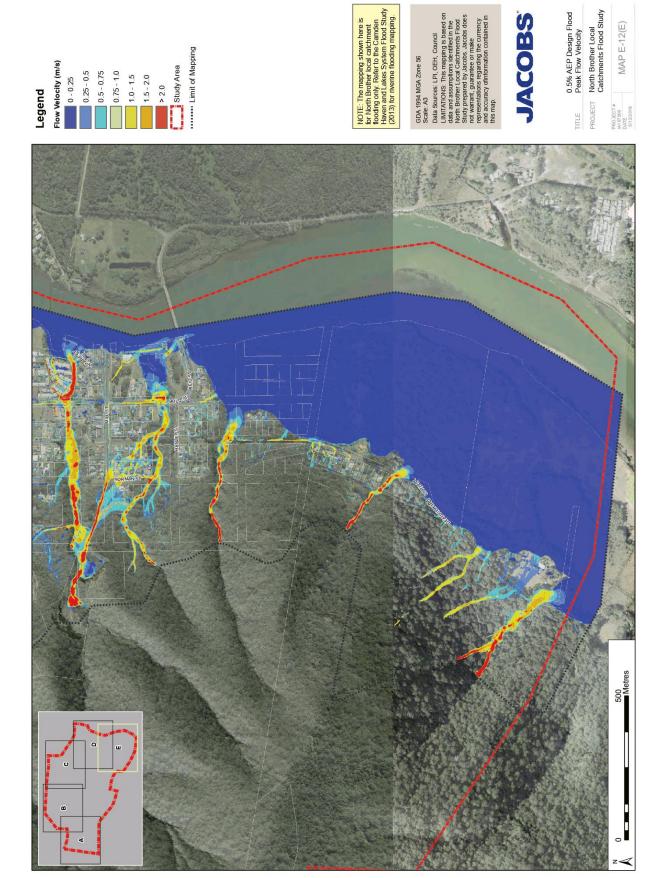


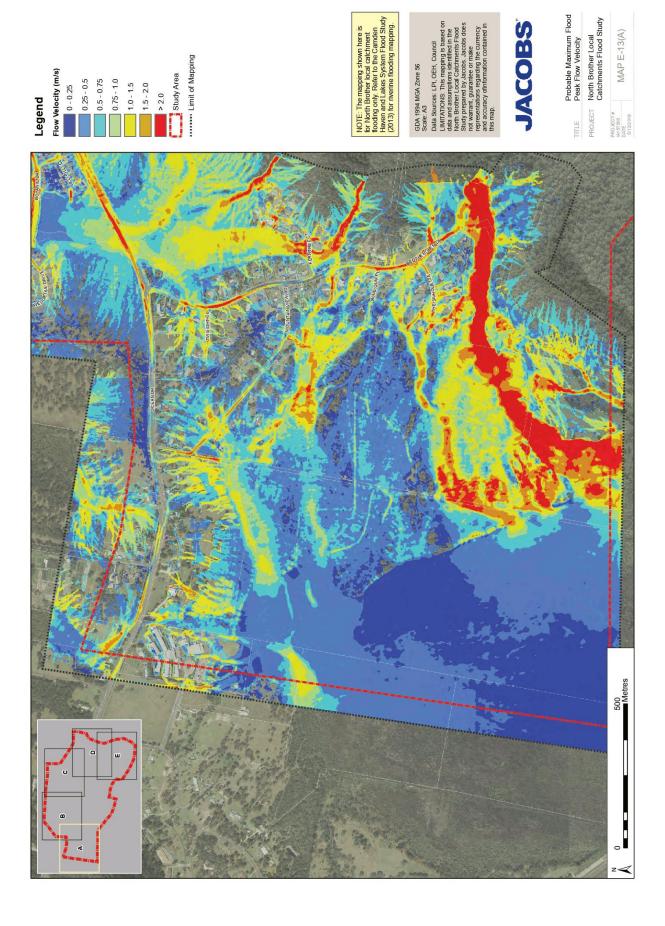












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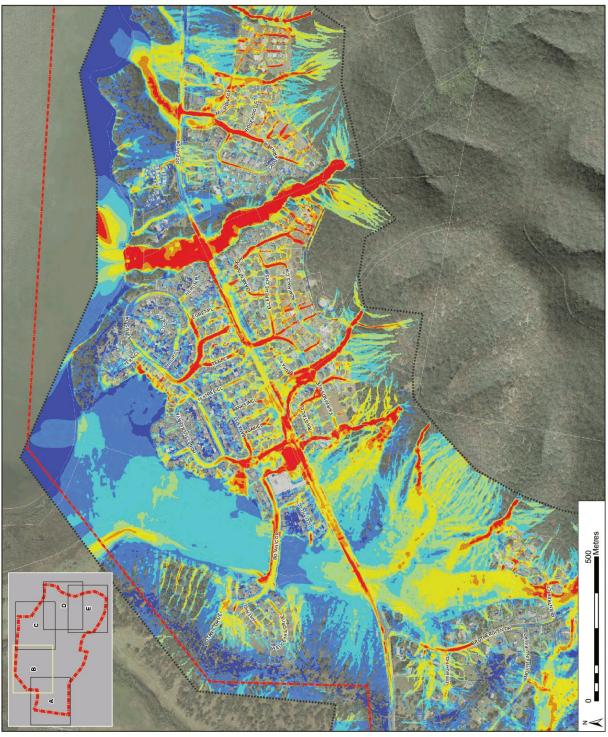
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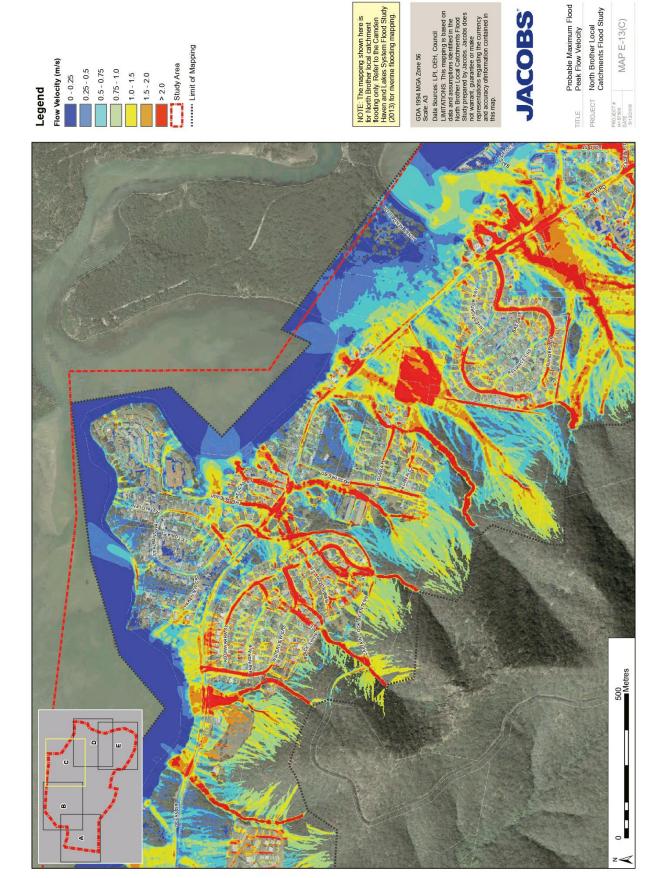
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Cata Sources: Up, CBH, Cauncil LIMITATIONS: This mapping is based on data and assumpton seemiled in the North Border Local Cardinments Flood Study prepared by Jacobs. Jacobs does not warrant, guarantee on make representations regarding the currency and accuracy dimformation contained in this map.

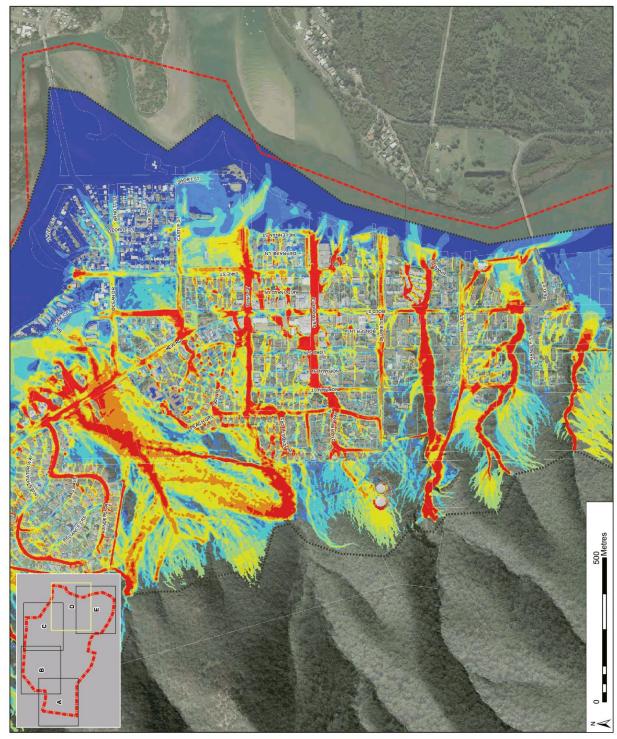
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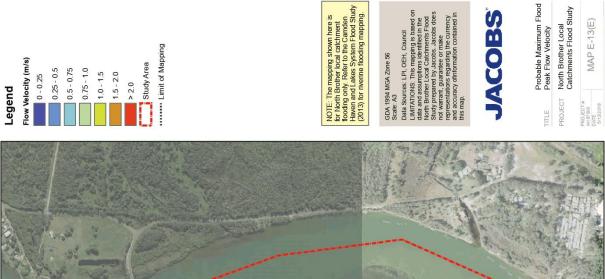
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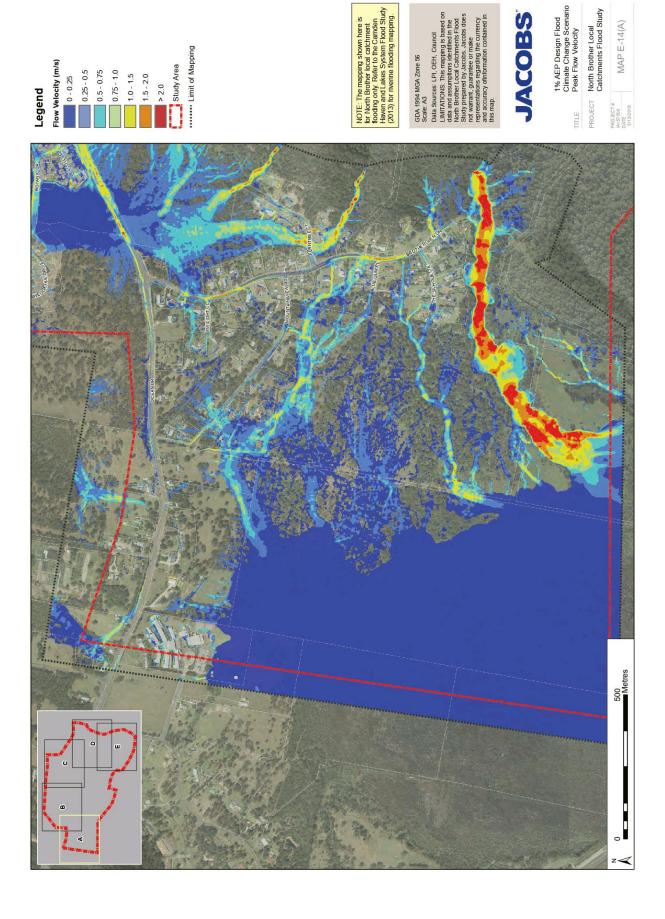
North Border Flood Study PROJECT

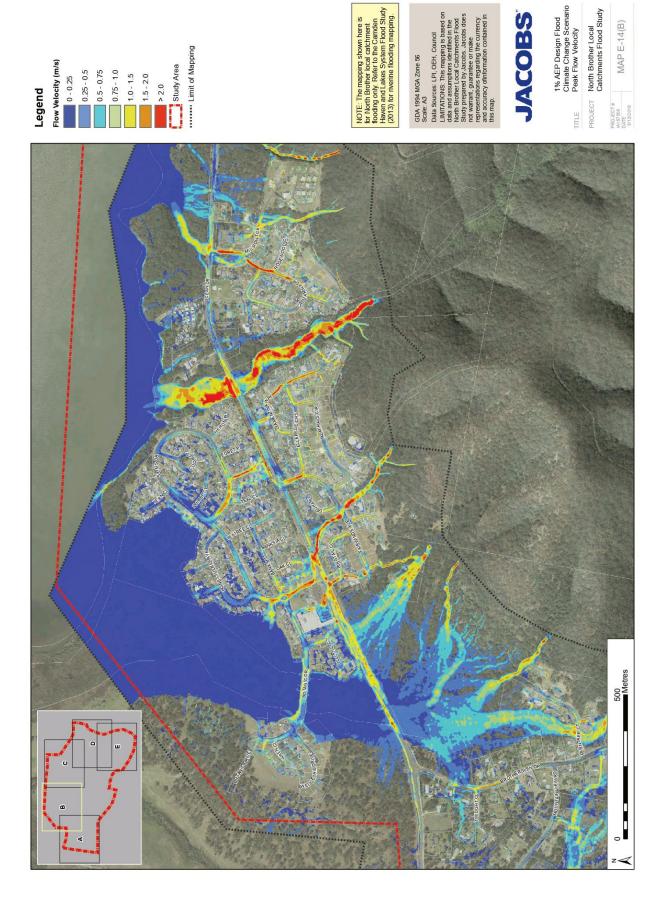
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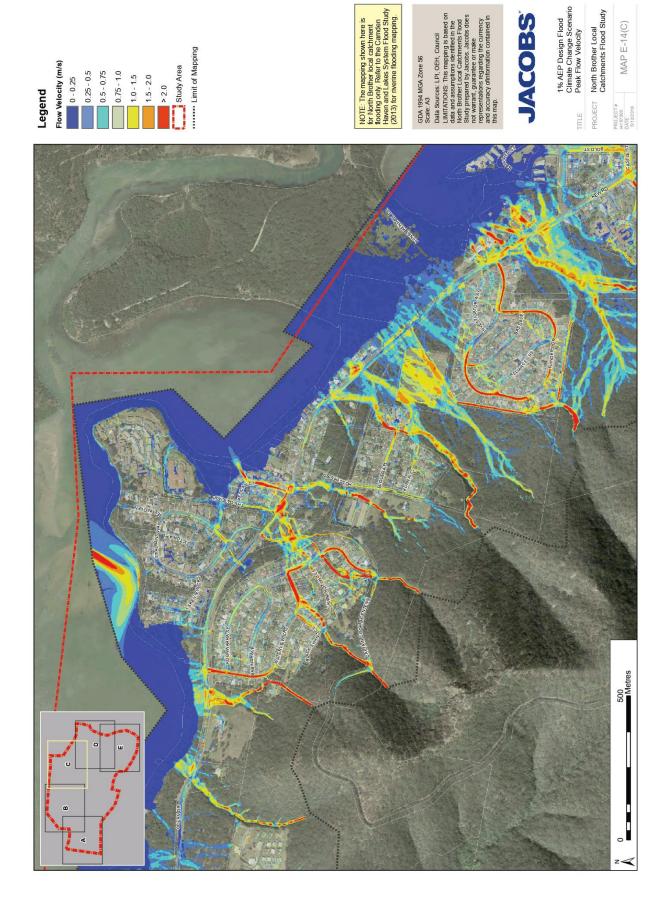
MAP E-13(D)

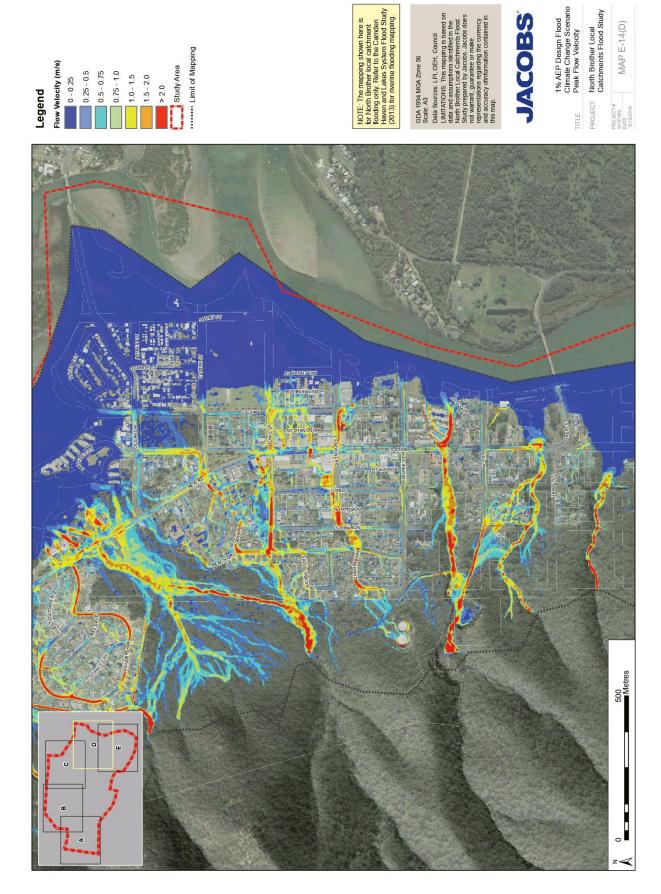


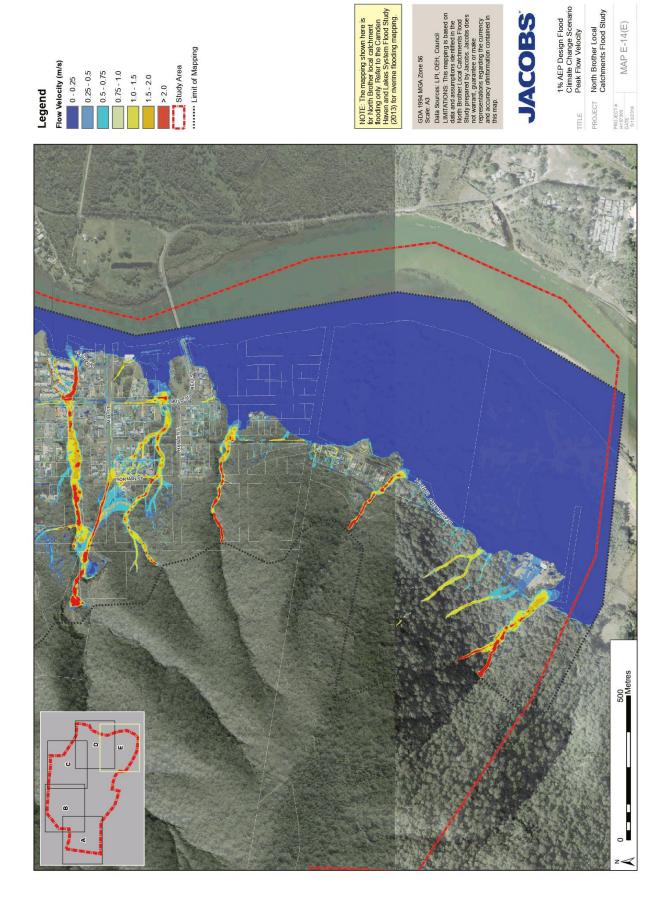


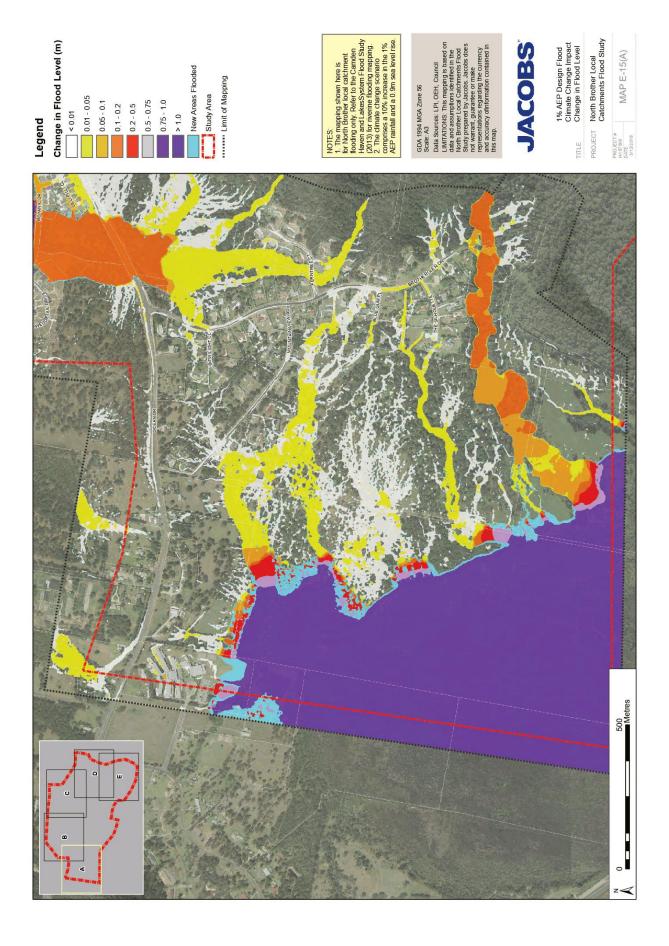


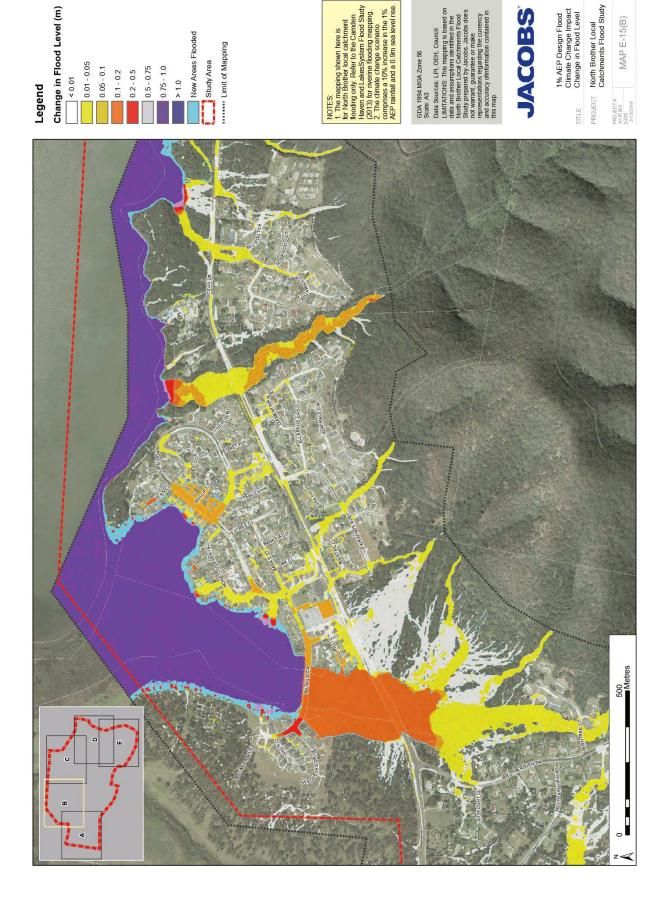


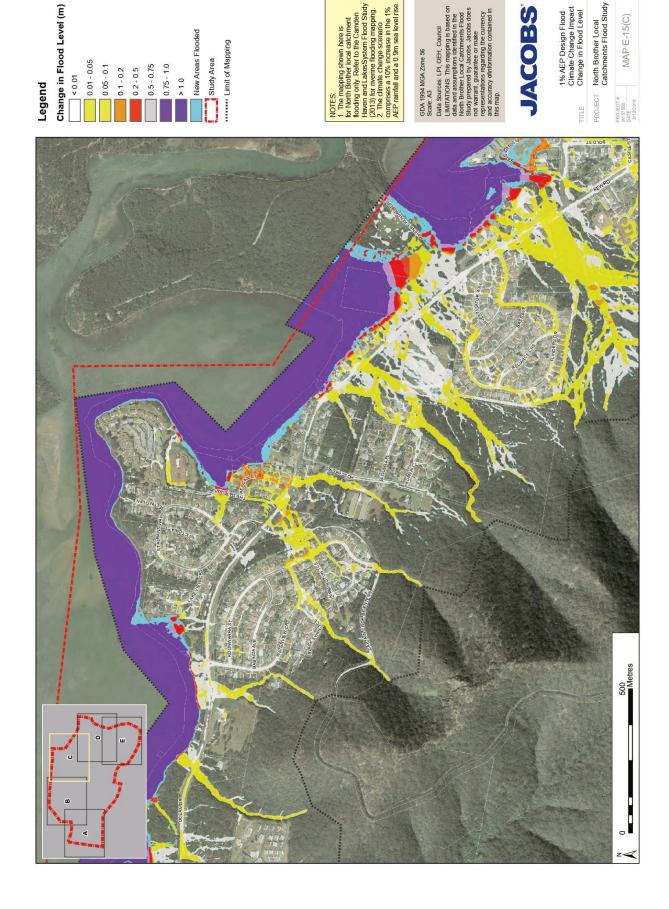


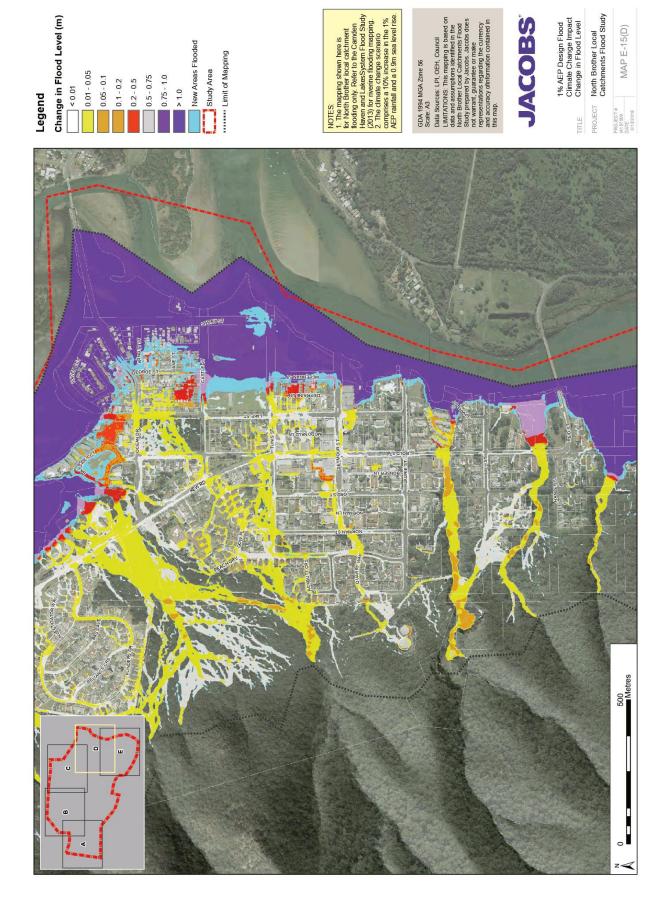


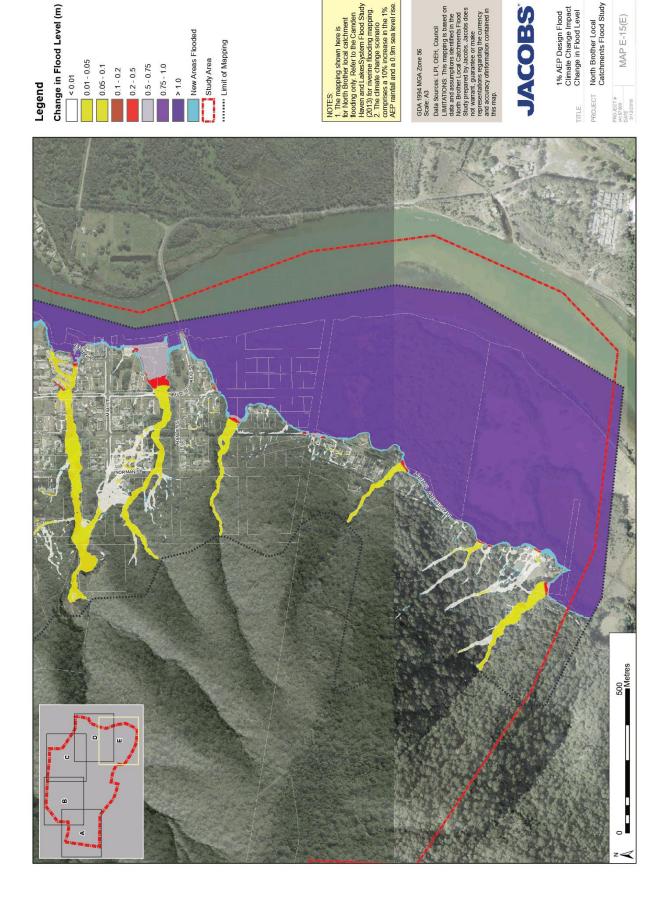










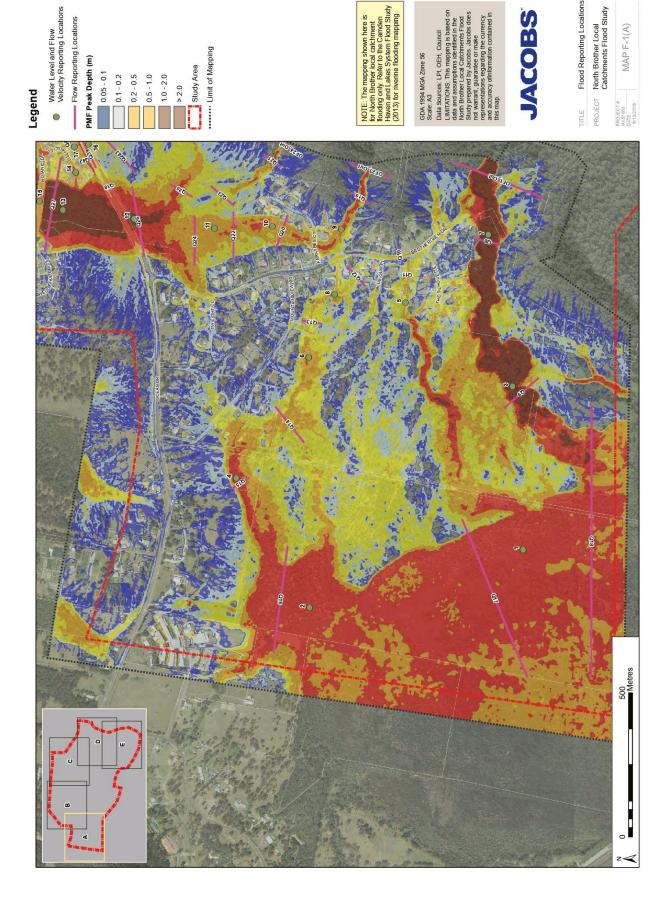




Appendix F. Summary of Flood Levels, Velocities and Flows at Specific Locations

Figure F-1 Flood Level, Velocity and Flow Reporting Locations

Table F-1 Summary of Peak Flood Level and Velocity at Selected Locations



Flood Reporting Locations Water Level and Flow Velocity Reporting Locations NOTE: The mapping shown here is for North Brother local catchment fooding only. Refer to the Camdon Haven and Lakes System Flood Study (2013) for riverine flooding mapping. Flow Reporting Locations Limit of Mapping PMF Peak Depth (m) 0.05 - 0.1 0.1 - 0.2 0.5 - 1.0 Legend

NOTE: The mapping shown here is for North Bother local catchment flooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. Flood Reporting Locations Water Level and Flow Velocity Reporting Locations - Flow Reporting Locations Limit of Mapping PMF Peak Depth (m) 0.05 - 0.1 0.1 - 0.2 1.0 - 2.0 500 Metres

NOTE: The mapping shown here is for North Brother local calchment flooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. Flood Reporting Locations Water Level and Flow Velocity Reporting Locations - Flow Reporting Locations Limit of Mapping PMF Peak Depth (m) Study Area 0.05 - 0.1 0.1 - 0.2 0.5 - 1.0 1.0 - 2.0 500 Metres

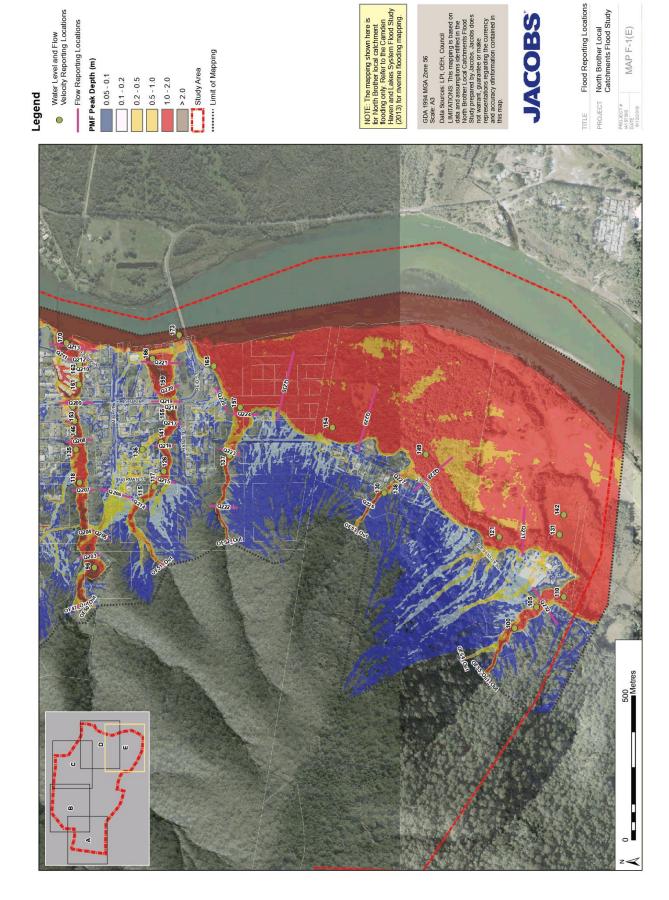


Table F-1 Summary of Peak Flood Level (m AHD) and Velocity (m/s) at Selected Locations

5% AEP 2% AEP 1% AEP
Water Velocity Water Velocity Water Velocity
1.43 0.1 2.01 0.0 2.11 0.0
1.58 0.1 2.01 0.1 2.11 0.1
9.96 1.7 10.11 1.8 10.23 1.9
4.29 0.5 4.35 0.5 4.40 0.5
15.69 0.5 15.71 0.5 15.70 0.5
9.84 0.4 9.90 0.4 9.90 0.4
19.60 1.3 19.78 1.4 19.92 1.5
14.06 0.6 14.11 0.7 14.10 0.7
19.74 1.4 19.79 1.5 19.80 1.6
11.07 0.7 11.11 0.8 11.12 0.8
6.88 0.6 6.94 0.7 6.96 0.7
3.53 0.3 3.62 0.4 3.69 0.4
3.42 0.7 3.61 0.2 3.68 0.2
3.73 0.5 3.81 0.6 3.84 0.4
3.38 0.1 3.54 0.3 3.59 0.4
5.65 1.2 5.68 1.2 5.69 1.2
4.51 0.2 4.58 0.2 4.60 0.2
1.47 0.2 2.04 0.2 2.11
4.44 0.2 4.77 0.3 4.81
10.91 0.6 10.98 0.9 10.98
1.40 0.1 2.03 0.1 2.11
11.57 2.0 11.60 2.3 11.61
17.30 1.0 17.40 1.0 17.41
3.19 0.2 3.28 0.3 3.31
14.87 1.8 14.93
19.20 1.3 19.33 2.0 19.34
23.25 1.4 23.31 1.5 23.31
5.04 0.1 5.09 0.1 5.09
31.37 0.7 31.45 0.7 31.47
3.08 0.3 3.17 0.3 3.20
9.73 0.1 9.75 0.1 9.74
3.62 1.5 3.69 1.7 3.69

و	0.2 EY	<u>,</u>	2%	5% AEP	2% AEP	AEP	1%,	1% AEP	0.5%	0.5% AEP	죠	PMF	Cha Cha	Change
	Water Level	Velocity												
	4.67	8.0	4.72	1.1	4.77	1.3	4.77	1.3	4.78	1.4	5.52	2.7	4.78	1.4
	3.22	0.2	3.47	0.2	3.58	0.3	3.62	0.3	3.67	0.3	4.58	6:0	3.69	0.2
	12.81	0.4	12.85	0.4	12.89	0.4	12.88	0.4	12.89	0.4	13.51	0.7	12.90	0.4
	16.90	1.6	17.04	1.7	17.13	1.8	17.20	1.9	17.26	2.0	18.52	3.0	17.25	2.0
	10.13	6.0	10.26	1.0	10.36	1.1	10.42	1.2	10.48	1.3	11.68	2.7	10.47	1.3
	22.15	1.4	22.27	1.6	22.35	1.8	22.41	1.9	22.46	2.0	23.57	4.1	22.44	2.0
	1.26	0.0	1.26	0.0	2.01	0.0	2.11	0.0	2.11	0.0	2.14	0.1	3.01	0.0
	06.6	6.0	96.6	1.1	10.05	1.2	10.09	1.3	10.13	1.4	10.87	2.8	10.12	1.4
	5.35	0.1	5.40	0.1	5.48	0.1	5.47	0.1	5.50	0.1	62.5	0.3	5.50	0.2
	12.00	1.3	12.22	1.4	12.36	1.7	12.46	1.6	12.54	1.7	14.09	2.8	12.54	1.7
	4.10	1.1	4.23	1.3	4.33	1.4	4.40	1.5	4.45	1.6	5.64	2.7	4.47	1.6
	13.43	7.0	13.47	0.7	13.51	7.0	13.50	6:0	13.51	8.0	14.00	1.2	13.51	8.0
	29.75	1.1	29.77	1.2	29.81	1.4	29.81	1.4	29.83	1.4	30.22	2.7	29.84	1.4
	25.40	6.0	25.43	1.0	25.48	1.1	25.47	1.1	25.49	1.1	25.87	1.9	25.47	1.1
	10.65	0.4	10.73	0.4	10.81	0.4	10.81	0.4	10.83	0.4	11.35	2.0	10.83	0.4
	32.85	0.4	32.93	0.4	33.01	0.5	33.00	0.5	33.03	0.5	33.70	1.6	33.03	0.5
	20.46	1.3	20.55	1.5	20.61	1.6	20.60	1.6	20.63	1.6	21.52	3.3	20.63	1.6
	8.55	8.0	8.82	8.0	9.02	8.0	9.01	8.0	9.04	8.0	9:36	9.0	9.04	0.7
	8.73	0.1	8.80	0.1	8.86	0.2	8.85	0.2	8.87	0.2	90.6	0.2	8.87	0.2
	8.91	0.4	96.8	0.5	9.03	9.0	9.02	9.0	9.04	9.0	99.6	1.6	9.05	9.0
	33.43	1.9	33.45	2.1	33.48	2.3	33.48	2.4	33.49	2.5	33.87	4.8	33.48	2.5
	14.96	8.0	15.02	6.0	15.06	1.0	15.07	1.0	15.09	1.1	15.53	1.9	15.08	1.1
	23.68	8.0	23.78	6.0	23.88	8.0	23.90	6.0	23.94	1.1	24.55	2.4	23.95	1.1
	8.29	6.0	8.32	1.0	8.35	1.0	8.35	1.0	8.36	1.1	8.62	1.6	8.38	1.1
	1	1	19.17	2.0	19.20	2.5	19.19	2.4	19.20	2.6	19.35	4.7	19.24	2.5
	39.69	0.4	39.80	0.5	39.91	1.0	39.91	9.0	39.94	9.0	41.00	1.6	39.94	9.0
	20.79	0.4	20.81	0.4	20.83	0.5	20.83	0.5	20.84	9.0	20.99	2.0	20.83	0.5
	32.40	1.4	32.46	1.5	32.51	1.7	32.51	1.7	32.52	1.7	32.93	2.7	32.58	1.6
	40.13	9.0	40.25	9.0	40.34	8.0	40.35	0.7	40.39	7.0	41.05	1.7	40.39	0.7
	7.45	8.0	7.50	8.0	7.53	6.0	7.52	6:0	7.53	6:0	7.74	6:0	7.53	6.0
	30.43	1.7	30.46	2.0	30.50	2.2	30.49	2.2	30.50	2.2	30.76	3.7	30.53	2.2
	32.17	8.0	32.21	0.7	32.23	1.2	32.24	9.0	32.25	9:0	32.47	1.1	32.25	0.7
65	25.34	0.0	25.38	3.3	25.42	3.7	25.42	2.7	25.42	3	75 74	2 2	74.70	0

5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 3.2 37.63	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 2.4 39.28	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 3.2 37.63 2.4 39.28 2.5 21.66 3.8 4.56	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 2.4 39.28 2.5 21.66 3.8 4.56 1.1 32.1	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 2.5 13.87 3.4 21.79 3.0 29.14 1.1 4.16 3.0 29.14 1.1 4.16 3.0 7.92 1.1 4.16 3.2 37.63 2.4 39.28 2.6 21.66 3.8 4.56 1.1 3.21 1.1 3.29 1.8 23.94 3.5 28.49	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 29.14 1.1 4.16 3.0 29.14 3.0 29.14 4.16 3.52 2.4 39.28 2.5 21.66 3.8 4.56 1.1 32.1 1.1 32.1 1.8 2.394 3.5 28.49 4.0 16.30	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.7 13.94 1.7 13.94 1.7 13.94 1.7 4.16 3.0 7.92 1.2 6.55 3.2 37.63 2.4 39.28 2.6 21.66 3.8 4.56 1.1 3.21 1.8 2.3.94 3.5 2.8.49 4.0 16.30 3.6 2.8.74	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 2.4 39.28 2.6 21.66 3.8 4.56 1.1 32.1 1.8 23.94 4.0 16.30 3.5 28.74 2.5 39.1 4.0 16.30 2.5 39.1	54 20.30 18 18.96 12 18.94 22 16.91 25 13.87 34 21.79 30 29.14 11 4.16 30 29.14 11 4.16 30 7.92 12 6.55 32 37.63 24 39.28 26 21.66 38 4.56 11 32.1 18 23.94 40 16.30 36 28.74 25 3.91 16 20.09 23 12.89	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.7 13.94 1.7 13.94 1.1 4.16 2.4 39.28 2.4 39.28 3.8 4.56 1.1 32.1 1.8 23.94 3.5 28.49 4.0 16.30 3.6 28.74 2.5 3.91 1.6 2.009 2.3 12.89 1.7 15.16	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.7 13.94 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 3.2 37.63 2.4 39.28 4.6 1.1 1.1 3.21 1.8 2.3.94 3.5 2.8.49 4.0 16.30 3.6 2.8.74 2.5 3.91 1.6 2.009 2.3 1.2.89 1.7 15.16 2.3 3.01	5.4 20.30 1.8 18.96 1.2 18.94 2.2 16.91 2.5 13.87 2.5 13.87 3.0 29.14 1.8 9.85 1.7 13.94 1.7 13.94 1.7 13.94 1.7 13.94 2.4 39.28 2.4 39.28 2.6 21.66 3.8 4.56 1.1 3.21 1.8 23.94 3.5 28.49 4.0 16.30 3.6 28.74 2.5 3.91 1.6 20.09 1.7 15.16 2.3 3.01 1.7 15.16 2.3 3.01 1.9 28.51	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.7 13.94 1.7 13.94 1.7 13.94 1.7 13.94 1.7 13.94 2.4 39.28 2.4 39.28 2.6 21.66 3.8 4.56 1.1 3.21 1.2 6.55 3.8 4.56 1.1 3.21 4.0 16.30 3.5 28.49 4.0 16.30 3.6 28.74 2.5 3.91 1.6 20.09 1.7 15.16 2.3 3.01 1.9 28.51 1.9 28.51 2.5 27.61	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.1 4.16 3.0 7.92 1.7 13.94 1.1 4.16 3.0 7.92 2.4 39.28 2.4 39.28 4.5 21.66 3.8 4.56 1.1 3.21 4.0 16.30 3.5 28.49 4.0 16.30 3.6 28.74 2.5 3.91 1.6 20.09 2.3 3.01 1.9 28.51 1.9 28.51 1.9 2.5 2.5 27.61 1.1 3.97	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.1 4.16 3.0 7.92 1.7 13.94 1.1 4.16 3.2 37.63 2.4 39.28 2.6 21.66 3.8 4.56 1.1 3.21 1.2 6.55 3.8 4.56 4.0 16.30 3.5 28.49 4.0 16.30 3.6 28.74 2.5 3.91 1.6 20.09 2.5 3.91 1.7 15.16 2.3 3.01 1.9 28.51 1.9 2.5 2.5 27.61 1.1 3.97 1.1 3.97 2.5 24.59	5.4 20.30 118 18.96 12 18.94 22 16.91 25 13.87 25 13.87 34 21.79 30 29.14 11 4.16 30 29.14 11 4.16 30 7.92 12 6.55 24 39.28 26 21.66 38 4.56 11 3.21 14 3.23 40 16.30 36 28.74 25 3.91 16 20.09 25 3.91 16 20.09 23 3.01 16 2.061 25 27.61 11 3.97 11 3.97 12 41.29	5.4 20.30 1.8 18.96 1.2 18.94 2.5 16.91 2.5 13.87 3.4 21.79 3.0 29.14 1.8 9.85 1.7 13.94 1.1 4.16 3.0 7.92 1.2 6.55 2.4 39.28 2.5 21.66 3.8 4.56 1.1 3.21 1.1 3.24 4.0 1.0 3.8 4.56 3.8 4.56 3.8 4.56 3.8 4.56 4.0 1.1 3.5 28.49 4.0 1.6 2.5 3.91 1.6 2.009 2.3 1.289 1.1 3.97 1.1 3.97 1.1 3.97 1.1 3.97 1.1 3.91
118 12 22 22 25 34 30 30 47 47 47 47 47 47 47 47 47 47 47 47 47	3.0 2.2 2.2 2.2 2.2 2.3 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	18 12 22 22 22 33 4 13 11 11 12 32 30 11 11 30 11 31 31 31 31 31 31 31 31 31 31 31 31	1.8 1.2 2.2 2.2 2.5 3.0 1.1 1.7 1.7 1.7 1.2 2.5 3.0 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.8 1.2 2.2 2.2 2.5 3.0 1.1 1.1 1.1 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.1	1.1	1.1 1.2 2.2 2.2 2.2 2.5 3.4 1.1 1.1 1.1 1.2 3.0 1.1 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.1	118 122 222 223 334 330 111 111 111 111 111 111 111 111 111	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.1	1.1	1.8 1.1 1.2 2.2 2.2 2.2 2.3 3.0 1.1 1.1 1.1 1.1 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.8 1.1 1.2 2.2 2.2 2.2 2.3 3.0 1.1 1.1 1.1 1.1 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.1 1.2 2.2 2.2 2.2 2.3 3.0 1.1 1.1 1.1 1.1 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.1 1.2 2.2 2.2 2.2 2.2 2.3 3.0 1.1 1.1 1.1 1.1 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	1.1 1.2 2.2 2.2 2.2 2.2 2.3 3.0 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	1.8 1.2 2.2 2.2 2.2 2.3 3.4 3.0 1.1 1.1 1.1 1.1 1.1 1.2 2.5 2.5 2.5 3.0 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1
2.5 2.5 3.4 3.0 3.0 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7 4.7	3.0 2.2 2.2 2.2 2.2 2.3 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	2.2 2.2 2.2 3.3 3.0 1.1 1.1 1.2 3.0 3.0 3.0 1.2 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 1.3 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	12 2 2 2 2 2 2 2 3 4 4 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 3 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.2 2.2 2.2 2.5 3.4 1.1 1.1 1.1 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	1.1 1.2 2.2 2.2 2.3 3.4 1.1 1.1 1.2 2.4 2.4 3.0 3.0 1.1 1.2 2.2 3.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	2.5 2.2 2.2 2.5 3.0 1.1 1.1 1.1 1.2 3.0 3.0 3.0 3.0 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	122 222 222 233 330 111 111 123 36 40 40	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 3 4 4 2 3 3 8 8 3 3 2 3 3 8 8 8 3 3 9 9 9 9 9 9 9 9 9 9 9 9 9	1.2 2.2 2.2 2.2 2.2 3.0 1.1 1.1 1.1 1.2 3.0 3.0 3.0 3.0 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	2.5	1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1	2.2 2.2 2.2 2.2 2.3 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	122 222 223 334 111 111 112 123 136 136 137 138 138 137 138 140 151 151 151 151 151 151 151 151 151 15	2.5 2.5 2.5 2.5 3.0 1.1 1.1 1.1 1.2 2.5 2.6 3.0 3.0 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	122 222 223 334 111 111 112 330 330 330 330 330 330 330 330 330 33	122 222 223 334 111 111 112 123 36 36 36 36 36 36 36 36 37 38 38 38 38 36 40 37 38 38 38 38 38 38 38 38 38 38 38 38 38	122 222 222 223 334 336 330 111 111 112 338 34 35 40 338 338 34 36 36 37 37 38 38 38 38 38 38 38 38 38 38 38 38 38	1.2 2.2 2.2 2.2 2.3 3.4 1.1 1.1 1.1 1.2 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8
17.32 14.24 22.33 29.63 10.84	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 37.82	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.38 8.16 37.82	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 8.16 37.82 22.32 5.37	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 8.16 39.55 22.32 22.33 5.37	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.38 8.16 37.82 39.55 22.32 5.37 5.37 24.34 24.34	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 8.16 39.55 22.32 23.32 24.34 26.74	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 37.82 22.32 22.32 5.37 24.34 24.34 16.67	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 37.82 39.55 22.32 22.32 5.37 16.67 16.67 28.93	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.16 8.16 37.82 39.55 22.32 22.32 24.34 16.67 16.67 28.93 5.12 20.57	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.38 8.16 8.16 37.82 39.55 22.32 5.37 5.37 28.33 24.34 28.74 16.67 16.67 28.93 5.12 20.57 13.26 15.53	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.38 8.16 37.82 22.32 22.32 23.37 5.37 24.34 28.74 16.67 28.93 5.12 20.57 13.26 15.53	17.32 14.24 22.33 29.63 10.84 14.54 4.72 8.38 8.38 8.16 37.82 22.32 22.32 24.34 24.34 16.67 16.67 16.67 16.67 16.67 28.74 16.67 17.53 24.34 28.93 24.14 26.74 27.12 28.93 27.12 28.93 27.13 28.93 27.13 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 28.93 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Water Level Valocity Level Water Level Valocity Level Water Level Valocity Level Level Level Water Level Level Level Level Level Water Level		0.2 EY	ΕΥ	5% AEP	\EP	2%.	2% AEP	1%1	1% AEP	0.5%	0.5% AEP	ā	PMF	1%AEP + Clir Change	1%AEP + Climate Change
380 17 386 18 393 20 396 20 1815 11 1825 13 1834 15 1832 15 591 11 1825 13 1834 15 1832 15 1414 0.6 1423 0.8 143 0.9 143 10 1744 0.6 1423 0.8 143 0.9 143 10 1744 0.6 1423 0.9 1749 0.9 1750 0.9 1744 0.8 1746 0.9 1749 0.9 1750 0.9 1681 0.0 143 0.9 1749 0.9 1750 0.9 1682 0.0 174 0.9 1749 0.9 1750 0.9 1683 0.1 1.0 0.0 1.0 0.0 1.1 0.0 1.1 1684 0.2 0.1 1.0 0.0 1.1		Water Level	Velocity	Water Level	Velocity										
18.15 1.1 18.25 1.3 18.34 1.5 18.32 1.5 1.5 18.3 1.5 18.3 1.5 18.3 1.5 18.3 1.5 18.3 1.5 18.3 1.5 18.3 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	01	3.80	1.7	3.86	1.8	3.93	2.0	3.96	2.0	3.98	2.1	4.55	3.9	3.98	2.1
591 10 585 11 589 12 601 12 1414 06 1423 08 143 09 1434 10 1744 08 1746 09 1749 09 1750 09 989 10 98 12 1005 13 1006 13 661 14 689 16 676 18 677 18 585 06 591 07 597 07 600 08 1629 03 1634 04 1637 05 163 10 1629 03 1634 04 1637 05 163 06 1629 03 1634 04 1637 05 163 10 1629 03 1634 04 1637 05 163 10 1629 04 1559 04 1585 07 1434 10 <tr< td=""><td></td><td>18.15</td><td>1.1</td><td>18.25</td><td>1.3</td><td>18.34</td><td>1.5</td><td>18.32</td><td>1.5</td><td>18.36</td><td>1.6</td><td>19.20</td><td>3.8</td><td>18.37</td><td>1.5</td></tr<>		18.15	1.1	18.25	1.3	18.34	1.5	18.32	1.5	18.36	1.6	19.20	3.8	18.37	1.5
14,14 0.6 14,23 0.8 14,30 0.9 14,34 1,0 17,44 0.8 17,49 0.9 17,49 0.9 17,50 0.9 989 1.0 9.88 1.2 10.05 1.3 10.06 1.3 661 1.4 6.69 1.6 6.76 1.8 6.77 1.8 585 0.6 5.91 0.7 5.97 0.7 6.00 1.3 1629 0.3 16.34 0.4 16.37 0.5 16.37 0.8 10.78 0.7 10.92 0.9 11.00 1.0 1.0 1.0 11.25 0.0 2.01 0.0 2.01 1.0 1.0 1.0 1.0 11.24 0.8 11.2 1.0 1.2 0.0 2.01 1.1 0.0 2.01 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1		5.91	1.0	5.95	1.1	5.99	1.2	6.01	1.2	6.03	1.3	6.50	2.1	6.03	1.3
1744 08 1746 09 1749 09 1750 09 989 10 9.98 1.2 1005 1.3 1006 1.3 661 1.4 6.69 1.6 6.76 1.8 6.77 1.8 585 0.6 5.91 0.7 5.97 0.7 1.006 1.3 1629 0.3 16.34 0.4 16.37 0.7 1.60 1.8 1078 0.7 10.92 0.9 11.00 1.1 1.0 1.10 1.1 0.0 2.11 0.0 1.1 0.0 2.11 0.0 1.1 0.0 2.01 0.0 2.11 0.0 2.11 0.0 2.11 0.0 2.11 0.0 2.11 0.0 2.01 0.1 1.0 1.1 0.0 2.1 0.0 2.11 0.0 2.0 1.1 0.0 2.1 1.0 1.1 0.1 1.1 0.1 1.1 0.1 1.1 <td></td> <td>14.14</td> <td>9.0</td> <td>14.23</td> <td>0.8</td> <td>14.30</td> <td>6:0</td> <td>14.34</td> <td>1.0</td> <td>14.38</td> <td>1.1</td> <td>15.22</td> <td>2.0</td> <td>14.38</td> <td>1.1</td>		14.14	9.0	14.23	0.8	14.30	6:0	14.34	1.0	14.38	1.1	15.22	2.0	14.38	1.1
989 110 9.98 12 1005 13 1006 13 661 14 6.69 1.6 6.76 1.8 6.77 1.8 585 0.6 5.91 0.7 5.97 0.7 1.6 1.8 6.77 1.8 1629 0.3 16.34 0.4 16.37 0.5 16.37 0.5 1.8 0.7 1.8 1078 0.7 10.92 0.9 11.00 1.0 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		17.44	8.0	17.46	6.0	17.49	6.0	17.50	6.0	17.51	6.0	17.69	1.2	17.51	6.0
661 14 6.69 1.6 6.76 1.8 6.77 1.8 585 0.6 5.91 0.7 5.97 0.7 6.00 0.8 1629 0.3 16.34 0.4 16.37 0.7 6.00 0.8 1078 0.7 10.92 0.9 11.00 1.0 11.03 1.0 1125 0.0 1.25 0.0 2.11 0.0 2.11 0.0 1548 0.4 15.59 0.4 15.65 0.4 15.70 0.4 1128 0.1 1.36 0.7 13.59 0.6 1.0 0.1 0.0 1128 0.1 1.30 0.2 2.01 0.1 1.1 0.2 1.1 1.3 0.7 14.14 0.8 0.1 1.0 1.1 0.2 1.1 1.3 0.7 14.14 0.8 0.1 1.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1 1.		9.89	1.0	96.6	1.2	10.05	1.3	10.06	1.3	10.09	1.4	10.79	2.8	10.09	1.4
585 0.6 5.91 0.7 5.97 0.7 6.00 0.8 1629 0.3 16.34 0.4 16.37 0.5 16.37 0.5 1078 0.7 10.92 0.9 11.00 1.0 11.03 1.0 115.48 0.4 15.59 0.4 15.65 0.4 15.70 0.4 115.8 0.1 1.25 0.0 2.01 0.0 2.11 0.0 112.8 0.1 1.30 0.2 2.01 0.1 2.11 0.0 10.36 0.1 1.30 0.2 2.01 0.1 2.1 0.0 11.24 0.8 11.27 1.0 11.30 0.7 14.14 0.8 11.24 0.8 11.27 1.0 11.30 0.7 14.14 0.8 11.24 0.8 11.27 1.0 11.3 1.2 0.1 1.1 0.1 11.3 1.1 0.1 1.1 1.1 </td <td></td> <td>6.61</td> <td>1.4</td> <td>69.9</td> <td>1.6</td> <td>92.9</td> <td>1.8</td> <td>6.77</td> <td>1.8</td> <td>6.80</td> <td>1.9</td> <td>7.35</td> <td>3.3</td> <td>6.77</td> <td>1.9</td>		6.61	1.4	69.9	1.6	92.9	1.8	6.77	1.8	6.80	1.9	7.35	3.3	6.77	1.9
(629) 0.3 (6.34) 0.4 (6.37) 0.5 (6.37) 0.5 (6.37) 0.5 (6.37) 0.5 (6.37) 0.5 10.92 0.9 11.00 1.0 11.03 1.0 15.48 0.4 15.59 0.4 15.65 0.4 15.70 0.4 13.46 0.3 13.41 0.4 13.65 0.7 13.59 0.6 10.36 0.1 1.30 0.2 2.01 0.1 2.11 0.0 10.36 1.6 10.52 1.7 10.65 1.9 1.0 0.0 11.24 0.8 11.27 1.0 11.30 0.7 14.14 0.8 11.24 0.8 11.27 1.0 11.30 0.7 14.14 0.8 11.39 0.7 14.13 0.7 14.14 0.8 0.9 11.44 0.4 2.55 0.4 2.72 0.4 2.79 0.4 11.44 0.4 <td>_</td> <td>5.85</td> <td>9.0</td> <td>5.91</td> <td>0.7</td> <td>5.97</td> <td>0.7</td> <td>00.9</td> <td>8.0</td> <td>6.03</td> <td>8.0</td> <td>6.79</td> <td>1.5</td> <td>6.03</td> <td>8.0</td>	_	5.85	9.0	5.91	0.7	5.97	0.7	00.9	8.0	6.03	8.0	6.79	1.5	6.03	8.0
1078 0.7 10.92 0.9 11.00 1.0 11.03 1.0 15.48 0.4 1.55 0.0 2.01 0.0 2.11 0.0 15.48 0.4 15.59 0.4 15.65 0.4 15.70 0.4 13.6 0.3 13.41 0.4 13.65 0.7 13.59 0.6 10.36 0.1 1.30 0.2 2.01 0.1 2.11 0.0 10.36 1.6 10.52 1.7 10.65 1.9 10.73 2.0 11.24 0.8 11.27 1.0 11.30 0.7 14.14 0.8 11.39 0.7 14.08 0.7 14.13 0.7 14.14 0.8 2.41 0.4 2.55 0.4 2.72 0.4 2.72 0.4 2.73 1.154 0.4 2.55 0.4 2.72 0.4 2.79 0.4 1.07 1.1 1.3 1.	_	16.29	0.3	16.34	0.4	16.37	0.5	16.37	0.5	16.38	0.5	16.64	6:0	16.38	0.5
155 0.0 1.25 0.0 201 0.0 211 0.0 1548 0.4 1559 0.4 1565 0.4 1570 0.4 1346 0.3 1341 0.4 1365 0.7 1359 0.6 1036 1.6 10.52 1.7 10.65 1.9 10.73 2.0 1124 0.8 11.27 1.0 11.30 1.2 11.11 0.2 11396 0.7 14.08 0.7 14.13 0.7 14.14 0.8 11396 0.7 14.08 0.7 14.13 0.7 14.14 0.8 241 0.4 2.55 0.4 2.72 0.4 2.72 0.4 2.79 0.4 1164 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.9 0.3 9.8 0.3 1.5 1.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1		10.78	7.0	10.92	6.0	11.00	1.0	11.03	1.0	11.07	1.1	12.10	2.6	11.07	1.0
15.48 0.4 15.59 0.4 15.65 0.4 15.70 0.4 13.16 0.3 13.41 0.4 13.65 0.7 13.59 0.6 10.36 0.1 1.30 0.2 2.01 0.1 2.11 0.2 10.36 1.6 10.52 1.7 10.65 1.9 10.73 2.0 11.24 0.8 11.27 1.0 11.30 1.2 11.31 1.3 13.39 0.7 14.08 0.7 14.13 0.7 14.14 0.8 2.41 0.4 2.55 0.4 2.72 0.4 2.72 0.4 2.72 0.4 2.79 0.4 1.164 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.59 0.2 2.02 0.4 2.72 0.4 2.73 0.4 1.154 1.5 11.76 1.5 11.79 1.6 0.3 1.158 <t< td=""><td>142</td><td>1.25</td><td>0.0</td><td>1.25</td><td>0.0</td><td>2.01</td><td>0.0</td><td>2.11</td><td>0.0</td><td>2.11</td><td>0.0</td><td>2.15</td><td>0.2</td><td>3.01</td><td>0.0</td></t<>	142	1.25	0.0	1.25	0.0	2.01	0.0	2.11	0.0	2.11	0.0	2.15	0.2	3.01	0.0
13.16 0.3 13.41 0.4 13.65 0.7 13.59 0.6 10.36 1.6 10.52 1.7 10.65 1.9 10.73 2.0 11.24 0.8 11.27 1.0 11.30 1.2 11.31 1.3 13.39 0.7 14.08 0.7 14.13 0.7 14.14 0.8 2.41 0.4 2.55 0.4 2.72 0.4 2.72 0.4 11.64 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.59 0.2 2.02 0.4 2.72 0.4 2.72 0.4 11.64 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.59 0.2 2.02 0.4 2.72 0.4 2.72 0.4 1.07 1.5 10.29 1.8 10.39 2.2 10.43 1.5 1.08 0.2 0.2 2.02	~	15.48	0.4	15.59	0.4	15.65	0.4	15.70	0.4	15.73	0.5	16.27	1.2	15.73	0.5
128 0.1 1.30 0.2 201 0.1 2.11 0.2 1036 16 10.52 1.7 10.65 1.9 10.73 2.0 1124 0.8 11.27 1.0 11.30 1.2 11.31 1.3 1396 0.7 14.08 0.7 14.13 0.7 14.14 0.8 2.41 0.4 2.55 0.4 2.72 0.4 2.72 0.4 2.79 0.4 1.164 1.0 11.71 1.3 11.76 1.5 11.79 1.6 0.4 959 0.2 2.02 0.4 2.72 0.4 2.72 0.4 1.79 1.6 959 0.2 0.2 0.2 0.4 2.72 0.4 1.6 0.3 10.77 1.5 10.29 1.8 10.39 2.2 10.43 1.5 10.17 1.5 10.29 1.8 10.39 2.7 10.43 1.5	_	13.16	0.3	13.41	0.4	13.65	7.0	13.59	9.0	13.70	0.7	15.18	1.6	13.70	0.7
10.36 1.6 10.52 1.7 10.65 1.9 10.73 2.0 11.24 0.8 11.27 1.0 11.30 1.2 11.31 1.3 13.36 0.7 14.08 0.7 14.13 0.7 14.14 0.8 2.41 0.4 2.55 0.4 2.72 0.4 2.72 0.1 0.1 9.59 0.2 2.02 0.4 2.72 0.4 2.79 0.4 11.64 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.59 0.2 2.72 0.4 2.72 0.4 2.79 0.4 11.64 1.0 11.71 1.3 11.76 1.5 11.79 1.6 9.59 0.2 2.72 0.0 2.71 0.0 2.1 0.0 1.14 0.5 1.30 0.0 2.02 0.1 1.5 1.15 0.0 1.14 0.5 1.13		1.28	0.1	1.30	0.2	2.01	0.1	2.11	0.2	2.11	0.2	2.41	8:0	3.01	0.1
1124 08 1127 10 1130 12 1131 13 1336 0.7 1408 0.7 1413 0.7 1414 0.8 133 0.1 1.38 0.2 202 0.1 2.12 0.1 241 0.4 2.55 0.4 2.72 0.4 2.79 0.4 1164 1.0 11.71 1.3 11.76 1.5 11.79 1.6 959 0.2 9.72 0.4 2.72 0.4 2.79 0.4 1017 1.5 10.29 1.8 10.39 0.3 982 0.3 1017 1.5 10.29 1.8 10.39 2.2 10.43 1.5 1017 1.5 10.29 1.8 10.39 2.2 11.4 0.0 6.40 0.2 6.49 0.2 6.57 0.2 11.0 10.2 11.19 0.5 11.28 0.7 11.32		10.36	1.6	10.52	1.7	10.65	1.9	10.73	2.0	10.80	2.0	12.68	3.1	10.81	2.0
1338 0.7 14.08 0.7 14.13 0.7 14.14 0.8 133 0.1 1.38 0.2 202 0.1 2.12 0.1 241 0.4 2.55 0.4 2.72 0.4 2.79 0.1 959 0.2 9.72 0.4 2.72 0.4 2.79 0.4 1154 1.0 11.71 1.3 11.76 1.5 11.79 1.6 959 0.2 9.72 0.2 0.4 2.79 0.4 1.6 10.77 1.5 10.29 1.8 10.39 2.2 11.79 1.6 10.78 0.0 1.30 0.0 202 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 11.3 0.9 11.37 0.3 1.44 0.4 2.02 0.2 2.11 0.2 11.39 0.7 1.8 0.7 1.32		11.24	8.0	11.27	1.0	11.30	1.2	11.31	1.3	11.32	1.3	11.48	2.8	11.31	1.3
133 0.1 1.38 0.2 202 0.1 2.12 0.1 241 0.4 2.55 0.4 2.72 0.4 2.79 0.4 1154 1.0 11.71 1.3 11.76 1.5 11.79 1.6 959 0.2 9.72 0.2 9.79 0.3 982 0.3 10.77 1.5 10.29 1.8 10.39 2.2 10.43 1.5 1.28 0.0 1.30 0.0 202 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 11.3 0.0 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 11.37 0.3 1.44 0.4 2.02 2.11 0.2 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4		13.98	7.0	14.08	0.7	14.13	0.7	14.14	8.0	14.17	6.0	15.14	1.3	14.17	6.0
241 0.4 2.55 0.4 2.72 0.4 2.79 0.4 1154 1.0 11.71 1.3 11.76 1.5 11.79 1.6 959 0.2 9.72 0.2 9.79 0.3 982 0.3 10.17 1.5 10.29 1.8 10.39 2.2 10.43 1.5 1.28 0.0 1.30 0.0 202 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 11.3 0.9 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 11.37 0.3 1.44 0.4 2.02 0.2 11.0 0.2 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.40 2.8 4.55 3.2 4.66	_	1.33	0.1	1.38	0.2	2.02	0.1	2.12	0.1	2.12	0.1	2.23	0.3	3.03	0.0
1164 1.0 11.71 1.3 11.76 1.5 11.79 1.6 959 0.2 9.72 0.2 9.79 0.3 982 0.3 10.17 1.5 10.29 1.8 10.39 2.2 10.43 1.5 1.28 0.0 1.30 0.0 2.02 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 6.60 0.2 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.40 2.8 4.29 0.3 4.29 0.3 4.31 0.3 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.19 0.7 4.27 0.7 4.31		2.41	0.4	2.55	0.4	2.72	0.4	2.79	0.4	2.85	0.5	4.33	1.2	3.11	0.4
959 0.2 9.72 0.2 9.79 0.3 982 0.3 10.17 1.5 10.29 1.8 10.39 2.2 10.43 1.5 128 0.0 1.30 0.0 202 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 6.60 0.2 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.25 0.4 4.29 0.3 4.29 0.3 4.31 0.3 4.19 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.2 2.2 1.94 0.7 4.27 0.7 4.31 <t< td=""><td></td><td>11.64</td><td>1.0</td><td>11.71</td><td>1.3</td><td>11.76</td><td>1.5</td><td>11.79</td><td>1.6</td><td>11.82</td><td>1.7</td><td>12.40</td><td>2.4</td><td>11.82</td><td>1.7</td></t<>		11.64	1.0	11.71	1.3	11.76	1.5	11.79	1.6	11.82	1.7	12.40	2.4	11.82	1.7
10.77 1.5 10.29 1.8 10.39 2.2 10.43 1.5 6.40 0.0 1.30 0.0 202 0.0 2.11 0.0 6.40 0.2 6.49 0.2 6.57 0.2 6.60 0.2 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.25 0.4 4.29 0.3 4.29 0.3 4.31 0.3 4.19 0.7 4.27 0.7 4.29 0.3 4.29 0.3 4.31 0.8 4.19 0.7 4.27 0.7 4.31 0.8 4.31 0.8 4.19 0.7 4.27 0.7 4.31 0.8 0.9 4.19 0.7 4.27 0.7		65.6	0.2	9.72	0.2	9.79	0.3	9.82	0.3	9.85	0.3	10.30	0.3	9.85	0.3
128 0.0 1.30 0.0 2.02 0.0 2.11 0.0 640 0.2 6.49 0.2 6.57 0.2 6.60 0.2 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 10.73 0.3 1.44 0.4 2.02 0.2 2.11 0.2 2.30 0.4 2.48 0.9 10.94 1.0 10.92 1.0 4.25 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.46 0.7 4.27 0.7 4.31 0.8 4.31 0.8 4.19 0.7 4.27 0.7 2.22 2.7 2.2 2 2.46 0.4 2.8 2.4 2.8 4.31<		10.17	1.5	10.29	1.8	10.39	2.2	10.43	1.5	10.48	1.5	11.30	4.4	10.47	1.5
640 02 649 0.2 657 0.2 660 0.2 11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 10.73 0.3 1.44 0.4 2.02 0.2 2.11 0.2 2.30 0.4 1.083 0.9 10.94 1.0 10.92 1.0 4.25 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.19 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.19 1.7 2.04 2.1 2.22 2.1 2.7 2.2 2.46 0.7 4.27 0.7 4.31 0.8 4.31 0.8 4.19 0.7 4.27 0.7 2.2 2.1 2.2 2.2 2.46 0.4 2.6 2.1 2.2 2.1 <td></td> <td>1.28</td> <td>0.0</td> <td>1.30</td> <td>0.0</td> <td>2.02</td> <td>0.0</td> <td>2.11</td> <td>0.0</td> <td>2.12</td> <td>0.0</td> <td>2.19</td> <td>0.2</td> <td>3.02</td> <td>0.0</td>		1.28	0.0	1.30	0.0	2.02	0.0	2.11	0.0	2.12	0.0	2.19	0.2	3.02	0.0
11.19 0.5 11.28 0.7 11.32 0.8 11.35 0.9 1.37 0.3 1.44 0.4 2.02 0.2 2.11 0.2 1.073 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.25 0.4 4.29 0.3 4.29 0.3 4.31 0.3 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.19 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.46 0.4 2.84 0.7 4.31 0.8 4.31 0.8 3.46 0.7 2.24 2.22 2.1 2.27 2.2 2.46 0.4 2.84 0.7 2.84 0.7 <		6.40	0.2	6.49	0.2	6.57	0.2	09:9	0.2	6.63	0.2	7.56	1.2	6.63	0.3
1.37 0.3 1.44 0.4 2.02 0.2 2.11 0.2 10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.25 0.4 4.29 0.3 4.29 0.3 4.31 0.3 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.6 0.4 2.6 0.4 4.31 0.8 9.0 0.0 0.0	60	11.19	0.5	11.28	0.7	11.32	8.0	11.35	6.0	11.36	1.0	11.70	2.0	11.36	1.0
10.73 0.7 10.83 0.9 10.94 1.0 10.92 1.0 2.30 0.4 2.48 0.4 2.58 0.4 2.61 0.4 4.25 0.4 4.29 0.3 4.29 0.3 4.31 0.3 4.40 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.18 0.7 4.27 0.7 4.31 0.8 1.7 2.04 2.1 2.22 2.2 2.8 0.4 2.1 2.22 2.1 2.27 2.2 2.4 0.4 2.84 0.7 2.84 0.0 2.00 0.0		1.37	0.3	1.44	0.4	2.02	0.2	2.11	0.2	2.12	0.2	2.38	6.0	3.01	0.1
230 0.4 2.48 0.4 2.58 0.4 2.61 0.4 425 0.4 4.29 0.3 4.29 0.3 4.31 0.3 440 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.18 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.16 0.1 2.64 0.1 2.84 0.0 2.00 0.0		10.73	7.0	10.83	6.0	10.94	1.0	10.92	1.0	10.97	1.0	11.51	1.5	10.96	1.0
425 0.4 4.29 0.3 4.29 0.3 4.29 0.3 4.31 0.3 440 2.8 4.55 3.2 4.66 3.4 4.72 3.6 4.18 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.18 0.1 2.64 0.1 2.84 0.0 2.00 0.0		2.30	0.4	2.48	0.4	2.58	0.4	2.61	0.4	2.65	0.4	3.52	1.2	3.03	0.3
440 28 4.55 3.2 4.66 3.4 4.72 3.6 4.18 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.16 0.1 2.54 0.1 2.84 0.0 2.00 0.0		4.25	0.4	4.29	0.3	4.29	0.3	4.31	0.3	4.32	0.4	4.49	0.7	4.32	0.4
4.18 0.7 4.27 0.7 4.31 0.8 4.31 0.8 1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.18 0.4 2.54 0.4 2.84 0.0 2.00 0.0		4.40	2.8	4.55	3.2	4.66	3.4	4.72	3.6	4.77	3.8	5.81	6.2	4.78	3.8
1.93 1.7 2.04 2.1 2.22 2.1 2.27 2.2 2.1 2.27 2.2 2.1 2.1 2.1 2.2 2.1 2.1 2.1 2.1 2.1		4.18	2.0	4.27	0.7	4.31	8.0	4.31	8.0	4.33	8.0	5.04	1.3	4.33	0.8
216 01 254 01 284 00 200 00	~	1.93	1.7	2.04	2.1	2.22	2.1	2.27	2.2	2.33	2.3	3.30	4.5	3.05	1.5
2.04 2.04 2.04	164	2.16	0.1	2.54	0.1	2.84	0.0	2.90	0.0	2.93	0.0	3.37	0.3	3.03	0.0

1%AEP + Climate Change	Velocity	0.1	0.1	0.5	0.1	0.2	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.0	
1%AE C	Water Level	3.01	3.01	4.67	3.01	3.32	3.01	3.07	3.17	3.01	3.01	3.02	3.01	3.01	
PMF	Velocity	0.4	7.0	1.1	2.4	8:0	6.0	9.0	0.3	0.4	6:0	0.5	0.4	0.1	c
۵.	Water Level	2.14	3.05	5.27	2.15	3.78	2.20	3.50	3.55	2.12	2.12	2.66	2.15	2.13	0.40
0.5% AEP	Velocity	0.0	0.2	0.5	0.2	0.2	0.2	0.5	0.1	0.2	0.1	0.2	0.1	0.0	0
0.5%	Water Level	2.11	2.51	4.67	2.11	3.32	2.12	2.78	3.16	2.11	2.11	2.43	2.11	2.11	2 11
1% AEP	Velocity	0.0	0.1	0.5	0.2	0.2	0.2	0.5	0.1	0.2	0.1	0.2	0.1	0.0	00
1%,	Water Level	2.11	2.49	4.64	2.11	3.29	2.11	2.73	3.14	2.11	2.11	2.41	2.11	2.11	2 11
2% AEP	Velocity	0.0	0.1	0.5	0.2	0.2	0.2	0.5	0.1	0.2	0.1	0.2	0.1	0.0	0.0
2% 1	Water Level	2.01	2.47	4.60	2.01	3.24	2.02	2.67	3.10	2.01	2.01	2.40	2.01	2.01	2 01
5% AEP	Velocity	0.1	0.1	0.5	0.4	0.2	0.3	0.4	0.1	0.3	0.3	0.2	0.3	0.2	
2% /	Water Level	1.26	2.37	4.56	1.53	3.21	1.27	2.55	3.07	1.27	1.26	2.38	1.30	1.46	
0.2 EY	Velocity	0.1	0.1	0.5	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	
0.2	Water Level	1.26	2.19	4.45	1.48	3.17	1.26	2.28	3.02	1.27	1.26	2.33	1.26	1.45	
١	⊇	165	166	167	168	169	170	171	172	173	174	175	176	177	178

1%AEP + Climate Change	12.5	11.1	6.1	4.8	2.9	6.7	7.1	1.6	2.7	3.7	56.0	4.8	2.0	8.7	4.6	2.4	2.6	7.5	0.4	0.7	2.4	3.2	1.1	2.5	9.0	1.2	1.0	0.5	0.0	0.1	67.3
PMF	31.8	21.1	10.6	8.4	4.7	10.4	26.4	2.3	7.2	12.3	249.4	13.6	6.8	46.1	27.8	11.0	13.0	37.3	0.4	2.5	10.5	11.2	4.2	9.3	1.6	4.3	4.9	6.5	0.0	0.5	179.7
0.5% AEP	12.5	11.1	6.1	4.8	2.9	6.7	7.1	1.6	2.7	3.7	44.9	4.8	2.0	8.5	4.3	2.3	2.3	7.2	0.4	7.0	2.4	3.2	1.1	2.5	9.0	1.2	1.0	0.5	0.0	0.1	67.3
1% AEP	11.4	10.4	2.7	4.5	2.9	9:9	6.1	1.5	2.5	3.3	34.3	4.3	1.8	7.2	3.5	2.0	2.0	0:9	0.4	0.5	2.1	2.8	1.0	2.2	9.0	1.0	6:0	0.3	0.0	0.1	61.0
2% AEP	10.9	10.2	2.5	4.5	2.8	6.4	5.5	1.5	2.5	3.0	25.5	4.1	1.6	6.7	3.1	1.6	1.7	6.2	0.4	0.5	2.2	2.9	1.0	2.3	0.5	1.1	6.0	0.2	0.0	0.1	53.5
5% AEP	8.7	8.1	4.8	3.6	2.6	6.3	3.4	1.3	2.1	2.1	12.2	2.8	1.0	4.1	1.8	8.0	6.0	3.9	0.4	0.4	1.5	2.1	0.7	1.7	0.4	8.0	9.0	0.1	0.0	0.1	45.4
0.2 EY	0.9	0.9	3.7	2.6	2.2	5.2	1.2	1.2	1.8	1.1	9.8	1.6	0.4	2.0	6.0	0.2	0.1	1.6	0.4	0.3	1.0	1.3	9.0	1.3	0.3	9.0	0.3	0.1	0.0	0.1	34.4
Ω	Q33	Q34	Q35	Q36	Q37	Q38	Q39	040	041	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62	Q63
1%AEP + Climate Change	0.1	1.6	0.3	9.0	2.5	6.1	169.8	164.1	3.5	1.2	2.8	4.7	9.8	15.5	21.9	5.2	158.6	12.2	15.2	7.6	18.0	8.1	22.0	11.5	40.9	54.9	0.3	2.7	10.3	12.2	12.7
PMF	9.0	6.2	1.2	2.3	9.7	25.3	521.8	437.7	7.1	8.7	7.3	15.4	40.8	61.0	117.0	9.7	540.7	32.4	47.7	20.0	65.8	20.4	80.8	43.5	182.7	234.3	1.4	10.9	28.2	35.9	37.2
0.5% AEP	0.1	1.6	0.3	9:0	2.5	6.1	169.8	164.1	3.5	1.2	2.8	4.7	8.6	15.5	26.1	2.9	160.6	12.2	15.2	7.6	18.0	8.1	22.0	11.5	41.0	41.3	0.3	2.7	10.3	12.2	12.7
1% AEP	0.1	1.4	0.3	9.0	2.2	5.4	151.4	147.2	3.2	1.1	2.5	4.3	8.8	14.1	23.1	3.2	143.6	11.1	13.8	8.9	15.8	7.4	19.4	10.4	37.3	31.7	0.3	2.5	9.2	11.1	11.5
2% AEP	0.1	1.4	0.3	0.5	2.2	5.5	131.0	125.6	3.2	1.1	2.5	4.4	8.4	11.6	17.1	2.8	124.5	10.3	13.3	6.3	15.0	7.0	18.1	10.6	34.0	22.9	0.3	2.5	8.7	10.7	11.1
5% AEP	0.1	1.0	0.2	0.4	1.6	4.1	106.3	102.9	2.4	1.0	1.8	3.0	6.3	9.6	12.4	1.9	94.5	7.9	9.5	5.1	10.5	5.3	13.1	7.3	25.7	11.7	0.2	1.8	6.9	8.0	8.4
0.2 EY	0.1	8.0	0.2	0.3	1.2	2.9	73.8	70.5	1.6	6.0	1.1	1.9	3.6	5.9	8.3	1.5	62.1	5.6	6.3	3.5	7.1	3.7	0.6	4.9	16.4	10.4	0.2	1.3	4.9	2.7	2.7
Ω	02	03	Q 4	92	90	Δ7	80	60	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	020	Q21	Q22	Q23	Q24	025	026	027	028	020	030	Q31	Q32

1%AEP + Climate Change	8.0	8.9	12.1	3.9	2.0	7.0	1.9	6.4	9.6	1.7	17.6	17.5	4.5	5.6	7.1	8.3	4.7	23.4	21.6	5.2	8.4	6.0	15.0	15.5	8.7	2.7	6.2	12.2	8.0	7.3	12.6	4.2
PMF	23.3	17.1	37.5	21.9	9.1	20.4	7.3	18.0	15.4	5.5	9.09	61.9	19.1	20.2	31.1	36.2	33.6	74.0	70.3	23.4	62.1	3.8	37.5	41.6	21.1	0.9	22.9	31.7	31.0	30.9	49.3	10.4
0.5% AEP	8.0	6.8	12.1	3.9	2.0	7.0	1.9	6.4	9.6	1.7	17.6	17.5	4.5	5.6	7.1	8.3	4.7	23.2	20.8	5.2	8.5	6.0	15.0	15.5	8.7	2.7	6.2	12.2	8.0	7.3	12.6	4.2
1% AEP	7.2	6.1	10.7	3.4	1.7	6.5	1.6	5.8	5.2	1.5	15.6	15.7	4.0	5.0	6.3	7.3	3.7	20.1	18.2	4.8	7.5	8.0	13.6	14.1	8.0	2.4	5.3	11.1	7.1	6.5	11.5	3.9
2% AEP	7.3	6.3	10.2	3.3	1.6	6.1	1.5	5.4	5.1	1.5	15.4	14.9	4.1	5.2	6.5	7.6	4.0	20.0	18.0	5.0	7.7	6.0	12.1	12.8	7.5	2.2	4.7	10.6	6.3	6.5	11.4	3.8
5% AEP	5.1	4.2	7.0	2.5	1.0	4.9	1.0	4.4	4.1	6.0	11.3	10.7	3.0	3.9	4.6	5.4	1.9	13.7	12.5	3.7	5.2	0.7	9.7	6.6	0.9	1.8	3.3	8.2	4.4	4.7	8.4	3.3
0.2 EY	3.4	3.0	3.5	1.4	0.4	3.5	0.5	3.0	3.0	0.5	7.0	5.8	2.2	2.8	3.3	3.7	0.4	7.4	9.9	2.3	3.4	0.4	6.8	6.9	4.2	1.2	1.9	5.5	2.5	3.3	5.8	2.6
Q	Q101	Q102	Q103	Q104	Q105	Q106	Q107	Q108	Q109	Q110	Q111	Q112	Q113	Q114	Q115	Q116	Q117	Q118	Q119	Q120	Q121	Q122	Q123	Q124	Q125	Q126	Q127	Q128	Q129	Q130	Q131	Q132
1%AEP + Climate Change	78.0	72.8	2.7	3.3	1.8	1.3	2.7	3.0	7.5	4.8	10.7	1.0	7.5	1.0	16.4	3.6	5.8	7.8	8.4	1.0	7.0	9:9	7.4	9.9	7.7	13.8	1.3	6.0	8.0	9.3	7.4	6.5
PMF	231.4	214.7	2.6	13.4	5.0	5.9	12.6	16.9	32.6	20.3	41.1	3.9	38.7	13.9	73.7	6.6	19.9	29.6	32.1	2.8	26.3	16.6	16.8	28.1	19.5	43.7	1.9	2.8	24.9	32.1	21.4	17.2
0.5% AEP	78.0	72.8	2.7	3.3	1.8	1.3	2.7	3.0	7.5	4.8	10.7	1.0	7.5	1.0	16.8	3.6	5.8	7.8	8.4	1.0	7.0	9.9	7.4	6.6	7.7	13.8	1.3	6.0	8.0	9.3	7.4	6.5
1% AEP	70.0	65.5	2.4	2.9	1.6	1.2	2.4	2.6	9.9	4.1	9.6	6.0	6.2	0.4	15.2	3.2	5.2	7.1	9.7	6.0	6.1	0.0	9:9	8.9	7.1	12.5	1.2	8.0	7.2	8.4	6.8	0.9
2% AEP	61.4	67.9	2.5	3.0	1.7	1.2	2.5	2.7	6.9	4.3	9.7	6.0	6.5	9.0	15.6	3.1	5.4	9.7	7.9	1.0	6.4	5.4	6.3	0.6	7.1	12.5	1.2	6.0	7.1	8.7	7.0	0.9
5% AEP	49.9	47.2	1.8	2.1	1.3	6.0	1.8	1.9	4.7	2.8	7.3	7.0	3.8	0.0	11.3	2.4	4.0	5.2	5.7	7.0	4.3	4.5	5.2	6.8	5.5	9.1	1.0	8.0	5.5	6.3	5.1	4.6
0.2 EY	35.8	34.1	1.3	1.6	1.0	0.7	1.3	1.4	3.3	1.8	5.4	0.5	1.7	0.0	7.7	1.7	2.9	4.0	4.0	0.4	2.7	3.0	3.6	5.0	4.2	6.3	8.0	9.0	3.9	4.6	3.8	3.3
<u> </u>	Q69	Q70	Q71	Q72	Q73	Q74	Q75	076	Q77	Q78	Q79	080	Q81	Q82	Q83	Q84	Q85	Q86	Q87	Q88	O89	060	Q91	Q92	Q93	Q94	Q95	960	Q97	038	039	Q100

1%AEP + Climate Change	10.5	18.9	9.5	3.5	2.8	0.4	13.6	6.6	9.5	2.5	14.9	15.5	10.3	6.2	5.8	5.6	8.3	8.5	2.3	0.1	2.9	5.2	6.8	7.7	8.1	8.2	8.1	7.7	6.5	7.5	8.9
PMF	50.3	70.0	34.7	9.1	9.1	4.7	34.5	45.5	50.7	9.4	28.2	31.5	28.2	25.7	21.9	19.5	36.2	55.1	3.6	0.2	5.8	23.3	32.9	40.6	43.0	38.7	54.2	54.8	21.7	55.5	55.2
0.5% AEP	10.3	18.9	9.5	3.5	2.8	0.4	13.6	6.6	9.5	2.5	14.9	15.5	10.3	6.2	5.8	5.6	8.3	8.5	2.3	0.1	5.9	5.2	8.9	7.7	8.1	8.2	8.1	7.7	6.5	7.5	8.9
1% AEP	9.0	17.3	9.8	3.2	2.6	0.3	12.6	8.8	8.2	2.2	13.7	14.1	9.2	5.3	5.0	5.0	7.1	7.0	2.2	0.1	2.8	4.6	0.9	6.7	7.0	7.0	8.9	6.5	5.4	6.3	7.5
2% AEP	7.6	15.3	7.7	2.8	2.2	0.3	11.7	7.3	7.0	1.8	11.6	12.4	7.8	4.4	4.1	4.1	2.7	6.3	2.2	0.1	2.8	4.6	6.1	6.9	7.3	7.5	7.4	7.1	5.9	8.9	8.1
5% AEP	5.3	11.5	6.1	2.2	1.7	0.2	10.0	5.0	4.8	1.2	9.4	9.4	6.2	3.4	3.0	3.2	4.1	3.8	1.9	0.1	2.3	3.3	4.3	4.8	5.1	5.3	4.8	4.5	3.7	4.2	5.3
0.2 EY	3.3	9.2	4.9	1.7	1.3	0.1	8.5	3.1	3.0	9.0	5.3	5.2	3.5	1.9	1.6	1.8	2.1	1.5	1.5	0.0	1.7	2.2	2.5	2.8	3.0	3.2	2.6	2.2	1.5	1.9	2.3
Ω	Q164	Q165	Q166	Q167	Q168	Q169	Q170	Q171	Q172	Q173	Q174	Q175	Q176	Q177	Q178	Q179	Q180	Q181	Q182	Q183	Q184	Q185	Q186	Q187	Q188	Q189	Q190	Q191	Q192	Q193	Q194
1%AEP + Climate Change	4.6	9.3	15.5	3.3	1.8	5.9	3.8	3.7	0.9	2.8	3.9	0.5	4.0	5.1	3.7	1.0	3.6	17.6	8.8	4.4	5.5	27.2	17.1	12.3	18.0	46.7	47.5	29.2	19.1	12.4	12.9
PMF	9.8	15.1	28.1	10.7	8.9	13.6	11.1	10.1	18.4	8.9	14.5	1.5	13.3	19.9	11.4	3.2	20.1	77.1	43.3	19.3	22.0	113.6	88.0	43.9	68.1	156.4	168.5	86.1	94.6	71.6	35.8
0.5% AEP	4.6	9.3	15.5	3.3	1.8	5.9	3.8	3.7	0.9	2.8	3.9	0.5	4.0	5.1	3.7	1.0	3.6	17.6	8.8	4.4	5.5	27.2	17.1	12.3	18.0	46.7	47.5	29.2	19.1	13.2	12.9
1% AEP	4.3	9.8	14.3	2.9	1.5	5.3	3.3	3.4	5.2	2.4	3.3	0.4	3.5	4.3	3.2	6.0	3.1	15.4	9.7	3.7	4.9	24.5	15.1	10.9	15.9	42.5	43.7	27.3	16.7	11.7	12.2
2% AEP	4.2	7.8	12.6	2.3	1.3	4.7	3.0	3.0	4.6	2.0	2.7	0.4	2.9	3.6	2.7	7.0	2.5	13.6	7.5	3.2	4.4	21.5	12.6	10.4	15.1	37.7	38.7	25.0	14.2	10.1	11.3
5% AEP	3.6	8.9	11.0	1.8	1.0	3.6	1.9	2.1	2.7	1.3	1.7	0.3	1.7	1.7	1.7	0.5	1.2	8.0	4.7	1.3	3.3	15.7	8.8	7.9	11.3	29.9	30.5	20.8	10.0	6.7	9.7
0.2 EY	2.9	5.3	8.5	1.1	7.0	2.1	8.0	6.0	1.2	7.0	7.0	0.2	8.0	7.0	8.0	0.3	9.0	3.7	2.7	0.2	2.4	11.7	5.5	5.2	7.3	22.7	23.4	17.3	6.3	4.6	8.3
<u> </u>	Q133	Q134	Q135	Q136	Q137	Q138	Q139	Q140	Q141	Q142	Q143	Q144	Q145	Q146	Q147	Q148	Q149	Q150	Q151	Q152	Q153	Q154	Q155	Q156	Q157	Q158	Q159	Q160	Q161	Q162	Q163

1%AEP + Climate Change	11.2	12.6	3.2	4.9	6.3	8.8	27.0	32.5	32.7	3.5	1.2	0.6	1.1	2.1	10.9	6.5	10.3	10.9	23.9	32.5	51.6	0.7	146.1	10.9	2.4	5.1	3.6	2.6	10.2	3.5	1.0
PMF	29.6	35.5	10.6	2.0	8.2	24.8	77.1	9.89	78.3	25.5	3.9	21.7	17.8	7.8	44.5	41.0	20.8	27.4	113.7	68.1	131.4	2.0	446.6	26.2	9.8	12.2	6.7	5.6	6.7	8.8	4.0
0.5% AEP	11.2	12.6	4.0	3.2	5.7	7.0	27.0	32.5	32.7	3.8	1.2	0.6	1.1	2.1	10.9	6.4	10.3	10.9	18.0	32.5	51.6	0.7	146.1	10.9	2.4	5.1	3.6	2.6	10.2	3.5	1.0
1% AEP	10.0	11.5	3.2	3.0	5.1	6.5	24.4	30.4	30.2	3.7	1.0	8.2	8.0	2.0	9.7	5.3	9.5	10.1	13.8	30.2	46.3	0.7	132.8	6.6	2.1	4.6	3.3	2.3	8.8	3.2	6.0
2% AEP	9.1	10.9	3.1	2.8	4.6	7.7	22.6	27.5	27.3	3.6	8:0	7.8	1.0	2.1	10.0	5.5	8.8	9.3	10.4	27.0	40.8	0.7	117.5	9.8	1.8	4.2	2.7	2.0	7.1	3.1	0.8
5% AEP	7.5	8.1	1.4	1.1	1.4	4.6	17.8	23.6	23.7	2.4	9.0	6.3	9.0	1.6	7.2	3.7	7.2	7.2	5.5	23.9	33.9	9.0	96.5	7.3	1.4	3.4	2.3	1.7	5.3	2.4	0.5
0.2 EY	5.2	5.8	1.1	1.2	1.5	3.1	12.0	18.3	18.5	1.2	0.4	4.6	0.4	1.1	5.1	1.9	5.2	5.1	4.2	18.5	24.0	0.5	55.7	5.1	8.0	2.4	1.9	7.0	3.0	1.7	0.2
Ω	Q226	Q227	Q228	Q229	0230	Q231	Q232	0233	Q234	Q235	Q236	Q237	Q238	Q239	Q240	Q241	Q242	0243	Q244	Q245	Q246	Q247	OF1_Out	OF23_Out	OF24_Out	OF25_Out	OF26_Out	OF27_Out	OF28_Out	OF32_Out	OF33_Out
1%AEP + Climate Change	9.0	5.4	6.2	3.1	9.2	8.2	6.1	8.2	39.1	29.3	9.0	0.9	33.5	35.0	32.4	34.0	3.4	34.5	38.0	11.6	14.4	16.2	21.5	21.7	18.6	22.9	23.8	12.9	15.3	17.5	1.5
PMF	54.7	52.7	39.5	5.9	44.7	50.7	19.6	29.0	105.8	82.4	22.9	13.7	98.4	108.6	110.4	101.7	19.1	104.8	125.6	39.5	55.2	65.1	80.2	81.5	79.8	87.5	92.6	34.8	44.1	52.4	6.3
0.5% AEP	0.6	5.4	7.1	2.5	6.6	8.2	6.3	7.9	39.1	29.3	0.6	0.9	33.5	35.0	32.4	33.9	3.1	34.2	37.8	11.6	14.4	16.2	21.5	21.7	18.6	22.9	23.1	12.9	15.3	16.9	1.5
1% AEP	8.1	4.6	6.5	2.4	9.0	7.1	9.6	7.1	35.2	26.3	8.3	9.6	29.9	31.4	28.8	30.9	2.4	30.9	32.0	10.2	12.8	14.4	19.5	19.6	16.4	20.5	20.7	11.6	13.8	15.2	1.4
2% AEP	8.4	4.7	6.5	2.4	8.8	5.9	4.8	6.1	31.2	22.7	7.4	5.1	26.5	27.5	25.0	27.0	1.6	27.1	30.2	9.6	12.4	13.6	17.6	17.6	14.6	18.7	18.4	10.8	13.0	14.7	1.4
5% AEP	6.4	2.8	5.0	1.8	7.0	4.3	3.3	4.3	26.2	19.2	6.4	4.3	21.4	21.8	18.4	21.4	0.7	21.4	22.0	8.0	10:0	10.8	13.7	13.7	10.4	14.3	13.1	8.7	6.6	10.7	1.1
0.2 EY	4.6	1.0	4.0	8.0	4.9	1.3	6.0	1.4	19.2	13.9	4.9	3.4	15.0	15.2	11.5	15.0	0.3	14.8	15.1	5.1	6.2	8.9	9.6	9.6	6.3	10.1	7.8	0.9	8.9	7.4	0.8
Ω	Q195	Q196	Q197	Q198	Q199	00200	Q201	Q202	Q203	Q204	Q205	0200	Q207	Q208	0200	Q210	Q211	Q212	Q213	Q214	Q215	Q216	Q217	Q218	Q219	0220	Q221	0222	0223	Q224	Q225

ate	2	0	-	**		0	0	0		
1%AEP + Climate Change	0.2	2.9	52.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0
PMF	8.0	7.7	137.2	5.5	0.1	0.2	0.7	0.0	0.0	0.0
0.5% AEP	0.2	2.9	52.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0
1% AEP	0.2	2.6	46.9	1.3	0.0	0.0	0.0	0.0	0.0	0.0
2% AEP	0.2	2.2	40.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
5% AEP	0.1	1.8	34.2	6.0	0.0	0.0	0.0	0.0	0.0	0.0
0.2 EY	0.1	1:1	24.1	7:0	0.0	0.0	0.0	0.0	0.0	0.0
9	OF55_Out	OF56_Out	OF41_Out	Up Ellerslie	Up Ellerslie2	Up Ellerslie3	Up Ellerslie4	Q248	0249	Q250
1%AEP + Climate Change	0.3	0.5	6.6	5.9	0.2	0.4	5.3	3.2	2.6	4.4
PMF	1.2	4.0	30.5	12.6	8.0	1.9	9.9	10.4	4.8	15.9
0.5% AEP	0.3	0.5	6.6	5.9	0.2	0.4	5.3	3.2	2.6	4.4
1% AEP	0.3	0.3	8.8	5.1	0.1	9.0	2.8	3.3	2.4	3.7
2% AEP	0.3	0.3	7.8	4.0	0.2	0.3	2.5	3.1	1.9	2.9
5% AEP	0.2	0.2	6.7	2.8	0.1	0.2	1.9	2.4	1.6	2.3
0.2 EY	0.1	0.2	5.0	1.0	0.1	0.1	1.3	1.5	1.6	1.
9	OF34_Out	OF35_Out	OF36_Out	OF37_Out	OF39_Out	OF40_Out	OF47_Out	OF50_Out	OF51_Out	OF52_Out



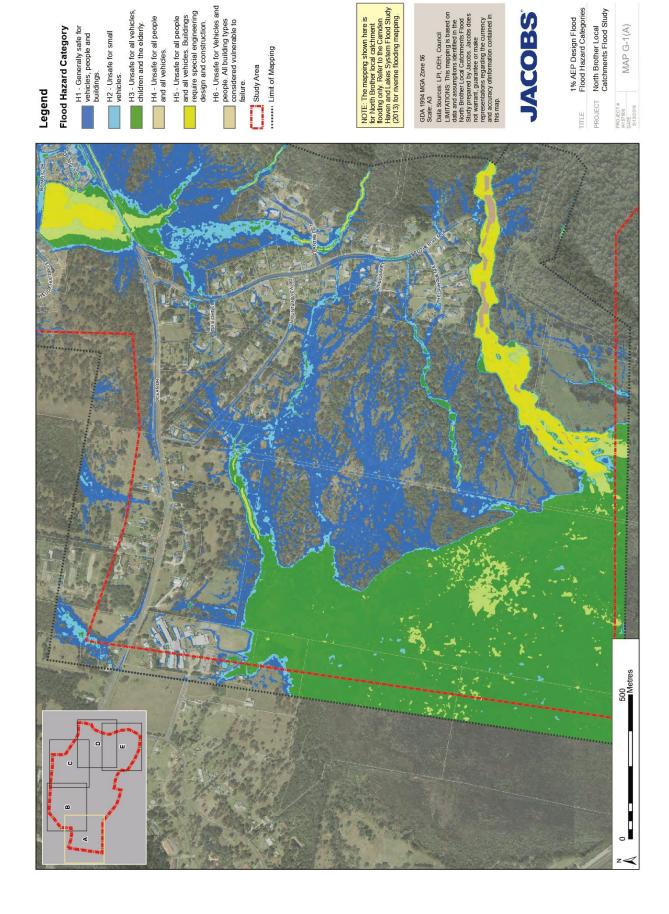
Appendix G. Provisional Hydraulic and Hazard Mapping

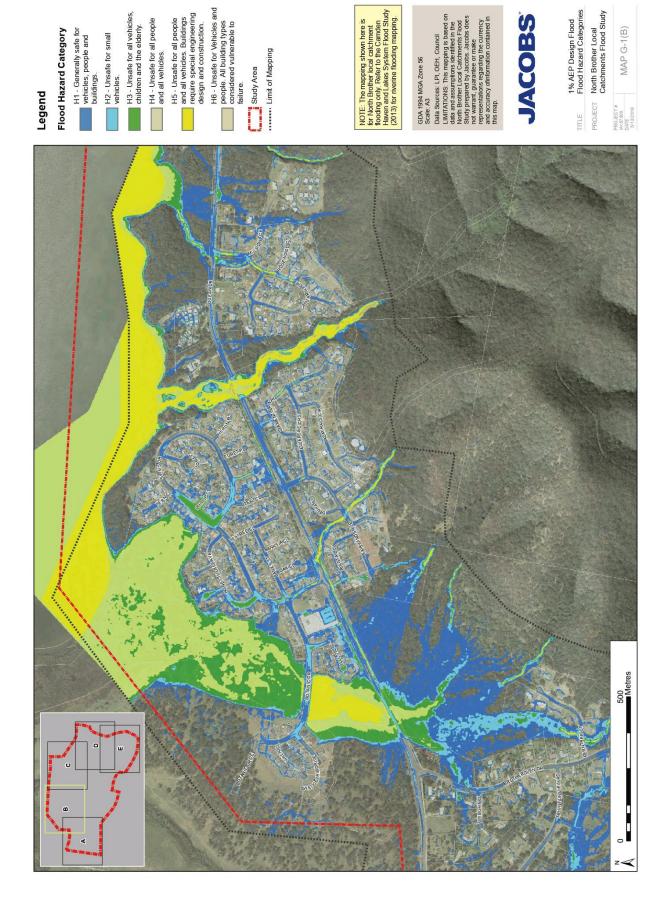
Figure G-1 - 1% AEP Flood - Provisional Flood Hazard

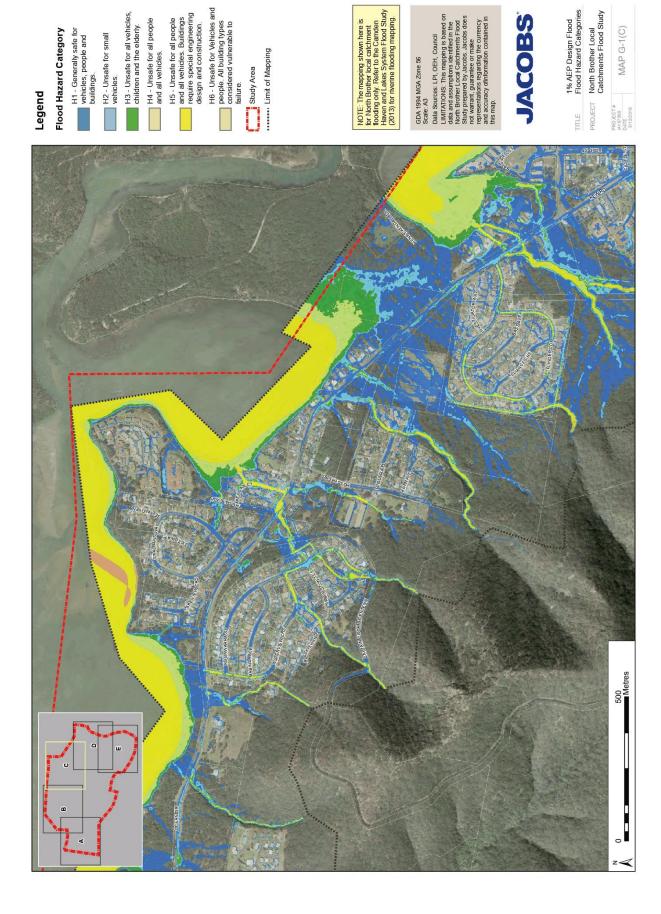
Figure G-2 - 1% AEP Flood - Climate Change Scenario Provisional Flood Hazard

Figure G-3 – 1% AEP Flood - Provisional Hydraulic Categories

Figure G-4 – 1% AEP Flood - Climate Change Scenario Provisional Hydraulic Categories





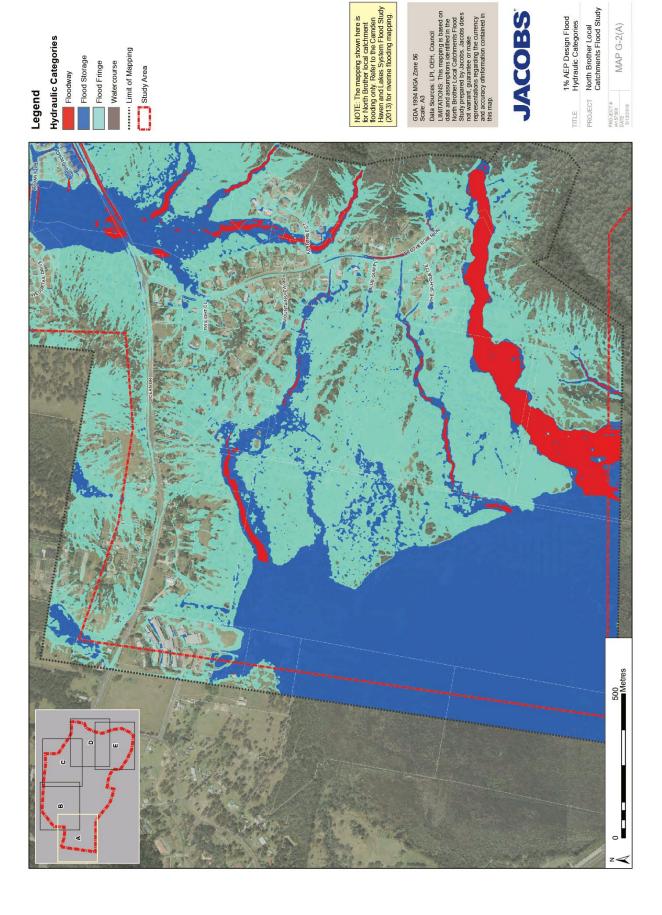


MAP G-1(D)

NOTE: The mapping shown here is for North Brother local catchment flooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. H6 - Unsafe for Vehicles and people. All building types considered vulnerable to failure. North Brother Local Catchments Flood Study 1% AEP Design Flood Flood Hazard Categories H5 - Unsafe for all people and all vehicles. Buildings require special engineering design and construction. CDA 1994 MGA Zone 56 Scale, AS, LP Data Sources; LPI, OEH, Council LMIXATIONS: This rapping is based on data and assumptions identified in the North Brother Local Calciments Flood Study prepared by actorish, actorish coes not warrant, quarantee or make representations regidning the currency and accuracy dinformation contained in H3 - Unsafe for all vehicles children and the elderly. H4 - Unsafe for all people and all vehicles. Flood Hazard Category H2 - Unsafe for small vehicles. Limit of Mapping Study Area Legend 500 ■Metres

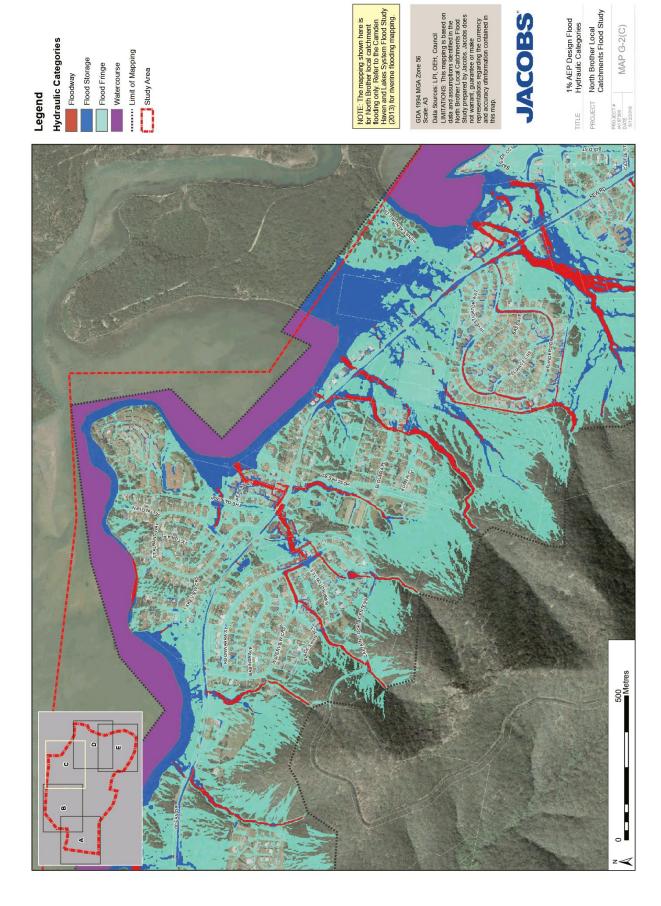
MAP G-1(E)

NOTE: The mapping shown here is for North Brother local catchment flooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. North Brother Local Catchments Flood Study 1% AEP Design Flood Flood Hazard Categories H5 - Unsafe for all people and all vehicles. Buildings require special engineering design and construction. H3 - Unsafe for all vehicles children and the elderly. H4 - Unsafe for all people and all vehicles. Flood Hazard Category GDA 1994 MGA Zone 56 Scale: A3 Data Sources: LP, OEH, Council LMTATIONS: This mapping is base data and assumptions the ruffied in the Morth Brother Local Catchments Floy H2 - Unsafe for small vehicles. Limit of Mapping Study Area 500 Metres

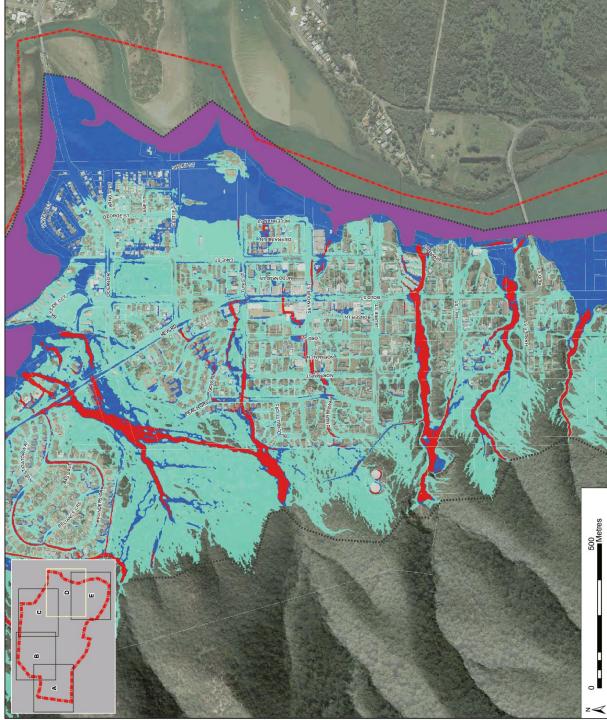


MAP G-2(B)

NOTE: The mapping shown here is for North Bother local catchment fooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. North Brother Local Catchments Flood Study GDA 1994 MGA Zone 56
Scale: A3
Data sources: LPI, OEH, Council
LIMITATIONS: This mapping is based or
data and assumptions identified in the
North Brother Local Catthemeris Flood
Study prepared by Jacobs. Jacobs clear
not warrist, guarantee or make
representations regarding the currency
and accuracy ofinformation contained in
his map. 1% AEP Design Flood Hydraulic Categories Hydraulic Categories Limit of Mapping Flood Storage Watercourse Study Area Floodway Legend

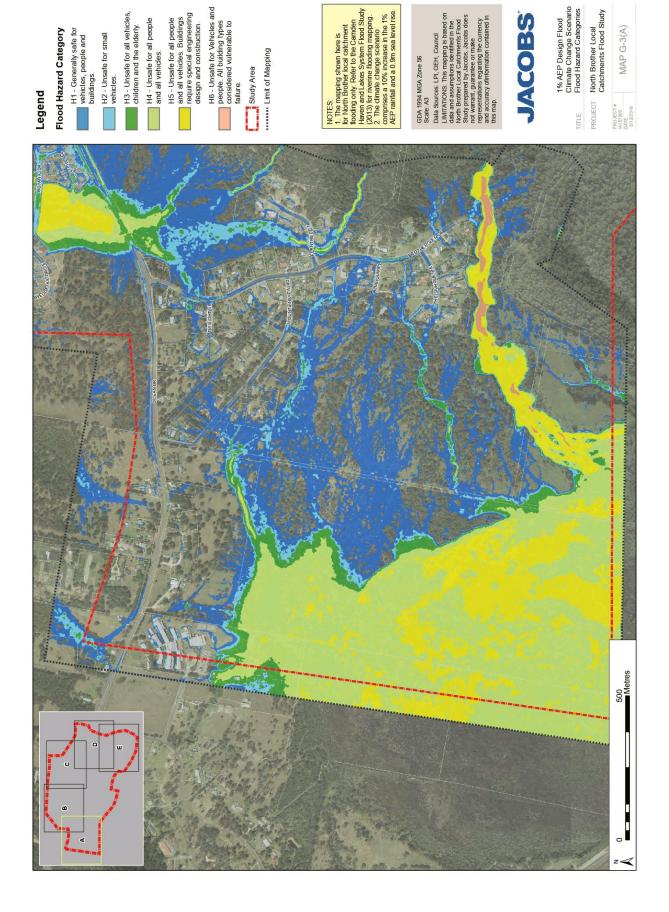


Hydraulic Categories
Floodway
Flood Storage
Flood Storage
Flood Finge
Water Ourse
Water Ourse
Water Ourse
Study Area
Stud



MAP G-2(E)

NOTE: The mapping shown here is for North Bother local catchment fooding only. Refer to the Camden Haven and Lakes System Flood Study (2013) for riverine flooding mapping. Hydraulic Categories Study Area 500 Metres



MAP G-3(B)

1. The mapping shown here is for Noth Bothle Cardiment flooding only. Relet to the Canden Haven and Lakes System Flood Study (2013) for twenne flooding mapping 2. The dimate change scenario comprises a 10% increase in the 1% AEP rainfall and a 0.9m sea level rise. H6 - Unsafe for Vehicles and people. All building types considered vulnerable to failure. 1% AEP Design Flood Climate Change Scenario Flood Hazard Categories North Brother Local Catchments Flood Study H5- Unsafe for all people and all vehicles. Buildings require special engineering design and construction. H3 - Unsafe for all vehicles children and the elderly. H4 - Unsafe for all people and all vehicles. GDA 1994 MGA Zone 56 Scale: A3 Data Sources: LPI, OEH, Council LIMITATIONS: This mapping is based idata and assumptions identified in the North Brother Local Catchments Flood H1 - Generally safe for vehicles, people and buildings. Flood Hazard Category H2 - Unsafe for small vehicles. Limit of Mapping Study Area Legend 500 ■Metres

MAP G-3(C)

NOTES. The mapping shown here is for North Bother local calchment flooding only. Refer to the Camden Haven and Lakes System Food Study (2013) for riverine flooding mapping. The dimate charge scenario comprises a 10% increase in the 1% AEP rainfall and a 0 8m sea level rise. H6 - Unsafe for Vehicles and people. All building types considered vulnerable to failure. 1% AEP Design Flood Climate Change Scenario Flood Hazard Categories North Brother Local Catchments Flood Study H5 - Unsafe for all people and all vehicles. Buildings require special engineering design and construction. GDA 1994 MGA Zone 56 Scale AB Scale AB Data Sources: LPI, OEH, Council LIMITATIONS: This mapping is based or data and assumptions forfulted in the North Bother Local Cactoments Frod H3 - Unsafe for all vehicles children and the elderly. H4 - Unsafe for all people and all vehicles. H1 - Generally safe for vehicles, people and buildings. Flood Hazard Category H2 - Unsafe for small vehicles. Limit of Mapping Study Area Legend 500 Metres

MAP G-3(D)

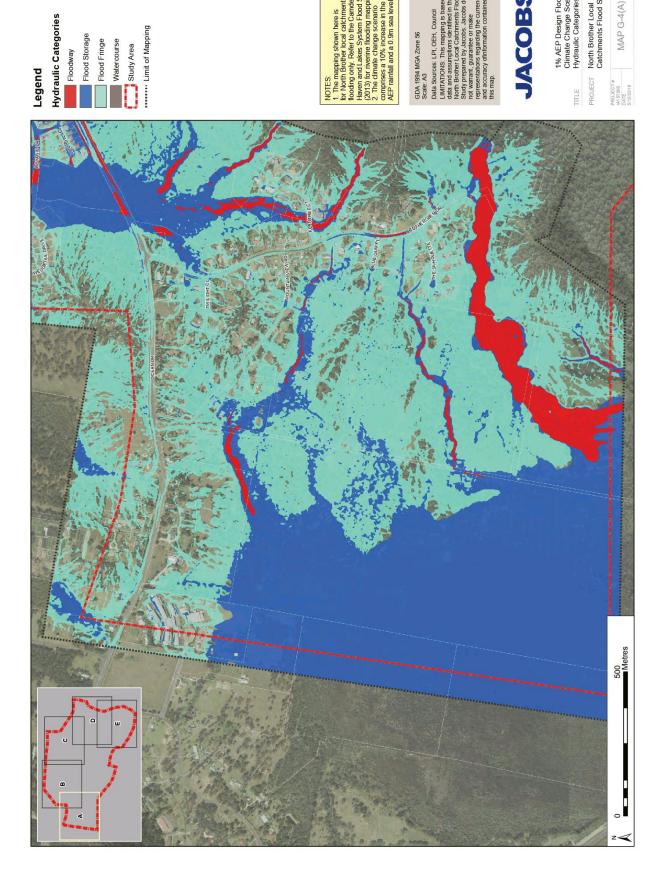
H6 - Unsafe for Vehicles and people. All building types considered vulnerable to failure. 1% AEP Design Flood Climate Change Scenario Flood Hazard Categories North Brother Local Catchments Flood Study H5- Unsafe for all people and all vehicles. Buildings require special engineering design and construction. H3 - Unsafe for all vehicle children and the elderly. H1 - Generally safe for vehicles, people and buildings. H4 - Unsafe for all people and all vehicles. GDA 1994 MGA Zone 56 Scale. A3 Data Sources: LP, OEH, Council LMRTAIONS: This mapping is base data and assumptions dertiffed in the North Brother Local Catchments Floo Flood Hazard Category H2 - Unsafe for small vehicles. Limit of Mapping Study Area Legend 500 ■Metres

North Brother Local Catchments Flood Study

MAP G-3(E)

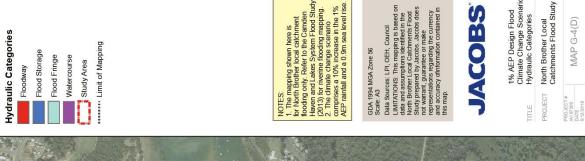
1% AEP Design Flood Climate Change Scenario Flood Hazard Categories

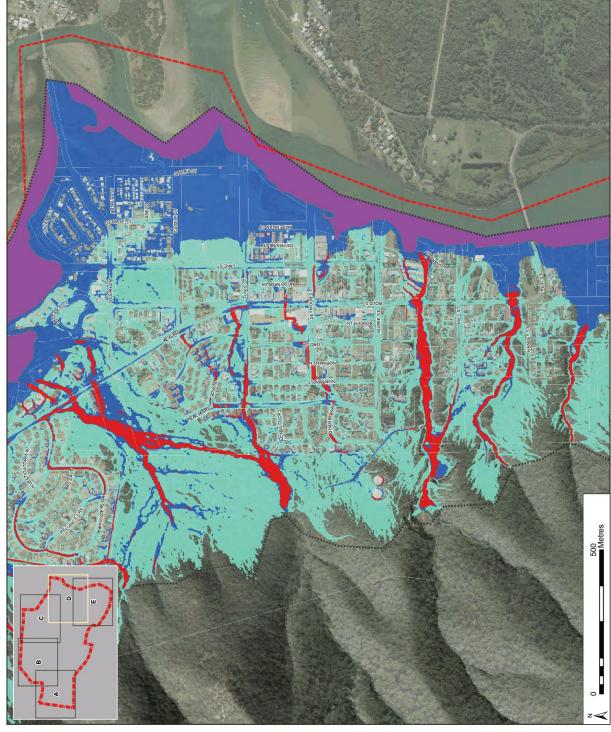
H5 - Unsafe for all people and all vehicles. Buildings require special engineering design and construction. H3 - Unsafe for all vehicle children and the elderly. H4 - Unsafe for all people and all vehicles. H1 - Generally safe for vehicles, people and buildings. GDA 1994 MGA Zone 56 Scale: A3 Data Sources: LP, OEH, Council LMTATIONS: This mapping is base data and assumptions the ruffied in the North Brother Local Catchments Floy Flood Hazard Category H2 - Unsafe for small vehicles. Limit of Mapping Study Area Legend 500 Metres

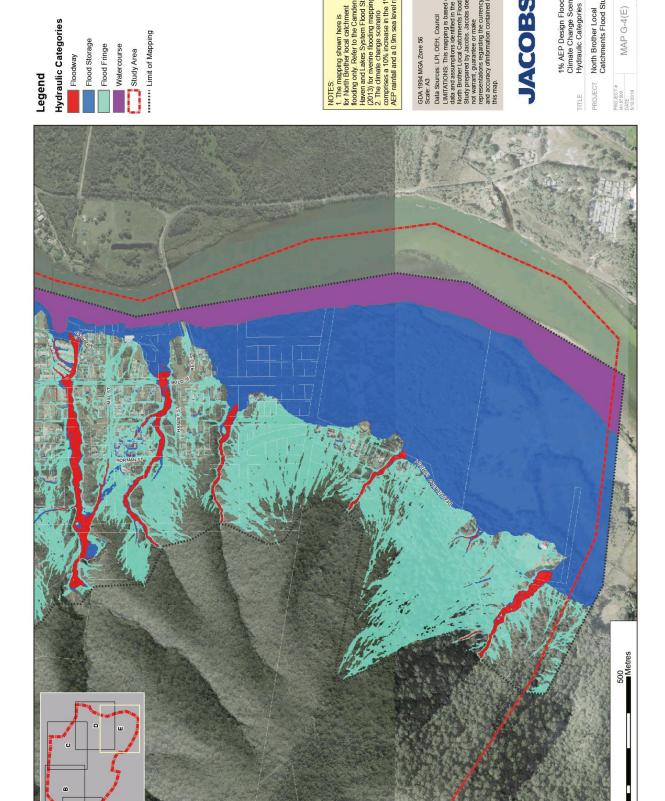


GDA 1994 MGA Zone 56
Scale: A3
Data Sources: LPI, OEH, Council
LIMITATIONS: This mapping is base,
data and assumptions identified in th
North Bother Local Catchments Flox
Study prepared by Jacobs, Jacobs, Jacobs Hydraulic Categories Limit of Mapping Flood Storage Watercourse Study Area Floodway Legend

Hydraulic Categories Limit of Mapping 500 Metres Legend







Draft Flood Study Report



Appendix H. Provisional Flood Planning Area Mapping

Flood Planning Area Study Area

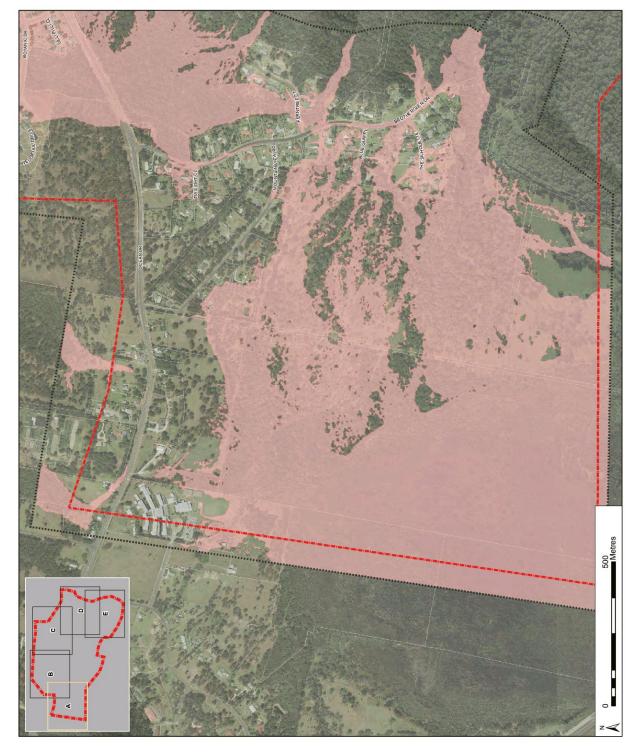
NOTES:

1. The mapping shown here is for Noth Brother local catchment fooding only Refer to the Camden Haven and Lakes System Food Study (2013) for riverne flooding mapping.

2. The food planning area mapping is based on the climate change scenario comprising a 10% increase in the 1% AEP rainfall and a 0.9m sea level rise.

als Sources, 10, OEH, Council
MITATIONS: This mapping is based on
and assumptions identified in the
other Brother Local Catchments Flood
of properated by Jacobs, Jacobs does
at warrant, guarantee or make
presentations regarding the currency
of accuracy ofinformation contained in
is map.





Flood Planning Area Study Area Study Area

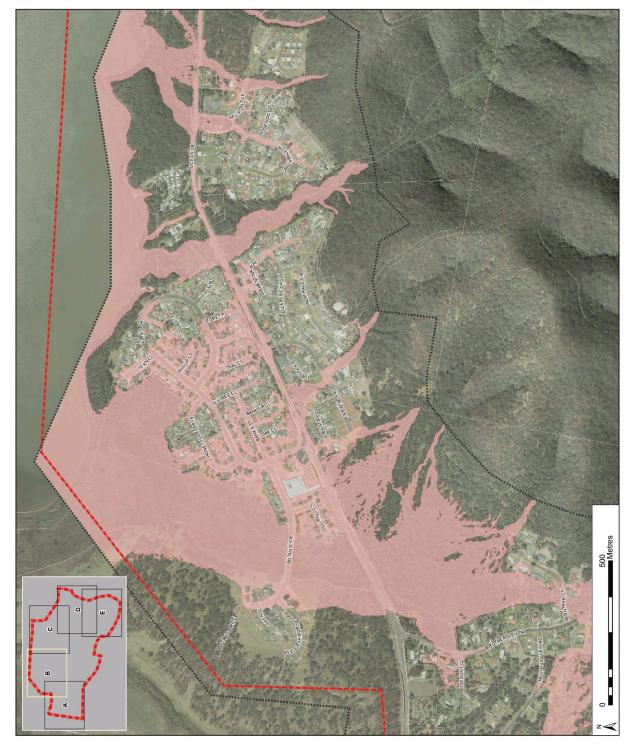
NOTES:

1. The mapping shown here is for North Brother local catchment flooding only Refer to the Camden Haven and Lakes System Flood Study (2013) for riverne flooding mapping.
2. The flood planning area mapping is based on the climate change scenario comprising a 10% increase in the 1% AEP rainfall and a 0.9m see level rise.

Omprising a 10% increase in the 1% ISDA 1994 MGA Zone 56 Scale: A3 Scale: A3







Flood Planning Area
Study Area
Limit of Mapping

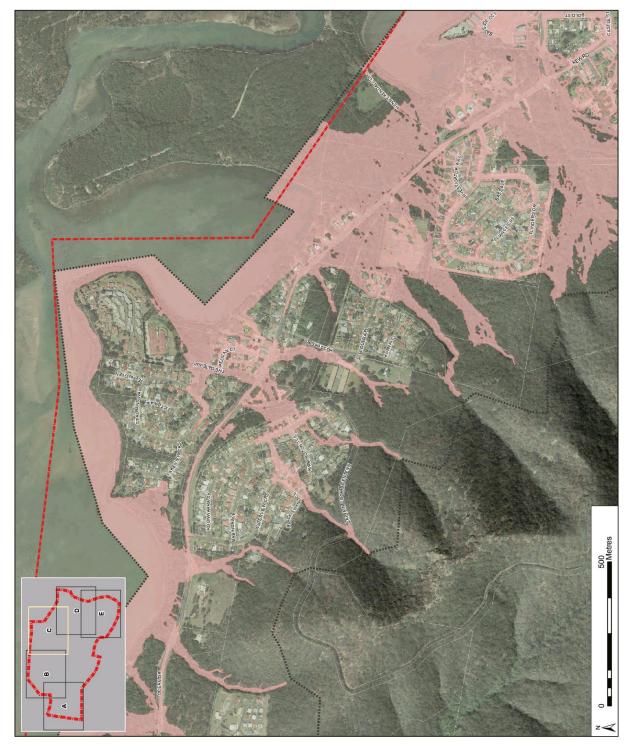
Legend

NOTES:

1. The mapping shown here is for Noth Brother local catchment fooding only. Refer to the Cannden Haven and Lakes System Food Study (2013) for riverne flooding mapping.
2. The flood planning area mapping is based on the climate change scenario comprising a 10% increase in the 1%.

ala Sources. LPI, OEH, Council
MITATONIS. This mapping is based on and assumptions betinded in the onth Brother Local Calciuments Frod prepared by Jasobs. Jacobs coes yal warrant, guarantee or make presentations regarding the currency and accuracy dinformation contained in is map.





Legend
Flood Planning Area Study Area

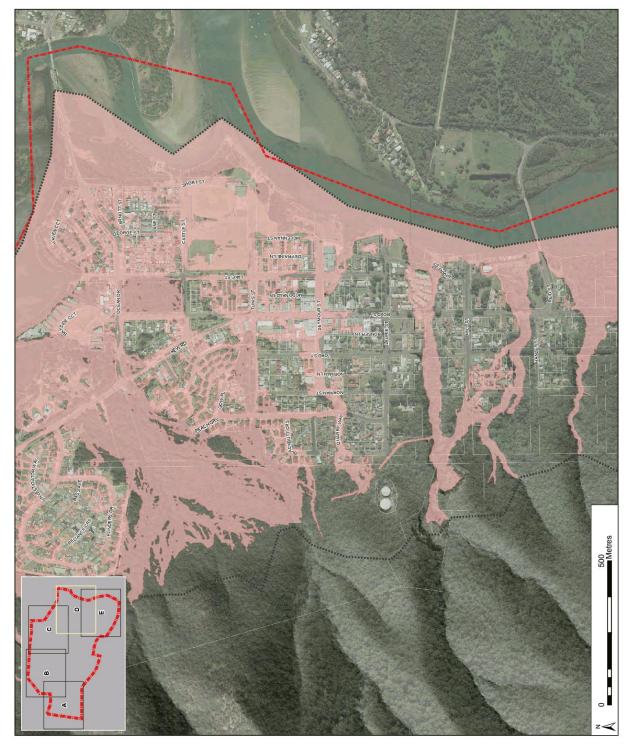
NOTES:

1 The mapping shown here is
for North Brother local carchment
flooding only. Relear to the Cardien
Haven and Lakes System Flood Study
(2013) for the riverine flooding mapping,
based on the climate change scenario
comprising a 10% increase in the 1%
AEP rainfall and a 0.9m sea level rise.

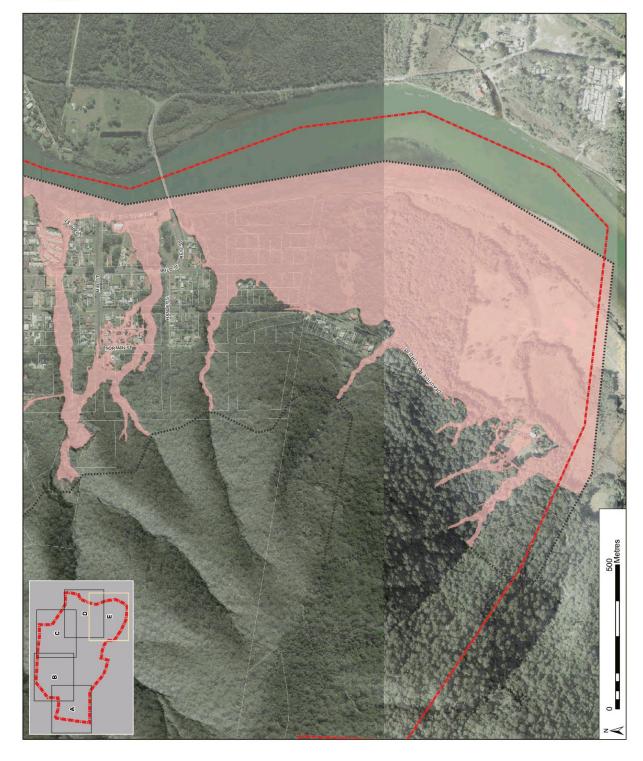
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Flood Planning Area Study Area Legend



(FUTURE) PUBLIC EXHIBITION DATES
(Start) to (Finish)

Planning Proposal - Airport Business Park

Draft Port Macquarie-Hastings LEP 2011
(Amendment No *)

Ccl ref: PP2015-3.1

DP&E ref: *

Date: 5 July 2019

V1: Section 3.33 version



Planning Proposal status (for this copy)

Stage	Version Date (blank until achieved)
Reported to Council - sec 3.33	
Adopted by Council and referred to DPI&E - sec 3.34(1)	
Gateway Panel determination - sec 3.34(2)	
Revisions required: Yes/No	
Public Exhibition - Schedule 1 clause 4	
For Council review - sec 3.35(1)	
Local Environmental Plan made by Minister's delegate - sec 3.36	

PP2015-3.1				
Port Macquarie-Hastings LEP 2011				
(Amendment No *)				
Department of Planning & Environment reference: *				
act Officer				
act Officer Ira Bush				
Ira Bush				

Adoption of the Planning Proposal

1. For initial Gateway determination

This Planning Pro	oposal was endorsed on by the undersigned Council delegate:
Signed:	
	Peter Cameron
Position:	Group Manager Strategic Land Use Planning
2. For sect	ion 3.35 finalisation
0	pposal was endorsed on by Port Macquarie- l, or the undersigned Council delegate (delete one):
Signed	
Name	
Position	

PP2015-3.1 5/7/2019

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Executive Summary

Planning Proposal

This is a Planning Proposal in relation to a potential Business Park zoning at the Port Macquarie Airport. In addition, it proposes to implement the outcomes of the Port Macquarie Airport and surrounding lands Biodiversity Certification Assessment approved by the NSW Minister for the Environment on 7 September 2018.

What is a Planning Proposal?

The preparation of a Planning Proposal is the first step in making an amendment to the *Port Macquarie-Hastings Local Environmental Plan* (LEP) 2011. A Planning Proposal is a document that explains the intended effect and justification for the proposed amendment. Under the *Environmental Planning and Assessment Act* 1979, Council must prepare and submit a Planning Proposal to the Department of Planning, Industry and Environment for consideration of an amendment to the *Port Macquarie-Hastings LEP* 2011.

This Planning Proposal is set out in the manner required by the State government and it contains information required by the State government when Councils prepare changes to their LEPs.

What is the intent of this Planning Proposal?

The intent of this Planning Proposal is to amend the *Port Macquarie-Hastings LEP 2011* in relation to planning controls for a proposed Business Park zoning on Council-owned land at the Port Macquarie Airport, including zone extent, lot size, height of buildings, floor space ratios and permitted uses.

In addition, the Planning Proposal seeks to implement the Biodiversity Certification Assessment outcomes approved by the NSW Minister on 7 September 2018 for the Environment for the Port Macquarie Airport and surrounding lands.

Any questions, contact:

Sandra Bush on telephone 6581 8025 or email sandra.bush@pmhc.nsw.gov.au

Background

Council Meeting November 2018

At the Ordinary Council Meeting held on 21 November 2018, Council considered a report on a proposed expansion of the existing B7 Business Park zone at Port Macquarie Airport. This initiative is consistent with the *Port Macquarie Urban Growth Management Strategy 2017-2036* and the *North Coast Regional Plan 2036*. The November 2018 Council report and Meeting minutes are at **Appendix A**.

Following Council's resolution, the proponent King and Campbell Pty Ltd, was invited to submit the basis for a Planning Proposal to meet the requirements of the Department of Planning and Environment's A Guide to Preparing Planning Proposals 2018.

The proponent's Planning Proposal request (at **Appendix B**) was submitted on 4 June 2019 and has been assessed by Council's Development & Environment Division to inform the content of this Planning Proposal by Council, as the Planning Proposal Authority.

Planning Proposal

This Planning Proposal has been prepared in accordance with the *Environmental Planning and Assessment Act* 1979 and the NSW Department of Planning and Environment's A guide to preparing planning proposals 2018 and A guide to preparing local environmental plans 2018.

It explains the intended effects of a proposed amendment to the *Port Macquarie-Hastings Local Environmental Plan 2011* (LEP 2011) to:

- Permit a reconfiguration and expansion of existing B7 Business Park zone on Councilowned land on the eastern side of Boundary at the Port Macquarie Airport, as shown in Part 4 Figure 2 of this proposal.
- Rezone the current B7 Business Park zone on the western side of Boundary Street to SP2 Infrastructure (Air transport facility). This land includes currently undeveloped B7 land and land within the B7 zone occupied by Airport related uses, as shown in Part 4 Figure 2 of this proposal.
- Apply planning controls to the Newman Senior Technical College which falls within the existing B7 Business Park zone on the western side of Boundary Street.
- Rezone Council's Airport and adjoining Thrumster lands to reflect the Biodiversity Certification Assessment outcomes approved by the NSW Minister for the Environment on 7 September 2018, and
- Identify all land in the LGA that has been biodiversity certified.

The Site

Figure 1 shows the site included in the proponent's Planning Proposal request. It covers an area of approximately 760 hectares and includes the Port Macquarie Airport and Council's Thrumster

lands, together with a small area of Crown Land impacted by the Airport Obstacle Limitation Surface.

It falls within a larger area that has undergone a Biodiversity Certification Assessment approved by the Minister for the Environment on 7 September 2018. The total area covered by the Biodiversity Certification Assessment, which is shown edged white in Figure 1.

Areas within the site referred to in this Planning Proposal as 'Airport Business Park', 'Airport Lands' and 'Thrumster Lands' are shown on Figure $\bf 1$ and shaded blue, yellow and red, respectively.

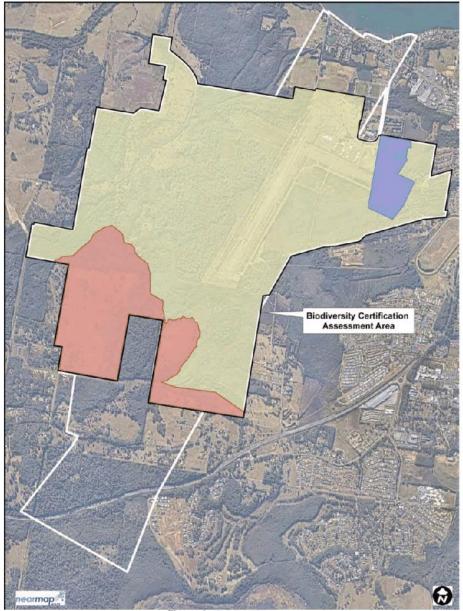


Figure 1: Subject Site

Council roles & responsibilities

For context and transparency, the roles and responsibilities of Council in relation to this Planning Proposal are as follows:

- PMHC Airport Landowner and proponent seeking a rezoning, represented by King and Campbell Ptv Ltd
- Development & Environment Division Provides advice to Council as the 'Planning Proposal Authority' to assess the Planning Proposal and determine the appropriate content of any Planning Proposal and related planning documents
- Elected Council As the 'Planning Proposal Authority' (PPA) Council is responsible for the Planning Proposal, the quality of the information provided in support of the proposal and its referral for Gateway determination.

The PPA is responsible for ensuring that the level of detail in the Planning Proposal document is sufficient to respond to the statutory requirements of the *Environmental Planning and Assessment Act 1979* and related guidelines. The PPA must ensure the information is accurate, current and sufficient for issuing a Gateway Determination and detailed enough for the purposes of consulting with government agencies and the general community.

Probity review

In recognition that Council has a role as Airport operator, landowner and planning proposal authority in this matter, Council's D&E Division has engaged Cardno (NSW/ACT) Pty Ltd to independently review the planning process and provide probity reports and recommendations on the statutory procedures involved in preparing a Planning Proposal for a proposed Airport Business Park rezoning.

The Preliminary Probity report (at **Appendix C**) covered the period from 16 March 2016 to 7 November 2018 and concluded that Cardno had not observed or detected evidence of partiality, bias or probity issues of concern in the planning process leading up to the presentation of the 21 November 2018 report to Council.

A Final Probity report will review Council's processes for a Business Park Planning Proposal against the ICAC guideline. In particular, the report will address whether or not there are any probity issues of concern in relation to the exhibition and assessment processes involved in this Planning Proposal and the final recommendations to Council.

Part 1 - Objectives or Intended Outcomes

The objectives and intended outcomes of this Planning Proposal are:

- To provide for a reconfigured and expanded Business Park area (23.75 ha) east of Boundary Street, as shown in Part 4 Figure 2 of this proposal, to reflect the importance of the Port Macquarie Airport as a regional hub.
- To consolidate existing airport infrastructure with future airside and general aviation land uses generally west of Boundary Street, as shown in Part 4 Figure 2 of this proposal.
- To rezone the Airport Lands and Thrumster Lands to reflect the Biodiversity Certification
 Assessment and Strategy outcomes for clearing and conservation of native vegetation
 within the Port Macquarie Airport and adjoining Council-owned Thrumster lands.
- To identify all land in the locality that is subject to the Port Macquarie Airport and surrounding lands Biodiversity Certification Assessment and Strategy.
- To apply lot size and height of buildings controls to the Newman Senior Technical College site, for consistency with the proposed Airport Business Park lands.

Part 2 - Explanation of Provisions

The following **Land Zone Map amendments** to the Port Macquarie-Hastings LEP 2011 are proposed to achieve the intended outcomes:

- Zone B7 Business Park to 19.1 hectares (ha) of land on the eastern side of Boundary Street, as shown in Part 4 Figure 2 of this proposal. When combined with the existing 4.65 ha of Zone B7 on the western side of Boundary Street, the reconfigured Business Park will have a total area of 23.75 ha, resulting in an overall increase of 10.45 ha of Zone B7 compared to the existing situation.
- Zone SP2 Infrastructure (Air transport facility) to the Airport Lands:
 - required to be cleared to satisfy Commonwealth Government Civil Aviation Safety Authority (CASA) Code 4C aerodrome standards for the OLS, and
 - generally west of Boundary Street (as shown in Part 4 Figure 2 of this proposal), to incorporate existing airport infrastructure with future airside and general aviation uses. This includes 17 ha of existing Zone B7, of which 8.4 ha is currently occupied by Airport related uses.
- Zone E2 Environmental Conservation to the Biodiversity Certified conservation lands
 within the Airport and Thrumster Lands (i.e. future Biobank Site). This includes areas
 identified for clearing and or conservation cropping adjacent to the Airport runway and
 areas identified for essential infrastructure (i.e. roads, fire trails, services corridors), as
 permitted by the Biodiversity Certification Assessment approval.
- Zone E3 Environmental Management to the northern extent of the Partridge Creek Residential Precinct in Thrumster to reflect the intended use of this land for Asset Protection Zones and public open space, consistent with existing zoning in the Thrumster Urban Release Area.

The following Land Use Table amendments are also proposed:

- Strengthen the B7 zone objectives to confirm the strategic intent of the proposed Business Park and recognise its place in the retail hierarchy for the region. The proposed changes are shown in red text:
 - 1 Objectives of zone
 - To provide a range of office and light industrial uses, within large scale/format developments.
 - · To encourage employment opportunities.
 - To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.
 - To create business park employment opportunities within large scale/format developments that are of a high visual quality and that will respect the natural environment within which they are located.
 - To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District as the focal point for subregional functions and service delivery.
- Revise permitted land uses in the B7 zone to ensure that the proposed Business Park will support a range of land uses that are consistent with the zone objectives, as follows:

Delete permitted uses:

- Landscaping material supplies
- Plant nurseries
- Takeaway food and drink premises
- Timber yards

Include additional permitted uses:

- + Food and drink premises
- + Self-storage units

Delete prohibited uses:

- Electricity generating works
- Function centres, and
- Industrial training facilities

In addition, the following changes are proposed:

- Amendments to the Lot Size, Floor Space Ratio and Height of Buildings Maps for the proposed B7 zone to permit:
 - A minimum lot size of 2,000sqm to encourage large scale/format developments consistent with the revised Zone B7 objectives
 - A maximum floor space ratio of 0.65:1 to ensure consistency with the traffic studies undertaken in support of the Airport Business Park, and
 - A maximum building height of 11.5m to support the desired outcome for large scale/format developments.
- Amendments to the Lot Size and Height of Buildings Maps applying to the existing zoned B7 Newman Senior Technical College site to permit a minimum lot size of 2,000sqm and maximum building height of 11.5m, for consistency with the proposed B7 Business Park area.
- Amendments to the Lot Size Map applying to the Airport Lands and Thrumster Lands to permit a minimum lot size of 40 ha for the Zone E2 and Zone E3 environmental lands.
- Inclusion of an additional clause to Part 7 'Additional local provisions' and creation of a Biodiversity Certified Land Map to identify all land that is subject to the Port Macquarie Airport and surrounding lands Biodiversity Certification Assessment approved on 7 September 2018.

See Part 4 for proposed map changes.

<u>Note</u>: Consultation will be required with the Department of Planning, Industry and Environment to determine technical mapping requirements for the proposed Biodiversity Certified Land Map.

Part 3 - Justification

In accordance with the Department of Planning, Industry and Environment's A guide to preparing planning proposals, this Part provides a response to the following matters:

- Section A: Need for the Planning Proposal
- Section B: Relationship to strategic planning framework
- Section C: Environmental, social and economic impact
- · Section D: State and Commonwealth interests

Section A - Need for the Planning Proposal

Is the Planning Proposal a result of any strategic study or report?

Yes. As discussed in Section B, the proposal is consistent with the North Coast Regional Plan 2036 and Council's Port Macquarie-Hastings Urban Growth Management Strategy 2017-2036 which has been endorsed by the Department.

With respect to the proposed Business Park, this has resulted in an assessment of all land within the Airport Precinct Investigation area against planning criteria to determine which areas of the precinct should be prioritised for detailed rezoning investigations, as reported to the November 2018 Ordinary Council Meeting.

The precinct investigation area included the existing B7 Business Park zone and adjoining Council land to the south and east together with privately owned land to the north, with frontage to Boundary Street. The proposed Business Park area was selected as the preferred site to provide for an expanded Business Park area at the Airport.

Additionally, the Port Macquarie Airport and surrounding lands Biodiversity Certification Assessment and Strategy, approved on 7 September 2018, provides a strategic approach to ongoing operational, development and biodiversity issues related to the Port Macquarie Airport, particularly the new and more extensive Airport obstacle limitation requirements required by the Civil Aviation Safety Authority. The Assessment and Strategy also includes land owned by private parties to the north and south of the Airport on which vegetation conservation and clearing is required due to Airport operations.

This Planning Proposal has been informed by a rezoning request lodged by King and Campbell Pty Ltd on 4 June 2019 on behalf of the Port Macquarie-Hastings Council Airport. As background to and in support of the request, the proponent submitted a body of information that includes the following:

- Economic Impact Assessments
- Traffic Impact Assessments
- Biodiversity Certification
- Aboriginal Archaeology Assessment
- Geotechnical Assessments
- Sewerage Services Strategy
- Stormwater Management Strategy
- Water Supply Infrastructure Strategy

The majority of this work was completed to inform the proposed Business Park site selection process, as reported to Council in November 2018.

Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes. The area proposed for Business Park is currently zoned part SP2 Infrastructure (Air transport facility) and E2 Environmental Conservation. For the site to be developed for Business Park purposes, it needs to be appropriately zoned.

The proposed rezoning of the remaining Airport Land and Thrumster Land is not essential in ensuring the outcomes of the approved Airport and surrounding lands Biodiversity Certification Assessment. However, rezoning this land as proposed to reflect the Biodiversity Certification is preferred to reflect the future use of this land.

Section B - Relationship to strategic planning framework

Is the Planning Proposal consistent with the objectives and actions of the North Coast Regional Plan 2036?

In terms of the proposed Business Park rezoning, the *Regional Plan City Map for Port Macquarie* identifies the existing Airport Business Park as 'Business Centre'. Proposed Business Park zoning outside this area is mapped as 'Investigation Area – Employment Land'.

Action 6.1 of the Regional Plan recommends that in planning for economic growth around airports, Councils consider new infrastructure needs and introduce planning controls that encourage clusters of related activity. Also recommended is the need to promote new job opportunities that complement existing employment nodes around airport precincts, and the need to deliver infrastructure and coordinate the most appropriate staging and sequencing of development (Action 7.1).

The proposed retention of the SP2 zone for Airport related uses west of Boundary Street and consolidation of B7 Business Park uses east of Boundary Street, recognises the close linkage between the existing and proposed Airport lands and the current and future Airport operations.

Direction 6 of the Regional Plan requires that new commercial precincts, outside of centres, be of an appropriate size and scale relative to the area they will be servicing to deliver positive social and economic benefits for the wider community and maintain the strength of the regional economy. This matter is discussed in more detail under Question 4 below in context of the centres hierarchy.

The proposed LEP amendments to reflect the approved Airport and surrounding lands Biodiversity Certification Assessment and Strategy is consistent with Action 2.1 which requires that development focus on areas of least biodiversity sensitivity and implement the 'avoid, minimise, offset' hierarchy to biodiversity, including areas of high environmental value.

4. Is the Planning Proposal consistent with Council's Community Strategic Plan and Urban Growth Management Strategy?

Towards 2030 Community Strategic Plan

The Planning Proposal satisfies the key strategies of this Plan for both 'business and industry' and 'natural and built environment' in that it will:

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- Provide for employment lands in close proximity to a transport hub
- Attract investment to a location that is well serviced and connected to the greater Port Macquarie area
- Provide for effective management and maintenance of urban infrastructure and services
- Facilitate development that is compatible with the natural and built environment
- Provide for the effective integration of transport systems, and
- Restore and protect natural areas, consistent with the approved Biodiversity Certification of the Port Macquarie Airport and surrounding lands.

Port Macquarie-Hastings Urban Growth Management Strategy (UGMS) 2017-2036

Planning for the development of an expanded Business Park at the Port Macquarie Airport to create opportunities for technology and airport related businesses, is listed as a priority economic development action in the UGMS (Action 15).

A key aim in the UGMS is to maintain the primacy of the Port Macquarie CBD and the existing hierarchy of centres in the Port Macquarie-Hastings region. Office uses are particularly important to the vibrancy, function and attractiveness of the CBD as a Regional City. Council will also focus on opportunities for office uses associated with the establishment of an expanded Business Park at the Airport and in the proposed Health and Education Precinct.

Consistent with the Regional Plan (Direction 6), new commercial precincts outside of centres are required to be of an appropriate size to maintain the strength of the regional economy. The UGMS requires that Council review detailed economic assessments as part of investigations for proposed Business zones to ensure that a balanced approach to supply and demand is achieved.

In order to assess the appropriate level of opportunity for office space at the Airport, Council's D&E Division commissioned Hill PDA consultants to provide advice on the relationship between a proposed Airport Business Park expansion and the existing hierarchy of business centres in the Port Macquarie-Hastings.

The 2016 Hill PDA report (at **Attachment 1**) is based on a survey of floor space and assessment of employment trends and population forecasts, as well as modelling of low and medium growth scenarios to project business park office space demand and land requirements for the Port Macquarie-Hastings LGA to 2036. In a subsequent 2017 report (at **Attachment 2**) Hill PDA has concluded that from a centres hierarchy perspective, the maximum amount of B7 Business Park land that can be recommended in the expanded Airport Business Park is 20 ha gross developable land.

In addition, the proponent has commissioned Gillespie Economics and Augusta consultants to consider the opportunity for commercial development at the Airport Business Park. Both of these reports (at **Attachments 3 & 4**), together with the Hill PDA assessments, conclude that there are significant commercial development opportunities in the proposed Business Park.

This Planning Proposal seeks to reinforce the unique location and characteristics of the proposed B7 Airport Business Park, while ensuring that potential impacts on the centres hierarchy are mitigated through:

- Amended B7 Business Park zone objectives to place additional emphasis on large-scale floorplate development
- Changes to the land uses permitted with consent in the B7 zone to ensure that the precinct functions as a Business Park, different to a town centre
- A minimum 2,000sqm lot size which is larger than that typically provided in other commercial and industrial zones (i.e. 1,000sqm), and

 A maximum 0.65:1 Floor Space Ratio (FSR) for development of the Business Park lands to ensure that future traffic generation is within the capacity of the road network, noting that the proponent's hypothetical development scenario used to inform traffic modelling for the Airport Business Park site selection process is based on a maximum FSR of 0.7:1.

The scale of the Business Park has been considered by Council's D&E Division and having regard to the revised permitted uses, strengthened B7 zone objectives and proposed lot sizes and floor space ratio controls, it is considered that the proposed 23.75 ha of B7 zoning at the Airport is unlikely to result in significant economic impacts on the centres hierarchy.

5. Is the Planning Proposal consistent with applicable State Environmental Planning Policies?

An assessment of consistency with State Environmental Planning Policies (SEPPs) of relevance is provided below.

SEPP	Consistent	Reason for inconsistency or comment
No 44 Koala Habitat Protection	Yes	Encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure permanent free-living populations will be maintained over their present range. Council's cannot approve development in an area affected by the policy without an investigation of core Koala habitat. The Port Macquarie Airport and surrounding lands Biocertification
		Assessment determined that the Koala was one of five species that will be impacted by the land that is certified. Species credits were determined and the number of species credits generated by the proposed conservation measures were found to be deficient for the Koala (323 credits).
		The Biocertification has resulted in a 444.17 ha offset area, which provides for a 301.88 ha of Koala habitat. Council has committed to the purchase of an additional 40 to 50 ha off-site for the retirement of the 323 Koala species credits.
No 55 - Remediation of Land	Unsure	Introduces state-wide planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated.
		The proponent's Planning Proposal request advises that all operational lands associated with the Airport will be zoned SP2 Infrastructure. Land areas that are not currently used by the Airport do not have a land use history that would indicate future contamination issues.
		The proposed Business Park site is identified in Council's Contaminated Land Register. A preliminary contaminated land investigation and report will be required in accordance with SEPP 55 to support the Planning Proposal. Council's Contaminated Land Policy 2017 requires that a suitably qualified and practising contaminated land practitioner undertake the assessment.
Infrastructure 2007	Yes	The aim of this Policy is to facilitate the effective delivery of infrastructure across the State.
		This Policy is relevant to the future infrastructure (roads, sewerage systems, stormwater management systems, water supply systems)

SEPP	Consistent	Reason for inconsistency or comment
		required for the proposed Airport Business Park, the Airport Lands and the Thrumster Lands.
		Hastings River Drive is a classified road, with access to the Airport Lands and the proposed Airport Business Park via Boundary Street, which is greater than 90m in distance to its connection with Hastings River Drive. Therefore clause 104 of the SEPP will only apply to the future development types listed in Column 2 at Schedule 3 to the SEPP. These development types will require consultation with the NSW Roads and Maritime Services as part of the development approval process.
		The development of sewerage, water and stormwater infrastructure to service the Airport Lands, Thrumster Lands and proposed Airport Business Park Lands is able to be carried out by or on behalf of Council in any zone under SEPP Infrastructure. The site includes a number of existing fire trails and future fire trails, both of which have been included in the biodiversity process as cleared lands.
State and Regional Development 2011	Yes	The aims of this Policy are to identify development that is State significant development, State significant infrastructure and critical State significant infrastructure, and that is regionally significant development.
2011		Development with a capital investment value of more than \$30 million is declared as regionally significant development and required to be determined by the relevant Regional Planning Panel.
		Should this be the case for any future Development Application in relation to the subject land, the proposal will be regionally significant development and will be reported to the Regional Planning Panel for determination.
Coastal Management	Yes	The aim of this Policy is to promote an integrated and coordinated approach to land use planning in the coastal zone.
2018		A large extent of the site is mapped as either Coastal Wetlands or Proximity Area for Coastal Wetlands. Part 2 Division 1 is relevant for any works within this mapped area and with the exception of environmental protection works, all development will be declared designated development for the purposes of the Act.
		Under SEPP (Infrastructure) 2007, Part 1 Clause 8(4) and (5) (relationship to other environmental planning instruments) confirms that emergency works or routine maintenance works that can be carried out without consent, or is exempt development, are not declared designated development for the purpose of the Act. Additionally, the maintenance of existing fire trails will not be declared a designated development.
Primary Production and Rural	Yes	The aims of the Policy are to facilitate the orderly economic use and development of lands for primary production.
Development 2019		Existing RU1 Primary Production zoned lands are proposed to be zoned E2 Environmental Conservation, consistent with the approved Biodiversity Assessment and Strategy.

Is the Planning Proposal consistent with applicable Ministerial Directions?

An assessment of consistency with Ministerial Directions of relevance is below.

1. Employment and Resources

S9.1 Direction	Consistent	Reason for inconsistency or comment
No 1.1 Business and Industrial Zones	No	The objectives of this direction are to: (a) encourage employment growth in suitable locations, (b) protect employment land in business and industrial zones, and (c) support the viability of identified centres.
		The Planning Proposal is inconsistent with this Direction because it is proposed to alter the location of the existing B7 Business Park lands. In this regard, there is currently 25.54 ha of B7 Business Park zoning at the Port Macquarie Airport, of which 13.3 ha is undeveloped. It is proposed to:
		 rezone 17.04 ha of the existing B7 Business Park on the western side of Boundary Street to SP2 Instructure (Air transport facility). This land is currently occupied by Airport related uses, and rezone 19.1 ha of land on the eastern side of Boundary Street to B7 Business Park. Combined with the existing 4.65 ha of land area on the eastern side of Boundary Street that is currently zoned B7, the overall footprint of the B7 Business Park will be 23.75ha.
		The relationship to other commercial centres has been considered by Hill PDA consultants, as discussed under Secton B Q4 of this proposal. The inconsistency of the proposal with this directon is justified on the basis that planning for an expanded Business Park at the Port Macquarie Airport to create opportunities for technology and airport related business is a key action of the Port Macquarie-Hastings Urban Growth Management Strategy 2017-2036 (Action 15).
No 1.2 - Rural Zones	Yes	The objective of this direction is to protect the agricultural production value of rural land.
		A small area of land is proposed to be rezoned from RU1 to E2. This land area is isolated and through the Biodiversity Certification is included in the Biobank site.
No - 1.5 Rural Lands	No	This direction aims to protect the agricultural production value of rural land and to facilitate the orderly and economic development of rural lands for rural and related purposes.
		As noted above, a small area of existing RU1 zoned land is proposed to be rezoned to E2. This inconsistency is justified on the basis that this land is included as part of the Biobank site identified in the Airport and surrounding lands Biodiversity Certification Assessment and Strategy approved by the NSW Minister for the Environment on 7 September 2018.

2. Environment and Heritage

S9.1 Direction	Consistent	Reason for inconsistency or comment
No 2.1 - Environmental Protection Zones	Yes	The objective of this direction is to protect and conserve environmentally sensitive areas. All lands that are either zoned E2 or are proposed to be zoned E2 under this Planning Proposal have undergone assessment as part of the Airport and surrounding lands Biodiversity Certification Assessment and Strategy.
No 2.2 - Coastal Management	Yes	The objective of this direction is to protect and manage coastal areas of NSW. The lands proposed to be rezoned in this Planning Proposal include lands that are mapped under this as either Coastal Wetlands or Proximity Area for Coastal Wetlands. Future development within the mapped Coastal Wetlands will be either Designated Development or exempt (existing fire trails).
No 2.3 - Heritage Conservation	Unsure	The objective of this direction is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance. The Proponent has submitted correspondence from the Birapi Local Aboriginal Land Council (Attachment 5) advising that an inspection of the site has been undertaken in relation to the proposed B7 area and no artefacts of significance were found. Consultation on this matter will be required with the NSW Office of Environment and Heritage following the issue of a Gateway Determination.

3. Housing, Infrastructure and Urban Development

2. Hodoling, infraoctate and orban betolepinent		
S9.1 Direction	Consistent	Reason for inconsistency or comment
No 3.1 - Residential zones	No	The objectives of this direction are: (a) to encourage a variety and choice of housing types to provide for existing and future housing needs, (b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and (c) to minimise the impact of residential development on the environment and resource lands. This Planning Proposal will rezone R1 Residential zoned lands to partly E2 Environmental Conservation and partly E3 Environmental Management. The inconsistency of the proposal with this Direction is justified on the basis that these lands have been included in the Biodiversity Certification Assessment and Strategy.
No 3.5 - Development near Regulated Airports and	Yes	The objectives of this direction are: (a) to ensure the effective and safe operation of regulated airports and defence airfields;

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Defence Airfields		(b) to ensure that their operation is not compromised by development that constitutes an obstruction, hazard or potential hazard to aircraft flying in the vicinity; and (c) to ensure development, if situated on noise sensitive land, incorporates appropriate mitigation measures so that the development is not adversely affected by aircraft noise. This Planning Proposal supports the airport operator's (PMHC Airport) rationale for undertaking the Biodiversity Certification process, which will ensure an on-going strategic and sustainable approach to the management and offsetting of any environmental impacts associated with the long-term operation and future development of essential infrastructure related to Airport operations, including the proposed the Airport Business Park. The proposed Business Park zone is not expected to conflict with future Airport operations.
		Following the issue of a Gateway Determination and in accordance with this Direction, consultation will occur with the Civil Aviation Safety Authority in relation to the proposal.
No 3.6 - Shooting Ranges	Yes	The objectives are: (a) to maintain appropriate levels of public safety and amenity when rezoning land adjacent to an existing shooting range, (b) to reduce land use conflict arising between existing shooting ranges and rezoning of adjacent land, (c) to identify issues that must be addressed when giving consideration to rezoning land adjacent to an existing shooting range.
		The Port Macquarie shooting range adjoins the site to the south and is zoned RE2 Private Recreation. An area of existing E2 zoned lands within the site separates the range from the proposed Airport Business Park.
		An E2 zone buffer will be retained between the range and the proposed Business Park, ensuring that more intensive land uses cannot be approved adjacent the range. This separation distance will also ensure minimal impact from potential noise. Additionally the land uses that will be permitted in the B7 Business Park zone are not considered noise sensitive receivers.
		Following the issue of a Gateway Determination, consultation regarding this aspect of the proposal will occur with the NSW Police Firearms Registry as the relevant range licensing body.

4. Hazard and Risk

S9.1 Direction	Consistent	Reason for inconsistency or comment
No 4.1 - Acid Sulfate Soils	Yes	The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulfate soils.
		The proposed Business Park area includes lands mapped as Classes 2, 3 and 5 Acid Sulfate Soils (ASS).
		Groundwater assessments completed on behalf of the proponent by Regional Geotechnical Solutions in October 2015 and November 2017 (at Attachment 6) to inform the development potential of the

		proposed Business Park land, confirmed the presence of both Actual and Potential ASS. An ASS Management Plan will be required prior to any on-site works where groundwater will be present.	
		The proponent's Planning Proposal request also notes that a proposed Low-Pressure Sewerage Scheme will minimise potential issues associated with the Actual and Potential ASS, as deep excavation will not be required.	
No 4.3 Flood	No	The objectives of this direction are:	
Prone Land		(a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and (b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.	
		The site (including the existing extent of Boundary Street) is identified on the Flood Planning Map of the PMHLEP 2011. An area of approximately 6,000sqm of the proposed B7 lands is identified within the mapped Flood Planning Area, being the 1:100 ARI plus 0.5m freeboard. The remaining proposed B7 lands are identified within the mapped Level of Probable Maximum Flood.	
		Council's Hastings River Flood Study 2018 nominates a 1:100 ARI of 3.17m AHD for the Airport precinct. The proposed rezoning from SP2 Infrastructure (Air transport facility) and E2 Environmental Conservation to B7 Business Park is inconsistent with clause (5) of this Direction.	
		This inconsistency can be justified on the basis of the following:	
		 The Port Macquarie-Hastings Flood Policy 2018 is consistent with the principles and guidelines included in the Floodplain Development Manual 2005. 	
		Council's Flood Policy requires a flood planning level of FPL2 (with 25% of ground floor to be FPL3) for all commercial development (FPL2 = 100 year ARI Flood level + Climate Change, no freeboard), FPL3 = 100 year ARI Flood level + Climate Change + 500mm freeboard).	
		The future permissible uses within the proposed Airport Business Park are not of a type that will require consideration under clause 7.4 of the PMH LEP 2011 (Level of Probable Maximum Flood); and	
		 The quantity of fill required to comply with Council's Flood Policy equates to approximately 1,500m3 and given the footprint of the total land area of the proposed B7 zone and the location of the proposed Business Park on the fringe of the flood prone land, can be considered to be of minor significance. 	
		Council is currently preparing detailed concept design to upgrade Boundary Street to 1 in 20-year flood immunity. Council is also currently investigating flood free road access options to link the Port Macquarie Airport and the Oxley Highway which may improve the	

		standard of flood free access to the Airport and proposed Business Park in the future.
		The footprint of the proposed 23.75 ha gross area of B7 Business Park zone provides opportunities to link with potential flood free road access options to the south (as an extension of Boundary Street) and to the south east to Lady Nelson Drive. These future road access options have been included in the lands subject to Biodiversity Certification.
		The lands subject to Biodiversity Certification also include a potential road link to The Binnacle (east of the proposed Business Park) which may be used as flood free access to the Airport Lands and the Business Park Lands as required.
		The existing road access via Boundary Street to the proposed Business Park will provide guaranteed access to the Business Park and notwithstanding that this road is below the 1:100 year flood level, it will provide a reasonable standard of access to the Business Park given the nature of the land uses permitted.
No 4.4 - Planning for Bushfire Protection	Unsure	The objectives of this direction are to protect life, property and the environment from bush fire hazards by discouraging the establishment of incompatible land uses in bush fire prone areas; and to encourage sound management of bush fire prone areas.
		The existing vegetated areas within the proposed Business Park area are mapped as bushfire prone land. This vegetation has been Biodiversity Certified and will be cleared as development occurs. The proponent's Planning Proposal request notes that future development of the Business Park will need to provide adequate Asset Protection Zones to the Biobank lands (i.e. future E2 zones to the east & south) and to rural land adjoining to the north.
		As required by this Direction, consultation on this matter will occur with the Commissioner of the NSW Rural Fire Service following receipt of a Gateway Determination and prior to public exhibition of the Planning Proposal.

5. Regional Planning

S9.1 Direction	Consistent	Reason for inconsistency or comment
5.10 - Implementation of Regional Plans	Yes	The objective of this direction is to give legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plans. The proposed Airport Business Park is consistent with the strategic directions of the North Coast Regional Plan 2036 to promote new job opportunities that complement airport precincts. The proposal also identifies areas of environmental significance to be zoned for conservation in accordance with the approved Biodiversity Certification Assessment and Strategy.

ATTACHMENT

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

6. Local Plan Making

S9.1 Direction	Consistent	Reason for inconsistency or comment
No 6.1 - Approval and Referral Requirements	Yes	The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development. This Planning Proposal will not introduce any additional requirements for concurrence with other Government agencies.
6.2 - Reserving Land for Public Purposes	Yes	The objective of this direction is to discourage unnecessarily restrictive site-specific planning controls. This Planning Proposal will rezone an area zoned RE1 Public Recreation to E2 Environmental Conservation. This land was included in the biodiversity conservation lands (future Biobank site) in the Biodiversity Certification Assessment and Strategy.

Section C - Environmental, social and economic impact

 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

Biodiversity impacts associated with the proposed rezoning of the Airport Lands, Thrumster Lands and Business Park Area have been addressed in the Airport and surrounding lands Biodiversity Certification Assessment and Strategy approved by the Minister for the Environment on 7 September 2018.

7. Are there any other likely environmental effects as a result of the Planning Proposal and how are they proposed to be managed?

Stormwater

The proponent's Stormwater Management Plan in support of the proposed Business Park (Attachment 7) recommends a stormwater treatment train approach, primarily using bio-retention basins/swales centrally located within the proposed road network. The concept has been assessed by Council's Transport and Stormwater Network Section and is considered to provide a satisfactory response to stormwater management issues to support a Planning Proposal.

8. How has the Planning Proposal adequately addressed any social and economic effects?

Visual amenity

Due to the significance of the proposed Business Park and its location at an important gateway entry to the Port Macquarie-Hastings, draft development control plan provisions are proposed to be prepared in consultation with the proponent, to guide future development of the Airport Business Park with the aim of facilitating higher amenity office and commercial uses.

The proposed development controls will provide detailed guidance for future development of the precinct, including (but not limited to) policy for streetscape and building form, building setbacks, landform, vehicle access, and landscaping, having regard to the operational requirements of the Airport and the gateway status of the precinct.

It is intended that the draft development controls be concurrently exhibited with this Planning Proposal.

Section D - State and Commonwealth interests

Is there adequate public infrastructure for the Planning Proposal?

Road Infrastructure Capacity

In the absence of any certainty regarding a future alternative road access, it is assumed that all access to the proposed Business Park will be via Boundary Street.

In the lead up to the site selection process, the proponent commissioned a Traffic Engineering report by TPS Group (June 2016) at **Attachment 8**, to address traffic planning for development of the Airport Precinct Investigation Area for Business Park purposes.

Based on an indicative Hastings River Drive/Boundary Street intersection design prepared by Council's Transport and Stormwater Network (T&SN) Section, TPS Group 'reverse engineered' their traffic modelling to determine the future capacity of the intersection. TPS also estimated the

amount of land in the investigation area that could be developed for Business Park, using the existing road network.

The TPS Group report modelled traffic generation assuming a hypothetical Business Park mix of uses across the total investigation area and concluded that the intersection, with a modified lane arrangement, would be capable of accommodating 100% of the proposed Business Park development traffic in 2030 (i.e. approx. 20,000 vehicles/day).

Council's Transport and Stormwater Network (T&SN) Section reviewed the TPS Group report and concluded that the TPS Group land use scenarios did not meet all of Council's normal Level of Service and Degree of Saturation targets. Council's T&SN modelling concluded that a maximum 50% of the investigation area (i.e. 20.5 ha) could be developed for Business Park, until such time as a secondary access to the Port Macquarie Airport becomes available.

The proponent engaged SLR consultants to peer review the TPS Group report and Council's T&SN review of that report. The SLR review (at **Attachment 9**) agreed with TPS Group's conclusion that the full Business Park development can be catered for at 2030 with a modified lane arrangement for the Hastings River Drive/Boundary Street intersection.

After reviewing the SLR report and noting that the constraining factor is the capacity of the intersection, Council's T&SN restated their earlier conclusion that the proposed upgraded intersection would have capacity to provide for 50% (i.e. 20.5ha) of the investigation area for Business Park development.

The proponent's Planning Proposal request concludes that the proposed rezoning of an expanded Airport Business Park footprint to 23.75 ha is not likely to have unacceptable impacts on the capacity of existing road infrastructure.

King and Campbell, note that the proposed Airport Business Park footprint (23.75 ha) will result in an estimated 16.03 ha of net developable land, which represents 58% of the net developable area modelled by TPS Group. King and Campbell note that this represents a 14% increase in the net developable area that will ultimately be achieved at the Airport Business Park and consider this a minor increase to the footprint and traffic volumes accepted by T&SN for the proposed Airport Business Park.

The Planning Proposal request notes that the proposed maximum Floor Space Ratio of 0.65:1 is less than that assumed for the traffic modelling (i.e. 0.7:1). This represents a 2% reduction in modelled traffic volumes.

Also noted is that the traffic modelling undertaken of the 2030 performance of the Hastings River Drive/Boundary Street intersection is a model of a long-term outcome. There are many parameters in the broader road network (e.g. decisions with respect to other road & intersection upgrades & development rates across the LGA) that will also impact the performance of the intersection and therefore, the results of the future modelling. Various traffic engineering parameters are inputs into the modelling of the future performance of the intersection.

Having regard to the above, Council's T&SN has accepted that on balance, the impact of a 14% increase in the footprint of net developable B7 zone is within the accuracy limits that can be expected to be achieved with the modelling of the future traffic outcomes.

Road infrastructure funding

The TPS Group and SLR reports together with Council's T&SN Section review of these reports recognise that development of the proposed Business Park, together with an assumed doubling of traffic generated by existing land uses in the area, will require upgrading of the Hastings River

Drive/Boundary Street intersection and improvements to Boundary Street. These works are currently not listed in Council's future works program.

The Planning Proposal request acknowledges that in the absence of a local roads contribution plan, it is anticipated that the intersection improvements will be specified as a condition of development consent for the establishment of the Airport Business Park, including details of a proposed trigger for these works. King and Campbell expect that apportionment of the share of the costs of the intersection works between the Business Park and other development would be negotiated through a Works in Kind Agreement at that time.

The D&E Division assessment is that an upgrade of Boundary Street is a fundamental requirement for the proposed Business Park, which will generate a significant proportion of demand for the upgrade. In this case, Council cannot enter into a Planning Agreement to obtain a commitment in relation to road upgrades. Any sale of the Council owned Business Park land could be contingent upon a Planning Agreement to demonstrate to the community, that the development of Council owned land has been treated in the same way as any other proposed development.

In addition, it is proposed that Council's D&E Division prepare a draft Section 9.11 Contributions Plan to enable collection of developer contributions towards road infrastructure required to service the proposed Airport Business Park. The draft Plan will identify the level of developer contributions applicable to road and intersection works to accommodate future development of the proposed Business Park area overtime and can be referenced in any future Planning Agreements. The proposed Contributions Plan will need to be in place prior to development of the Business Park but need not delay the proposed referral of a Planning Proposal to the Department of Planning, Industry and Environment for a Gateway Determination.

Sewerage

The proponent's Planning Proposal request presents two options for sewerage infrastructure (at **Attachment 10**), being a conventional gravity sewerage scheme and a low-pressure sewerage scheme. These options have been assessed by Council's Water and Sewer Section and are considered to adequately demonstrate that it will be possible to service the proposed Business Park land in the future. A decision on which option to progress will be determined at the later Development Application stage.

Water supply

The Port Macquarie Airport and existing developed Business Park lands are currently serviced by reticulated water supply. Based on modelling undertaken by Council's Water and Sewer section and assuming preliminary densities provided by the proponent, the proposed Business Park can be serviced by water supply subject to augmentation of connection from the Oxley Highway ultimately linking to the existing infrastructure in Boundary Street.

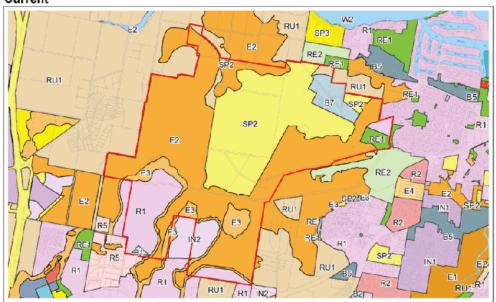
10. What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

The Department of Planning, Industry and Environment's Gateway Determination will specify requirements for consultation on the Planning Proposal with State and Commonwealth Government agencies. It expected that consultation would occur with NSW Roads and Maritime Services, NSW Rural Fire Service, Office of Environment and Heritage, Birpai Local Aboriginal Land Council, NSW Department of Primary Industries, Crown Lands, Civil Aviation Authority and NSW Police.

Part 4 - Mapping

Proposed map amendments, as described in Part 2 of this Planning Proposal are shown below.

Current





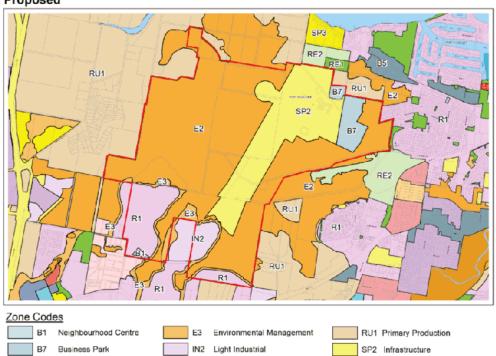
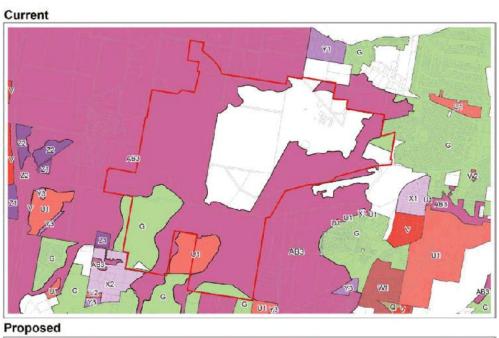


Figure 2: Existing & proposed Land Zone

General Residential

R1

Environmental Conservation



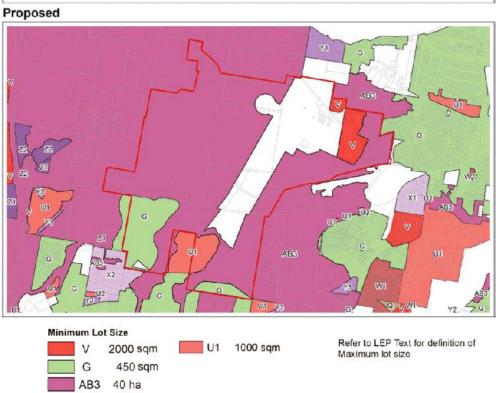
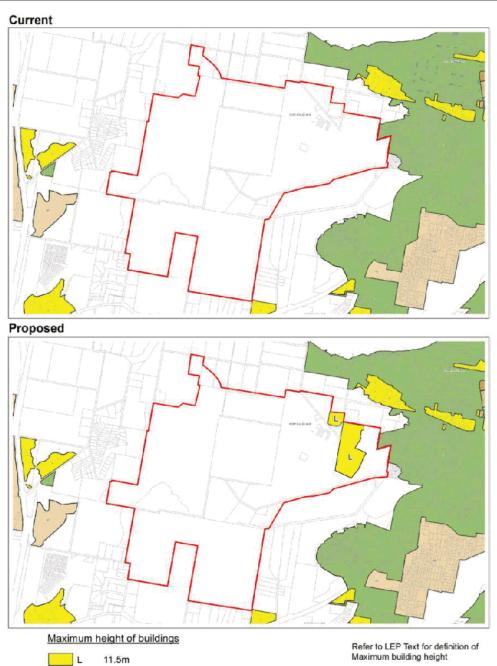


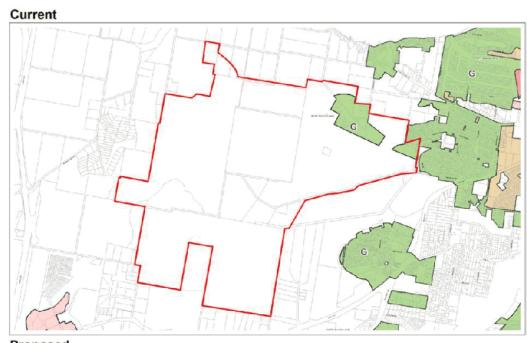
Figure 3: Existing & proposed Lot Size

Blank - no maximum



Blank - no maximum

Figure 4: Existing & proposed Height of Buildings



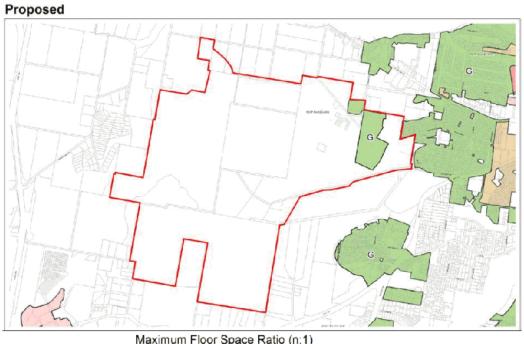




Figure 5: Existing & proposed Floor Space Ratio

Blank - no maximum

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As noted in Part 2, it is also proposed to prepare a Biodiversity Certified Land Map to identify all land that has been biodiversity certified. The proposed map will identify all land affected by red and green shading on the map below. Consultation will be required with the Department of Planning, Industry and Environment to determine technical mapping requirements for the proposed Biodiversity Certified Land Map.

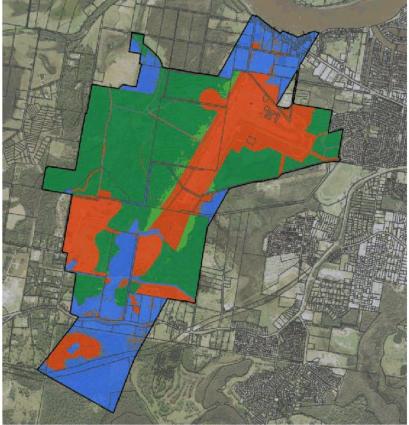


Figure 6: Biodiversity Certification Assessment Area

Part 5 - Community Consultation

The proposal is not considered to be a low impact proposal and therefore, a 28-day public exhibition period is nominated.

Public consultation is intended in accordance with the Gateway Determination and normal requirements of the *Environmental Planning and Assessment Act* 1979. Council is not requesting plan-making delegations for the Planning Proposal. Therefore, all exhibition material will need to be endorsed by the Department of Planning, Industry and Environment ahead of the public exhibition period.

The consultation and public exhibition will include notification in a locally circulating newspaper, notification on Council's website and written notification to affected and all adjoining landowners. This includes writing to the three adjoining landowners within the Airport Precinct Investigation Area, advising of the Planning Proposal and inviting submissions as part of the public exhibition process.

It is proposed that during the public exhibition, Council will undertake further engagement with representatives of Newman Senior Technical College regarding the lot size and height of buildings controls proposed for the College site.

In accordance with the recommendations of Cardno's Preliminary Probity Report, Council will also invite submissions from Mr John Jeayes and Lewis Land Group for Sovereign Hills Project (represented by GEM Planning). This will ensure that any actual or perceived overlapping and/or outstanding issues can be considered and addressed prior to a decision being made on the Planning Proposal.

For the purposes of the public exhibition, a Statement of Council Interest will be included in the Planning Proposal, consistent with the Department of Planning Industry and Environment's Best Practice Guideline - LEPs and Council Land 1997.

It is proposed that the draft Airport Business Park development control provisions be reported to Council for endorsement, prior to being concurrently exhibited with the Planning Proposal.

Part 6 - Project Timeline

The Gateway Determination will specify the timeframe in which this Planning Proposal is to be completed. The project timeline below is based on anticipated dates and timeframes, noting that there can be unexpected delays.

Given the direct interest of Council as both the landowner and the proponent in respect of the proposal, Council is not seeking delegation from the Department of Planning, Industry and Environment to be the local plan-making authority for the Planning Proposal.

Planning Proposal process outline	Anticipated Timeframe
Commencement (date of Gateway determination)	Aug 2019
Timeframe for completion of required additional information (as required by Gateway Determination)	Aug/Sep 2019
Timeframe for government agency consultation (as required by Gateway Determination)	Sep/Oct 2019
Public exhibition period	Nov/Dec 2019
Timeframe for consideration of submissions	Jan 2020
Timeframe for the consideration of a proposal post exhibition	Feb 2020
Date of submission to the Department to finalise the LEP	Feb 2020
Date the Department will make the plan	Mar/Apr 2020

Appendix A - Report to Council & Meeting Minutes 21 November 2018

PP2015 - 3.1 5/7/2019

Item: 12.09

Subject: AIRPORT PRECINCT INVESTIGATION AREA - SITE SELECTION

FOR PROPOSED BUSINESS PARK

Presented by: Development and Environment, Melissa Watkins

Alignment with Delivery Program

4.5.1 Carry out strategic planning to manage population growth and provide for coordinated urban development.

RECOMMENDATION

That Council:

- Note the assessment in this report which confirms that the Council owned land within the Port Macquarie Airport Precinct Investigation Area, as shown in Attachment 15, is the most suitable land to supply 20.5 hectares of gross developable Business Park zoning in the Airport Precinct Investigation Area.
- 2. Receive a further report to the February 2019 Council meeting in respect of a Planning Proposal for the Council owned land as identified in 1 above.
- 3. Advise landowners within the Airport Precinct Investigation Area of the outcome of this decision.

Executive Summary

This report provides an assessment of a proposed rezoning of land known as the Airport Precinct Investigation Area which includes land adjoining the Port Macquarie Airport in Council ownership and other land in private ownership adjoining Boundary Street. Investigations for expansion of the existing Airport Business Park are listed as a key action in the *Port Macquarie-Hastings Urban Growth Management Strategy* 2011–2031.

In recognition that Council has a role as Airport operator, landowner and planning authority in this matter, Council's Development and Environment Division commissioned Cardno (NSW/ACT) to independently review the planning process and prepare probity reports and recommendations in relation to the land use planning statutory process regarding the Airport Business Park Planning Proposal.

Key issues in assessing a proposed rezoning of the land include the capacity of existing road infrastructure to service an expanded Business Park at the Airport and the impact of the proposal on other business centres in the Local Government Area.

From a traffic and centres hierarchy perspective, it is considered that a maximum 50% of the investigation area (i.e. 20.5 ha) can be rezoned for Business Park uses until such time a secondary access to the Port Macquarie Airport becomes available and there is further economic expansion opportunities within the centres hierarchy.



Council's Strategic Land Use Planning staff have developed planning criteria to assess the capability and suitably of land within the Airport Precinct Investigation Area to arrive at a conclusion as to where the 20.5 ha of Business Park land should be located. The assessment of the criteria indicates that the Council Airport property has a number of clear advantages that distinguish it from the other sites in the investigation area.

Consequently, it is recommended that the Council owned land within the Airport Precinct Investigation Area be confirmed as the most suitable land to supply 20.5 ha of gross developable Business Park zoning in the Airport Precinct.

If the recommended approach is adopted by Council, the next step is to undertake more detailed consultation regarding configuration of zones and content of Local Environmental Plan changes (Planning Proposal) based generally on the concept submitted for Council by King and Campbell (at **Attachment 15**). A further report is proposed to be presented to Council in February 2019, subject to the outcomes of that consultation.

In general terms, subject to further consultation in relation to zone boundaries, it is expected that the Planning Proposal would result in a reconfiguration of the existing B7 Business Park and SP2 Infrastructure - Air transport facility zones on the Council land

Based on the concept prepared for Council by King and Campbell, this should result in:

- An increase in the amount of undeveloped B7 Business Park zone from 13.3ha at present to 20.5ha
- A shift in the location of the B7 Business Park zone further away from Airport operations, and
- A change in zone to SP2 Infrastructure Air transport facility for areas nearer the Airport which will permit uses that are ordinarily ancillary and incidental to Airport operations.

Land Ownership/Proponents

There are four landowners in the Airport Precinct Investigation Area, as follows:

- Port Macquarie-Hastings Council
- JW Missen, Kingswood Estates Pty Ltd and FL & LE Wilkins
- BW & KE Gilson
- KD Ireland.

As discussed in this report, two of these landowners, Port Macquarie-Hastings Council and JW Missen, Kingswood Estates Pty Ltd and FL & LE Wilkins, are seeking a rezoning of their properties for Business Park purposes.



Discussion

This report is presented in four parts:

- Part 1: Background
- Part 2: Key issues
- Part 3: Planning criteria
- Part 4: Conclusions and options

The report has been prepared by Council's Development and Environment (D&E) Division with input from Council's Transport and Stormwater Network (T&SN), Water and Sewer, and Environment sections, noting that Council's Airport is a landowner and stakeholder in the process. The roles and responsibilities of Council in this process are as follows:

- Elected Council consider D&E assessment and determine the most suitable land for a proposed Business Park zoning within the Airport Precinct Investigation Area
- PMHC Airport landowner and proponent seeking a land rezoning
- D&E assess and make recommendations on rezoning
- T&SN traffic assessment and advice
- Water & sewer water and sewer assessment and advice
- Environment flooding and biodiversity assessment and advice.

An organisational restructure of Council came into effect on 1 May 2017 which included the transfer of the Strategic Land Use Planning function from the Development and Environment Division to the new Strategy and Growth Division. The Strategic Planning team is responsible for Council's strategic land use planning responsibilities associated with the Airport Business Park Planning Proposal.

In addition to Strategic Land Use Planning, the new Strategy and Growth Division includes Council's Economic Development, Community and Place, and Assets functions. The Assets section has responsibility for Council's land in the Airport Precinct Investigation Area, as an asset.

To avoid any real or perceived conflict of interest, the Strategic Land Use Planning team has continued to report to Council's Director of Development and Environment and will continue to do so in relation to the Planning Proposal for the Airport precinct, as was the case prior to the restructure.

PART 1: BACKGROUND

The Port Macquarie Airport is owned and operated by Port Macquarie-Hastings Council. The existing operations include a small number of airport related businesses in a B7 Business Park zone, which adjoins the Airport fronting Boundary Street. Council's Corporate Performance Division manages/operates the Airport.

In 2006, Council commissioned the preparation of an Industrial Land Strategy for the Port Macquarie-Hastings local government area by AEC Group. An investigation area was identified at the Airport in the *Port Macquarie-Hastings Industrial Land Strategy 2007* (ILS). The aim being to provide a "large dedicated site close to the urban area of Port Macquarie to accommodate future local services growth,



accommodate any transferred demand from the rezoning of industrial areas to commercial, and to accommodate emerging business technology park style development."

The investigation area included land in Council ownership and other land in private ownership adjoining Boundary Street. In February 2006 Luke and Company consultants lodged an application on behalf of one of the private landowners (Missen), seeking a rezoning for industrial purposes. Assessment of the application was deferred pending completion of the ILS.

Following adoption of the ILS, Council resolved in August 2007 to prepare a draft local environmental plan to initiate a rezoning of the Airport Precinct Investigation Area for industrial purposes and to prepare a Structure Plan for the existing zoned 4(t) Industrial Technology land adjacent to the Airport (now zoned B7 Business Park).

Following notification of the proposal, the former Department of Planning advised on 11 November 2007 that whilst there was in principle support for additional industrial/business technology development at the Airport, a rezoning was premature as Council's review of the Airport Master Plan was incomplete. Also the Department questioned the need for additional industrial land having regard to the stock of existing, undeveloped Zone 4(t) land in the locality. Consequently, a rezoning was not able to be progressed.

Council proceeded with the preparation of a Masterplan for the Airport between 2008 and 2010. Council also commissioned reports by HillPDA in relation to retail and industrial supply and demand in 2010 as a precursor to the preparation of the Port Macquarie-Hastings Urban Growth Management Strategy. HillPDA identified the Airport Precinct Investigation Area as a major new site for business technology and local services growth.

The investigation area was subsequently included in the *Mid North Coast Regional Strategy 2009* and in the *Port Macquarie-Hastings Urban Growth Management Strategy 2011* (UGMS). The Regional Strategy highlighted the precinct as a regional priority for more detailed investigations, as discussed in this report. The UGMS identified the key issues to be addressed during planning investigations for rezoning and proposed the preparation of a Structure Plan for the investigation area.

In 2011 Council's D&E Division commenced the preparation of a Structure Plan in consultation with the affected landowners. The investigations included an ecological report by Biolink Pty Ltd and internal consultation with Council infrastructure managers and staff.

A Discussion Paper was prepared in 2012 by D&E that provided a summary of the key planning issues and identified a number of issues requiring more detailed investigation. In 2013 preliminary geotechnical investigations were undertaken for part of the investigation area to determine likely landfill requirements. This related to the flood prone parts of the investigation area and in particular to the privately owned land in the north.

In 2014, investigations were put on hold pending a review of the *Port Macquarie Airport Master Plan* and preliminary investigation into the feasibility of a north-south secondary road link to the Airport, between Hastings River Drive and the Oxley Highway. The Airport Master Plan relates principally to Airport operations and



includes consideration of new Civil Aviation Safety Authority (CASA) Obstacle Limitations Surface (OLS) requirements.

In May 2015, landowners in the investigation area were asked whether they wished to proceed with the preparation of a Planning Proposal for their land. Two parties (PMHC Airport & Missen) expressed an interest and indicated that they would commence more detailed investigations to support a rezoning. Council's D&E Division retained responsibility for the preparation of a Planning Proposal for the Airport Business Park Investigation Area.

In recognition that Council has a role as Airport operator, landowner and planning authority in this matter, Council D&E engaged Cardno (NSW/ACT) to independently review the planning process and prepare probity reports and recommendations in relation to the land use planning statutory processes for the preparation of a Planning Proposal in relation to the proposed Airport Business Park.

A preliminary probity report at **Attachment 1** and as discussed in more detail under 'Planning & Policy Implications', addresses whether there are any probity issues of concern in the process leading up to and including this report to Council. A final probity report will be provided to Council after any exhibition of a Planning Proposal, to address whether there are any probity issues of concern in the exhibition and review process and in relation to the final recommendations to Council.

PMHC Airport engaged King and Campbell Pty Ltd to co-ordinate the investigations for Council's land. Detailed investigations have included the preparation of a Biodiversity Certification (BioCertification) Assessment and Strategy for Council owned land around the Airport.

The BioCertification Assessment and Strategy, which was approved by the NSW Minister for the Environment on 7 September 2018, includes allowance for expansion of the existing Airport Business Park over Council's land, should this be the outcome of a Planning Proposal. The BioCertification process aims to provide an option for larger-scale development and biodiversity conservation offset (i.e. at a more strategic level). In this case, the BioCertification has been applied to all of Council's Airport and nearby Thrumster lands. This means that Council is able to submit an application for development and conservation outcomes, provided they are consistent with the approved BioCertification Strategy.

As detailed in D&E's report to the 10 August 2016 Ordinary Council Meeting, six (6) submissions were received to the public exhibition of the BioCertification Assessment and Strategy. Two of these, from John Jeayes and GEM Planning Projects, raised concerns about the BioCertification process and also foreshadowed planning process and probity issues. A copy of these submissions is included here as **Attachment 2** and the key issues raised with respect to the Business Park proposal, are addressed in this report.

King and Campbell for PMHC Airport, has also commissioned traffic modelling, sewer, water and stormwater concept proposals, a geotechnical assessment and an Aboriginal heritage assessment to inform the preparation of a Planning Proposal for Council's land.

Land Dynamics has been engaged to coordinate detailed investigations for the Missen property. Staff from Council D&E, T&SN, Water and Sewer and Environment



met with Land Dynamics in August 2015, February 2016 and May 2016 regarding the key issues for the preparation of a Planning Proposal for the Airport Precinct Investigation Area. A threatened species assessment in relation to the Wallum Froglet has been submitted for the Missen property, in addition to a concept plan showing sewer, water and stormwater servicing for the site.

Council D&E engaged HillPDA in August 2016 to provide advice regarding the relationship between the proposed expansion of the Airport Business Park and the existing hierarchy of business centres in the Port Macquarie-Hastings Local Government Area (LGA). That report has been reviewed by landowners in the Airport precinct and Council D&E has sought further clarification from HillPDA, as discussed in this report.

The conclusions and recommendations in this report are based on the combined information and consultations since 2007, as summarised above.

The Airport Precinct investigation area

The Airport Precinct investigation area includes the existing B7 Business Park zone and adjoining Council land to the south and east and privately owned land to the north, generally having frontage to Boundary Street. The extent of the investigation area is shown in Figure 1.





Figure 1: Airport Precinct Investigation Area

Existing precinct land uses include:

- General aviation facilities comprising two u-shaped cul-de-sac aprons which provide access to adjacent aircraft hangar facilities. The hangars are used for aircraft associated with both business and recreational activities.
- Newman Senior Technical College located on a 3.8 ha site with frontage to Boundary Street. The college is a senior secondary school (students in Years 11 & 12) that provides vocational education and training.



- A dwelling adjoining Newman College to the north.
- Former crayfish farm located on a 4 ha private property on the eastern side
 of Boundary Street. The crayfish farm no longer operates, however the site
 has been developed for a series of elongated freshwater ponds that cover
 the majority of the land. This property also contains a dwelling.

The Airport Precinct Investigation Area incorporates a range of zones under the *Port Macquarie-Hastings Local Environmental Plan 2011*, as follows:

- B7 Business Park over the existing General Aviation Facilities, Newman Senior Technical College and other Council-owned land in Boundary Street
- SP2 Infrastructure Air transport facility over Council land to the north and south of the B7 land
- RU1 Primary Production over the existing dwellings and vacant rural land in Boundary Street, and
- E2 Environmental Conservation over the remainder of the investigation area.

The distribution of existing land use zones is shown in Figure 2.

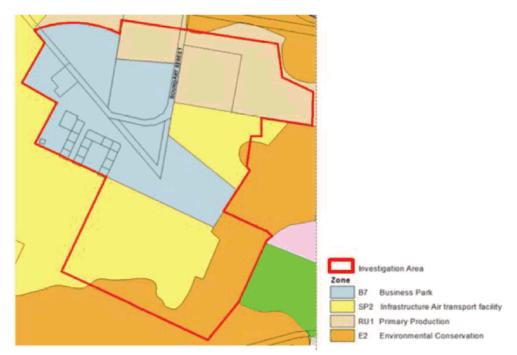


Figure 2: Existing Land Use Zoning

Strategic Land Use Planning Context

North Coast Regional Plan 2036

The Regional Plan identifies the Port Macquarie Airport as one of five busiest airports in regional NSW and maps the Airport precinct as an investigation area for



employment lands, adjoining the part of Council's land that is already zoned B7 Business Park.

In planning for economic growth around airports, the Regional Plan recommends that Councils consider new infrastructure needs and introduce planning controls that encourage clusters of related activity (Action 6.1). Also recommended is the need to promote new job opportunities that complement existing employment nodes around airport precincts, and to deliver infrastructure and coordinate the most appropriate staging and sequencing of development (Action 7.1).

Recognised as important gateways for business, tourism and personal travel, as well as high-value freight, Action 10.1 of the Plan requires the delivery of Airport precinct plans for Ballina-Byron, Lismore, Coffs Harbour and Port Macquarie that capitalise on opportunities to diversity and maximise the potential of value-adding industries close to Airports.

Port Macquarie-Hastings Urban Growth Management Strategy 2011-2031

The 2011-2031 UGMS has been used as a key strategic document in determining priorities in consultation with landowners as described in this report.

The rationale for retail and business development in the UGMS is based on the Department of Planning and Environment's *Settlement Planning Guidelines 2007* for the North Coast, as applicable to the Port Macquarie-Hastings area. The key principles are summarised below:

- To provide a wide range of quality shopping opportunities and commercial experiences for consumers in a hierarchy of viable retail centres consistent in scale with existing towns and villages and centrally located within each community.
- To provide for further growth in retail and commercial space to meet growth demand generated by population and household growth.
- To protect and enhance the integrity and function of existing centres, and to improve the amenity and vitality of centres as focal points for the Port Macquarie-Hastings community.
- To integrate planning for commercial uses within transport, public domain and infrastructure opportunities.
- Fragmentation and out-of-centre retailing should be resisted unless compelling reasons exist in order to maintain the healthy retail and service functioning of particular centres in the region.
- To identify opportunities for bulky goods style retailing in accessible locations in or near commercial centres and restrict this form of retailing in industrial zones.

The UGMS identifies the Airport Precinct for investigation to provide for service industry and business park industrial uses, in accordance with the 2007 *Port Macquarie-Hastings Industrial* Strategy and for a range of aviation related uses. The Strategy recommends that these investigations consider links and opportunities associated with the expected future operations of the Airport.



The aim is to reinforce the Airport Precinct as a significant gateway to Port Macquarie and to ensure that future development is compatible with further Airport operations, including height, lighting and other potential impacts.

Port Macquarie-Hastings Urban Growth Management Strategy 2017-2036

The UGMS 2017-2036 was adopted by Council on 20 June 2018. The Strategy is not yet endorsed by the NSW Department of Planning and Environment. Essentially it maintains the same principles as the 2011-2031 UGMS.

Port Macquarie Airport Master Plan 2010 & Addendum Report 2013

The Port Macquarie Airport is owned and operated by Port Macquarie-Hastings Council and is the fifth largest regional airport in NSW (by passengers) with approximately 230,000 passenger movements per annum. A doubling of passenger numbers is forecast to approximately 450,000 passengers per annum by 2030.

The Port Macquarie Airport Master Plan 2010 and Port Macquarie Airport Master Plan Addendum Report 2013 (i.e. Airport Master Plan) sets out a 20-year vision for the Airport and provides the framework and strategic direction to guide the future development to underpin the region's economic development and tourism potential. Priority objectives are:

- To provide adequate infrastructure and facilities to meet forecast demand for future regular public transport airline operations, and
- To provide opportunity for commercial property development to promote employment opportunities, facilitate economic development, and support the long-term financial viability and sustainability of the Airport business.

The Master Plan identifies areas required for the ongoing operation and development of the Airport consistent with aviation demand forecasts and compliance with CASA requirements for full Code 4C aerodrome standards. This includes widening the runway and associated OLS from 150 to 300 metres (m) and the extension and/or relocation of critical aviation-related infrastructure and facilities, subject to detailed investigation and planning approval.

The Master Plan also identifies potential areas to the north and east of the existing Airport facilities for non-aviation uses, including a proposed Business Park and Airport related accommodation/hotel development, subject to detailed investigation and rezoning.

The Airport Master Plan concept for the potential long-term development of the Airport lands is at **Attachment 3**.

PART 2: KEY ISSUES

Having considered the background to the Airport Business Park investigations, the following part of this report looks at the key issues to be addressed in any Planning Proposal to rezone additional land for Business use. These issues need to be addressed by Council to comply with State planning legislation and Council's strategic planning policy position, as described in the UGMS.



The key issues are:

- A. the Centres Hierarchy in the Port Macquarie-Hastings LGA and amount of zoned land
- B. the capacity of existing road infrastructure
- C. secondary access options to the Airport.

These issues are discussed below.

A. Centres Hierarchy in the Port Macquarie-Hastings LGA

Council's adopted centres hierarchy, as outlined in Table 1 below, assists in understanding the functions of the commercial centres in the Port Macquarie-Hastings LGA and the relationship between the centres.

Table 1: Port Macquarie-Hastings Centres Hierarchy

Classification	Centres	Characteristics
Port Macquarie CBD	Town Centre Settlement City Gordon Street	The principle centre in the LGA and broader region for business services, administrative services and government functions.
Town Centres	Wauchope Laurieton	Plays a significant role in providing commercial services to residents in the LGA.
Large Villages	Lakewood Lake Innes Lake Cathie Lighthouse Plaza Bonny Hills* Thrumster*	Typically provides a small range of services to meet the daily and occasionally, weekly needs of the local catchment.
Small Villages	North Haven Kew Kendall Lighthouse Beach Flynn's Beach Waniora Parkway Bonny Hills Clifton	Generally provides only day-to-day, or occasionally weekly needs to service a small catchment.

^{*} Future Centre.

The centres hierarchy is important because it has a major influence on guiding public and private investment in the LGA and it helps to protect the integrity and viability of existing centres. The relationship between the Airport Business Park and other centres is primarily related to opportunities for new office space because the B7 zone does not permit retail premises.

In order to assess the appropriate level of opportunity for office space at the Airport, Council D&E commissioned HillPDA consultants to provide advice regarding the relationship between the proposed expansion of the Airport Business Park and the existing hierarchy of business centres in the Port Macquarie-Hastings LGA. As noted in the Background section of this report, this included consideration of a submission from GEM Planning consultants for Sovereign Hills, received as part of the Biodiversity Certification exhibition.

The submission suggested that Council has a vested interest in applying for BioCertification of the Airport and Thrumster lands and in particular, raised concerns about the extent of Council's ownership, the lack of land use planning controls



applying to the existing B7 Business Park area compared to other business areas in the LGA, and the potential impact of the proposed Business Park expansion on other commercial centres.

As part of the brief, HillPDA were also asked to consider zone options for the Airport precinct. The B7 Business Park zone provides for a variety of light industrial uses, including high technology industries and also encourages development of strategically located out-of-centre sites through the permissibility of office premises.

Based on an assessment of employment trends and population forecasts, HillPDA modelled low and medium growth scenarios to project business park office space demand and land requirements for the Port Macquarie-Hastings LGA to 2036.

Consideration was also given to three of the six business zones in the *Port Macquarie-Hastings Local Environmental Plan 2011* (i.e. B4 Mixed Use, B5 Business Development & B7 Business Park) to assess the most appropriate zoning to apply to the Airport Precinct Investigation Area.

HillPDA noted that recent demand for office floor space in the Port Macquarie-Hastings LGA has been low. The majority of this demand has been associated with the medical sector around the Port Macquarie Base and the Private Hospitals. Other demand has mostly been for smaller office premises in the Port Macquarie CBD. Nationally, there is a trend towards office-based activities in Business Parks and towards clustering/agglomeration of like businesses, such as freight distribution through regional Airports.

HillPDA's assessment (at **Attachments 4 & 6**) has included a review of a report prepared by Gillespie Economics on behalf of PMHC Airport (at **Attachment 5**).

In summary, the following key points and conclusions have been made by HillPDA in relation to the Airport precinct:

- Overall, the demand for stand-alone office floor space in the Port Macquarie-Hastings LGA to 2036 is projected to be between approximately 61,000 sqm to 85,000 sqm. A significant component of this floor space provision will be in the CBD areas of Port Macquarie, Wauchope, Laurieton and Thrumster.
- Assuming CBD capture rates of 80%, this additional demand translates into approximately 3 ha and 4.2 ha of absolute net developable land being required for out-of-centre Business Park style office space. A lower capture rate in the commercial centres of 60% would result in a demand for up to 8.5 ha of land being required for Business Park office space.

The Gillespie Economics review for PMHC Airport was critical of the HillPDA assessment in that it did not make an adjustment to the 'business as usual' forecast for commercial office space and industrial land demand, having regard to the significant level of investment at the Airport from all levels of government. The review suggests that Airport investment will drive inward investment and relocation of businesses could be informed by consideration of other upgraded regional Airports and their surrounding developments.

HillPDA note that there are always examples where the introduction of a 'base' industry can stimulate jobs and economic growth either temporarily or in the long-



term (e.g. a new mine). However, Airports are not really a 'base' industry but transport infrastructure, required to support other industries.

HillPDA has suggested two different options for Council's consideration:

- Option 1 is to rezone 10 hectares net developable land (i.e. 15 ha gross) for Business Park uses at the Airport precinct, noting that the disadvantage with this option is that it restricts the scenario of a significant rapid development of the precinct unless there is rezoning of further land.
- Option 2 is to rezone up to 20 hectares gross developable land for Business Park uses. The advantage of this option is that it provides economies of scale up to the capacity of the current road network.

HillPDA have recommended option 2, noting that this option is unlikely to threaten the viability of the centres hierarchy because as identified in the 2016 HillPDA assessment, the only 'white collar' industry in the LGA to have shown significant interest in commercial space over the past decade or two has been health. This industry, as well as several others (such as real estate services, etc.) is population based and would therefore express a stronger interest in the Port Macquarie CBD, other commercial centres and the hospital precinct, rather than the Airport. Recognising that achieving a perfect forecast for employment lands is increasingly difficult the longer the planning horizon, it is preferable to err on the side of extra supply for Business Park uses in the Airport precinct to ensure that the local economy can respond rapidly to new and emerging opportunities, where required.

Option 2 from the HillPDA report quotes 20 ha, however as shown on p4 of the report that option is in fact based on the capacity of the road network which is 20.5 ha. On this basis Council D&E has assumed that option 2 is up to 20.5 ha.

Therefore, from a centres hierarchy perspective, the maximum amount of B7 Business Park land that can be recommended in the expanded Airport Business Park is 20.5 ha gross developable land. In Part 3 of this report, the most appropriate location for this 20.5 ha is considered in more detail.

B. Road infrastructure

PMHC Airport through King and Campbell, commissioned the preparation of a Traffic Engineering Report by TPS Group to address traffic planning for an expanded Business Park at the Airport Precinct. In the absence of any certainty regarding a future alternative road access, Council D&E and T&SN has assumed, for the purpose of transport planning, that all access to the Airport and proposed Business Park precinct will be via Boundary Street.

An initial TPS Group report (Dec 2015) at **Attachment 7**, was prepared based on assumptions by TPS Group regarding land use types, density and traffic generation. The report modelled traffic generation for existing development and growth of the Airport and other development on Boundary Street, plus growth of the proposed Business Park precinct at various stages of completion (i.e. 30%, 50%, 70% & 100%). A number of design options were presented for upgrade of the Hastings River Drive and Boundary Street intersection, with conclusions by TPS Group for each, based on projected traffic volumes to 2030.



Council T&SN reviewed the TPS Group report (review at **Attachment 8**) and in summary, advised that:

- The larger upgrade options for the Hastings River Drive/Boundary Street
 intersection are unrealistic. There are limits on the potential to expand the
 size of the intersection given existing land uses and having regard to the
 capacity of the adjoining road network. For e.g. even a minor upgrade would
 involve significant land acquisition of adjoining properties.
- Minor upgrades of the intersection, although costly, are realistic and suitable for accommodating increased traffic in the precinct, and
- A secondary access to the Airport cannot be seen as a given.

T&SN prepared an intersection layout considered to be indicative of the maximum size feasible for the Hastings River Drive/Boundary Street intersection. The indicative layout was based on compatibility with the adjoining road network and the maximum level of land acquisition likely to be acceptable to the community.

It was suggested to TPS Group that they "reverse engineer" their modelling based on the indicative design to determine the future capacity of the intersection with more certainty and from that, estimate the amount of land that could be realistically developed for Business Park development in the Airport precinct.

A revised TPS Group report (June 2016) at **Attachment 9**, modelled traffic generation assuming a hypothetical Business Park mix of uses across the precinct. TPS Group concluded that the intersection would be capable of providing for approximately 75% of the overall Business Park development in 2030, or approximately an additional 15,000 vehicles per day (vpd). It was also concluded that the intersection would be capable of providing for all Business Park development traffic in 2030, i.e. 20,000 vpd, if the left turn lane in the east approach were extended from 35m to 60m.

Traffic modelling is highly sensitive to input assumptions, particularly in peak periods on congested networks. Therefore, when the road network is operating at or near capacity, a minor change in modelling input parameters can have a significant impact on model outputs. Council's T&SN section review of the revised TPS Group report (review at Attachment 10) identified that several of the agreed input values/modelling parameters provided by T&SN had been adjusted and that this resulted in a cumulative effect on the modelling outcomes. T&SN found that the TPS Group 100% and 75% land use scenarios still did not meet all of Council's normal Level of Service and Degree of Saturation targets. These are commonly used parameters to assess the operating performance of a road network.

T&SN have recommended from a traffic perspective that a maximum of 50% of the Business Park investigation area be rezoned until such time a secondary access to the Port Macquarie Airport becomes available. This proportion equates to 20.5 ha of gross developable area.

In response to T&SN's recommendation PMHC Airport has submitted a peer review of both the TPS Group report (June 2016) and the review of that report by Council T&SN (Sep 2016). A copy of the resulting SLR Consulting Australia Pty Ltd report is at **Attachment 11**. In brief, SLR support the assumptions used by TPS Group in the Sidra modelling and agree with the conclusion that the full Business Park



development can be catered for at 2030 with the modified lane arrangement for the Hastings River Drive/Boundary Street intersection, as outlined in the TPS Group report.

T&SN reviewed the SLR report (see review at **Attachment 12**) and advised that no new information has been presented that would provide adequate justification to alter T&SN's prior advice.

It is therefore assumed for the purpose of this report that up to 20.5 ha of gross developable B7 land can be accommodated through an upgraded intersection at Hastings River Drive and Boundary Street.

C. Secondary access options

Council T&SN is currently investigating secondary access options to provide flood free access to the Airport. At this stage there is no certainty that a secondary access will be feasible and therefore, Council D&E is not able to demonstrate for the purpose of a Planning Proposal that there is adequate public infrastructure for more than 20.5 ha of gross developable Zone B7 land.

King and Campbell for PMHC Airport argue that in order to maximise the potential for affordable employment land it is important that infrastructure is planned and implemented for the full footprint of the proposed Airport Business Park expansion (i.e. up to 41ha). They argue that a partial zoning will not provide the certainty required to implement the long term infrastructure planning, including future road links to/from the Airport and that there are sound planning, infrastructure and economic development grounds to include the full footprint of the Business Park precinct in a Planning Proposal.

King and Campbell propose that a legal mechanism be established, in conjunction with a Planning Proposal and the preparation of Section 94 and Section 64 Contributions Plans under the *Environmental Planning and Assessment Act 1979* and *Local Government Act 1993* respectively, to rezone the full footprint of the Airport Precinct Investigation Area. They consider that this will provide Council with the ability to stage the release of land in the precinct for future development and propose that the terms of the legal mechanism, including the associated timeframes for the staging of development, be negotiated between the relevant parties.

King and Campbell suggest that this is a similar approach to that applied by Council to rezone the Warlters Street Schools site to B3 Commercial Core in 2010. In that instance, the planning agreement entered into between Council and the Catholic Church restricted development of the B3 land to agreed timeframes which had been determined in an economic impact assessment report.

There are no examples in Council's planning for growth in the past 10 years in which land has been zoned where essential infrastructure needs may not be able to be met. In the cited case of the Warlters Street land, the planning agreement related to the timing of development based on forecast land demand and nothing else. All other infrastructure was able to be provided.

The potential economic importance of the Airport Business Park is acknowledged in accordance with local and regional strategic planning. However, in this case, the Hastings River Drive/Boundary Street intersection has absolute limits as the only



access point to the proposed Business Park expansion and there is currently no clear evidence that alternative access arrangements can be physically provided in the future, including a secondary road link.

The proposed use of a legal mechanism to stage land release is therefore not appropriate as it does not guarantee that a secondary road link can be provided to the Oxley Highway. It is not appropriate to zone land that may not be able to be serviced with road infrastructure until satisfactory arrangements for that infrastructure are in place.

On this basis, the maximum amount of B7 Business Park land that can be recommended is 20.5 ha gross developable land, based on the traffic assessment discussed in Part 2B above.

PART 3: PLANNING CRITERIA

Based on the assessment of key issues in Part 2, it is considered that Council can support an expansion of the Airport Business Park up to 20.5 ha. The question is: Where should this 20.5 ha of B7 land be located?

To assist in determining the relative merit of land in the Investigation Area for rezoning, five planning criteria have been applied to evaluate the potential Business Park sites within the Airport Precinct, as follows:

- Existing planning provisions applying to the land and the relationship to future Airport operations
- Capacity to limit or address potential environmental constraints
- 3. Co-ordination with other land in the Precinct, e.g. access arrangements
- Capacity to deliver necessary infrastructure, including improvements to major transport corridors, and
- 5. Capacity to deliver affordable employment land to facilitate market choice.

These criteria are based on planning principles for industry in the UGMS, which are:

- To provide opportunities for a range of industrial development types, in a variety of locations, generally in close proximity to urban centres and services, to service the needs of a growing population and export markets.
- To provide sufficient zoned industrial land to facilitate market choice, maintain affordability, and allow for expected loss of yield due to constraints.
- To provide industrial land to service market demand on land that is appropriate located with regard to:
 - the proposed urban settlement pattern (i.e. settlement areas, markets, transport & access).
 - environmental constraints, and
 - cost effective provision of urban services and infrastructure.

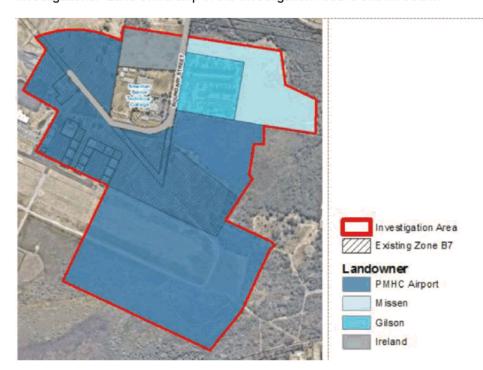
Council D&E have used the planning criteria to assess the capability and suitability of land within the Airport Precinct Investigation Area to arrive at a conclusion as to where the 20.5 ha of B7 land should be located. Capability considerations relate to the physical attributes of the land and the risks of degradation associated with the



proposed Business Park use. Suitability considerations include other factors such as economics, infrastructure requirements, conflicting and complementary land uses and the planning policy framework.

The planning criteria have been circulated to precinct landowners and submissions invited to help inform this assessment. Submissions addressing the criteria have been received from King and Campbell for PMHC Airport and from Land Dynamics for Missen. Copies of the landowners' submissions are at **Attachments 13** and **14**, respectively and the key points raised are discussed in the assessment below.

All land within the Airport Precinct has been assessed against the planning criteria to determine which areas of the precinct should be prioritised for detailed rezoning investigations. Land ownership in the Investigation Area is shown below.



Criterion No. 1

Existing planning provisions applying to the land and the relationship to future Airport operations

PMHC Airport land

The PMHC Airport property is the largest site in the Investigation Area (approx. 48 ha) and is currently zoned partly B7 Business Park, partly SP2 Airport Infrastructure and partly E2 Environmental Conservation.

King and Campbell have submitted a rezoning concept plan on behalf of PMHC Airport (**Attachment 15**), which takes into account the footprint of the existing B7 Business Park zone, the *Port Macquarie Airport Master Plan* and existing operations of the Port Macquarie Airport.



The concept plan shows a southerly extension of Boundary Street and potential for future secondary flood free access to the Oxley Highway. It proposes that all Council owned land on the western side of Boundary Street be rezoned to SP2 Airport Infrastructure for use in conjunction with Airport operations and that all Council owned land on the eastern side of Boundary Street be rezoned to B7 Business Park.

In summary, the submission:

- Notes that there is currently 25.53 ha of B7 Business Park zoned land within the PMHC Airport investigation area, of which 13.3 ha is undeveloped.
- Proposes to rezone 17.04 ha of the existing B7 zoned land on the western side of Boundary Street to SP2 Airport Infrastructure. This area includes 8.39 ha of B7 land occupied by Airport related uses and 8.65 ha of undeveloped B7 land.
- Proposes to rezone additional land on the eastern side of Boundary Street (19.1 ha) to B7, over and above the existing B7 zoned land on the eastern side of Boundary Street (4.65 ha), taking the overall proposed B7 footprint on Council owned land to 23.75 ha in area.

King and Campbell also note that their concept recognises the close linkage between the PMHC Airport land on the western side of Boundary Street and the current and future Airport operations and suggests that this land is more appropriately zoned SP2 Airport Infrastructure given its close proximity to Airport operations.

Missen land

The Missen property has a total area of 12.75 ha and is currently zoned partly RU1 Primary Production and partly E2 Environmental Conservation. Land Dynamics have submitted a development concept on behalf of Missen (**Attachment 16**) that proposes a footprint of approximately 4.2 ha within the Investigation Area for either Zone INI General Industrial, or Zone B7 Business Park.

The submission from Land Dynamics does not specifically address the relationship to existing or future Airport operations. Development of the Missen property could take place without any direct impact on Airport operations.

Gilson land

The Gilson property comprises an area of approximately 4 ha and is currently zoned RU1 Primary Production. The land has a frontage of approximately 200m to Boundary Street that provides opportunities for access off Boundary Street without any direct impact on Airport operations.

Ireland land

The Ireland property is currently zoned RU1 and has a total area of 4.3 ha, of which approximately 2.5 ha falls within the Airport Precinct Investigation Area. Located on the eastern side of Boundary Street, the land adjoins Newman College to the north and PMHC Airport airside land to west. The site has access off Boundary Street, with no direct impact on Airport operations.



Comment:

The PMHC Airport land has the greatest potential for direct integration between landside and airside activities. It also contains a significant amount (13.3 ha) of existing undeveloped Zone B7 land which is proposed to be relocated as part of the expanded B7 Business Park zone.

King and Campbell's proposal of retaining Airport related uses east of Boundary Street and consolidating Business Park uses west of Boundary Street is generally consistent with the *Port Macquarie Airport Master Plan*. Accordingly, it is considered that the consolidation of Zone SP2 land on the western side of Boundary Street is reasonable and reflective of the appropriate use of this land.

Therefore in terms of Criterion No. 1, it is considered that the PMHC Airport land provides the most logical location for an expansion of the existing B7 Business Park zone, followed by the Gilson, Ireland and Missen properties in order of land suitability, due to proximity to Boundary Street and existing B7 zoned land.

Criterion No. 2

Capacity to limit or address potential environmental constraints

• PMHC Airport land

Large parts of the PMHC Airport land are unconstrained in terms of biodiversity impacts. Environmental impacts associated with rezoning and developing the land have been addressed in the approved Biodiversity Certification Assessment and Strategy for the Port Macquarie Airport and surrounding land.

The flooding constraints relating to the 1:100 year flood do not apply to the PMHC Airport land. Only minor filling will be required to achieve flood planning levels on the fringe areas in the north and south of the site, in accordance with the *Port Macquarie-Hastings Flood Policy 2015*.

Missen land

The eastern area of the development footprint proposed by Land Dynamics has previously been mapped by Biolink Pty Ltd as being affected by medium level Wallum Froglet activity. In support of a rezoning Land Dynamics have submitted a *Threatened Species Seven Part Test Assessment* report.

The assessment report concludes that removing the potential non-breeding Wallum Froglet habitat for the proposed footprint will have a negative impact by reducing connectivity between two local populations. Recommended mitigation measures include retaining a link with new breeding habitat approximately 100m wide in the east of the site and allowing rehabilitation to structured forest, together with effective stormwater treatment, as the Wallum Froglet species is sensitive to water quality.

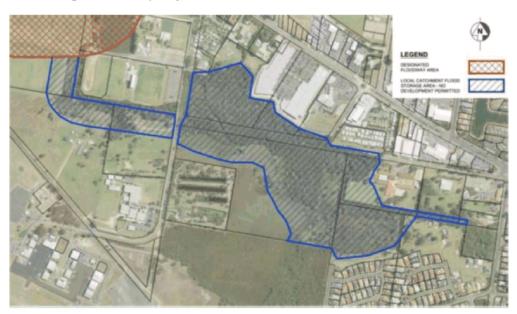
Council's Environmental staff have reviewed the assessment report and advised that they are generally supportive of the proposed footprint, subject to an assessment of other relevant matters identified by Biolink and not addressed in the Seven Part Test Assessment (i.e. native vegetation loss, hollow-bearing trees, environmental buffer requirements & habitat to the Little Bent-Winged Bat & Koala food trees). Details



about how it is intended to secure and manage the residue environmental lands as offset will also be required to support a rezoning.

During a meeting with Council staff on 16 February 2016, Land Dynamics advised that the landowner is not willing to commission any further ecological work to progress a rezoning. It was suggested that the initial ecological assessment report submitted with the landowner's initial rezoning application and based on an earlier concept, would suffice. Council staff recommended that the 2005 assessment report, together with the work completed by Biolink Pty Ltd in 2012, be consolidated and updated to address current State government requirements to support a Planning Proposal.

The Missen property is subject to flooding from the local catchment and the Hastings River in a 1:100 year flood. As such, any proposed development is to have regard to the *Port Macquarie-Hastings Flood Policy 2015* including the permitted development areas in Figure 2 of the policy, as shown below.



Council's Environment section has advised that the blue hatched area is an absolute minimum as flood storage which is required to manage the local Clifton Drive catchment and is considered to have no practical development potential.

As the proposed footprint for the Missen property extends into the blue hatched area, a detailed Flood Study and modelling will be required to support a rezoning to demonstrate that the encroachment will not raise the flood level by more than 10mm or change the velocity of flows.

For development to meet flood planning levels, the proposed footprint will need to be filled to a height of 3.7m AHD. As there is no source of fill on the site, all fill will need to be imported. In correspondence dated 23 July 2015, Land Dynamics estimated that 146,993m³ of fill (based on an earlier but similar concept plan) will be required to achieve the flood planning level. This volume equates to approximately 2,670 truck and dog movements.



To confirm how much of the property needs to be stripped off before filling can occur (i.e. existing soil may not be able to take compaction) and to consider the likely impacts on groundwater, a geotechnical assessment will be required to support a Planning Proposal to rezone the land. A detailed estimate of total fill volumes to assess total truck movements and anticipated impact on the road network would be required at the subsequent development assessment stage.

Gilson land

There are no known ecological constraints on the Gilson property, which has previously been used for aquaculture. However, the land is subject to flooding and fill requirements, as discussed for the Missen property above.

Ireland land

The Ireland property is mostly cleared but does contain a hollow bearing tree previously identified by Biolink, which would need to be assessed and managed as part of any Planning Proposal.

Development of the property will also require fill due to flooding. A moratorium presently exists on filling the land in this location, pending finalisation of the Hibbard Floodway Investigation, which is currently underway. Following a decision on the final floodway alignment through Hibbard West, the moratorium may be lifted.

Comment

In terms of biodiversity, the normal principle is to avoid impacts where possible, mitigate impacts on-site where it is not possible to avoid, and offset impacts elsewhere if it is not possible to avoid or mitigate impacts on-site. On this basis, the parts of the study area most capable for development in terms of biodiversity are:

- a) The central cleared parts of the PMHC Airport property, and
- b) The Gilson, Missen and Ireland properties.

As noted above, there are some knowledge gaps in relation to biodiversity constraints relating to the Missen and Ireland properties, including details about how it is intended to secure and manage residue environmental lands. The impacts on biodiversity and offsetting arrangements for development on the PMHC Airport property are known through the approved Biodiversity Certification Assessment and Strategy.

In relation to flooding, the PMHC Airport land is considered preferable as the proposed Zone B7 area is located above the predicted 1:100 year flood level. The PMHC Airport land does not require extensive fill, as required for the other landholdings, involving a large number of truck movements, impacts on the road network, detailed monitoring regarding fill suitability and quality and, in the case of the Ireland and Missen properties, an assessment of impacts on flood flows and storage in surrounding areas.

In conclusion regarding environmental constraints, the most logical location for an expansion of the existing B7 zone is considered to be the PMHC Airport property, followed by the Gilson; Missen and then Ireland properties, in order of land capability.



Criterion No. 3

Co-ordination with other land in the precinct, e.g. access arrangements

PMHC Airport land

The concept plan for the PMHC Airport land shows the potential for coordinated access to existing and proposed future development to the north and west via Boundary Street. Access options are also provided via future road links to the south (as an extension of Boundary Street), to the south-east (to Lady Nelson Drive) and to the east (to The Binnacle), subject to further detailed investigation. These potential links have also been included in the Biodiversity Certification of Council's land.

The King and Campbell submission notes that the proposal for PMHC Airport provides a major intersection Gateway to the Port Macquarie Airport and associated uses and potential to link to the adjoining northern lands in the Investigation Area in the future.

Missen land

The Land Dynamics concept shows a battle-axe access via the property's 100m frontage off Boundary Street adjacent to the northern boundary of the adjoining Gilson site. Land Dynamics have suggested that vehicle access is also available along the northern portion of the site via an existing road reserve with potential linkages to Hastings River Drive.

Access along the currently unformed road reserve and connection to Hughes Place, as an alternative or additional connection to the Airport Precinct, has previously been considered and dismissed due to ecological impacts (i.e. the road would cross State Environmental Planning Policy Coastal Management 2018 wetland & Endangered Ecological Communities) and the likely transfer of traffic congestion to the Hughes Place intersection. It has therefore been assumed by Council D&E and T&SN staff for the purpose of transport planning, that all access to the Airport and proposed Business Park Precinct will be via Boundary Street.

The internal road layout shown on the Land Dynamics concept provides for connectivity to PMHC Airport's concept road network to the south. The cul-de-sac access in the east of the Missen footprint is not considered to be suitable to service light industrial or large floorplate campus style Business Park development. A loop or perimeter road, which would also address issues relating to bushfire hazard, stormwater run-off and environmental edge effects, would be required as part of any proposed development.

The concept road layout does not provide for any future integration with the adjoining Gilson property to the east. Land Dynamics suggest that it is not necessary for the Missen and Gilson lands to be developed together, with both enjoying road frontage to Boundary Street, and with both properties being of adequate size and shape to accommodate development in their own right, subject to a variation of Council's environmental buffer requirements for the Missen land.

One the key ingredients in creating a successful Business Park for the Airport Precinct is to ensure that future development occurs in a coordinated and strategically sound way that will enhance the function, amenity and overall integration of development within the Precinct. If the Missen property is to be included as part of



a future B7 zone, there should be coordination of subdivision layout and internal road design to cater for a range of light industrial and large floorplate Business Park uses, in addition to enhanced connectivity to other businesses in the Precinct.

Coordination is also desirable in relation to filling and the delivery of service infrastructure to the Missen and Gilson sites.

Gilson land

The Gilson property has a regular shape and a 200m frontage to Boundary Street. This land has potential to act as a key gateway site on the northern approach to the precinct and could be developed in isolation. However, it provides only 4 ha of potential B7 land and coordination with adjoining property would also be a key issue, as discussed for the Missen land above.

Ireland land

The Ireland property is relatively small but has direct access to Boundary Street and may provide an opportunity for connections to Newman College in the future.

Comment

In terms of Criterion No. 3, all properties within the Investigation Area have access to Boundary Street and could be coordinated to provide linkages to surrounding properties and existing land uses in the precinct. The PMHC Airport land also provides opportunities for potential linkages to the south and east of the Airport which may assist in achieving flood free access to the Airport and important connections from an economic development perspective.

The PMHC Airport land has potential to provide 20.5 ha of B7 land and is therefore considered to be suitable in terms of coordination issues, followed by the Gilson, Ireland and Missen properties, in order of preference. The Missen property is considered to be the least suitable site due to its battle-axe frontage, irregular shape for potential development and more complex relationship with surrounding properties in the current development concept.

Criterion No. 4

Capacity to deliver necessary infrastructure, including improvements to major transport corridors

PMHC Airport land

The King and Campbell submission notes that the Biodiversity Certification Assessment and Strategy includes three potential future road links to the south, the south-east and to the east. Each of these potential future road links will provide flood free access to the Airport. They will also provide an important major north-south linkage between Hastings River Drive, the Oxley Highway and the Port Macquarie CBD.

As discussed in Part 2C of this report, Council T&SN is currently undertaking preliminary investigations for a secondary access link to the Airport. At this stage however, no certainty exists that the required road infrastructure to serve more than 20.5 ha of gross developable B7 Business Park land can be provided at any point in the future. However, the PMHC Airport proposal does make provision for partial



construction of a future road network that may incorporate a secondary access, or accesses, in the future.

King and Campbell has previously submitted a Stormwater Management Plan (SMP) to support a rezoning of the PMHC Airport land. The SMP considers potential impacts on stormwater quality and quantity and recommends implementation of a stormwater treatment train approach, primarily using bio-retention basins/swales centrally located within the proposed road network. A maintenance plan has been formulated as part of the SMP to assist in the establishment and continued operation of the proposed stormwater treatment infrastructure, including recommendations on species selection and maintenance intervals.

This stormwater concept has been assessed by Council T&SN and is considered to provide a satisfactory response to stormwater management issues to support a Planning Proposal.

The Port Macquarie Airport and existing developed Business Park lands are currently serviced by reticulated water supply. The Airport Precinct can be serviced by water supply subject to augmentation of a connection from the Oxley Highway around the northern edge of the racecourse in Lady Nelson Drive.

Based on modelling undertaken by Council's Water and Sewer and assuming preliminary densities provided by King and Campbell, the design provides for a 250mm water main from the Oxley Highway to the eastern perimeter of the PMHC Airport land, reducing to 200mm and connecting to an existing 150mm main in Boundary Street, with 150mm mains providing internal reticulation and connecting through to the existing supply points in Boundary Street. The design incorporates water supply security to the proposed PMHC Airport land, as well as to the remaining lands in the Investigation Area from two directions. This is considered to be satisfactory to support a Planning Proposal.

A Sewer Strategy prepared by King and Campbell for PMHC Airport provides for two sewer pump stations at a depth of approximately 5m. The Strategy is reflective of proposed staging to make the most of the initial sewer pump station in Boundary Street, with a second sewer pump station required in the south as part of stage two. The strategy also makes provision for an additional pump station or filling at the time of developing the northern investigation lands, subject to rezoning.

A Geotechnical Assessment report prepared for PMHC Airport by RGS consultants, has identified that there will be construction issues relating to depth of excavation, high water table, existence of the coffee rock and potential and actual acid sulphate soils. More detailed geotechnical assessment will be required at the subsequent development assessment stage to inform the final design for sewerage infrastructure. The Assessment report also recommended that an Acid Sulfate Soils Management Plan be prepared as part of the approval process associated with the construction of the proposed Sewer Pump Stations and the reticulated sewerage infrastructure.

Site specific development control provisions will require that future Development Applications include detailed investigation of geotechnical conditions and groundwater levels to assess any limitations for development and associated infrastructure construction.



Missen land

The submission from Land Dynamics notes that preliminary concept plans have previously been submitted showing sewer, water supply and stormwater infrastructure to service the proposed development footprint for the Missen property.

The water supply concept indicates that the property is dependent on both a connection via PMHC Airport's adjoining land to the south and from Boundary Street. The sewer concept shows a connection to a proposed Sewer Pump Station on the adjacent Ireland property. Council's Water and Sewer section requires that major infrastructure (i.e. sewerage pumping stations) in flood prone areas be located above the 1:100 year flood level.

The stormwater concept indicates a series of pipes and a vegetated swale to direct stormwater drainage into one of three bio-retention basins proposed in the east and north of the property. Council T&SN has advised that it would be preferable to combine the proposed two easternmost bio-retention basins into one facility to minimise the future maintenance liability for Council as the owner of stormwater infrastructure.

Council T&SN has also advised that as the adjoining Gilson property is subject to overland flooding from Boundary Street, consideration will need to be given to capturing and diverting this runoff either through or around the proposed Missen footprint, if developed ahead of the adjoining Gilson land.

As noted under consideration to Criterion No 2, the Wallum Froglet species is sensitive to water quality. Council's Environment section has advised that stormwater infrastructure is to be designed to either discharge into non-Wallum Froglet habitat (preferred), or discharge into Wallum Froglet habitat using a pH treatment train to ensure pH water quality matches the natural variation currently experienced in this habitat. The latter option may require larger than normal stormwater treatment area with the provision of Swamp Forest vegetation to achieve a corrected pH prior to discharge.

Detailed strategies for sewer servicing, water supply and stormwater management will be required to support a Planning Proposal for the Missen land. There will be staging and sequencing issues to be addressed if infrastructure is to be provided across multiple landowners/properties.

· Gilson and Ireland lands

The same principles and conclusions as outlined for the Missen property above apply regarding sewer servicing, water supply and stormwater management for any rezoning of the Gilson and Ireland lands.

Comment:

Future development within the Airport Precinct Investigation Area will depend on the extension of infrastructure, particularly water and sewer and upgrade of Boundary Street. The PMHC Airport concept provides potential for partial construction of a future road network that may incorporate a secondary access or accesses to the Oxley Highway in the future. The sewer, water and stormwater concepts provided on behalf of PMHC Airport and Missen indicate that all land within the investigation area is able to be serviced but staging and sequencing will be important considerations.



Therefore in terms of Criterion No. 4, the PMHC Airport land is considered to be the most suitable, followed by the Missen, Gilson and Ireland lands, in no particular order of preference.

Criterion No. 5

Capacity to deliver affordable employment land to facilitate market choice.

PMHC Airport land

Key issues relating to the affordability of the employment land relate to the cost of the delivery of infrastructure including:

- Boundary Street road infrastructure improvements
- Reticulated sewerage services
- Reticulated water supply services, and
- Catchment based stormwater drainage management facilities.

Based on the 20.5 ha of gross developable land that can be supported and given that servicing the PMHC Airport land does not require extensive fill, it is considered that this site is more likely to provide affordable employment land. The land also has the benefit of being able to provide 20.5 ha within one ownership, providing greater certainty regarding development costs.

· Missen, Gilson and Ireland lands

As discussed under Criterion No. 2, the Missen, Gilson and Ireland lands require significant volumes of fill to create a platform suitable for development. Although Council has requested supporting information regarding these costs, a great deal of uncertainty remains about the feasibly of the filling works and the costs involved, including funding towards damage to Council's road network.

Comment

It is expected that the cost of developing flood prone land will be greater due to the fact that these properties require extensive fill prior to development. In terms of criterion No. 5, the PMHC Airport land is considered suitable to deliver affordable employment land and to facilitate market choice, followed by the Gilson, Ireland and Missen properties, in no particular order of preference.

PART 4: CONCLUSIONS AND OPTIONS

The assessment of the potential sites against the evaluation criteria indicates that the PMHC Airport property is the most capable and suitable land to supply 20.5 ha of gross developable Business Park zoning in the precinct. This land has a number of clear advantages that distinguish it from the other sites as follows:

- Ability to incorporate existing undeveloped Zone B7 land into the footprint.
- Close proximity and linkages to the current and future Airport operations.
- Large site area in one ownership providing clear opportunities to accommodate large footprint Business Park development.
- Availability of flood free land avoiding the need for significant filling works.



- Ecological issues associated with rezoning and future development have already been addressed through the biodiversity certification process.
- Potential for partial construction of a future road network that may incorporate a secondary access or accesses to the Oxley Highway in the future.

Further consultation with PMHC Airport on the gross development area forming the basis of a Planning Proposal will be required, but on balance the assessment of the planning criteria indicates that the PMHC Airport land is the most viable option to provide for future Business Park lands in the precinct.

The remaining lands have some reasonable potential and will be worthwhile investigating in the longer term if a future secondary link road access becomes available and take up of the Business Park indicates that this is warranted from a strategic land use planning perspective.

Options

The following options are available to Council:

- 1. Not identify any land for the preparation of a Planning Proposal.
- 2. Defer consideration of a Planning Proposal pending further work.
- 3. Proceed as recommended.
- 4. Proceed with the preparation of a Planning Proposal for alternative land.

Having regard to the extensive work undertaken to date, including lengthy consultation with landowners and their representatives, option 3 is the preferred option.

Community Engagement & Internal Consultation

As detailed in the 'Background' section of this report, there has been significant consultation with precinct landowners concerning land use planning for the Airport investigation area. The landowners have been notified of this matter being reported to Council.

Internal consultation in relation to this matter has also occurred with managers and staff of Council's Transport and Stormwater Network, Water and Sewer, Environment, and Contribution Planning teams.

If resolved by Council as recommended, the next step is to undertake more detailed consultation regarding configuration of zones and content of Local Environmental Plan (Planning Proposal) changes based generally on the concept submitted for Council by King and Campbell (at Attachment 15). A further report is proposed to be presented to Council in February 2019, subject to the outcomes of that consultation.

Planning & Policy Implications

The proposal to rezone land within the Airport Precinct investigation area for Business Park development, as discussed in this report, is consistent with the *North Coast Regional Plan 2036* and the former 2011-2031 and adopted 2017-2036 *Port Macquarie-Hastings Urban Growth Management Strategy.*



Under the *Port Macquarie-Hastings Local Environmental Plan 2011* the B7 Business Park zone allows office premises as well as light industrial uses. This use of the zone is a response to the changing nature of manufacturing, industry and business services in NSW and is considered appropriate, based on the assessment of the centres hierarchy, to optimise the future employment generating potential of the Airport precinct.

In preparing a Planning Proposal to rezone the proposed business park lands, consideration will be given to amending associated development standards (i.e. floor space ratio, height of buildings & lot size). A review of the Zone B7 Land Use Table will also occur to ensure that the uses listed as Permitted with consent are consistent with the main intent of the zoning.

Furthermore, development control plan provisions will need to be prepared to provide detailed guidance for future development of the precinct. High quality urban design and landscaping (having regard to operational requirements of the Airport) that contributes to the creation of an attractive streetscape and amenity, is intended to reflect the significant gateway status of the precinct. The provisions will also seek to minimise the environmental impacts of Business Park development.

Council is committed to ensuring a clear and transparent process for land use decision-making. Therefore, Cardno (NSW/ACT) Pty Ltd were engaged by Council D&E to undertake an independent review of Council's planning processes relating to the preparation of a Planning Proposal for the proposed Airport Precinct Investigation Area.

Cardno's Preliminary Probity review report (at Attachment 1) covers the period from 16 March 2016 to 7 November 2018 and considers whether the relevant planning processes have been followed and undertaken by the Council, and in particular the activities and tasks completed by Council D&E, in an unbiased way.

As part of this review and as detailed in the report, Cardno undertook a range of tasks, including:

- sighting documents, reports, technical studies, consultancy briefs, Councillor briefing material and meeting minutes
- confirming the confidentiality of sensitive information and internal file security arrangements
- reviewing Council D&E planning criteria for site assessment, and
- observing meetings between Council D&E and landowners.

In short, the report concludes that Cardno has not observed or detected evidence of partiality, bias or probity issues of concern in the planning process leading up to the presentation of this report to Council.

If Council resolves as recommended, a final Probity report by Cardno will review the processes involved in the preparation and public exhibition of a Planning Proposal for the Airport Precinct Business Park.

Financial & Economic Implications

Based on the economic assessment attached to this report (Hill PDA reports Attachments 4 & 6), there are no significant economic impacts expected on the



existing and proposed hierarchy of business centres in the Port Macquarie-Hastings in rezoning up to 20.5 ha of land within the Airport Precinct Investigation Area.

The cost of servicing Business Park development in the precinct and the risk associated with the upfront funding of servicing will be significant. The major infrastructure costs that will require a resolution relate to road infrastructure, sewer servicing, water supply and stormwater.

There is currently work being undertaken on Boundary Street by Council and further work is possible (e.g. in relation to secondary access roads to the Airport). Infrastructure requirements would need to be assessed and resolved in conjunction with any future Development Application for subdivision/development of the proposed Business Park lands.

Attachments

1 View. Preliminary Probity Review report Nov 2017

2View. GEM Planning and J Jeayes submissions

3View. Airport Master Plan concept

4View. HillPDA assessment Nov 2016

5View. Gillespie Economics Review

6 View. HillPDA review of Gillepsie review

7 View. TPS Group traffic report Dec 2015

8View. TSN review of 2015 traffic report

9View. TPS Group traffic report Jun 2016

10View. TSN review of 2016 traffic report

11 View. SLR peer review

12<u>View.</u> TSN review of SLR report

13 <u>View</u>. King and Campbell submission to planning criteria Land Dynamics submission to planning criteria

15<u>View.</u> King and Campbell rezoning concept16<u>View.</u> Land Dynamics development concept





12.07 PLANNING PROPOSAL: LOT 14 DP 240042 PIONEER STREET, NORTH HAVEN - CONSIDERATION OF SUBMISSIONS

Mr Anthony Thorne, King & Campbell Pty Ltd, representing landowners Robert & Neil Tate, addressed Council in support of the recommendation.

RESOLVED: Internann/Hawkins

That Council:

- As a result of the consideration of submissions, amend the Planning Proposal
 as outlined in the report to extend the area of E2 Environmental Conservation
 zoned land in the southern part of the site to protect habitat for the Squirrel
 Glider.
- Subject to approval under Item 1 above, take the necessary steps under section 3.35 and 3.36 of the Environmental Planning and Assessment Act 1979 (the Act) to finalise Local Environmental Plan 2011 (Amendment No 25).
- Delegate authority to the Director Strategy and Growth to make any minor amendments to the Planning Proposal in finalising the Local Environmental Plan.
- Notify all persons who lodged submissions and provide information of the meeting outcome.

CARRIED: 8/0

FOR: Alley, Cusato, Dixon, Griffiths, Hawkins, Internann, Levido and Pinson

AGAINST: Nil

12.09 AIRPORT PRECINCT INVESTIGATION AREA - SITE SELECTION FOR PROPOSED BUSINESS PARK

Councillor Cusato declared a Pecuniary Interest in this item, left the room and was out of sight during the Council's consideration, the time being 7.12pm.

Mr Anthony Thorne, King & Campbell Pty Ltd, representing Council as the owner of the Port Macquarie Airport, addressed Council in support of the recommendation.

RESOLVED: Levido/Hawkins

That Council:

- Notes the assessment in this report and confirms that the Council owned land within the Port Macquarie Airport Precinct Investigation Area, as shown coloured light brown in Attachment 15, is the most suitable land to supply 23.75 hectares of gross developable Business Park zoning in the Airport Precinct Investigation Area.
- Receive a further report to the February 2019 Council meeting in respect of a Planning Proposal for the Council owned land as identified in 1 above.
- Advise landowners within the Airport Precinct Investigation Area of the outcome of this decision.

CARRIED: 7/0

FOR: Alley, Dixon, Griffiths, Hawkins, Internann, Levido and Pinson AGAINST: Nil

Councillor Cusato returned to the meeting, the time being 07:24pm.



09.01 STATUS OF REPORTS FROM COUNCIL RESOLUTIONS

Councillor Hawkins left the meeting, the time being 07:25pm.

RESOLVED: Griffiths/Internann

That Council note the information contained in the Status of Reports from Council Resolutions report.

CARRIED: 7/0

FOR: Alley, Cusato, Dixon, Griffiths, Internann, Levido and Pinson

AGAINST: Nil

09.02 REQUEST FOR LEAVE OF ABSENCE - MAYOR PETA PINSON

RESOLVED: Dixon/Alley

That Council:

- Grant leave of absence for Mayor Peta Pinson for the period 21 February to 17 March 2019 inclusive.
- Note that in accordance with Section 231(3) of the Local Government Act, the Deputy Mayor will perform all duties of the Mayor during this period.
- 3. Allocate the Mayoral allowance to the Deputy Mayor during this period in accordance with Section 249(5) of the Local Government Act.

CARRIED: 7/0

FOR: Alley, Cusato, Dixon, Griffiths, Internann, Levido and Pinson

AGAINST: Nil

09.03 NOTICE OF MOTION - COUNCILLOR PORTFOLIO PROTOCOL

Councillor Hawkins returned to the meeting, the time being 07:27pm.

RESOLVED: Internann/Alley

That Council:

- Request the General Manager amend the Councillor Portfolio Protocol to remove participation by the Mayor, as per the Mayor's recent request.
- 2. Request the General Manager table the amended Councillor Portfolio Protocol at the December 2018 Ordinary Council Meeting for consideration.

CARRIED: 7/1

FOR: Alley, Cusato, Dixon, Hawkins, Internann, Levido and Pinson

AGAINST: Griffiths

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Appendix B - Proponent's Planning Proposal Request

PP2015 - 3.1 5/7/2019

KING + CAMPBELL

Planning Proposal Port Macquarie Airport Lands, Airport Business Park and Thrumster Area 13 Urban Release Area Port Macquarie

Prepared for:

Port Macquarie-Hastings Council

Prepared by:

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Date: May, 2019

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List of Appendices

Appendix A - Site Context Plan - King & Campbell

Appendix B – Proposed Zone Plan – King & Campbell

Appendix C – Economic Impact Analyses:

Attachment 1 - Hill PDA Land Use Assessment, November 2016;

Attachment 2 - Gillespie Economics Review of Hill PDA Demand Forecasts for Port Macquarie Airport Business Park 24042017;

Attachment 3 – Airport Business Park – Supplementary Strategic Property Advice from Augusta 2017; and

Attachment 4 – Hill PDA Review of Submissions from King and Campbell, July 2017.

Appendix D - Traffic Studies and Reviews

Attachment 1 - TPS Report, 27 June 2016 TPS31 RF16;

Attachment 2 – Concept subdivision layout showing hypothetical development scenario;

Attachment 3 - PMHC TSN Review of TPS Report, September 2016;

Attachment 4 - SLR Peer Review 620.11821-R01-v2.0;

Attachment 5 - K&C 5271_115_Planning Response;

Attachment 6 – 5271P_Development Areas_20170428; and

Attachment 7 – Item 12.09 Agenda 21 November 2018.

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- Appendix E Biodiversity Certification Office of Environment and Heritage
- Appendix F Aboriginal Heritage Assessment Birpai Local Aboriginal Land Council
- **Appendix G** Geotechnical Assessment Regional Geotechnical Solutions
- Appendix H Concept Sewer Strategy King & Campbell
- Appendix I Concept Stormwater Management Plan King & Campbell
- Appendix J Port Macquarie Airport Masterplan Addendum Report
- Appendix K Independent Review Cardno
- Appendix L Strategic Context and Summary of the Key Issues identified in the report to the PMHC Meeting of 21 November, 2018

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

SECTION 1 – EXECUTIVE SUMMARY

1.1 Introduction

This Planning Proposal has been prepared to support a proposed amendment to the Port Macquarie Hastings Local Environmental Plan 2011 (LEP 2011) with respect to the Port Macquarie Airport Lands, the Port Macquarie Airport Business Park and the Council owned lands within the Thrumster Area 13 Urban Release Area, Port Macquarie, as identified on **Exhibit 1**.

SECTION 1 provides an executive summary, including relevant background information to the site with respect to the key issues. A detailed review of the strategic context and key issues identified in the report to the PMHC Meeting of 21 November, 2018 is provided at **Appendix L**.

SECTION 2 is the **Planning Proposal.** Section 2 is consistent with Section 3.33 of the *Environmental Planning and Assessment Act 1979* and the Department of Planning and Environment's *A guide to preparing planning proposals 2016* and *A guide to preparing local environmental plans 2016*. Section 2. The Planning Proposal provides for the following:

PART 1 - Objectives or intended outcomes

PART 2 - Explanation of provisions

PART 3 - Justification

Section A - Need for the planning proposal

Section B - Relationship to strategic planning framework

Section C - Environmental, social and economic impact

Section D - State and Commonwealth interests

PART 4 - Mapping

PART 5 - Community consultation

PART 6 - Project timeline

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

1.2 The Site

This Planning Proposal relates to lands that are owned by Port Macquarie-Hastings Council, and also includes a small area of Crown Land that is impacted by the Airport OLS (*the site*).

The land to which the Planning Proposal applies (the site) is identified on **Exhibit 1** and includes:

- The Port Macquarie Airport Lands (Airport Lands), including lands impacted by the CASA Code 4C aerodrome standards for the Airport OLS and the Conservation Lands (future Biobank site) that have been established through the Order conferring biodiversity certification – Port Macquarie Airport and surrounding land;
- The Port Macquarie Airport Business Park (ABP); and
- Council's landholdings within the Thrumster Area 13 Urban Release Area (Area 13 URA).

This Planning Proposal is underpinned by the *Order conferring biodiversity certification – Port Macquarie Airport and surrounding land*, as published in the NSW Government Gazette of 7 September, 2018 (see **Appendix E** for the Order).

The Port Macquarie Hastings Council (PMHC) rationale for undertaking the biodiversity certification is to ensure an on-going strategic and sustainable approach to the management and offsetting of any environmental impacts associated with the long-term operation and future development of essential infrastructure related to *the site*.

The site for the purposes of this Planning Proposal represents a footprint of approximately 759.7 ha, or 74% of the lands that were assessed for biodiversity certification. The *Biodiversity Certification Assessment Area* (BCAA) in context with *the site* is illustrated on the site context plan at **Appendix A**.

The biodiversity certification results in the biodiversity issues associated with this Planning Proposal and subsequent Development Applications for the Airport Lands, the ABP and the Area 13 URA having already been assessed and offset.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

1.2.1 Exhibit Plan Set

The following exhibit set identifies the lands the subject of this Planning Proposal in the following manner:

Exhibit 1 - Identification of lands the subject of this Planning Proposal:

This plan shows the boundary of the Planning Proposal and identifies the following lands:

- Port Macquarie Airport Lands (including lands impacted by the CASA Code 4C aerodrome standards for the Airport OLS and the Conservation Lands (future Biobank site) that have been established through the Order conferring biodiversity certification Port Macquarie Airport and surrounding land);
- Port Macquarie Airport Business Park; and
- Thrumster Area 13 Urban Release Area.

Exhibit 2 – Existing zoning and context:

This plan shows the existing zones that apply to the lands the subject of this Planning Proposal together with the boundaries of the three (3) land areas.

Exhibit 3 – Proposed zoning and context:

This plan shows the proposed zones that will apply to the lands the subject of this Planning Proposal, including the following additional information that has been used to inform the proposed zones:

- The relevant Obstacle Limitation Surface (OLS) that applies to the airport operations; and
- The areas identified for conservation cropping to meet the OLS, where single trees will be selectively pruned (canopy), poisoned to prevent regrowth and retained as a stag for fauna habitat.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

1.3 Strategic Intent of Planning Proposal

This Planning Proposal continues PMHC's strategic long term approach to planning for certainty with respect to:

- The on-going operations of the existing Port Macquarie Airport (Airport Lands) in compliance with the CASA Code 4C aerodrome standards for the Airport OLS and the strategic objective to protect the existing airport infrastructure and ensure future airside and general aviation land uses;
- The on-going protection and management of the Conservation Lands (future Biobank site) that have been established through the Order conferring biodiversity certification – Port Macquarie Airport and surrounding land, as published in the NSW Government Gazette of 7 September, 2018 (see Appendix E for the Order);
- The development of an Airport Business Park (eastern side of Boundary Street) with a total gross land area of 23.75 ha to facilitate compatible and complementary development adjacent the Port Macquarie Airport as envisaged by the Airport Master Plan (refer Appendix G), achieving a long-term objective of ensuring the future supply of employment lands for the Port Macquarie Regional City, consistent with the North Coast Regional Plan 2036;
- The planning of infrastructure services required to support the future development of the Port Macquarie Airport, the Airport Business Park and surrounding lands; and
- The future residential and industrial development of the Council owned lands within the Thrumster Area 13 Urban Release Area (Area 13 URA) with respect to biodiversity issues.

1.4 Consultation and Probity

Cardno Pty Ltd was engaged by PMHC to prepare an independent review of the planning process undertaken by Council in relation to this Planning Proposal. A copy of the Preliminary Planning Process Review is included at **Appendix K**.

With respect to the ABP this Planning Proposal provides justification for the inclusion of 23.75 ha of gross land area within the B7 Business Park zoning. Additionally, this will include consideration of key issues raised in the PMHC staff report to the Council meeting on 21 November, 2018 in relation to:

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

- (Impacts on) Centres Hierarchy in Port Macquarie Hastings LGA;
- Traffic impacts; and
- Secondary access options to the Airport.

The strategic context applicable to these three (3) key issues is detailed at **Appendix L**.

1.5 Council Meeting of 21 November, 2018 and the Airport Business Park

At its meeting of 21 November, 2018, Port Macquarie Hastings Council resolved the following with respect to Item 12.09 – *Airport Precinct Investigation Area* – *Site Selection for Proposed Business Park*:

RESOLVED: Levido/Hawkins

That Council:

- Notes the assessment in this report and confirms that the Council owned land within the Port Macquarie Airport Precinct Investigation Area, as shown coloured light brown in Attachment 15, is the most suitable land to supply 23.75 ha of gross developable Business Park zoning in the Airport Precinct Investigation Area.
- Receive a further report to the February 2019 Council meeting in respect of a Planning Proposal for the Council owned land as identified in 1 above.
- Advise landowners within the Airport Precinct Investigation Area of the outcome of this decision.

CARRIED: 7/0

FOR: Alley, Dixon, Griffiths, Hawkins, Internann, Levido and Pinson

AGAINST: ni

The staff report to the Council meeting had recommended a <u>gross</u> are a of 20.5 ha of land be rezoned to Business Park B7, based on the capacity of the existing road network <u>determined</u> by PMHC Transport & Stormwater Network (PMHC TSN). The recommendation was contained in TSN's review (refer **Attachment 3** at **Appendix D**) of the future traffic modelling undertaken by TPS in their Traffic Engineering Report dated June 2016 (refer **Attachment 1** at **Appendix D**).

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Hill PDA (refer **Attachment 4** at **Appendix C**) confirmed that the 20.5ha option, which was based on the estimated capacity of the existing road network including the intersection at Boundary Street and Hastings River Drive, is not likely to threaten the viability of existing commercial centres.

The resolution by Council recognised that the proposed 23.75ha Airport Business Park (i.e.; an additional 3.25ha) is similarly able to be absorbed into the capacity of the existing road network and is not likely to threaten the viability of existing commercial centres, noting the long-term (20+ years) context of this Planning Proposal.

This Planning Proposal will result in the implementation of the PMHC resolution on 21 November, 2018 by:

- Rezoning 19.1 ha of land on the eastern side of Boundary Street to B7
 Business Park. When combined with the existing 4.65 ha of the land
 on the eastern side of Boundary Street that is already zoned B7
 Business Park, the overall footprint of the B7 Business Park zone will
 be a gross area of 23.75 ha (refer Attachment 6 at Appendix D); and
- Rezoning 17.04 ha of the current B7 Business Park zone on the western side of Boundary Street to SP2 Airport Infrastructure. This includes 8.65 ha of currently undeveloped B7 land and 8.39 ha of land within the B7 zone that is occupied by Airport related uses (refer Attachment 6 at Appendix D)

The proposed B7 Business Park zone will result in an overall gross increase of 10.45 ha of undeveloped B7 land compared to the existing land areas.

Appendix L of this Planning Proposal provides the detailed justification, on both traffic/road network and economic impact grounds, for supporting the rezoning to create 23.75ha of gross developable ABP. A summary of this justification is provided below:

1.5.1 Traffic and Road Network justification

The capacity of the road infrastructure has been the subject of three reports, including TPS June 2016, PMHC TSN September 2016 and SLR Peer Review April 2017 (see **Appendix D**). The reports contrast various models and assumptions and recommend <u>gross</u> development areas ranging from 20.5 ha to 41.85 ha.

Based on the various traffic modelling and impact advice and the reviews of that work contained in **Appendix D**, the proposed rezoning of the revised ABP Footprint to 23.75 ha of <u>gross</u> land area can be supported as it is not likely to have unacceptable impacts on the capacity of existing road infrastructure.

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This conclusion was confirmed following consideration of the following:

- The proposed gross area of the B7 Business Park zoning assessed in the initial TPS June 2016 report has been reduced from 41.85 ha (28.99 ha PMHC landholding and 12.86 ha other landowners) to the revised ABP Footprint of 23.75 ha on the PMHC landholding (the subject of this PP).
- The revised ABP Footprint (23.75ha gross) will result in the potential for 16.03 ha of net developable land. This represents 58% of the net developable area that was modelled by TPS (refer **Attachment 1, Appendix D**), which considered a larger net developable area of 27.58 ha
- The net 16.03ha of developable area is well within the modelling undertaken by TPS (27.58 ha), where it was established that the upgraded intersection at Hastings River Drive and Boundary Street can cater for a net developable area of 20.6ha.

(note – modelling to achieve a <u>net</u> developable area of 20.6 ha was based on PMHC's preferred Base Saturation Flow Rate of 1800 tcu/hr and Peak Hour Factor 95%).

The difference between 20.5ha recommended by PMHC TSN and the proposed 23.75 ha of gross B7 zone represents a 14% increase in the net developable area that will ultimately be achieved at the ABP. The Planning Proposal will result in a net developable area of 20.6ha and PMHC TSN had recommended a net developable area of 13.84 ha.

The proposed 23.75 ha of gross B7 zone is therefore well within the degree of accuracy that can be expected from long term traffic modelling of this nature, noting that:

- The 23.75 ha gross area is well within the footprint of the Airport Business Park that is able to be serviced by the modified Hastings River Drive and Boundary Street intersection as modelled by TPS and SLR;
- The differences in gross and net areas is considered to be a minor increase in footprint (and therefore traffic volumes) at the Planning Proposal stage of the Airport Business Park;
- The minor increase in gross area is supported by a reduction of the maximum Floor Space Ratio (FSR) from 0.7:1 to 0.65:1. This represents a further 2% reduction in the traffic volumes modelled by TPS. SLR and PMHC TSN;

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- The traffic modelling undertaken of the 2030 performance of the
 Hastings River Drive and Boundary Street intersection is a model
 of a long-term outcome. There are many parameters in the broader
 road network (e.g. decisions with respect to other road and
 intersection upgrades and development rates across the LGA) that
 will also impact the performance of the intersection and therefore
 the results of the future modelling;
- The various reports and reviews outline the traffic engineering
 parameters that are inputs into the modelling of the future
 performance of the intersection. It is considered that the impact of
 a 14% increase in the footprint of the <u>net</u> developable B7 zone is
 within the accuracy limits that can be expected to be achieved with
 the modelling of the future traffic outcomes;
- The 14% increase in the footprint of the land proposed to be rezoned for B7 Business Park purposes may result in improvements to the Hastings River Drive and Boundary Street intersection being required to be implemented in a shorter timeframe than otherwise would have applied.
- The TPS, SLR, PMHC and TSN traffic assessments have all identified the required improvements to the Hastings River Drive / Boundary Street intersection to cater for the traffic generated by the proposed ABP and doubling of traffic generated by existing uses. The Major Roads Contribution Plan 2006 includes provision for a roundabout at the intersection. These planned works were replaced by the existing signalised intersection.

In the absence of a local roads contribution plan applicable to the intersection works, it is anticipated and acknowledged that the implementation of the identified intersection improvements will be included in a condition of development consent as part of the determination of a future development application for the establishment of the Airport Business Park. The condition of development consent will include details of the proposed trigger for the intersection improvement works. Apportionment of the sharing of the costs of the intersection works between the ABP and other developments would be expected to be negotiated through a works in kind agreement at that time.

 The 23.75 ha gross area of proposed B7 Business Park land abuts Conservation Lands (as per the Biodiversity Certification of the Airport and surrounding lands) on its southern and eastern boundaries thereby ensuring that further expansion of Business Park within the Airport Lands on the eastern side of Boundary Street cannot be undertaken.

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1.5.2 Economic justification

PMHC have previously principally relied on advice from HillPDA with respect to the review of potential economic impacts.

HillPDA have in their advice dated 5 July 2017 (refer **Attachment 4** at **Appendix C**) confirmed that provided the capacity of the existing road network is not exceeded, 20.5ha (gross zoned area) of B7 land is justified as it will not threaten the viability of existing commercial centres.

20.5ha gross zoned area of B7 land equates to 13.85ha net developable area of B7 zoned lands (i.e.; the development capacity).

As outlined above, TPS and SLR have confirmed the existing road network has capacity for development of 20.6 ha (net developable area) of B7 zoned land based on agreed incremental improvements to the existing Hastings River Drive / Boundary Street intersection.

This Planning Proposal proposes 23.75ha gross zoned area of B7 land which equates to 16.03ha net developable area of B7 zoned land (i.e.; the development capacity).

The proposed 23.75ha gross zoned area of B7 land is therefore well within the capacity of the existing road network determined by TPS and SLR.

Port Macquarie Airport have obtained further economic impact advice from Gillespie Economics and Augusta (refer **Attachments 2** and **3** at **Appendix C**).

Gillespie Economics and Augusta have both highlighted the unique characteristics of the ABP, noting:

- The on-going investment in the Airport as a catalyst to attract new investment and business;
- The trend towards business park developments clustering at universities, airports and hospitals and along transport corridors;
- The stimulation of jobs not normally located in the CBD;
- The potential for the ABP to complement other existing and future business precincts.

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HillPDA in their review of Gillespie Economics (refer **Attachment 4 Appendix C**) have also concluded as follows:

If Gillespie Economics proves to be correct in its forecast of airport stimulating jobs then many of these businesses would not locate in the CBD anyway. These are businesses that rely more on proximity to the airport (and perhaps also the Pacific Highway) rather than proximity to the population base. There is some risk that they would locate outside the LGA altogether if space was not available (refer **Attachment 4** at **Appendix C** - Hill PDA, July 2017).

This Planning Proposal seeks to reinforce the unique characteristics of the proposed ABP highlighted in the Gillespie and Augusta reports while ensuring potential impacts on existing commercial centres are mitigated through:

- Changes to the objectives of the B7 Business Park zone to place additional emphasis on large-scale/format developments; and
- Changes to the uses permitted with development consent to remove landscaping material supplies, plant nurseries and timber yards;
- Changes to the uses permitted/prohibited, to permit food and drink premises, self-storage units, electricity generating works, function centres and industrial training facilities;
- Larger minimum lot size provisions (minimum 2,000 m²) than typically provided in other commercial and industrial zones (typically minimum 1,000 m²); and
- Reduction of the maximum Floor Space Ratio (FSR) to 0.65:1.
 Commercial zones with an 11.5 m building height limit typically have a FSR of 1:1 outside CBD areas, e.g. Grant Street and Lord Street. The maximum FSR of 0.7:1 has been reduced to 0.65:1 to ensure floor areas generated do not exceed that determined in hypothetical development scenarios used to inform traffic and economic impact assessments

It is considered that the planning controls proposed in the LEP emphasise the unique location and characteristics of the Airport Business Park. These planning controls considered in conjunction with the specialist economic impact advice outlined above provide certainty to confirm the 23.75ha footprint of B7 zoned land in the Airport Business Park will not threaten existing commercial centres.

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1.6 Summary of Proposed LEP Amendments

The intended outcomes within *the site* are proposed to be achieved by making the following changes to the Port Macquarie-Hastings Local Environmental Plan 2011 (LEP 2011):

1.6.1 Airport Lands

- Amendment to the LEP 2011 Land Zoning Map to apply an SP2 Air transport facility zoning to the Airport Lands that are required to be cleared to satisfy the CASA Code 4C aerodrome standards for the Obstacle Limitation Surface (OLS);
- Amendment to the LEP 2011 Land Zoning Map to apply an SP2 Air transport facility zoning to the Airport Lands generally west of Boundary Street that will include existing airport infrastructure and future airside and general aviation land uses;
- Amendment to the LEP 2011 Land Zoning Map to apply an E2 Environmental Conservation zone to all land areas within the Conservation Lands (future Biobank Site);
- Amendment to the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the *Threatened* Species Conservation Act 1995:

7.17 Port Macquarie Airport and surrounding lands

- (1) The objectives of this clause are as follows:
 - (a) to identify land that has been conferred for biodiversity certification under section 126 H of the Threatened Species Conservation Act 1995
 - (b) to allow development for essential infrastructure, including roads, fire trails and sewerage services on the lands that have been identified as certified;

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

- (2) This clause applies to:
 - (a) land that is shown as "Certified Land" on the Biodiversity Certification Land Map.
- (3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:
 - is consistent with the Order conferring biodiversity certification – Port Macquarie Airport and surrounding lands (NSW Government Gazette No. 87 of 7 September 2018).
- Amendment to the LEP 2011 Schedule 1 to provide for the following additional permitted use:
 - Use of certain land at Port Macquarie Airport, Boundary Street, Port Macquarie
 - 1) This clause applies to land at Port Macquarie Airport, Boundary Street, Port Macquarie being Lot 25 DP 1123026, Lot 239 DP 754434, Lot 238 DP 754434, Lot 1 DP 1034982, Lot 1 DP 1087368, Lot 7325 DP 1184893, Lot 335 DP 754434, Lot 14 DP 1139180 shown as Item 12 on the Additional Permitted Uses Map.
 - 2) Development for the purposes of vegetation clearing and/or conservation cropping of vegetation is permitted to the extent specified within the 'Order conferring biodiversity certification – Port Macquarie Airport and surrounding lands', as published in the NSW Government Gazette No. 87 of 7 September 2018.

1.6.2 Airport Business Park

Amendment to the LEP 2011 Land Zoning Map to apply a B7
 Business Park zoning to the lands to the east of Boundary Street,
 which will ultimately provide for an Airport Business Park of 23.75 ha
 (gross area);

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- Amendment to the LEP 2011 Land Use Table, to amend the **objectives** for the B7 Business Park zone, to confirm the strategic intent of the business park and to recognise its place within the retail hierarchy for the broader LGA, as follows (changes shown in red);
 - To provide a range of office and light industrial uses, within large scale/format developments.
 - To encourage employment opportunities.
 - To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.
 - To create business park employment opportunities within large scale/format developments that are of a high visual quality and that will respect the natural environment within which they are located.
 - To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District as the focal point for sub regional functions and service delivery.
- Amendment to the LEP 2011 Land Use Table, to amend the uses that will be **permitted with consent** in a B7 Business Park zone, to ensure that the zone will support a range of uses that are consistent with the zone objectives and also consistent with the retail hierarchy for the broader LGA, including:
 - Deleting the following permitted uses:
 - Landscaping material supplies;
 - Plant nurseries;
 - Takeaway food and drink premises; and
 - Timber yards.
 - Including the following additional permitted uses:
 - Food and drink premises; and
 - Self-storage units.

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- 3. Deleting the following prohibited uses:
 - Electricity generating works;
 - Function centres; and
 - Industrial training facility.
- Amendment to the LEP 2011 Lot Size Map to allow a minimum lot size
 of 2,000 m² for lands within the Airport Business Park, to encourage
 large scale/format developments that are consistent with the zone
 objectives;
- Amendment to the LEP 2011 Floor Space Ratio Map to allow a maximum FSR of 0.65:1, to ensure consistency with the traffic studies undertaken in support of the Airport Business Park; and
- Amendment to the LEP 2011 Height of Building Map to allow a maximum building height of 11.5m for lands within the identified Airport Business Park, to support the desired outcomes for large scale/format developments.

1.6.3 Area 13 URA

- Amendment to the LEP 2011 Land Zoning Map to apply an E2
 Environmental Conservation zoning to the northern extent of the Partridge Creek Residential Precinct within the Area 13 URA to support its inclusion within the Conservation Lands (future Biobank Site); and
- Amendment to the LEP 2011 Land Zoning Map to apply an E3
 Environmental Management zoning to lands adjacent the Partridge Creek Residential Precinct (R1 zone) within the Area 13 URA to support its intended use for Asset Protection Zones and public open space (consistent with the existing zones within the Area 13 URA).

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

1.7 Supporting documentation

This Planning Proposal relies, in part, on previous technical and specialist information provided to PMHC with respect to the proposed Business Park. These specialist studies have been undertaken by Council in its capacity as the consent authority (PMHC Planning) or in its capacity as the landowner (PMHC Airport) and include:

Economic Impact Assessments (Appendix C)

The *Economic Impact Assessments* prepared by Hill PDA, the review of the Hill PDA report prepared by Gillespie Economics, the Strategic Review prepared by Augusta Group and the review of the Gillespie Economics Report by Hill PDA have been reviewed to address the potential Economic Impacts of the future development of the Business Park the subject of this Planning Proposal.

Traffic Impact Assessments (Appendix D)

The *Traffic Impact Assessments* undertaken by TPS related to the broader Airport Investigation Area. The results of these assessments have been reviewed in the context with Council's resolution of 21 November, 2018, to include the reduced footprint of PMHC owned land only. The review of the Traffic Impact Assessments also includes consideration of the Peer Review of the TPS Report undertaken by SLR and the review comments provided by PMHC's Traffic & Stormwater Drainage section.

Biodiversity Certification (Appendix E)

The site falls within a larger land area that is subject to the Order conferring biodiversity certification – Port Macquarie Airport and surrounding land as published in the NSW Government Gazette of 7 September, 2018 (see **Appendix E** for the Order and Exhibits 1-3 for the land area).

The *Biodiversity Certification Assessment Area* (BCAA) represents a total land area of 1,024.48 ha. The biodiversity certification will permanently protect and manage for conservation 444.17 ha (43% of the BCAA) of Council owned operational land, some currently private land within the BCAA and an additional 40 – 50 ha off-site off-set areas to provide additional protection for the koala.

The site for the purposes of this Planning Proposal represents a footprint of approximately 759.7 ha, or 74% of the BCAA. The conservation areas that will be zoned E2 Environmental Conservation under this Planning Proposal will be registered as a Biobank Site under Part 7A of the TSC Act within 12 months of the Minister conferring Biocertification. This will provide in perpetuity conservation protection and management on the land title.

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Aboriginal Archaeology Assessment (Appendix F)

The Aboriginal sites officer for the Birpai Local Aboriginal Land Council has inspected the site and by correspondence of 25 November, 2015, has confirmed that no artefacts were observed. The Birpai LALC recommends that should any artefact be uncovered during excavations works, all works should cease and the LALC should be contacted.

Geotechnical Assessments (Appendix G)

The Geotechnical Assessment reports prepared by RGS has been included to address the relevant geotechnical issues that will apply to the future development of the Airport Business Park with respect to underground services.

Sewerage Services Strategy (Appendix H)

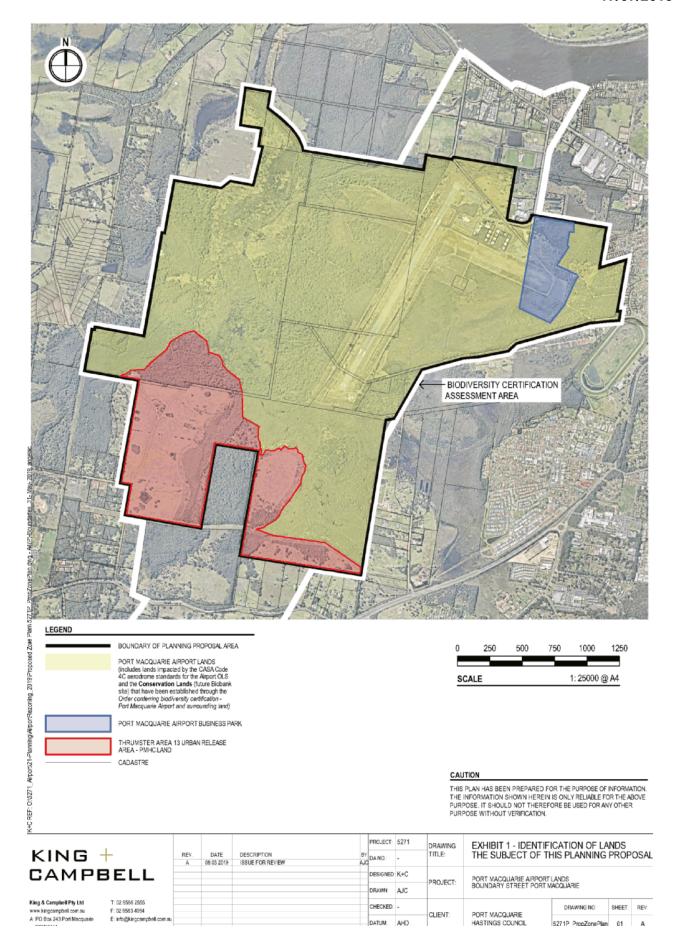
A Sewerage Services Strategy based on gravity sewer infrastructure was submitted to PMHC in November 2015. An alternate Sewerage Services Strategy based on low pressure sewer infrastructure is included with this Planning Proposal. PMHC have in more recent times implemented low pressure sewer reticulation on the North Shore and have in meetings since November 2015 indicated a willingness to consider a low pressure sewer system for the Airport Business Park.

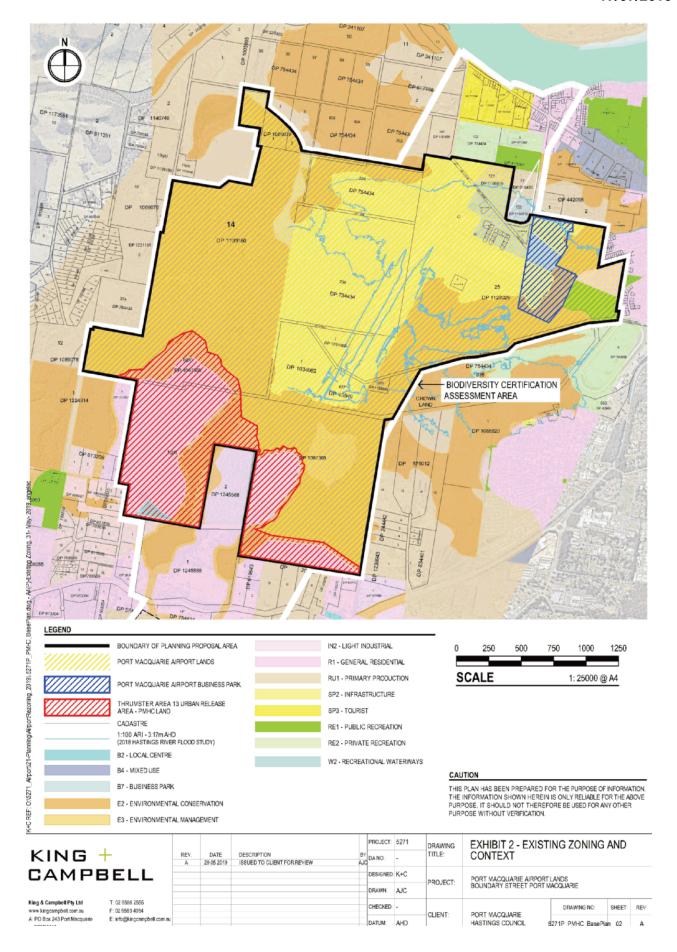
Stormwater Management (Appendix I)

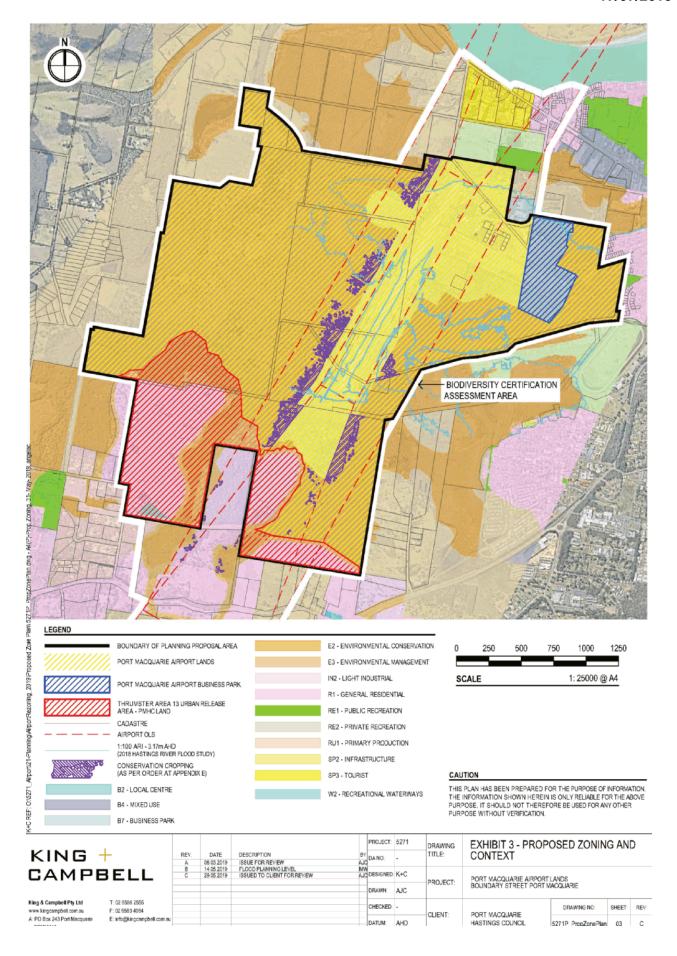
A Stormwater Management Plan for the Airport Business Park was submitted to PMHC in November 2015. PMHC stormwater drainage section have provided comments on that Stormwater Management Plan and a response to those comments was forwarded to Council on 27 November 2015. The Stormwater Management Plan has now been reviewed to take into account the comments provided by PMHC and the changes to the extent of the proposed Business Park since the production of the original report. The revised Stormwater Management Plan (2019) is included with this Planning Proposal.

Water Supply Infrastructure

This Planning Proposal relies on the Water Supply advice provided by PMHC as the Water Authority with respect to the future water supply reticulation for the Airport Business Park with the trunk watermain link to be from the Oxley Highway.







Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

SECTION 2 - PLANNING PROPOSAL

Summary of Planning Proposal

This is a Planning Proposal prepared under Section 3.33 of the Environmental Planning and Assessment Act, 1979, in accordance with the Department of Planning and Environment's *A guide to preparing planning proposals 2016* and *A guide to preparing local environmental plans 2016*.

The Planning Proposal is in relation to a proposed amendment to Port Macquarie-Hastings Local Environmental Plan (PMHLEP) 2011, as set out below:

Proposal	Rezoning of land
Property details	Port Macquarie Airport, Airport Business Park and Council owned lands with the Thrumster Area 13 URA (see below for real property description of all properties that comprise these land areas).
Current land zones within the site	Part SP2 Infrastructure, part R1 General Residential, part B2 Local Centre, part B7 Business Park, part E2 Environmental Conservation, part E3 Environmental Management, part RE1 Public Recreation and part RU1 Primary Production
Proposed land zones	Zones to be expanded include - SP2 Infrastructure, B7 Business Park, E2 Environmental Conservation and E3 Environmental Management
Applicant details	Port Macquarie Hastings Council
Land owner	Port Macquarie Hastings Council

This Planning Proposal explains the intended effects of a proposed amendment to the Port Macquarie Hastings Local Environmental Plan 2011 (LEP 2011), which will provide strategic certainty for:

The on-going operations of the existing Port Macquarie Airport (Airport Lands) in compliance with the CASA Code 4C aerodrome standards for the Airport OLS and the strategic objective to protect the existing airport infrastructure and ensure future airside and general aviation land uses;

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

- The on-going protection and management of the Conservation Lands (future Biobank site) that have been established through the Order conferring biodiversity certification – Port Macquarie Airport and surrounding land, as published in the NSW Government Gazette of 7 September, 2018 (see Appendix E for the Order);
- 3. The development of an Airport Business Park (eastern side of Boundary Street) with a total gross land area of 23.75 ha to facilitate compatible and complementary development adjacent the Port Macquarie Airport as envisaged by the Airport Master Plan (refer Appendix G), a chieving a long-term objective of ensuring the future supply of employment lands for the Port Macquarie Regional City, consistent with the North Coast Regional Plan 2036;
- The planning of infrastructure services required to support the future development of the Port Macquarie Airport, the Airport Business Park and surrounding lands; and
- The future residential and industrial development of the Council owned lands within the Thrumster Area 13 Urban Release Area (Area 13 URA) with respect to biodiversity issues.

The Site

This Planning Proposal relates to lands that are owned by Port Macquarie-Hastings Council, and also includes a small area of Crown Land that is impacted by the OLS (*the site*).

The site includes three (3) areas within the boundary of the Planning Proposal, being the Port Macquarie Airport Lands, the Port Macquarie Airport Business Park and the Thrumster Area 13 Urban Release Area. These areas are identified on Exhibit 1.

The site falls within a larger land area that has undergone a Biocertification assessment in accordance with the Biocertification Assessment Methodology (BCAM). **Appendix E** includes an extract from the Government Gazette, confirming that the Minister has conferred biodiversity certification on the lands that includes the site.

The site for the purposes of this Planning Proposal represents a footprint of approximately 759.7 ha, or 74% of the lands that were assessed for biodiversity certification. The *Biodiversity Certification Assessment Area* (BCAA) in context with *the site* is illustrated on the site context plan at **Appendix A**.

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

The land parcels the subject of this Planning Proposal includes:

- Lot 14 DP 1139180;
- Lot 1 and 2 DP 1089078;
- Lot 238 and 239 DP 754434;
- Lot 121 DP 1156615;
- Lot 25 DP 1123026;
- Lot 1 DP 1034982;
- Lot 657 DP 45949;
- Lot 1 DP 1087368;
- Lot 103 DP 1127168 (closed road);
- Lot 104 DP 1173567 (closed road);
- Lot 3 DP 813358;
- Lot 1 DP 242345 (closed road);
- Lot 2 DP 547484;
- Lot 1 DP 827134;
- Lot 4 DP 115306 (closed road);
- Lot 1 DP 1025083 (closed road);
- Lot 2 DP 1025083 (closed road);
- Lot 335 DP 754434 (Crown Land);
- Lot 7325 DP 1184893 (Crown Land);
 Lots 1 and 2 DP 1071193 (lease);
- Lots 5 to 14 SDO 813358 (lease),
- Lots 15 and 16 DP 848479 (lease);
- Lot 22 DP 877448 (lease);
- Lot 24 DP 1123026 (lease).

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

PART 1 - Objectives or Intended Outcomes

The intended outcomes of this Planning Proposal are;

- To ensure that the future management of the biocertified lands will support the on-going operations of the Airport Lands with respect to the Airport Facilities and CASA Code 4C aerodrome standards for the Obstacle Limitation Surface (OLS);
- To ensure the proposed LEP Amendment supports the permanent management and protection of the Conservation Lands established through the biodiversity certification;
- To permit uses that are appropriate, compatible and complementary to the existing Airport on lands identified as the Airport Business Park (ABP);
- 4. To ensure the future development within the ABP is carried out in a manner that will integrate and support the primary function of the airport use, particularly with respect to:
 - Management of future traffic and future road infrastructure upgrades;
 - Extension of reticulated water supply and sewerage services to the ABP and the Airport Lands; and
 - Management of future stormwater drainage.
- To facilitate future industrial and residential development within Thrumster Area 13 Urban Release Area that is consistent with the biodiversity certification with respect to the biocertified and conservation lands; and
- To ensure all future development can be managed to ensure minimal impact on the natural and surrounding environment.

ATTACHMENT ORDINARY COUNCIL
17/07/2019

King & Campbell Pty Ltd

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

This Planning Proposal will result in zonings that:

- More appropriately reflect the importance of Port Macquarie Airport as a regional hub;
- Facilitate the establishment of the Airport Business Park to be complementary and supportive of the Port Macquarie Airport;
- Support the permanent management and protection of the Conservation Lands; and
- Ensure future development of Council owned land in the Thrumster Area 13 Urban Release Area is consistent with the outcomes of the biodiversity certification.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

PART 2 – Explanation of Provisions

2.1 Summary

The intended outcomes within *the site* are proposed to be achieved by making the following changes to the Port Macquarie-Hastings Local Environmental Plan 2011 (LEP 2011):

Airport Lands:

- Amendment to the LEP 2011 Land Zoning Map to apply an SP2 Air transport facility zoning to the Airport Lands that are required to be cleared to satisfy the CASA Code 4C aerodrome standards for the Obstacle Limitation Surface (OLS);
- Amendment to the LEP 2011 Land Zoning Map to apply an SP2 Air transport facility zoning to the Airport Lands generally west of Boundary Street that will include existing airport infrastructure and future airside and general aviation land uses;
- Amendment to the LEP 2011 Land Zoning Map to apply an E2 Environmental Conservation zone to all land areas within the Conservation Lands (future Biobank Site);
- Amendment to the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the *Threatened* Species Conservation Act 1995:

7.17 Port Macquarie Airport and surrounding lands

- (1) The objectives of this clause are as follows:
 - (a) to identify land that has been conferred for biodiversity certification under section 126 H of the Threatened Species Conservation Act 1995
 - to allow development for essential infrastructure, including roads, fire trails and sewerage services on the lands that have been identified as certified;

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

- (2) This clause applies to:
 - (a) land that is shown as "Certified Land" on the Biodiversity Certification Land Map.
- (3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:
 - is consistent with the Order conferring biodiversity certification – Port Macquarie Airport and surrounding lands (NSW Government Gazette No. 87 of 7 September 2018).
- Amendment to the LEP 2011 Schedule 1 to provide for the following additional permitted use:
 - 12. Use of certain land at Port Macquarie Airport, Boundary Street, Port Macquarie
 - 1) This clause applies to land at Port Macquarie Airport, Boundary Street, Port Macquarie being Lot 25 DP 1123026, Lot 239 DP 754434, Lot 238 DP 754434, Lot 1 DP 1034982, Lot 1 DP 1087368, Lot 7325 DP 1184893, Lot 335 DP 754434, Lot 14 DP 1139180 shown as Item 12 on the Additional Permitted Uses Map.
 - 2) Development for the purposes of vegetation clearing and/or conservation cropping of vegetation is permitted to the extent specified within the 'Order conferring biodiversity certification Port Macquarie Airport and surrounding lands', as published in the NSW Government Gazette No. 87 of 7 September 2018.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Airport Business Park:

- Amendment to the LEP 2011 Land Zoning Map to apply a B7
 Business Park zoning to the lands to the east of Boundary Street,
 which will ultimately provide for an Airport Business Park of 23.75 ha
 (gross area);
- Amendment to the LEP 2011 Land Use Table, to amend the objectives for the B7 Business Park zone, to confirm the strategic intent of the business park and to recognise its place within the retail hierarchy for the broader LGA, as follows (changes shown in red);
 - To provide a range of office and light industrial uses, within large scale/format developments.
 - To encourage employment opportunities.
 - To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.
 - To create business park employment opportunities within large scale/format developments that are of a high visual quality and that will respect the natural environment within which they are located.
 - To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District as the focal point for sub regional functions and service delivery.
- Amendment to the LEP 2011 Land Use Table, to amend the uses that will be **permitted with consent** in a B7 Business Park zone, to ensure that the zone will support a range of uses that are consistent with the zone objectives and also consistent with the retail hierarchy for the broader LGA, including:
 - 1. Deleting the following permitted uses:
 - Landscaping material supplies;
 - Plant nurseries;
 - Takeaway food and drink premises; and
 - Timber yards.

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- 2. Including the following additional permitted uses:
 - Food and drink premises; and
 - Self-storage units.
- 3. Deleting the following prohibited uses:
 - Electricity generating works;
 - Function centres; and
 - Industrial training facility.
- Amendment to the LEP 2011 Lot Size Map to allow a minimum lot size
 of 2,000 m² for lands within the Airport Business Park, to encourage
 large scale/format developments that are consistent with the zone
 objectives;
- Amendment to the LEP 2011 Floor Space Ratio Map to allow a maximum FSR of 0.65:1, to ensure consistency with the traffic studies undertaken in support of the Airport Business Park; and
- Amendment to the LEP 2011 Height of Building Map to allow a maximum building height of 11.5m for lands within the identified Airport Business Park, to support the desired outcomes for large scale/format developments.

Area 13 URA:

- Amendment to the LEP 2011 Land Zoning Map to apply an E2
 Environmental Conservation zoning to the northern extent of the Partridge Creek Residential Precinct within the Area 13 URA to support its inclusion within the Conservation Lands (future Biobank Site); and
- Amendment to the LEP 2011 Land Zoning Map to apply an E3
 Environmental Management zoning to lands adjacent the Partridge Creek Residential Precinct (R1 zone) within the Area 13 URA to support its intended use for Asset Protection Zones and public open space (consistent with the existing zones within the Area 13 URA).

The rationale for the above provisions is set out in **Sections 2.2** to **2.4** below.

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

2.2 Airport Lands

Airport Lands			
Location	Existing zone	Proposed	
		zone	
Existing and future airside and general aviation land uses (western side of Boundary Street)	B7 (17.03 ha) SP2 (7.69 ha) E2 (1.03 ha)	SP2	
b. Existing airport infrastructure (runway, apron, weather station)	Part E2 Part SP2	SP2	

Comments

The existing zones that apply to the Airport Lands on the western side of Boundary Street do not all currently reflect the purpose for which the lands are used. These lands are in close proximity to the airport and are capable of providing direct access to the airport apron. An SP2 zone for this area will ensure that all future uses will be for the purpose shown on the Land Zoning Map (air transport facility), including uses that are incidental or ancillary to this purpose. All lands identified within the proposed SP2 footprint are subject to the *Order conferring biodiversity certification – Port Macquarie and surrounding land* (see **Appendix E**).

The existing airport infrastructure, which includes runway, apron and weather station (located generally west and south of the lands referred to in point a above), will be included in the SP2 zone. These lands have also been biodiversity certified.

c. Obstacle Surface Limitation (as it app	lies to the eastern and western edges	E2	SP2
of existing runway strip)	_		

Comments

The revised CASA code for a 4C aerodrome standard requirements for the OLS have determined that a 54m width on both the western and eastern edges of the runway strip is required to be managed. A 54m clearing area allows maximum operational certainty and efficiency for ongoing airport operations whilst reducing ongoing operational expenses associated with the need to re-crop areas every 2-3 years due to rapid regrowth of vegetation.

The Biocertification process has certified this width for vegetation removal as *cleared lands* and accordingly an SP2 zone has been applied. An E2 zone will apply to areas affected by the OLS that are outside this 54m wide land area. The biodiversity certification confirms that *conservation cropping* within the E2 zone to meet the requirements of the OLS has been assessed and offset as part of the biocertification (see point **f** below for further discussion on this matter). A Schedule 1 Additional Permitted Use is proposed to provide for the conservation cropping within the E2 zone in this location.

d.	Obstacle Surface Limitation (as it applies to the southern edge of existing	Part E3 and	SP2
1	runway)	part E2	

Comments

In accordance with the revised CASA code for a 4C aerodrome standard that the airport must satisfy and the new OLS requirements, the land area to the south of the existing runway must be cleared for safety. This land area of 16.77ha has been assessed as part of the Biocertification process as *cleared lands*. The Biocertification assessment noted that whilst the vegetation must be removed, the landform could still retain characteristics of the *Coastal freshwater meadows and forblands of lagoons and wetlands*.

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Permitted Use)

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Airport Lands		
Location	Existing zone	Proposed zone
On the basis that this land area is critical to the on-going function of the airport for SP2. Vegetation will be removed and no fill or landform modification will be under ground water characteristics of the Coastal freshwater meadows and forblands of	ertaken, thereby re	taining the
e. Future services corridors, roads and existing and future fire trails	Part E2, part E3, part SP2, part R1, part RE1 and part RU1	E2 (within the Conservation Lands)
Comments These lands include the areas identified for future construction of essential sewer services connections to the east, south-east and south of the ABP. These lands a certification and assessed as <i>cleared lands</i> . This Planning Proposal will amend the LEP 2011 to introduce a new clause 7.17 a identify the land that has been conferred for biodiversity certification under section <i>Species Conservation Act 1995</i> . An objective of the clause is to allow developme including roads, fire trails and sewerage services on the lands that have been identified.	are included in the and supporting ma 126 H of the Thro nt for essential inf	p that will eatened rastructure,
f. Conservation Lands	Part E2, part RE1, part R1, part E3 and part SP2	E2, (including a Schedule 1 Additional

Comments -

All lands that are <u>not</u> identified at points **a** to **e** above (and are <u>not</u> identified as Area 13 lands and Airport Business Park lands below), comprise the Conservation Lands and will be zoned E2.

The Biocertification assessment has identified an area of approximately 20.9ha within the Conservation Lands that will require modification (selective tree cropping) to comply with the requirements of the Obstacle Limitation Surface. These areas have been assessed and offset as part of the biodiversity certification process and identified as *conservation cropping* land.

The conservation cropping area includes lands where there are occasional trees that may require management, however complete clearing works are not required. Individual trees will be pruned and subsequently poisoned to prevent re-growth. The Biocertification assessment recommends that the resultant dead tree (stag) should be left in-situ to provide fauna habitat.

A Schedule 1 Additional Permitted Use is proposed to provide for the conservation cropping within the future E2 zone in this location.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

2.3 Airport Business Park (ABP)

2.3.1 Proposed Land Zoning Map amendment

The proposed B7 Business Park zone that will apply to the lands to the east of Boundary Street has been developed following assessments of potential economic and traffic impacts undertaken on behalf of PMHC.

As set out at **Section 2.2** above, the lands to the west of Boundary Street will form part of the Airport Lands and zoned *SP2 (Air transport facility)* in recognition of their proximity to the current airport operations.

The following is noted with respect to the proposed ABP:

- There is currently 25.53 ha of land zoned B7 Business Park at the Port Macquarie Airport. 13.3 ha of that land is currently undeveloped.
- This Planning Proposal will rezone 17.04 ha of the current B7 Business Park zone on the western side of Boundary Street to SP2 Infrastructure (Air transport facility). This includes 8.65 ha of currently undeveloped B7 land and 8.39 ha of land within the B7 zone that is occupied by Airport related uses.
- This Planning Proposal will rezone an additional 19.1 ha of land on the eastern side of Boundary Street to B7 Business Park. When combined with the existing 4.65 ha of the land already zoned B7 Business Park on the eastern side of Boundary Street, the overall footprint of the B7 Business Park zone will be a gross area of 23.75 ha.
- The proposed B7 Business Park zone will ultimately result in the production of approximately 16.03 ha of <u>net</u> developable area within that zone.

All lands that will be rezoned to B7 have been biodiversity certified.

The biodiversity certification also includes the potential future road links to the south (as an extension of Boundary Street), to the south-east (to Lady Nelson Drive) and to the east (to The Binnacle).

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This Planning Proposal will amend the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the *Threatened Species Conservation Act 1995*. An objective of the clause is to allow development for essential infrastructure, including roads, fire trails and sewerage services on the lands that have been identified as certified.

This Planning Proposal provides for the following zone amendments within the 23.75 ha future *Airport Business Park*:

Airport Business Park:		
Existing zone	Proposed zone	Area (ha)
В7	Retain B7	4.65
SP2	B7	11.26
E2	B7	7.84
	Total area of ABP	23.75

The proposed B7 Business Park zoning that will apply to all lands within the identified ABP is consistent with the identified actions within the **North Coast Regional Plan 2036**, being to facilitate economic activity around industry anchors such as health, education and airport facilities through introducing planning controls that encourages clusters of related activity.

2.3.2 Proposed Land Use Table amendment

This Planning Proposal includes an amendment to the LEP 2011 Land Use Table for the B7 Business Park zone. The intent is to ensure that the zone will permit uses that are appropriate for the objectives of the Airport Business Park and to also reflect the position of the ABP in the retail hierarchy for the broader LGA.

The existing objectives for the B7 zone are proposed to be modified to support the intent of the Airport Business Park and to establish the matters that are important considerations for future development within the B7 zone.

This Planning Proposal therefore proposes the following amendments to the Land Use Table:

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	Existing B7 Business Park zone	Proposed amendments to the B7 zone (shown in red text)
1. Objectives	- To provide a range of office and light industrial uses.	- To provide a range of office and light industrial uses, within large scale/format developments.
	-To encourage employment opportunities.	-To encourage employment opportunities.
	- To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.	- To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.
	- To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District	-To create business park employment opportunities within large scale/format developments that are of a high visual quality and that will respect the natural environment within which they are located.
	as the focal point for sub regional functions and service delivery.	- To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District as the focal point for sub regional functions and service delivery.
2. Permitted with consent	Nil	Nil
3. Permitted with consent	Centre-based child care facilities; Garden centres; Hardware and building supplies; Landscaping material supplies; Light industries; Liquid fuel depots; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Respite day care centres; Roads; Take away food and drink premises; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4 (Note – mandated uses shown in green shade)	Centre-based child care facilities; food and drink premises Garden centres; Hardware and building supplies; Landscaping material supplies; Light industries; Liquid fuel depots; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Respite day care centres; Roads; Self-storage units; Take away food and drink premises; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres;
4. Prohibited	Agriculture; Airstrips; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Correctional centres; Crematoria; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Funeral homes; Heavy industrial storage establishments; Highway service centres; Home-based child care; Home businesses; Home occupations; Home occupations (sex services); Industrial training facilities; Industries; Marinas; Mooring pens; Open cut	Agriculture; Airstrips; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Correctional centres; Crematoria; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Funeral homes; Heavy industrial storage establishments; Highway service centres; Home-based child care; Home businesses; Home occupations; Home occupations (sex services); Industrial training facilities; Industries; Marinas; Mooring pens; Open cut

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Existing B7 Business Park zone	Proposed amendments to the B7 zone (shown in
	red text)
mining; Recreation areas; Registered clubs;	mining; Recreation areas; Registered clubs;
Research stations; Residential accommodation;	Research stations; Residential accommodation;
Retail premises; Rural industries; Sewerage	Retail premises; Rural industries; Sewerage
systems; Sex services premises; Tourist and visitor	systems; Sex services premises; Timber yards;
accommodation; Truck depots; Vehicle body repair	Tourist and visitor accommodation; Truck depots;
workshops; Vehicle repair stations; Veterinary	Vehicle body repair workshops; Vehicle repair
hospitals; Waste or resource management	stations; Veterinary hospitals; Waste or resource
facilities; Water recreation structures; Wharf or	management facilities; Water recreation structures;
boating facilities	Wharf or boating facilities
	_

2.3.3 Proposed amendment to the LEP 2011 Lot Size Map

This Planning Proposal provides for an amendment to the LEP 2011 Lot Size Map to provide a minimum lot size of 2,000 m² for lands within the Airport Business Park.

The intent of this development standard is to ensure that future development is of a suitably large scale/format, which will enable a range of office premises tenants to be housed within a single building and will ensure consistency with the objectives for the B7 zone. A further consideration is the findings of the groundwater modelling, which will likely require all future parking within the ABP to be at grade.

Accordingly, a 40m wide x 50m site will encourage a building with a minimum frontage of 20m to the street and will also provide for a typical carpark module of 18m in width.

2.3.4 Proposed amendment to the LEP 2011 Floor Space Ratio Map

This Planning Proposal provides for an amendment to the LEP 2011 Floor Space Ratio Map to allow a maximum FSR of **0.65:1** for lands within the Airport Business Park (ABP).

The proposed **0.65:1** development standard has been adopted to ensure the future traffic generated by the ABP is within the capacity of the existing road network noting that the hypothetical development scenario prepared to inform the modelling of future traffic volumes generated by the ABP was based on a maximum FSR of 0.7:1.

In combination with the minimum lot size development standard and future at-grade parking, this FSR will support a built form outcome of future three-storey development with a frontage of approximately 20m to the street.

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2.3.5 Proposed amendment to the LEP 2011 Height of Building Map

This Planning Proposal provides for an amendment to the LEP 2011 Height of Building Map to allow a maximum building height of 11.5m for lands within the Airport Business Park.

The intent of this development standard is to support the objectives for the ABP, through encouraging a single two - three storey building that is suitable for either a single large scale tenancy or for a grouping of multiple smaller scale tenancies. The 11.5m height of building development standard is consistent with either employment zone located outside core retail centres, e.g.; Macquarie Business Park.

In combination with the minimum lot size development standard, the maximum FSR development standard and future at-grade parking, this FSR will support a built form outcome of a future three-storey development with a frontage of approximately 20m to the street.

2.4 Thrumster Area 13 lands

Thrumster Area 13 URA			
Location Existing zone Proposed			
		zone	
a. Northern extent of the Partridge Creek Residential Neighbourhood (north of	Part R1, Part	Part E3 and	
Crown road).	E2 and Part	Part E2	
,	E3		

Comments -

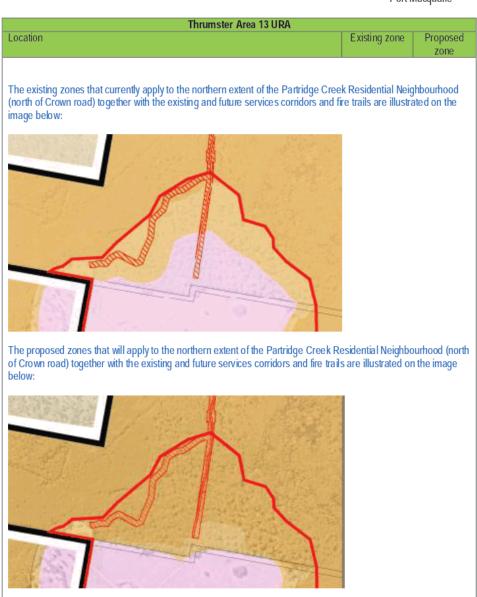
The land immediately to the north of an existing east-west crown road is identified within the DCP 2013 for future residential development. However the option for a future road link to the north that would service this residentially zoned land has been abandoned by Council. Additionally, this area is vegetated and includes core Koala habitat under the Area 13 Koala Plan of Management.

The biodiversity certification has nominated the area that is proposed to be zoned E2 as part of the Biobank site. The proposed E3 zone is in recognition of the requirement for future bushfire Asset Protection Zones for adjoining residential development to the south of the crown road and a neighbourhood park, as set out in the DCP 2013. The application of an E3 zone in this location is consistent with the existing zones that apply to future APZs within the Area 13 URA.

Future services corridors (sewer) and future and existing fire trails been assessed for vegetation removal/modification under the biodiversity certification and accordingly do not form part of the Biobank site. To remove any ambiguity for their future use this Planning Proposal will amend the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the Threatened Species Conservation Act 1995. An objective of the clause is to allow development for essential infrastructure, including roads and services, fire trails and sewerage services on the lands that have been identified as certified.

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PART 3 - Justification

Section A - Need for the planning proposal

Q1. Is the planning proposal a result of any strategic study or report?

The site, including the Airport Lands, the Airport Business Park and the Area 13 URA, has been subject of numerous strategic studies and reports. The recently completed biodiversity certification will now ensure a strategic and sustainable approach to the management of any environmental impacts associated with achieving the future development that is envisaged by the strategic studies undertaken within the site.

The Airport Business Park and Airport Lands:

The Airport Business Park is an Employment Investigation Area that was initially identified in Council's 2007 Industrial Land Strategy, with the Port Macquarie Airport Master Plan adopted by Council in 2010, addendum to the Master Plan adopted in December 2013 and the UGMS in December 2010. The ABP is currently identified within the North Coast Regional Plan 2036 as part Business Centre and part Investigation Area – Employment Land and within the Growth Area Boundary of the PMHC Urban Growth Management Strategy 2017–2036 (UGMS).

The Airport Business Park is identified as a key action in the UGMS and recognises its continued expansion under the Port Macquarie Airport Master Plan and the opportunities for business technology, aviation-related businesses and service industry. The UGMS confirms that ... Council will undertake planning for an expansion of the ABP to build on the key role of the Airport as a regional hub and transport gateway. The aim is to create opportunity for a technology and campus style business park, aviation related uses and service industry.

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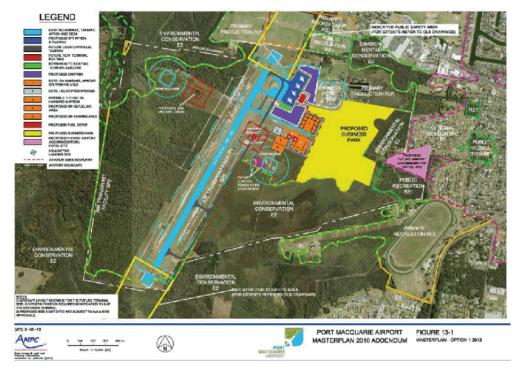


(Source: UGMS 2018, p.23)

The Port Macquarie Airport Master Plan presents a 20 year vision of the Airport site and considers the requirements for future airline operations, general aviation activities and commercial property development opportunities and provides the framework and strategic direction to guide the future development of the Airport to underpin the region's economic development and tourism potential. The lands identified in this Masterplan as being part of the existing Airport operations at the time (2013) are shown on the extract below.

The Master Plan identified areas within the Airport Lands that could be set aside for non-aviation uses as part of the ABP. At the time (2013) approximately 28 ha of land east of the runway was identified for further investigation.

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(Source: Port Macquarie Airport Master Plan, Figure 13.1 Option 1 2013)

The Port Macquarie Airport Master Plan also identifies the operational requirements for a Regional Airport to comply with the relevant standards determined by the Civil Aviation Safety Authority (CASA). The airport is now required to meet Code 4C aerodrome standards, including the widening of the existing runway and changes to the OLS. The purpose of the 2013 addendum to the Airport Master Plan was to identify the various issues, constraints and potential future development options to comply with the Code 4C aerodrome standards.

In order to meet Code 4C, vegetation clearing and/or modification is required. Council engaged Eco Logical Australia Pty Ltd to:-

- Undertake a Biodiversity Certification Assessment of the Port Macquarie Airport Master Plan and the Port Macquarie - Hastings Council owned land within the Thrumster Area 13 Urban Release Area; and
- Prepare a Biocertification Strategy in accordance with the Biocertification Assessment Methodology (BCAM).

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These overarching strategic plans and reports are now supported by the site specific specialist reports that have been undertaken to support this Planning Proposal, including, economic, transport and servicing aspects associated with the development of the ABP.

The Thrumster Area 13 Lands

The Council owned land within the Thrumster Area 13 Urban Release Area includes the neighbourhoods identified as Partridge Creek Residential. Partridge Creek Industrial and West Lindfield. These lands are currently zoned part R1 General Residential, part IN2 Light Industrial, part B2 Local Centre, Part E2 Environmental Conservation and part E3 Environmental Management.

The future development of these neighbourhoods, including their associated connecting roads, APZs, easements for services and constraints were included in the biodiversity certification. The required vegetation clearing/modification associated with their development will be offset by the *Conservation Lands*, being the proposed E2 zones included in this Planning Proposal.

Q2. Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

This Planning Proposal explains the intended effects of a proposed amendment to the Port Macquarie Hastings Local Environmental Plan 2011 (LEP 2011), which will provide a strategic and sustainable approach to the:

- on-gong operational requirements of the Airport Lands as required by the revised CASA code for a 4C aerodrome standard;
- development of the Airport Business Park;
- development of the Thrumster Area 13 Urban Release Area; and
- the permanent management and protection of the Conservation Lands (Biobank Site).

All lands the subject of this Planning Proposal are within the footprint of the land included in the biodiversity certification.

This process has ensured that the ecological issues associated with development within the site have already been addressed. The biodiversity certification will permanently protect and manage for conservation the biodiversity conservation lands containing 444.17ha of council lands.

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ORDINARY COUNCIL 17/07/2019

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The site specific investigations carried out to date support the zone amendments and this Planning Proposal will allow appropriate development that will manage environmental hazards. The site is capable of connection to existing water and sewerage services without significant costs.

This Planning Proposal is the best way to achieve the intended outcomes.

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Section B - Relationship to stategic planning framework

Q3. Is the Planning Proposal consistent with the objectives and actions of the North Coast Regional Plan 2036 (NCRP)

The North Coast Regional Plan 2036 (NCRP) identifies that the Port Macquarie aviation precinct should be an economic and employment priority, which should be built upon to achieve the desired outcomes of the Plan. In relation to the specific goals and directions of the Plan, the following is noted:

Goal 1: The most stunning environment in NSW

Direction 1: Deliver environmentally sustainable growth

The Planning Proposal is consistent with the actions for this direction as:

- The Airport Business Park is within the mapped Investigation Area Employment Land identified by the NCRP, in a location that can sustain additional development and servicing is not a constraint to its development:
- The Airport Business Park, the Airport Lands, the Partridge Creek Residential and Industrial lands and the West Lindfield Residential lands are within the footprint of the land subject to biodiversity certification. Accordingly, the biodiversity considerations with future development within these areas have been assessed and offset; and
- At the local level, the Airport Lands and the Airport Business Park lands are identified within the Growth Area Boundary shown in the PMHC Urban Growth Management Strategy 2017–2036 (UGMS 2018). The Airport Business Park is recognised as a key action in this strategy, with its expansion to be investigated within year 1.

Direction 2: Enhance biodiversity, coastal and aquatic habitats and water catchments

The Planning Proposal is consistent with the actions for this direction as:

- Development will only be undertaken on areas that have been biocertified; and
- Biodiversity certification has resulted in the permanent management and protection of 444.17ha of Conservation Lands (future Biobank site).

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Direction 3: Manage natural hazards and climate change

The Planning Proposal is consistent with the actions for this direction as:

 Site specific specialist studies have confirmed that development can be undertaken that will ensure minimal impact on the environment and downstream environments.

Direction 4: Promote renewable energy opportunities

The Planning Proposal is consistent with the actions for this direction as:

 The Planning Proposal will provide for additional employment lands within an area that is already serviced and/or can be augmented with minimal impact on the environment.

Goal 2: A thriving, interconnected economy

Direction 6: Develop successful centres of employment

The Planning Proposal is consistent with the actions for this direction as:

- The Planning Proposal will provide for additional employment lands that are centred around an industry anchor (airport), enabling a cluster of related activities; and
- The proposed future development for employment purposes will not impact on existing or future sensitive receivers.

Direction 7: Coordinate the growth of regional cities

The Planning Proposal is consistent with the actions for this direction as:

- The North Coast Regional Strategy identifies Port Macquarie as a Regional City. The Planning Proposal will promote employment growth and job opportunities within a nominated employment investigation area adjoining an existing employment hub (Port Macquarie Airport);
- The future development can be serviced and is well located to existing transport infrastructure and
- The proposed Airport Business Park will support the ongoing development of the Port Macquarie Airport as a key driver for regional growth, economic development and employment.

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Direction 9: Strengthen regionally significant transport corridors

The Planning Proposal is consistent with the actions for this direction as:

 Additional employment lands will be provided adjacent the primary transport connection of Port Macquarie Airport.

Direction 10: Facilitate air, rail and public transport infrastructure

The Planning Proposal is consistent with the actions for this direction as:

 The Airport Business Park will provide for value-adding industries in close proximity to the Port Macquarie Airport.

Goal 3: Vibrant and engaged communities

Direction 16: Collaborate and partner with Aboriginal communities

The Planning Proposal is consistent with the actions for this direction as:

 Consultation with the Birpai Local Aboriginal Land Council was undertaken as part of the Master Planning for the Airport Business Park and the November 2015 assessment found that there were unlikely to be any aboriginal artefacts present on the lands the subject of this Planning Proposal.

Direction 21: Coordinate local infrastructure delivery

The Planning Proposal is consistent with the actions for this direction as:

- The site is well located to utilise existing servicing provisions that have been, or can be augmented, for the existing land uses, thereby maximising the cost-effective and efficient use of infrastructure; and
- The development of the Airport Business Park will provide the opportunity and increased momentum for improved road access and reticulated sewerage services to the Port Macquarie Airport.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Q4. Is the Planning Proposal consistent with Council's Local Strategies?

Towards 2030 Community Strategic Plan

The Towards Community Strategic Plan (CSP) is an overarching 10 year plan prepared by Council and the community and is based on community priorities. It enables Council to coordinate its funding priorities, activities and services.

The Planning Proposal satisfies the key strategies of this Plan for both business and industry and natural and built environment. The Planning Proposal will:

- Provide for employment lands in close proximity to a transport hub;
- Attract investment to a location that is well serviced and connected to the greater Port Macquarie area;
- Attract investment to create jobs;
- Provide for effective management and maintenance of urban infrastructure and services;
- Assist in minimising the impact of natural events (bushfires), through appropriate mitigation measures;
- Facilitate development that is compatible with the natural and built environment;
- Provide for the effective integration of transport systems; and
- Restore and protect natural areas, consistent with the biodiversity certification of the Port Macquarie Airport and surrounding lands.

Urban Growth Management Strategy 2017 - 2036

The Airport Business Park is recognised as a key action in the UGMS 2018 and recognises its continued expansion under the Port Macquarie Airport Master Plan and the opportunities for business technology, aviation-related businesses and service industry. The UGMS 2018 confirms that ... Council will undertake planning for an expansion of the ABP to build on the key role of the Airport as a regional hub and transport gateway. The aim is to create opportunity for a technology and campus style business park, aviation related uses and service industry.

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Economic Development Strategy 2017-2021

The purpose of this Strategy is to nurture economic development and growth within the LGA through ensuring alignment with Council's key strategic documents. The Strategy has adopted an *Economic Development Mission ...to lead, create and proactively support an environment that stimulates sustainable industry, business and investment growth.*

Strategic Objectives 5 and 18 are relevant to this Planning Proposal:

<u>Objective 5</u> – Ensure appropriately zoned land and precinct planning to encourage business investment and the development of new industries.

Objective 18 - Support the growth of the Port Macquarie Airport precinct

The Planning Proposal will assist in achieving the actions for these objectives through:

- Providing for expansion opportunities in close proximity to the Port Macquarie Airport; and
- Supporting the Key Actions identified in the Urban Growth Management Strategy through progressing expansion opportunities within the Airport Precinct

Q5. Is the Planning Proposal consistent with applicable State Environmental Planning Policies?

An assessment of consistency with State Environmental Planning Policies (SEPPs) of relevance is below.

SEPP	Consistent	Reason for inconsistence/consistency
44 Koala Habitat Protection	Yes	Encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range.
		The Biocertification assessment noted that two(2) Koala Plans of Management apply to the land area within the Biodiversity Certification Assessment Area (BCAA), including:
		KPoM (GHD 2010), prepared in support for the cropping activities undertaken within the Airport Lands to date; and The Area 13 KPoM (Biolink 2008), prepared in support for the Thrumster Area 13 Urban Release Area.
		The Biocertification assessment determined that the Koala was one of five species that will be impacted by the land that is certified. Species credits were determined and the number of

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SEPP	Consistent	Reason for inconsistence/consistency
		species credits generated by the proposed conservation measures were found to be deficient for the Koala (323 credits).
		The Biocertification process will result in a 444.17 ha offset area, which provides for a 301.88 ha of Koala habitat. PMHC has committed to the purchase of an additional 40-50 ha off-site for the retirement for the 323 Koala species credits.
55 Remediation of Land	Yes	Introduces state-wide planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated.
		All operational lands associated with the Airport will be zoned SP2 Infrastructure. Land areas that are not currently used by the Airport do not have a landuse history that would indicate future contamination issues.
Infrastructure 2007	Yes	The aim of this Policy is to facilitate the effective delivery of infrastructure across the State
		This Policy is relevant to the Airport operations, the future infrastructure (roads, sewerage systems, stormwater management systems, water supply systems) required for the ABP, the Airport Lands and Area 13 URA, the on-going management of existing fire trails and the future traffic generating development within the Airport Lands and the ABP.
		Airport Lands
		Part 3 Division 1 sets out the uses that are permitted without consent and permitted with consent in relation to an Air transport facility. This clause will allow a range of uses within the Airport Lands, the subject of this Planning Proposal, if considered ancillary to an air transport use, including; (a) passenger transport facilities, (b) facilities for the receipt, forwarding or storage of freight, (c) hangars for aircraft storage or maintenance, (d) commercial premises, (e) industries,
		(f) recreation areas, recreation facilities (indoor) or recreation facilities (outdoor), (g) residential accommodation, (h) tourist and visitor accommodation.
		Sewerage systems
		Part 3 Division 18 sets out the circumstances where development for the purpose of water industry infrastructure or a sewerage reticulation system can be carried out. The Division also defines prescribed zones and prescribed circumstances.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

SEPP	Consistent	Reason for inconsistence/consistency
		The SP2 zone associated with the Airport is a prescribed zone , however the E2 zone within which services will be required is not identified as a prescribed zone . If development consists of the construction of water industry infrastructure or the works are carried out by or on behalf of a public authority, it is recognised as a prescribed circumstance .
		Having regard to these definitions the following clauses will be relevant to the future sewer infrastructure:
		(2) Development for the purpose of sewage treatment plants or biosolids treatment facilities may be carried out without consent on land in a prescribed zone in the prescribed circumstances.
		(2A) In any other circumstances, development for the purpose of sewage treatment plants or biosolids treatment facilities may be carried out with consent on land in a prescribed zone.
		(3) Development for the purpose of water recycling facilities may be carried out without consent on land in a prescribed zone in the prescribed circumstances.
		(3A) In any other circumstances, development for the purpose of water recycling facilities may be carried out with consent if:
		(a) the land on which the development is carried out is in a prescribed zone, or
		(b) the development is ancillary to an existing land use.
		(3B) Development for the purpose of sewage reticulation systems may be carried out without consent on any land in the prescribed circumstances.
		(3C) In any other circumstances, development for the purpose of sewage reticulation systems may be carried out with consent on any land.
		The site is partially mapped as Coastal Wetland and Part 1 Clause 8 of this Policy is relevant. This clause confirms that if there is any inconsistency between a provision of this Policy and clauses 10, 11 and 19 of State Environmental Planning Policy (Coastal Management) 2018, then the Coastal Policy will prevail. Under the Coastal Policy, any works within areas mapped as Coastal Wetland is declared to be designated development for the purposes of the Act (see Coastal Policy below).
		Notwithstanding, pursuant to Part 1 Clause 8(4) and (5) of this Policy (relationship to other environmental planning instruments), development for the purpose of emergency works and routine maintenance works is not declared designated development for the purpose of the Act:

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SEPP	Consistent	Reason for inconsistence/consistency
		(4) A provision of this Policy that permits development for the purpose of emergency works or routine maintenance works to be carried out without consent, or that provides that development for that purpose is exempt development, prevails over clauses 10 and 11 of State Environmental Planning Policy (Coastal Management) 2018 to the extent of any inconsistency, but only if any adverse effect on the land concerned is restricted to the minimum possible to allow the works to be carried out.
		(5) For the avoidance of doubt, development to which subclause (3) or (4) applies is not declared designated development for the purposes of the Act.
		Stormwater management systems
		Part 3 Division 20 sets out that stormwater management systems, if carried out by or on behalf of a public authority, is permitted without consent on anyland . If not undertaken by or on behalf of a public authority the works will require consent. This Division also sets out the works that are exempt development, which includes emergency works and routine maintenance works.
		The site is partially mapped as Coastal Wetland and Part 1 Clause 8 of this Policy is relevant. This clause confirms that if there is any inconsistency between a provision of this Policy and clauses 10, 11 and 19 of State Environmental Planning Policy (Coastal Management) 2018, then the Coastal Policy will prevail.
		Notwithstanding, pursuant to Part 1 Clause 8(4) and (5) of this Policy (relationship to other environmental planning instruments), development for the purpose of emergency works and routine maintenance works is not declared designated development for the purpose of the Act:
		(4) A provision of this Policy that permits development for the purpose of emergency works or routine maintenance works to be carried out without consent, or that provides that development for that purpose is exempt development, prevails over clauses 10 and 11 of State Environmental Planning Policy (Coastal Management) 2018 to the extent of any inconsistency, but only if any adverse effect on the land concerned is restricted to the minimum possible to allow the works to be carried out.
		(5) For the avoidance of doubt, development to which subclause (3) or (4) applies is not declared designated development for the purposes of the Act.
		Water supply

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SEPP	Consistent	Reason for inconsistence/consistency
		Part 3 Division 24 sets out that water reticulation systems, if carried out by or on behalf of a public authority, is permitted without consent on anyland . If not undertaken by or on behalf of a public authority the works will require consent. This Division also sets out the works that are exempt development, which includes emergency works and routine maintenance works.
		The site is partially mapped as Coastal Wetland and Part 1 Clause 8 of this Policy is relevant. This clause confirms that if there is any inconsistency between a provision of this Policy and clauses 10, 11 and 19 of State Environmental Planning Policy (Coastal Management) 2018, then the Coastal Policy will prevail.
		Notwithstanding, pursuant to Part 1 Clause 8(4) and (5) of the Policy (relationship to other environmental planning instruments), development for the purpose of emergency works and routine maintenance works is not declared designated development for the purpose of the Act:
		(4) A provision of this Policy that permits development for the purpose of emergency works or routine maintenance works to be carried out without consent, or that provides that development for that purpose is exempt development, prevails over clauses 10 and 11 of State Environmental Planning Policy (Coastal Management) 2018 to the extent of any inconsistency, but only if any adverse effect on the land concerned is restricted to the minimum possible to allow the works to be carried out.
		(5) For the avoidance of doubt, development to which subclause (3) or (4) applies is not declared designated development for the purposes of the Act.
		Fire trails
		The site includes a number of existing fire trails and future fire trails, both of which have been included in the biodiversity process as cleared lands.
		Part 3 Clause 48A sets out the following exempt provisions for existing fire trails that are not mapped as Coastal Wetlands:
		(1) Development for any of the following purposes is exempt development if the development complies with clause 20 and is consistent with the applicable bush fire management plan or the direction or agreement relating to the applicable designated fire trail:
		(a) maintaining fire trails, or installing or maintaining gates and associated structures on such trails, if the development is consistent with the Fire Trail Standards and does not result in any change in the alignment of fire trails,

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SEPP	Consistent	Reason for inconsistence/consistency
		(b) maintaining asset protection zones or installing or maintaining gates and associated structures on such zones, if the development is consistent with the NSW Rural Fire Service's publication Standards for Asset Protection Zones published on the website of the NSW Rural Fire Service and does not result in any change in the alignment of asset protection zones.
		Part 3 Clause 48B sets out the following exempt provisions for existing fire trails that are mapped as Coastal Wetlands:
		(3) Development for the purpose of maintaining a fire trail may be carried out by a public authority without consent on land to which this clause applies if:
		(a) the development is consistent with the applicable bush fire management plan or any direction or agreement relating to the applicable fire trail, and
		(b) the development complies with the Fire Trail Standards, and
		(c) the development does not involve the use of fire, the widening of a fire trail, any clearing of vegetation (other than of regrowth on a fire trail) or any excavation.
		Traffic generating development
		Hastings River Drive (HRD) is a classified road, with access to the Airport Lands and the ABP via Boundary Street which is greater than 90m in distance to its connection with HRD. Therefore clause 104 of the Policy will only apply to the future development types listed in Column 2 at Schedule 3 to the Policy. These development types will require consultation with the RMS as part of the approval process.
Rural Lands 2008	Yes	The aim of this policy is to facilitate the orderly and economic use and development of rural lands for rural and related purposes. The SEPP contains a number of 'Rural Planning Principles' that must be considered in preparing any planning proposals affecting rural land.
		A small extent of existing isolated RU1 Primary Production zoned lands will be rezoned to E2 Environmental Conservation, this being consistent with the biodiversity certification.
State and Regional Development 2011	Yes	The aims of this Policy are to identify development that is State significant development, State significant infrastructure, critical State significant infrastructure and regionally significant development.
		Development with a capital investment value greater than \$5 m (Council related development) is declared to be regionally significant development that must be determined by the Regional

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SEPP	Consistent	Reason for inconsistence/consistency
OLI I	Consistent	Planning Panel. The future DA for the Airport Lands, Area 13 and the ABP will be required to be cognisant of this requirement should the value of works exceed \$5m.
Coastal Management 2018	Yes	The aim of this Policy is to promote an integrated and co- ordinated approach to land use planning in the coastal zone.
		The lands the subject of this Planning Proposal are shown within the red line on the coastal map image below.
		This mapping confirms that a large extent of the site is mapped as either Coastal Wetlands or Proximity Area for Coastal Wetlands. Part 2 Division 1 is relevant for any works within this mapped area and with the exception of environmental protection works, all development will be declared designated development for the purposes of the Act.
		As noted under SEPP (Infrastructure) 2007, Part 1 Clause 8(4) and (5) (relationship to other environmental planning instruments) confirms that emergency works or routine maintenance works that can be carried out without consent, or is exempt development, these works are not declared designated development for the purpose of the Act
		Additionally, the maintenance of existing fire trails will not be declared a designated development.

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Q6. Is the Planning Proposal consistent with applicable Ministerial Directions (s.9.1 directions)?

An assessment of consistency with Ministerial Directions of relevance is below (as of 2 April, 2018).

Relevant Section	Consistent	Reason for inconsistence/consistency
9.1 Direction		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
 Employment and F 	Resources	
1.1 Business and Industrial Zones	Yes – consistent with the objectives	There is currently 25.53 ha of land zoned B7 Business Park at the Port Macquarie Airport, where 13.3 ha of that land is currently undeveloped. This Planning Proposal will - rezone 17.04 ha of the current B7 Business Park zone on the western side of Boundary Street to SP2 Air transport facility. This 17.04 ha land area is currently occupied by Airport related uses (employment uses); and - rezone 19.1 ha of land on the eastern side of Boundary Street to B7 Business Park. Combined with the existing 4.65 ha of land area on the eastern side of Boundary Street that is zoned B7, the overall footprint of the B7 Business Park will be a gross area of 23.75ha (16.03 ha of net developable area). The Airport Business Park is recognised as a key action in Council's UGMS 2018, which recognises its continued expansion under the Port Macquarie Airport Master Plan and opportunities for business technology, aviation-related businesses and service industry.
1.2 - Rural Zones	Yes – consistent with the objectives	A small area of land is proposed to be rezoned from RU1 to E2. This land area is isolated and through the biodiversity certification is to be included in the Biobank site.
1.4 - Rural Lands	Yes – consistent with the objectives	As above
2. Environment and I	Heritage	
2.1 – Environment protection zones	yes	All lands that are either zoned E2 or are proposed to be zoned E2 under this Planning Proposal have undergone assessment as part of the biodiversity certification.
2.2 – Coastal Management	Yes	The lands the subject of this Planning Proposal includes lands that are mapped under the SEPP (Coastal Management) 2018 as either Coastal Wetlands or Proximity Area for Coastal Wetlands. Future development within the mapped Coastal Wetlands will be either Designated Development or exempt (existing fire trails).
2.3 - Heritage Conservation	Yes	The Birpai Local Aboriginal Land Council has been consulted and a site inspection conducted. The LALC have confirmed that it is unlikely that the site contains artefacts of significance to the Birpai LALC.

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Relevant Section 9.1 Direction	Consistent	Reason for inconsistence/consistency		
Housing, Infrastructure and Urban Development				
3.1 – Residential zones	Yes	This Planning Proposal will rezone R1 zoned lands to E2, on the basis that these lands are vegetated and have been included in the biodiversity conservation lands.		
3.4 - Integrating Land Use and Transport	Yes	This Planning Proposal will not impact access, transport, car travel, public transport or the movement of freight.		
3.5 – Development near Regulated Airports and Defence Airfields	Yes	This Planning Proposal supports the airport operators (PMHC Airport) rationale for undertaking the biodiversity certification process, which will ensure an on-going strategic and sustainable approach to the management and offsetting of any environmental impacts associated with the long-term operation and future development of essential infrastructure related to the Airport (including the Airport Business Park).		
3.6 – Shooting Ranges	Yes	The Port Macquarie shooting range adjoins the <i>site</i> to the south and is zoned RE2 Private Recreation. An area of existing E2 zoned lands within the <i>site</i> separates the range from the proposed ABP. This Planning Proposal will retain an E2 zone buffer between the range and the proposed ABP, ensuring that more intensive land uses cannot be approved adjacent the range. This separation distance will also ensure minimal impact from potential noise. Additionally the land uses that will be permitted in the B7 Business Park zone are not considered noise sensitive receivers.		
4. Hazard and Risk				
4.1 – Hazard and Risk	Yes	The site includes lands mapped as Class 2, 3 and 5 on the Acid Sulfate Soils Maps of the PMH LEP 2011. Groundwater assessments have been undertaken by Regional Geotechnical Solutions (29 October, 2015 and 16 November 2017) to inform the future development potential of the site and a copy of		
		each report is attached at Appendix G . The assessments confirmed both Actual and Potential ASS are present and accordingly, An Acid Sulfate Soils Management Plan (ASSMP) will be required prior to onsite works where groundwater will be present. The preferred sewerage scheme (Low Pressure Sewerage Scheme) will minimise potential issues associated with the Actual and Potential ASS as deep excavation will not be required.		
10.51.15		· ·		
4.3 – Flood Prone Land	Yes – consistent with Clause (9)	The site (including the existing extent of Boundary Street) is identified on the Flood Planning Map of the PMHLEP 2011. An area of approximately 6,000m² of the proposed B7 lands is identified within the mapped Flood Planning Area, being the 1:100 ARI plus 0.5m freeboard. The remaining proposed B7 lands are identified within the mapped Level of Probable Maximum Flood.		

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Relevant Section	Consistent	Reason for inconsistence/consistency
9.1 Direction		<u> </u>
		The 2018 Hastings River Flood Study, adopted by PMHC in December, 2018, nominates a 1:100 ARI of 3.17m AHD for the airport precinct.
		The proposed rezoning from SP2 Infrastructure and E2 Environmental Conservation to B7 Business Park is inconsistent with clause (5) of this Direction. However, pursuant to clause (9) this inconsistency can be justified on the basis of the following:
		 Following preparation of the Hastings River Floodplain Risk Management Study (2012) and the Hastings River Flood Study (2017), Council has adopted the Port Macquarie-Hastings Flood Policy (2018). These studies and policy are consistent with the principles and guidelines included in the Floodplain Development Manual 2005;
		- The PMHC Flood Policy (2018) requires a flood planning level of FPL2 (with 25% of ground floor to be FPL3) for all commercial development (FPL2 = 100 year ARI Flood level + Climate Change (no freeboard), FPL3 = 100 year ARI Flood level + Climate Change + 500mm freeboard);
		The future permissible uses within the proposed ABP are not of a type that will require consideration under clause 7.4 of the PMH LEP 2011 (Level of Probable Maximum Flood); and
		- The quantity of fill required to comply with the PMHC <i>Flood Policy (2018)</i> equates to approximately 1,500m³ and given the footprint of the total land area of the proposed B7 zone and the location of the ABP on the fringe of the flood prone land, can be considered to be of minor significance.
		PMHC is currently preparing detailed concept design to upgrade Boundary Street to 1 in 20 year flood immunity. Upon completion of the detailed design it is anticipated the Boundary Street upgrade works will be included in future application for government funding.
		PMHC is currently investigating flood free road access options to link the Port Macquarie Airport and the Oxley Highway. The community engagement process is currently underway for the Port Macquarie Orbital Road, which includes options for the future primary flood free access to the Port Macquarie Airport.
		The footprint of the proposed 23.75 ha gross area of B7 Business Park zone provides opportunities to link with potential flood free road access options to the south (as an extension of Boundary Street) and to the south east to Lady Nelson Drive. These future

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Relevant Section	Consistent	Reason for inconsistence/consistency
9.1 Direction 4.4 - Planning for Bushfire Protection	Yes – consistent with the objectives	road access options have been included in the lands subject to Biodiversity Certification. The construction of a flood free secondary access road to the Port Macquarie Airport and other existing development on Boundary Street including the future Airport Business Park will provide a new north-south link between the Oxley Highway and Hastings River Drive which is considered to be an important regional road improvement. The lands subject to biodiversity certification also include a potential road link to The Binnacle (east of the ABP) which may be used as flood free access to the Airport Lands and the ABP as required. The existing vegetated areas within the area identified for the future ABP are identified as bushfire prone. This vegetation has been biocertified and will be removed as development within the ABP occurs. Future development will be required to consider the buffer areas to the biobank lands (future E2 zones to the east and south) and the rural zoned property to the north. All required APZ's and edge roads will be required to be provided within the B7 zoned lands, ensuring consistency with the relevant version of the Planning for Bushfire Protection.
5. Regional Planning		
5.10 - Implementation of Regional Strategies	Yes	The Airport Business Park is identified within the North Coast Regional Plan 2036 as part Business Centre and part Investigation Area – Employment Land.
6. Local Plan Making		
6.1 - Approval and Referral Requirements	Yes	This Planning Proposal will not introduce any additional requirements for concurrence with other State Government agencies.
6.2 – Reserving :Land for Public Purposes	Yes	This Planning Proposal will rezone an area zoned RE1 Public Recreation to E2 Environmental Conservation. This land was included in the biodiversity conservation lands (future Biobank site) by the biodiversity certification.

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Section C - Environmental, social and economic impact

Q7. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

Ecology:

PMHC Airport engaged Ecological Australia to undertake a Biodiversity Certification Assessment and prepare a Biocertification Strategy in accordance with the Biocertification Assessment Methodology. Two reports have been prepared by Eco-Logical Australia with respect to this certification process:

- Port Macquarie Airport Master Plan and Port Macquarie Hastings Council owned land within the Thrumster Area 13 Urban Release Area - Biodiversity Certification Assessment Report & Biocertification Strategy Application to Minister, Eco Logical Australia, 24 October, 2016; and
- Port Macquarie Airport Master Plan implementation and vegetation clearing on Council owned land in the Thrumster Urban Release Area -EPBC Preliminary Documentation Assessment Report, Eco Logical Australia, 9 November, 2018

The site falls within the land area that has undergone biodiversity certification (see **Exhibit 1**) and accordingly, this process will result in the biodiversity impacts associated with future development within *the site* having already been assessed and offset.

The purpose of the Ecological Australia assessments and strategy was to obtain Biodiversity Certification of:

- The land required for the ongoing operational use of the existing airport (maintenance of the runway strip and associated obstacle limitation surface (OLS));
- The land affected by the existing and expanded Obstacle Limitation Surface (OLS) and the extension and/or relocation of critical aviation related infrastructure and facilities in accordance with the revised CASA aerodrome standards;
- Future residential and light industrial development in the Partridge Creek Residential, Partridge Creek Industrial, and West Lindfield neighbourhoods of the Thrumster Urban Release Area, and their associated roads, Asset Protection Zones (APZs), easements and fire trails; and

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 Future employment and airport related accommodation facilities within the Airport Business Park precinct and the establishment of flood-free road access to the airport consistent with the Airport Master Plan.

The *Biodiversity Certification Assessment Area* (BCAA) represents a total land area of 1,024.48 ha. The biodiversity certification will permanently protect and manage for conservation 444.17 ha (43% of the BCAA) of Council owned operational land and some currently private land within the BCAA and an additional 40 – 50 ha off-site off-set areas to provide additional protection for the koala.

The 444.17 ha of biodiversity conservation lands within the BCAA includes:

- 221.99 ha of the three red flag EECs;
- 111.24 ha of SEPP 14 Wetlands;
- 26.70 ha of riparian buffers; and
- 8.77 and 61.78 ha of state and regional biodiversity links.

The site for the purposes of this Planning Proposal represents a footprint of approximately 759.7 ha, or 74% of the BCAA. The conservation areas that will be zoned E2 Environmental Conservation under this Planning Proposal will be registered as a Biobank Site under Part 7A of the TSC Act within 12 months of the Minister conferring Biocertification (see **Appendix E** for Order). This will provide in perpetuity conservation protection and management on the land title.

The biodiversity assessment included consideration of the following vegetation works that will be undertaken on the lands that are included in this Planning Proposal:

- Clearing of vegetation for the widening (and ongoing maintenance) of the existing Code 3C 150m wide runway strip to a code 4C 300m wide runway strip;
- Ongoing establishment and maintenance of existing Code 3C 2% OLS at each end of runway 03/21 (150m approach and 180m take-off surfaces), which includes clearing and lopping of vegetation on land within and surrounding the airport property;
- Widening and ongoing maintenance of existing Code 3C 2% OLS at each end of runway 03/21 to comply with CASA Code 4C aerodrome standards which includes clearing and lopping of vegetation on land within and surrounding the airport property

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- Potential future development/extension and/or relocation of critical aviation related infrastructure and facilities within the aviation uses precinct of the Airport to comply with CASA Code 4C aerodrome standards and cater for forecast growth in air services and passenger numbers, including (though not limited to) a potential new Regular Public Transport (RPT) apron, passenger terminal building and car parking, and a future parallel taxiway to the east of the runway;
- Clearing of native vegetation for the establishment of an Airport Business Park (new employment lands);
- Clearing of native vegetation for the establishment of flood free road access to the existing Airport between the Oxley Highway and Hastings River Drive via Port Macquarie Airport and the Airport Business Park and an upgrade to Boundary Street (the current access road to the Airport).
- Clearing of native vegetation to allow future residential and light industrial development on Council owned land within the Partridge Creek Residential, Partridge Creek Industrial, and West Lindfield neighbourhoods of the Thrumster Urban Release Area and establishment of associated roads and Asset Protection Zones (APZs). Future development would provide for a village centre, residential areas of up to 820 lots (700 in Partridge Creek and 120 in West Linfield) bordered by environmental lands, conventional residential development, and an employment hub containing a diverse range of employment generating uses for the Thrumster Urban Release Area; and
- Clearing of vegetation to allow the establishment of water and sewer easements to meet expected future needs of the Thrumster Urban Release Area and fire trails within the conservation areas to aid in strategic fire and conservation management.

The biodiversity assessment makes a number of recommendations with respect to *the site* and these recommendations have been used to inform the zone amendments within this Planning Proposal, including:

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Location and impact

Recommendation from Biocertification process

 Clearing of vegetation for the widening (and ongoing maintenance) of the existing Code 3C 150m wide runway strip to a code 4C 300m wide runway strip An OLS clearing boundary of 54 m have been identified rather than the full extent of the OLS boundary. A 54m clearing area allows maximum operational certainty and efficiency in ongoing airport operations whilst reducing ongoing operational expenses associated with the need to re-crop areas every 2-3 years due to rapid regrowth of vegetation

20.9 ha has been identified outside of this corridor within land proposed for conservation measures for selective tree cropping, and only if required. This area is labelled as conservation cropping and includes area where there are occasional trees that may require management based on predicted growth models and where vegetation does not require complete clearing. Only single trees will be pruned and subsequently poisoned to prevent regrowth. These trees will be left in-situ to provide fauna habitat (stags) and pruned material will not be removed from site to minimise indirect impacts and other disturbances

Where clearing is proposed east and west of the runway, as is the case with vegetation management in the existing OLS boundary, vegetation will not be cleared to bare earth but to a managed native ground cover, similar to an urban asset protection zone. These areas will retain biodiversity values and act as buffers to retained vegetation, reducing indirect impacts

Comment

This Planning Proposal includes an amendment to zone the 54m wide clearing areas to SP2.

The additional 20.9 ha outside this corridor that are affected by the OLS (to east and west) will be zoned E2 Environmental Conservation. The biodiversity certification has assessed and offset the impact of this activity and future approvals for vegetation modification can rely on their certification.

This Planning Proposal provides for an amendment to the LEP 2011 Schedule 1, to provide for an additional permitted use on nominated lands within the site for the purposes of vegetation clearing and/or conservation cropping to the extent specified within the biodiversity certification.

 Ongoing establishment and maintenance of existing Code 3C 2% OLS at each end of runway 03/21 (150m approach and 180m take-off surfaces), which includes clearing and lopping of vegetation on land within and surrounding the airport property; and The area of Paperbark swamp forest of the coastal lowlands of the North Coast at the southern end of the runway (16.77 ha) is proposed to be managed to permanently remove the trees only but retain the characteristics of the Coastal freshwater meadows and forblands of lagoons and wetlands. This is an EEC and will maintain water quality and functioning of the SEPP14 wetland, whilst avoiding attracting water birds that pose a risk to aviation operations. Where possible, some trees will be retained in the area south of the

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Location and impact

Recommendation from Biocertification process

Widening and ongoing maintenance of existing Code 3C 2% OLS at each end of runway 03/21 to comply with CASA Code 4C aerodrome standards which includes clearing and lopping of vegetation on land within and surrounding the airport property

runway, and glider poles and ropes will be installed to maintain a link between conserved vegetation. The resulting vegetation structure will continue to provide habitat for NSW listed threatened species including Eastern Chestnut Mouse, Wallum Froglet, Grass Owl and other species

Comment

This Planning Proposal includes an amendment to zone this 16.77 ha area to SP2. The land area is critical to the on-going function of the Airport Lands and the required extent of vegetation modification is not appropriate for an environmental zone. The certification process has included the area as a *cleared area* and appropriate offset for this clearing action is included in the vegetation impact calculations.

 Clearing of native vegetation for the establishment of an Airport Business Park (new employment lands); and The Biocertification process has included all lands identified for the future ABP and road connections as cleared lands.

Clearing of native vegetation for the establishment of flood free road access to the existing Airport between the Oxley Highway and Hastings River Drive via Port Macquarie Airport and the Airport Business Park and an upgrade to Boundary Street (the current access road to the Airport).

Comment

This Planning Proposal will amend the zone of the 23.75 ha of land within the Airport Business Park to B7.

This Planning Proposal will amend the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the *Threatened Species Conservation Act 1995*. An objective of the clause is to allow development for essential infrastructure, including roads, fire trails and sewerage services on the lands that have been identified as certified.

Generally the required APZs for the future Area 13 development are located in the existing E3 zones. This Planning Proposal will retain these zones.

4. Clearing of native vegetation to allow future residential and light industrial development on Council owned land within the Partridge Creek Residential, Partridge Creek Industrial, and West Lindfield neighbourhoods of the Thrumster Urban Release Area and establishment of associated roads and Asset Protection Zones (APZs). Future development would provide for a village centre, residential areas of up to 820 lots (700 in

Thrumster URA - Of the 118.50 ha of impact vegetation proposed in the action, only 10.08 ha (including APZs) is as a result of clearing on Council owned land in the Thrumster URA and this impact area includes two road corridors that have allowed up to 50m of clearing. The final clearance width is likely to be only 15-20m wide.

Bush Fire Asset Protection Zones (APZs) have been included in vegetation impact calculations, however will retain some trees that will provide foraging resources

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Location and impact	Recommendation from Biocertification process
Partridge Creek and 120 in West Lindfield) bordered by environmental lands, conventional residential development, and an employment hub containing a diverse range of employment generating uses for the Thrumster Urban Release Area; and Clearing of vegetation to allow the establishment of water and sewer easements to meet expected future needs of the Thrumster Urban Release Area and fire trails within the conservation areas to aid in strategic fire and conservation management.	for Koala, Swift Parrot and Grey-headed Flying-fox and reduce/buffer indirect impacts to adjacent conservation lands
0	

Comment

This Planning Proposal retains the existing E3 zone for the future APZs within the Area 13 URA, where the required vegetation modification has been included in the biodiversity certification. The existing and future fire trails will retain the zone within which they are located, noting that the vegetation works associated with their maintenance/creation has been assessed and offset in the biodiversity certification.

Where future service corridors are required through the conservation lands (E2 zone) this Planning Proposal will amend the LEP 2011 to introduce a new clause 7.17 and supporting map that will identify the land that has been conferred for biodiversity certification under section 126 H of the *Threatened Species Conservation Act* 1995. An objective of the clause is to allow development for essential infrastructure, including roads, fire trails and sewerage services on the lands that have been identified as certified.

Q8. Are there any other likely environmental effects as a result of the Planning Proposal and how are they proposed to be managed?

Groundwater and Stormwater Management Plan:

The following geotechnical assessments have been undertaken to inform the rezoning process for the Airport Business Park (see **Appendix G**):

- Geotechnical Assessment, Regional Geotechnical Solutions (October 2015); and
- Groundwater Assessment Factual Report, Regional Geotechnical Solutions (16 November 2017)

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

The initial assessment (October 2015) was prepared to assist with the development of the Stormwater Management Plan (SMP) at **Appendix I** for the Airport Business Park (ABP) and to also provide an overview of the existing geotechnical conditions with particular reference to excavation activities and groundwater conditions for a proposed sewer reticulation system.

The November 2017 assessment provides the findings from the monitoring sites during the monitoring period and the ground level responses to rainfall. This monitoring was also used to inform further development of the SMP.

The observations contained within the November 2017 assessment support the October 2015 observations, where the long term groundwater levels were highly variable and ranged from 0.05 – 0.9m depths due to localised perched aquifers above indurated sand aquitard layers.

The observations confirmed that excavations within the ABP to construct conventional sewer and stormwater drainage infrastructure and bioretention systems will likely intersect the existing indurated sand layers. This will result in the connection of the upper and lower aquifers and subsequent modification to the water table within the development envelope.

Therefore the proposed SMP, with bio-retention swales and basins with a permanent submerged zone as a feature of their design for stormwater treatment, will establish and regulate groundwater levels at levels close to the existing upper aquifer levels, which will support the maintenance of groundwater levels in their vicinity.

Additionally, the implementation of bio-retention basins at the development edge will assist to maintain existing water levels within the adjoining lands.

The adoption of bio-retention systems within the development with submerged zones close to the surface will assist to maintain consistent groundwater levels post construction. Connection between the surface aquifers and rainfall will also be retained through the use of these bio-retention systems.

The attached SMP also assessed the impact of the proposed development of an ABP on stormwater quantity and stormwater quality utilising the DRAINS and MUSIC programs.

Water quality - The assessment compared the existing conditions to proposed conditions and the change to water quality from source to outlet. The proposed development has been designed to implement the treatment train approach to ensure outflows from the development mimic existing conditions, and have been afforded suitable stormwater quality treatment to meet the stated water quality objectives.

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

The SMP also recommends that the future allotments be required to provide a gross pollutant capture device (Gross Pollutant Trap, Litter Screen or Litter Baskets or similar) prior to the point of connection with the Council trunk drainage system, to ensure that the stormwater swales are adequately protected and are not impacted by silt/sediment or gross pollutants and litter.

<u>Water quantity</u> - The landform at the outlet being part of the floodplain of the Hastings River was considered a mitigating factor for stormwater quantity outflows. The impact of higher flows when considering the large surface area results in negligible increases to water levels within the wetlands. The SMP concludes that stormwater detention is not required in this instance.

Flooding:

The site (including the existing extent of Boundary Street) is identified on the Flood Planning Map of the PMHLEP 2011. An area of approximately 6,000m² of the proposed B7 lands is identified within the mapped Flood Planning Area, being the 1:100 ARI plus 0.5m freeboard. The remaining proposed B7 lands are above the Flood Planning Area but identified within the mapped Level of Probable Maximum Flood.

The 2018 Hastings River Flood Study, adopted by PMHC in December, 2018, nominates a 1:100 ARI of 3.17m AHD for the airport precinct.

The PMHC Flood Policy (2018) requires a flood planning level of FPL2 (with 25% of ground floor to be FPL3) for all commercial development (FPL2 = 100 year ARI Flood level + Climate Change (no freeboard), FPL3 = 100 year ARI Flood level + Climate Change + 500mm freeboard). The quantity of fill required to comply with the PMHC Flood Policy (2018) equates to approximately 1,500m³ and given the footprint of the total land area of the proposed B7 zone and the location of the ABP on the fringe of the flood prone land, can be considered to be of minor significance.

Additionally the future permissible uses within the proposed ABP are not of a type that will require consideration under clause 7.4 of the PMH LEP 2011 (Level of Probable Maximum Flood).

PMHC is currently preparing detailed concept design to upgrade Boundary Street to 1 in 20 year flood immunity. Upon completion of the detailed design it is anticipated the Boundary Street upgrade works will be included in future application for government funding.

PMHC is currently investigating flood free road access options to link the Port Macquarie Airport and the Oxley Highway. The community engagement process is currently underway for the Port Macquarie Orbital Road, which includes options for the future primary flood free access to the Port Macquarie Airport.

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The footprint of the proposed 23.75 ha gross area of B7 Business Park zone provides opportunities to link with potential flood free road access options to the south (as an extension of Boundary Street) and to the south east to Lady Nelson Drive. These future road access options have been included in the lands subject to Biodiversity Certification.

The construction of a flood free secondary access road to the Port Macquarie Airport and other existing development on Boundary Street including the future Airport Business Park will provide a new north-south link between the Oxley Highway and Hastings River Drive which is considered to be an important regional road improvement.

The lands subject to biodiversity certification also include a potential road link to The Binnacle (east of the ABP) which may be used as flood free access to the Airport Lands and the ABP.

Q9. Has the Planning Proposal adequately addressed any social and economic effects?

Economic:

PMHC have previously principally relied on advice from HillPDA with respect to the review of potential economic impacts.

HillPDA have in their advice dated 5 July 2017 (refer **Attachment 4** at **Appendix C**) confirmed that provided the capacity of the existing road network is not exceeded, 20.5ha (gross zoned area) of B7 land is justified as it will not threaten the viability of existing commercial centres.

20.5ha gross zoned area of B7 land equates to 13.85ha net developable area of B7 zoned lands (i.e.; the development capacity).

As outlined in **Appendix L**, TPS and SLR have confirmed the existing road network has capacity for development of 20.6 ha (<u>net</u> developable area) of B7 zoned land based on agreed incremental improvements to the existing Hastings River Drive / Boundary Street intersection.

This Planning Proposal proposes 23.75ha gross zoned area of B7 land which equates to 16.03ha net developable area of B7 zoned land (i.e.; the development capacity).

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

The proposed 23.75ha gross zoned area of B7 land is therefore well within the capacity of the existing road network determined by TPS and SLR.

Port Macquarie Airport have obtained further economic impact advice from Gillespie Economics and Augusta (refer **Attachments 2** and **3** at **Appendix C**).

Gillespie Economics and Augusta have both highlighted the unique characteristics of the ABP, noting:

- The on-going investment in the Airport as a catalyst to attract new investment and business;
- The trend towards business park developments clustering at universities, airports and hospitals and along transport corridors;
- The stimulation of jobs not normally located in the CBD;
- The role of the Airport as a key driver for regional growth, economic development and employment which is not necessarily a consequence of population growth. (Augusta, 2011/Gillespie Economics,2017);
- The potential for the ABP to complement other existing and future business precincts; and
- Biodiversity Certification of the Port Macquarie Airport and surrounding lands is a key enabling action for the establishment of the Airport Business Park (Augusta, 2017). The footprint of the 23.75 ha proposed to be rezoned for Business Park purposes is within the footprint of the land that has received Biodiversity Certification by the state government in September 2018.

HillPDA in their review of Gillespie Economics (refer **Attachment 4 Appendix C**) have also concluded as follows:

If Gillespie Economics proves to be correct in its forecast of airport stimulating jobs then many of these businesses would not locate in the CBD anyway. These are businesses that rely more on proximity to the airport (and perhaps also the Pacific Highway) rather than proximity to the population base. There is some risk that they would locate outside the LGA altogether if space was not available (refer **Attachment 4** at **Appendix C** - Hill PDA, July 2017).

This Planning Proposal seeks to reinforce the unique characteristics of the proposed ABP highlighted in the Gillespie and Augusta reports while ensuring potential impacts on existing commercial centres are mitigated through:

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

- Changes to the objectives of the B7 Business Park zone to place additional emphasis on large-scale/format developments; and
- Changes to the uses permitted with development consent to remove landscaping material supplies, plant nurseries and timber yards;
- Changes to the uses permitted/prohibited, to permit food and drink premises, self-storage units, electricity generating works, function centres and industrial training facilities;
- Larger minimum lot size provisions (minimum 2,000 m²) than typically provided in other commercial and industrial zones (typically minimum 1,000 m²); and
- Reduction of the maximum Floor Space Ratio (FSR) to 0.65:1.
 Commercial zones with an 11.5 m building height limit typically have a
 FSR of 1:1 outside CBD areas, e.g. Grant Street and Lord Street. The
 maximum FSR of 0.7:1 has been reduced to 0.65:1 to ensure floor
 areas generated do not exceed that determined in hypothetical
 development scenarios used to inform traffic and economic impact
 assessments.

It is considered that the planning controls proposed in the LEP emphasise the unique location and characteristics of the Airport Business Park. These planning controls considered in conjunction with the specialist economic impact advice outlined above provide certainty to confirm the 23.75ha footprint of B7 zoned land in the Airport Business Park will not threaten existing commercial centres.

Aboriginal Archaeology:

The Aboriginal sites officer for the Birpai Local Aboriginal Land Council has inspected the site and by correspondence of 25 November, 2015 (see **Appendix F**), has confirmed that no artefacts were observed. The Birpai LALC recommends that should any artefact be uncovered during excavations works, all works should cease and the LALC should be contacted.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Section D - State and Commonwealth interests

Q10. Is there adequate public infrastructure for the Planning Proposal?

Road network:

Currently industrial and commercial developments do not pay section 7.11 (Section 94) Contributions towards Arterial Roads. Accordingly the future development application for the subdivision to establish the ABP will not attract developer contributions under the current adopted contribution plans of the Council.

Subsequent development applications for industrial and commercial development within the ABP will be subject to Section 7.12 (Section 94A) levies of 1% of the overall cost of the proposed development. The trigger for the payment of these Section 7.12 levies is prior to the issuing of the construction certificate.

The Major Roads Contribution Plan 2006 includes provision for a roundabout at the intersection. These planned works were replaced by the existing signalised intersection.

Unless PMHC resolve to prepare a local roads contribution plan for the Airport Precinct (i.e. it would need to levy not only the Airport Business Park but also any other new traffic generating development in the area), there is no trigger currently available to Council to require the developer of the ABP to make monetary developer contributions to road infrastructure upgrades.

Boundary Street is recognised in a range of forums (PMHC, Chamber of Commerce, EDSG, and Port Macquarie Tourism Board) as one of the gateways to Port Macquarie and that its current condition is unacceptable as a Gateway to Port Macquarie.

PMHC is currently preparing detailed design for the upgrade of Boundary Street. The final design will be informed by the Hibbard Precinct Flood Study, which is currently on public exhibition.

It is anticipated that once the detailed design for the upgrade of Boundary Street is completed PMHC will seek funding for those works from all levels of government. This will occur as part of the need to upgrade the only access to the Port Macquarie Airport in its role as a Gateway to Port Macquarie and will occur with or without the development of the proposed ABP.

The traffic Impact assessments undertaken to date have confirmed that there is not a road capacity issue with respect to Boundary Street generated by the development of the ABP.

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The road infrastructure identified that the ABP will need to contribute towards is the incremental upgrade of the Hastings River Drive and Boundary Street intersection.

The TPS, SLR, PMHC and TSN traffic assessments have all identified the required improvements to the Hastings River Drive / Boundary Street intersection to cater for the traffic generated by the proposed ABP and doubling of traffic generated by existing uses.

In the absence of a local roads contribution plan applicable to the intersection works, it is anticipated and acknowledged that the implementation of the identified intersection improvements will be included in a condition of development consent as part of the determination of a future development application for the establishment of the Airport Business Park. The condition of development consent will include details of the proposed trigger for the intersection improvement works. Apportionment of the sharing of the costs of the intersection works between the ABP and other developments will typically be negotiated through a works in kind agreement at that time.

Sewerage:

This Planning Proposal is accompanied by two (2) options for sewerage infrastructure; a conventional gravity sewerage scheme and a low pressure sewerage scheme (LPSS).

The options have been informed by the geotechnical assessments undertaken by Regional Geotechnical Solutions (RGS) (see **Appendix G**), including:

- Geotechnical Assessment, RGS (October 2015); and
- Groundwater Assessment Factual Report, RGS (16 November 2017)

The initial assessment (October 2015) was prepared to assist with the development of the Stormwater Management Plan (SMP) at **Appendix I** for the Airport Business Park (ABP) and to provide an overview of the existing geotechnical conditions with particular reference to excavation activities and groundwater conditions for a proposed sewer reticulation system.

The November 2017 assessment provides the findings from the monitoring sites during the monitoring period and the ground level responses to rainfall. This monitoring was also used to inform the SMP.

The observations contained within the November 2017 assessment support the October 2015 observations, where the long term groundwater levels were highly variable and ranged from 0.05 – 0.9m depths due to localised perched aquifers above indurated sand aquitard layers.

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The observations confirmed that excavations within the ABP to construct conventional sewer and stormwater drainage infrastructure and bioretention systems will likely intersect the existing indurated sand layers. This will result in the connection of the upper and lower aquifers and subsequent modification to the water table within the development envelope.

1. Conventional Gravity Sewerage Scheme

The initial design for a conventional gravity system has been based on several assumptions, including:

- Exact loading details are unknown as the exact mix of development is still being finalised however 15ET per gross hectare has been adopted (for the Airport Business Park) in consultation with Council staff;
- Existing loading details have been obtained for the Port Macquarie
 Airport and these have been used for the airport and general aviation
 lands (Airport Lands). This loading has been used to estimate a
 loading of 1 ET per gross hectare of Airport Lands;
- A minimum grading of 1% generally was adopted. It is recognised that under detailed design this could potentially be reduced however given the uncertainty of achieving 15ET/ha it was decided to be conservative for the initial design;
- A minimum invert level of RL0.0m at each pump station was adopted as the lowest IL for the gravity sewer. This equates to depths around 4-4.5m for the gravity sewer system and a pump station well depth of 5-5.5m;
- A well size and depth of 2.4m diameter with 1m control volume has been adopted to provide some flexibility with respect to possible depths of the pump stations;
- The Geotechnical Assessment prepared by RGS identified that there
 will be construction issues relating to depth of excavation, high water
 table, existence of the coffee rock and potential and actual acid
 sulphate soils. Future Development Applications will require more
 detailed geotechnical assessment to inform the final design for the
 sewerage infrastructure;
- The Geotechnical Assessment has recommended that an Acid Sulfate Soils Management Plan will be required to be prepared as part of the approval process associated with the construction of a Sewer Pump Stations and the reticulated sewerage infrastructure;
- The preparation of this Sewerage Strategy has also considered the

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

possibility of connecting Newman College to the new sewer system to provide early flows to the system. (note - this will require agreement with Newman College).

- A preliminary layout and grading which confirmed that a Conventional Sewerage System approach is achievable with the following details:
 - Two sewer pump stations. The first of these will service Stage 1
 of the Airport Business Park and provide for Newman Collage,
 the existing Airport Terminal and the existing General Aviation
 area.
 - The second pump station will service Stage 2, providing for the southern area of the Airport Business Park and the expansion to the General Aviation lands
- The Sewer Rising Main from the proposed Stage 1 Sewer Pump Station will connect to SPS23 in Hastings River Drive. It has been confirmed with Council that the scheme will need to discharge to the collecting manhole for SPS23 as there is no capacity within the existing gravity system along Hastings River Drive.
- Initial sizing for the sewer rising main has determined that a 150mm rising main will be required for the Airport Business Park. It was determined that a 100mm interim sewer rising main would service approximately 12ha or Stage 1 of the development if installed. It was determined that there was no merit in using the existing rising main from Newman Collage based on its small diameter (65mm).

2. Low Pressure Sewerage Scheme (LPSS)

A pressure sewer system consists of a series of positive displacement grinder pumps moving finely ground effluent material along a network of small diameter polyethylene pipes. Each property within the system has a below ground pump station. The waste water is delivered to the station by traditional gravity methods; this is then ground into a fine slurry and pumped under a low pressure through a network of polyethylene pipes. Due to the velocities of pressure sewer smaller pipe sizes are used and only a minimum cover over the pipeline is required and they follow the contours of the land.

LPSS's are located in areas where occupied properties use a pump to move wastewater from the dwelling to a small diameter pressure reticulation system. Wastewater then flows to a larger pumping station or gravity wastewater system. A LPSS is generally used in areas where a conventional gravity system is not a viable servicing option due to flat, wet, rocky, hilly terrain or environmentally sensitive areas.

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Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Equipment required for LPSS generally consist the following infrastructure:

- Small diameter pressure reticulation pipes these pipes are usually located in the street. Wastewater flows under pressure to a larger pumping station or gravity wastewater system.
- A sewer lateral and a boundary assembly kit every property within a pressure sewer area requires this infrastructure, which the water service authority owns and maintains.
- On-property equipment including a collection tank, pump and alarm control panel - Every property connecting to the LPSS requires this equipment.

For industrial, commercial and publicly owned property the LPSS equipment is generally owned and maintained by the property owner. This can be with a commercial agreement between the owner and water service authority if appropriate.

The Geotechnical Assessment prepared by RGS identified that there will likely be construction issues for conventional gravity sewer relating to the depth of excavation, high water table, existence of the coffee rock and potential and actual acid sulphate soils. The use of a LPSS will minimise the impact of these on the design and construction of the sewerage scheme.

It is considered feasible to have a pressure sewer main from the Airport Lands and Airport Business Park to SPS23. This would need to be confirmed during the development application and detailed development design stage.

Water Supply:

This Planning Proposal relies on the Water Supply advice provided by PMHC with respect to the future water supply reticulation for the Airport Business Park. New reticulation is expected to be supplied from the Oxley Highway ultimately linking to the existing infrastructure in Boundary Street. Preliminary reviewed densities indicate a 250mm potable watermain will be required.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

Q11. What are the views of state and Commonwealth public authorities consulted in accordance with the Gateway determination?

Should the proposal be supported, the Department of Planning and Environment's gateway determination will specify consultation requirements.

Consultation with State agencies is expected to occur with the NSW Office of Environment and Heritage, the NSW Rural Fire Service and the relevant electricity and telecommunications providers.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

PART 4 - Mapping

Proposed map amendments to PMHLEP 2011 are described in Part 2 of this Planning Proposal.

The proposed Zone plan is provided at Appendix B.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

PART 5 - Community consultation

It is proposed to undertake community consultation for 28 days including notification in a local newspaper and written notification to adjoining landowners. In addition, the exhibition material will be available on Council's website and at the Port Macquarie Administration building for the duration.

In addition to the public exhibition of the Planning Proposal, it is noted that:

- The Biodiversity Certification Assessment of the Biocertification Strategy was publicly exhibited in May to June 2016;
- The Port Macquarie Airport Master Plan 2010 has undergone community and stakeholder consultation since 2009 and the Addendum Report (October 2013) was placed on public exhibition from 4th October to 1st November 2013.

Planning Proposal Port Macquarie Airport Lands, Airport Business Park & Thrumster Area 13 URA Port Macquarie

PART 6 - Project timeline

This project timeline is based on anticipated dates and timeframes, as outlined below:

Anticipated dates		2019							
	May	June	July	August	September	October	November	December	
Commencement (date of Gateway determination)			Х						
Timeframe for the completion of required additional information				Х					
Timeframe for government agency consultation (pre and post exhibition as required by Gateway determination)				Х		Х			
Commencement and completion dates for public exhibition period					Х				
Dates for public hearing (if required)									
Timeframe for consideration of submissions						Х			
Timeframe for the consideration of a proposal post exhibition							Х		
Date of submission to the department to finalise the LEP							Х		
Date Council will make the plan (if delegated)								Х	
Date Council will forward to the department for notification.								Х	

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Appendix C – Preliminary Probity Review Report

PP2015 - 3.1 5/7/2019

ORDINARY COUNCIL 21/11/2018



Our Ref: 810160122:SA Contact: Scott Anson

Port Macquarie Hastings Council

17 Burrawan Street Port Macquarie NSW 2244

Attention: Sandra Bush (Senior Strategic Planner)

Dear Sandra,

PORT MACQUARIE AIRPORT PRECINCT INVESTIGATION AREA – SITE SELECTION FOR PROPOSED BUSINESS PARK, PRELIMINARY PLANNING PROCESS REVIEW

Cardno (NSW/ACT) Pty Ltd ABN 95 001 145 035

Unit 1 10 Denney Street Broadmeadow 2292 Australia

Phone +61 2 4965 4555 Fax +61 2 4965 4666

1 Introduction

Cardno (NSW/ACT) Pty Ltd (Cardno) has been engaged by Port Macquarie Hastings Council (Council) to prepare an independent review of the planning process undertaken by the Council, relating to the preparation of a Planning Proposal for the Port Macquarie Airport Business Park. The investigation area includes land owned by Council.

This report provides an opinion and conclusions based on the observations and work performed. The services provided and work performed were in accordance with Council's letter of engagement and cover the period from 16 March 2016 to the date of this preliminary report, 7 November 2018. This preliminary report is limited to the planning process that has been undertaken and the planning reports and recommendations presented to Council during the specified period. This report considers the relevant NSW planning legislation, processes and guidelines, together with the NSW ICAC Probity Principles. This report is not a merit review of the Council's planning for the Airport Investigation Area. A copy of Council's letter of engagement to Cardno is attached.

Cardno's planning process review team has no prior involvement with the investigation area, land owners or surrounding developments. Cardno is not aware of any conflict of interest that would preclude the Cardno planning team from undertaking this planning process review.

This preliminary planning process review was primarily conducted by Scott Anson, Technical Director – Planning, Cardno Northern NSW. Scott is a Registered Planner (#4156) and is bound by the Planning Institute of Australia (PIA) Code of Professional Conduct (https://www.planning.org.au/documents/item/6014). Scott commenced with Cardno in January 2017 and has over 23 years experience working with NSW legislation including the *Environmental Planning and Assessment Act 1979*, NSW Local Government Act 1993 and related legislation and regulations. Scott has no prior engagements working with or on behalf of Council.

Scott has been assisted by Natasha Wells, Senior Planner - Cardno Northern NSW who has over 15 years professional planning experience. Natasha has been involved in this planning process review since March 2016. Between March 2016 and October 2016 the review was conducted by Renae Gifford and Keith Blackmore. Renae and Keith ceased working at Cardno in 2016. Natasha concluded working at Cardno in 2017.

Cardno advises that Cardno engineering staff have been engaged by Council to prepare an engineering design for Boundary Road, Port Macquarie. This planning review is a separate and discrete engagement prepared by the planning team at Cardno Northern NSW. This preliminary report has been peer reviewed by the Cardno Sydney planning team located in St Leonards.

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Item 12.09 Attachment 1

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Item 13.05 Attachment 1

ORDINARY COUNCIL 21/11/2018

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2 The Planning Proposal

This engagement involves a review of the planning process followed by Council for the preparation of a planning proposal for the investigation area comprising Council and private owned land. Cardno notes that Council has a role as land owner and airport operator. Council is a planning authority under the *Environmental Planning and Assessment Act 1979*. Council is also a roads authority under the *Roads Act 1993*.

The Department of Planning and Environment's *Local Environmental Plans – A guide to preparing local environmental plans* 2016 defines a *planning proposal* as a document that explains the intended effect of the proposed Local Environmental Plan (LEP) and provides the justification for making the plan under the Environmental Planning and Assessment Act 1978, s.3.33(1) [Previously s.55(1)]. The level of detailed required in a Planning Proposal should be proportionate to the complexity of the proposed amendment. The Planning Proposal should contain enough information to identify relevant environmental, social, economic and other site specific considerations. The scope of key issues should be identified in the initial Planning Proposal that is submitted for a Gateway determination. The Gateway determination process assesses the strategic merit of the proposal. The Gateway assessment is undertaken by the Department of Planning and Environment. If the Planning Proposal proceeds, the determination may specify further investigations, public and agency consultation and timing requirements to be met prior to the plan being made. As noted, further detailed investigations may be undertaken and included in the Planning Proposal after the Gateway determination is issued. When preparing and considering a Planning Proposal Council should consider whether they will be seeking an Authorisation to make the plan under delegation or request the Department to be the Responsible Planning Authority (RPA).

3 Purpose of Independent Planning Process Review

The purpose of this preliminary review is to provide an independent assessment of Council's planning process for the Airport Business Park Planning Proposal. This review considers whether the relevant planning processes have been followed and undertaken by the Council, in particular the activities and tasks undertaken by Council's Development and Environment Division (D&E), have been conducted in an unbiased way. The objectives of the review are:

- (a) To review the planning process that has been undertaken to date in relation to the Airport Business Park investigation area
- (b) To review the draft reports to Council in relation to planning proposals for the Council and Missen properties within the Airport Business Park investigation area,
- (c) To prepare independent probity reports regarding the planning process and recommendations and any partiality or bias that may be evident as a result of the probity review,
- (d) In relation to a) to c) above, to answer the question: Has Council fulfilled its role as planning authority in a fair and unbiased manner, notwithstanding the ownership of land by Council within the Airport Business Park Investigation Area?
- (e) To make any necessary recommendations to Council as a consequence of the above review (Port Macquarie Hasting Council Consultancy Brief RFQ 16-20 February 2016).

In respect to point (b) Cardno has considered the planning processes Council has applied to all land situated within the investigation area.

3.1 Preliminary planning process review

This preliminary planning process review covers the period of Cardno's engagement from 16 March 2016 to the date of this report 7 November 2018.

Cardno has undertaken a preliminary planning process review having regard to the provisions of the:

 NSW Environmental Planning and Assessment Act 1979, primarily covered under Section 3.33 (Previously Section 55);

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- Planning Proposals A guide to preparing planning proposals 2016; and
- Local Environmental Plans A guide to preparing local environmental plans 2016

These guidelines are issued by the Department of Planning and Environment.

Cardno has also considered the provisions of the NSW Local Government Act 1993 relating to code of conduct of councillors, staff, delegates and administrators as this relates to dealings with affected land owners and the general public (refer Port Macquarie Hastings Code of Conduct and Port Macquarie Hastings Council Code of Meeting Practice). Cardno has been guided by the core principles (where applicable) contained in the NSW Independent Commission Against Corruption publication Probity and Probity Advising - Guidelines for Managing Public Projects 2005, including:

- Accountability of the participants and transparency of the process;
- Fairness, impartiality and honesty in carrying out the process;
- · Management of actual, potential and perceived conflicts of interest;
- Maintenance of confidentiality and security of documentation and information; and
- Attaining best possible value for money under the prevailing circumstances.

3.2 Work Performed

Cardno undertook the following tasks in order to form a conclusion on the tasks undertaken by Council's Development and Environment Division in relation to the planning process, land owner consultation and consideration of technical studies as part of the preparatory work for the Airport Business Park Planning Proposal. For this preliminary report a sampling approach targeting key issues and/or process milestones was adopted. The relevant records are identified below.

3.2.1 Inception meeting, site inspection and background information

Cardno's Senior Planner Keith Blackmore attended the inception meeting and site inspection with Council's Development and Environment. For the period prior to Cardno's engagement in 16 March 2016, Cardno has relied on the provision of records comprising documents, reports, studies and minutes provided by Council.

3.2.2 Records Management

In respect to the confidentiality of sensitive information and internal file security arrangements, Council's Team Leader Information and Data has attested that only Strategic Land Use Planning staff have permissions to access the relevant Council Planning Proposal file(s). Council's Electronic Document Management System (HP TRIM) came into effect at Council in July 2012. Cardno has requested and received a summary of access controls applied to relevant Council planning proposal files within the Port Macquarie-Hastings Council's HP TRIM systems. On 20 September 2017 Council's Records Manager Team Leader confirmed that "no access has been provided to the Commercial Business Services group (of which airport staff are a subset) belonging to the Corporate Performance Division". The relevant records include:

- DD032.2015.00000003.001 PP2015 3.1 PMQ Airport Precinct rezoning PMHC land 54723
- DD032.2015.00000003.004 PP2015 3.4 PMQ Airport Precinct Expansion Impact Assessment 2491
- DD032.2015.00000003.005 PP2015 3.5 PMQ Airport Precinct Probity Review 2491

3.2.3 Biocertification issues

Cardno has identified and sighted Council meeting minutes relating to items considering the Biocertification matter. Cardno notes that CIrs Besseling and Cusato declared interests on 16 December 2015, 10 August 2016 and 19 October 2016. The other record identified by Cardno involves the initial consideration by Council of *Tender T-14-09 for the Biodiversity Certification Assessment and Strategy, Port Macquarie Airport* to select the consultant to undertake this work. Cardno notes that this item and resolution involved a Council administrative process and allocation of Council funds only. CIr Besseling participated in the meeting and Cr Cusalo was an apology. At time of writing this preliminary report, Cardno notes that Cr Besseling is no longer a Councillor at Port Macquarie Hastings Council.

Cardno has sighted the Council's bio-certification documentation submitted to the NSW Minister for the Environment. This documentation includes two (2) public submissions from Mr John Jeaves and Lewis Land Group for Sovereign Hill Project/GEM Planning. These submissions foreshadow potential probity issues concerning Council as a planning authority and as a land owner. Cardno contacted Mr Jeaves on 21 September 2016 confirming Cardno was undertaking an independent review of the Planning Proposal process undertaken by Council.

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The opportunity to scrutinise these specific issues and concerns and the overall merit of the Planning Proposal will be during the public consultation phase following Gateway determination. The Department of Planning and Environment determines if the planning proposal can proceed to community and agency consultation.

Cardno notes that the planning proposal for the Airport Business Park relies on approval of the bio-certification package by the Minister for the Environment. Cardno notes that conflicts of interest were declared and recorded for this item in the Council meeting minutes on 10 June 2016.

The Minister for the Environment is solely responsible for approving or refusing the bio-certification package submitted by Council. Cardno has sighted:

- The Office of Environment and Heritage (OEH) written advice to Council dated 17 August 2018
- Executed Biocertification documents signed in Port Macquarie and dated 3 September 2018
- Extract from NSW Government Gazette No 87 and Order dated 7 September 2018 pp 5856-5865 giving effect to the Biocertification arrangements
- Council Report Port Macquarie Airport and surrounding lands Biodiversity Conservation Agreement and Minutes dated 19 September 2018

Cardno notes that is was open to Mr Jeayes, Lewis Land Group and any other stakeholder to make representations direct to the Minister for the Environment on the biocertification matter.

3.2.4 Review planning criteria

Council's D&E provided draft planning criteria on 18 October 2016. Cardno notes that planning criteria were prepared in advance by Council's D&E in the event that the extent of the area to be rezoned needs to be limited in size or staged over time.

Cardno's response dated 3 November 2016 concluded that the Draft Planning Criteria are generally in line with the adopted Urban Growth Management Strategy. Cardno notes from a probity perspective that the criteria is not land owner centric and is generally consistent with adopted reports and strategies from 2007 to present, including the Industrial Lands Strategy, Urban Growth Management Strategy, Midcoast Regional Strategy and North Coast Regional Strategy.

3.2.5 Review meetings

Port Macquarie Airport Business Park – Planning Update Councillor Briefing by Peter Cameron/Duncan Clarke on 30 November 2016

Cardno was not present at the Councillor briefing on 30 November 2016. Council's Group Manager Strategic Land Use Planning verbally advised Cardno that Council staff representatives for the Port Macquarie Airport business enterprise left the room and were not present for the duration of the briefing. Cardno notes that this advice is consistent with Port Macquarie Hastings Council Meeting Code of Practice, Section 8.11.2, relating to matters involving a Council business enterprise.

Cardno has sighted the briefing material provided to Councillors on 30 November 2016. Cardno notes:

- Indicative area identified for potential rezoning illustrates different options covering part private owners and part Council land.
- > Presentation references Department of Planning advice circa November 2007 outlining key issues to be addressed in a planning proposal
- > Next steps includes D&E meeting with all affected landowners; and
- > Future report to Council on planning proposal noting proposal is subject to bio-certification package.

3.2.5.1 Landowner meetings with Council Development & Environment Division

Cardno observed meetings between Council's D&E and land owners conducted on 24 March 2017. This review included sighting the meeting agenda (including meeting purpose) prior to release to landowners. Cardno has sighted meeting minutes issued to participants.

The first meeting involved Council's D&E and representatives of the Port Macquarie Airport (Corporate and Organisational Services [COS] Division as per Port Macquarie Hastings Council organisation structure pre 1 May 2017). The second meeting involved Council's D&E and representatives of the private land owners

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adjoining the airport. Land owner Missen represented by consultant Land Dynamics. Land owners Gilson and Ireland were invited but did not attend.

In the interests of transparency, Cardno directly advised land owners that Cardno is engaged by Council for the engineering design of Boundary Road. This engineering design work is separate to this planning process review and involves different Cardno staff.

Cardno observed that the D&E acted consistently with the meetings terms of reference. No conflicts of interest were raised by each participant at each meeting. Cardno notes that affected land owners had an opportunity to read the key project information and preliminary findings of technical reports and make submissions to D&E. An extension of time was granted to all land owners to make a submission to D&E. Cardno sighted letters submitted by Port Macquarie Airport (COS) and Missen.

No issues where raised by the land owners with Cardno concerning the conduct of the meeting by Council's D&E or the contents of the record of meeting.

3.2.6 Land Economics Assessment

Cardno has reviewed the reports prepared by Hill PDA in 2010, 2016 and supplementary advice provided to Council's D&E Division in 2017 in response to a peer review by Gillespie Economics. Cardno notes the quantum of land identified for rezoning within the Airport Business Park investigation area has been reviewed and increased from around 10 hectares initially to 20 hectares in the current report.

In response to a clarification raised by a landowner concerning amount of land that could be supported to be rezoned on economic impact grounds, Council's D&E circulated the consultant brief to all adjoining landowners in attendance for their information. Cardno observes that the brief outlines study objectives, provides background information and invites the consideration and analysis of different options consistent with sound land economic planning practice. Cardno notes that Council's D&E Division has sought clarification and advice from Hill PDA over an extended timeframe in response to issues raised by the Department of Planning and Environment. The merits and economic justification will be considered as part of the Gateway determination and assessment of the planning proposal by the Department of Planning and Environment.

3.2.7 Council Restructure

Cardno notes the Council organisational restructure combining strategic planning and asset functions within the same Division effective from 1 May 2017. Council's Group Manager Strategic Land Use Planning confirmed in an email dated 29 May 2017 that the Strategic Land Use Planning team will continue to report to the Director Development & Environment on all matters relating to the Airport Business Park planning proposal for the duration of the process.

3.2.8 Road network capacity

A key issue identified early in the Planning Proposal process involved the capacity of the existing local road network. Cardno notes that Council's traffic unit initially identified information deficiencies in the traffic study. Council's traffic unit has recommended that the area to be rezoned is limited in size to reflect the existing traffic capacity. Cardno has reviewed and observed numerous exchanges on the merits of the Planning Proposal on traffic management grounds during the period 16 March 2016 to 7 November 2018. Cardno notes that Council's traffic unit has maintained a consistent position throughout the planning process and this is reflected in a maximum gross developable area of 20.5 ha reflected in the current Council report which aligns with Council's traffic unit's assessment of road infrastructure capacities.

3.2.9 Landowner information request

Council's D&E sought clarification from Cardno on 10 April 2017 concerning a request from Council's airport land owner and operator dated 6 April 2017. The request was to obtain internal Council traffic modelling (SIDRA) information supporting a recommendation to limit the area able to be rezoned based on existing traffic capacity.

The purpose of the land owner request was to enable a peer review of the internal traffic modelling to be conducted. Cardno's response considered internal email communications provided by Council's D&E between 6 April to 10 April 2017. Cardno advised that usual practice is to not release information of this nature, unless Council is compelled to do so, as part of legal proceedings or the *Government Information Public Access Act* (GIPA) *Act 2009*.

Cardno notes that Council's D&E declined to release the requested information and the landowner subsequently obtained an independent peer review of the original traffic report. Cardno also notes that

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Council's traffic unit continues to maintain a limit on the area able to be rezoned based on existing available local road network traffic capacity.

3.2.10 Preliminary Report

This preliminary report considers whether there are any issues of concern in the process leading up to and including the report to Council. This report considers the inception meeting, planning criteria and key interactions and meetings with landowners outlined above. Council provided a draft Council report on 18 August 2017. Cardno and Council's D&E conducted a telephone conference on 25 August 2017 to discuss the report and identify any issues requiring further clarification. On 7 September 2017 Cardno provided a written response to Council's D&E on the draft Council report. Following Biocertification approval being granted by the Minister for the Environment, Council's D&E provided a revised draft Council report to Cardno on 28 September 2018. Council D&E staff provided an information briefing to Councillors on 24 October 2018. Cardno was not present at that briefing. Council's D&E provided an email to Cardno including the presentation provided to Councillors. Cardno is advised that no conflicts of interest were declared by Councillors or Council D&E staff present at the Councillor information briefing on 24 October 2018. Council's D&E provided a further revised draft report to Cardno on 26 October 2018. The revised Council report is proposed for the 21 November 2018 Council meeting. The current Council report proposes:

- · a revised target date for a report back to Council on a planning proposal (now February 2019)
- additional text at the end of the Executive Summary to confirm/clarify the proposed net increase in B7 Business Park zone
- · a summary of the Preliminary Probity Review key conclusions; and
- Advising land owners within the Airport Precinct Investigation Area of the Council decision

3.2.11 Final Report

The final planning process review report will address whether there are any issues of concern in the exhibition and review process and the final recommendations submitted to Council. The preparation of the final report will consider the requirements and timeframes contained in the Gateway determination issued by the Department of Planning and Environment. The final report will primarily focus on the public exhibition process and Council's response to public submissions.

4 Conclusion – Preliminary Planning Process Review

Cardno have carried out an independent review of Council's management and execution of the planning process for the subject project based on the requirements of:

- NSW Environmental Planning and Assessment Act 1979, primarily covered under Section 3.33 (Previously Section 55);
- Planning Proposals A guide to preparing planning proposals Department of Planning and Environment 2016;
- Local Environmental Plans A guide to preparing local environmental plans Department of Planning and Environment 2016; and
- the NSW Independent Commission Against Corruption publication Probity and Probity Advising -Guidelines for Managing Public Projects 2005

Cardno has not observed or detected evidence of partiality, bias or probity issues of concern in the planning process leading up to the Airport Precinct Investigation Area – Site selection for proposed Business Park report provided to Cardno on 28 September 2018 and settled by Council's D&E on 7 November 2018.

Cardno is satisfied that the planning processes and associated tasks are consistent with the principles and review protocol described in the terms of engagement and outlined in this preliminary report.

No significant issues or unresolved concerns of a probity nature were raised by land owners with Cardno during the period 16 March 2016 to 7 November 2018.

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Cardno has based this conclusion upon the activities described in the Work Performed section above and undertaken between 16 March 2017, the date of engagement and the date of this preliminary report, 7 November 2018.

Cardno is satisfied that Council has satisfactorily responded to initial issues and points of clarifications raised by Cardno in respect to *Airport Precinct Investigation Area – Site selection for proposed Business Park prepared* by Port Macquarie Hastings Council Development & Environment. Cardno makes the following observations:

4.1 General

The purpose of this initial review is to test general understanding and consider the report in the context of general land use planning practice. This review is limited to clarifications only. This review is not a review of the planning merits and does not provide planning advice to the Council.

4.2 Biocertification

Cardno notes that the NSW Minister for the Environment granted biocertification approval for the Airport and Thrumpster lands which took effect on 7 September 2018 pursuant to an Order published in the NSW Government Gazette No 87. Cardno also notes the protracted timeframes associated with the biocertification statutory process leading up to a decision.

4.3 Technical Reports

Cardno has sighted the brief provided by Council to Hill PDA and notes that the brief has been previously circulated to adjoining land owners for information. Cardno notes that land owners have had the opportunity to review the Hill PDA report. Cardno notes that land owners Missen (represented by Land Dynamics), Gilson, Ireland and Port Macquarie Airport (represented by King & Campbell) were provided with the opportunity to review other documents. These documents included the traffic review summary prepared by Council's Transport and Stormwater Network (T&SN) Section study and the planning criteria prepared by Council's Strategic Land Use Planning section as part of the 24 March 2017 land owner meeting agenda

4.4 Quantum of land proposed to be rezoned

Cardno notes that Council D&E has settled on an area of 20.5ha as the recommended area to be rezoned. Council D&E have advised this is based on the capacity of the road network having regard to the report and land economic advice provided to Council's D&E unit prepared by Hill PDA.

4.5 Urban Growth Management Strategy 2011

Council has confirmed that the Urban Growth Management Strategy (UGMS) circa 2011 is the current reference document. Cardno notes that UGMS 2017-2036 was adopted by Council on 20 June 2018 and is pending endorsement by NSW Department of Planning and Environment.

4.6 Relevant Planning Authority

The Council planning proposal report should clearly identify the relevant Planning Authority overseeing this planning proposal.

Cardno notes that the Planning Proposal will be subject to further oversight by the NSW Department of Planning and Environment as part of Gateway determination process under the provisions of the *Environmental Planning and Assessment Act 1979.* The requirements of the Gateway determination process, including public exhibition, will be the focus of the final planning process review report. The following recommendations are presented for Council's consideration.

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5 Recommendations

That Council:

- Note Port Macquarie Airport Precinct Investigation Area Site selection for proposed Business Park, Preliminary Planning Process Review Report prepared by Cardno (NSW/ACT) dated 7 November 2018:
- Demonstrate adequate information has been prepared to proceed to Gateway determination. This is to include a preliminary planning proposal summary statement, generally consistent with the Department of Planning's planning proposal information checklist (DPE 2016) outlining:
 - a. Objectives and intended outcome
 - b. Mapping (including current and proposed zones)
 - c. Community consultation to be undertaken (including agencies to be consulted)
 - d. Explanation of planning provisions
 - Justification and the process for implementation (including compliance assessment against relevant Section 9.1 (Previously Section 117 direction/s);
- Voluntarily include a draft Statement of Council Interest to accompany public exhibition as part of
 planning proposal Gateway determination consistent with Best Practice Guidelines LEP's and
 Council Land 1997 (Note: This guideline, although dated and not mandatory, is still considered a
 common industry reference);
- 4. Subject to the planning proposal proceeding to public exhibition (post Gateway determination), Council's D&E write to Mr John Jeayes, Lewis Land Group for Sovereign Hills Project (represented by GEM Planning), Land owner Missen (represented by Urban Dynamics) and any other potentially effected land owners and stakeholders, alerting them and inviting them to make a submission on the Planning Proposal as part of the public exhibition process. This will ensure that any actual or perceived overlapping and/or outstanding issues can be considered and addressed prior to the Local Environmental Plan being made, notified and published on the NSW legislation website (www.legislation.nsw.gov.au).; and
- Maintain separate internal reporting on this matter via the Director Development & Environment for the duration of the Planning Proposal process.

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If Council has any questions concerning the content of this preliminary report, please do not hesitate to contact Scott Anson, Technical Director – Planning on 02 4940 5517 or email scott.anson@cardno.com.au

Yours sincerely,

Scott Anson

Technical Director

for Cardno

Direct Line: +61 2 4940 5517

Email: scott.anson@cardno.com.au

Enc:

1. NSW ICAC Probity Principles

Council brief dated February 2016

cc: Deb Sutherland, Principal & Senior Town Planning Specialist, Cardno Sydney (St Leonards)

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NSW ICAC Probity Principles

Accountability of the participants and transparency of the process

Accountability and Transparency are related concepts. Accountability involves agencies being able to justify the use of public resources to an appropriate authority by allocating and taking responsibility for past and expected performance. This includes aligning the decision-making process with the appropriate delegated authority, and keeping adequate records that will leave an auditable trail. Transparency refers to the preparedness to open a project and its processes to scrutiny and possible criticism. This also involves providing reasons for all decisions that are taken and the provision of appropriate information to relevant stakeholders.

Fairness, impartiality and honesty

Individuals and organisations involved in preparing and submitting proposals are entitled to expect impartial treatment at every stage of the process. If they do not consider the process to be fair, impartial and honest they may withhold valuable ideas or be deterred from bidding in the future. Any form of bias, whether driven by personal interests or not, could jeopardise the integrity of the project. Procedures that include multiple person panels, independent members and observers mitigate this risk.

Management of Conflicts of Interest

A conflict of interest is a conflict between the public duty and private interests of a public official where the public official has private interests which could improperly influence their official duties and responsibilities. The community and potential tenderers have a right to expect that public officials will make decisions that are not influenced by private interests. Similarly, when the private sector is engaged to perform public sector duties, there is an obligation to ensure that conflicts of interest are disclosed and effectively managed. Perceived or potential conflicts of interest can be as damaging as actual conflicts, and procedures should be implemented to mitigate the effect.

Maintenance of confidentiality and ensuring security

Although accountability and transparency are fundamental to the work of public sector organisations and public officials, there is some information that needs to be kept confidential, at least for a specified period of time, in order to protect the integrity of the process and give tenderers the confidence to do business with government. This information can include the content of proposals, intellectual property and tenderers' pricing and profit structures. Importantly, much of the information relating to the project needs to be kept confidential up to the point where a contract is executed with the successful tenderer. However, once this has happened, government guidelines require that certain information be released, consistent with the fundamental principles of public sector accountability and transparency, as discussed above. Procedures must be implemented to ensure that no unauthorised release of confidential information occurs.

Attaining value for money

This is demonstrated by the use of an open competitive environment in which the market is tested regularly, and tenderers can make attractive, innovative proposals with the confidence that they will be assessed on their merits. Value-for-Money is not necessarily achieved by accepting the lowest available price. The process should include: the evaluation of non-price criteria (such as the quality of the goods or services offered, the experience and past performance of the providers, the financial strength of the companies, the differing risk factors, the quality of the personnel, etc.); cost-benefit analysis against a target outcome or budget; the assessment of the total cost over the proposed life of the project; and, where appropriate, whether the outcome is best achieved by the Private Sector, using a Public Sector Comparator. Lapses in probity may lead to one or more parties obtaining unreasonable financial gains at the expense of the public interest.

Procedures should include a comparison of the non-price and price criteria on a weighted basis, with both the criteria and the weighting between price and non-price criteria declared in the Information Memorandum.

NSW Independent Commission Against Corruption, Probity and Probity Advising - Guidelines for Managing Public Projects 2005

http://ict-industry-reports.com.au/wp-content/uploads/sites/4/2013/10/2005-Guidelines-for-Probity-in-Public-Sector-Projects-ICAC-Nov-2005.pdf

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2. Council brief dated February 2016

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CONSULTANCY BRIEF

RFQ-16-20 Airport Business Park Planning Proposal Probity Review

Proposals due by 4 March 2016

Addressed to:

The General Manager
Port Macquarie-Hastings Council
PO Box 84
PORT MACQUARIE NSW 2444

Council's ref: PP2015 - 3.1 PP2015 - 3.2

Enquiries: Peter Cameron

T: 02 6581 8110

E: peter.cameron@pmhc.nsw.gov.au

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1. INTRODUCTION / BACKGROUND

The Port Macquarie Airport is owned and operated by Port Macquarie-Hastings Council. The existing operations include a small number of airport related

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businesses in a B7 Business Park zone, which adjoins the Airport fronting Boundary Street. The Airport and business operations are managed by Council's Corporate and Organisational Services Division (COS).

In 2007, Council commissioned the preparation of an Industrial Land Strategy for the Port Macquarie-Hastings local government area by AEC Group. The Strategy identified the need for a "large dedicated site close to the urban area of Port Macquarie to accommodate future local services growth, accommodate any transferred demand from the rezoning of industrial areas to commercial, and to accommodate emerging business technology park style development".

An investigation area was identified by AEC Group for the Airport to expand on the existing business zone. The investigation area, which is shown in Figure 1 below, includes land owned by Council and other parties adjoining Boundary Street. The Council owned land includes the former east west grass runway of the Port Macquarie Airport, which is no longer required for airport operations.

The investigation area was subsequently included in the Mid North Coast Regional Strategy (2009) and in the Port Macquarie-Hastings Urban Growth Management Strategy (UGMS) in 2011. The UGMS identifies the key issues to be addressed during investigations and proposes the preparation of a structure plan for the investigation area.

Investigations had been undertaken by Council's Development & Environment Division (D_8E) towards preparation of a Structure Plan, in consultation with the affected landowners. The investigations included an ecological report by Biolink Pty Ltd and internal consultation with Council infrastructure managers.

A Discussion Paper was prepared in 2012 by $D_{\alpha}E$, which provided a summary of the key planning issues and identified a number of issues requiring more detailed investigation. Preliminary geotechnical investigations were undertaken for part of the investigation area in 2013 to determine likely landfill requirements. This related to the flood prone parts of the Investigation area, and particularly to the land owned by Missen.

In 2014, investigations were put on hold pending a review of the Port Macquarie Airport Master Plan and further investigation into a north south link road. The Airport Master Plan relates principally to Airport operations such as new CASA Obstacle Limitations Surface (OLS) requirements.

In May 2015, landowners in the investigation area were asked whether they wished to proceed with the preparation of a planning proposal for their land. Two parties (COS and Missen) expressed an interest and indicated that they would commence more detailed investigations.

King & Campbell Pty Ltd has been engaged by COS to coordinate investigations into the proposed Business Park expansion. Detailed investigations have included the preparation of a Biocertification Assessment for the Council owned land surrounding the Airport and nearby at Thrumster, with the aim of providing satisfactory offsets for the loss of vegetation associated with Airport operations (OLS requirements) and the proposed business park expansion.

The draft Biocertification Assessment was reported to Council in December 2015 and has been lodged with the NSW Office of Environment and Heritage prior to proposed public exhibition. The Biocertification does not depend on any zone changes but does allow for expansion of the Airport Business Park, should this be the outcome of Council's planning investigations.

Traffic modelling has been undertaken by TPS Group for COS as well as water, sewer and stormwater concepts, geotechnical assessment and an Aboriginal

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Heritage assessment, to form the basis for a planning proposal

Land Dynamics has been engaged to coordinate more detailed investigations for the Missen property. A seven part test in relation to the Wallum Froglet has been prepared by Naturecall and submitted by Land Dynamics for Council review. Council's D&E Division met with Land Dynamics in February 2016 in relation to the preparation of a planning proposal for the Missen property.

Reports in relation to planning proposals for the Council land and Missen land are expected to be presented to Council in 2016, following review of ongoing investigations. Council's $D_{a}E$ Division will be responsible for the preparation of the planning proposals for the Airport Business Park Investigation Area.

Council has a role as Airport operator, landowner and planning authority in this matter. Given the potential for perceived conflict of interest, it is proposed that Council engage a suitably qualified professional to prepare a probity report.

The purpose of this brief is to describe the proposed probity report, which will focus on the process that has been undertaken and the planning recommendations to Council.

2. STUDY OBJECTIVES

- To review the planning process that has been undertaken to date in relation to the Airport Business Park investigation area
- To review the draft reports to Council in relation to planning proposals for the Council and Missen properties within the Airport Business Park investigation area,
- To prepare independent probity reports regarding the planning process and recommendations and any partiality or bias that may be evident as a result of the probity review,
- d) In relation to a) to c) above, to answer the question: Has Council fulfilled its role as planning authority in a fair and unbiased manner, notwithstanding the ownership of land by Council within the Airport Business Park Investigation Area?
- To make any necessary recommendations to Council as a consequence of the above review.

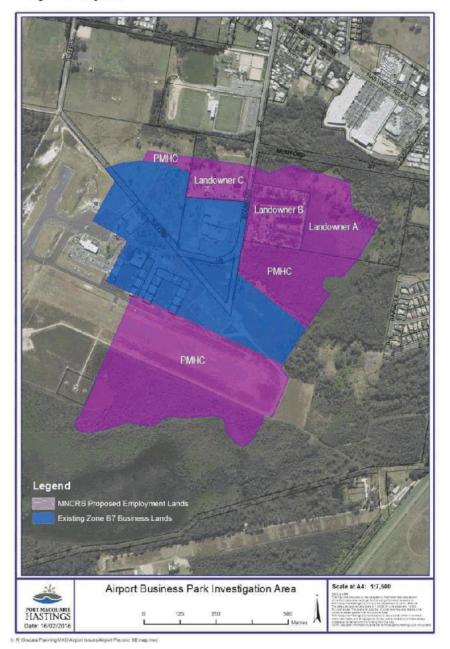
3. STUDY SITE

The Airport Business Park Investigation Area is shown in Figure 1 below.

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Figure 1: Study Site



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4. SCOPE OF WORK

- a) Inception meeting: An initial site visit and inception meeting with Council's D_&E Division will be held to familiarise the successful consultant with the study area and to provide relevant historical documentation for review by the consultant.
- b) Review planning criteria: Council's D₈E Division will produce draft planning criteria to prioritise areas for rezoning in the event that the extent of development needs to limited or where development needs to be staged or sequenced. It is proposed that the successful consultant will provide an independent review of these draft planning criteria.
- c) Review meetings: It is not expected that the consultant will need to meet with all parties in undertaking the probity review. However, it is possible that an issue may be raised and that the probity consultant may need to take part in a meeting or meetings to address the issue in the probity reports. Where meetings are necessary, they will be organised by the Project Manager.
- d) Preliminary report: A preliminary probity report will be prepared by the successful consultant for inclusion in a report to Council regarding the proposed preparation of planning proposals for the Airport Business Park investigation area. The preliminary probity report will address whether there are any probity issues of concern in the process leading up to and including the report to Council at that time.
- e) Final report: A final probity report will be prepared by the successful consultant for inclusion in a report to Council following exhibition and review of planning proposals for the Airport Business Park investigation area. The final probity report will address whether there are any probity issues of concern in the exhibition and review process and in relation to the final recommendations to Council.

Note: The probity reports are intended to focus on any relevant probity issues and not on the merit of Council's planning for the Airport Investigation Area. For example, it is not intended that the consultant provide a critique of proposed stormwater management systems, even if the consultant believes that the proposed system is not the best approach. However, if there is asignificant difference in the standards applied by Council in relation to its own land, then this is potential probity issue for inclusion in the consultant's reports.

It is intended that any planning proposal for Council land will clearly and transparently describe Council's position as landowner in accordance with the Department of Planning & Environment Best Practice Guideline (1997) LEPs and Council Land.

5. ADDITIONAL INFORMATION

Council will provide all relevant planning documents, which may be required as background information for the peer review.

All data supplied by Council remains subject to copyright vested in Council or the data supplier who has licensed use of the data to Council. At the completion of the project, no digital copies of the data supplied by Council are to be retained by the consultant.

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Council will provide authority to enter land, under the *Environmental Planning* and Assessment Act 1979, where necessary for the purposes of this project. The consultant is to comply with Council's Policy, Procedure and written instructions before entering private property for the purposes of gathering information and survey.

6. ADMINISTRATION AND REPORTING

6.1 Administration

The Project Manager is Council's Group Manager Strategic Land Use Planning, Peter Cameron, telephone (02) 65818110, email peter.cameron@pmhc.nsw.gov.au

The Project Director is Council's Director Development and Environment, Matt Rogers, telephone (02) 65818626, matt.rogers@pmhc.nsw.gov.au

6.2 Timing

Proposals are to be submitted to Council by 5pm on 4 March 2016. It is expected that the successful consultant will be notified by 14 March 2016.

It is not possible to predict the timing of the reports to Council as this depends in part on the submission of information by or on behalf of the landowners in the Airport Business Park Investigation Area.

At the time of preparation of this brief it is expected that the preliminary probity report may be required by the end of April 2016 in conjunction with the preparation of a report to Council's ordinary meeting on 18 May 2016.

It is anticipated that the final probity report from the successful consultant may be required for inclusion with a report to Council's ordinary meeting on 20 July 2016.

Council's Project manager will ensure that the successful consult is kept up to date regarding the planning process and any changes to the above timeframes.

6.3 Reports - written

The consultant is required to forward to Council:

- a digital copy of the preliminary report,
- a digital copy of the final report

preferably in an A4 format.

6.4 Reports - mapping

Council's D&E Division will assist with the preparation of any necessary mapping, should the need arise for any mapping associated with the consultant's report.

The mapping is to be included in the digital reports described in 6.3 above.

7. CONSULTANCY PROPOSAL

The proposal to undertake this Study is to include:

- Outline of the consultant's understanding of Council's requirements for this project.
- 2. Description of the approach to the project including methodology

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- 3. Outline of a project plan, covering timetable and milestones,
- Curriculum Vitae of the consultancy team who will be directly involved in this project, and details of similar work undertaken recently.
- 5. Consultancy fee, including:
 - a. the basis for charges and costs separately identified and estimated; any uncertainty regarding attendance at meetings can be addressed by including a proposed additional lump sum fee for attendance at meetings, including any associated disbursements.
 - b. the total cost for the project as a lump sum, including GST;
- 6. Details of insurance cover;
- ABN number and confirmation that the consultant is registered to collect GST

8. CONSULTANT SELECTION CRITERIA

The criteria for the selection of the consultant are:

- 1. The independence of the consultant.
- The quality and depth of the consultant's demonstrated experience in the field, as relevant to the project.
- 3. The proposed approach, methodology and deliverables.
- The consultant's capability and capacity to deliver quality outputs in accordance with the project objectives.
- 5. The project timetable
- 6. Consultancy costs and value for money.

9. CONDITIONS OF ENGAGEMENT

9.1 General Conditions of Engagement

The tasks as identified in the brief are based on Council's assessment of the project. The consultant may suggest any amendments required to achieve the project objectives during the course of the work.

Council must first endorse any proposed departure from the agreed project tasks before proceeding.

9.2 Termination

The consultants' commission to carry out the Study may be subject to termination due to non-performance or inability to meet set deadlines. Letter of such termination, which will be final and not subject to further correspondence, will inform the consultant.

9.3 Insurance

Certificates of currency from all parties undertaking the work (including sub consultants) for

- · Workers Compensation Insurance (where applicable)
- Motor Vehicle Insurance
- · Public Liability Insurances
- · Professional Indemnity Insurance

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shall be submitted to Council within one week of Council's letter commissioning the consultant to undertake the work, and in any case before commencement of the work.

Public Liability Insurance shall note the interest of Council. The Principal Consultant shall ensure that any sub consultants or other persons engaged by the Principal Consultant to assist in the study carry insurances listed above and on request shall provide certificates of currency to Council.

Where, in the carrying out of the work, access to private property is required, the consultant shall indemnify Council and the owner of the private property against claims by third parties for personal injury or property damage to the extent that the injury or damage is caused by the negligent act or omission of the Consultant its employees or its sub consultants. Such indemnity shall accompany the certificates of currency.

9.4 Confidentiality

Investigations and reports will remain confidential unless, or until released by Port Macquarie-Hastings Council.

Where any matter within the report relates to private property, the consultant shall provide, when requested by a landowner, a copy of the specific information relating only to the particular private property to the landowner and advise Council of any such provision.

Where as a result of carrying out the study, the consultant, or any subconsultant, obtains information regarding any matter not related to the study, the information shall not be used or disseminated elsewhere.

9.5 Ownership and Copyright

Ownership and copyright at all times shall be vested in the Council and any distribution whether for money or otherwise of the project should only be with the authority of the Council. Details of the content and progress of the project shall be confidential and shall not be made available to any third party without the authority of Council.

Council will have complete ownership of the content of the studies and plans and the reproduction and/or distribution of these documents in part or full, is prohibited without Council permission.

Council may permit the consultant to utilise information gained in the course of the project for the purpose of conference or educational papers or other publications provided that these are appropriately acknowledged and that confidentiality is respected.

9.6 Conflict of Interest

The consultant shall inform Council immediately of any matter connected with this project, which could give rise to an actual or potential conflict of interest. This information will be treated as confidential.

9.7 Certification

All final documents prepared by the consultant must be signed by the Project Director nominated in the consulting proposal to certify that they have been prepared by competent professional staff, checked for accuracy and comply with relevant regulations and the requirements of the Brief.

9.8 Corrections

Any error, ambiguity or deficiency, which becomes apparent during the

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course of the project, shall be referred to the consultant for correction or clarification. The consultant shall not be entitled to an additional fee where the correction or clarification arises from a fault of the consultant.

The content of the report is the responsibility of the consultant and may not be amended without the agreement of the consultant.

9.9 Payment and Costs

Upon submission of the draft report, the consultant may lodge a claim for payment for 50% of the total agreed cost, with a further claim for payment totalling 90% of the total agreed cost, being lodged with submission of the final reports. The Council shall not be obligated to make any payment unless it is satisfied that the work satisfies the requirements of the brief.

Council will retain 10% of the total consultancy fee, until acceptance of the final report and a final claim on completion of the whole of the project, as set out in the Scope of Work.

The consultant shall be responsible for all his/her own costs for travel, accommodation and any other expenses.

Council's preference is to do business with consultants who have an Australian Business Number. If the consultant cannot quote an ABN, withholding tax will be deducted.

Council will pay GST in addition to the agreed fees where the consultant supplies an ABN and confirms they are registered for the GST.

9.10 Business Ethics

Council's Statement of Business Ethics is at **Appendix 1**. The Statement outlines the ethical standards of behaviour that Council expects from Council staff, plus all suppliers, contractors and consultants and gives instruction to both Council staff and consultants on how to report any breaches of this Statement of Business Ethics. The consultant will be required to sign a declaration that states that they have read and understand the content and meaning of the Statement of Business Ethics prior to commencement.

9.11 Acceptance of Conditions

Written confirmation of acceptance of the commission for the project, in accordance with the conditions of engagement, is required before work commences.

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 ${\bf 10. Appendix\ 1-Statement\ of\ Business\ Ethics}$

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VP45209 suppliers statement of business ethics & declaration - sept 2006.doc



Statement of Business Ethics

Purpose of this document

This Statement of Business Ethics is intended to provide a clear understanding of mutual obligation. It helps set the ethical ground rules for all business dealings between Port Macquarie-Hastings Council and Suppliers. It applies to all Suppliers. Suppliers are deemed as providers of goods and services and include wholesalers, tenderers, contractors and consultants.

The Statement of Business Ethics defines Council's ethical standards and establishes Council's expectation that all Suppliers will meet these standards. It also provides businesses dealing with Council with a degree of understanding of what to expect in such dealings.

This Statement aligns to Council's core values, primarily through the value of 'Openness and Accountability'. In keeping with this value, Council will endeavour to behave with integrity, transparency and fairness at all times.

This Statement of Business Ethics also explains what the consequences are for Staff, Councillors and Suppliers of not complying with the requirements of this statement.

What is the impact of Business Ethics?

ICAC Advice

It should be noted that the Independent Commission Against Corruption (ICAC) in NSW defines those people employed by Council as consultants or contractors to be "public officials". When employed by Council, consultants & contractors are subject to the jurisdiction of ICAC and are considered to be "public officials" for the purpose of the ICAC act.

In addition, any individual can be found corrupt by the ICAC (even if they are not a public official) if they try to improperly influence a public official or Council's honest or impartial exercise of its official functions.

Further information relating to the ICAC Act is readily available to all Suppliers (including Suppliers, contractors and consultants) at the ICAC web site – www.icac.nsw.gov.au and copies of all relevant Council policies are also available at any time.

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VP45209 suppliers statement of business ethics & declaration - sept 2006.doc

Impact for Suppliers

By aligning business practices with Council's ethical expectations, Suppliers can expect to:

- · Compete for business on an even playing field
- Establish practices, which put them in good stead in competing for works with other public sector agencies.

If Suppliers to Council do not comply with this statement, then the consequences may be as follows:

- · Formal investigation for corruption or other offences
- Possible loss of work
- Termination of contracts
- Damage to reputation
- Loss of rights (such as loss of operating or trade licences etc).

Impact for Council Staff

If Council Staff do not comply with this statement, then the consequences may be as follows:

- · Formal investigation
- Disciplinary action
- Dismissal
- · Potential criminal charges.

How to Comply

Suppliers

General requirement

Council requires all those with whom it deals in the provision of goods and services to observe the following principles:

- · Act fairly, ethically and honestly in all dealings with Council
- · Not to disclose confidential Council information
- Not to exert pressure nor influence on Council Staff that may cause them to waiver from Council's Code of Conduct
- To abide by relevant legislative processes and industry codes of practice in all procurement dealings
- To have respect for the obligation of Council Staff to act in accordance with this Statement of Business Ethics
- Commit to not offer Council Staff inducements or incentives such as money, gifts, benefits, entertainment or employment opportunities
- Ensure that all sub-contractors and other people employed by the supplier are aware
 of this statement and the consequences of breaching it.

Communication requirement

As a general principle, all communication with Suppliers to Council should be *clear, direct* & accountable. Suppliers also have an obligation to ensure that their communication with Council abides by the above three principles, in order to minimise the risk of inappropriate influences being brought to bear on the business relationship.

There will be times where some communication needs to be strictly confidential for commercial-in-confidence or other reasons. This however should not preclude proper accountability and both parties should be able to explain the reasons for instituting specific communication protocols or keeping some communication confidential.

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Public perception of inappropriate influence can be extremely damaging to the reputation of both parties, even if nothing has occurred. Therefore it is in the best interests of both parties to ensure that formal communication processes are observed at all times and that all communication supports Council's core values of integrity, transparency and fairness.

Signed Declaration

This Statement of Business Ethics will form part of any formal tendering and/or contractual process for Council and all Suppliers/Tenderers will be asked to submit a signed declaration stating that they have read and fully understood the contents of this full statement in relation to dealing with Council.

What happens if I think there is a breach?

If you are concerned about a possible breach of this statement, or about any conduct that could involve fraud, corrupt conduct, maladministration or serious and substantial waste of public funds, please contact Council's General Manager, or one of Council's Directors. Please be aware that if you do approach a Council Director with such a report, it is a requirement of ICAC that the Director must inform the General Manager immediately.

It should also be noted that once the General Manager is made aware of a possible breach as described above, that it is incumbent upon him or her to report this directly to the ICAC. For Council staff, please refer to Councils policy titled "Corruption, Maladministration & Serious Substantial Wastage - Reporting Of (C23)" for more information on the processes that you are required to follow in the case of a possible breach of this statement.

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Confidential

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VP45209_suppliers statement of business ethics & declaration - sept 2006.doc

l,	(Print n	ame),
Of _	(Supplier Organis:	ation),
Do h	hereby solemnly declare and affirm the following:	
	I hold the position of, and am duly authorised by the supplier organisation to lawfully proclaim the following and, after having made due inquiry believe the following to be accurate to the best of my knowledge.	
	The Supplier and the Supplier's representatives has read and fully understand the contents and meaning of the Port Macquarie-Hastings Council Statement of Business Ethics as included as part of these contractual documents.	
	The Supplier and the Supplier's representatives agree to be bound by the standards of ethical behaviour as detailed in the Port Macquarie-Hastings Council Statement of Business Ethics and will not exert pressure nor influence Council staff that may cause them to waiver from Council's Code of Conduct.	
	The Supplier and the Supplier's representatives agree to have respect for the obligation of Council Staff to act in accordance with the Statement of Business Ethics.	
mad	ake this solemn declaration as to the matter aforesaid, according to the law in this behalf de, and subject to the punishment by law provided for any wilfully false statement in any the declaration.	
Sigr	nature of Supplier:	
Sub	bscribed and declared at:	
	s:(Year)	
Bef	fore me: (Print i	name)
Wit	ness: (Sign	ature)
(Jus	stice of the Peace or authorised person)	

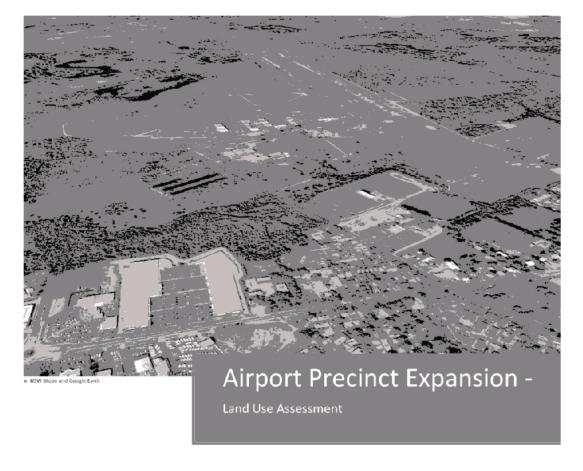
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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 1 - Hill PDA report 2016

PP2015 - 3.1 5/7/2019

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Prepared for Port Macquarie Hastings Council

November 2016



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Airport Precinct Expansion - Land Use Assessment

QUALITY ASSURANCE

Report Contacts

Gareth Williams and Nick Hill

Supervisor

Adrian Hack

Quality Control

This document is for discussion purposes only unless signed and dated by a Principal of HillPDA.

Reviewed by:

Dated 30 November 2016

Report Details

Job Ref No: C17030 Version:

File Name: Airport Land Demand Assessment

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Ref: Airport Land Demand Assessment C17030 Final

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Airport Precinct Expansion - Land Use Assessment

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Airport Precinct Expansion - Land Use Assessment

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial
Classification	
CBD	Central Business District
DCP	Development Control Plan
DP&E	NSW Department of Planning and Environment
FSR	Floor Space Ratio
GDP	Gross Domestic Product
GFA	Gross Floor Area
GLA	Gross Lettable Area
Ha	Hectares
JTW	Journey to Work
LEP	Local Environmental Plan
LGA	Local Government Area
MB	Mesh Block
MAT	Moving Annual Turnover
NLA	Net Lettable Area
NWGC	North West Growth Centre
PCA	Property Council of Australia
PTA	Primary Trade Area
SEPP	State Environmental Planning Policy
SCN	Shopping Centre News
SIA	Social Impact Assessment
SA1	Statistical Area Level 1
SA2	Statistical Area Level 2
SA3	Statistical Area Level 3
SA4	Statistical Area Level 4
SD	Statistical Division
SLA	Statistical Local Area
Sqm	Square metre
S⊤A	Secondary Trade Area
SWGC	South West Growth Centre
TDC	Transport Data Centre
TTA	Tertiary Trade Area
TZ	Travel Zone

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Airport Precinct Expansion - Land Use Assessment

EXECUTIVE SUMMARY

This report provides an assessment of the demand for land uses likely to occupy business park facilities in Port Macquarie-Hastings LGA over the period to 2036.

The report finds that demand for office space in Port Macquarie has been relatively muted over the last six years. The largest component of demand has originated from the medical sector. This demand has clustered around the Port Macquarie Base Hospital and to a lesser extent the Port Macquarie Private Hospital on Lake Road. Growth in the healthcare sector is likely to continue given the continued population ageing projected for Port Macquarie-Hastings LGA.

The office floorspace demand that has occurred has been for smaller premises in the CBD. There are a limited number of large floorplate commercial office space occupiers in Port Macquarie at the present time.

The 2015 HillPDA review of the Port Macquarie-Hastings Industrial Land Strategy (ILS) identified that apart from aviation related uses, the airport site is appropriate for high technology and campus style business park development.

Office construction trends suggest new office supply in the local market area of Port Macquarie Hastings has been limited over the past 6 years with relatively little new office supply. The medical sector has seen new developments and a component of these can be allocated to the office market. This has occurred at a time of strong growth in the residential sector and growth in the number of older persons in Port Macquarie Hastings LGA.

Analysis of employment data suggests stand-alone office space has increased from about 89,000 sqm in 2006 to about 101,000 in 2016.

It is considered that a significant component of future commercial floorspace demand will be meeting the needs of the growing population of Port Macquarie-Hastings, and these population serving industries (as opposed to base industries) are more likely to locate in the Port Macquarie CBD and the town centres than in "out-of-centre" business park style premises.

Under a medium growth scenario it is estimated that Port Macquarie will accommodate 4.1% of the regional NSW office market by 2036, up from 2.9% in 2016. 83,700 sqm more stand-alone office space would be required. 39% of the working aged population would have white collar jobs by 2036. Assuming 80% of this demand is located in

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Airport Precinct Expansion - Land Use Assessment

CBD areas, then around 4.2 ha is required to accommodate the demand for out-of-centre office space (assuming FSR of 0.4:1).

Under a lower growth scenario, it is estimated that an additional 60,800 SQM of office floor space will be required to 2036. This level of office floorspace demand would mean that 38% of the working age population would have white collar jobs. Accounting for 80% of this demand to be located in CBD areas would require a net developable area of 3.0 ha to be provided to accommodate the demand for office space.

The demand for land outside the CBD areas of Port Macquarie Hastings to meet office employment needs is projected to lead to a net developable land requirement of between 3.0 and 4.2 ha. However this range would double if the CBD areas capture a lower rate, say 60% of office space demand. It is recommended around 10 hectares of land at the airport be zoned 87 to accommodate this demand.

Council could consider the staging of development on the Airport Precinct Land in order to overcome any concern around a glut of supply of B7 Zoned development land adversely impacting the prospect of retaining commercial office occupiers in Port Macquarie CBD. The take up of development opportunities on the airport land should be reviewed periodically – say every five years.

There is expected to be demand over the period to 2036 for between 39ha to 67ha of land for additional services industry employment over the period to 2036. The majority of this land is expected to be required in Thrumster and Sancrox-Lake Innes and as such, provision of industrial zoned land at the airport land would not cater for this additional land requirement. If demand for light industrial land exceeds that identified in the 2015 Industrial Lands Review, the 87 zone can accommodate light industrial uses with consent.

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Airport Precinct Expansion - Land Use Assessment

1 INTRODUCTION

The expansion of the Port Macquarie airport precinct includes a key site (known as the 'Airport Precinct Employment Lands') for service industry and business park industrial uses. The additional land proposed for development could lend itself to the introduction of higher technology, freight, logistics and aviation affiliated industries, to underpin the Airport's regional role in ongoing economic development of Port Macquarie - Hastings LGA and the Mid North Coast. Development of the land could also ensure the Airport Precinct acts as a significant gateway to Port Macquarie. However, it is important for Council to ensure that future development is compatible with future airport operations, and that development of the precinct does not negatively impact the future prospects of the Port Macquarie CBD and the existing hierarchy of centres within Port Macquarie-Hastings LGA.

It is noted although the B7 Business Park zone has been in place over 5 years, there are no Development Control Provisions in place for the Airport Precinct. A Business Park precinct would typically have a location specific Precinct Plan. This assessment has been undertaken to understand the supply and demand for land uses and to determine the appropriate planning controls for the precinct.

In addition to the quantum of land that should be rezoned for development, it is required that Council consider the zone options available for the Airport Precinct, noting that the B7 Business Park zoning precludes industrial uses other than light industrial.

It is also noted that one of the priority objectives of the airport Master Plan 2010 is to provide opportunity for commercial property development to promote employment opportunities, facilitate economic development, and support the long-term financial viability and sustainability of the Airport business.

In the preparation of this assessment HillPDA has reviewed a number of background documents to understand the context of employment and industrial lands within the Port Macquarie - Hastings LGA. Documents reviewed included:

- PMQ Airport Master Plan 2010
- PMQ Airport Master Plan 2010 Addendum report
- PMH Urban Growth Management Strategy 2011-2031
- PMH Industrial Land Strategy Review 2015

Ref: Airport Land Demand Assessment C17030 Final

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- PMH Centres Strategy Review 2015
- PMQ Airport Precinct Traffic Study 2016
- PMQ Airport and Surrounding Land Biodiversity Certification Assessment and Strategy
- Area 13 Thrumster Development Control Plan.

Some land uses permissible under the B7 Business park zone are also (under the Port Macquarie Local Environmental Plan 2011 (LEP)) permissible land uses with the B5 Business Development Zone and the B4 Mixed Use Zone.

The B7 Zone

The B7 Business Park zone objectives are to provide a range of office and light industrial uses, employment opportunities, meet the day to day needs of works in the area and to ensure that development does not conflict with the hierarchy of business and retail centres. Although the B7 zone generally prohibits Retail Premises, it permits uses typically used as an anchor for bulky goods retail (e.g. Garden Centres, Hardware and Building Supplies and Plant Nurseries).

The B7 Business Park is not identified as one of the "identified specialty centres" for large footprint premises such as bulky goods premises. However, the B7 zone permits a relatively wide range of uses including Office Premises also Light industry as well as Garden Centres, Hardware and Building Supplies, Plant Nurseries, Timber Yards and Vehicle Sales or Hire Premises, Amusement Centres, Entertainment Facilities, Service Stations and Wholesale Supplies}.

There is no requirement for the uses that occur in Office Premises permitted within the zone to be related to technology, aviation or light industrial development in the precinct. As such, there may be concern that uses that would in future be able to occur at the Airport Precinct business park, may be in competition with comparable business uses in Port Macquarie CBD.

The objectives of the zone and the permitted and restricted uses are shown in

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Table 1 below. Currently height or minimum lot size controls apply to the existing B7 Business Park zone at the Airport while FSR controls in the B7 zone allow a maximum of 0.65:1.

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Table 1 - Zone B7 Business Park: Uses and Objectives

Zone B7 Business Park	
Objectives	To provide a range of office and light industrial uses.
	To encourage employment opportunities.
	To enable other land uses that provides facilities or services to meet the day to day needs of workers in th area.
	To ensure that development does not conflict with the hierarchy of business and retail centres in the Port Macquarie-Hastings region and the role of the Greater Port Macquarie Central Business District as the focal point for subregional functions and service delivery.
Permitted without consent	Nil
Permitted with consent	Child care centres; Garden centres; Hardware and building supplies; Landscaping material supplies; Light industries; Liquid fuel depots; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Respite day care centres; Roads; Take away food and drink premises; Timber yards; Vehicle sales onire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited	Agriculture; Airstrips; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Correctional centres; Crematoria; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Funeral homes; Heavy industrial storage establishments; Highway service centres; Home-based child care; Home businesses; Home occupations; Hom occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Marinas; Mooring pens; Open cut mining; Recreation areas; Registered clubs; Research stations; Residential accommodation; Retail premises; Rural industries; Sewerage systems; Sex services premises; Tourist and visitor accommodation; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary

Source: Port Macquarie-Hastings Local Environmental Plan 2011

The SP2 Air Transport Facility zone of the airport permits development that is ordinarily incidental or ancillary to an Air Transport Facility. This zone is being considered for use on land which will accommodate uses directly related to Airport operations.

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The B4 Zone

Council have also indicated that B4 zoning may be appropriate for the Airport land. The objectives of the zone and the permitted and restricted uses are shown in Table 2 below.

Table 2 - Zone B4 Mixed Use: Uses and Objectives

Zone B4 Mixed Use	
Objectives	To provide a mixture of compatible land uses.
	To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.
	To ensure that new developments make a positive contribution to the public domain and streetscape.
Permitted without consent	Home Occupations
Permitted with consent	Boarding houses; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Function centres; High technology industries; Home industries; Hostels; Hotel or motel accommodation; Information and education facilities; Medical centres; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Residential flat buildings; Respite day care centres; Restricted premises; Roads; Seniors housing; Shop top housing; Any other development not specified in item 2 or 4
Prohibited	Agriculture, Air transport facilities, Airstrips; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Car parks; Caravan parks; Cemeteries; Crematoria; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings. Farm stay accommocation; Forestry; Freight transport facilities; Heavy industrial storage establishments; Hellpads; Highway service centres; Home occupations (sex services): Industrial training facilities; Industries; Marinas; Mooring pens; Mortupries; Open cut mining; Research stations; Residential accommodation; Rural industries; Sewerage systems; Sex services premises; Storage premises; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Waste or resource management facilities; Wharf or pooting facilities

Source: Port Macquarie-Hastings Local Environmental Plan 2011

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The B5 Zone

B5 zoning may also be appropriate zoning for the Airport land. The objectives of the zone and the permitted and restricted uses are shown in Table 3 below.

Table 3 - Zone B5 Business Development: Uses and Objectives

Zone B5 Business Development	
Objectives	To enable a mix of business and warehouse uses, and bulky goods premises that require a large floor area, in locations that are close to, and that support the viability, centres.
	To minimise conflict between land uses within the zon and with adjoining zones.
	To ensure that new developments make a positive contribution to the public domain and streetscape.
Permitted without consent	Nil
Permitted with consent	Bulky goods premises; Child care centres; Food and drink premises; Garden centres; Hardware and buildin supplies; Kiosks; Landscaping material supplies; Light Industries; Neighbourhood shops; Passenger transport facilities; Plant nurseries; Respite day care centres; Roads; Self storage units; Vehicle sales or hire premise Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited	Advertising structures; Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries, Charter and tourism boating facilities. Commercial premises; Correctional centres; Crematoria; Eco tourist facilities; Electricity generating works; Entertainment facilities; Electricity generating works; Entertainment facilities; Ehribition homes; Exhibition villages; Extractive industries; Farm building Forestry; Freight transport facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home-based child care; Home bus nesses; Home occupations; Frome occupations (sex services); industrial training facilities; Industries; Marinas; Mooring pens; Open cut mining; Port facilities; Nooring pens; Open cut mining; Port facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Restricted premises; Rura industries; Sewerage systems; Sex services premises; Storage premises; Tourist and visitor accommodation;

Source: Port Macquarie-Hastings Local Environmental Plan 2011

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ATTACHMENT

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The report provides an overview of broad economic, social and development trends to provide context of the land use and development conditions in Port Macquarie Hastings. The following section of the report describes Current economic conditions, economic and social trends, and major trends in key land use sectors.

HillPDA - together with Council, has undertaken an assessment of the amount of commercial floorspace in use within the LGA. These are presented in Section 3.

Floorspace projections have been made based on recent development trends. These projections and land use implications are provided in Section 4. Industrial land projections are shown in Section 5.

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2 THE CHANGING NATURE OF THE ECONOMY

This section of the report reviews broad economic, social and development trends in order to provide context for better understanding land use and development conditions in Port Macquarie Hastings. The section is structured as follows:

- Current economic conditions;
- Economic and social trends; and
- Trends in key land use sectors.

Current Economic Context

The Australian economy continues to perform positively despite economic challenges. Key features are as follows.

- Gross Domestic Product has been increasing at a moderate rate for an extended period.
- Unemployment has been trending up since 2010, following a sharp rise during the GFC, with around 700,000 people now being unemployed nationally.
- Rising unemployment, falling wage growth and uncertain international conditions has resulted in a period of sustained low interest rates.
- The low interest rate environment has helped fuel the most recent upswing in house prices, from mid-2013. Indications suggest the market in Port Macquarie may be nearing the top of the current market cycle.
- The rising housing market has facilitated growth in housing approvals and construction, including significant growth in medium and high density housing in capital cities.
- The low interest rate climate has not yet translated into strong growth in the retail sector, which has been experiencing tough conditions over the past five years or so.
- Consumer sentiment has dipped in the context of rising unemployment and low wages growth. Households have increased savings at the expense of retail spending. However the recent growth in house prices may flow through to increased consumer sentiment and retail spending in the future.
- The Australian dollar has until recently been at high levels, which has helped keep inflation low by increasing the purchasing power of Australian consumers for imported goods, but this

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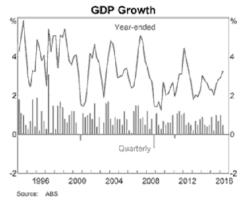
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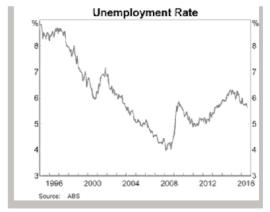
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- environment has contributed to tough trading conditions for exporters. The climate for exporters is now improving.
- Over the past decade the Australian economy was boosted by rapid mining investment. The mining sector has tapered off and other sectors of the economy, particularly in cities, have taken up the slack. Manufacturing for example may be boosted by the lower Australian dollar and switch of capital away from mining in years to come.

Selected economic charts from the Reserve Bank of Australia are shown below.

Figure 1 - Reserve Bank of Australia Economic Charts





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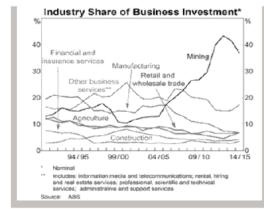
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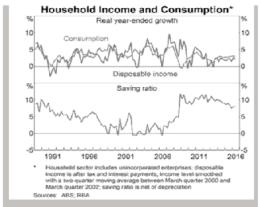
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Average of the ANZ-Roy Morgan and Westpac-Melbourne Institute consumer seatment measure of respondents' parceptions of their personal finance relative to the previous year; ANZ-Roy Morgan index rescaled to have the same average as the Westpac-Melbournellute index since 1999 arcss. ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute of the ANZ-Roy Morgan; RBA; Westpac and Melbourne Institute.



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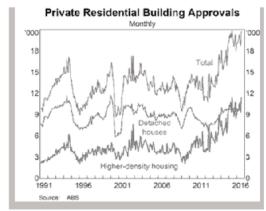


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Source: Reserve Bank of Australia (2016) The Australian Economy and Financial Markets Chart Pack January 2016

Economic and Social Trends

Longer term structural conditions and trends which impact on the Port Macquarie economy are noted below.

Structural Economic Change

Structural economic change refers to the long term shift of the economy towards growth in service sectors of the economy and in part away from secondary (manufacturing) and most primary sectors (agriculture, fishing, forestry and mining) in terms of jobs. This has been driven by globalisation of economy activity. It also refers to the organisation of businesses, which have generally become specialised via use of greater outsourcing of non-core business functions.

Investment activity and jobs growth in service sectors have driven demand in regional cities such as Port Macquarie. This trend and changing structure of the economy in NSW regional towns has occurred over a number of decades. The extent to which this trend is expected to continue is uncertain. This is particularly true where regional centres serve a significant rural hinterland and consequently play a role in providing services and administrative functions to a population significantly beyond that contained either within the LGA or indeed the broader region.

Ageing of Population

Ageing of the population has been a long term trend in Australia and this is expected to accelerate as the 'baby boomer' generation moves

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into retirement age. In recent years, increases in fertility rates and growth in the migration intake has balanced the population composition marginally but population ageing is expected to continue. This is expected to decrease labour force participation rates in the future, which may impact on economic growth unless productivity increases.

Office Space Trends

Economic changes to industry and technology has resulted in a significant shift in the location of office-based activities towards business park developments. The limited availability of suitable sites and higher land prices in both metropolitan centres and major regional centres has influenced the growth of non-CBD office at times, while a significant proportion of the growth in non-CBD office markets reflects underlying demand trends for non-CBD space and other benefits it offers tenants, including accessibility and amenity. In inner urban areas buildings have evolved from being predominantly warehousing to office.

Business parks are now recognised as being highly successful formats in metropolitan and regional centres. Consistent across these parks are the following key characteristics:

- They are predominantly office parks with a component of warehousing (closely aligned to the changing nature of industry and manufacturing), and in some cases a component of research and development and high-technology uses;
- Apart from providing A-grade or similar grade commercial space, often with cheaper rent than CBD locations, business parks enable purpose designed buildings and plenty of on-site car parking;
- The provision of on-site amenities that attract large corporations, such as recreation and open space facilities,
- They hold a sense of prestige which is a further factor that attracts large businesses. Tenants sign up with a business park in part for its marketable image. There is typically a preference for estates located away from industrial areas;
- Business parks enable large corporations to custom build their headquarters, providing them with their own standalone identity, which typically cannot be achieved in a centre of mixed tenants; and

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 They have flexible floor plates and cheaper ground rent, which allows warehousing and office space to be integrated.

Another trend is growth in the number and type of small businesses in the economy, associated with growth in skilled workers and service sectors of the economy. This has generated demand for a range of new property types including small offices, home offices and low cost space for start-ups and creative industries.

Clustering and Agglomeration

Agglomeration or clustering is the phenomenon whereby firms from the same industry gather together in close proximity. It is particularly evident in industries such as health care but also banking, research and development, the automotive industry, home building and manufacturing. By clustering, businesses benefit from things such as:

- A pool of expertise and skilled workers;
- Access to component suppliers;
- Information channels both formal (e.g. recognised industry associations) and informal (e.g. social networking with colleagues):
- Increased innovation and service sophistication;
- The ability to specialise and use other services to complement business activity; and
- A larger available customer and supplier market.

Consumers also benefit from the economic effect of agglomeration through better access to choice and lower prices as a result of price competition. The NSW State Government recognises the economic importance of agglomeration and the need to cluster businesses in "strategic centres".

Modern high-tech clusters often gather around universities where access to research and academic specialists is easier. Silicon Valley is near Stanford University (United States of America) for example and similar local high-tech clusters are gathered around Macquarie University at North Ryde.

Agglomeration in Australian cities has led to the creation of new business park developments and industrial zones along new transport corridors. Many businesses have relocated to these complexes to 'co-locate' their administration and warehouse needs. A mix of light industrial/commercial uses is seen as a legitimate need

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that would not be practical or economical in an established commercial centre with higher land values and smaller land parcels.

Apart from universities other major catalysts are airports and hospitals.

Agglomeration in some sectors - notably in hospital and health services - is more evident than in many other industries. A primary reason for this is that face-to-face encounters are imperative for medical care and procedures. Health is an industry where information flows cannot easily be performed remotely due to the need for specialist consultants/surgeons and complex/expensive equipment. Whilst there has been considerable growth in remote information exchange, due largely to advances in information technology, this has complemented rather than substituted face-to-face encounters. Clustering of health related business is evident in locations in Port Macquarie Hastings - including the Lake Road cluster, and around the Base Hospital

While freight distribution through airports accounts for a relatively small proportion of total Australian freight distribution, it is a key component of the logistics and freight distribution network particularly for goods with higher value to weight ratios. In addition to rapid growth of passenger travel in recent decades, air logistics has grown considerably and is a major driver of economic development. Air logistics comprises air cargo, air express and their supporting services. The types of businesses that locate near airports comprise those with time-critical manufacturing and distribution, entertainment, tourism, corporate offices and businesses that require long-distance connectivity. These types of uses and businesses may seek opportunities in the Port Macquarie-Hastings area on land around or close to the airport. Typical commercial uses based around airport lands will require large floor plates and significant car parking provision.

There are short to long term opportunities for commercial development in Port Macquarie brought about by key improvements in infrastructure. These include:

- The airport and growth in aviation traffic, and expansion of operating from Port Macquarie airport;
- The new Charles Sturt University (CSU) campus;
- The Base Hospital and the Port Macquarie Private Hospital; and
- The upgrade of the Pacific Highway.

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Locations identified for potential commercial uses in Port Macquarie include the airport, the Gordon Street / Grant Street mixed use zone, Lord Street and Grant Street, the Hospital / CSU Precinct and the Thrumster town centre.

Employment Changes

Jobs in Port Macquarie-Hastings increased to over 23,000 in 2011 - a 3.9% increase on the 2006 figure, equivalent to an annual growth rate of 0.8%. The data indicate that the largest sector in terms of jobs in Port Macquarie-Hastings is in healthcare. This is an industry which has seen significant growth - over 25% - over the five year period, and which has in part been driven by the changing demographic structure of the Port Macquarie population. The population of the town is growing, and the retired population is accounting for a significant component of this population growth. This brings both opportunities and challenges for businesses in the region. Increased demand for healthcare has led to the growth of the sector, which is likely to continue with the Charles Sturt University and hospital development.

Administrative and support services also saw strong jobs growth but remained relatively underrepresented in terms of the proportion of total jobs , compared to the proportion of jobs in the sector statewide.

Office based sectors that experienced significant growth in Port Macquarie from 2006-2011 include the following:

- Administrative and support services: 36%;
- Health care and social assistance: 27%;
- Professional, scientific and technical services: 11%; and
- Public administration and safety: 7%.

Office based sectors that saw a decline in jobs over the period included:

- Rental hiring and real estate services at -11.4%; and
- Arts and recreation services.

The location quotients for Port Macquarie Hastings are shown in Figure 2, together with the absolute size in employment and growth in the industry sector over the period 2006-2011. Jobs in mining are not shown in Figure 2 due to the scale of growth that occurred at 55% over the period- as the sector remains relatively insignificant in

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total employment terms, accounting for just 0.2% of all jobs in the LGA, compared to 1% of jobs in NSW. Electricity, Gas, Water and Waste Services are also not shown on the chart, owing to the location quotient of 4.9. The sector has seen significant growth and would be shown in the top right quadrant of the chart, albeit with a relatively small number of total employees in the sector.

Figure 2 can be interpreted as follows:

- The bottom right part of this chart indicates specialised but slow or negative growth;
- The top right part of the chart indicates specialised and growing;
- The left part of the chart indicates non-specialised in the location and either growing or otherwise; and
- The size of the bubble reflects size of the industry in the study area.

Area Weakness &

Growing

Professional scherificand inclinical and waterhoosing pulpic administration by safety

Insulation and sources and training

Professional scherificand inclinical and waterhoosing pulpic administration by safety

Insulation and sources and training

Other services

Accommodation

A

Figure 2 - Employment location Quotient Port Macquarie-Hastings 2006-2011

Source: Australian Bureau of Statistics, 2006 & 2011 Censuses of Population and Housing

Manufacturing jobs declined by nearly 10% over the period, a decline only exceeded in absolute terms by that seen in the retail and the construction sectors. The share of total jobs fell from 6.3% to 5.5% reflecting a broader national trend.

Employment by sector data from REMPLAN in 2016 suggest the changes noted in the economic structure and employment by

Ref: Airport Land Demand Assessment C17030 Final

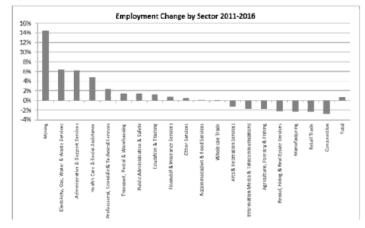
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industry sectors across the LGA have continued. Employment change by sector over the period is shown in Figure $3\,$

Figure 3 - Employment Growth By Sector 2011-2016



Industrial Trends

The advance of modern technologies in particular has been changing the methods of manufacturing production and the pattern of world trading. The global economy today consists of more sophisticated linkages between businesses which are designed to enable the efficient sharing of information and the delivery of goods through a global supply chain.

Globalisation and the free movement of people, goods and services have increased the amount of competition and resulted in a decline in the proportion of jobs within manufacturing industries.

The role of manufacturing in Australia has by necessity moved up the value chain. Successive waves of restructuring and job shedding over a number of decades has seen the sector move from being labour intensive to capital and knowledge intensive. Manufacturing firms are increasingly employing more professional and technical services staff and utilising more office and research and development space in facilities. Successful modern manufacturing enterprises are as much involved in administrative and commercial activities as in physical production. Those manufacturing sub-sectors that produce more basic products and face strongest competition from overseas have declined in relative importance.

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Non-food manufacturing in Australia has declined considerably over the past four decades. In 1975 it contributed 14.8% to ${\rm GDP}^1$. In 2012 its contribution represented only 5.8% of total GDP. In 1976 the Non-Food Manufacturing Sector in Australia employed 954,000 workers which comprised 17.7% of total employed persons. By 2011 this declined to 709,000 and the proportion of the total working population has decreased to $7.2\%^2$.

Despite the declines in employment, the demand for industrial lands for transport and storage related industries have shown strong growth.

Industrial floorspace used primarily for transport and storage, particularly those with low inventory turnover, are gravitating to inexpensive land and low cost buildings.

Large-scale transport, storage and warehousing sector (or logistics) have locational needs that are determined by efficient supply chains, access to customers and suppliers, land availability and main road access. This describes firms that have specific land and infrastructure needs and potentially buffer distance requirements from residential or other sensitive land uses.

Old Industrial locations next to CBDs and major centres and waterfront areas have been replaced over time by higher valued land uses, which include residential and other employment uses.

Transport and storage uses (which are typically low level employment generating industries) are increasingly unnecessary in close proximity to major centres and reflect an increasing underutilisation of resources with low economic performance. Areas like Sancrox, which are away from residential and commercial centres but close to main roads, provide a better alternative for such uses.

A further important consideration is the need to accommodate land uses which are sometimes deemed not compatible in business and/or residential zones (and in other cases may not be viable due to added land cost). These uses include entertainment facilities (such as ten pin bowling and laser tag) as well as sex services, places of public worship and the like. Industrial zones provide a buffer for these land uses away from more sensitive residential areas and even commercial centres.

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¹ ABS 5206.0 Australian National Accounts

² ABS Census 2011 and 1976 (excluding not stated or inadequately described)

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3 ANALYSIS OF COMMERCIAL FLOORSPACE AND LAND SUPPLY

This chapter provides a description of the supply of commercial and employment zoned land (including land zoned B, and B7) by the major centres and precincts within Port Macquarie. The role of each centre is identified as well as the principle land uses in each centre.

The floorspace survey undertaken determined there was approximately 148,000 SQM of commercial floorspace in the major commercial centres of Port Macquarie-Hastings. The floorspace by broad category is shown in the table below.

Table 4 - Floorspace by Category Port Macquarie-Hastings 2016

LOCATION	Financial	Govt	Medical	General	Vacant	Legal	Travel	Real Estate	Total
Port Macquarie CBD	12,032	4,790	5,452	14,915	4,609	4,645	460	3,250	50,152
Wauchope	1,288	650	731	2,134	0	130	717	1,655	7,305
Laurieton	1,572	250	4,347	656	600	491	332	1,140	9,388
Lake Rd Medical	0	0	10,942	0	C	0	0	0	10,942
Buller & Gordon, Gore St	3,310	1,255	4,255	8,720	1,085	635	0	855	20,115
Base Hospital	0	5,340	36,700	0	0	0	0	0	42,040
Lord Street, Grant Street	0	2,350	2,600	2,465	720	250	0	0	8,785
Total	18,202	14,385	65,027	28,890	7,014	6,151	1,509	6,900	148,477

Source: HillPDA, Port Macquarie Hastings Council 2015

Port Macquarie CBD

The Port Macquarie CBD is the main business, retail and service centre for the broader LGA and for the mid-north coast region. The centre also services as a significant tourism destination. The economy is broad based with public sector and services and private businesses. Accordingly, general commercial is the largest floorspace user in Port Macquarie CBD, accounting for 30% of commercial floorspace. Government uses and medical uses account for around 10% of floorspace in the centre,

Lake Road Medical

The Lake Road Medical precinct is to the south-west of Port Macquarie CBD. Port Macquarie Private Hospital provides an anchor for a cluster of medical services and consulting facilities.

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Lord Street and Grant Street

South east of Gordon Street, the Lord Street precinct comprises just under 9,000 sqm of office floorspace. This total is made up of small scale medical uses, (including physio and dental), the former Charles Sturt University campus, ABC Mid-North, government services, municipal buildings. The precinct also includes small scale retail, including food and drink, and a component of residential / mixed use premises.

Port Macquarie Base Hospital

To the South West of Lake Road the Port Macquarie Base Hospital which expanded in 2011 consists of over 42,000 square metres of floorspace. The majority of this space (36,700 sqm) - is categorised as medical floorspace, with the remainder identified as floorspace occupied by government and education at the PMQ Shared Health & Education Campus.

Buller Street / Gore Street / Gordon Street

Located between Port Macquarie CBD and Settlement City, the Buller Street area is home to Essential Energy, occupying around 4,200 square metres of commercial space between Buller Street and Waugh Street. Otherwise, medical uses account for the largest component of floorspace in the area (21% of total floorspace) while financial services also account for a significant proportion owing to the presence of State Super Financial Services at 40 Gordon Street.

Wauchope CBD

Wauchope CBD is 20km west of Port Macquarie CBD. The CBD is focused on the retail sector, with professional and businesses services - including finance, real estate - providing the bulk of commercial office floorspace demand. While the population of the surrounding area has grown significantly owing to subdivisions, the demand for commercial floorspace is reported to have remained stable over recent years.

Laurieton

Laurieton is 40 km south of Port Macquarie along Pacific Highway or 33km south along Ocean Drive. The Laurieton precinct plays a local service function role for local residents and the southern part of Port

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Macquarie-Hastings LGA. The centre serves a wider catchment of just over 16,000 in the Bonny Hills region - although the population is noted as being significantly older than nationally with a median age of over 52 years compared to 37 years old nationally, with a consequent impact on labour force participation rates. The centre comprises around 9,400 of commercial floorspace, with the majority centred on medical uses.

Additional locations: Thrumster

Council envisages development in Thrumster will accommodate up to 10,000 residents and up to 2,000 jobs in commercial, retail, high tech and light industries. Under the PMHLEP 2011, Light industrial uses are permissible in the Town Centre, Mixed-use, Business and Industrial zones.

The original concept plans for the Thrumster Town Centre show potential business technology and education precincts, which — zoned B2 – Local Centre (approx. 5.5ha) and B4- Mixed Use (approx. 15.5ha). These zones are generally suitable for office development while also allowing for residential uses. The extent to which commercial office space development occurs in Thrumster will be influenced by the relative feasibility of development of alternative land use classes, including residential and retail development. B5 zoned land is also provided within the Thrumster Town Centre precinct and permits bulky goods and light industrial uses amongst others, however commercial premises are prohibited in the B5 zone.

Additional locations: Port Macquarie Airport

The Port Macquarie Airport Business Park precinct comprises 25.5ha of land around 5km north-west of Port Macquarie CBD along Hastings River Drive. The precinct was converted to zone B7 Business Park with the introduction of Port Macquarie-Hastings Port Macquarie-Hastings Local Environmental Plan 2011 in February 2011 and development in the area includes a new senior Technical Tertiary College on land fronting Boundary Street in the north eastern sector of the precinct. Other land uses in the area have remained relatively unchanged over the last 10 years with occupiers mainly including aircraft related industries (e.g. scenic flights, learn-to-fly, car hire, general aviation hangers etc.).

Developable land supply in the existing Business Park has been revised down from 9.6ha to an estimated 5.6ha as a result of

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Council's purchase of Lot 121 DP1156615 (on the northern alignment of Tuffins Land, next to Newman College, 4.03ha zoned B7) for runaway extension and airport operations.

At the end of 2013 Council completed a \$21 million infrastructure upgrade at the Airport to underpin the region's future growth, economic development and tourism potential. The upgraded runway provides the capability for larger aircraft to use the airport. The upgrade was the 1st stage of the implementation of the Airport Master Plan.

The advantages of the Airport Precinct for further development include:

- proximity to Port Macquarie CBD and its broader urban area;
- proximity to Hastings River Drive and the Airport operations itself; and
- The availability of relatively flat, vacant, unconstrained land ready for development.

Any surrounding development must not interfere with Airport Operational requirements.

Additional locations: CSU/John Oxley Drive Precinct

The CSU / John Oxley Drive Precinct is under investigation by Council in accordance with the 2011 Urban Growth Management Strategy. The UGMS proposes to 'Establish an expanded tertiary education precinct or precincts'.

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4 DEMAND FOR COMMERCIAL LAND

This Section investigates the demand for commercial employment land within Port Macquarie-Hastings. Commercial floorspace and office employment generating land uses can be located in town centres, business parks, and, in the following zones; industrial lands, special use zones, rural lands, commercial uses are permitted where ancillary and incidental to an approved use rather than as stand-alone. Commercial floorspace can, in a minority of cases, be located in residential areas. The growth or decline of office based employment in these areas will have an impact on the extent of land required and the appropriate form of planning controls that need to be applied in the LGA.

Method for Estimating Demand for Employment Floorspace

Two methods are used for providing demand estimates for employment floorspace:

- The first method estimates future office demand based on extrapolation of trends in office construction activity over the recent years; and
- The second method projects jobs by type in Port Macquarie
 Hastings using population office based employment ratios and converts office based jobs to floorspace demand.

The results are considered against other information shown in this report (i.e. property market position and trends) to identify potential future demand for commercial space in Port Macquarie-Hastings area over the long term.

Development Trends and Projections - 1st Method

Table 5 below shows trends in office construction by value converted into finished office space. This suggests new office supply in the local market area has been relatively limited since 2011. The projects which were identified as having commenced, being under construction, or with a firm construction start date, amount to less than \$300,000 of activity in commercial office, which on investigation, related to the construction of a temporary sales office for a residential development project at Sovereign Hills

Owing to the size of the medical sector in Port Macquarie Hastings, there has been significantly more development in medical premises,

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which account for nearly \$100 million in value of projects started, under construction or completed.

Table 5 - Development In Port Macquarie-Hastings LGA 2011-2016

Category	Construction Value 2011-2016	Total Floorspace 2011-2016 (SQM)	Annual Floorspace (SQM)
Industrial	\$7,515,000	8,640	1,440
Medical	\$99,424,000	19,773	3,296
Retail / Showroom	\$2,220,000	700	117
Commercial	\$278,000	0	0
Infrastructure	\$3,982,000	0	0
Storage	\$1,376,000	2,500	417
Total	\$114,795,000	31,613	5,269

Source: CordellConnect, HillPDA

Council have provided alternative data relating to the development of commercial floorspace that has been developed in the LGA. In a number of these developments commercial elements accounted for a proportion of the total development. In these instances, HillPDA have provided a broad estimate of the commercial component of the total development value. These developments are shown in Table 6 with an estimated total of around \$18.4 million over the 11 year period.

Table 6 – Commercial Development in Port Macquarie-Hastings LGA 2005-2016

Property	Approved	Total Value of Development	Notes	Estimated Value Commercial Component
20-22 Clarence St, PMQ	5/03/2013	\$2.84M	ground floor retail, 1st floor offices	\$2,840,000
23 Clarence St, PMQ	17/06/2009	\$300,000	ground floor retail, 1st floor offices	\$300,000
75-77 Clarence St, PMQ	18/07/2005	\$2M	3 storey commercial building, restaurant occupies 50% of ground floor	\$1,665,667
102 - 104 Horton St, PMQ	20/04/2015	\$450,000		\$450,000
10 Hayward St, PMQ	16/12/2015	\$440,000	2-storey addition to existing commercial premises - under construction	\$440,000
132 Gordon St, PMQ	3/01/2007	\$1,542,996	development occurs over Lots 1 & 3 DP 153643	\$1,542,996
147 Gordon St, PMQ	7/06/2007	\$1.127M		\$1,127,000

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Property	Approved	Total Value of Development	Notes	Estimated Value Commercial Component
27 & 35 Grant St, PMQ	2/06/2005	\$6M	Change of use to educational establishment approved for No 27 Grant St on 9/1/2012 under DA2011/687	\$6,000,000
63 Lord St, PMQ	18/04/2012	\$2M	50% of 1st floor offices	\$1,000,000
65 Lord St, PMQ	23/08/2005	\$2.5M	2-storey commercial building subdivided into 7 strata lots on 31/3/10. Two lots approved in 2010 for change of use to noncommercial (i.e. medical centre & education establishment).	\$2,500,000
89 Lord St, PMQ	29/04/2015	\$256,000	Part demolition of existing office premises & construction of new office premises	256,000
243 High St, Wauchope	1/04/2009	\$970,000	7 shops (725 sqm) + 3 commercial premises (250 sqm) - under construction. Development over Lot 3 DP 260095 8. Lot 41 DP 806715	\$242,500
Total				\$18,365,163

Source: Port Macquarie Hastings Council

In terms of mooted or planned projects, the bulk of this proposed / planned development pipeline (\$7.25M in value) relates to retail development projects. No commercial developments are in the planning pipeline.

Table 7 - Planned or Mooted Development in Port Macquarie-Hastings LGA

Category	Construction Value Mooted	Total Floorspace Mooted (SQM)
Industrial	\$1,865,000	2,070
Medical	\$550,000	700
Showroom / Retail	\$7,250,000	2,941
Commercial	\$0	0
Storage	\$700,000	334
Replacement / refurbishment	\$4,650,000	838
Total	\$15,015,000	6,883

Source: CordellConnect, HillPDA

The data highlights the 'lumpy' nature of office investment in the market area. While the low demand and limited development could prevail for some time, pent up demand may result in the development of major projects that do not follow past trends in a

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linear fashion. On this basis the trends data should be interpreted with care and an alternate method of estimating demand for additional office space based on job growth is undertaken below.

However, if the trends observed over the last six years continue, Port Macquarie-Hastings would not be expected to see any significant commercial office floorspace development.

Any development that does occur would be expected in the centre of Port Macquarie, and to a lesser extent Wauchope and Laurieton.

Jobs Based Trends and Projections: 2nd Method

Another method for estimating potential future office activity and demand is via assessment of employment conditions and trends and extrapolating trends into the future based on observed growth rates.

The method is based on assessing the potential for office based employment in Regional NSW and estimating the share of activity that may be accommodated in the Port Macquarie-Hastings LGA. The regional share is then apportioned to the study area.

The broader regional assessment is undertaken because as noted above, local area trends may not be reliable in all circumstances and be dependent on local factors that can impact the market on a short-term basis - for example the loss of a major employer impacting on jobs growth across sectors, and releasing a significant quantity of commercial space onto a local market.

The first step in this method is to review jobs by industry sector and occupation. The data for Regional NSW and Port Macquarie-Hastings as at 2011 are shown below.

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Table 8 - Profile of Jobs in Regional NSW, 2011

2011	Regionial NSW								
	Managers	Professiona Is	Technicians and Trades Workers	and Personal Service Workers	Clerical and Administrat ive Workers	Sales Workers	Machinery Operators and Drivers	Labourers	Total
A Agriculture, Forestry and Fishing	38,063	1004	2261	133	2068	795	1928	9,150	54,903
8 Mining	1485	2,153	5639	- 11	1275	45	10049	706	21,430
C Manufacturing	9,907	5,505	23,267	582	7,507	3.597	11,213	15,401	77,079
D Electricity, Gas, Water and Waste Services	1,338	1,953	4,640	52	2,714	249	1,693	1107	13,746
E Construction	6.314	1.828	24,256	107	7,277	751	6,000	7,862	54,390
F Wholesale Trade	4,621	1,671	2,747	93	4,260	5,748	3,683	2,767	25,590
G Retail Trade	18,161	2,702	7,879	1,048	6,720	51,141	3,102	9,462	110,215
H Accommodation and Food Services	13,457	491	9,637	20,838	3,675	7,816	1258	17,875	75,047
I Transport, Postal and Warehousing	3,416	1,071	1,817	406	7,836	1,323	17,247	1,823	34,939
J Information Media and Telecommunications	999	2.528	1,328	45	1,535	1,435	154	320	8,344
K Financial and Insurance Services	2,939	4,547	1.89	98	11,660	707	58	112	20,310
L Rental. Hiring and Real Estate Services	1,458	772	547	195	3,055	6.627	502	599	13,756
M Professional, Scientific and Technical Services	2,859	19,358	5,501	200	11,683	483	302	801	41,207
N Administrative and Support Services	1,514	2,681	1,874	2,007	3,318	411	691	9,112	21,608
O Public Administration and Safety	5,796	10,945	6,400	13,044	16,359	478	3519	4,162	50,703
P Education and Training	5,518	51,569	2,398	11,465	9,725	198	209	1,916	33,176
Q Health Care and Social Assistance	5,190	48,008	4,652	41,804	17,157	445	924	6,999	125,199
R Arts and Recreation Services	1,460	1,890	1,510	3,054	1,125	356	271	1,219	10,835
S Other Services	1,950	2,234	19,815	3,810	4,101	551	827	3,289	36,578
Total	126,445	163,010	126,368	99.154	123.060	92,656	63,730	94.682	889,105

Source: Derived from 2011 and 2006 ABS Census of Population and Housing

Table 9 - Profile of Jobs in Port Macquarie-Hastings, 2011

2011	Port Macquarie-Hastings								
				Community					
	Managers	Professiona Is	Technicians and Trades Workers	and Personal Service	Clerical and Administrat ive Workers	Sales Workers	Machinery Operators and Drivers	Labourers	Total
				Workers					
A Agriculture, Forestry and Fishing	430	25	14	Ĺ:	22	- 1	20	117	640
B Miring	5	3	- 4	9	9	0	19	3	43
C Manufacturing	205	50	451	14	149	81	159	157	1,276
D Electricity, Gas, Water and Waste Services	189	253	169	4	410	10	45	29	1,109
E Construction	203	35	593	9	192	21	122	183	1,349
F Wholesale Trade	132	22	80	b b	96	128	87	59	609
G Retail Trade	530	62	218	33	213	1,909	111	284	3,354
H Accommodation and Food Services	410	14	306	583	133	235	25	500	2,211
I Transport, Postal and Warehousing	71	24	33	12	200	28	403	31	802
J Information Media and Telecommunications	26	85	37	D	39	50	0	15	252
K Financial and Insurance Services	107	143	8	0	321	15	0	7	596
L Rental, Hiring and Real Estate Services	50	19	10	5	99	274	3	12	472
M Professional, Scientific and Technical Services	57	492	138	0	360	13		10	1,075
N Administrative and Support Services	47	82	46	64	110	17	11	334	711
O Public Administration and Safety	82	178	113	205	447	9	54	94	1,182
P Education and Training	114	1,332	35	276	225	3	0	33	2,018
Q Health Care and Social Assistance	151	1,593	147	1,317	526	11	28	178	4,047
R Arts and Recreation Services	40	32	49	73	39	13	5	26	277
S Other Services	43	65	568	114	115	15	13	102	1,037
Total	2,887	4,507	3,019	2,716	3,805	2,832	1,110	2,184	23,060

Source: Derived from 2011 and 2006 ABS Census of Population and Housing

The data shows that a large share of jobs located within Port Macquarie Hasting are Managerial, Technician or Community and Personal Service Worker occupations and many of these are in two main industry sectors: Education and Training and Health Care and Social Assistance. Another significant proportion of the workforce is

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Professional occupations and many of these are in three industry sectors: Professional, Scientific and Technical Services, Education and Training and Health Care and Social Assistance. Sales jobs in Retail Trade are also significant in Port Macquarie.

Trends between 1991 and 2011 were examined. The jobs were allocated to either 'office based' or 'non-office based' to derive an estimate of office jobs and trends in such jobs.

Office jobs were converted to office floorspace using a ratio of 17.5 sqm per job. This is based on earlier HillPDA data that shows typical office density ratios being at around 20 in suburban areas and around 15 sqm per job in strong market areas. While there may be significant variation within the LGA of office density and occupation ratios, further research would be required to determine an exact figure. In this instance, an average is used.

Office based employment is further segmented into:

- Stand-alone office space, being strata office units or office buildings; and
- Ancillary office space associated with other land uses such as hospitals, schools, factories and shops.

This method provides an estimate of total stand-alone office space in 1991 and 2011. The data for regional NSW and Port Macquarie-Hastings are shown below.

The estimates for Port Macquarie-Hastings shows demand for standalone office space increasing from about 47,000 sqm in 1991 to about 78,000 sqm in 2011. The share of jobs based in offices in Port Macquarie-Hastings was 36% in 2011; marginally higher than the 1991 share of 34%.

Table 10 - Office Trends in Port Macquarie-Hastings, 1991-2011

	1991	2011
Jobs	15,953	23,060
Office Based Jobs	5,381	8,229
Percent	0.337	0.357
Office Floor space	94,150	156,251
Stand Alone Office	47,080	78,125

Source: HillPDA 2016 derived from 1991 and 2011 ABS Census

The table below shows Port Macquarie's share of jobs and office jobs (and hence office floorspace) in 1991 and 2011. The Port Macquarie Hastings share of regional NSW office jobs and floorspace increased

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between 1991 and 2011; from 1.99% of regional office based floorspace to 2.68%.

Table 11 - Port Macquarie Share of Total Jobs and Office Jobs in the Regional NSW, 1991 and 2011

	199	1	11	
	Jobs	Office Based Jobs and Floor Space	Jobs	Office Based Jobs and Floor Space
Total share	1.89%	1.99%	2.59%	2.68%

Source: HillPDA 2016, from 2006 and 2011 ABS Census

Using an annual average rate of change in the share of office based jobs in Port Macquarie between 1991 and 2011, projections for the NSW regions' key metrics were made - stand-alone office space, office floorspace, office based jobs and total jobs.

This suggests that office based jobs will continue to become more important over time, accounting for 39.4% of total jobs by 2036.

Overall, this method suggests regional NSW will have around 1.34M jobs by 2036, with about 0.53M being office based jobs. This finding was compared to NSW Department of Planning age cohort projections to 2036. This data source suggests regional NSW will have around 1.95M persons of working age (nominally 15 to 64) by 2036, and as such the employment projections appear plausible.

Medium Growth Scenario

The next step in the method is to apportion regional stand-alone office demand to Port Macquarie. This is done on a reducing share basis from 1991 and 2011 as observed and extrapolated to 2036. Under a medium growth scenario, this approach suggests Port Macquarie will accommodate 4.1% of the region's office market by 2036 (up from 2.7% in 2011) and require in the region of 188,000 sqm of stand-alone commercial office floorspace.

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Table 12 - Regional Job and Office Projections with Port Macquarie - Hastings Apportionment, 2006-2036

Year	Total Jobs in Regional NSW	Office to Total Job Ratio	Total Office Based Jobs in Regional NSW	Port Macquarie Share of Regional NSW Office Market	Required Stand Alone Office Floor Space in Port Macquarle	SQM Land Requirement at 0.4 FSR	HA Equivalent
2006	990,460	35.4%	350,634	2.6%	78,880	197,200	19.7
2011	1,056,842	35.9%	379,604	2.7%	88,911	222,276	22.2
2016	1,118,470	36.6%	409,207	2.9%	104,228	260,569	26.1
2021	1,183,691	37.3%	441,119	3.2%	122,183	305,459	30.5
2026	1,233,509	38.0%	468,229	3.4%	141,037	352,591	35.3
2031	1,285,424	38.7%	497,005	3.7%	162,799	406,997	40.7
2036	1,339,524	39.4%	527,550	4.1%	187,919	469,797	47.0
Change 2016-36					83,691	209,228	20.9
Avg/ann 2016-36					4,185	10,461	1.0

Source: HIJIPDA and ABS

The required increase in office space would be almost 84,000 SQM between 2016 and 2036 – an annual average rate of 4,200 SQM. If this floorspace demand were to be accommodated in an out of centre location, such as a business park or campus office environment, based on a FSR of 0.4:1 the required land area (absolute net developable area) is 20.9 hectares as shown in the table below.

Table 13 - Land Requirement Based on Medium Growth Scenario Floorspace Demand Projections 2016-2036

Year	Additional Required Hectares from 2016
2021	4.5
2026	9.2
2031	14.6
2036	20.9

Source: HillPDA estimate based on FSR of 0.4:1

Low Growth Scenario

A low growth scenario has been modelled in which the share of regional NSW office floorspace accommodated by Port Macquarie Hastings grows at a rate below the historic trend line for the next 20 years. This scenario assumes that the rate of change in the share of regional NSW office based jobs apportioned to Port Macquarie Hastings grows at around 0.5% over the period to 2036.

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Table 14 - Regional Job and Office Projections with Port Macquarie - Hastings Apportionment, 2006-2036 – Low Growth Scenario

Year	Total Jobs in Regional NSW	Office to Total Job Ratio	Total Office Based Jobs in Regional NSW	Port Macquarie Share of Regional NSW Office Market	Required Stand Alone Office Floor Space in Port Macquarie	SQM Land Requirement at 0.4 FSR	HA Equivalent
2006	990,460	35.4%	350,634	2.6%	78,880	197,200	19.7
2011	1,056,842	35.9%	379,604	2.7%	88,911	222,276	22.2
2016	1,118,470	36.6%	409,207	2.8%	101,175	252,938	25.3
2021	1,183,691	37.3%	441,119	3.0%	115,132	287,829	28.8
2026	1,233,509	38.0%	468,229	3.1%	129,005	322,512	32.3
2031	1,285,424	38.7%	497,005	3.3%	144,549	361,374	36.1
2036	1,339,524	39.4%	527,550	3.5%	161,967	404,918	40.5
Change 2016-2036					60,792	151,980	15.2
Avg/ann 2016-2036					3,040	7,599	8.0

Source: HillPDA and ABS

Under the low forecast Port Macquarie-Hastings will accommodate 3.5% of the region's office market by 2036 and require in the region of 162,000 sqm of stand-alone commercial office floorspace. This equates to an additional 61,000 SQM — or an average of 3,040 SQM of stand-alone office floorspace every year.

If this floorspace were to be provided in an out-of-centre location such as a business park or campus office environment, based on a FSR of 0.4:1 the LGA will need around 15 hectares of absolute net developable land to 2036.

Table 15 - Land Requirement Based on Low Growth Scenario Floorspace Demand Projections 2016-2036

Year	Additional Required Hectares from 2016
2021	3.5
2026	7.0
2031	10.8
2036	15.2

Source: HillPDA estimate based on FSR of 0.4:1

Distribution of Demand

The main focus of the provision of office based demand forecasts is to assess the net change in the future to provide a guide to the long term take up of space. Under a medium growth or a lower growth scenario, it is considered that a significant component of future commercial floorspace demand will be likely to meet the needs of the growing population of Port Macquarie-Hastings. Population serving

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industries are more likely to locate in the CBD than in business park style premises.

Using a benchmark of 80% of office market demand accommodated in the CBD locations of Port Macquarie-Hastings, between 12,000 to 17,000 sqm of stand-alone commercial floorspace will be required outside of CBD locations. At an FSR of 0.4:1, this results in a net developable land requirement of between 3ha and 4.2ha. The appropriate zoning of land to meet this requirement could be accommodated at the Airport Precinct, given that the Port Macquarie CBD is relatively constrained for business park style development.

Constraints CBD include:

- Lack of large sites with contiguous office floorspace potential;
- Infrastructure congestion; and
- Competition from alternative land uses, including residential and retail land uses.

Other locations that may accommodate campus style commercial floorspace include the CSU precinct and Thrumster. Of these, Thrumster would be expected to provide a neighbourhood centre role rather than a business park environment.

Summary

Office construction trends suggest new office supply in the local market area Port Macquarie Hastings has been limited over the past 6 years with limited new office supply. The medical sector has seen new developments and a component of these can be allocated to the office market. This has occurred at a time of strong growth in the residential sector and growth in the aged population in Port Macquarie and across the LGA.

Future take up of office floorspace in Port Macquarie Hastings is contingent on development being realised over time. While recent past property market trends provide a guide to possibilities in the future, they may be unreliable over a very long term outlook period due to cycles in the property market and structural changes in the economy and underlying demographic characteristics of regions.

A method to test long term needs or demand is via long term economic and employment projections. This approach provides an order of magnitude guide to future demand for jobs, office based jobs and office floorspace.

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Analysis of employment data suggests stand-alone office space has increased from about 89,000 sqm in 2006 to about 101,000 in 2016.

Under a medium growth scenario it is estimated that Port Macquarie will accommodate 4.1% of the regional NSW office market by 2036, up from 2.9% in 2016. 84,700 sqm more stand-alone office space would be required taking up almost 21 hectares of absolute developable land. 39% of the working aged population would have white collar jobs by 2036.

Under the lower growth scenario, it is estimated that an additional 60,800 SQM of office floor space will be required to from 2016 to 2036 which will require 15 hectares of absolute net developable land at a 0.4:1 FSR. This level of office floorspace demand would mean that 38% of the working age population would have white collar jobs.

Demand for stand-alone office floorspace by 2036 is expected to be between 61,000 and 85,000 sqm. Assuming CBD capture rates of 80%, this level of stand-alone office demand will require from 3 hectares to 4.2 hectares of absolute net developable land. Assuming lower CBD capture rates of 60% would result in demand for up to eight and half hectares of land being required for business park style office space. In order to ensure an adequate supply of land we recommend at least 10 hectares of land be appropriately zoned to accommodate out-of-centre office floorspace in Port Macquarie-Hastings.

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5 DEMAND FOR INDUSTRIAL LAND

The Mid-North Coast Regional Strategy identifies Port Macquarie — along with Coffs Harbour - as requiring substantial industrial land to support future employment growth. The Strategy notes that "local land use planning will be required to ensure that opportunities exist for a range of industrial development types, including light, general, heavy, transport and business technology industries, to service the needs of the growing population and export markets".

There is expected to be an excess of supply if the land currently under investigation is released for development. HillPDA concludes that land is being released beyond projected market demand in the short term to provide for the best economic outcomes and an efficient economy. There are 530ha of industrial zoned land in Port Macquarie-Hastings LGA, of which around 245ha of land is developed and 285ha is zoned and vacant. If Herons Creek - which is constrained - is excluded, there are around 210ha of vacant suitable industrial land available to the market.

The HillPDA review of the Industrial Land strategy identified that there were three sites in the planning stages of investigation and possible future rezoning. These included the Airport which will add around 10 hectares of developable land, Area 14 (Lake Cathie), which will add around 4 hectares of developable land and the John Oxley Drive and Oxley Highway area that could potentially add a further 8 hectares. This would bring the total developable area to around 232ha.

The Port Macquarie-Hastings LGA will demand an additional 78ha to 135ha of industrial land to 2036 indicating there is sufficient current supply to meet demand to 2036.

For the longer term, additional land may be required in order to ensure that future industrial land, beyond 2036, is continued to be made available. Such land needs to be sufficient to:

- Facilitate market choice;
- Maintain affordability;
- Allow for expected loss of yield in some areas due to constraints;
 and
- Be located appropriately in relation to urban growth and market preference.

³ MNCRS; 2009, p.24

Ref: Airport Land Demand Assessment C17030 Final

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An area of priority investigation noted in the 2015 review of Industrial lands was the airport precinct, noting the requirement to accommodate business technology, local services growth and airport related industries. The review noted that available land at the airport is appropriate for a range of aviation related uses including - couriers, freight, logistics, services relating to airport, manufacturing, light aircraft manufacture, aircraft maintenance and repairs, search and rescue, aerial surveillance, aircraft instrument/electrical installation, charter operations, aircraft restoration, flight training, petrol/fuelling, skydiving operations, helicopter operations and emergency services.

Various parcels of land at the airport have been identified in the Port Macquarie Airport Master Plan 2010 as "Zone SP2 Infrastructure – Air transport facility" and have been reserved as potentially suitable for possible future airport infrastructure and facilities, including terminal buildings, parking facilities, emergency services, etc.

Local Service Industrial Demand

In the Industrial Land Review, HillPDA calculated projected total local service industrial demand based on population forecasts. These projections are presented in the table below.

Table 16 - Additional Local Service Industrial Land Demand by Location to 2036 (hectares)

Precinct	Low Participation	High Participation	Full Participation
Camden Haven	3.0	4.2	5.3
Flynns Beach			
Kings Creek - Sancrox - Lake Innes	5.9	8.1	10.1
Lake Cathie - Bonny Hills	5.7	7.9	9.9
Lighthouse Beach - Greenmeadows	1.7	2.3	2.9
Port Macquarie - Innes Pen	1.2	1.6	2.1
Rural North	2.7	3.7	4.7
Rural West - South	1.6	2.1	2.7
Shelly Beach - Bellevue Hill	0.9	1.2	1.5
Area 13 (Thrumster)	12.2	16.8	21.0
Town Beach – CBD	1.0	1.4	1.7
Wauchope	2.8	3.8	4.8
Westport	0.4	0.6	0.7
Total	39.0	53.8	67.4

Source: Hill PDA 2015

The table above indicates Port Macquarie-Hastings will require an additional 39ha to 67ha of local service industrial land to cater for demand to 2036. This demand is a component of total industrial land demand in the LGA.

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Airport Precinct Expansion - Land Use Assessment

6 RECOMMENDATIONS

Recommendations for the study area are documented below.

Planning Policy

To maintain and further develop Port Macquarie's role and purpose into the future, land use controls will need to be managed to ensure that appropriate uses are balanced across the centre and the viability of businesses in the Commercial core are maintained.

A mix of land uses in the Port Macquarie CBD is preferable into the future. The function of the CBD is largely retail and in recent years commercial development has been limited. To encourage commercial activity in the CBD, zoning at the airport must not detract from the activities at the CBD.

Office Development Requirements

Office use across Port Macquarie CBD is an important activity that contributes to the vibrancy of the centre, supports retail activity during weekdays and provides diversity in local employment opportunities. Port Macquarie plays a role as the regional hub for business services, administrative services and government functions. However, while there has been significant development in the medical sector owing to the Base Hospital development and the Port Macquarie Private Hospital, there has not been significant commercial office development activity in the LGA over the last six years.

Growth based on longer term trends suggest that demand will be strong - however the longer term trend incorporates a period of significant structural adjustment and a period of significant growth in Port Macquarie's role as a regional service centre. Projections based on shorter term trends indicate a slower rate of growth in demand for commercial floorspace in Port Macquarie-Hastings LGA.

Consultation with local real estate agencies indicated that demand for new commercial development in Port Macquarie other than for medical premises has not been particularly strong. It is possible that the provision of a significant quantum of land for commercial development outside of Port Macquarie CBD may have an impact on the potential for future commercial development within the commercial core. However, as there are limited opportunities for large floorplate office developments within the CBD. The typical

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occupiers of business park B7 space may not necessarily seek CBD based alternative accommodation options if business park facilities are not available - rather seeking alternative locations where accommodation needs can be met. These might include opportunities outside of the Port Macquarie-Hastings LGA area.

Further, the 2015 HillPDA review of the Port Macquarie-Hastings Industrial Land Strategy identified that apart from aviation related uses, the site (at the airport) is appropriate for high technology and campus style business park development.

A judgement is required to determine whether the airport site is the most suitable location for this type of commercial development or whether other locations in Port Macquarie Hastings LGA are better suited to this role. The Port Macquarie CBD is relatively constrained for campus style or business bark commercial office development while alternative locations, such as Thrumster would be expected to be more focused on providing a local town centre role as opposed to a campus style business park environment. Particularly when considering that the B4 mixed use zone provision at Thrumster – while permitting (with consent) office premises – also allows for residential development in a number of formats, including shop top housing, residential flat developments, multi-dwelling housing and seniors housing.

The analysis on commercial floorspace and land requirements to provide for the commercial floorspace projections provides an order of magnitude guide to guide planning decision making. A significant component of the required floorspace provision will be in the CBD areas of Port Macquarie, Wauchope, Laurieton and Thrumster going forward. Businesses occupying commercial floorspace in the CBD in order to serve local populations and businesses are expected to continue to locate in CBD areas notwithstanding the availability of commercial floorspace elsewhere in the LGA.

Projecting the demand for commercial floorspace that is not driven by local resident population and business demands for services depends on a range of factors. Not all businesses require a CBD location, and those seeking lower rent options with parking provision for all employees may opt to locate in out of town centre business park locations. Forecasts in this analysis have adopted a benchmark target figure of 80% of expected demand for stand-alone office floorspace in Port Macquarie Hastings to be accommodated in the existing CBD areas of Port Macquarie Hastings. The actual proportion may be more or less than 80%. This figure has been adopted to

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provide an order of magnitude guide to the potential level of demand that might occur. The analysis has determined that between 3 ha and 4.2 ha of absolute net developable land will be required to meet demand for stand-alone office floorspace over the period to 2036 and that land at the airport is appropriate for this type of development.

Given the variability in the proportion of demand that may occur in out of town office locations relative to CBD office locations, a range of capture rates for commercial centres should be considered. A lower capture rate in the commercial centres of say 60% would result in a demand for up to eight and half hectares of land being required for business park style office space. In the interests of cost effectiveness it is preferable to ensure an adequate supply of land and hence we recommend at least 10 hectares of land be zoned to accommodate out-of-centre office floorspace.

Council could consider the staging of development on the Airport Precinct Land in order to overcome any concerns over a glut of business development adversely impacting the prospect of retaining commercial office users in Port Macquarie and to ensure that existing infrastructure capacity is not exceeded.

It is recommended that the take-up of development opportunities on land zoned at the airport is reviewed on a periodic basis – for example at five year intervals – to determine whether the quantity of land set aside for office uses is sufficient to meet the needs of occupiers. If demand for office space is strong, then the rezoning of additional land could be brought forward or investigated further. The periodic review would also provide opportunities to assess the strength of demand for office space in Port Macquarie CBD and to maintain an appropriate balance between protecting the longer term commercial viability and success of the CBD and enabling businesses that require larger office floorplates in business park type premises to establish in Port Macquarie Hastings.

Service Industry Development Requirements

In addition to the requirement for provision of commercial office land in Port Macquarie-Hastings, there is a need for identification of appropriate locations for service industry employment land. HillPDA have projected demand for service industry land requirements over the period to 2036. These projections show between 39ha and 67ha of land will be required for additional services industry employment over

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the period to 2036. The majority of this land – 21 ha and 10 ha – would be required in the Thrumster and Sancrox-Lake Innes areas. The HillPDA Review (2015) identified that there were opportunities to provide additional light and general service industrial lands to cater for employment opportunities in Thrumster, Lake Cathie/Bonny Hills, and Kew/Lakewood and as such, additional land would not be required at the airport precinct in order to cater for the additional industrial land requirement. Despite this, the current B7 zoning allows for light industrial development with consent.

While the 2015 Industrial Review identified the Airport land as a large dedicated site close to the urban area of Port Macquarie with potential to accommodate future local services growth, and to accommodate the transferred demand from any future rezoning of existing industrial areas to commercial, the existing and future opportunities at Thrumster, Lake Cathie Bonny Hills and Sancrox mitigate the need to provide additional land for service industry at the airport in the medium term.

This is after taking into account the shortcomings of industrially zoned land at Herons Creek and Bago Road in Wauchope. These areas are not well located to provide for demand generated in Port Macquarie.

The transition of existing industrially zoned land in the Lake Road industrial precinct to other land uses and the potential displacement of industry could be accommodated at Sancrox. Sancrox is well located in terms of access to the Pacific Highway, while further provision of light industrial land nearer Port Macquarie at Lindfield Park Road and Partridge Creek in the Thrumster release area could accommodate displaced industry. It is not considered likely that land zoned for services industry will be required at the Airport. However should demand for service industry uses be in excess of that projected in the 2015 HillPDA Industrial Lands review, appropriately zoned land could be used for light industry and service industry requirements at the airport.

Appropriate Zoning for the Airport Precinct

Zoning to be considered at the airport includes B7 Business Park, B4 Mixed Use and B5 Business Development. Tourist zoning was considered as potential for tourism accommodation may be a factor that attracts business to locate near the airport: however office premises are not a permitted use in the SP3 zone and therefore such

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zoning would not meet the demand requirements for commercial office space in Port Macquarie Hastings.

The B4 Zone allows for office development and for light industrial uses – which are permitted with consent through virtue of not being included in the prohibited uses for the zone, Tourist accommodation – in the form of hotels or motels are also permitted in B4. B4 also allows for residential uses. This may not be appropriate at the Airport land given the infrastructure constraints (the requirement for future development of the Airport Link Road), and may compromise the ability of developers to provide large scale office development in campus style premises. In addition, permitting retail to develop at the airport land may play a role in undermining the existing retail hierarchy in Port Macquarie Hastings.

Offices are also permitted in the B5 zone. Light industry is identified as permitted with consent. The zone provides for employment generating uses such as offices, warehouses, retail and bulky goods premises. The zone is generally applied in locations that are close to and support the viability of centres. Provision of bulky goods premises at the Airport land may undermine the existing retail hierarchy in Port Macquarie Hastings.

It is recommended that around 10 hectares of land at the airport be zoned B7. While B7 zoning does not permit tourist accommodation, there is significant provision of tourist accommodation options in Port Macquarie CBD. If it is deemed necessary, further appropriate zoning could be provided within the Airport land to accommodate hotel development. This could be SP3 Zone. The B7 zone does allow for office development, and also for light industrial land use activities should demand for these uses be in excess of that projected in the 2015 HillPDA Industrial Lands review. Further, residential accommodation is not permitted in the B7 zone.

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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 2 - Hill PDA report 2017

PP2015 - 3.1 5/7/2019

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Peter Cameron Port Macquarie Hastings Council PO Box 84 Port Macquarie NSW 2444

5 July 2017

Dear Peter

Subject: Port Macquarie Airport Precinct Expansion - Review of Submission from King and Campbell

HillPDA was commissioned by Port Macquarie Hastings Council (PMHC) Strategic Land Use Planning to prepare a review of the submission from King + Campbell in relation to the Port Macquarie Regional Airport Business Park. King + Campbell represent PMHC as the owner and operator of the Port Macquarie Airport (PMHC Airport). As part of the submission, King + Campbell had Gillespie Economics review the HillPDA report titled "Land Use Assessment of the Proposed Airport Precinct Expansion" (2016). The 2016 HillPDA study was commissioned by PMHC Strategic Land Use Planning to provide a forecast of demand for business park floor space and zoned land.

The 2016 HillPDA report

The 2016 HillPDA report projected demand based on a combination of trend extrapolation, employment trends and population forecasts. It concluded that only 4-5 hectares of land is likely to be taken up for business-park uses at the airport under a medium growth scenario to 2036. However this demand could easily double under a higher growth scenario and/or higher rate of total LGA "white collar" jobs being captured at the airport. At least 10 hectares of land was recommended for rezoning (Page 42).

The HillPDA report also concluded that 10 hectares of business park at the airport would not undermine the commercial centres hierarchy given that around 60% of future "white collar" jobs would locate in Port Macquarie CBD and other centres.

Liability limited by a scheme approved under the Professional Standards Legislation

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The Gillespie Submission

The Gillespie review of the HillPDA study was critical in that the HillPDA methodology was not aspirational. It assumed 'business as usual' rather than investment driven / airport related. The Gillespie review was critical of the HillPDA study in that it did not make an adjustment to the "business as usual" forecast due to the significant level of investment at the airport from all levels of government. The report states that the airport has "potential to be a catalyst to attract new investment and business into the region." Finally it states "the airport is seen by PMHC as a key driver for regional growth, economic development and employment' (Augusta Properties Pty Ltd, p. 5) and hence demand for rezoned land is driven by the airport development NOT a consequence of population growth".

Before considering this issue it is important to note that the Gillespie submission did not address the commercial centres hierarchy.

Planning Considerations

There are several factors which I will address here. Before discussing the points for and against, it is clear that planning should support jobs and economic growth. The objects of the NSW Planning and Environment Act include "the promotion of orderly and economic use of land". Hence all things being equal it is better to zone more land for employment uses rather than not enough. Planning for the Airport Business Park is also consistent with the Mid-North Coast Regional Strategy.

Economic Growth Considerations

In support of the Gillespie argument there are always examples where the introduction of a "base" industry can stimulate jobs and economic growth either temporarily or in the long-term. A good example is a new mine. People do chase jobs or job opportunities. During the mining boom new mines in the Hunter Valley and Midwestern regions of NSW certainly stimulated jobs which then stimulated population growth and demand for more housing and urban services. There are multiplier impacts, both production and consumption induced, that can result in significant growth in the local or regional economy.

That said there are a few counter claims that should be raised. Firstly airports are not really a base industry. Airports are transport

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infrastructure required to support other industries. The demand to fly people and cargo is generated from other industries — whether it is in mining, tourism, agriculture, etc. "Build an airport and they will come" is not necessarily true — although an airport could improve demand as a result of improved accessibility.

Examples of Other Regional Airports

There are many cases where local governments have been a little optimistic with their predictions about airports attracting other businesses.

As an example Dubbo has 96 hectares of industrial zoned land north of the airport but to date there has been no development of this land¹. There are a few transport businesses located immediately to the south of the airport. Dubbo has more flights with around 10 to 11 arrivals and 10 to 11 departures each day compared to Port Macquarie 7 flights in and 7 flights out. Mining has been a big stimulus to Dubbo resulting in a need to fly workers in and out.

Coffs Harbour accommodates a similar number of flights with around 10-11 arrivals and 10-11 departures each day. Yet it has little to show in the way of an "airpark". There is a small innovation or technology park with a number of tenants but this has its nexus relationship with the education sector (rather than the airport). There are several transport related industries but these are found in the industrial area some 5km from the airport rather than adjacent to the airport.

Wagga Wagga has a similar number of flights with 2 from Melbourne and 8-9 from Sydney through the day. The main industry next to the airport is the RAAF base. There is a masterplan for the airport with plans to accommodate a diverse range of commercial and industrial businesses, education and research institutions and aviation support.

Overall the evidence that regional airports stimulate significant interest in a business park is a little weak. It's likely that other factors (not just the airport) would be involved for a business park near a regional airport to be successful.

Ref: C17343 - Port Macquarie Airport Employment Lands Review of Submissions

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Dubbo City Regional Airport Masterplan 2015

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Planning Options

We understand that if more than 20 hectares of business park were absorbed in the market and developed it is likely that access via Hastings River Drive will begin to exceed the capacity of the road network until such time as the road from Oxley Highway is constructed. Therefore no more than 20 hectares can be rezoned until the link road is constructed.

This leaves two options for Council to consider:

- Option 1 is to rezone no more than 10 hectares for business park uses. The disadvantage with this option is that it restricts the scenario of a significant or rapid development of the airpark unless there is rezoning of further land.
- Option 2 is to rezone no more than 20 hectares to B7 for business park uses. If proven that the market absorbs the land at a faster rate than expected (and hence appropriately zoned land depletes quicker than expected) then the new road could be constructed earlier subject to funding. This is the option that we recommend.

The Centres Hierarchy

Option 2 is not likely to threaten the viability of commercial centres. The main reason was identified in the 2016 HillPDA study. The only "white collar" industry in the LGA to have shown significant interest in commercial space over the past decade or two has been health. This industry, as well as several others (such as real estate services, etc), is population based and would therefore express a stronger interest in Port Macquarie CBD, other commercial centres and the hospital precinct rather than the airport.

If Gillespie Economics proves to be correct in its forecast of the airport stimulating jobs then many of these businesses would not locate in the CBD anyway. These are businesses that rely more on proximity to the airport (and perhaps also the Pacific Highway) rather than proximity to the population base. There is some risk that they would locate outside the LGA altogether if space was not available. This risk was identified in the 2016 HillPDA study.

Ref: C17343 - Port Macquarie Airport Employment Lands Review of Submissions

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Light Industry

In relation to light industry Council's Employment Lands Strategy prepared by HillPDA noted that industrial land was not needed at the airport due to sufficient supply in the LGA. Nevertheless the airport would be an attractive location for many businesses – not just because of the airport but because of the site's proximity to the Port Macquarie urban area relative to Sancrox, Thrumster and Wauchope. We note that the majority of people live east of the airport and that there are very few remaining sites to develop in the Lake Road and Hastings River Drive industrial areas. Therefore there is the opportunity to rezone part of the developable area for light industry without exceeding the road capacity.

Sincerely

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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 3 - Gillespie Economics Review 2017

PP2015 - 3.1 5/7/2019

Port Macquarie Airport Business Park Investigation Review of Demand Forecasts

Prepared for Port Macquarie Hastings Council

Ву



Gillespie Economics www.gillespieeconomics.com

24 April 2017

Disclaimer

All surveys, forecasts, projections, findings and recommendations made in this report are made in good faith on the basis of information available at the time; and achievement of objectives, projections or forecasts set out in this report will depend among other things on the actions of the NSW Government and their agents, over which we have no control. Notwithstanding anything contained therein, neither Gillespie Economics nor its servants or agents will, except as the law may require, be liable for any loss or other consequences arising out of the project.

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1.0 INTRODUCTION

King and Campbell Pty Ltd, on behalf of Port Macquarie Hastings Council as the owner of the Port Macquarie Airport (PMHC Airport), has prepared a preliminary zoning plan as part of the proposed establishment of the Port Macquarie Regional Airport Business Park.

Port Macquarie-Hastings Council as the Planning Authority (PMHC Planning) engaged Hill PDA to undertake a land use assessment of the proposed Airport Business Park to understand the supply and demand for land uses and determine the appropriate planning controls for the precinct (Hill PDA, 2016).

PMHC Airport has engaged Gillespie Economics to undertake a review of the Hill PDA assessment and prepare a brief report commenting on the Hill PDA methodology and its application to the Airport Business Park, including a consideration of potential competition with the CBD.

This review has regard to some of the relevant planning context which is summarised in Section 2.

2.0 PLANNING CONTEXT

2.1 North Coast Regional Plan 2017

The North Coast Regional Plan 2017 (NSW Department of Planning and Environment, 2017) identifies airports as centres of employment.

Action 6.1 is "Facilitate economic activity around industry anchors such as health, education and airport facilities by considering new infrastructure needs and introducing planning controls that encourage clusters of related activity

The North Coast Regional Plan (p. 28) identifies that "Regional cities also have employment, health, education and airport precincts that are capable of promoting employment growth for the entire North Coast." Action 7.1 arising from this is to "promote new job opportunities that complement existing employment nodes around existing education, health and airport precincts."

Figure 8 in the North Coast Regional Plan identifies land around the Port Macquarie Airport as "Investigation Area - Employment Lands".

Direction 10: Facilitate Air, Rail and public transport infrastructure identifies that "Airports are important gateways for business, tourism and personal travel, as well as high-value freight. Airport precinct plans will be developed to investigate opportunities for compatible and complementary air transport-related industry and business uses on land adjoining airports. The development of retail and bulky -goods uses should be avoided in these areas." Action 10.1 is to "deliver airport precinct plans for Ballina-Byron, Lismore, Coffs Harbour and Port Macquarie that capitalise on opportunities to diversify and maximise the potential of value-adding industries cost to airports."

The North Coast Regional Plan (p. 88) defines Employment Nodes as "Land use clusters that **leverage** and support intensification of economic activity in and around key employment anchors like hospitals, universities and airports."

2.2 Port Macquarie Hastings Urban Growth Management Strategy 2010

The Port Macquarie-Hastings Urban Growth Management Strategy (UGMS) 2010 identifies that "the current economic development strategy is to surround certain distinct infrastructure opportunities with superior business settings, in turn supported by high quality industry and business development programs, to grow an increasingly diversified, high value adding, wealth creating, small business base. It is focussed on the development of clusters or aggregations of related activities, which result in a concentration of likeminded firms utilising a common resource and achieving synergies as a consequence." One of these is the Airport precinct where "It is proposed to investigate part of the existing east-west grass runway and other land to the east of the airport, including land along Boundary St, to determine the suitability of this areas for service industry and business park industrial uses. There is also potentially synergies aviation related uses, including couriers, airfreight, logistics, services relating to airport, manufacturing, light aircraft manufacture, aircraft maintenance and repairs, search and rescue, aerial surveillance, aircraft instrument/electrical installation, charter operations, aircraft restoration, flying training, petro/fuelling, skydiving operations, helicopter operations, and emergency services. Land use planning investigations are proposed for the Airport Precinct as discussed in Section 5.3.4c) of this Strategy."

The UGMS 2010 (Table 5.3.2), which draws on the Port Macquarie - Hastings Industrial Land Strategy Review 2010 (Hill PDA 2015), forecasts demand for 10ha of industrial land at the Airport Precinct.

2.3 Port Macquarie Hastings Industrial Land Strategy Review 2015

The Port Macquarie Hastings Industrial Land Strategy Review 2015 (Hill PDA 2015) has been prepared to inform the current review of the UGMS being undertaken by Council.

Section 3 of the report addresses the changing nature of industry including off-based trends toward business park developments, clustering and agglomeration along transport corridors, universities, airports and hospitals.

Table 14 identifies estimated developmental land area at the Airport Precinct of 10ha, with a B7 Business Park Zoning.

2.4 Port Macquarie Airport Master Plan 2010 Addendum Report

The Port Macquarie Airport Master Plan 2010 Addendum Report outlines plans for upgrading of the Port Macquarie Airport. This is being progressively implemented.

In 2012-13 / 2013-14 Port Macquarie airport received a \$20.5m upgrade of the airside infrastructure (runway etc). An additional \$7.5m is committed over 2016-17 / 2017-18 for the proposed upgrade of the passenger terminal building. This is in addition to a \$12.2m investment in 2007-08 to upgrade the airport to cater for the introduction of VA jet services and \$1M in 2008-09 to provide for the introduction of checked baggage security screening services. Overall, \$41m has been spent / committed (by all 3 levels of government) to upgrade Port Macquarie Airport as a key component of the regional transport network and to underpin the region's growth, economic development and tourism potential.

3.0 PRELIMINARY ZONING PLAN FOR THE AIRPORT PRECINCT

The preliminary zoning plan for the Airport Precinct prepared by King and Campbell for Council is for:

- 23.75 ha of proposed B7 zoned land;
- 25.76 ha of SP2 (infrastructure air transport facility) zoned land; and
- 7.73 ha of B7 investigation land.

This includes rezoning 17.04 ha of land currently zoned B7 to SP2.

4.0 HILL PDA AIRPORT PRECINCT EXPANSION - LAND USE ASSESSMENT

Hill PDA (2016) undertook a land use assessment of the proposed Airport Precinct Expansion to understand the supply and demand for land uses and determine the appropriate planning controls for the precinct (PDA, 2016).

Two approaches were used to examined demand for commercial land:

- 1. extrapolation of trends in office construction activity over recent years.
- 2. projection of jobs by type and then use of populations-office based employment ratios to convert office based jobs to floor space demand. Key steps and assumptions in this approach our outlined below:
 - identification of employment trends between 1991 and 2011 at a 19 sector level of aggregation;
- allocation of jobs between office based (stand alone office space and ancillary office space) or nonoffice based;
- office jobs were converted to office floor space using a ratio of 17.5 sqm per job;
- used annual average rate of change in the share of office based jobs in the LGA between 1991 and 2011 and extrapolated them to 2036;
- apportioned regional stand-alone office demand to Port Macquarie medium growth scenario and low growth scenario;
- assumed that 80% of the increased office demand would be needed to service the needs of the growing population and be located in the CBD rather than business style premises. Found that 12,000 to 17,000 sqm of stand-alone commercial floorpsace would be required outside of CBD locations:
- estimated the absolute net development land that would be needed outside the CBD assuming a FSR of 0.4:1 - 3 to 4.2 ha;
- assuming a lower CBD capture rate of 60% then demand for outer CBD office space would be about 8.5ha.

In order to ensure an adequate supply of land Hill PDA (2016) recommended at least 10 ha of land be appropriately zoned to accommodate out of centre office floorspace in Port Macquarie - Hastings.

Hill PDA (2016) identified that there is sufficient current supply of industrial land to meet demand to 2036, including local service industrial demand. Hill PDA (2016) indentified that potential rezoning at the Airport will add around 10 ha of developable land.

Hill PDA (2016) recommended that:

- around 10 ha of land at the airport be zoned B7 to accommodate future demand for out-of centre office floorspace;
- Council consider the staging of development on the Airport Precinct land in order to overcome any
 concerns over a glut of business development adversely impacting the prospect of retaining
 commercial office users in Port Macquarie and to ensure that existing infrastructure capacity is not
 exceeded.

Hill PDA (2016) found that additional land would not be required at the airport precinct in order to cater for the forecast demand for service industry land.

5.0 REVIEW OF HILL PDA AIRPORT PRECINCT EXPANSION - LAND USE ASSESSMENT

5.1 Forecast Demand for Commercial Office Space

Hill PDA (2016) focus on the supply and demand for commercial office space using:

- extrapolation of past office development; and
- population projections, employment and floor space ratios and numerous assumptions.

Its recommendation for around 10 ha of land at the airport to be zoned B7 to accommodate future demand for out-of centre office floorspace, repeats its same finding in the Port Macquarie Hastings Industrial Land Strategy Review in 2010 (Hill PDA 2010), which was carried through to the Port Macquarie Hastings UGMS 2010, and the same finding in the Port Macquarie Hastings Industrial Land Strategy Review 2015 (Hill PDA 2015).

While the generic approach to forecasting may be suitable for normal business as usual projections of broad demand for commercial office space, it is questionable whether such a general approach provides a sound basis for decision-making in relation to the Port Macquarie Hastings Airport Precinct.

Firstly, general office space projections may not be representative of the specific types of activities that may benefit from rezoning at the airport. As identified in Hill PDA (2016, p. 23), "the types of business that locate near airports comprise those with time critical manufacturing and distribution, entertainment, tourism, corporate offices and business that require long distance connectivity. These types of uses and businesses may seek opportunities in the Port Macquarie Hastings area on land around or close to the airport. Typical commercial uses based around airport lands will required large floor plates and significant car parking." What is relevant is demand for a specific type of commercial office space. This was not addressed by Hill PDA.

Secondly, generic business as usual forecasting does not have regard to the implications of the recent \$21M investment in the airport and the proposed future investment. This is evidenced by Hill PDA's unchanged finding over time for 10 ha of land at the airport to be zoned for industrial/office uses. The \$21M investment in the airport and the proposed future investment has had no impact on forecast demand. However, the airport investment is not a business as usual event but an expansion of critical infrastructure that has the potential to be a **catalyst** to attract new investment and business into the region. As identified by (Aurecon 2011, p. 11), "The Airport Precinct business park will seek to attract new inward investment opportunities to the region and businesses that will either have a close association with airport activity or be likely to receive a competitive advantage by being located in close proximity to an airport." "It is envisaged that the Airport upgrade project will be the **catalyst** for the successful development of the proposed Airport Precinct business park, with a high-performing regional airport being a critical factor to the long-term attractiveness of the region to investors." (Aurecon 2011, p. 11). Consequently, demand forecasts at the Airport cannot be considered in isolation of the recent and future investment in the airport.

Thirdly, the generic business as usual forecasting was population driven and implicitly assumes that demand for commercial floorspace generally and at the airport precinct is driven by demand from the growing population. However, "The airport is seen by PMHC as a key driver for regional growth, economic development and employment" (Augusta Properties Pty Ltd, p. 5) and hence demand for rezoned land is driven by the airport development NOT a consequence of population growth. The airport precinct is likely to be attractive for industries that obtain a benefit from being located in close proximity to the airport,

many of which may be basic industries (i.e. those exporting from the region) rather than local service industries driven by local population growth. The potential is therefore for the development of the airport to attract business from other regions, including Sydney, because of lower rents and greater amenity while still enjoying proximity to a suitably scaled airport.

In this context, forecasting of demand for office and industry in the Port Macquarie Airport Precinct may be considered at least partially separate and additional to normal business as usual demand. The extent that the airport investment will drive inward investment and relocation of businesses could be informed by consideration of other upgraded regional airports and their surrounding developments.

5.2 Forecast Demand for Industrial Land

Hill PDA (2016) briefly examines demand for industrial land in the region and concludes that there is sufficient industrial land to meet demand to 2032 and so additional industrial zoned land at the airport precinct would not be required.

The consideration of demand for industrial land doesn't specifically address potential demand for uses that would be located in the proposed SP2 zone at the airport, but seem more related to uses that may be located in B7 zoned land.

Again, the projection of demand for industrial land is generic business as usual forecasting that does not distinguish between specific types (or location) of industrial activity that may benefit from rezoning at the airport, does not have regard to implications of the recent \$21M investment in the airport and the proposed future investment, and is largely focused on service industries driven by local population growth rather than demand that may be **driven** by the airport investment.

In relation to the first point, it is noted that Augusta (2011, p. 36) identified that it did not consider that the UGMS 2010 that predicts an overall excess of supply over demand of industrial land accurately reflect the situation for the Airport Business Precinct, because "a well presented, serviced and accessible business precinct at the airport is only properly compared to other centrally located (and appropriately presented) industrial land. It is not appropriate to compare this to industrial land at Wauchope, Camden Haven or other locations remote from the Port Macquarie town centre." Augusta (2011, p. 36) concluded that "Therefore it would appear that market(s) and location(s) with which the Airport Business Precinct should most properly be compared appear likely to be in a situation of undersupply going forward, and not oversupply."

5.3 Competition with the CBD

The proposed B7 zoning at the Airport Precinct allows for office uses. Hill PDA (2016) raises the issue of potential competition with the Port Macquarie CBD, and potential for development at the airport to adversely impact the prospect of retaining commercial office users in Port Macquarie.

However, these concerns would appear to be misplaced. Businesses locate where it is most beneficial for their profitability taking into account a range of supply e.g. labour availability and costs, land availability and costs, energy costs, transport costs and community/amenity factors, and demand factors e.g. customer accessibility, image etc. CBD locations offer agglomeration economies for some businesses and advantages re: customer accessibility etc. Other locations offer advantages to other types of businesses.

As identified by Hill PDA (2016, p. 21), "Economic changes to industry and technology has resulted in a

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significant shift in the location of office-based activities towards business park developments." These can offer different attributes to CBD locations including cheaper rents, plentiful car parking, open space and onsite amenities etc. (Hill PDA, 2106). The types of businesses that locate near airports typically require large floor plates and significant car parking (Hill PDA 2016). These are not the types of businesses that tend to locate in the CBD and "there are a limited number of large floorplate commercial office space occupiers in Port Macquarie at the present time" (Hill PDA 2016, p. 6) and "limited opportunities for large floorplate office developments within the CBD" (Hill PDA 2016, p. 45).

Potential occupiers of B7 zoned land at Port Macquarie "may not necessarily seek CBD based alternative accommodation options if business park facilities are not available - rather seeking alternative locations where accommodation needs can be met. This might include opportunities outside of the Port Macquarie-Hastings LGA area" (Hill PDA, 2016, p. 46).

Furthermore, overly prescriptive office space policy that serves to reduce competition can provide territorial monopoly rents to owners of office space and mitigates against the process whereby competition between locations ensures strong investment in refurbishment and expansion - and hence a process of continuous evolution and upgrading of office facilities to meet community requirements (BIS Shrapnel 1999).

6.0 SUMMARY/CONCLUSION

The North Coast Regional Plan identifies the importance of airports as employment hubs and that these precincts are capable of promoting employment growth for the entire North Coast. Airports can be a key driver of, and catalyst for, regional growth

Hill PDA (2016) focus on the supply and demand for commercial office space using:

- extrapolation of past office development; and
- · population projections, employment and floor space ratios and numerous assumptions.

While the generic approach to forecasting may be suitable for normal business as usual projections of broad demand for commercial office space, it is questionable whether such a general approach provides a sound basis for decision-making in relation to the Port Macquarie Hastings Airport Precinct.

Firstly, general office space projections may not be representative of the specific types of activities that may benefit from rezoning at the airport. What is relevant is demand for a specific type of commercial office space. This was not addressed by Hill PDA

Secondly, generic business as usual forecasting does not have regard to the implications of the recent \$21M investment in the airport and the proposed future investment. The \$21M investment in the airport and the proposed future investment has had no impact on forecast demand by HillPDA. However, the airport investment is not a business as usual event but an expansion of critical infrastructure that has the potential to be a **catalyst** to attract new investment and business into the region. Consequently, demand forecasts at the Airport cannot be considered in isolation of the recent and future investment in the airport.

Thirdly, the generic business as usual forecasting was population driven and implicitly assumes that demand for commercial floorspace generally and at the airport precinct is driven by demand from the growing population. However, "The airport is seen by PMHC as a key driver for regional growth, economic development and employment" (Augusta Properties Pty Ltd, p. 5) and hence demand for rezoned land is driven by the airport development NOT a consequence of population growth.

Finally, generic business as usual forecasting does not specifically address the changing nature of industry and the trends toward business park developments, clustering and agglomeration along transport corridors, universities, airports and hospitals.

7.0 REFERENCES

Augusta Properties Pty Ltd (2011) Port Macquarie Airport Business Precinct Preliminary Analysis Strategic Property Advice To Port Macquarie – Hastings Council, Port Macquarie Hastings Council, Port Macquarie.

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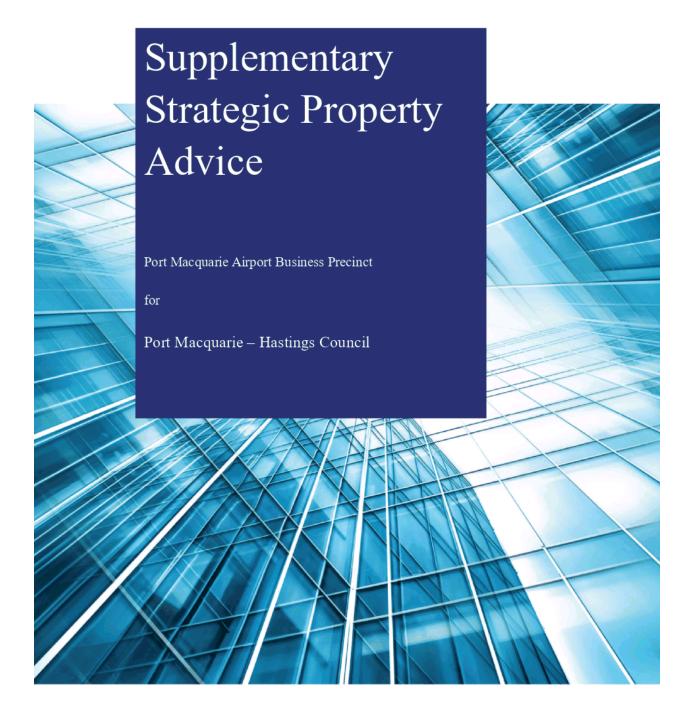
Port Macquarie Hastings Council (2013) Port Macquarie Airport Master Plan 2010 Addendum Report, Port Macquarie Hastings Council, Port Macquarie

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 4 - Augusta Report 2017

PP2015 - 3.1 5/7/2019

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EXECUTIVE SUMMARY

The Port Macquarie-Hastings region, the regional city of Port Macquarie, Council and the airport have achieved substantial progress since the initial Augusta report was submitted in April 2011, as summarized below.

Regional Vision and Opportunity

The NSW Government has recognized Port Macquarie as one of four regional cities of the NSW North Coast. These will be the major focus for employment, housing and investment over the next 20 years and beyond.

Council's vision for the Port Macquarie Hastings community over this period, as expressed in the draft Urban Growth Management Strategy 2017-2036, is "A sustainable high quality of life for all". A key requirement to achieve this vision is to deliver economic development and employment to create a prosperous and diversified economy.

Airport Contribution

The development of the Port Macquarie Airport is considered a key enabler of growth opportunities for Port Macquarie including tourism and other industry sectors. The airport has been upgraded to accommodate 180-seat Code 4C jet aircraft (i.e. A320 and B737-8). The Airport Master Plan provides for continued expansion of airport facilities and projects passenger numbers to double by 2036.

Airports are recognised for their ability to generate economic activity. The NSW Government North Coast Regional Plan confirms that the Port Macquarie Airport can be a key driver of, and catalyst for regional growth.

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Airport Business Park (ABP) Contribution

The NSW Government also promotes and supports the concept that airport precinct plans must be developed to investigate opportunities for compatible and complementary air transport-related industry and business uses on land adjoining airports. This is a logical extension of, and creates leverage for, the benefits the airport can deliver to the region.

It is proposed to build on the key role of the airport as a regional hub and transport gateway by creating the opportunity for a campus-style business park for technology, aviation-related and service industries, to deliver high value jobs.

Enabling Actions for ABP

Bio-Certification Assessment & Application

A Biodiversity Certification Assessment and Strategy submission dated October 2016 has been made for Port Macquarie Airport and surrounding lands. Once approved this will provide a 'pre-approved' mechanism for dealing with the ecological issues associated with the implementation of the Airport Master Plan and compliance with CASA standards. It also paves the way for the adoption of the Planning Proposal, the initiation of associated services amplification and development of flood-free road access to Port Macquarie Airport and surrounding land.

Planning Proposal

A Planning Proposal (rezoning application) is currently being considered by Council's strategic planners. The Planning Proposal was prepared taking into account the Airport Master Plan, airport operations, environmental considerations and economic and traffic impacts.

The adoption by PMHC of the Planning Proposal enables PMHC to facilitate delivery of a significant parcel of well situated employment land (237,500 m²) at the Port Macquarie Airport Business Park and the opportunity to attract new high value businesses and employers to the region.

Other Reports

Since completion of the initial report submitted by Augusta in April 2011 PMHC has produced or commissioned the following additional Council and consultant reports:

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- Airport Master Plan Addendum December 2013.
- Bio-Certification Assessment & Application Port Macquarie Airport and Surrounding Land – October 2016.
- PMHC Strategic Planning (PMHC Planning) for the Port Macquarie Airport Business Park.
- PSA Gap Infrastructure Analysis October 2014
- Traffic & Parking Systems Group Report June 2016.
- GHD Airport Precinct Traffic Study April 2016
- King + Campbell Landowners Planning Response April 2017.
- Hill PDA Report Airport Precinct Expansion Land Use Assessment November 2016.
- Gillespie Economics Review of Hill PDA Report April 2017.
- PMHC Economic Development Strategy May 2017.

Constraints

Ecological

The existing vegetation surrounding the airport includes areas identified as coastal wetlands potentially containing endangered ecological communities and/or threatened species.

The Biodiversity Certification Assessment and Strategy provides a response to the ecological issues associated with the implementation of the Airport Master Plan and compliance with CASA standards. An application has also been made under the Federal Government Environment Protection and Biodiversity Protection Act.

Services

To realize the potential of affordable employment land at the Airport Business Park it is important that relevant services infrastructure is planned and costed for implementation, including:

- Reticulated sewerage services to support the ABP and Airport Precinct.
- Reticulated water supply services to service the proposed Business Park.
- Catchment based stormwater drainage management facilities.
- Reticulated power supply.
- Reticulated telecommunications services including phone and National Broadband Network connection.

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Flood Free Road Access

The lack of flood free road access is a major constraint on the operation of the airport, the ability for the airport to deliver benefits to the region and to the establishment of an airport business park. It also inhibits and potentially prevents NSW and Federal assistance being provided in the event of the most likely natural disaster to affect Port Macquarie – flooding.

The provision of a new flood-free access also provides the opportunity to achieve connectivity of the airport to the regional road network while also providing relief to current and projected traffic load by the development of the secondary road access and/or connection to an orbital road network.

Opportunity

Port Macquarie's opportunity is to take a major step towards achieving its community vision by attracting high value business and jobs at low cost by undertaking key actions which are in any event required for other reasons.

Provision of flood free access to the airport is a requirement in its own right, but, once provided, it will be a 'game changer' for the ability of the airport to deliver benefits to the city and region by attracting high value employment opportunities and delivering economic prosperity.

It will strategically locate Port Macquarie Airport and the Airport Business Park with respect to all current business precincts and proposed activity within Port Macquarie. This will enable both Port Macquarie airport and Port Macquarie Airport Business Park to achieve their potential as a specialised high value regional business and employment hub and transport gateway.

The creation of the APB represents a unique strategic opportunity to complete and complement the existing business precincts in Port Macquarie. This statement is especially relevant to the connection of the airport and the ABP to the orbital road system that optimizes connectivity and facilitates highly efficient transport of personnel, goods and materials into and out of the Port Macquarie region.

The central location of Port Macquarie Airport and the ABP within the Port Macquarie network of business precincts and represents a highly efficient application of infrastructure that benefits the entire region. Consequently, the ABP is not a competing interest but rather a compliment to existing business precincts, other development sites and existing commercial and industrial zoned land elsewhere in the PMHC Local Government Area.

Get 'Shovel Ready'

On approval of the Bio-Certification and Assessment application by the NSW Minister for the Environment and adoption of the Planning Proposal for Port Macquarie Airport and ABP, and with road and services upgrades planned and costed, PMHC achieves a status of 'shovel ready' and positions itself to move very quickly to lobby both NSW and Federal Government for all possible grants to upgrade and amplify services and flood-free access roads to Port Macquarie Airport and the ABP.

'Shovel ready' status is the most compelling indication to new business, developers and investors that Port Macquarie is ready and open for business to attract new high value industries to move to the region.

Attract Grants

The current political environment is unusually positive for the prospects to attract grants. The NSW Government's commitment in 2017-18 is to spend \$22.3 billion, including major infrastructure projects and programs to realise opportunities for economic growth and provide for regional centres and associated communities. The Federal Government has already demonstrated support by its substantial contribution to the airport upgrade.

Specifically, the \$7.5m funding for the funding for the Port Macquarie Airport Terminal upgrade comprised the following contributions as a current and demonstrable example of NSW and Federal Government funding availability for infrastructure projects;

- \$5.0m in NSW Government funding through the Restart NSW Regional Tourism Infrastructure Fund.
- \$1.25m in Australian Government Funding through the Community Development Grants Program.
- \$1.25m PMHC contribution from the Port Macquarie Airport Reserve.

The development of valuable regional infrastructure, including airports and airport associated business parks, is fully consistent with all Federal and NSW Government strategies currently in place.

Flood free road access is the key enabling factor. Senior PMHC Executives have advised that that both the NSW Government and Roads and Maritime Services have expressed initial support and interest in the funding of additional major infrastructure projects relevant to Port Macquarie Airport and associated roads and services amplification.

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Attract Occupants

Once 'shovel ready' and with a commitment to deliver flood free road access confirmed, the upgraded Port Macquarie Airport and Airport Business Park becomes a strategic and unique offering to attract new government and non-government business to the Port Macquarie–Hastings region.

The proposed Airport Business Park should be promoted to attract aviation, hi-tech and service businesses drawn to the Airport, and to the new linkages between the airport and the other business precincts in the city and the region.

Low Cost/High Value Strategy

This is a low cost/high value strategy. The entire vision can be coordinated and budgeted by PMHC very early in planning and development phase for the Airport Business Precinct. PMHC has already made substantial progress with the upgrade to Port Macquarie Airport, which is planned to continue in 2018 with the proposed upgrade of the Terminal facility for a further \$7.5m.

PMHC has also already prepared and lodged the Bio-certification Application and the Planning Proposal. Attraction of grants for the provision of flood free road access would be the catalyst and 'game changer' for the airport to maximise its contribution to the region. The ABP would be positioned to attract interest from occupants and developers, who will contribute to funding delivery of the services infrastructure.

PMHC has already achieved significant progress in the early planning and costing of major infrastructure and services upgrade required to create the ABP. Whilst these costs are substantial they represent a normal part of the development process of a new business precinct/estate and routinely precede major development costs and contributions by developers and occupants.

Therefore at this point there is no need to lock in a funding model because the strategy minimises ongoing costs.

Opportunity Cost

A failure by PMHC to fully embrace this opportunity and assume a "do nothing" option may result in the loss of new and emerging industries, not attracted to the Port Macquarie Hastings Region because of its lack of infrastructure and connectivity. These businesses and the jobs they create will be attracted to competing regional cities.

The worst possible outcome for PMHC is for future council elected representatives and officers to look back in 20-30 year and regret the loss of this major opportunity to advance the Port Macquarie region in its position and status within New South Wales.

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Recommendation

Port Macquarie-Hastings Council is in a unique position to take a long-term view to maximize the benefits to the regional city of Port Macquarie from Port Macquarie Airport and the Airport Business Park.

Importantly, the upgrade to Port Macquarie Airport, the improvements to infrastructure, the upgrade to access, linkage to orbital road network and the creation and development of the Airport Business Park does not constitute competition with other interests or developments within the Port Macquarie region. The unique business nature and central location of the airport and ABP within the region means this opportunity is more accurately to complement and benefit other existing and future business precincts.

To achieve this benefit Council must assume ownership of the vision and take all necessary decisions to position Port Macquarie Airport and the Airport Business Park to deliver leveraged benefits to the region. Initially these important decisions include:

- Bio-Certification Assessment approved.
- Planning Proposal approved in full.
- Complete infrastructure and planning costings. Update developer contributions plans.
- Once the initial critical components are completed PMHC can capitalize of the external opportunities provided by the following sectors:
 - NSW Government funding
 - Federal Government funding
 - Property market, occupants and developers
 - Aviation related businesses.
- Attract occupants from both the private and government sectors.
- Obtain specific Development Consents and other approvals as required in response to the attraction of occupants.

Importantly until such time that these matters are completed there is no need for PHMC to commit to a specific funding model.

The scope and contents of this supplementary report is specifically restricted to the PMHC-owned land component of the Airport Business Park.

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METHODOLOGY

The scope provided by PMHC for this supplementary report is attached as Annexure 1. The subject matter of this supplementary report is restricted to the PMHC-owned land component of the Airport Business Park.

Representatives of Augusta Advisors attended an extensive series of meetings in Port Macquarie on Thursday 14 September 2017 with the following parties to update all available data and information relevant to the preparation of this supplementary report:

- Senior Council staff
- Port Macquarie Airport Advisory Group
- Port Macquarie Airport management
- Independent consultants to PMHC
- Real estate agents

A copy of the agenda for Thursday 14 September 2017 is attached as Annexure 2.

During the preparation of this supplementary report the following documents and information has been reviewed and selected parts included to support recommendations contained herein;

- Airport Master Plan Addendum 2013
- NSW Governments North Coast Regional Plan 2036
- Port Macquarie-Hasting Council Towards 2030 Community Strategic Plan
- Port Macquarie-Hastings Council Economic Development Strategy May 2017
- PMHC 2017-2036 Draft Urban Grown Management Strategy
- Shape of the Future Port Macquarie-Hastings Council 2017
- Traffic & Parking Systems Group Report June 2016
- King + Campbell Planning Response April 2017
- Hill PDA Report Airport Precinct Expansion Land Use Assessment November 2016
- Gillespie Economics Peer Review of Hill PDA Report April 2017
- PSA Consulting Port Macquarie-Hasting Gap Infrastructure Analysis October 2014
- GHD Port Macquarie-Hastings Council Port Macquarie Airport Precinct Study – April 2016
- PMHC Assessment by IPART under 2015 Fit For Future review

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THE VISION

The Regional Opportunity

THE COMMUNITY VISION FOR THE PORT MACQUARIE-HASTINGS IS: 'A SUSTAINABLE HIGH QUALITY LIFE FOR ALL'

- PMHC DRAFT URBAN GROWTH MANAGEMENT STRATEGY 2017-2036

The North Coast is forecast to continue to be the number one tourist destination within regional NSW.

Over the next 20 years, almost 77 per cent of population growth on the North Coast will be in the four regional cities of Port Macquarie, Coffs Harbour, Tweed Heads and Lismore. Port Macquarie-Hastings is expected to grow, on average, by around 1,200 people per year over that period.

There are opportunities for Port Macquarie to deliver greater housing choice, more jobs and services, and vibrant precincts that suit the needs of the growing and changing population forecast by the NSW Government.

A key requirement is to deliver economic development and employment to create a prosperous and diversified economy. This will be facilitated by the completion of strategic infrastructure to attract business opportunities that in turn stimulate population growth, employment opportunities and the economic prosperity.

"THE 2017-2021 ECONOMIC DEVELOPMENT STRATEGY HAS BEEN DEVELOPED TO POSITION THE PORT MACQUARIE HASTINGS REGION AS A PLACE WHERE PEOPLE WANT TO LIVE, LEARN, WORK, PLAY AND INVEST."

- CRAIG SWIFT-MCNAIR - GENERAL MANAGER - PMHC 2017

Port Macquarie is a strong city with a distinctive character. Port Macquarie is developing inter-regional and cross-border links, growing farming and tourism sectors, high-quality infrastructure assets and a series of unique business and community environments.

Leveraging these assets will grow jobs and the economy over the longer term. PMHC can build relationships across communities within the region by leveraging their longstanding social and economic associations and the increasing connectivity between the regional centres and between business centres within Port Macquarie.

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Enhancing the social, economic and transport links between cities and centres, adjoining regions and with South East Queensland is also forecast to develop new markets and increase job opportunities for the Port Macquarie region.

This strategy of linking Port Macquarie to other capital cities and markets also applies to Melbourne and is enabled by the upgrade of Port Macquarie Airport to accommodate 180-seat Code 4C jet aircraft and the airport's strategy to secure direct flights to Melbourne.

Continued infrastructure delivery will be required to support the growth of the region's communities and economy.

Airport Contribution to City and Region

Airports are important gateways for business, tourism and personal travel, as well as high-value freight. The Port Macquarie Airport is a core component of the regional transport infrastructure.

The Port Macquarie Airport provided gateway access to the region for 225,000 passengers per year (2016-17). This figure has doubled over the past 10 years and is forecast to double again over the next 20 years.

The airport is seen by PMHC and the NSW Government as a "key driver" for regional growth, economic development and employment. Council updated its Master Plan for the airport in 2013 to cater for and facilitate that growth and maximise regional benefits.

"AIRPORTS CAN BE A KEY DRIVER OF, AND CATALYST FOR REGIONAL GROWTH"

- NORTH COAST REGIONAL PLAN 2017

The Airport Masterplan Addendum 2013 sets out the strategic direction of the airport including land use of airport land. It confirms the priority objectives for Port Macquarie Airport as follows:

- "to provide adequate infrastructure and facilities to meet the forecast demand for future regular public transport (RPT) airline operations.
- "to provide opportunity for commercial property development to promote employment opportunities, facilitate economic development, and support the long-term financial viability and sustainability of the Airport business."

The Airport Masterplan addendum 2013 seeks to maximise economic development opportunities of airport related economic development by the progressive upgrading on the Airport and the creation of the Airport Business park.

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Employment generating development at the Airport is expected to provide a significant economic driver in the Port Macquarie region.

The Port Macquarie Airport's upgraded ability to accept B737 / A320 aircraft also presents a strategic opportunity for air freight transportation.

The upgraded Port Macquarie Airport connects the region to the wider world. It will provide greater access to new markets and economic opportunities in adjoining regions, including not only the important and rapid growth in South East Queensland but also emerging markets throughout Asia. It is also important to note that the Port Macquarie Airport is located close to rural producers in the Taree and Kempsey areas who now have the opportunity to freight high value perishable produce to previously untapped markets in Asia.

Making the most of this access will underpin a vibrant economy that will deliver homes, jobs and infrastructure for the region's communities.

Opportunities for Port Macquarie-Hastings are provided by region-shaping infrastructure like the upgrade and expansion of Port Macquarie Airport.

ABP is a Logical Extension to Maximize Regional Benefit

The ABP is a logical extension of, and creates greater leverage for, the benefits that the airport can deliver to the city and the region. Airport related business activity has an established track record in Australia and overseas. The four examples investigated in Augusta's original report were Newcastle, Sydney Metro (Bankstown), Coffs Harbour and Jandakot, although many other examples exist.

"THE AIRPORT INVESTMENT IS NOT A "BUSINESS AS USUAL" EVENT BUT AN EXPANSION OF CRITICAL INFRASTRUCTURE THAT HAS THE POTENTIAL TO BE A CATALYST TO ATTRACT NEW INVESTMENT AND BUSINESS INTO THE REGION"

- GILLESPIE ECONOMICS REPORT - APRIL 2017

The NSW Government promotes and supports the concept that airport precinct plans should be developed to investigate opportunities for compatible and complementary air transport-related industry and business uses on land adjoining airports.

Development of infrastructure and transport are widely accepted as major stimuli of a diverse range of business activities in emerging regional centres such as Port Macquarie.

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Leveraging and maximising the social and economic links being delivered by the Port Macquarie Airport upgrade to city of Port Macquarie and its region will provide Port Macquarie-based businesses and population with access to new markets and offer current and future residents greater choice in where to live and work.

The Port Macquarie Airport Business Park is a logical extension and affordable opportunity to develop land to attract new business opportunities to the Port Macquarie region resulting from the largely government funded upgrade to the airport and a means by which PMHC can achieve its Mission Statement as contained in the Airport Master Plan Addendum 2013.

The generic approach to business forecasting adopted in the Hill PDA Report 2016 may be suitable for normal "business as usual" projections of broad demand for commercial office space, but is questionable regarding decision-making in relation to the Port Macquarie Hastings Airport Precinct.

It does not have adequate regard to the implications of the recent \$21m investment in the airport and the current investment of a \$7.5m upgrade to the Port Macquarie Airport Terminal Facilities. PMHC capital expenditure on upgrading the airport and facilities has totalled over \$40m over the past 10 years. Any demand forecasts at the Airport cannot be considered in isolation from the recent and future investment in the airport.

General commercial business projections may not be representative of the specific types of activities that may benefit from rezoning at Port Macquarie Airport and the creation of the Airport Business Park. Forward looking projections for demand at the ABP based on historical demand in other traditional areas is unlikely to be appropriate.

Furthermore, generic "business as usual" forecasting does not specifically address the changing nature of industry and the trends toward business park developments, clustering and agglomeration adjacent to airports.

The creation of the APB represents a strategic opportunity to complete and complement the existing business precincts in Port Macquarie. This statement is especially relevant to the connection of the airport and the ABP to the orbital road system that will optimize connectivity and facilitate highly efficient transport of personnel, goods and materials into and out of the Port Macquarie region.

The central location of Port Macquarie Airport and the ABP within the Port Macquarie network of business precincts represents a highly efficient application of infrastructure that benefits the entire region. Consequently, the ABP is not a competing interest but rather a compliment to existing business precincts, other developments sites and existing commercial and industrial zoned land elsewhere in the PMHC Local Government Area.

Opportunity Cost of Not Upgrading Airport and Airport Business Park

At a Federal and NSW Government level, Port Macquarie is designated as a Regional City together with Coffs Harbour, Lismore and Tweed Heads.

Port Macquarie is often compared to Coffs Harbour. Both Cities are of a similar size and population and both are serviced by modern airports and are also linked by rail connection and the Pacific Highway.

Port Macquarie and Coffs Harbour are almost identical in terms of the following categories;

- Population
- Major Services;
 - Linked to both Sydney and Brisbane by Pacific Highway
 - Linked to both Sydney and Brisbane by North-South rail network
 - Medical Centre
 - Tertiary Education Centre
 - Commercial Centre
 - Industrial Centre
- Port Macquarie is located 400 kilometres from Sydney
- Coffs Harbour is located 390 kilometres from Brisbane

Failure to capitalize on the upgrade to Port Macquarie Airport and the establishment of the proposed Airport Business Park to contribute to the regional opportunity for Port Macquarie may result in the following;

- Failure to attract future business trends and opportunities for the Port Macquarie region
- Failure to embrace both the NSW and Federal Governments' vision for the NSW North Coast and its regional cities
- Failure to attract valuable NSW and Federal Funding for major infrastructure projects considered vital for the region
- Loss of strategic ground to Coffs Harbour and other regional centres in the competition to secure business activity, services and quality of life and community for the inhabitants of Port Macquarie
- Loss of high value industries and jobs

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Port Macquarie Airport Master Plan Addendum 2013

Following completion of the Stage 1A airside infrastructure upgrade in 2013, PMHC has recently reviewed and updated the Master Plan by way of an Addendum Report dated December 2013 which identifies future development required to:

- Continue to comply with Civil Aviation Safety Authority (CASA) aerodrome standards;
- Cater for forecast growth in airline (RPT) services and passenger numbers;
- Cater for demand for future general aviation (GA) activities;
- Provide opportunity for commercial property development; and
- Promote the establishment of flood-free road access to the Airport

The updated Port Macquarie Airport Master Plan presents a 20-year vision for the Airport site and provides the framework and strategic direction to guide the future development of the Airport to underpin the Port Macquarie region's growth, economic development and tourism potential.

The two principal initiatives within the Airport Master Plan addendum 2013 are to upgrade the airport infrastructure, to meet the increased passenger demand and to create an airport business precinct to promote economic development and employment, and to support the financial viability of the airport.

PORT MACQUARIE-HASTING COUNCIL'S VISION FOR THE AIRPORT IS TO BE THE PREMIER GATEWAY TO THE NSW MID NORTH COAST

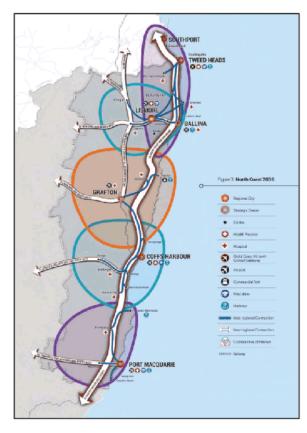
The Mission Statement for the Airport is to continue to grow the Airport's contribution to the regional economy by promoting a range of competitive airline services that underpin the region's business and tourism industries, and by establishing an airport precinct business park to attract new employment and inward investment opportunities to the region.

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CONTEXT

Since the initial Augusta report in April 2011 there has been substantial progress in relation to the Port Macquarie-Hastings region, the regional city of Port Macquarie, Port Macquarie-Hastings Council, Port Macquarie Airport and the Port Macquarie Airport Business Park. A summary of that progress and issues arising is as follows:

Regional Progress



NSW GOVERNMENT VISION FOR THE NSW NORTH COAST
DEPICTING REGIONAL CENTRES & ASSOCIATED SERVICES

The natural features of Port Macquarie, its location on the East Coast between Sydney and Brisbane, together with the population growth and economic development that have been achieved in recent years have contributed to its significance within New South Wales and its recognition as a regional city by the New South Wales Government.

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Those distinguishing economic developments are listed below to reinforce their importance in the recognition of Port Macquarie as a regional city:

- 5th largest regional airport in NSW (behind Sydney, Newcastle, Ballina and Coffs Harbour)
- Located on the major North-South road link between Sydney and Brisbane
- Located close to the major North-South rail link between Sydney and Brisbane (at Wauchope)
- A centre for medical excellence
- Tertiary education centre
- A strong and attractive commercial centre
- Appropriately provided for industrial and employment lands
- A centre for cultural activities

"THE NSW GOVERNMENT VISION FOR THE NORTH COAST IS A NETWORK OF STRONGER CITIES AND REGIONAL CENTRES"

- NSW NORTH COAST 2036 REGIONAL PLAN- 2017

Increased connectivity is building stronger partnerships and collaboration across communities of interest that will drive future prosperity for each region of the NSW North Coast and specifically for the Port Macquarie region.

The Pacific Highway upgrade is one of the largest and most important projects ever undertaken in Australia. By 2020, approximately \$15 billion will have been invested to deliver a four-lane divided highway through the North Coast, from Newcastle to Queensland.

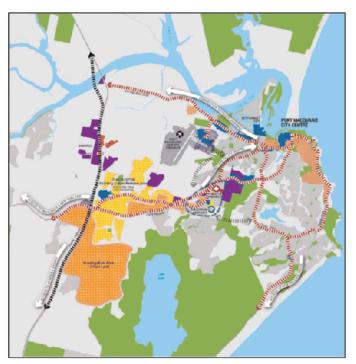
CONNECTIVITY IS CONSIDERED A KEY COMPONENT OF PORT MACQUARIE'S FUTURE AND CONTINUED SUCCESS

The focus for the future of the Port Macquarie region is to harness new opportunities that arise from the improved travel safety, reduced travel times, improved transport efficiency and lower freight transport costs, and most importantly, the development of new markets and business activities generated by the highway upgrade and by increased air transport into or out of Port Macquarie Airport.

To capitalise on these opportunities, PMHC needs to continue with strategic initiatives for the investment and development of major infrastructure projects within the Port Macquarie region, including Port Macquarie Airport and the Airport Business Park, to attract and support economic growth, new business activities and continued and forecast increases in population.

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The increased tourism and market access being provided by the upgraded Port Macquarie Airport will enable PMHC to deliver housing, jobs, tourism and recreation activities that maximise the opportunities provided by the projected population growth of South East Queensland to more than five million people by 2041.



CONFIRMATION OF FUTURE TRANSPORT CONNECTION
ROUTES -NORTH COAST REGIONAL PLAN 2036 - NOTE
ADDITIONAL PROPOSED CONNECTIONS BETWEEN
EXISTING HIGHWAYS AND PORT MACQUARIE AIRPORT.

Airport Progress

In December 2013 Port Macquarie-Hastings Council completed a \$2m million airside infrastructure upgrade at Port Macquarie Airport to underpin the region's future growth, economic development and tourism potential.

The upgrade marks a significant milestone for the Airport and the Port Macquarie regional community, with the upgraded runway now providing the capability for up to 180-seat B737 / A320 aircraft for the first time in the Airport's 60-year history.

The project was supported by \$15m in funding assistance from the Australian Government

The upgrade represents the stage 1A of the implementation of the Airport Master Plan, and involved the upgrade of the airside facilities (runway, taxiway and RPT apron), including:

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- strengthening, extending (by 110m to south) and widening the existing main runway 03/21 to 1800 metres long x 45 metres wide;
- expansion of the existing regular public transport (RPT) apron (located in front
 of the terminal building) to provide additional parking positions for larger
 aircraft, including a new taxiway connection to the main runway;
- relocation of the helicopter landing and parking area, and general aviation
 (GA) aircraft parking area; and
- provision of associated infrastructure / facilities (e.g. runway, taxiway and apron lighting, other visual aids, drainage, line marking etc.

The Port Macquarie Airport provided gateway access to the region for 225,000 passengers per year (2016-17). This figure has doubled over the past 10 years and is forecast to double again over the next 20 years.



PORT MACQUARIE AIRPORT TERMINAL CONCEPT PLAN
- 28 JULY 2017

Funding has been confirmed for a \$7.5m upgrade to the airport terminal building. The current terminal building was constructed in 1994, and the upgrade is required to cater for increased passenger numbers, to improve the standard of current facilities, and provide an improved airport experience that is consistent with other regional airports, and supports Port Macquarie's standing as a tourist destination of choice.

The upgrade will double the existing floor space, increase the service capability and provide a more contemporary, comfortable and efficient facility for passengers and other airport visitors.

New amenities will be provided and there will be significant changes to enable 'back of house' operations to function more efficiently, further improving the customer experience. Additional elements include new air conditioning, baggage reclaim services and retail facilities. The electrical supply will also be upgraded and a new reticulated sewer system installed.

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Notably, the upgrade to the terminal building follows a 'strategic concept' that was developed in late 2016 to support grant applications.

A fundamental and severe compromise to the upgrade to Port Macquarie Airport and its connectivity to the Port Macquarie city centre, other business centres and to other major transport links is the absence of flood-free access and the poor condition of the existing entry to the airport via Boundary Street.

Port Macquarie-Hastings Council Progress

Since April 2011 the following progress and relevant documentation has been completed by or in relation to Port Macquarie-Hastings Council:

- i. Designation of Port Macquarie as a Regional City by the NSW Government
- ii. Inclusion and relevance of Port Macquarie contained within the NSW Government's North Coast Regional Plan 2036
- iii. PMHC production of Towards 2030 Community Strategic Plan
 - "The Community Strategic Plan (CSP) is an overarching 10-year plan that is prepared by Council and the community based on community priorities. It enables Council to coordinate its funding priorities, activities and services"
- iv. PMHC production of DRAFT Urban Growth Management Strategy 2017-2036
- v. PMHC production of DRAFT Area Wide Traffic Study and Orbital Road Planning
- vi. PMHC Economic Development Strategy 2017-2021
 - "The 2017-2021 Economic Development Strategy has been developed to position the Port Macquarie Hastings region as a place where people want to live, learn, work, play and invest.
 - Craig Swift-McNair General Manager PMHC 2017
- vii. PMHC assessment by IPART as a stand-alone council under the 2015 Fit for the Future review
 - "Port Macquarie-Hastings Council has demonstrated that it has undertaken a large number of reviews and implemented numerous strategies to improve its financial position, with the additional Fit for the Future strategies expected to materialise additional cost savings and operational/service delivery efficiencies"

viii. Relevant recent NSW State Government Announcements:

"We are committed to funding infrastructure projects that make regional locations more attractive places to live, work and travel. This upgrade to Port Macquarie Airport will create more opportunities for investment in the Port Macquarie region and boost the local economy,"

- Ms Leslie Williams – NSW Member for Port Macquarie and Parliamentary Secretary for Rural and Regional Health – October 2017

Airport Business Park Progress

Since the its initial report in 2011, Augusta has noted that the following progress has been made in relation to the establishment of the Airport Business Park:

 Resolution of Environmental issues by lodgement of Bio-Certification – Assessment & Application – Port Macquarie Airport and Surrounding Land – December 2015.

The Biodiversity Certification Assessment and Strategy submission to the NSW Government for Port Macquarie Airport provides an appropriate and tactical response to the ecological issues associated with the implementation of the Airport Master Plan and compliance with CASA standards. It also paves the way for the adoption of the Planning Proposal and initiation of associated services amplification and development of flood-free road access to Port Macquarie Airport and surrounding land.

The Biocertification process will result in the environmental issues associated with the Planning Proposal and the subsequent Development Applications for the Business Park having already been resolved or pre-approved.

We understand the application is currently with the Minister's office for final approval.

In parallel an application has also been made to the Federal Government Environmental Protection and Biodiversity Conservation Act.

 Lodgement of Planning Proposal for adoption by Port Macquarie-Hastings Council.

A Planning Proposal (rezoning application) is currently being considered by Council's strategic planners. The Planning Proposal was prepared taking into account the Airport Master Plan, airport operations, environmental considerations and economic and traffic impacts.

The adoption by PMHC of the Planning Proposal enables PMHC to facilitate delivery of affordable employment land at the Port Macquarie Airport Business Park and the opportunity to attract new high value businesses and employers to the region.

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- Key issues relating to the ABP remain for PMHC to resolve:
 - Road infrastructure improvements and provision of flood free road access.
 - Planning and costing for delivery of water, sewer and stormwater services

Further Reports

- Airport Master Plan Addendum December 2013.
- Bio-Certification Assessment & Application Port Macquarie Airport and Surrounding Land – December 2015.
- PMHC Strategic Planning (PMHC Planning) for the Port Macquarie Airport Business Park.
- PSA Gap Infrastructure Analysis October 2014.
- Traffic & Parking Systems Group Report June 2016.
- GHD Airport Precinct Traffic Study April 2016.
- King + Campbell Planning Response April 2017.
- Hill PDA Report Airport Precinct Expansion Land Use Assessment November 2016.
- Gillespie Economics Review of Hill PDA Report April 2017.

The GHD and PSA Analyses are detailed infrastructure and Traffic studies specific to the impact of Port Macquarie Airport and Airport Business Park on the region and specifically on the area surrounding Port Macquarie Airport.

Both TPS, Hill PDA and King + Campbell reviews have highlighted additional issues for consideration by PMHC;

- The demand and profile of potential occupants at the Airport Business Park.
- Traffic issues arising from the Planning Proposal.
- Services amplification required for Airport and ABP.

Both King + Campbell and Gillespie Economics reports are supportive of the Planning Proposal, the positive effect of the Bio-Certification Assessment and Application and the proposed Airport Business Park.

PMHC has completed significant analyses of the impact of the Airport upgrade and the establishment of the Airport Business Park on the Port Macquarie region and the immediate surrounds of the specialist Airport Business Precinct.

The multiple analyses and peer group reviews form the basis of a highly professional and detailed business case for PMHC to support the Planning Proposal and to establish the Port Macquarie Airport Business Park.

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NSW Government – Political Climate for Regional Funding

The NSW Government's published position is supportive of development of Regional Cities on the NSW North Coast. The NSW Government 2017-18 Budget continues the record program with capital spend of \$72.7 billion in the four years to 2020-21. The NSW Government's commitment in 2017-18 is \$22.3 billion. This includes major infrastructure projects and programs to realise opportunities for economic growth and provide for local communities.

The NSW Government is investing an additional \$1.3 billion in regional infrastructure to support growing regional centres, activate local economies and improve services in communities, through the new Regional Growth Fund.

As part of the Regional Growth Fund, funding will be made available through the Growing Local Economies fund over four years to turbocharge new regional economic opportunities and enliven local economies.

Examples of the appetite and commitment by the NSW Government to the support and funding of NSW regional infrastructure projects are the funding secured by PMHC to the Stage 1A upgrade of Port Macquarie Airport and the further upgrade of the Port Macquarie Airport terminal in 2018.

"WE ARE COMMITTED TO FUNDING INFRASTRUCTURE PROJECTS THAT MAKE REGIONAL LOCATIONS MORE ATTRACTIVE PLACES TO LIVE, WORK AND TRAVEL. THIS UPGRADE WILL CREATE MORE OPPORTUNITIES FOR INVESTMENT IN THE PORT MACQUARIE REGION AND BOOST THE LOCAL ECONOMY,"

- NSW MEMBER FOR PORT MACQUARIE, LESLIE WILLIAMS, 5 OCTOBER 2017

Specifically, the \$7.5m funding for the funding for the Port Macquarie Airport Terminal Upgrade comprised the following contributions as a current and demonstrable example of NSW & Federal Government funding availability for infrastructure projects;

- \$5m in NSW Government funding through the Restart NSW Regional Tourism Infrastructure Fund
- \$1.25m in Australian Government Funding through the Community Development Grants Program
- \$1.25m PMHC contribution from the Port Macquarie Airport Reserve

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Federal Government

- Funding for
Regional
Development

The Federal Government is similarly supportive of regional development. Federal Government funding is available for approved infrastructure projects from many Australian Government departments including:

- Department of Infrastructure and Regional Development
- Regional Development Australia (RDA) is an Australian Government initiative
 that brings together all levels of government to enhance the development of
 Australia's regions. A national network of RDA committees has been
 established to achieve this objective.

The Federal Government has already demonstrated support by its substantial contributions of \$15m to the airport upgrade and \$1.25m for the terminal upgrade.

We note a comment made by PMHC's General Manager at the initial meetings on 14 September that Council's senior management has had success in creating stronger relationships with both local NSW and Federal Members of Parliament.

The availability of funding for major regional capital projects will continue to be subject to the approval of a detailed and robust business case which will be enhanced by our key recommendations for the Port Macquarie Airport and ABP to be "shovel ready".

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OPPORTUNITY

Vision for Airport/ ABP Contribution to Regional Benefit

The vision for the Port Macquarie-Hastings community as expressed on the draft Urban Growth Management Strategy 2017-2036 is "a sustainable high quality life for all".

The mission expressed in the Airport Master Plan Update of 2013 is to continue to grow the Airport's contribution to the regional economy by promoting a range of competitive airline services that underpin the region's business and tourism industries, and by establishing an airport precinct business park to attract new employment and inward investment opportunities to the region.

Port Macquarie's opportunity is to take a major step towards achieving its community vision by attracting high value business and jobs at an affordable cost by taking actions which need to be undertaken in any case.

Provision of flood free road access to the airport is a requirement in its own right but, once provided, it will be a 'game changer' for the ability of the airport to deliver benefits to the city and region by attracting high value employment opportunities and delivering economic prosperity.

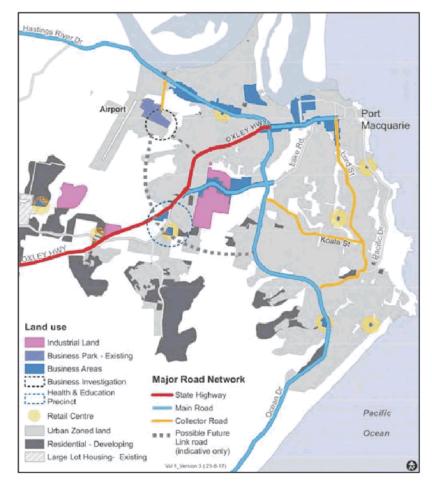
It will strategically locate Port Macquarie Airport and the Airport Business Park with respect to all current business precincts and proposed activity within Port Macquarie. This will enable the airport and ABP to achieve their potential as a specialised high value regional business and employment hub and transport gateway.

The creation of the APB represents a unique strategic opportunity to complete and complement the existing business precincts in Port Macquarie. This statement is especially relevant to the connection of the airport and the ABP to the orbital road system that optimizes connectivity and facilitates highly efficient transport of personnel, goods and materials between business precincts and into and out of the Port Macquarie region.

The central location of Port Macquarie Airport and the ABP within the Port Macquarie network of business precincts and represents a highly efficient application of infrastructure that benefits the entire region. Consequently, the ABP is not a competing interest but rather a compliment and benefit to existing business precincts or other developments sites and existing commercial and industrial zoned land elsewhere in the PMHC Local Government Area.

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Linkages to Other Specialist Precincts



PMHC URBAN GROWTH MANAGEMENT STRATEGY 2017-36

The above extract from the PMHC Urban Growth Management Strategy 2017-36 shows the potential new road linkages to the airport and clearly demonstrates how these links strategically position the airport at the centre of the current and future areas of business and commercial activities including the town centre, the Lake Road industrial precinct and the health and education precinct. This is consistent with the recommendations of the Augusta Advisors Report dated 2011.

We see no reason to change our previous observation that the smooth and efficient connection of the various business precincts is critical for growth and the attraction of new investors and businesses to the Port Macquarie region and maximizes the ability of Port Macquarie Airport and Airport Business Park to contribute to the region.

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"SUCH A NETWORK OF LINKAGES PLACES THE AIRPORT AND THE AIRPORT BUSINESS PRECINCT AT THE CENTRE OF VIRTUALLY ALL CURRENT AND PROPOSED ACTIVITY WITHIN PORT MACQUARIE. THIS WILL DRIVE BENEFITS TO THE AIRPORT AND THE OTHER LINKED PRECINCTS"

- AUGUSTA- APRIL 2011

The upgraded airport also connects the city and region to the wider world. It provides greater access to new markets and economic opportunities in adjoining regions, the rapid growth of South East Queensland and emerging markets in Asia.

The establishment of a second road access which provides 1:100 year flood free access to the airport is considered fundamental to the linkage of all business precincts and creates a major attraction to new business investment into the Port Macquarie-Hastings Region.

Need for Flood Free Road Access

Flood free road access to the airport is a requirement irrespective of the Airport Business Park. As well as being flood affected the Boundary Street access to Port Macquarie Airport is currently sub-standard and does not provide appropriate arrival/exit from the Airport to the Town Centre or other precincts. This access is already the subject of traffic studies and costing analyses within PMHC and will form a part of the detailed business case required to secure further government grant support for this infrastructure.

Options for improved road access to the airport as indicated in the graphic on the previous page are:

- Boundary Street Upgrade Council officers estimate that Boundary Street will
 require approximately \$20m of civil engineering upgrades to achieve flood
 free access but only to 1:20 year standard.
- East-West Link to Lady Nelson Drive adjoining land owner consultation will be required with Port Macquarie Racecourse but not Port Macquarie Rifle Range, which is not expected to be impacted by the Lady Nelson Drive Option.
- North-South Link to Oxley Highway achievable subject to approval of Biocertification Assessment and satisfactory consultation with relevant adjoining land owners.

Both the East-West Link to Lady Nelson Drive and the North-South Link to Oxley Highway present the opportunity to upgrade permanent road access to Port Macquarie Airport ensuring 1:100 year flood free road access and also bring significant broader benefits to the regional road network.

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In addition to the necessity to provide flood free road access, a secondary access to the airport is also considered mandatory for multiple emergency services reasons, not least of which is bushfire emergency access and egress.

Flood free access is considered critical for NSW Government and Federal Government disaster relief.

"Do Nothing" Option and Potential Cost to Region

Council representatives and staff are all confronted by a similar question: Do they embrace the opportunity for the airport and ABP to make substantial contribution to achieving the regional vision or give weight to vested and competing interests? If the latter is the case then a "do nothing" option is a real possibility.



The "do nothing" option, whether by design or consequence of frustration by allowing planning regulations and administrative procedures to delay implementation of the above stated regional vision may see Port Macquarie slip from its current position and lose valuable ground to competing regional cities on the North Coast and other competing locations in relation to the following key factors of economic growth and community wellbeing;

- Population growth
- Construction of new homes
- Attraction of new businesses
- Attraction of high value jobs
- Attraction of increased tourism visitors

A failure by PMHC to fully embrace the above vision and assume a "do nothing" option may result in the loss of new and emerging industries, not being attracted to the Port Macquarie Hastings region because of its lack of infrastructure and connectivity.

The planning and development concept in front of PMHC represents a once in a generation opportunity to contribute to the Port Macquarie region and establish its emerging relevance to the commerce and population of not only the North Coast but within the context of NSW as whole, the East Coast of Australia and its future connection to emerging markets in foreign countries.

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The freehold land that is currently available strategically located adjacent to the upgraded Port Macquarie Airport is a rare and unique opportunity not often replicated in major regional cities of Australia. This unique convergence of factors is considered to be a major attraction to high value business operators associated with aviation, connectivity to the other business precincts locally, high technology and connection to domestic and foreign markets.

As stated elsewhere it is important to note the establishment of ABP under these circumstances is not competition but is rather a complementary benefit to the other existing and potential business areas in the PMHC LGA, because it will attract new high value business and employment that would otherwise not come to the Port Macquarie Hastings region.

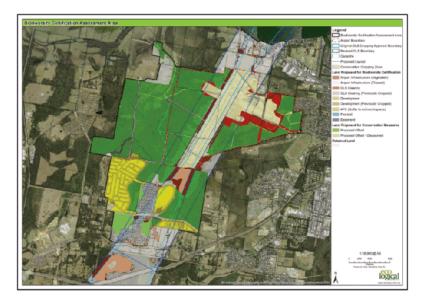
The worst possible outcome for PMHC is for future council elected representatives and officers to look back in 20-30 years and regret the loss of this major opportunity to advance the Port Macquarie region in its position and status within New South Wales.

DEVELOPMENT CONSTRAINTS

Environmental Issues

The existing vegetation surrounding the airport includes areas identified as coastal wetlands potentially containing endangered ecological communities and/or threatened species.

The Biodiversity Certification Assessment and Strategy provides a proposed response to the ecological issues associated with the implementation of the Airport Master Plan and compliance with CASA standards.



BIODIVERSITY CERTIFICATION ASSESSMENT AREA

The proposal for Biodiversity Certification relates to Council owned land around the Airport, including land zoned for residential and light industrial development in the Partridge Creek Industrial and West Lindfield neighbourhoods of the adjoining Thrumster Urban Release Area.

The proposal also relates to privately owned land to the south of the Airport on which vegetation is required to be cleared due to the Obstacle Limitation Surface (OLS) for airport operations.

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Refer to the Australian Government EPBC Act Referral/Preliminary Documentation referral process.

Biodiversity certification provides greater certainty for Council, for the future operation of Port Macquarie Airport and compliance with CASA standards, new business occupants, the developer/investor and the community, as the impacts of development to biodiversity values are identified and the offset measures agreed up-front as part of the process.

The planning proposal is expected to rezone land within the BCCA to reflect areas identified for Airport development, including widening the runway and OLS, providing for a potential Airport Business Park and conserving available biodiversity offset areas.

Once Biocertification has been conferred on the subject lands, future development applications for the development of the Business Park within the Port Macquarie Airport landholding will no longer be required to assess impacts to biodiversity values as these will have already been addressed by the Minister and the in-perpetuity management of the Conservation Lands.

The Biocertification application is currently being considered by the Minister for Environment.

The Biocertification process is with the NSW Government. In parallel a referral has been made under the Federal Government Environment Protection and Biodiversity Conservation Act.

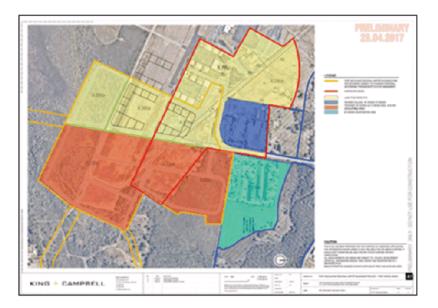
Existing Zoning/ Planning Constraints (Addressed by Planning Proposal)

Not having sufficient land which is appropriately zoned for occupation by the new high value businesses which ABP seeks to attract is a significant disincentive for them to consider Port Macquarie as a location. If not already in place the rezoning (i.e. Planning Proposal) process has considerable cost, time and risk implications, which new occupants, investors or developers would not wish to bear. The Airport Business Park represents the opportunity to provide appropriately zoned land directly adjacent to the Port Macquarie Airport to attract new high value businesses.

This is further emphasized by the concept of clustering/aggregation of symbiotic business activities that are the subject of case studies referred to in the original Augusta Advisors Report dated April 2011 and elsewhere in this supplementary report.

Those type of high value businesses will not be attracted to similarly zoned land remote from the Airport "cluster" and are therefore classified as non-competing with typical industrial/commercial activities elsewhere in Port Macquarie.

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AIRPORT BUSINESS PARK PROPOSED ZONING
- KING + CAMPBELL - APRIL 2017

A Planning Proposal is currently being considered by Council's strategic planners. The Planning Proposal was prepared taking into account the Airport Master Plan, airport operators, environmental considerations and economic traffic impacts. The Planning Proposal for the Airport Business Park (237,500m²) is wholly within the footprint of the land contained in the Biocertification Assessment.

The Biocertification process will result in the environmental issues associated with the Planning Proposal and the subsequent Development Applications for the Business Park having already been resolved.

To maximise the potential for affordable employment land it is important that relevant infrastructure is planned for implementation for the full footprint of the proposed Port Macquarie Airport Business Park.

"A PARTIAL ZONING DOES NOT PROVIDE THE CERTAINTY REQUIRED TO IMPLEMENT THE LONG-TERM INFRASTRUCTURE PLANNING, INCLUDING POTENTIALLY THE ADOPTION OF LOCAL SECTION 94 AND SECTION 64 CONTRIBUTION PLANS, TO ESTABLISH EQUITABLE FUNDING ARRANGEMENTS BETWEEN INVESTORS, LANDOWNERS AND PMHC"

- KING + CAMPBELL - PLANNING RESPONSE - APRIL 2017

In recognition of the long-term nature of the development of the Airport Business Park and to provide additional certainty with respect to issues raised by the Strategic Planning and regulatory arm of PMHC with respect to economic issues and traffic, it is proposed that a legal mechanism be established, in conjunction with the Planning Proposal for the overall footprint of the Airport Business Park to allow for the staged development of the ABP over a 20-30-year period.

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This will provide PMHC Planning with the ability to stage the release of the land within the Port Macquarie Airport Business Park as and when Government Funding is secured, connectivity via new roads is completed along with services amplifications.

This approach allows PMHC Planning to proceed with the planning for future upgrades of roads and services for the full footprint of the ABP, while reducing the potential economic impacts associated with the overall development of the land by the staging of the release of the land for development. The staging mechanism also allows PMHC to balance the release of land within the ABP with the amplification of infrastructure and the associated demand for roads and other services.

This approach will allow the essential infrastructure planning and the associated local and regional contribution plans to be completed in conjunction with the Planning Proposal for the full footprint of the future Port Macquarie Airport Business Park.

Flood Free Access

A major remaining obstacle to the future of both Port Macquarie Airport and Airport Business Park development is the lack of appropriate flood free road access and efficient transports links between the regional city of Port Macquarie, Port Macquarie Airport and both the Pacific Highway and major rail links.

The lack of flood free road access is a major constraint on the operation of the airport, the ability for the airport to deliver benefits to the region and to the establishment of an airport business park. It also prevents NSW and Federal Government assistance being provided in the event of the most likely natural disaster to affect Port Macquarie – flooding.



FLOOD PLAN: PORT MACQUARIE AIRPORT PRECINCT

In the event of a major flood, Port Macquarie Airport can maintain aviation activities but cannot transfer flood relief goods and services or deliver or evacuate people or medical evacuees due to the lack of 1:100-year flood-free access.

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Interviews with local real estate agents indicate that flood free access will be a major issue with potential occupants at ABP. A prudent business decision maker is unlikely to accept a risk of their premises being isolated by flooding.

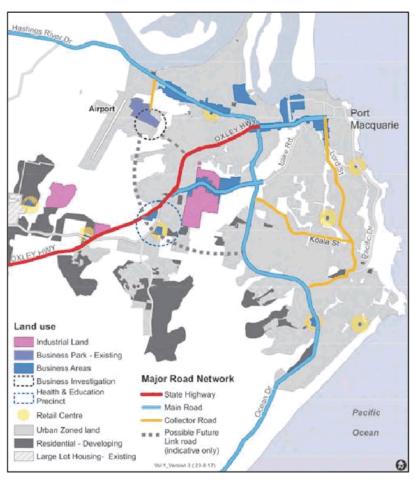
In addition to the necessity to provide flood free road access to Port Macquarie Airport, a secondary access to the airport is also considered mandatory for multiple emergency services reasons, not least of which is bushfire emergency access and egress.

A long-term solution to the provision of flood free access to Port Macquarie Airport and the Airport Business Park will be a necessary inclusion in any application for either NSW Government or Federal Government grant funding.

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SERVICES AND INFRASTRUCTURE AMPLIFICATION

Roads



PMHC URBAN GROWTH MANAGEMENT STRATEGY 2017-36

The existing sole access to Port Macquarie Airport, Boundary Street, is depicted above as a yellow Collector Road. Two alternate access roads are also depicted as follows:

- East West Link to Lady Nelson Drive above 1:100-year flood level
- North-South Link to Oxley Highway above 1:100-year flood level

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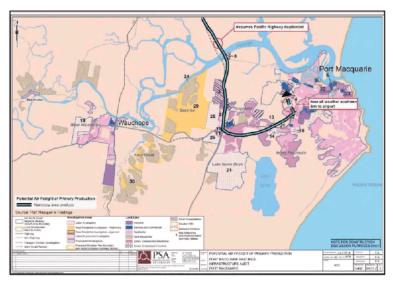
The primary regional connections supporting the Port Macquarie-Hastings economy are provided by the Pacific Highway (main north-south corridor), Oxley Highway (main east-west corridor), Hastings River Drive, Ocean Drive, Lake Road and John Oxley Drive.

These roads play an important role in supporting the local economy and provide connections to highways into, out of and around the region.

An effective and functioning road network linking areas of economic activity is a foundational component to the Port Macquarie - Hastings regional economy. Transport networks need to expand to facilitate development of new residential and employment growth areas. This should not be at the expense of ensuring the existing transport network is managed so that traffic congestion does not start to impinge on the economic prosperity of the region.

We have previously referred to the desirability of connecting the airport with the other business precincts.

"The Biocertification Assessment (relevant to PMHC owned land only) will allow development of the potential future road links that will ensure PMHC's capacity to deliver flood free transport corridor(s) to the Port Macquarie Airport, being one the key gateways to the designated Regional City of Port Macquarie" – King + Campbell – April 2017.



THE ABOVE FIGURE HIGHLIGHTS THE POTENTIAL EFFICIENCY OF A FAST AND EFFICIENT SOUTHERN ACCESS TO THE AIRPORT VIA THE OXLEY HIGHWAY

As noted, the provision of a new southern access to the airport from Oxley Highway would benefit freight movements where certainty of travel time is of the essence.

As mentioned earlier, options for improved road access to the airport are:

Boundary Street Upgrade - Council officers estimate that Boundary Street will
require approximately \$20m of civil engineering upgrades to achieve flood
free access but only to 1:20 year standard.

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- East-West Link to Oxley Highway (via Lady Nelson Drive) This link is only achievable by the approval of the Biocertification Assessment and consultation with adjoining landowners may be required.
- North-South Link to Oxley Highway achievable subject to approval of Biocertification Assessment and satisfactory consultation with adjoining landowners.

Both the East-West Link to Lady Nelson Drive and the North-South Link to Oxley Drive present the opportunity to upgrade permanent access to Port Macquarie Airport and ensure 1:100 Year Floor Free access.

This is considered critical for NSW Government and Federal Government disaster relief and State and Federal Government Grants to assist with the proposed development program to the Port Macquarie Airport and Airport Business Park.

Assuming there will be a nexus between occupants of that business park and the other business precincts within the region, it would seem logical that an efficient and flood-free access to Port Macquarie Airport and, ABP be developed to complement the existing transport system and complete an orbital road system.

It is understood that Council staff are currently reviewing the requirements of the Airport and ABP as a part of their overall traffic planning studies.

Services

The status of the existing services infrastructure at the airport is only adequate to support current operations. However, for expanded airport operations and for development of the airport business precinct additional services infrastructure is required.

The provision of adequate services is a fundamental requirement to the success of any development project. This includes provision of adequate power, water, sewer, stormwater, telecommunications and other amenities specific to the needs of the occupants.

However, at this point it is only required that the services infrastructure be planned and costed. Planning and costing of the services is an important component of the ABP becoming 'shovel ready' to take advantage of external opportunities that arise from government funding and/or the property market. It is envisaged that the cost of delivering the services will be largely funded from those sources.

Sewer

The airport is yet to be connected to this system. Any future development of the precincts will require extension and upgrade of the mains sewer system and reticulation to cater for the expected demand.

On 14 September 2017 Augusta was advised of the following in relation to PMHC forecasting in relation to Sewer installation:

 A design proposal for the inclusion of Sewer connection to the Port Macquarie Airport and Airport Business Park is in the PMHC Development Services Plan.

The proposed sewer connection design is proposed as a combination of the following elements:

- Rising main
- Gravity system
- Pressure system

Major design Issues currently under review and consideration are also listed below:

- Dewatering
- 350/550 mm line proposed
- Pumping Stations
- Rising Main (2 off) 2 x 1.5 km length
- Estimated Cost \$3m approx
- Completion horizon: 2-3 years

Full Design Concept and High-Level Budget Analysis will be required to support any NSW Government funding application.

Power

Essential Energy has indicated that if the new electricity feed is installed as part of the airport upgrade works, there will be enough capacity in the system for both the airport upgrade and also development of the surrounding business precincts. Essential Energy has already installed an 11Kv underground power supply main along the Airport boundary.



Water

The current mains water supply which services the airport is insufficient for future expansion of the airport and its surrounding development precincts. Preliminary assessments undertaken by Council suggests upgrade of the mains water system via supply feeds coming from both Hastings River Drive and Lady Nelson Drive with varying supply pipe feeds ranging from 250mm, 200mm and 150mm.

On 14 September 2017 Augusta was advised by PMHC officers that PMHC was forecasting an extension and amplification water supply to Port Macquarie Airport and environs by the installation of 250/150 CWS line. This service is forecast to be completed within 3 years or by December 2020. The benefit of this amplification of water services will provide additional benefits to both Port Macquarie Airport and the ABP as follows:

- Provision of adequate services for all future development in the airport precinct.
- Significant confidence for prospective investors and high value business operators attracted to the ABP.



Telecommunications

Reticulated telecommunications services including phone and National Broadband Network connection. This service is considered fundamental to the attraction of Technology/aviation based occupants and investors.

The importance of access to high quality (speed coverage and reliability) telecommunications is well recognised as an important driver in economic growth and development. This importance is recognised at all levels of government particularly at a Federal level with the commitment to the National Broadband Network.

Improved access to telecommunications will drive and support the growth of all existing and emerging industries in Port Macquarie – Hastings region.

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Funding

Obtaining funding to undertake necessary works is an obvious constraint o development of the ABP.

Augusta's original report of April 2011 suggested a range of scenarios for the staged development of the Airport Business Park that assumed a self-funding model with Council taking a developer position in relation to subdivision and sale of the land. That model assumed Council takes responsibility for delivery of new/upgraded road access and services infrastructure and recovers those costs through the sale of subdivided land.

In light of the current positive environment for NSW and Federal Government funding of regional infrastructure projects, and after consultation with Port Macquarie-Hastings Council senior staff and others in September 2017, Augusta has amended its advice in relation to the suggested implementation to reflect a 'shovel ready' strategy as summarized by the following milestones:

- Obtain Bio-Certification to resolve all potential environmental issues.
- Obtain approval for Planning Proposal for the full footprint of the proposed Port Macquarie Airport Business Park.
- Finalise planning and costing for required infrastructure.
- Update Contribution Plan to provide for development based contributions to infrastructure upgrades.
- Obtain Federal and NSW Government funding for major infrastructure components including;
 - Improved road connections including 1:100-year flood-free access and connectivity to other business precincts.
 - Amplification of services to support Airport Business Park.
- Announce and market Port Macquarie Airport Business Park as a certain outcome with all current and future infrastructure completed or programmed with Federal and/or NSW Government funding secured. Obtain interest from occupants, developers and investors.
- Obtain DAs and other approvals as required by the commitment of occupants, developers and investors.

It should be noted that securing funding for a second flood free road access is a key 'game changing' outcome for the ABP. However, in relation to the case to be made to secure this funding, the ABP is a fortunate by-product which leverages the benefit that the funding delivers. The main underlying reason is to provide a second flood free road access to the airport itself, which has its own compelling case.

The additional funding required to get the ABP to 'shovel ready' status is minimal by comparison, with a significant portion already having been expended on the airport upgrade and on preparation of the Biodiversity Certification Application and the Planning Proposal.

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MARKET FACTORS

Current Local Demand

On 14 September 2017 Augusta representatives, together with Jason Doyle of Port Macquarie-Hastings Council, met separately with each of the following real estate agency representatives/principals to obtain an update on current market activity and demand:

- Garry Krestensen Laing & Simmons
- Graeme Garrett Raine & Home Commercial
- Debbie Moore Debbie Moore Real Estate

In summary their combined view was that there would be current demand for land or for new rental premises if the ABP was available today. This would be overflow demand from the Lake Road precinct which is approaching full capacity. Demand for land was indicated at 1-2,000 m^2 with current pricing of \$300+/ m^2 p.a. net. Demand for rental space was indicated as being for small industrial units of 100-300 m^2 at a rent of \$110+/ m^2 p.a. net. There is little current demand for office space.

Other comments reflective of the general commercial real estate market and not specifically directed at the PMHC vision for the ABP included:

- The Airport Business Park is an acceptable location.
- Quick and easy road access to highways is a high priority amongst tenants and owner/occupiers. Upgraded road access to ABP would be required.
- Freehold land tenure is highly desirable.
- Ownership of a strata industrial unit is a preferred investment model for the selfmanaged super funds of small business owners.
- Multi-unit strata titled developments are in demand by developer/investors and syndicates. 30-40 strata units is the typical investment size sought by developer/investors.
- The most common tenants/owner occupiers are from the business, technology and professional services sectors.

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Future High Value Businesses

Future high value businesses and the high value jobs they create can reasonably be expected to seek to locate at an established (or at least 'shovel ready') ABP, arising from the following sources.

- Opportunities will be generated from the airport upgrade itself as usage of the airport by more and large aircraft and more passengers increases in relation to the following activities:
 - Passenger related (RPT)
 - retail
 - parking
 - car hire
 - accommodation
 - tourism
 - Airport usage (RPT)
 - maintenance
 - catering
 - repairs
 - refuelling
 - Air Freight
 - handling
 - forwarding
 - consignment
- As indicated in our original report the proximity, and connectivity, of the ABP to other business precincts and activities can be expected to generate demand by occupants.

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PMHC URBAN GROWTH MANAGEMENT STRATEGY 2017-36

"SUCH A NETWORK OF LINKAGES PLACES THE AIRPORT AND THE AIRPORT BUSINESS PRECINCT AT THE CENTRE OF VIRTUALLY ALL CURRENT AND PROPOSED ACTIVITY WITHIN PORT MACQUARIE. THIS WILL DRIVE BENEFITS TO THE AIRPORT AND THE OTHER LINKED PRECINCTS"

AUGUSTA ADVISORS – APRIL 2011

Examples previously suggested of potential synergistic benefits accruing from the airport precinct integrating in a cooperative manner with other precincts could include the following:

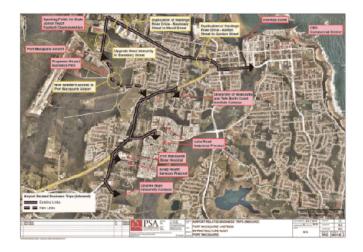
Tertiary education

- Access for students and staff
- Overseas students and their specific requirements
- Flight training
- Aeronautical studies
- Ancillary location for research, etc.
- On the job training for electrical, mechanical and other engineering studies

Medical

- Air ambulance
- Patient transfer
- Staff, patient and family travel
- Blood, organ, medicine transport
- Ancillary location
- Aviation medicine support

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FROM PORT MACQUARIE HASTINGS INFRASTRUCTURE
GAP ANALYSIS, PSA, OCTOBER 2014

- Also, as indicated in the draft UGMS 2017-2036, there will be demand for new office floorspace in out-of-centre locations, including the proposed business hub at Port Macquarie Airport. This is consistent with a trend in major cities and regional centres, which has seen a shift in the location of office based activities into business park developments. These are predominantly office parks with a component of warehousing and in some cases research and development and high technology uses. Businesses are attracted to the amenity business parks offer and often benefit from the clustering of similar businesses (e.g. healthcare or research and development), usually around a core activity such as a hospital or airport.
- Finally, we continue to be of the opinion that making freehold general aviation land available can create a real point of difference and competitive advantage for Port Macquarie Airport and ABP.

Few if any east coast regional airports offer freehold aviation land for general aviation businesses. The opportunity to purchase freehold aviation land is likely to attract and retain general aviation businesses such as aircraft repair and maintenance, manufacturing and sales, and high net worth individual aircraft hangars.

While the provision of freehold GA land should be a consideration its inclusion should be subject to the completion of a comprehensive business case and risk assessment of all options including freehold and leasehold land tenure. This business case and risk assessment study can also consider CASA regulations, potential future changes thereof and the operational requirements and future land requirements of Port Macquarie Airport.

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Council should consider engaging with the NSW Government and relevant departments to develop a regional inward investment strategy to attract new high value businesses and employers to the region. The strategy should aim to target government as well as non-government organisations.

It is also advised that additional specific research into demand trends for specialist high value aviation-associated and other businesses is recommended with focus into cluster developments adjacent to airports to better identify likely users/owners and tenant driven needs so that marketing and public relations announcements can be more accurately targeted to potential occupants.

The Risk of Compromising the Future with Current Demand

There is a risk of compromising the ability of the ABP to attract future high value occupants by catering to existing demand. Existing demand is essentially overflow from the Lake Road precinct so catering for that would establish that style of 'industrial area' development at ABP, which is not the environment that high value business would wish to be in.

This would negatively impact upon the opportunity for the ABP to build on the key role of the airport as a regional hub and transport gateway, to deliver benefits to the city and region by the attraction of high value jobs. This overflow industrial demand from Lake Road can be satisfied elsewhere, for example at Sancrox, Fernbank Creek, Thrumster or Lindfield Park.

The detailed concept for the ABP should place a high priority on the infrastructure and development aesthetics of the ABP and its significance as the point of arrival for both business and tourist consumers and its perception as the "gateway" to the Port Macquarie-Hastings region.

The creation of the APB represents a strategic opportunity to complete and complement the existing business precincts in Port Macquarie. This statement is especially relevant to the connection of the airport and the ABP to the orbital road system that optimizes connectivity and facilitates highly efficient transport of personnel, goods and materials between business precincts and into and out of the Port Macquarie region.

The central location of Port Macquarie Airport and the ABP within the Port Macquarie network of business precincts represents a highly efficient application of infrastructure that benefits the entire region. Consequently, the ABP is not a competing interest but rather a compliment to existing business precincts, other development sites and existing commercial and industrial zoned land elsewhere in the PMHC Local Government Area.

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Importantly, the revised funding approach adopted in this supplementary advice means that it is not necessary to cater to existing demand as a means of obtaining early sales to self-fund development of the ABP. Initial government grants can be supported later by developer contributions, underpinned by the attraction of high value businesses.

IMPORTANTLY, THE REVISED FUNDING APPROACH
ADOPTED IN THIS SUPPLEMENTARY ADVICE MEANS
THAT IT IS NOT NECESSARY TO CATER TO EXISTING
DEMAND AS A MEANS OF OBTAINING EARLY SALES TO
SELF-FUND DEVELOPMENT OF THE ABP.

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LESSONS LEARNED FROM CLUSTER DEVELOPMENTS

There are hundreds of examples of successful and unsuccessful business clustering attempts. Below is a list of internationally accepted best-practice action points, extracted from the following document, that are relevant to the Port Macquarie ABP attracting a cluster of high value businesses over time.

Reference: Guidelines for Cluster Developments: A handbook for Practitioners – Maxwell Stamp PLC – June 2013

Based on the accepted criteria listed below, it can be seen that Port Macquarie ABP is well positioned to achieve success.

1. Provide a focus for attracting investment.

This is provided by the upgraded airport, efficient linkages to other business precincts and the region, and by the lifestyle advantages of Port Macquarie-Hastings. The ABP providing (at least) 'shovel ready' status underpins the focus.

2. Focus on building your brand.

The most successful clusters result in a brand that identifies a place with quality, establishes customer loyalty and becomes a prime destination. Regions can support branding through their marketing efforts and state publications. Famous brands are common in agriculture, food and drink with, for example, French champagne, Scotch whisky, Belgian chocolates, Parma ham, etc. – all globally recognised clusters.

3. Create local structures.

Clusters are predominantly a local activity, and for development initiatives to be sustainable they should be driven by local organisations. PMHC has already taken this position.

4. Early political support helps.

PMHC has provided / is providing this, with NSW and Federal Government support.

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5. But private sector leadership must follow.

Leadership needs to move as soon as possible from the initial politicians, to the private sector. Clustering should not be positioned as a 'government initiative'. Well respected business leaders need to visibly take charge as soon as possible.

6. Focus on facilitation - not more analysis.

A key role in stimulating the development clusters is the availability of a cluster facilitator. What is needed is a relationship builder within a community, not a researcher/analyst. Skill focus should be on facilitation and dialogue skills, not administrative ones. In this case the cluster facilitator is PMHC and Port Macquarie Airport.

7. Move early into action - look for "low hanging" fruit.

A clustering initiative needs to be action orientated, holding the commitment of stakeholders through generating early benefits. Aim initially for small modest benefits (the low hanging fruit) focusing on aspects that offer early, low-risk results, without substantial effort. For Port Macquarie ABP the airport upgrade (with upgraded road access to follow) provides ample evidence of early action.

8. Build for the long term.

For the Port Macquarie ABP this suggests that focussing on the attraction of high value businesses, and not catering to existing local demand, is the correct way to proceed.

9. Build a cluster portfolio.

Successful local economies are not completely dependent on just one or two clusters for growth and job creation. It is good practice to develop a portfolio of initiatives which generate benefits for a large number of cluster stakeholders, and ensuring that not all eggs are held in one basket. For Port Macquarie Airport and the ABP this is achieved by links to the other business precincts and to the wider region.

10. Both high tech and low tech.

Politicians often see clustering initiatives as only being applicable to high tech activities. However, a true knowledge-driven economy is not restricted to a few glamorous operations, but a basket of them with varying degrees of technology intensity. Inclusion of General Aviation associated operations are an example of this criteria at the ABP.

11. Market sector focus.

If the cluster boundary is taken too broadly, as 'light manufacturing' rather than 'processed foods', for example, then the initiatives that emerge are likely to be too generic to have much impact. For ABP work still needs to be done to identify and communicate with specific groups of potential high value business occupants.

12. Geographic focus.

The geographic boundaries of a cluster often do not coincide with political boundaries. Often economic development professionals see value with cross-border cooperation, but their political masters less so. Port Macquarie's ABP will be seeking to attract occupants from outside the region/LGA.

13. Bring additional resources to the table.

In the early stages additional resources are important to gaining private sector attention. This could include funding from government agencies, public utilities, funding/allocation of resources from private sector organisations. For Port Macquarie ABP the strategy of getting 'shovel ready' and then seeking further government funding is highly aligned with this action point.

14. Connect to universities and technology institutes: key sources of knowledge.

Tertiary institutions internationally are emerging from a narrow role of learning institutions, to a broader role serving as technology generators, and generators of new companies. They are offering specialised training for SMEs, providing technology transfer, and also acting as the neutral catalyst in bringing the diverse stakeholders in a local cluster together to establish areas of collaborative engagement. For Port Macquarie ABP the proposed linkage with the education precinct addresses this item.

15. Build media coverage – use integrated marketing communications strategy.

For the Port Macquarie ABP this has already occurred with coverage of the airport upgrade and, recently, coverage of the terminal upgrade. A strategy should be developed to continually build on this as further developments and milestones occur (e.g. funding of a second road access). This should merge with and become part of a marketing strategy once the ABP is 'shovel ready' and therefore ready to market to prospective occupants, developers and investors.

Case Studies

Additionally we have considered the other business park/cluster locations referenced in the PMHC scoping document in relation to this supplementary advice. These are the airport based developments at Bankstown, Coffs Harbour, Newcastle and Jandakot airports and non airport clusters at Macquarie Park, Pyrmont and Ultimo, Westmead and the Australian Technology Park. Unsurprisingly the airport based developments appear more relevant to PMHC Airport and the ABP.

1. Bankstown Airport NSW (Parcel freight and niche passenger aviation centre)

Sydney Metro Airport Bankstown is located within the Bankstown Local Government Area approximately 26km south west of the Sydney CBD and 17km from Sydney Airport. It has proximity to the Bankstown CBD (5km) and Liverpool CBD (6km).

The site occupies an area of approximately 313.3ha. While the area to the north of the site is primarily residential, the Airport sits within the broader central west Sydney industrial and commercial zone, and remains the only large developable parcel of land within the region.

Sydney Metro Airport Bankstown is well located with respect to key population and economic growth areas in Bankstown, Fairfield, Parramatta and Liverpool. The Airport has convenient access to major arterial roads including the M5 and M7 to the south, Henry Lawson Drive to the west and the Hume Highway to the north. The site has an extensive internal road network.

The goal of Bankstown Airport is to meet the current general aviation, parcel freight and niche passenger aviation needs of Sydney and develop the aviation and property assets to maintain maximum sustainable value.

Relevant experience from Bankstown Airport includes:

- Complete property development business plans early which include comprehensive environmental and geotechnical analysis of development sites.
- Release available land as early as possible to provide funding for subsequent infrastructure development and further land release. Subsequent branding campaigns must be supported by infrastructure expenditure.
- General aviation development can be attracted to regional airports by offering lower operating costs and freehold land.
- Coffs Harbour Airport NSW (Regional airport of NSW North Coast and non specific development of adjacent lands)

43 hectares of land at Coffs Harbour Airport is designated for development as a new industrial estate. The concept is to transform the vacant land at the northern end of Coffs Harbour Airport into the new 100 lot, industrial estate for the regional city. 18 of the proposed 100 lots are reserved for existing businesses in the area.

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CHCC has prepared a mixed land use plan for the Coffs Harbour Airport precinct. The proposed estate will eventually include a mix of aviation related industry, other industry, businesses and residential development.

Relevant experience from Coffs Harbour Airport includes:

- Early planning must include comprehensive reviews of environmental and geotechnical limitations.
- Passenger growth will depend on airline capacity and the relationships developed with airline management.
- Non aviation development on airport is best supported by a regional approach with supporting infrastructure links.
- Expenditure on infrastructure for aviation development should be linked to projected growth.
- Newcastle Airport NSW (Major commercial airport with strong allegiance to Australian Defence Force and aerospace industry)

Newcastle Airport is on the southern boundary of Williamtown Royal Australian Air Force (RAAF) Military Base, 20 km north of Newcastle. The airport is jointly owned by Newcastle City Council and Port Stephens Council, and managed by Newcastle Airport Limited (NAL). The airport shares the RAAF Base runway.

The Williamstown Aerospace Centre (WAC) was established to create, enhance and facilitate commercial activities in the land adjoining RAAF Base Williamstown and Newcastle Airport.

WAC includes the Newcastle Airport Precinct and 120 hectares of industrial and business land. It will provide first class facilities and a variety of infrastructure solutions to meet the needs of individual organisations of any size or requirement.

Set on three hectares of land located at the entrance to Newcastle Airport and just two minutes from the entrance to the RAAF Base Williamstown, 1 Technology Place is the first stage of the Williamstown Aerospace Centre. The commercial campus-style tech park includes commercial offices, and technical and light industrial spaces for lease.

Three buildings have now been completed, with a fully let 2,000m² fourth building currently under construction. All buildings have been designed and build to Defence zone level security requirements. The estate boasts the 95 room Mercure Hotel (Newcastle Airport) and a conference centre with substantial seminar and meeting room facilities at the heart of the estate.

Relevant experience from Newcastle Airport includes:

- Develop a strong brand and work with State and Local government business and tourism organisations to promote airport as a destination for business development.
- Retain control of the property development activities with appropriate external advisers
- Creative use of existing infrastructure, followed by capital expenditure on aviation infrastructure to match activity growth.

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4. Jandakot Airport WA (Flight training campus)

Jandakot Airport is located 16km south of the City of Perth and 13km east of the Port of Fremantle. The airport's 622-hectare site is within the boundary of the City of Cockburn.

Jandakot Airport is the main general aviation airport in Perth. and is one of the busiest airports in Australia in terms of aircraft movements. The airport operates 24 hours a day, 7 days a week. It provides facilities for tourism, pilot and aviation training, general aviation, services to resource and pastoral sectors and emergency services.

The development of the mixed business precincts over the past seven years has attracted leading-edge firms to the airport site. JAH's vision is to successfully develop and manage Jandakot Airport as a strategically significant aviation hub with a supporting business campus. There are also more than 30 aviation support businesses located at Jandakot, providing services such as aircraft repairs and maintenance, avionics, painting and detailing.

Jandakot Airport has a significant role as a major training base for both local and international pilots.

Relevant experience from Jandakot Airport includes:

- Environmental limitations should be identified early and included in business planning.
- Non aviation development is an integral part of the development of the airport and is essential to create revenue streams for subsequent growth.
- Expenditure on aviation development should be linked to growth projections.
- General aviation development can include both leasehold and freehold sites.
- Macquarie Park (Technological and innovation, highly connected, multi-modal transport hub)

Macquarie Park is currently the second largest commercial office region in New South Wales after Sydney CBD and North Sydney, and is on track to becoming the nation's fourth largest CBD (behind Sydney, Melbourne and Brisbane) by 2030.

Located just 12km north-west of the CBD, the area has quickly become Sydney's second largest business district and already hosts a range of corporations in industries including telecommunications, technology, pharmaceutical and electronics. Some of the growing list of corporations who call the area home include Microsoft, Sony, Optus, Johnson & Johnson and Goodman-Fielder.

With its leading-edge infrastructure, Macquarie Park is a highly connected technological and multi modal transport hub.

Macquarie Park is recognised as a 'specialist centre' under the NSW Government's Metropolitan Strategy for Greater Sydney, and forms an integral part of Sydney's Global Economic Corridor due to the types of businesses in the area and the GDP it produces.

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Macquarie Park's steady growth and fast-evolving infrastructure are underpinned by its commitment to innovation and focus on the future. These factors have seen it become a magnet for industry leaders and global giants, and are now forging the way for further growth.

6. Australian Technology Park (High tech and biotechnology spin off hub)

The Australian Technology Park is a business, research and technology centre in Eveleigh, an inner-city suburb of Sydney, New South Wales. It is located about 3 km south of the Sydney CBD, adjacent to Redfern railway station, spread over 13.9 hectares of land.

Australian Technology Park primarily houses start-up hi-tech companies, especially biotech firms, and spin-offs from university research.

The primary intent of the park is for researchers to be located alongside companies with the capital and expertise to commercialise research discoveries.

Today, the site has 100 resident firms providing over 5,500 jobs and research positions, and is part of the local community - providing local jobs, support for community programs and high-quality campus services.

Pyrmont-Ultimo Cluster Development (Within the City of Sydney, digital industries hub

The City of Sydney, and specifically in the Inner West of Sydney, is home to a number of industry clusters either linked by supply chains or by competitive complementarities.

Pyrmont-Ultimo is renowned as a Digital industries hub. According to statistics, digital businesses within the Pyrmont-Ultimo have employed an extra 3023 staff working in information and communications technology (ICT) companies in the five years from 2007 which is an increase of 252 per cent.

Ultimo in particular is heralded as the largest concentration of IT start-ups in Australia, boasting more than 150 'Silicon Valley-style' start-up businesses sharing working space.

Pyrmont-Ultimo is also home to many significant not-for-profits and change-making organisations, including Vibewire, WWF Australia, Barnardos and Pyrmont Cares.

It is a leading technology and creative hub with clusters of media agencies, IT, and digital creative, together with leading iconic brands including Network 10, Channel 7, Google, Accenture, Mirvac, Fairfax, Tabcorp, NOVA DMG Radio, Macquarie Radio, American Express, OMD, Toga Group, Medina, and Shine Productions.

8. Westmead (University and medical campus)

The Westmead precinct is one of the largest health, education, research and training precincts in Australia and a key provider of jobs for the greater Parramatta and western Sydney region.

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ORDINARY COUNCIL 17/07/2019

Spanning 75 hectares, the Westmead precinct comprises over 400,000 m² of high-end health-related developments, including four major hospitals, three world-leading medical research institutes, two university campuses and the largest research-intensive pathology service in NSW.

Westmead is a flagship for highly specialised and integrated health, research, education and innovation and a major lever for economic stimulus.

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CRITICAL SUCCESS FACTORS

Alignment of Interests

The long-term growth of Port Macquarie Airport is critical to the overall prosperity and growth of the Port Macquarie region relative to the three other regional cities of the NSW North Coast.

The continuing upgrade of Port Macquarie Airport and completion of an orbital road system providing connections with the other business precincts gives rise to the secondary development of the Airport Business Park and represents an alignment of the interests and strategic initiatives of the following authorities:

- Port Macquarie-Hastings Council
- NSW Government
- Federal Government
- NSW Roads & Maritime Services
- NSW State Emergency Services & NSW Flood Relief Plans

The alignment of these interests enables the success of the ABP, particularly with respect to the provision and funding of a second flood free road access to the airport, which will be a 'game changer' to the commercial prospects of the ABP.

Documents published by NSW Government and PMHC in relation to regional development of the NSW North Coast and Port Macquarie LGA include:

- NSW Government North Coast Regional Plan 2036
- Port Macquarie-Hasting Council Towards 2030 Community Strategic Plan
- Port Macquarie-Hastings Council Economic Development Strategy May 2017
- PMHC Draft Urban Grown Management Strategy 2017-2036
- Shape of the Future Port Macquarie-Hastings Council 2017

The above NSW Government documents encourage regional development of infrastructure and airport hubs as a means of attracting and promoting new business opportunities to attract population growth and quality of life in regional NSW.

Similarly, the PMHC documents confirm to its constituents and potential investors in the region the continued commitment and adherence to NSW Government initiatives and support for regional development in the Port Macquarie region.

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Ownership of the Vision and Opportunity by PMHC



Since April 2011 PMHC has achieved significant progress towards implementation of its vison for the upgraded Port Macquarie Airport and the development of an adjacent Airport Business Park.

In the intervening period of $6\frac{1}{2}$ years PMHC has commissioned numerous consultant reports and analyses to support the appropriate economic and business case rigour to warrant the unconditional support of the initiative by Port Macquarie-Hastings Council and its constituents.

PMHC has an opportunity to attract high value jobs and achieve its community vision at a low cost by undertaking actions which need to be done anyway. Provision of flood free road access to the airport is necessary on its own right but once provided will be a 'game changer' for the ability of the airport and the ABP to deliver benefits to the city and the region. This is a high value/low cost strategy and a unique opportunity.

Key milestones to take advantage of the opportunity are approval of the Biocertification Application and approval of the Planning Proposal for the full footprint of the ABP. There is some opposition to the ABP by vested development interests which is potentially impacting and delaying the administrative procedures of, for example, assessment of the Planning Proposal. For the benefit of the overall precinct, and as an alternative approach, PMHC would encourage other properties in the immediate vicinity to become part of the ABP, provided that they are able to meet their own environmental constraints.

In order to overcome these impediments and take advantage of the opportunity so that the community's vision can be achieved it is highly desirable that councillors and staff take ownership of the vision and recognise and embrace the opportunity.

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Need to Achieve 'Shovel Ready' Status

Provision of a second flood free road access and provision of upgraded services infrastructure are critical success factors for the ABP, as identified in our original report. That report adopted a methodology for PMHC to proceed with the development of the Port Macquarie Airport Business Park by self-funding and staged development scenarios.

At that time the Bio-Certification Application and Planning Proposal processes had not commenced, let alone be completed and submitted for approval.

In response to these developments, and to the current environment for government funding of regional infrastructure, and after discussions with senior PMHC staff, Augusta has amended its recommendation to reflect a lower risk 'shovel ready' strategy summarised by the achievement of the following milestones:

- Obtain Bio-Certification to resolve all potential environmental issues.
- Obtain approval of the Planning Proposal for the full footprint of Port Macquarie Airport Business Park.
- Undertake planning and costing for the preferred second road access and services upgrades.
- Update developer contribution plans.
- PMHC will then be in a position to take advantage of the current government funding environment to seek Federal & NSW Government Funding for major infrastructure components including:
 - Completion of Port Macquarie Airport Upgrade to 4C capability
 - Undertake second road connection including 1:100-year flood-free access and connectivity to other Business Precincts
 - Amplification of services to support the Airport Business Park
- Obtain development consents and other specific approvals as required.

No Specific Funding Model Required to Initiate Vision

As stated elsewhere in this report PMHC will need to develop detailed costings and plan for the required infrastructure and services upgrades required for the ABP.

Additionally, PMHC will need to update its contribution plans to provide for development based contributions to infrastructure upgrades.

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The funding model for the ABP needs to remain flexible to accurately plan and budget for the ABP and required infrastructure and receive governmental grant funding when and as secured, later to be supplemented by developer contributions underpinned by the attraction of high value businesses.

For these reasons, and because of the platform already established by the airport upgrade and the Biocertification and Planning Proposal processes, there is no specific funding model currently required to initiate the vision of ABP's contribution to the region.

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IMPLEMENTATION STRATEGY

As an update of its initial report of April 2011 and in order to reflect progress since then and current circumstances, Augusta has amended its recommended implementation strategy, as summarised by the following critical milestones:

'Shovel Ready'

- Obtain approval for Bio-Certification Assessment.
- Obtain approval for Planning Proposal over full ABP footprint over full ABP footprint.
- Complete necessary planning and costing for all required Infrastructure including services and second road access, and review contribution plans.

This is a relatively low-cost activity as much of this work is complete or substantially progressed.

Secure Grants – Federal and NSW Government

Prepare the PMHC business case(s) supported by relevant consultant reports and costing analyses to secure further NSW and Federal Government funding for these major regional infrastructure projects.

NSW and Federal Government support reduces the financial burden on Port Macquarie-Hastings Council.

Construct Secondary Road Access

Construction of a second flood free road access is the 'game changer' for the Port Macquarie Airport and ABP and their ability to deliver benefits to the region. The beneficial effect will be maximised if the second flood free road access is connected to the Orbital Road Network.

This project is a major benefit for the entire Port Macquarie- Hastings Council region and ensures connectivity of the Airport and Airport Business Park to all other business precincts to the wider region.

The principle benefit of this project is the provision of a 1:100-year flood free road access to Port Macquarie Airport to properly connect it to the city, the region and to other major transportation links including the Pacific Highway and the North-South rail network. This also ensures access to State and Federal Government assistance and access for State Emergency Services during crisis and natural disaster.

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However, as a by-product, it also provides the same benefits to ABP. Occupants, investors and/or developers need relevant assurances that the necessary infrastructure is planned for construction, subject only to the timing of Federal or NSW Government funding.

Subsequent confirmation of occupant demand will enable a understanding of the required distribution and timing of services and enable creation of a staged development program.

Attract Occupants

The suggested strategy of 'shovel ready' is devised to provide adequate assurance to prospective investors and new businesses to commit to the Port Macquarie region and specifically to the Airport Business Park.

Amplification of Services

The delivery of services amplification can be staged to suit identified demand as and when targeted occupants pre-commit.

Update contribution plans to facilitate developer funding/contribution for ABP infrastructure.

Specific Approvals

Obtain specific Development Consent and other approvals as required, in response to attraction of occupants.

ANNEXURES

- 1 PMHC Scope for Upgrade of Augusta Advisors Report
- 2 Agenda for Augusta Advisors Site Visit and inspection dated 14 September 2017
- 3 Update on Market Information obtained from Port Macquarie Real Estate Agents
 14 September 2017

1. PMHC Scope for Upgrade of Augusta Advisors Report

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14th July 2017

Strategic Advice - Airport Business Park

Background:

As detailed in the *Port Macquarie Airport Master Plan 2010 Addendum Report*, a priority objective of Council for the Airport is to provide opportunities for land development within the airport property that promote employment opportunities, facilitate economic development, and support the long-term financial viability and sustainability of the airport.

Council recognises the role of Port Macquarie Airport as a catalyst for aggregating economic development drivers in the region. Council also recognises the changing nature of industry, and the trend toward business park developments clustering and aggregating around transport corridors, universities, airports and hospitals.

Council has identified an area of approximately 23.75 ha of land owned by Council within the Master Plan area that is adjacent to the airport, relatively flat and readily developable, and potentially ideally suited to a cluster style Airport Business Park development.

Requirement:

In order to review the strategic importance of Council's airport lands as a development site, Council requires an update and recalibration of the original strategic property advice provided by Augusta Properties to Council in 2011 for the development of an Airport Business Precinct. This strategic advice will be used to inform the manner and extent in which the site may be developed into the future; to support future successful clustering of industry; and to ensure that staging options appropriately compliment infrastructure development requirements.

Scope:

- Vision confirmation of Airport Business Precinct vision, with reference to the Airport Master Plan
- Airport Progress review of recent developments and current works in progress relating to Port Macquarie Airport, including:
 - a. Completion of \$20.5m Airport runway upgrade to cater for Code 4C medium jet aircraft;
 - Receipt of approval to proceed with a \$7.5m airport terminal building upgrade including funding by Federal and State governments and Council;
 - c. Lodgement to the Minister for Environment of an application for the Biodiversity Certification (biocertification) of the Airport Lands, including the Airport's operational OLS (obstacle limitation surfaces), the proposed Airport Business Park, and the corridors for future road linkages to the airport and business park. The biocertification of the Airport Lands will mean that a consent authority will not have to take biodiversity issues into consideration when assessing future development applications.
 - d. Current proposal for rezoning of subject land for appropriate future development (attached);
 - e. Ongoing improvements to Airport passenger numbers.
- 3. **Council Progress** review of recent developments, current works in progress, and key planning documents relating to Port Macquarie-Hastings Council, including:



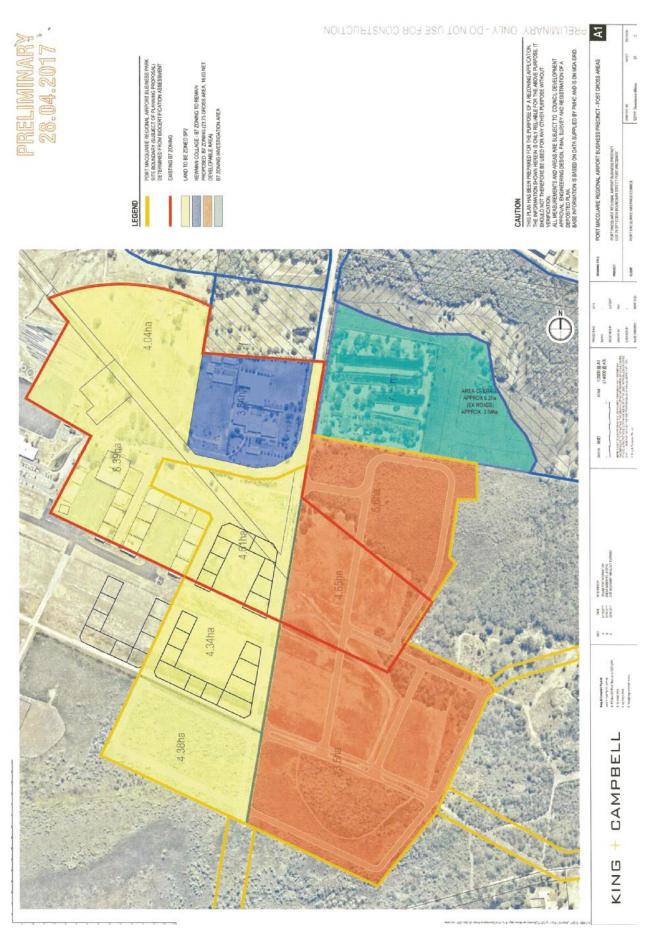


- a. Designation of Port Macquarie as a Regional City by the NSW Government;
- b. NSW Government's North Coast Regional Plan 2036;
- c. Council's Towards 2030 Community Strategic Plan;
- d. Council's draft Urban Growth Management Strategy;
- e. Council's draft Area Wide Traffic Study and orbital road planning;
- f. Council's assessment by IPART as a stand-alone council under the 2015 Fit for the Future review;
- g. Relevant State Government announcements.
- Site Factors review of the opportunities and constraints associated with the site, including environmental considerations and infrastructure staging options.
- Strategic Viability review of project viability, in a strategic context, with reference to the vision (item 1), Airport progress (Item 2), Council progress (Item 3), and existing site factors (Item 4).
- Market Factors commentary on relevant market demand factors including industry type, tenure, and site requirements.
- 7. Cluster Developments provision of lessons learned, assessments for developments that act as a cluster of interconnected businesses, suppliers and institutions (including Macquarie Park, Pyrmont and Ultimo, Westmead, and Australian Technology Park) and airport based cluster developments such as Bankstown, Coffs Harbour, Newcastle and Jandakot airports (noting there may be other relevant case studies).
- 8. **Critical Success Factors** assessment of the critical success factors for the successful development of an Airport Business Park (with reference to access requirements, upgraded services, value capture by Council, and staging recommendations).



Out of Scope:

1. **Update of Detailed Feasibilities** – this is expected to form part of a future scope of work.



2. AGENDA FOR AUGUSTA ADVISORS SITE VISIT AND INSPECTION DATED 14 SEPTEMBER 2017

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Port Macquarie Airport Business Precinct – Site Visit by Augusta Advisors

Agenda - Thursday 14th September 2017

Augusta Advisors – Martin Hillier – Director

Ross Norton – Senior Consultant

Organiser – Jason Doyle – Group Manager Assets & Property Investment

0830 - 0900	Kick-Off
Function Room	Cr Justin Levido – Chair Airport Advisory Group
	Brian Tierney – Member Airport Advisory Group
	Tony Thorne – King & Campbell
	Rebecca Olsen – Director, Corporate Performance
	Ashley Grummitt - Group Manager Commercial Business Units
	Gayleen Burley - Business Enterprise Manager - Airport
	 Welcome & Review of Scope (Jason)
	 Setting the Scene including Council Direction & Intent (Justin, Brian)
	 Airport Progress post 2011 (Ashley, Gayleen)
	 Planning Proposal Progress & Status (Tony, Ashley)
0900 - 1000	Planning Proposal In Detail
Blue Room*	Brian Tierney – Member Airport Advisory Group
	Tony Thorne – King & Campbell
	 Land Use Proposal
	 Planning Opportunities & Constraints
	 Biocertification Assessment
	 Infrastructure Inputs
	Planning Proposal Principles
	 Development Trends
	Clusters
1000 – 1100	Transport Infrastructure
Blue Room*	Duncan Clarke – Group Manager Transport & Stormwater Network
	Cameron Hawkins - Engineering Planning Manager
	Existing Road Infrastructure & Constraints
	 Future Planning – Boundary St, Secondary Access Strategic Planning - Areawide Traffic Study Orbital Road
1100 - 1115	Charles of anning Thousand Traine Charles Than Toda
1115 – 1215	Drive to Airport Ashley Grummitt - Group Manager Commercial Business Units
Port Macquarie	Gayleen Burley - Business Enterprise Manager - Airport
Airport	Doug Page - Airport Operations Co-ordinator
Allpoit	Airport Site Tour
	View Airport Infrastructure & Facilities
	View Airport Business Park Landholding
	Airport Operations
	Runway Upgrade
	Proposed Airport Terminal Upgrade
	 Passenger Numbers and Trends
1215 - 1230	Drive to CBD
1230 - 1330	Working Lunch
1330 - 1400	Industrial & Commercial Property - Market Review
Laing & Simmons	Garry Krestensen - Laing & Simmons
Cnr Clarence and	 Demand and Supply Factors
Murray St	 Airport Business Precinct Considerations
	Market Commentary
1400 – 1430	Industrial & Commercial Property - Market Review
Raine & Horne	Luke Horton - Raine & Horne Commercial
Commercial	 Demand and Supply Factors
3/136 William St	 Airport Business Precinct Considerations
	Market Commentary
1430 – 1500	Industrial & Commercial Property - Market Review

Debbie Moore	Debbie Moore - Debbie Moore Real Estate						
Real Estate	 Demand and Supply Factors 						
Lord St	 Airport Business Precinct Considerations 						
	 Market Commentary 						
1500 - 1530	Water & Sewer Infrastructure						
Green Room	Luke Moane – Acting Water & Sewer Planning Manager						
	 Existing Water & Sewer Infrastructure & Constraints 						
	 Future Planning & Implications 						
1530 - 1615	Strategic Land Use Planning Inputs						
Green Room	Peter Cameron – Group Manager Strategic Land Use Planning						
	Sandra Bush – Senior Strategic Planner						
	 Urban Growth Management Strategy 						
	 Economic Development Precincts 						
	 Population and Growth Considerations 						
	Economic Development Inputs						
	Liesa Davies – Group Manager Economic Development & Communications						
	 Economic Drivers 						
	 Business Trends & Opportunities 						
1615	Drive to Airport						

3. UPDATE ON MARKET INFORMATION OBTAINED FROM PORT MACQUARIE REAL ESTATE AGENTS – 14 SEPTEMBER 2017

Garry Krestensen & Chris Koch - Laing & Simmons

Airport Business Park Satisfactory-preferred location subject to

business type and land price

Land Tenure Freehold is imperative for SMSF owners/investors

Demand Significant demand for 50-150 m² industrial units

Medium-Large Size Industrial Units – Low demand

Commercial Space - Low Demand

Lake Road Industrial Estate 100% leased @ \$100-\$150/m²

Horton Street Commercial 100% leased at \$300-\$400/m²

Graeme Garrett - Raine & Horne Commercial

Airport Business Park - SP2 Zoning Business-Technology focus

Generally smaller footprint users.

1,000 m² would be consider a large occupant

Airport Business Park – B7 Zoning 150-200 m² is the "sweet spot" for the Light

Industrial office /warehouse market

Strong demand for smaller strata-units of 80-100

m²

Super Lots Typical development being sought 30-40 strata-

titled units

General No serviced land available for industrial

development

SMSF Demand 1,000 m²-4,000 m² with strong tenant on secure

lease is in high demand

Commercial Demand No change in commercial Lease rates in 15

years

Industrial Demand 20% increase in Industrial Lease rates in 2 years

2015-2017

Industrial Vacancy Estimated at 2-3%

Debbie Moore - Debbie Moore Real Estate;

SP2 Zoning Aviation related new industries attracted to

Airport Business Park

B7 Zoning Light Industrial and Professional Services Users

Access to Airport is a high priority and major attraction for Owner/Occupiers and tenants

Demand High for small service industries

1,000 -2,00 \mbox{m}^{2} users are just starting to emerge in

the Port Macquarie region

Government tenants are starting to be attracted

to regional NSW Centres

Land Sub-division 1,000 – 2,000 m² minimum Lot size

50% site coverage Suggested FSR 1:1

Comparable Land Pricing \$310-\$320/m² - Lake Road Industrial Precinct

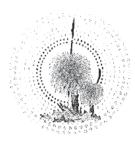
\$310/m² - Uralla Road Industrial Precinct

\$350/m² Merrigal Road

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 5 - Birapi Local Aboriginal Land Council Advice

PP2015 - 3.1 5/7/2019



Birpai Local Aboriginal Land Council

King and Campbell Surveyors PO Box 243 Port Macquarie NSW 2444 25 November 2015

On the 20/11/15 a survey was conducted with Tony Thorne and myself at the Port Macquarie Airport Expansion site. Upon inspection, the level of ground cover was low and had recently been mowed, however visibility was good. I walked the boundary of the site and found two oyster shell midden sites 15 to 20 metres east of the Port Parachute landing site. I declare these two sites to be of European heritage [and not to be of Aboriginal heritage]. I believe that it is unlikely any Aboriginal artifacts will be uncovered on the project site as per the NSW National Parks and Wildlife Service (NPWS) act 1974 if any artifacts are uncovered during excavation of the site a stop work occurs and a local Aboriginal site officer be contacted at the Birpai Local Aboriginal Land Council. We look forward to seeing the project completed.

Yours in unity,

MUE COPY

Jason Holten.

Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 6 - Groundwater Assessment Reports

PP2015 - 3.1 5/7/2019

King & Campbell

Port Macquarie Airport Business Park

Geotechnical Assessment – Final Report

Report No. RGS20421.1-AB 29 October 2015





Manning-Great Lakes

Port Macquarie

Coffs Harbour

RGS20421.1-AB

29 October 2015

King & Campbell Pty Ltd PO Box 243 PORT MACQUARIE NSW 2444

Attention: Tony Thorne

Dear Tony,

RE: Port Macquarie Airport Business Park

Geotechnical Assessment – Final Report

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical assessment for the proposed Port Macquarie Airport Business Park.

Surface and subsurface conditions at the site are presented in the attached report along with a discussion on excavation and groundwater conditions.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Tim Morris

Senior Engineering Geologist



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Figures

Figure 1 Investigation Location Plan

Appendices

Appendix A Results of Field Investigations

Appendix B Results of Laboratory Testing

Appendix C Infiltration Testing Results

Regional Geotechnical Solutions RG\$20421.1-AB 29 October 2015



1 INTRODUCTION

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical assessment for the proposed Port Macquarie Airport Business Park.

The geotechnical assessment is required to provide information to assist with the development of a Stormwater Management Plan at the site and provide an overview of geotechnical conditions present, in particular with regards to excavation and groundwater conditions for proposed sewer pump stations and service trenches.

The site is located in an area of gently undulating topography and is centred on a broad sand dune that grades down to poorly drained aeolian sand plains. The site is mostly cleared with some areas of thick heath vegetation to the north and south.

The purpose of the work described herein was to address the following:

- A geotechnical model of the site that includes general foundation conditions and the depth of the soil profiles;
- Excavation conditions:
- General recommendations on management of construction and drainage at the site from a geotechnical perspective;
- The presence of Acid Sulfate Soils and the need for an Acid Sulfate Soil Management Plan;
- · Presence of groundwater;
- Provide soil permeability values for soil types at nominated locations;
- Summary of initial round of water quality monitoring results and comparison with ANZECC guidelines.

The work was commissioned by Tony Thorne of King & Campbell Pty Ltd.

2 FIELD WORK

Field work for the assessment was undertaken on 18 and 22 September 2015 and was based on the supplied drawing titled "5271P_SewerGravityOption_Staged". Fieldwork included:

- Observation of site and surrounding features relevant to the geotechnical conditions of the site;
- Four boreholes undertaken by a track mounted drilling rig using geo-probe push tube techniques, logged and sampled by an Engineering Geologist. SPT testing was undertaken at regular intervals for the deep boreholes near the proposed sewer pump stations;
- Installation of groundwater monitoring wells in each borehole. The wells were constructed
 with slotted 50mm diameter PVC screen in the nominated groundwater body and
 extended to the surface with 50mm PVC casing. The boreholes were backfilled with
 graded sand to the top of the screen and sealed with bentonite pellets and concrete. The

Regional Geotechnical Solutions RGS20421.1-AB 29 October 2015



wells were finished off with a protective steel monument approximately 0.7m high and secured with a padlock;

· Twelve test pits excavated by backhoe, logged and sampled by an Engineering Geologist.

Engineering logs of the boreholes and test pits are presented in Appendix A. The locations of the boreholes are shown on Figure 1. They were obtained on site by measurement relative to existing site features. Coordinates for each investigation location were recorded by hand held GPS and are shown on the logs. Reduced levels at the investigation locations were estimated from the supplied drawing and are shown on the logs.

3 LABORATORY TESTING

Samples retrieved during field work for the current geotechnical assessment were returned to a NATA registered laboratory for testing which included:

- Acid Sulfate Soil Screening Test;
- Detailed CRS analysis to detect oxidisable sulphur and acid generating potential;
- Soil aggressivity analysis for buried steel and concrete;
- Water quality parameters including pH, EC, turbidity, Total Nitrogen/ Phosphorous/ Suspended Solids.

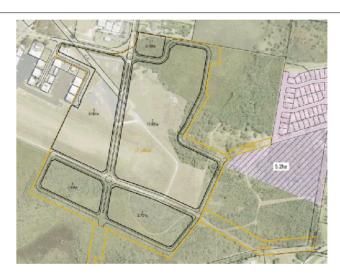
4 SITE CONDITIONS

4.1 Surface conditions

The site is located in an area of gently undulating topography and is centred on a broad east west orientated sand dune that has surface elevations in the order 5.5mAHD and has been modified by earthworks to form a grassed runway. The sand dune slopes grade gently down to the north and south with surface angles of less than 1° towards aeolian sand plains that are poorly drained.

An image of the site is reproduced below.





Proposed Airport Business Park (outlined in black), located to the south east of the existing airport. A disused grass runway is located in the centre of proposed business park.

Vegetation comprised low grass maintained by slashing in the centre of the site with areas of thick heath vegetation to the north and south that graded into swamp vegetation near the site boundaries. Peat soils were exposed in the access tracks in the low lying areas. A large gravel hardstand area is present in the centre of the site, adjacent to the existing runway.

Drainage of the site is via a combination of overland flow and surface infiltration. Surface water was observed pooling in the low lying areas in the north and south of the site and in some sections of the various access trails as shown in Figure 1.

A selection of images of the site is presented below.



Grassed runway area in centre of site



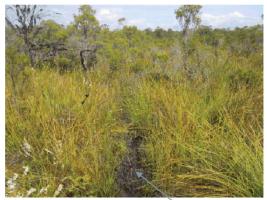
Grass access track adjacent to runway area.
Water pooling in wheel tracks.

Regional Geotechnical Solutions RGS20421.1-AB 29 October 2015





Surface water in poorly drained area on northern site boundary. Peat soils exposed by service trenching works.



Swamp vegetation and surface water in poorly drained area near southern site boundary.

4.2 Subsurface conditions

Reference to the 1:25,000 Port Macquarie Coastal Quaternary Geology Sheet indicates the site is centred on a Pleistocene aeolian sand dune that grades down onto Pleistocene back-barrier sand plains to the north and south.

Reference to the Port Macquarie 1:25,000 Acid Sulfate Soil (ASS) Risk Map indicates the site is an aeolian sand plain with no known occurrence of ASS. However, RGS has previously encountered Potential ASS underlying Pleistocene sand deposits in the local area.

The investigations encountered a variable soil profile as summarised in Tables 1 and 2.



Table 1: Summary of Geotechnical Units

Geotechnical Unit	Material	Material Description
UNIT 1A	FILL - GRAVEL	Sandy GRAVEL, fine to coarse
UNIT 1B	FILL - SAND	SAND, fine to medium, grey, trace silt
UNIT 2A	TOPSOIL	SAND, fine to medium, grey, trace silt, organic fines and roots
UNIT 2B	TOPSOIL / PEAT	Silty SAND, fine to medium, black, with organic fines and root matter.
UNIT 3A	AEOLAIN	SAND, fine to medium grained, pale grey/ white, trace grey/ brown mottling. Test pit walls typically collapsed in the aeolian sand profile.
UNIT 3B	AEOLIAN - INDURATED	SAND, fine to medium, brown/ dark brown/ black /yellow, weakly to moderately cemented, dense to very dense, organic odour
UNIT 4	MARINE	SAND, fine to coarse, grey/ brown, trace shell fragments
UNIT 5	RESIDUAL	CLAY, high plasticity, white, very stiff to hard



Table 2: Summary of Subsurface Conditions

	70							2			1.2		
	Ground	0.8	0.4	0.4	0.3	1.3		1.5, 2.2	1.6	1.4	0.1, 0.6, 1.2	1.2	1.6
	Unit 5 Residual	1	≥ 5.45		1	1	1	1	+		1	1	1
	Unit 4 Marine	≥ 5.5	5.4	ı	ı	1	1	ı	-	1	ı	ı	ı
	Unit 3A Aeolian (3° ^d)	≥ 5.5	5.4	ı	ı	-	> 2.0*	ı	-	-	-	-	ı
yer (m)	Unit 3B Aeolian Indurated (2nd)	1	-	ı	ı	1	1.3	1	> 2.0*	1	>1.7*	> 2.0*	> 2.0*
Material Lay	Unit 3A Aeolian (2 nd)	1	-	1	1	≥ 1.6*	1.1	1	1.5	1	6.0	1.4	1.7
Depth to Base of Material Layer (m)	Unit 3B Aeolian Indurated	3.7	3.4	≥ 1.4	≥ 1.5	1.5	9.0	> 2.2*	0.85	≥ 2.3*	0.4	9.0	0.9
De	Unit 3A Aeolian	1.2	1.1	0.5	0.7	1.3	0.4	1.7	0.7	1.4	-	1	0.7
	Unit 2B Peat	1	0.15	ı	0.15	0.3	1	1	-	1	1	ı	ı
	Unit 2A Topsoil	0.1	-	0.2	-	0.2	0.1	6:0	0.4	0.15	0.15	0.3	0.3
	Unit 1B Sand Fill	1	-	ı	1	1	1	0.8	-	1	1	1	ı
	Unit 1A Gravel Fill	1	-	1	1	-	1	1	0.3	1	-	-	-
(ш)		4.3	5.0	4.0	4.1	5.0	5.0	5.0	5.5	5.2	4.2	5.0	5.7
lnvestigation		BHI	BH2	BH3	BH4	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8

Test pit abandoned due to walls collapsing

Page 6

Material not encountered Base of material layer not encountered 1 🗚

Table Notes:

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Table 2: Summary of Subsurface Conditions (Continued)

	Ground water	1:1	1.3	0.8	1.3
	Unit 5 Residual	1	-	-	1
	Unit 4 Marine	1	ı	ı	ı
	Unit 3A Aeolian (3°d)	1	-	1	≥ 2.3*
yer (m)	Unif 3B Aeolian Indurated (2nd)	1	-	-	2.1
Material Lay	Unit 3A Aeolian (2 nd)	ı	> 2.0*	ı	1.4
Depth to Base of Material Layer (m)	Unit 3B Aeolian Indurated	≥ 1.7*	1.6	≥ 1.5*	0.6
De	Unit 3A Aeolian	1.4	0.5	6.0	0.3
	Unit 2A Unit 2B Topsoil Peat	1	-	1	1
	Unit 2A Topsoil	0.2	0.1	0.15	0.1
	Unit 1B Sand Fill	ı	ı	ı	ı
	Unit 1A Gravel Fill	1	1	ı	ı
	(m)	5.7	4.5	5.0	4.5
u	oitogitsəvnl	TP9	TP10	TP11	TP12

Test pit abandoned due to walls collapsing

Material not encountered Base of material layer not encountered

1 🗚

Table Notes:



Groundwater was encountered at the depths shown in Table 2. It should be noted that fluctuations in groundwater levels can occur as a result of seasonal variations, temperature, rainfall and other similar factors, the influence of which may not have been apparent at the time of the assessment.

5 DISCUSSION

5.1 Subsurface Profile

The soil profiles encountered typically comprised aeolian sands with up to two distinct zones of weakly to moderately cemented, dense to very dense, indurated sand, referred to locally as coffee rock, to depths of up to 3.7m. Based on previous experience in the area, indurated sand profiles are typically variable in their degree of cementing and their horizontal and vertical extents. Marine sands were encountered in the deeper boreholes below the indurated sand horizons from 3.7m. Residual clay soils were encountered in one location, BH2 at 5.45m.

Examples of excavated profiles are presented below.



TP2 – Typical profile with aeolian sands, overlying a thin upper indurated sand horizon, overlying more aeolian sands where the test pit is collapsing due to water inflow occurring above a lower indurated sand layer.



TP6 – Test pit near southern boundary. Perched water table inflow occurring in peat horizon above shallow indurated sand horizon. Water inflow also occurring above deeper indurated sand horizon.

5.2 Groundwater Conditions

Groundwater depths were variable and included shallow perched water tables above the peat and indurated sand horizons. Groundwater inflow from up to three water tables / aquifers were observed in the test pit profiles and were separated by the indurated sand horizons which act as aquitards. Details of water inflow are shown on the attached engineering logs. Future works that require excavation of service trenches, or similar, through indurated sand horizons are likely to result in changes to the local hydrology, including the potential drainage of shallow perched groundwater tables.

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The surface water bodies observed pooling near the northern and southern boundaries of the site as shown in Figure 1 are considered to represent a shallow, perched groundwater table overlying the upper indurated sand profile that daylights as the surface elevation grades down. The perched water tables are anticipated to vary rapidly in height in response to rainfall. Groundwater levels encountered during the drilling investigation (22/9/15) which was undertaken four days after the test pitting (18/9/15) were observed to be approximately 300mm higher following approximately 43mm of rainfall between 18 to 20 September.

Groundwater monitoring wells were installed at four locations to allow monitoring of groundwater levels in response to rainfall. A brief summary of groundwater levels observed since the installation of the wells is presented in Table 3.

Table 3: Groundwater Monitoring Observations

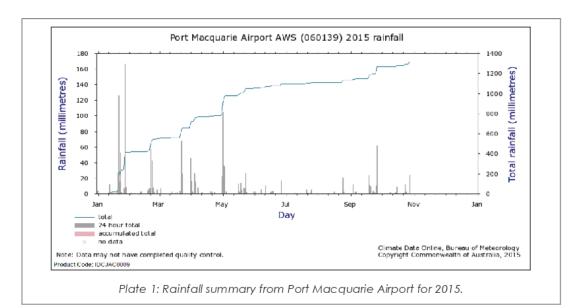
	вн1	BH2**	внз	вн4
Surface RL*	4.3	5.0	4.0	4.1
Groundwater inflow depth (m) 26/9/15	0.8	0.4	0.4	0.3
Groundwater RL (26/9/15)	3.5	4.6	3.6	3.8
Groundwater depth (m) 1/10/15	0.5	0.9	0.05	0.4
Groundwater RL (1/10/15)	3.8	4.1	3.95	3.7

^{*}Estimated Surface RL based on contours shown on supplied plan

Rainfall data from Port Macquarie Airport for 2015 is presented in Plate 1 and indicates low rainfall conditions occurred through winter and spring with an isolated rainfall event of 61mm on 26 September 2015.

^{**}BH2 installed in lower groundwater horizon





As noted previously fluctuations in groundwater levels can occur as a result of seasonal variations, temperature, rainfall and other similar factors. The use of data loggers installed in monitoring wells to collect water level data would allow a more accurate assessment of groundwater responses to rainfall events over a longer time period.

5.3 Permeability

Sand soils typically have a permeability coefficient (k) in the order of 1×10^{-5} to 10^{-2} m/s, however, this can vary depending on depth of the existing groundwater table, depth to aquitard (such as coffee rock) or aquiclude, soil moisture content and other environmental factors.

Falling head infiltration testing was undertaken to assess permeability conditions adjacent to BH2 at on 22 September 2015. Groundwater was present at 0.4m following rainfall over the preceding days. The results of the testing are presented in Appendix C and indicate a calculated permeability coefficient (k) of 5×10^{-5} m/s. This is lower than the indicative value provided above which is likely to be due to the shallow water table that was present.

5.4 Excavation Conditions

Taking into account the materials likely to be encountered it is expected that excavations could be achievable using excavator bucket to at least the depths achieved in the test pit excavations. Slow digging may be encountered in very dense indurated sand horizons, depending on the depth and width of excavation. Excavations in sand profiles will collapse below the water table.

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Excavations in sand profiles are potentially unstable and will therefore require shoring when the excavations are below the water table. Dewatering is also likely to be required to allow excavation below the water table. Groundwater levels will fluctuate in response to climatic conditions and may be higher than the levels encountered during fieldwork.

Dewatering below trench routes could be undertaken by installing horizontal dewatering systems prior to trench excavation. Where possible, service installation should be kept as high as is practicable to minimise the extent of dewatering required. Dewatering may require approval from the NSW Department of Water. Water being discharged during pumping may also be acidic and have high sulfate/iron concentrations that will require appropriate management.

Entry into unsupported trenches deeper than 1.0m should be avoided and appropriate signage and barricading should be installed around all open excavations. Excavation design should take into account maximum batter angle and setback requirements for vehicle traffic as detailed in the Excavation Work Code of Practice (Safe Work Australia – 2014).

Dewatering and management of excavated materials will need to take into account the potential presence of Potential or Actual Acid Sulfate Soils. This is discussed further in Section 6.

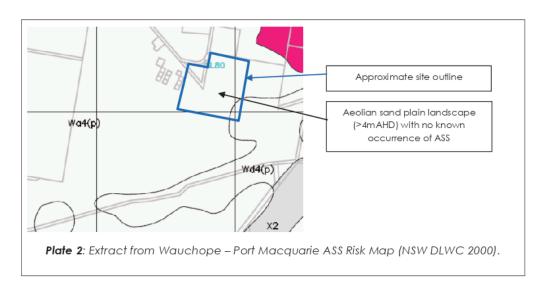
6 ACID SULFATE SOILS

6.1 Presence of ASS

Acid Sulfate Soils (ASS) produce sulphuric acid when exposed to oxygen due to the presence of iron sulphides in the form of pyrite within the soil matrix. These soils form when iron-rich sediments are deposited in saltwater or brackish water environments. Prior to oxidation, these pyritic soils are referred to as Potential ASS. ASS that have produced acid as a result of oxidation are referred to as Actual ASS. They typically occur in natural, low-lying coastal depositional environments below approximately 5m AHD. In the field ASS are generally identified as alluvial or estuarine soils or bottom sediments in creeks and estuaries.

Reference to the Wauchope - Port Macquarie ASS Risk Map presented in Plate 2, indicates there is no known occurrence of ASS at the site. However, as noted previously, RGS has identified Potential ASS in similar aeolian landscapes where ASS was shown not to occur on the Risk Map.





6.2 Assessment Methodology

The ASS Manual details the minimum number of sample locations required for ASS assessment. The purpose of the current investigation was to undertake a preliminary assessment of the presence of ASS and sampling was therefore restricted to the two deep boreholes undertaken in the vicinity of the proposed sewer pump stations as shown in Figure 1.

6.3 Laboratory Testing

Samples obtained were submitted to the NATA accredited Environmental Analysis Laboratory (EAL) and screened for the presence of ASS. The results are presented in Appendix B and indicate the following:

- The pH of the samples in distilled water ranged from 4.0 to 5.51. A pH value of less than 4 in this test is considered indicative of Actual ASS:
- The samples showed varying effervescent reactions following the addition of hydrogen peroxide and pH values after oxidation ranged from 2.01 to 4.96. Samples with an oxidised pH value of less than 3 in this test which is considered indicative of Potential ASS.

Two samples were subsequently submitted for detailed chromium reducible sulphur (CrS) analysis. The results, presented in Appendix B, confirm that the sample from BH1 (3.5 - 4.0 m) is an Actual ASS with traces of pyrite also present and that the sample from BH2 (4.0 - 5.0 m) is a Potential ASS.



6.4 ASS Assessment Summary

The detailed laboratory testing results indicate that Actual and Potential ASS are present in the marine sands (Unit 4) within the vicinity of the proposed sewer pump station excavations and that the total acidity concentrations exceed the ASSMAC Action Criteria (ASS Manual 1996) of 18 moles H+/tonne for coarse grained soils. An Acid Sulfate Soils Management Plan (ASSMP) will therefore be required for the proposed works.

The ASS are present within the marine sands underlying the indurated sand profile. Based on the results obtained, a liming rate of between 4.3 and 9 kg CaCO₃/tonne dry weight was calculated for neutralisation of the ASS material, which includes a 1.5 safety factor. Further assessment will therefore be required for any sewer trenching works that will disturb the marine sands (Unit 4) to assist in the preparation of an ASS Management Plan. The Plan will also need to take into account any potential changes to the groundwater table(s) that occur in association with the works.

7 SOIL AGGRESSIVITY

Two samples from the boreholes undertaken in the vicinity of the proposed sewer pump stations were submitted to a NATA accredited laboratory for chemical analysis. The results are presented in Appendix B.

In accordance with the aggressivity and exposure classifications provided in AS2159-2009 the soils would be considered severely aggressive to concrete at BH2 and moderately aggressive in BH1.

8 WATER ANALYSIS

Water was collected from the four groundwater monitoring wells and two surface water bodies. The sample locations are shown on Figure 1. The collected samples were submitted to a NATA accredited laboratory for analysis on a range of environmental parameters. The results are presented in Appendix B and selected results are summarised in Table 4.

Table 4: Summary of Laboratory Test Results

Location	рН	EC (d\$/m)	Total Suspended Solids (mg/L)	Total Phosphorous (mg/L)	Total Nitrogen (mg/L)
BH1	4.49	0.147	357	0.02	0.29
BH2	4.98	0.136	36	0.01	0.59
ВН3	5.04	0.094	978	0.06	0.92
BH4	5.35	0.154	11,015	0.13	2.56
WS-NB1	5.3	0.197	6	0.01	0.3
WS-NB2	4.96	0.123	7	0.01	0.35

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The pH of the groundwater and surface water samples is weakly acidic. Water with a pH of <5.5 can be indicative of the presence of ASS, however, based on previous experience with coastal sand plain landscapes the surface waters are often acidic and this is typically due to organic acidity rather than the presence of ASS. The high Total Suspended Solids (TSS) values from the groundwater in the monitoring wells is associated with the presence of indurated sand horizons. When the indurated sands profiles are disturbed by drilling it results in silty fines settling within the water column, giving the water a brown colour and elevated TSS values.

9 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Tim Morris

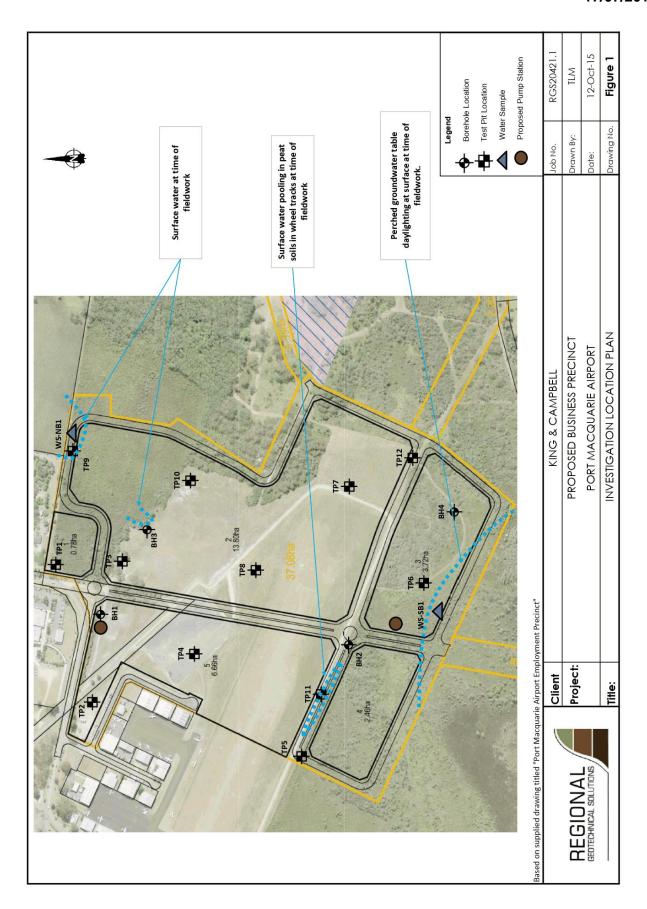
Senior Engineering Geologist



Figure

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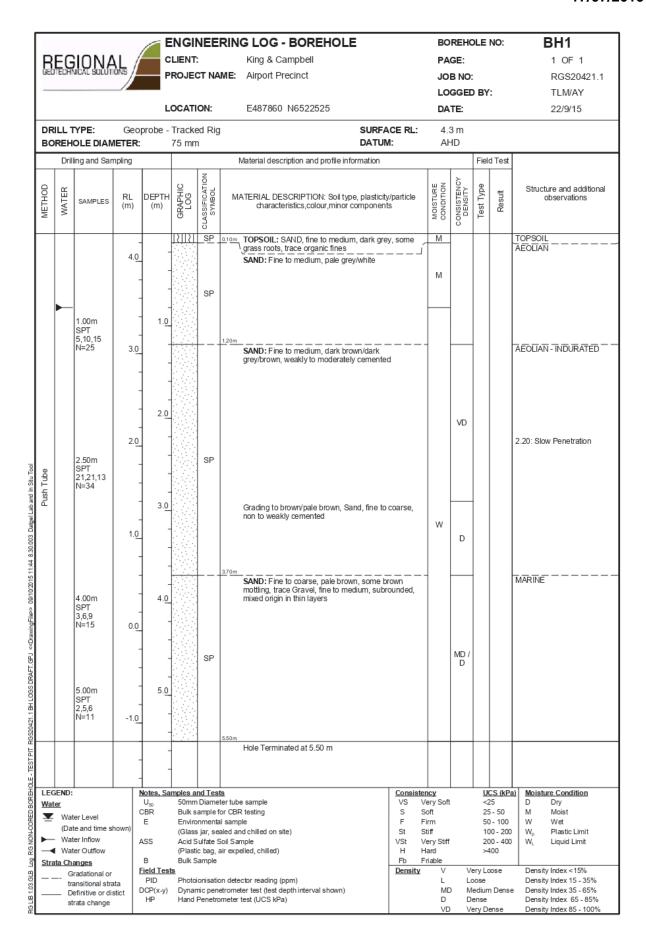


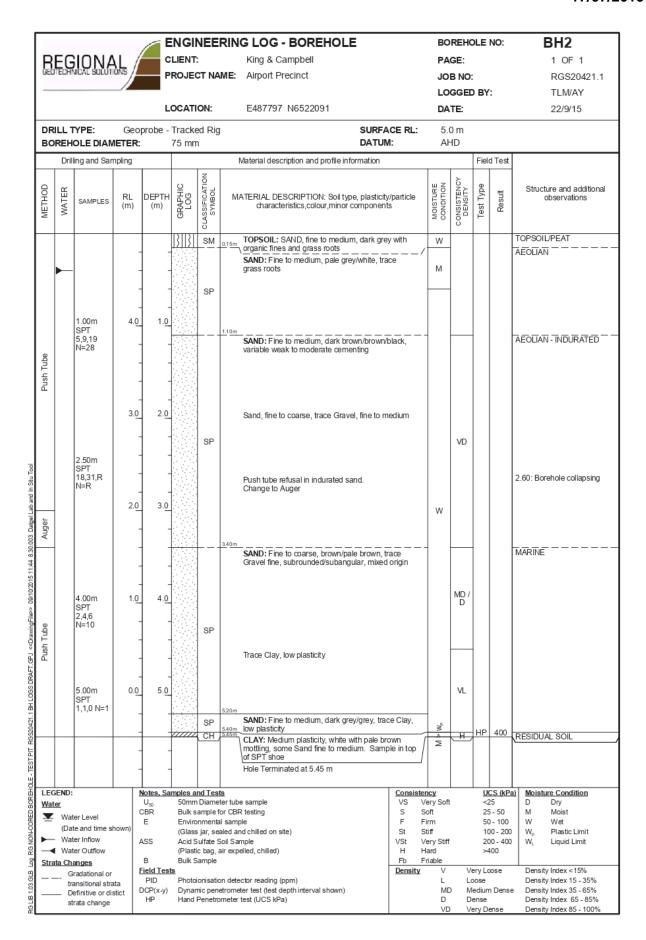
Appendix A

Results of Field Investigations

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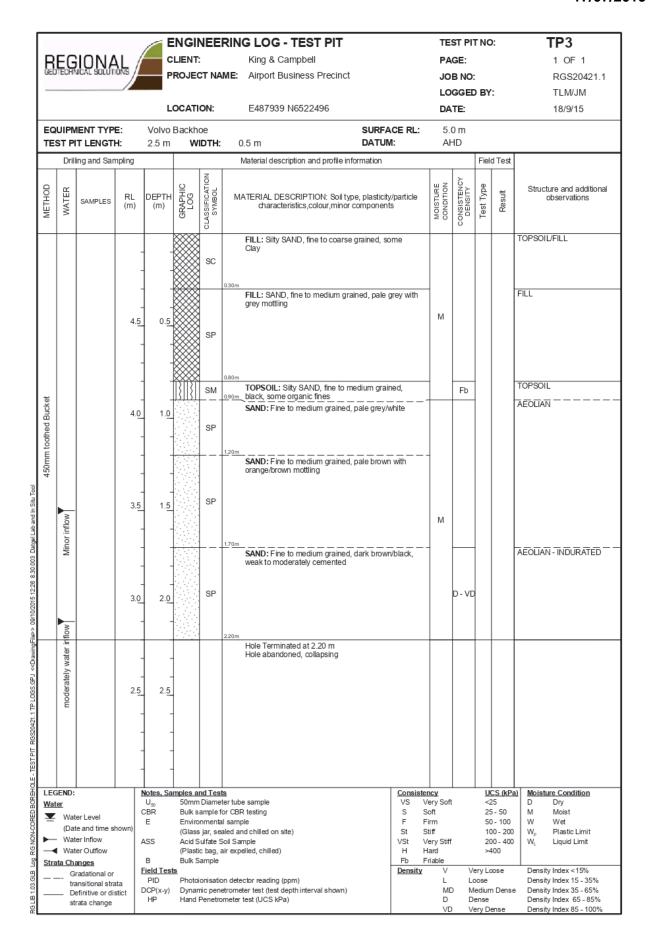


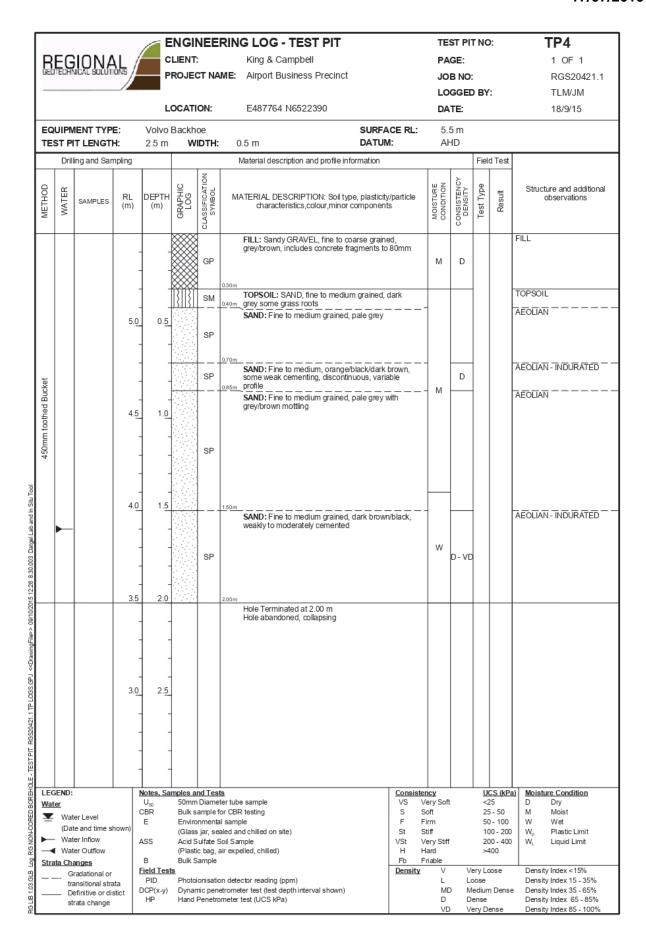
R	EG	IONA	L	٥	LIENT	:	RING LOG - BOREHOLE King & Campbell ME: Airport Precinct		PA JO	REHO GE: B NO:	:		BH3 1 OF 1 RGS20421.1 TLWAY
				L	OCATI	ON:	E488001 N6522433			TE:			22/9/15
		YPE: OLE DIAN		probe -	Tracke 75 mn		SURFA DATUI	ACE RL:	4.0 Al-	0 m HD			
	Drill	ing and San	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics,colour,minor componen	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						SM	TOPSOIL: SAND, fine to medium, dark gre organic fines and grass roots SAND: Fine to medium, grey	y, some	_ M				TOPSOIL AEOLIAN
ADV	•	0.50m SPT 2,2,7 N=9	3.0_	1.0		SP SP	SAND: Fine to medium, pale brown with br mottling, variable non to weak cemented Brown/dark brown, weakly to moderately ca		w	D		,	AEOLIAN - INDURATED
				_			1.40m Hole Terminated at 1.40 m		_	VD			
			- 2.0 <u></u> - - - 1.0 <u></u>										
			-0.0 <u>-</u> 										
Wat	Wat (Dat Wat Wat ta Cha	er Level te and time sl er Inflow er Outflow	nown)	Notes, Sa U ₂₀ CBR E ASS B Field Tes: PID DCP(x-y)	50mm Bulk s Enviro (Glass Acid S (Plasti Bulk S Photo	Diame ample f onmenta s jar, se sulfate S ic bag, s sample	ts ter tube sample or CBR testing il sample aled and chilled on site) soil Sample air expelled, chilled) on detector reading (ppm) etrometer test (test depth interval shown)	Consis VS S F St VSt H Fb	Very Soft Soft Firm Stiff Very Stiff Hard Friable	V	25 50 10 20 20 ery Lo	CS (kPa 25 5 - 50 0 - 100 00 - 200 00 - 400 400 cose	D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit Density Index < 15% Density Index 15 - 35%

				E	NGI	NEE	RING LOG - BOREHOLE		ВО	REH	DLE	NO:	BH4
R	EG	IONA	AL /		LIENT		King & Campbell		PA	GE:			1 OF 1
ĠEĎ	TECHI	VICAL SOLUT	IÒÑS	P	ROJE	CT NA	ME: Airport Precinct		JO	B NO	:		RGS20421.1
_									LO	GGE	BY	:	TLM/AY
					OCATI	ON:	E487958 N6621883		DA	TE:			22/9/15
		YPE: OLE DIAN		probe - :	Tracke 75 mn	_	SURF/ DATU	ACE RL: M:		1 m HD			
	Dril	ing and San	mpling				Material description and profile information				Fiel	d Test	
МЕТНОD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticil characteristics,colour,minor componen	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
			4.0	4	[3][3]	SM	TOPSOIL: SAND, fine to medium, black w	ith					TOPSOIL/PEAT
	-			-		SP	SAND: Fine to medium, white with yellow/o mottling	prange		Fb			AEOLIAN
ADV] -		ļ 	SAND: Fine to medium, brown/dark brown	some	- M				AEOLIAN - INDURATED
A			3.0	1.0		SP	orange mottling, non to weakly cemented	,	Σ	D - VC			
				 	(2, 32.5		Hole Terminated at 1.50 m		\vdash				
			2.0	2.0			Borehole collapsing						
	1.0 <u>-</u> 3.0 <u>-</u>												
	0.0 4.0												
			-1.0	5.0									
Wat ▼	Water U _∞ CBR			CBR E ASS B Field Tes	50mm Bulk s Enviro (Glass Acid S (Plasti Bulk S	n Diame ample f onmenta s jar, se Sulfate S ic bag, a Sample	er tube sample r CBR testing sample led and chilled on site) oil Sample ir expelled, chilled)	S S F F St S VSt V	/ery Soft Soft Firm Stiff /ery Stiff lard Friable V	·	25 50 10 20 >4	CS (kPa 25 5 - 50 0 - 100 00 - 200 00 - 400 400 cose	D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit Density Index <15%
	_ D	ansitional stra efinitive or dis rata change		PID DCP(x-y) HP	Dynar	nic pen	n detector reading (ppm) trometer test (test depth interval shown) meter test (UCS kPa)		L ME D VD) M D	oose lediun ense ery D	n Dense	Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%

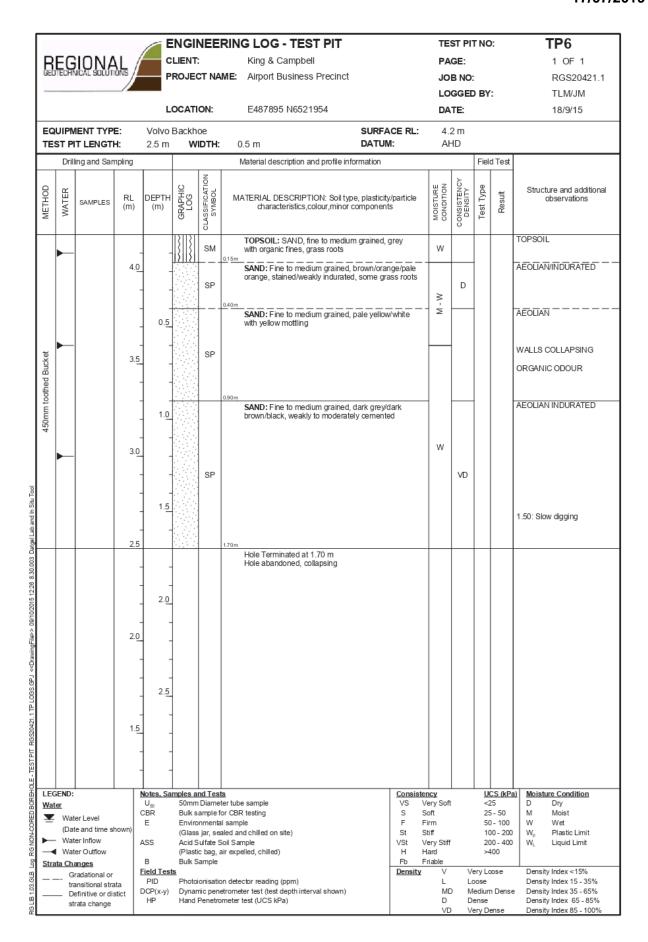
Г				<u></u> E	NGII	NEE	RING LOG - TEST PIT		TE	ST PI	TNC):	TP1
lκ	EG	IONA	AL /	a c	LIENT	:	King & Campbell		PA	GE:			1 OF 1
ĠEÒ	TECHN	VICAL SOLÚTI	IÒNS	P	ROJE	CT NA	ME: Airport Business Precinct		JO	B NO	:		RGS20421.1
_									LO	GGEI	BY	:	TLM/JM
				L	OCATI	ON:	E487941 N6522593		DA	TE:			18/9/15
		MENT TYP		Volvo 2.5 m	Backh W	oe IDTH:		ACE RL: VI:	5.0 Al-	0 m HD			
	Drill	ling and San	mpling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics,colour,minor componen	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						SP	TOPSOIL/SAND: Fine to medium grained, grey/pale grey, tree roots						TOPSOIL
				† :	131131	SM	Silty SAND: Dark brown, organic fines, trace	ce Clay	1	Fb			PEAT
				1 -			SAND: Fine to medium grained, pale yellov		1				AEOLIAN
				1 .			yellow/orange/brown mottling trace of weak cemented Sand	dy					
			4.5	0.5									
cket				'					M				
d Bu				-					"				
oothe				-		SP							
450mm toothed Bucket				-									
450			4.0	1.0									COLLAPSING
				-									
	<u> </u>					L	SAND: Fine to medium grained, dark brow	n/black	_		-		AEOLIAN INDURATED — —
	inflov					SP	weakly cemented	IVDIACK,					, in the second
	gh water inflow		3.5	1.5		L	1.50m		- W	D			AEOLIAN
	盲					SP	SAND: Fine to medium grained, grey/brown	П					ALOLIAN
	+			↓ .			Hole Terminated at 1.60 m Refusal						
				↓ .									
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			3.0	2.0									
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			2.5	2.5									
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LEG Wat	GEND:		T	Notes, Sa U _∞			ts ter tube sample	<u>Consiste</u>	ency Very Soft			CS (kPa 25	a) <u>Moisture Condition</u> D Dry
<u> </u>		er Level		CBR E	Bulk s	ample f	or CBR testing	S :	Soft Firm		25	5 - 50 0 - 100	M Moist W Wet
		te and time sl ter Inflow	1	ASS	(Glass	jar, se	aled and chilled on site)	St :	Stiff		10	00 - 200	W _p Plastic Limit
Ĭ <u>~</u>	● Wat	ter Outflow			(Plasti	c bag,	Soil Sample air expelled, chilled)	н	Very Stiff Hard			00 - 400 400) W _L Liquid Limit
	ata Cha G	anges radational or		B <u>Field Tes</u>	<u>ts</u>	ample		Fb Density	Friable V		ery Lo	oose	Density Index <15%
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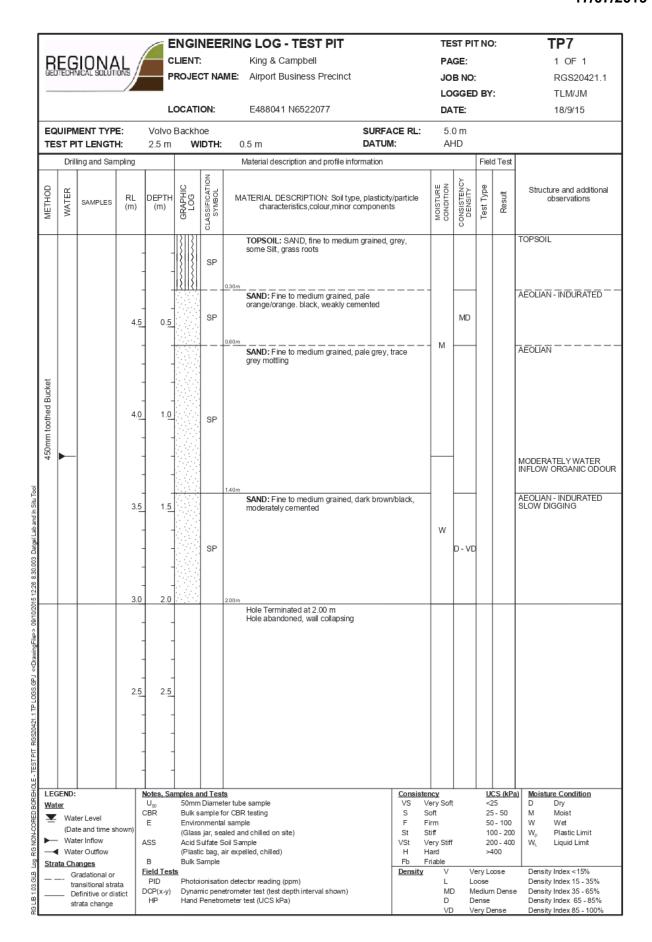
Г				E	NGI	NEE	RING LOG - TEST PIT		TE	ST PI	TNC):	TP2
lΒ	EG	IONA	AL /	<u> </u>	LIENT	:	King & Campbell		PA	GE:			1 OF 1
GEL	JIECHN	NICAL SOLUT	UNS	P	ROJE	CT NA	ME: Airport Business Precinct			B NO			RGS20421.1
					OCATI	ON-	E487710 N6522527			GGEI TE:) BY	:	TLM/JM 18/9/15
<u></u>	LUDA	IENT TYP			Backh			ACE RL:		0 m			10/3/13
		T LENGT		2.5 m		oe IDTH:	0.5 m DATUM		Al-				
	Drill	ing and San	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity characteristics,colour,minor component	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						SP	SAND: Fine to medium grained, grey/brown	n, trace					TOPSOIL
						SP	SAND: Fine to medium grained, pale grey/ variable boundary	white,					AEOLIAN
			4.5	0. <u>5</u>		SP	SAND: Fine to medium, black/dark yellow, cemented	weakly		MD - D			AEOLIAN - INDURATED
450mm toothed Bucket			4.0	1.0		SP	SAND: Fine to medium grained, pale grey/	white	М				AEOLIAN
450mm	ater inflow					SP	SAND: Fine to medium grained, black/dark weakly to moderately cemented	brown,		D			AEOLIAN - INDURATED
10/2(15) 2/26 8/30/003 Datgel Lab and in Sifu Lool	Moderate water inflow		3.5			SP	SAND: Fine to medium grained, dark grey		w				AEULIAN
			3.0	2.0			Hole Terminated at 2.00 m Refusal Test Pit collapsing						
Revolved the property of the p			2.5	2.5			пашаа төэт Fit соларыну						
LEG	GEND:		\vdash	Notes, Sa				Consiste				CS (kPa	
	Wat (Dat	er Level te and time si er Inflow er Outflow anges	hown)	U _{so} CBR E ASS	Bulk s Enviro (Glass Acid S (Plasti Bulk S	ample f nmenta s jar, se sulfate S	ter tube sample or CBR testing Il sample aled and chilled on site) soil Sample air expelled, chilled)	S S F F St S VSt V H F	ery Soft fort firm Stiff ery Stiff lard riable		25 50 10 20 >4	25 5 - 50 0 - 100 00 - 200 00 - 400 400	W _L Liquid Limit
KG LIB 1.03.GLB	G tra Da	radational or ansitional stra efinitive or dis rata change	ata	Field Tes PID DCP(x-y) HP	Photo Dynar	nic pen	on detector reading (ppm) etrometer test (test depth interval shown) imeter test (UCS kPa)	<u>Density</u>	V L ME D VD	Le M D	ery Lo oose lediun ense ery D	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



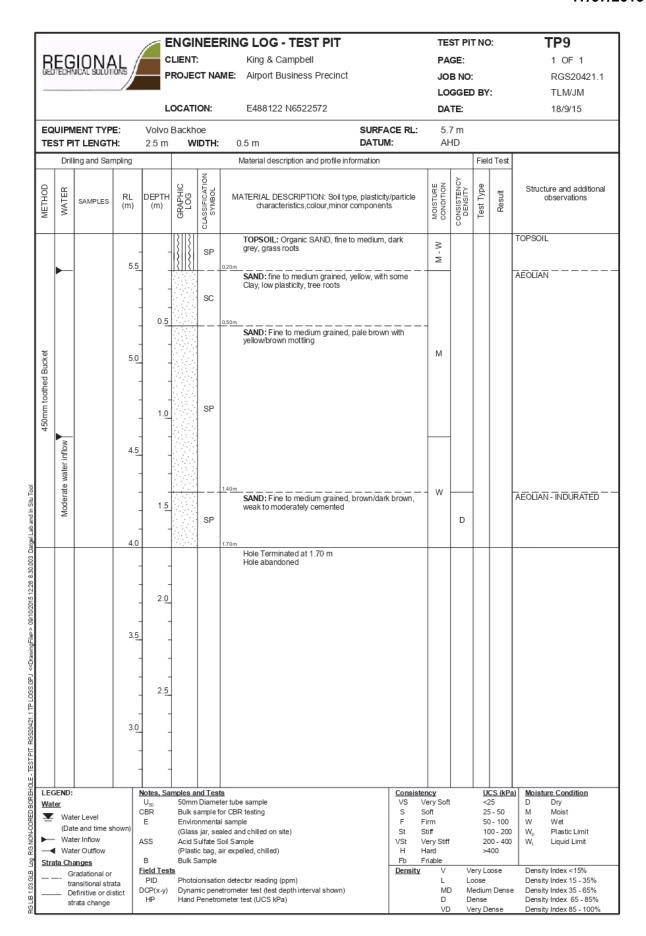


							RING LOG - TEST PIT		TES	ST PI	TNC	D:	TP5
R	EG	IONA NICAL SOLUTI	L ONS /	27	ROJE		King & Campbell ME: Airport Business Precinct			GE: B NO			1 OF 1 RGS20421.1
_			\mathcal{J}		KOJE	JI NA	ME. Allpoit Business Frecinct			B NO GGEI		,.	TLM/JM
				L	OCATI	ON:	E487597 N6522175		DA		, ,		18/9/15
l '		IENT TYP		Volvo 2.5 m		oe IDTH:		ACE RL:	5.2 AH	 2 m HD			
⊢	Drill	ing and San	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticit characteristics,colour,minor componen	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						SM	TOPSOIL: SAND, fine to medium grained, some Silt	grey,					TOPSOIL
			5.0	0.5	181181		SAND: Fine to medium grained, pale grey/	white	_				AEOLIAN
			4.5]]		SP			М				
450mm toothed Bucket			4.0	1.0									
4	Moderate water inflow		3.5	1.5		SP	SAND: Fine to medium grained, dark grey, to dark brown/black stained, grained with d moderately cemented		w	D			AEOLIAN - INDURATED
			3.0	2.0			2.30m			VD			
			2.5	2.5			Hole Terminated at 2.30 m Hole abandoned, collapsing						
Wat	Wat	er Level		Notes, Sa U ₅₀ CBR E	50mm Bulk s Enviro	Diame ample for nmenta	ter tube sample or CBR testing Il sample	S S	/ery Soft Soft Firm		25	CS (kPa 25 5 - 50 0 - 100	D Dry M Moist W Wet
	- Wat ¶ Wat ata Cha	er Inflow er Outflow		ASS B Field Tes	Acid S (Plasti Bulk S	ulfate S ic bag, a sample	aled and chilled on site) soil Sample sir expelled, chilled) on detector reading (ppm)	VSt \	Stiff /ery Stiff Hard <u>Friable</u> V L		20	00 - 200 00 - 400 400 oose	P P
_	De	efinitive or dis rata change		DCP(x-y) HP	Dynar	nic pen	etrometer test (test depth interval shown) meter test (UCS kPa)		MC D VD) N D			

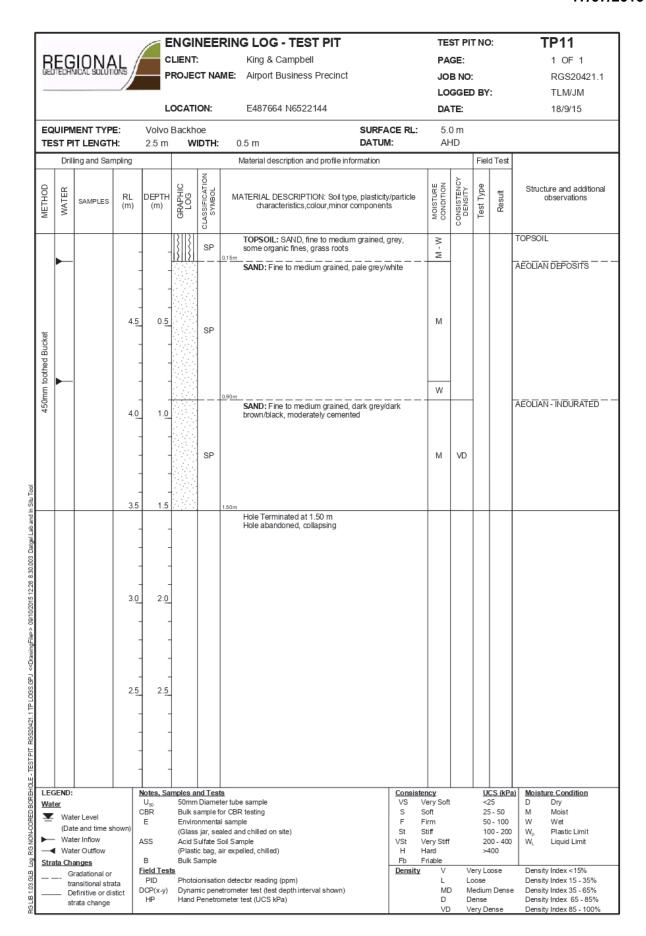


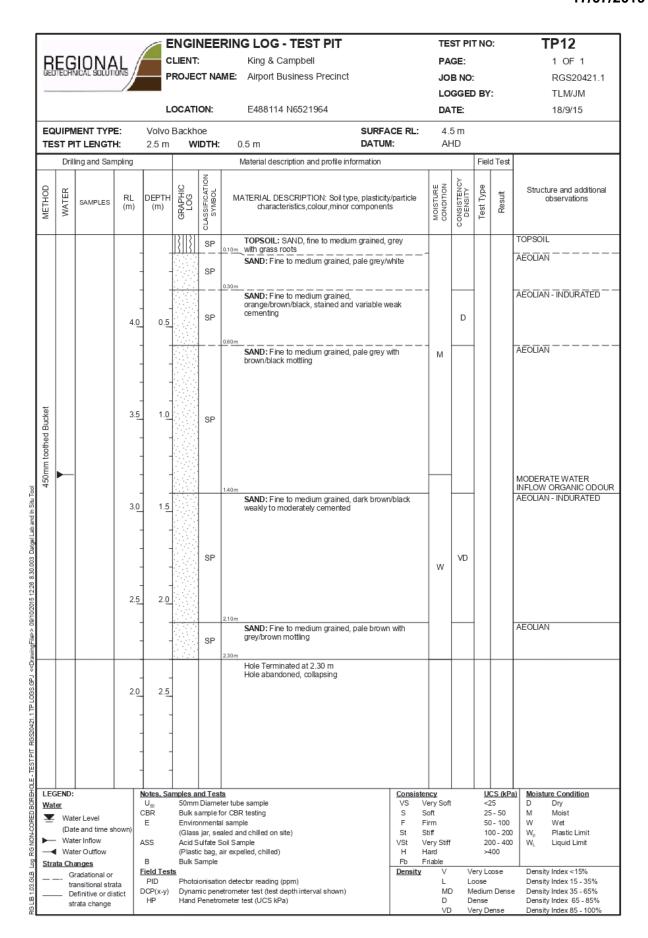


				E	NGII	NEE	RING LOG - TEST PIT		TES	ST PI	TNC	D:	TP8
R	EG	IONA IICAL SOLUT	L ONS		ROJE		King & Campbell ME: Airport Business Precinct			GE: B NO:			1 OF 1 RGS20421.1
_			$-\!\!/\!\!\!/$		NOUL	J 1 140	ME. Allpoit Business Freeinet			GGEI		′ :	TLM/JM
				L	OCATI	ON:	E487941 N6522243		DA				18/9/15
1		IENT TYP		Volvo 2.5 m	Backh W	oe IDTH:	SURFA 0.5 m DATUM	ACE RL:	5.1 AH	7 m 1D			
	Drill	ing and San	npling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity characteristics,colour,minor component	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						SP	TOPSOIL: SAND, fine to medium grained,	grey,					TOPSOIL
			5.5	0.5		SP	SAND: Fine to medium grained, pale grey/	white					AEOLIAN
			5.0	1 '			Variable profile						
ucket			5.5			SP	SAND: Fine to medium grained, pale grey/l with orange/dark brown staining, some disc zones of weak cementing	brown continuous	м	MD - D			AEOLIAN - INDURATED
450mm toothed Bucket			4.5	1.0		SP	SAND: Fine to medium grained, pale grey, grey/dark grey mottling	trace					AEOLIAN DEPOSITS — — — COLLAPSING
10/2015 12.20 0.30/005 Daligi Lab and month 100	High water inflow		4. <u>0</u>	2.0		SP	SAND: Fine to medium grained, dark brown/black/dark grey, weakly to moderated cemented		w	D	-		AEOLIAN - INDUREATED
			3.5				Hole Terminated at 2.00 m Hole abandoned						
TEO MAIN DE LES PETITIONES DE L'ACCIONNES DE L'ACCI			3.0	2.5									
LEG	GEND:			Notes, Sa				Consiste				CS (kPa	
Stra	Wat (Dat Wat	er Level e and time si er Inflow er Outflow anges	nown)	U _{so} CBR E ASS	Bulk s Enviro (Glass Acid S (Plasti Bulk S	ample f nmenta jar, sea ulfate S cbag, a	ter tube sample or CBR testing I sample aled and chilled on site) ioil Sample iir expelled, chilled)	S S F S St S VSt S H S	Very Soft Soft Firm Stiff Very Stiff Hard Friable		25 50 10 20 >4	25 5 - 50 0 - 100 00 - 200 00 - 400 400) W _L Liquid Limit
	tra De	adational or Insitional stra Efinitive or dis ata change	ıta	Field Tes PID DCP(x-y) HP	Photoi Dynan	nic pene	in detector reading (ppm) strometer test (test depth interval shown) meter test (UCS kPa)	Density	V L MD D VD	Le M D	ery Lo pose lediun ense ery D	n Dense	Density Index <15% Density Index 15 - 35% e Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



				<u></u> E	NGII	NEE	RING LOG - TEST PIT		TE	ST PI	TNC	D:	TP10
lΒ	EG	IONA	AL /	e c	LIENT	:	King & Campbell		PA	GE:			1 OF 1
GEO	JTECHN	IICAL SOLUT	IONS	P	ROJE	CT NA	ME: Airport Business Precinct		JO	B NO	:		RGS20421.1
_									LO	GGEI	D BY	' :	TLM/JM
L				L	OCATI	ON:	E488085 N6522352		DA	TE:			18/9/15
l '		ENT TYP		Volvo 2.5 m	Backh W	oe IDTH:		ACE RL: VI:	4. . Al-	5 m HD			
	Drill	ing and San	mpling				Material description and profile information				Fiel	d Test	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity characteristics,colour,minor component	y/particle ts	MOISTURE	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
							TOPSOIL: SAND, fine to medium grained,	grey,					TOPSOIL
] :	7,11,71		SAND: Fine to medium, pale grey/white, tra	ace roots					AEOLIAN
			4.0			SP							
			4.0	0.5			SAND: Fine to medium grained, grey/dark grey/brown, variable weak to non-cemented staining present	d profile,	1				AEOLIAN - VARIABLE INDURATION
t.									M				
450mm toothed Bucket			3.5	1.0		SP				MD			
450mm							1.30m						WALLS COLLAPSING
	Moderate water inflow		3.0	1. <u>5</u>		SP	SAND: Fine to medium grained, dark brown moderately cemented	n/black,					AEOLIAN - INDURATED
	Moderal					SP	SAND: Fine to medium grained, brown/pak with nodules of weakly cemented indurated brown/dark brown		w	D			AEOLIAN
				1 .:									
			2.5	2.0	01,021,0		Hole Terminated at 2.00 m						
				- ·			Refusal walls collapsing						
			2.0	2.5									
LEG Wat	GEND:			Notes, Sa U _∞			ts ter tube sample	Consiste	ncy /ery Soft			CS (kPa 25	a) Moisture Condition D Dry
		er Level		CBR E	Bulk s	ample f	for CBR testing	S 5	Soft Firm		25	5 - 50 0 - 100	M Moist W Wet
—	- Wat	e and time si er Inflow	1	ASS	(Glass Acid S	jar, se ulfate 9	aled and chilled on site) Soil Sample	St S	Stiff /ery Stiff		10 20	00 - 200 00 - 400	W _p Plastic Limit
Stra	● Wat ata Cha	er Outflow anges		В		c bag, a ample	air expelled, chilled)		Hard Friable		>4	400	
	Gi tra De	radational or insitional stra efinitive or dis rata change	ata	Field Tes PID DCP(x-y) HP	<u>ts</u> Photoi Dynan	onisation	on detector reading (ppm) etrometer test (test depth interval shown) ometer test (UCS kPa)	Density	V L ME D VD	L (ery Lo oose lediun ense ery D	n Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%





Location:

Logged By:

MONITORING WELL DETAILS

Client: KING & CAMPBELL

PROPOSED BUSINESS PARK Project: PORT MACQUARIE AIRPORT

BOREHOLE BH1 NUMBER: Refer Figure 1 TLM Job Number: RGS20420.1

Logged B	у.	ILIM				Date:	umber:			22/09/2015
Drill Rig:		Track Me	ounted Ge	oprobe		Surface	RL:			22/07/2013
Hole diamet	er:	100		Slope:		Datum:				
Di	rilling and Sa	ımpling						Τ		
D Ja	/ell Details	Well Notes	Depth (m)		Refer separate log sheets for material description					Observations
<u> </u>					SAND	+		\vdash		TOPSOIL/FILL
PUSH TUBE	Blank PVC	Concrete	0.4		SAND					AEOLIAN
→		Bentonite	0.8							
		-	1.0		SAND, weakly to moderately cemented					AEOLIAN - INDURATED
		_	1.5_		SAND, WEAKY TO MICCORDINET					
		Screen PV	2.0							
		Screen PVC in gravel pack	2.5							
		_	3_							
		_	3.5							
			3.8		SAND Borehole continued to 5.5m					MARINE
GEND:		1	Notes, Sam	ples and Tests	<u> </u>	Consistence		<u>ucs</u> (Moisture Condition
Water Level	ime shown)			50mm Diameter tube		VS S F	Very Soft Soft Firm	<25 25 - 5 50 - 10	0	D Dry M Moist W Wet
Water Inflor Water Outfl	w		E ASS	Bulk sample for CBR to Environmental sample (Glass jar, sealed an d Acid Sulfate Soil Samp	o chilled an site) ée	St VSt H	Stiff Very Stiff Hard	100 - 2 200 - 4 >400	00	W wet W, Plastic Limit W, Liquid Limit
rata Changes Gradational	or transitional ch	ange	В	Plastic bag, air expeli Bulk Sample		Fb Density	Friable VL	Very Loos	e	Density Index <15%
- Definitive or	r distinct strata ch	ange	DCP (x-y)	Photoionisation detec Dynamic penetromete Vane Shear test	tor reading or test (test depth interval shown)		MD D VD	Medium Dense		Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%

MONITORING WELL DETAILS

KING & CAMPBELL Client: PROPOSED BUSINESS PARK Project:

PORT MACQUARIE AIRPORT

BH2 NUMBER: Location: Refer Figure 1 RGS20420.1 Logged By: TLM Job Number:

BOREHOLE

Date: 22/09/2015 Drill Rig: Track Mounted Geoprobe Surface RL: Hole diameter: 100 Slope: Datum: Drilling and Sampling Observations Refer separate log sheets for material description Well Details Silty SAND TOPSOIL/ PEAT AEOLIAN 1.0 AEOLIAN - INDURATED SAND, weakly to moderately cemented 2.0 2.5 MARINE SAND 4.5 Borehole continued to 5.45m LEGEND: Notes, Samples and Tests UCS(kPa) Moisture Condition <25 25 - 50 CBR Bulk sample for CBR testing 50 - 100 (Date and time shown) Water Inflow Water Outflow 300 - 200 200 - 400 ASS Acid Sulfate Soil Sample >400 (Plastic bag, air expelled, chilled) Bulk Sample Density Index 15 - 35% Density Index 35 - 65% PID Photoionisation detector reading Definitive or distinct strata change ٧s Vane Shear test Density Index 65 - 85%

REGIONAL GEOTECHNICAL SOLUTIONS

BOREHOLE

MONITORING WELL DETAILS

Client: KING & CAMPBELL

Project: PROPOSED BUSINESS PARK

PORT MACQUARIE AIRPORT

Location: Refer Figure 1 NUMBER: BH3
Logged By: TLM Job Number: RG\$20420.1

22/09/2015 Date: Drill Rig: Surface RL: Track Mounted Geoprobe Hole diameter: 100 Datum: Observations Method Depth Refer separate log sheets for material Well Details Notes PUSH TUBE Silty SAND TOPSOIL/ PEAT SAND AEOLIAN Blank PVC AEOLIAN - INDURATED SAND, weakly to moderately cemented 1.0 1.5 2.0 2.5 3 3.5 SAND MARINE 3.8 Borehole continued to 5.5m LE GEND: UCS(kPa) Moist ur e Condition onsistency <25 (Date and time shown) CBR Bulk sample for CBR testing 50 - 100 W Wet Water Inflow Environmental sample 100 - 200 W_P Plastic Limit Water Outflow (Glass jar, sealed and chilled on site) VSt W_L Liquid Limit ASS Acid Sulfate Soil Sample Strata Changes

- Gradational or transitional change Bulk Sample Density PID Density Index 15 - 35% Photoionisation detector reading Definitive or distinct strata change CP (x-y) VS Vane Shear test D Density Index 65 - 85% Density Index 85 - 1009 Very Den

REGIONAL GEOTECHNICAL SOLUTIONS

BOREHOLE

MONITORING WELL DETAILS

Client: KING & CAMPBELL
Project: PROPOSED BUSINE

Project: PROPOSED BUSINESS PARK
PORT MACQUARIE AIRPORT

Location: Refer Figure 1 NUMBER: BH4
Logged By: TLM Job Number: RGS20420.1

22/09/2015 Date: Drill Rig: Surface RL: Track Mounted Geoprobe Hole diameter: 100 Datum: Observations Method Depth Refer separate log sheets for material Well Details Notes TOPSOIL/ PEAT PUSH TUBE Silty SAND SAND AEOLIAN Blank PVC Gra AEOLIAN - INDURATED SAND, weakly cemented 1.0 Screen 1.5 2.0 2.5 3 3.5 SAND MARINE 3.8 Borehole continued to 5.5m LE GEND: UCS(kPa) Moist ur e Condition onsistency ٧s <25 (Date and time shown) CBR Bulk sample for CBR testing 50 - 100 W Wet Water Inflow Environmental sample 100 - 200 W_P Plastic Limit Water Outflow (Glass jar, sealed and chilled on site) VSt W_L Liquid Limit ASS Acid Sulfate Soil Sample Strata Changes

- Gradational or transitional change (Plastic bag, air expelled, chilled) Bulk Sample Density PID Density Index 15 - 35% Photoionisation detector reading CP (x-y) VS Vane Shear test D Density Index 65 - 85% Density Index 85 - 1009 Very Den



Appendix B

Laboratory Test Results

Regional Geotechnical Solutions RG\$20421.1-AB 29 October 2015

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RESULTS OF ACID SULFATE SOIL ANALYSIS

5 samples supplied by Regional Geotechnical Solutions Pty Itd on 2nd October, 2015 - Lab. Job No. E4924

Analysis requested by Tim Morris. Your Project: RGS20421.1

(44 Bent Street WINGHAM NSW 2429)

Sample Site	EAL	TEXTURE	MOISTURE	TURE	HELD/ L	AB PEROXIDE	FIELD/ LAB PEROXIDE SCREENING TECHNIQUE	CHNIQUE	TITRAT	TITRATABLE ACTUAL ACIDITY (TAA)	REDO	REDUCED INORGANIC SULFUR	NET ACIDITY Chromium Suite	LIME CALCULATION Chromium Suite
	epoo				Initial pH _F	pHFox				(To pH 6.5)	(% chro	(% chromium reducible S)	mole H*/tonne	kg CaCO ₃ /tonne DW
		(note 7)	(% moisture of total wet	(g moisture / g of oven	water	peroxide	pH change	Reaction	PH.	nH. (mole H⁴/torne)	(860,00)	(mole H ⁺ /tonne)	(hasan an BiCore)	(includes 1.5 safety Factor when liming rate is 've)
Method Info.			(1.6.1.1	(((ACTUAL A	ACTUAL ACIDITY-Method 23)	- 11	(POTENTIAL ACIDITY-Method 22B)	note 5	note 4 and 6
BH1 3.5-4.0	E4924/1	Coarse	17.5	0.21	4.59	3.08	-1.51	Medium	4.74	43	0.023	14	57	4.3
BH1 4.0-4.5	E4924/2		18.2	0.22	5.27	4.67	-0.60	Low	:	:	:	:	:	:
BH1 4.5-5.0	E4924/3	Coarse	18.2	0.22	5.51	4.96	-0.55	Low	:	:	:	:	:	:
BH2 4.0-5.0	E4924/4		19.2	0.24	4.28	2.17	-2.11	Very High	4.77	38	0.131	82	120	0.6
BH2 5.2-5.4	E4924/5	Coarse	20.5	0.26	4.00	2.01	-1.99	Very High	:	:	:	:	:	:

1 - All analysis is Dry Weight (DW) - samples dried and ground immediately upon arrival (unless supplied dried and ground)

NOTE

2 - Samples analysed by SPOCAS method 23 (ie Suspension Peroxide Oxidation Combined Acidity & suffate) and 'Chromium Reducible Suffur' technique (Scr - Method 22B)
3 - Methods from Ahen, Q., McBhea A.E., Sullivan I.A. (2004), Add Sulfate Solls Laboratory Methods Quivelines. QLD DNRME.
4 - But Dorsity is required for liming rate calculations per soil volume. Lab. Bulk Dersity is no longer applicable - field bulk dersity rings can be used and dried weighted in the laboratory.
5 - ABA Equatorn. Net Addity E. Sors of Son? + Actual Addity - Retained Addity - Imasured ANC/FF (With F currently defaulted to 1.5)

6 - The neutralising requirement, lime calculation, includes a 1.5 safety margin for acid neutralisation (an increased safety factor may be required in some cases)

7 - For Texture: coarse = sands to loamy sands; medium = sandy loams to light clays; fine = medium to heavy clays and silty clays 8 - ... denotes not requested or required. '0' is used for ANC and Snag calcs if TAA pH <6.5 or >4.5

NATA
NATA
Semination of 1966.
According on properties with 150 IEC (1925).

9 - SCREENING, CRS, TAA and ANC are NATA accredited but other SPOCAS segments are currently not NATA accredited

10- Results at or below detection limits are replaced with '0' for calculation purposes. 11 - Projects that disturb >1000 tonnes of soil, the ≥0.03% S dassification guideline would apply (refer to acid sulfate management guidelines).

12 - Results refer to samples as received at the laboratory. This report is not to be reproduced except in full.

(Cassification of potential acid sulfate material if: coarse Sor≥0.0396S or 19mole H*/t; medium Sor≥0.0696S or 37mole H*/t; fine Sor≥0.196S or 62mole H*/t) - as per QUASSIT Guidelines



Graham Lancaster Laboratory Manager checked:

> Environmental Analysis Laboratory, Southern Cross University, Tel. 02 6620 3678, website: scu.edu.au/eal

checked:

Laboratory Manager Graham Lancaster

RESULTS OF SOIL ANALYSIS (Page 1 of 1)

5 samples supplied by Regional Geotechnical Solutions Pty Ltd on 2nd October, 2015 - Lab Job No. E4924

Analysis requested by Tim Morris. - Your Project: RGS20421.1

(44 Bent Street WINGHAM NSW 2429)

(44 Delle Screet Windflam INSW 2429)			
		Sample 1	Sample 4
		BH1 3.5-4.0	BH2 4.0-5.0
	Method		
	EAL job No.	E4924/1	E4924/4
Moisture (%)	enoqui	82	9
Texture	See note 2 below.	Coarse	Coarse
Soil pH (1:5 water)	Rayment and Lyons 4A1	4.93	4.32
Soil Conductivity (1:5 water dS/m)	Rayment and Lyons 4B1	0.073	0.153
Soil Resistivity (ohm.mm)	** Calculation	136,986	62,359
Chloride (mg/kg)	** Water Extract- Rayment and Lyons 5A2b	34	35
Chloride (as %)	** Calculation	0.003	0.004
Sulfate (mg/kg)	** Water Extract-Apha 3120 ICPOES	909	883
Sulfate (as % SO ₃)	** Calculation	0.049	0.071
Chloride / Sulfate Ratio	** calculation	0.1	0.0

Notes:

- ppm = mg/Kg dried soil
- 2. For Texture: coarse = sands to loamy sands; medium = sandy loams to light clays; fine = medium to heavy clays and silty clays
 - 3. All results as dry weight DW soils were dried at 60oC for 48hrs prior to crushing and analysis.
- 5. Methods from Rayment and Lyons. Soil Chemical Methods Australasia
- 6. Based on Australian Standard AS: 159-1995
- 7 Methods from Ahern, CR, McElnea AE, Sullivan LA (2004). Acid Sulfate Soils Laboratory Methods Guidelines. QLD DNRME.
 - 8. ** denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available



Environmental Analysis Laboratory, Southern Cross University, Tel. 02 6620 3678, website: scu.edu.au/eal

RESULTS OF WATER ANALYSIS (Page 1 of 1)

samples supplied by Regional Geotechnical Solutions Pty Ltd on the 2nd October, 2015 - Lab. Job No. E4925

Inalysis requested by Tim Morris - Your Project: RGS20421.1

44 Bent Street WINGHAM NSW 2429)

PARAMETER	METHODS REFERENCE	Sample 1 BH1	Sample 2 BH2	Sample 3 BH3	Sample 4 BH4	Sample 5 WS-NB1	Sample 6 WS-SB1
	Job No.	E4925/1	E4925/2	E4925/3	E4925/4	E4925/5	E4925/6
Į	APHA 4500-H ⁺ -B	4.49	4.98	5.04	5.35	5.30	4.96
CONDUCTIVITY (EC) (ds/m)	APHA 2510-B	0.147	0.136	0.094	0.154	0.197	0.123
OTAL DISSOLVED SALTS (mg/L)	calculation using EC x 680	100	95	64	105	134	84
OTAL SUSPENDED SOLIDS (mg/L)	GFC equiv. filter - APHA 2540-D	357	36	826	11,015	9	17
OTAL PHOSPHORUS (mg/L P)	APHA 4500 P-H	0.02	0.01	90.0	0.13	0.01	0.01
RTHOPHOSPHATE (mg/L P)	APHA 4500 P-G	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
OTAL NITROGEN (mg/L N)	APHA 4500 N-C	0.29	0.59	0.92	2.56	0.30	0.35
OTAL KJELDAHL NITROGEN (mg/L N)	CALCULATION: TN - NOX	0.17	0.58	0.92	2.55	0.30	0.35
IITRATE (mg/L N)	APHA 4500 NO ₃ ⁻ -F	0.113	<0.005	<0.005	<0.005	<0.005	<0.005
IITRITE (mg/L N)	APHA 4500 NO3 ⁻ -I	0.007	900.0	<0.001	<0.001	0.001	0.003
MMONIA (mg/L N)	APHA 4500 NH ₃ -H	0.014	0.315	0.112	0.049	0.040	0.012

otes.

. 1 mg/L (milligram per litre) = 1 ppm (part per million) = $1000 \, \mu g/L$ (micrograms per litre)= $1000 \, ppb$ (part per billion)

". For conductivity - 1 dS/m = 1 mS/cm = 1000μ S/cm

. Analysis performed according to APHA, 2012, "Standard Methods for the Examination of Water & Wastewater", 22nd Edition, except where stated otherwise.

I. Analysis conducted between sample arrival date and Report provision date





Environmental Analysis Laboratory, Southern Cross University, Tel. 02 6620 3678, website: scu.edu.au/eal



Appendix C Infiltration Testing Results

Regional Geotechnical Solutions RG\$20421.1-AB 29 October 2015

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FALLING HEAD INFILTRATION TEST - CASED HOLE

CLIENT:KING & CAMPBELLJob No.:RGS20421.1PROJECT:PROPOSED BUSINESS PARKDate:22-Sep-15LOCATION:PORT MACQUARIE AIRPORTBy:TM



Hole radius (BH2			Test Locatio	n:	Refer to Fi	gure 1		
	m):	0.1			Surface RL:		5			
Hole depth(r		0.30			Casing stick	up(m):	0.00			
Depth to wa	ter table (m):	0.4			Water table	RL(m)	4.7			
Reading	Time elapsed (min)	Depth to water (m)	Height of water (m)				Calculat	ions		
1	0	0.100	0.20			Cor	nstant loss ti	me perio	d <u>:</u>	
2	0.2	0.110	0.19		Reading 1:	2	Time 1:	0.2	Height 1:	0.190
3	3	0.115	0.19		Reading 2:	9	Time 2:	32	Height 2:	0.090
4	5	0.120	0.18			Total time (ı	min):	31.8	0	
5	8	0.130	0.17			Total head l	oss (m):	-0.10	0	
6	10	0.140	0.16							
7	17	0.165	0.14	1						
8	22	0.175	0.13							
9	32	0.210	0.09			In si	tu Perm	neabili	ity:	
10	38	0.220	0.08				(Heiaht 2 -	– Heiaht	1)	
11	6					K =	(Height 2 -	- Time1)	
12	7									
13	8					K=	5.24	E-05	m/sec	
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King & Campbell

Port Macquarie Airport Business Park

Groundwater Assessment – Factual Report

Report No. RGS20421.1-AF 16 November 2017





Manning-Great Lakes

Port Macquarie

Coffs Harbour

RGS20421.1-AF

16 November 2017

King & Campbell Pty Ltd PO Box 243 PORT MACQUARIE NSW 2444

Attention: Tony Thorne

Dear Tony,

RE: Port Macquarie Airport Business Park

Groundwater Assessment – Factual Report

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a groundwater assessment for the proposed Port Macquarie Airport Business Park.

Groundwater conditions at the site for the period July – December 2016, are presented in the attached report.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Tim Morris

Senior Engineering Geologist



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Regional Geotechnical Solutions RG\$20421.1-AF 16 November 2017



1 INTRODUCTION

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a groundwater assessment for the proposed Port Macquarie Airport Business Park.

RGS has previously undertaken a geotechnical assessment at the site, refer Report RGS20421.1-AD, which should be read in conjunction with this assessment.

The purpose of the work described herein was to provide a summary of groundwater conditions that were present at the three monitoring sites during the monitoring period and the groundwater level responses to rainfall. This information will then assist with the development of a Stormwater Management Plan for the proposed development.

The work was commissioned by Tony Thorne of King & Campbell Pty Ltd.

2 FIELD WORK

Groundwater wells were initially installed on 22 September 2015 by a track mounted drilling rig using geo-probe push tube techniques, logged and sampled by an Engineering Geologist.

Groundwater monitoring wells were installed four boreholes. The wells were constructed with slotted 50mm diameter PVC screen in the identified groundwater body and extended to the surface with 50mm PVC casing. The boreholes were backfilled with graded sand to the top of the screen and sealed with bentonite pellets and concrete. The wells were finished off with a protective steel monument approximately 0.7m high and secured with a padlock.

Engineering logs of the boreholes are presented in Appendix A. The locations of the boreholes are shown on Figure 1. They were obtained on site by measurement relative to existing site features. Coordinates for each investigation location were recorded by hand held GPS and are shown on the logs. Reduced levels at the investigation locations were estimated from the supplied drawing and are shown on the logs.

Groundwater level data loggers were subsequently installed in three of the monitoring wells on the 13 May 2016. Data from the loggers was downloaded on 27 July 2016 and 12 May 2017. The well loggers have a memory capacity of approximately 150 days and the second period of data recording ceased on 25 December 2016.

3 SITE CONDITIONS

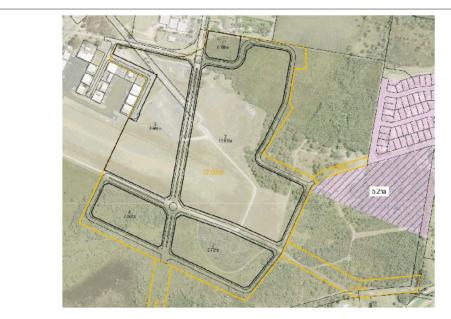
3.1 Surface conditions

The site is located in an area of gently undulating topography and is centred on a broad east west orientated sand dune that has surface elevations in the order 5.5mAHD. The surface of the sand dune has been modified by earthworks to form an east – west orientated grassed runway. The sand dune slopes gently down to the north and south away from the runway with surface angles of less than 1° towards aeolian sand plains that are poorly drained.

Regional Geotechnical Solutions RGS20421.1-AF Page 1



An image of the site is reproduced below.



Proposed Airport Business Park (outlined in black), located to the south east of the existing airport. A disused grass runway is located in the centre of proposed business park.

Vegetation comprised low grass maintained by slashing in the centre of the site near the former grass runway with areas of thick heath vegetation to the north and south that graded into swamp vegetation near the site boundaries. Peat soils were exposed in the access tracks in the low lying areas. A large gravel hardstand area is present in the centre of the site, adjacent to the existing runway.

Drainage of the site is via a combination of overland flow and surface infiltration. Surface water was observed pooling in the low lying areas in the north and south of the site and in some sections of the various access trails as shown in Figure 1.

A selection of images of the site is presented below.





18/9/2015 - Grassed runway area in centre of site



18/9/2015 - Grass access track on south side of grass runway. Water pooling in wheel tracks.



18/9/2015 - Surface water in poorly drained area on northern site boundary. Peat soils exposed by service trenching works.



18/9/2015 - Swamp vegetation and surface water pooling in poorly drained swamp near southern site boundary at BH4.

3.2 Subsurface conditions

Reference to the 1:25,000 Port Macquarie Coastal Quaternary Geology Sheet indicates the site is centred on a Pleistocene aeolian sand dune that grades down onto Pleistocene back-barrier sand plains to the north and south.

Reference to the Port Macquarie 1:25,000 Acid Sulfate Soil (ASS) Risk Map indicates the site is an aeolian sand plain with no known occurrence of ASS. However, RGS has previously encountered Potential ASS underlying Pleistocene sand deposits in the local area.

Refer Report RGS20421.1-AD for details of subsurface profiles encountered in previous investigations.



4 DISCUSSION

4.1 Subsurface Profile

The soil profiles encountered in the original investigation typically comprised aeolian sands with up to two distinct zones of weakly to moderately cemented, dense to very dense, indurated sand, referred to locally as coffee rock, to depths of up to 3.7m. Indurated sand horizon can act as aquitards, preventing draining of groundwater, resulting in the formation of perched water tables.

Based on previous experience in the area, indurated sand profiles are typically variable in their degree of cementing and their horizontal and vertical extents. Marine sands were encountered in the deeper boreholes below the indurated sand horizons from 3.7m. Residual clay soils were encountered in one location, BH2 at 5.45m.

Examples of excavated profiles are presented below.



TP2 – Typical profile with aeolian sands, overlying a thin upper indurated sand horizon, overlying more aeolian sands. The test pit is collapsing due to water inflow occurring above a lower indurated sand layer (not visible).



TP6 – Located near southern boundary. Water inflow from perched water table in peat horizon above shallow indurated sand horizon. Water inflow also occurring above lower indurated sand horizon.

4.2 Groundwater Conditions

Groundwater depths encountered in the original investigation were variable and included shallow perched water tables above the peat and indurated sand horizons. Groundwater inflow from up to three distinct water tables / aquifers were observed in the test pit profiles and were separated by the indurated sand horizons which act as aquitards.

Surface water bodies were observed pooling near the northern and southern boundaries of the site on 22 September 215 as shown in Figure 1 and are considered to represent a shallow, perched groundwater table that daylights as the surface elevation grades down and overlies a thin upper indurated sand profile. The perched water tables are anticipated to vary rapidly in height in



response to rainfall. Groundwater levels encountered during the drilling investigation (22/9/15) were observed to be approximately 300mm higher than when the test pitting was undertaken (18/9/15) following approximately 43mm of rainfall between 18 to 20 September.

Groundwater monitoring wells were installed at four locations to allow monitoring of groundwater levels in response to rainfall. A brief summary of groundwater levels observed at installation and final removal of the well loggers is presented in Table 1.

Table 1: Groundwater Monitoring Well Summary

Borehole	Surface Level* (RL m)	Groundwater Inflow at Installation 22/9/2015 (m)	Reduced Level of Water Table (RL m)	Groundwater Depth at 12/5/2017 (m)	Reduced Level of Water Table (RL m)
BH1	4.3	8.0	3.5	0.71	3.59
BH2	5.0	0.4	4.6	1.11	3.89
ВН3	4.0	0.4	3.6	0.15	3.85
BH4	4.1	0.3	3.8	0.29	3.81

^{*}Estimated Surface RL based on contours shown on supplied plan

HOBO groundwater well loggers were installed in monitoring wells at BH1, BH2 and BH4 in May 2016 and groundwater level data then collected from each of the wells continuously to 25 December 2016. Results are presented in Graphs 1-6.

In summary, the results indicate the shallow perched groundwater tables at BH1 and BH4 show a rapid response to rainfall events such as the one that occurred from 4 – 6 June 2016 comprising a total of 120.8mm over the three days. Groundwater levels in the low lying landscape at BH4 were subsequently recorded above the ground surface level for approximately one week, equivalent to approximately RL4m. The groundwater levels in BH2 which was installed in a lower groundwater body, below the overlying indurated sand horizon typically showed a more subdued response to rainfall events.

Rainfall data from Port Macquarie Airport Automated Weather Station (AWS) for 2016 is presented in Graph 7 and Graph 8. It shows generally low rainfall conditions occurred in spring and summer 2016, following rainfall events in winter on 4-6 June 2016 and 3 – 5 August 2016. Rainfall for 2016 was 1068mm which is below the 1317mm average rainfall for the Port Macquarie AWS.

Future works that require excavation of service trenches, or similar, through indurated sand horizons are likely to result in changes to the local hydrology, including the potential drainage of shallow perched groundwater tables. In addition, future earthworks such as placement of fill will be restricted following rainfall events that may result in a raised groundwater table and prevents placement and compaction of fill by heavy plant.

^{**}BH2 cased off to 3.2m and installed in lower groundwater horizon below indurated sand



5 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

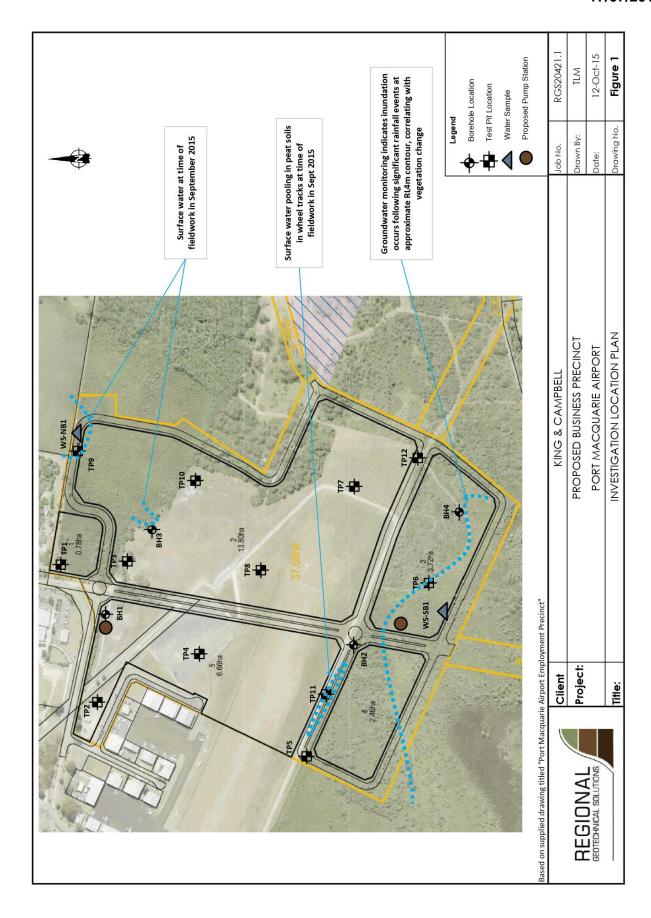
Regional Geotechnical Solutions Pty Ltd

Tim Morris

Senior Engineering Geologist



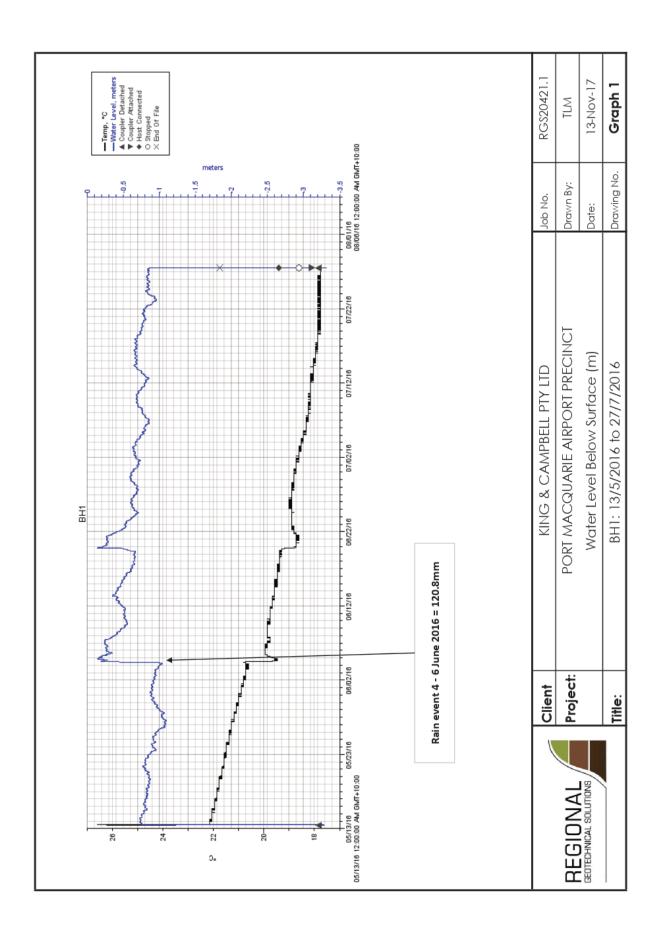
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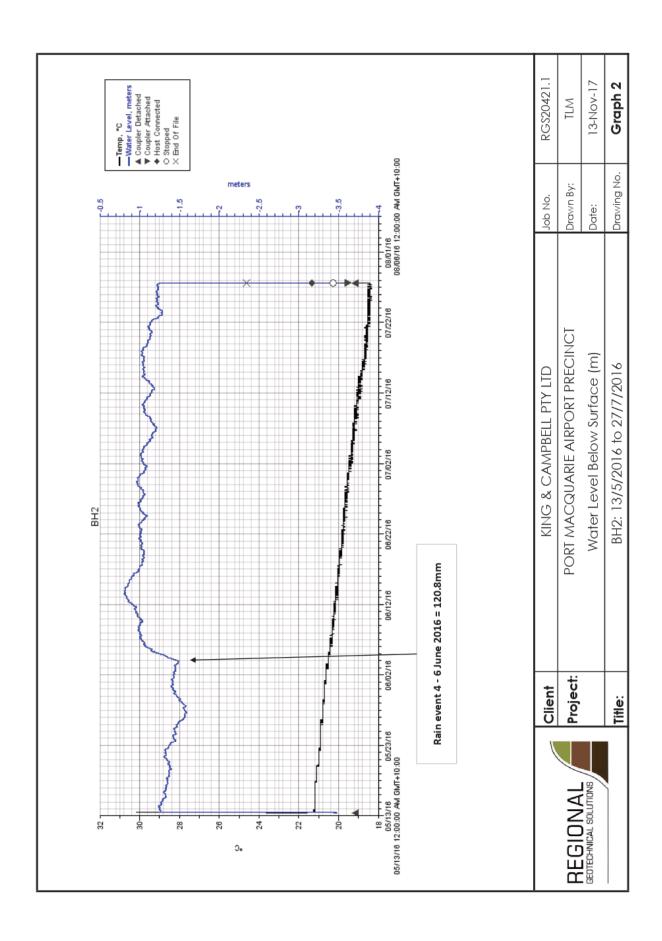


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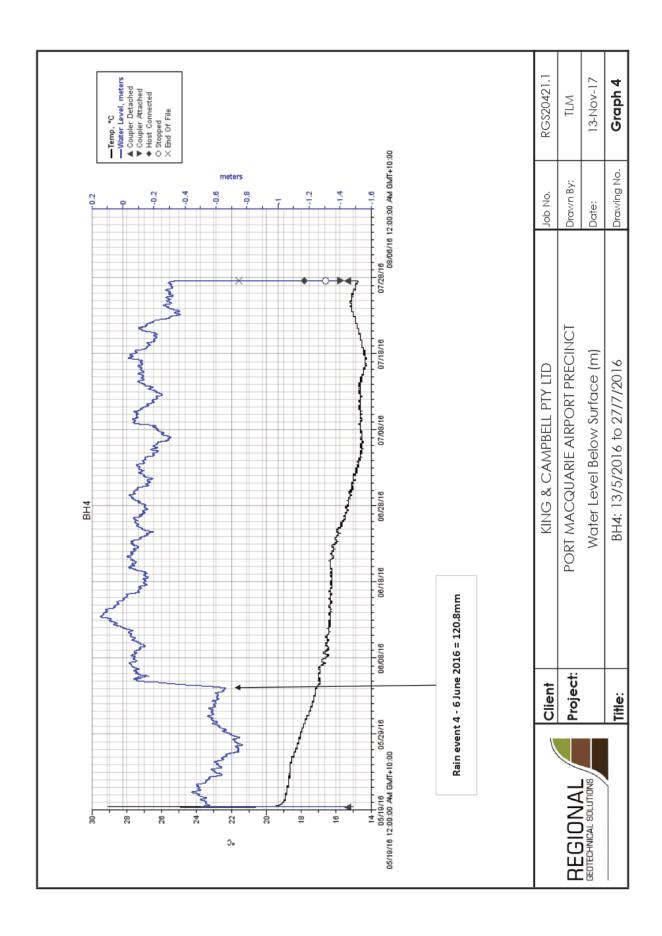


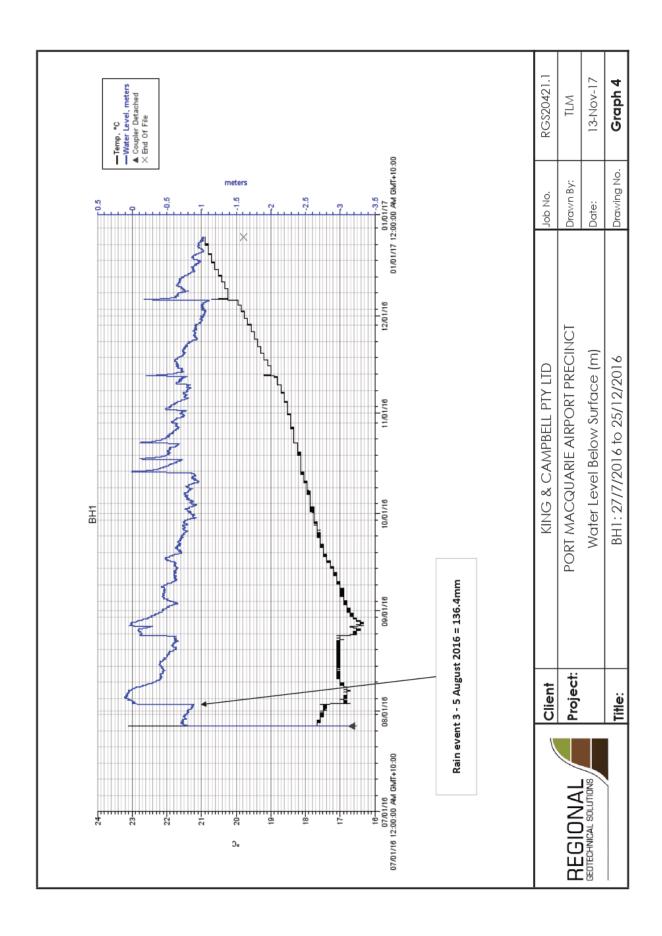
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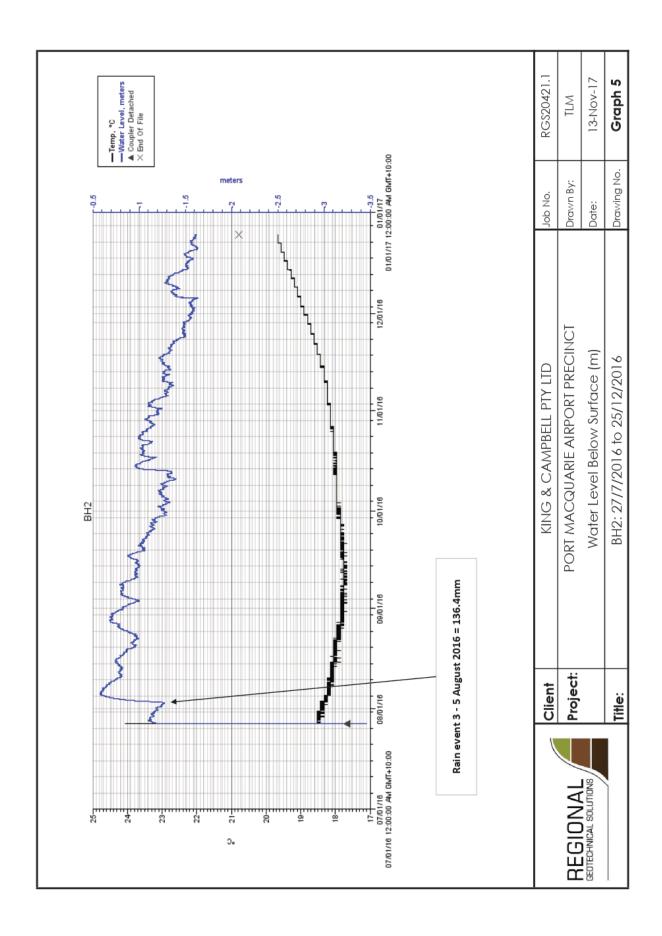


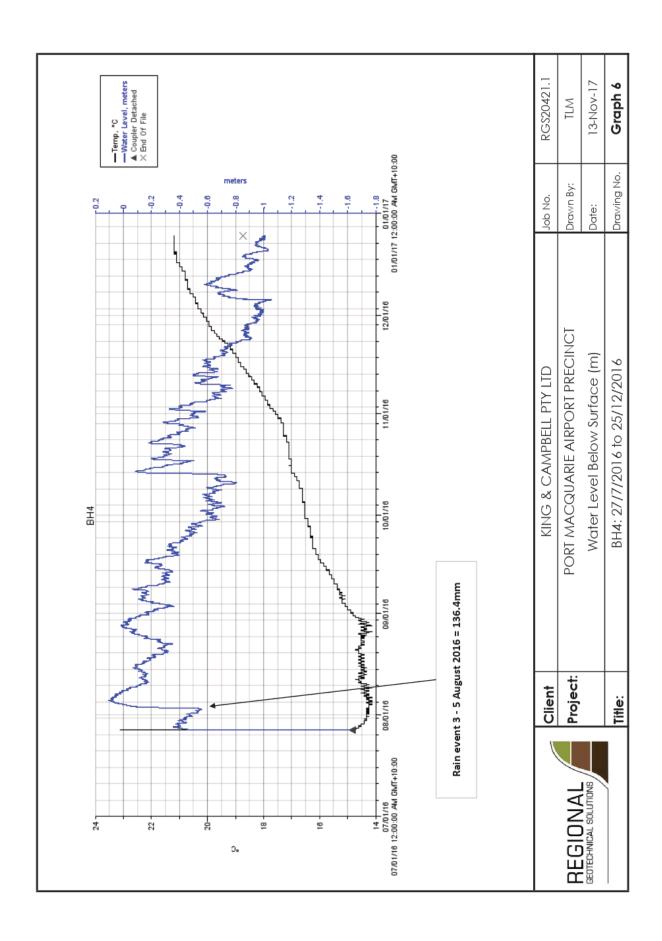


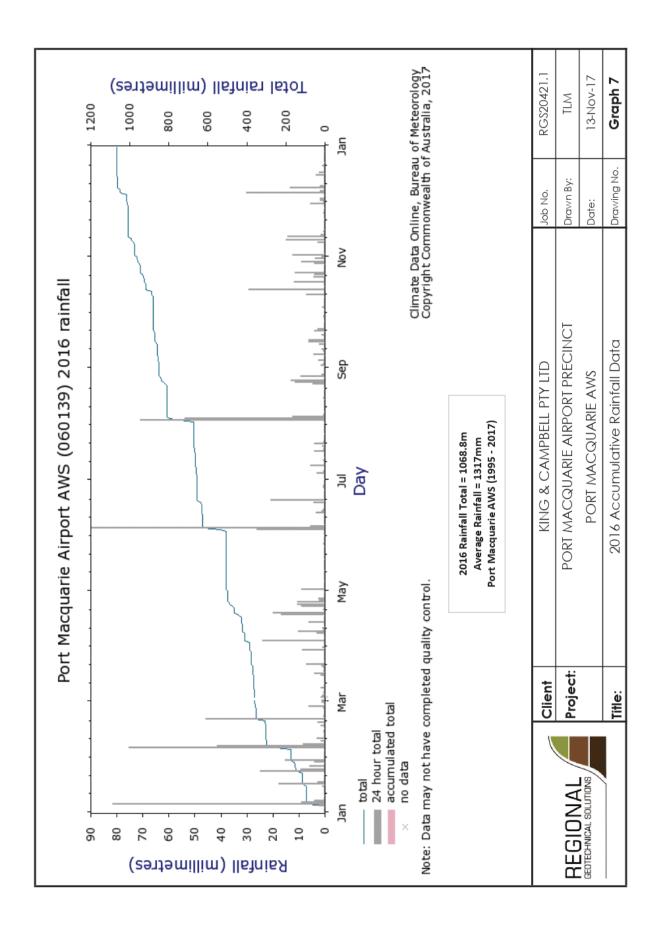
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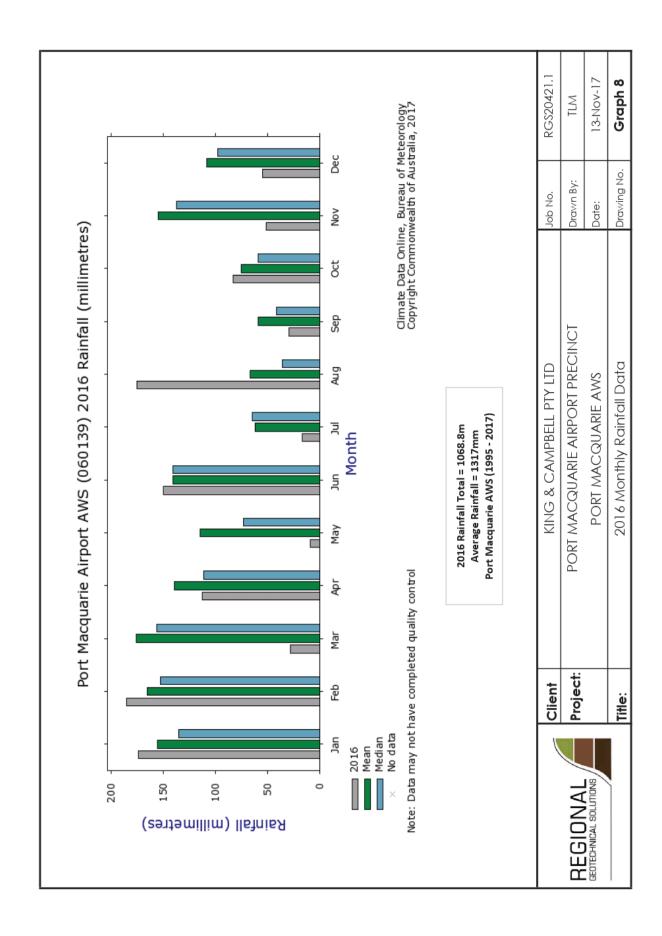








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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 7 - Concept Stormwater Management Plan

PP2015 - 3.1 5/7/2019

KING + CAMPBELL

Concept Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park, Port Macquarie

Prepared for:

Port Macquarie-Hastings Council

Prepared by:

King & Campbell Pty Ltd
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25-27 Hay Street
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PO Box 243
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info@kingcampbell.com.au

Date: November 2015. Updated: January 2019.

Stormwater Management Plan

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Executive Summary

This Stormwater Management Plan has been prepared in support of a Planning Proposal to amend the Port Macquarie Hastings Local Environmental Plan 2011 (LEP 2011) for the Port Macquarie Airport Lands and Airport Business Park, in accordance with the resolution of Port Macquarie Hastings Council (PMHC) at its meeting of 21 November, 2018.

The Airport Lands (*the site*) includes existing and future development for general aviation uses to the west of Boundary Street and the Airport Business Park includes future development to the east of Boundary Street.

This Plan provides the relevant information necessary for Council to assess the stormwater management requirements of the proposed development and has been prepared in accordance with the requirements of the Port Macquarie Hastings Council's AUS-SPEC D5 and D7 specification (Table D7A-4 Stormwater Management Plan Requirements) and the requirements of relevant Australian Standards.

The site was assessed for its suitability for the proposed development in terms of servicing requirements and the ability to mitigate the impact of urbanisation on the existing stormwater cycle.

The assessment considered the stormwater management requirements of future development, including legal point of discharge, soils and groundwater impacts and the capacity of the land to cater for the stormwater needs and production of future development.

The assessment determined the necessary mitigation measures required to be implemented to ensure the development can be adequately serviced with design constraints and recommendations made within the relevant sections of this report.

The impact of the proposed development on stormwater quantity and stormwater quality was modelled in the DRAINS and MUSIC programs. The modelling compared the existing conditions to the proposed conditions and the change to water quality from source to outlet.

This SMP recommends the adoption of a treatment train approach incorporating gross pollutant removal and bio-retention facilities to protect the downstream environment.

Due to the location of the proposed development at the edge of the Hastings River floodplain, it is recommended that detention is not required due to the large areas of stormwater ponding available and the minimal impacts upon this area that the increased runoff from the future development may cause.

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Stormwater Management Plan Port Macquarie Airport Lands and Business Park

Section 1 Introduction

This Stormwater Management Plan (SMP) has been prepared in support of a Planning Proposal to amend the Port Macquarie Hastings Local Environmental Plan 2011 (LEP 2011) for the Port Macquarie Airport Lands and Airport Business Park, in accordance with the resolution of Port Macquarie Hastings Council (PMHC) at its meeting of 21 November, 2018.

The Airport Lands (the site) includes existing and future development for general aviation uses to the west of Boundary Street and the Airport Business Park includes future development to the east of Boundary Street

This SMP has been developed to determine an earthworks, site regrading and stormwater strategy to mitigate impact upon the downstream infrastructure, adjoining properties and receiving waters.

This SMP provides the relevant information necessary for Council to assess the stormwater management requirements of the proposed development and has been prepared in accordance with the requirements of the Port Macquarie Hastings Council's AUS-SPEC D5 and D7 specification (Table D7A-4 Stormwater Management Plan Requirements), and the requirements of relevant Australian Standards.

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

Section 2 Development Details

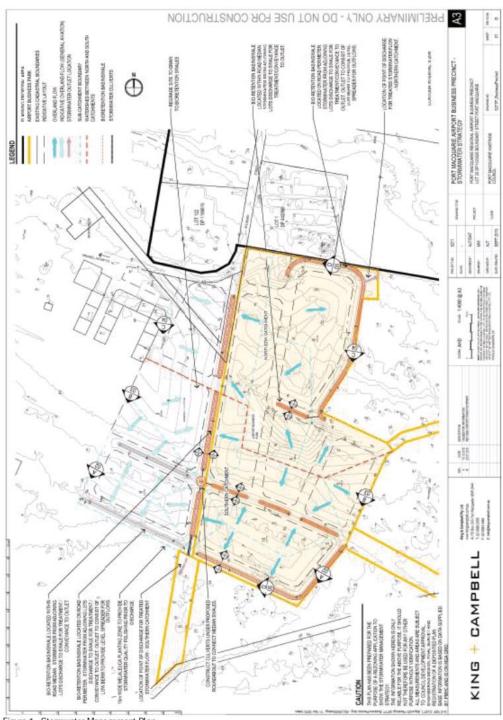


Figure 1 - Stormwater Management Plan

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Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

Section 3 Site Conditions

3.1 Location

The site is located within the Port Macquarie Hastings Local Government Area (PM-H LGA), on the western fringe of the town of Port Macquarie, within the Hastings River catchment on the north coast of New South Wales.

The site is bound by existing residential development to the east, environmental conservation zoned area to the south, existing airport development to the east and an education facility to the north.

3.2 Legal Point of Discharge

In accordance with established conventions in determining the lawful point of discharge, a point of discharge in considered *lawful* if it satisfies the following two point test¹:

- a. That the location of the discharge is under the lawful control of the local government or other statutory authority from whom permission to discharge has been received. This will include park, drainage or road reserve or stormwater drainage easement.
- b. That in discharging in that location, the discharge will not cause an actionable nuisance (i.e.; a nuisance for which the current or some future neighbouring proprietor may bring an action or claim for damages arising out of the nuisance). In general terms this implies no worsening as a result of the discharge.

The site includes 2 sub-catchments draining to the north east and south respectively. The discharge locations for each catchment are located wholly within the site and through the use of bio-filtration swales/basins and level spreader devices, outflows will be converted to overland sheet flow to natural drainage depressions.

Stormwater mitigation measures are proposed, including bio-filtration swales and basins, to ensure the impact of the expected discharges modelled within the context of the larger catchment system will not cause an actionable nuisance.

¹ Queensland Urban Drainage Manual – volume 1 second edition 2007 – pp 3-3 http://www.derm.qld.gov.au/water/regulation/pdf/guidelines/flood_risk_management/qudm_3.pdf (Accessed 24 February 2012)

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

3.3 Topography

The site is located on generally flat terrain of the Hastings River floodplain and is dominated by a low dune forming a ridge running in an east-west direction. The low dune generally bisects the site into approximate equal north and south sub-catchments. Northern and southern slopes consist of low grades of less than 1%. The topography can be described as regular in nature, with long flat grades being typical within the site.

There are no defined natural watercourses within the site, with surface drainage consisting primarily of infiltration and sheet flow surface runoff.

It is proposed to modify the existing landform through the construction of bio-retention swales within road medians, to reduce filling requirements, and to provide at source stormwater treatment.

3.4 Soils

The existing site soils have been investigated through extensive borehole and soil samples undertaken by Regional Geotechnical Solutions (RGS). RGS confirms that the site is located on a Pleistocene sand dune, which grades to Pleistocene back-barrier sand plains. The site consists of Aeolian sands throughout. Soil profiles of silty sands and residual clay were also present. With reference to the Port Macquarie 1:25,000 Acid Sulphate Soil (ASS) Risk Map, RGS states there are no known occurrence of ASS within the soils.

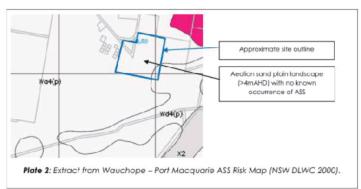


Figure 3 - Extract from Wauchope - Port Macquarie ASS Risk Map (NSW DLWC 2000)

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

3.5 Groundwater

Regional Geotechnical solutions (RGS) have undertaken groundwater investigation for the site, including;

- Geotechnical Assessment, (October 2015); and
- Groundwater Assessment Factual Report, (16 November 2017).

The assessments confirm that the groundwater inflow is from three aquifer sources that are separated by sand horizons. RGS confirm groundwater was visible at various depths throughout the site, ranging from 0.05 – 0.9m depths. RGS also confirm that the sandy soils are a good indication of the presence of a shallow groundwater table.

The 2017 assessment included monitoring of groundwater conditions during the period from July to December 2016.

This assessment found that groundwater depths encountered in the original investigation were variable and included shallow perched water tables above the peat and indurated sand horizons. During test pit excavation activities groundwater was observed flowing into the excavation within these separate layers. It was further confirmed that the...perched water tables are anticipated to vary rapidly in height in response to rainfall.

The 2017 assessment concluded that the results indicate the shallow perched groundwater tables at BH1 and BH4 [reflecting the shallower aquifers] show a rapid response to rainfall events such as the one that occurred from 4-6 June 2016 comprising a total of 120.8mm over the three days. The assessment also noted that the groundwater was above the surface at these locations for approximately one (1) week following that event, before subsiding. The assessment therefore suggests a high connectivity between surface water/rainfall and the upper aquifers.

The groundwater modelling of the lower aquifer, separated from the upper aquifer by a layer of indurated sand, recorded *a more subdued response to rainfall events*.

The assessment further noted that excavation for service trenches may result in the linkage of the aquifers, which will likely result in changes in the local hydrology in the immediate area surrounding those works.

It is noted that the observations contained within the 2017 assessment supported the initial 2015 observations, where the long term groundwater levels were highly variable and ranged from 0.05-0.9m depths due to localised perched aquifers above indurated sand aquitard layers.

Accordingly, excavations within *the site* for the purposes of sewer, conventional stormwater drainage infrastructure and bio-retention systems will likely intersect the existing indurated sand layers. This will result in the connection of the upper and lower aquifers and subsequent modification to the water table within the development envelope.

Therefore the adoption of the bio-retention swales and basins, with a permanent submerged zone as a feature of their design, for stormwater treatment will establish and regulate groundwater levels at levels close to the existing upper aquifer levels and as such support the maintenance of groundwater levels in their vicinity.

ATTACHMENT ORDINARY COUNCIL 17/07/2019

King & Campbell Pty Ltd

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

Additionally, the implementation of bio-retention basins at the development edge will assist to maintain existing water levels within the adjoining lands. The adoption of bio-retention systems within the site with submerged zones close to the surface will assist to maintain consistent groundwater levels post construction. Connection between the surface aquifers and rainfall will also be retained through the use of these bio-retention systems.

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

Section 4 Water Quality

4.1 Site and Receiving Water Quality

All stormwater quality modelling for the site was undertaken in accordance with recommended procedures within *Chapter 13 – Modelling Urban Stormwater Management Systems* of ARQ 2006. Given the *highly non-linear* and *highly stochastic* characteristics involved in stormwater management systems, there is an obvious requirement for the use of sophisticated computer modelling packages to estimate the likely pollutant export from future development.

The computer software MUSIC Version 6.1 (Build 0.767) developed by eWater was utilised to determine the likely stormwater runoff quality for pre and post development scenarios.

Design parameters for the software were obtained and adopted from the Draft NSW MUSIC Modelling Guidelines (BMT WBM Pty Ltd, August 2010) along with local rainfall and evaporation parameters for the Port Macquarie area. (Port Macquarie Hastings Council, February 2004).

4.1.1 Northern Catchment

The northern catchment of the site discharges to the Hastings River via an existing area of Coastal Wetlands pursuant to SEPP (Coastal Management) 2018 and drainage channels extending between Boundary Street and Tuffins Lane.

The contributing catchment has been substantially modified via the development of existing airport infrastructure, with the clearing of trees and understorey vegetation, regular slashing and placement of suitable pavement base for aircraft movements.

4.1.2 Southern Catchment

The southern catchment of the site discharges to the Hastings River via an existing area of Coastal Wetlands pursuant to SEPP (Coastal Management) 2018 and onwards via a circuitous route to the south of the existing main airport runway before connecting to Partridge Creek.

Similarly to the northern catchment, the contributing catchment has been substantially modified with the development of existing airport infrastructure.

4.2 Water Quality of the Receiving Waters

For the purposes of water quality modelling and notwithstanding urbanisation and development that has occurred in the area, the receiving waters for all catchments of the site have been considered to be pristine, or unmodified ecosystems.

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

4.3 Pre Development Modelled Pollutant Loads

The site was modelled as two separate catchments, determined according to the existing landform and topography as well as consideration of the ultimate built form of the future development. The existing soils are considered to be generally sandy with layers of impermeable indurated sands, which allows for medium amounts of infiltration.

Results of the pre development modelling are as follows:-

Table 1 - Existing Condition Annual Export Loads (Western Catchments)

Sub Catchment	Flow (ML/yr)	Total Suspended Solids (kg/year)	Total Phosphorous (kg/yr)	Total Nitrogen (kg/yr	Gross Pollutants (kg/yr)
N	128	19200	35	264	1250
S	150	25100	38.7	312	1460

4.4 Post Development Modelled Pollutant Loads

Port Macquarie Hastings Council (Port Macquarie Hastings Council, February 2004) specifies water quality objectives, sourced from the ARQ (Engineers Australia, National Committee for Water Engineering, 2007) document.

AUS-SPEC requires that stormwater treatments shall be designed to meet the minimum level of pollutant load objective in accordance with Table D7.7.

Table 2 - Extract from AUS-SPEC D7 - Table D7.7

Pollutant	Objective
Suspended Solids (SS)	80% retention of average annual load
Total Phosphorous (TP)	45% retention of average annual load
Total Nitrogen (TN)	45% retention of average annual load
Litter	100% retention of litter greater than 5mm for flows up to the 3 months ARI peak flow
Sediment	100% retention of sediment greater than 0.125mm for flows up to the 3 month ARI peak flow
Oil and Grease	No visible oils for flows up to the 3 month ARI peak flow

Additionally, the developed stormwater concentrations should be **no worse** than existing.

Results of stormwater quality modelling revealed that the critical nutrient was nitrogen. Sizing calculations for stormwater mitigation measures were therefore undertaken on the basis of achieving the stormwater reductions for this nutrient.

The following data was utilised within MUSIC to model the bio-retention basins:

Stormwater Management Plan Port Macquarie Airport Lands and Airport Business Park

Table 3 - Catchment and Treatment Data utilised in MUSIC

Sub- Catchment No.	Catchment Area (Ha)	Bio-retention Area (m²)	Basin Area (m²)	Basin Perimeter (m)
1	1.93	640	2000	520
2	2.85	360	1600	318
3	4.27	740	1950	375
4	5.88	750	2100	380
5	7.04	1750	4300	1035
6	3.68	143	690	145
7	4.77	475	1740	480
8	4.32	1020	3150	820
9	1.28	403	1140	206

Table 4 – Treatment Train Effectiveness and Water Quality Objective Compliance.

Parameter	Catchment	Source	Residual Load	% Retention	Water Quality Objective	Complia nce?
Total	N	49800	1030	97.9		✓
Susp. Solids (kg/yr)	S	54800	1530	97.2	85%	✓
Total	N	67.9	33.2	51.1		✓
Phos. (kg/yr)	S	84	32.2	61.6	45%	✓
Total	N	548	245	55.3		✓
Nitrogen (kg/yr)	S	648	306	52.7	45%	✓
Gross	N	5500	0	100		✓
Pollutants (kg/yr)	S	6430	0	100	90-100%	✓

Table 5 - Comparison of Pre and Post Development Annual Loads

Parameter	Catchment	Pre Development	Post Development	Compliance?
Total	N	24800	1530	✓
Suspended Solids (kg/yr)	S	19200	1030	✓
Total	N	39.8	32.2	✓
Phosphorus (kg/yr)	S	35	33.2	✓
Total Nitrogen	N	315	306	✓
(kg/yr)	S	264	245	✓
Gross	N	1460	0	✓
Pollutants (kg/yr)	S	1250	0	✓

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Therefore the pollutant outflow concentrations as reported by MUSIC modelling software comply with the relevant requirements of AUS-SPEC D7.

Appendix 1 of this report contains the graphical and numerical modelling parameters and output from the software.

4.5 Stormwater Discharge Quality Management Plan

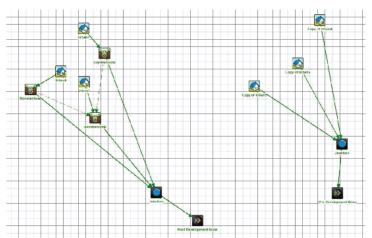


Figure 2 - Screenshot from MUSIC Software illustrating the proposed treatment train for the Northern Catchment.

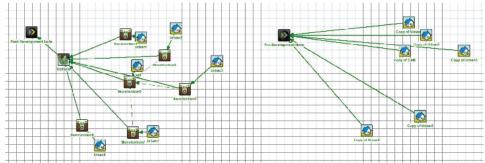


Figure 3 - Screen capture from MUSIC Software illustrating the proposed treatment train for the Southern Catchment

The treatment train includes:-

- Primary treatment via the use of bio-retention and water sensitive urban design.
 - Bio-retention swales/basins
 - o Buffer Strips
 - Gross Pollutant Traps (provided at boundary of each lot prior to discharge to street trunk drainage network)

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- Rainwater Tanks (rainwater reuse within each lot should be encouraged within each lot to reduce the volume of water discharge to the central swale system)
 - NOTE: It should be noted that in accordance with current Council preference, the effect of rainwater tanks on the performance of the treatment train have not been included as part of the MUSIC modelling process.
- Constructed Wetland Outlet

Gross pollutant traps which should be required for each lot, are considered on their ability to capture litter only within the MUSIC model. Where there is potential for oils/grease to be produced by or released from the site, suitable measures should be employed to reduce the impact and prevent release from the site.

4.6 Outlet Structure and Design considerations

Outlet structures within the bio-retention basins have been modelled based on the expected configurations for each structure with a culvert or riser pit outlet for the minor storm and an overflow spillway (or multiple spillways in the case of the south western bio-retention basin). The detailed design process will consist of determining the site specific requirements to provide the appropriate stage-discharge required to comply with the modelling as performed for this application.

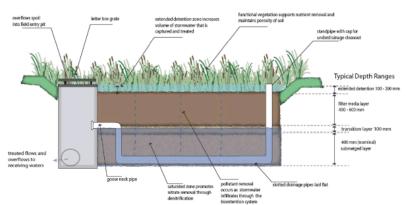


Figure 4 - Typical Bio retention Basin Minor Storm Outlet Configuration SOURCE: Townsville City Council WSUD Guidelines - Chapter 5.

In addition to the bio-retention basin outlet design, it is proposed to provide further stormwater quality facilities to provide final polishing of stormwater prior to discharge.

The southern catchment is reported to discharge to an area identified as habitat for the Wallum Froglet. The wallum froglet reportedly favours water that is slightly acidic. Water testing undertaken by *Regional*

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Geotechnical Solutions (2015) indicate that surface water is slightly acidic, with measured pH of 4.96 within the Wallum Froglet habitat area.

The report notes that:

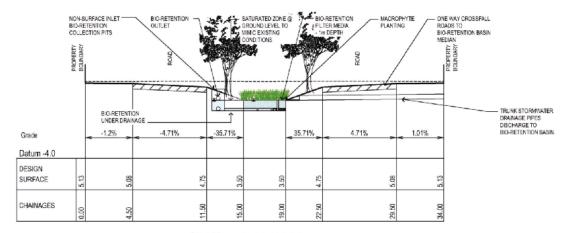
Water with a pH of <5.5 can be indicative of the presence of ASS, however, based on previous experience with coastal sand plain landscapes, the surface waters are often acidic and this is due to organic acidity rather than the presence of ASS.

These acidic waters are often also caused by the presence of melaleuca forests within the wetlands as the source of the organic acidity. The discharges from bio-retention facilities typically report levels of pH close to neutral.

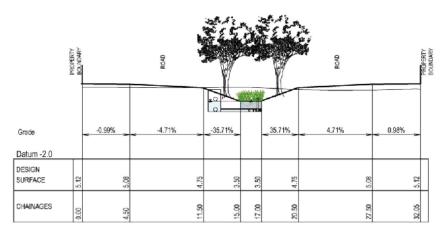
Recent observations of wallum froglet behaviour as part of the Tugun Bypass project suggest that the froglet is capable of colonising bioretention basins as suitable habitat (SOURCE: http://www.tmr.qld.gov.au/~/media/Projects/T/Tugun%20Bypass%20project/Flora%20fauna/tugunbypassfrogmqtplan.pdf)

The above observations notwithstanding, it is proposed to provide a bunded melaleuca forest planting area downstream of the bio-retention basin outlet to provide additional treatment to lower the pH to a level more suited to the Wallum Froget as detailed below.

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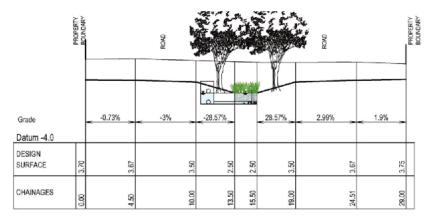
TYPICAL SECTION A



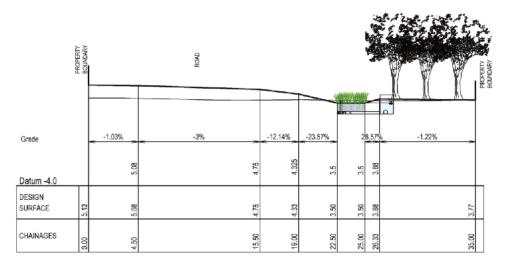
TYPICAL SECTION B

Figure 5 - Typical sections of bio-retention basins within road medians. refer to Stormwater Management Plan for section locations

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TYPICAL SECTION C



TYPICAL SECTION D

Figure 6 - Typical Sections of bio-retention basins within road median and perimeter road basin, including melaleuca planting area (Typical Section D)

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Section 5 Site Hydrology

5.1 Site Hydrology

For industrial subdivision development, the developed 1 in 100 year ARI storm is deemed to be the design storm for major events. Port Macquarie Hastings Council's AUS-SPEC D5 specification requires consideration of the impact upon downstream infrastructure and property in considering the most cost effective methods for management of stormwater discharges. (Port Macquarie Hastings Council, February 2004).

It has been presumed that all future internal roads shall be kerb and gutter. In combination of the natural site topography along with the site regrading for the construction of earthworks and drainage swales, all site stormwater can be drained to treatment structures and discharged to the receiving waters.

Detailed modelling of the site using the computer software package DRAINS has modelled the existing and developed catchments, considering the change in catchment areas as well as the change in imperviousness. The modelling demonstrates that the developed discharge although larger than the existing undeveloped condition at the point of discharge to the Hastings River Floodplain, can be adequately managed without significant impact.

The proposed provision of stormwater bio-retention basins/swales within the development results in the provision of some stormwater detention. Modelling of these proposed basins/swales suggest that whilst significant reductions in post development flows are likely, predevelopment flow rates are not able to be achieved without significant areas of land being utilised as detention basins.

It is considered however that the cost of constructing such basins would greatly outweigh any likely benefits for downstream properties or likely infrastructure.

The location of the points of discharge to the fringes Hastings River floodplain for both northern and southern catchment, and the large storage areas provided by this type of landform results in increased flow rates causing minimal changes to existing flood levels.

The northern and southern catchments were modelled using DRAINS to determine the pre and post runoff volumes. The floodplain areas (and resulting ponded water area) was then estimated for both catchments. Detention provided by the proposed bio-retention basins were estimated, and subtracted from the runoff volume difference and the resulting maximum increase in stormwater ponding in the 1 in 100 year ARI was estimated.

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The results of this modelling are provided below:-

Table 6 - Table showing calculations of maximum increase in water levels for floodplain area.

Catchment	Northern	Southern
Post Development Runoff Volume (m³)	16474	19581
Pre Development Runoff Volume (m³)	11214	13090
Detention Provided within Bio-retention Basins (m³)	3000	4000
Runoff Volume Difference (m³)	2260	2491
Floodplain Area (Ha)	20	50
Maximum Ponded Water Level Increase (mm)	0.011	0.005

As is demonstrated within the above calculations, by considering the worst case scenario of a constrained outlet for the floodplain area, the resulting increases in ponded water levels are minimal. On this basis, it is considered that the provision of detention facilities would not be cost effective, and would be unlikely to provide any real benefit to the downstream catchments.



Figure 7 - Existing Ponding Area for Northern Catchment

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Figure 8 - Existing Ponding Area for Southern Catchment

Therefore on the basis of the expected minimal modelled impacts on the adjoining land it is proposed that the development provide for basins for stormwater quality only, and that the provision of additional facilities specifically for detention is not warranted in this case.

5.2 System Layout - Central Swales in Road Corridors.

Due to the lack of grade within the site, the stormwater bio-retention swales within the road medians have been designed without longitudinal grade, as elongated pond areas. It is noted that further calculations will be required to support future Development Applications. Subsequently, careful design will be required at Construction Certificate stage to ensure that ponding depths in roadway areas are appropriate and manageable.

The width of swales within the road reserves will be a function of the runoff generated by the contributing catchments during design storm events, anticipated constraints to drainage such as intermediate drainage structures/culverts and outlets. Detailed modelling and design will determine the final required swale flow widths, and as such is it likely that the swales will progressively increase from their upstream end to the outlet. As such, cross sections shown on the concept plans should be noted to be indicative only and must not be used to define overall road reserve widths. The difference in widths between upstream and downstream ends of each swale may be substantial, therefore it is recommended that flexibility is included within any future DCP regarding required road reserve widths to cater for this.

It is anticipated that a variety of methods will be employed within the transition from the road edge and the stormwater swales, particularly the high traffic dual lane roads. It is anticipated that options such as wider carriageways, cycle ways, traffic barriers, bollards and other treatments are likely to be employed to prevent accidental vehicular entry to the stormwater swales.

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The bio-retention swales/basins are to be designed to ensure that long term ponding of water does not occur which may lead to future issues with mosquitoes or ongoing vegetation maintenance issues. This is anticipated to include the design of the invert of the swales to be located above the long term submerged zone water level. Careful management will be required at the design stage to ensure that outlet levels and invert levels are designed to provide for this outcome.

Similarly to the above, the detailed designs will require consideration of the road pavement design, including subsoil drainage to ensure that future road pavements are not impacted by proposed swales. Sufficient vertical separation is proposed as part of the typical sections shown within Figure 5 and Figure 6 above. Site conditions at the time of construction may also require other methods such as drainage blankets or geofabics to be considered and employed to ensure adequate protection for the road pavement.

The vegetation to be planted within the swales are to be selected on the basis of hardiness and water tolerance with low maintenance requirements, typical of those used within bio-retention systems. Given the potential for brackish flood waters to enter the system during Hastings River flood events, it is recommended that endemic native species from the adjoining heathlands be employed vegetate the swales.

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Section 6 Maintenance Operation Plan

61 Maintenance Operation Plan requirements for infrastructure and stormwater treatment devices.

The proposed landscape treatment associated with stormwater infiltration areas aims to be as functional and maintenance free as possible. The following initiatives are intended to ensure that ongoing maintenance is minimal:

- Use of locally and regionally endemic sedge and groundcover plants including
 - Lomandra Longifolia (locally endemic)
 - Lomandra Longifolia var. Katrinus (locally endemic)
 - o Dianella Caerulea (locally endemic)
 - Juncas Usitatus (regionally endemic)
 - Carex Appressa (regionally endemic)
 - Isolepsis Nodosa (regionally endemic)
- Planting densities at high rates (5 to 6 plants per square metre)
- The use of pre-slit (for planting) jute matting to assist in moisture retention, suppress weed growth and provide erosion control Jute matting is a natural fibre which will break down completely after three to five years.
- All bio-retention areas are to be subject to a 12 month defects liability period commencing upon the release of the subdivision certificate.

Whilst the above initiations will minimise maintenance associated with landscape treatment of stormwater infiltration areas, some ongoing maintenance will be required. This can ideally be expected to be broadly as follows:-

- 2 to 3 years after installation site maintenance on a quarterly basis to remove weeds and replant as required. Expected time for maintenance visits: ½ day for 2 workers every 3 months.
- 3 to 4 years after installation site maintenance on a half yearly basis to remove weeds. Expected time for maintenance visits: ½ day for 2 workers every 3 months.
- 5 years onwards general maintenance on an annual basis.

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The proposed permanent stormwater management devices (bioretention basins) are to be contained within Drainage Reserves or road reservations to be dedicated to Council.

Bio-retention basins will require replacement of the upper layer of filter media material at regular intervals throughout their lifespan. When infiltration performance becomes degraded, the top sediment laden media will require removal and replacement with clean media, and topsoil and planting replaced on the surface. It is anticipated that this level of maintenance will not be required in less than a 10 – 20 year recurrence.

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Section 7 Conclusion

The proposed development was assessed for its suitability for the proposed development in terms of mitigating the impact of urbanisation on the stormwater management.

The assessment considered the stormwater management requirements of the proposed development, including legal point of discharge, soils and groundwater impacts and the capacity of the land to cater to the stormwater treatment for the proposed development.

The impact of the proposed development on stormwater quantity and stormwater quality was modelled in the DRAINS and MUSIC programs, comparing existing conditions to proposed conditions, and the change to water quality from source to outlet. The proposed development has been designed to implement the treatment train approach to ensure outflows from the development mimic existing conditions, and have been afforded suitable stormwater quality treatment to meet the stated water quality objectives.

The provision of stormwater quality basins within the development will serve to provide some detention for smaller rainfall events, however will not in themselves provide sufficient detention to maintain post development discharge quantities to that existing.

The proposed stormwater swale network will require careful design calculations to determine the following:-

- Width of roadway corridor required to cater for the expected stormwater flows within the network. Any future DCP will require some flexibility within road corridor widths to accommodate this variation.
- Appropriate measures to prevent accidental vehicular entry into the central stormwater swales.
- Invert and Submerged zone parameters to prevent long term stormwater ponding to prevent mosquito issues.
- Vegetation selection to minimise maintenance requirements, tolerance of saturated soils, and periodic exposure to brackish water during flood events within the Hastings River. It is recommended that local endemic species be utilised wherever possible.
- Pavement design for the adjoining roads to ensure that sufficient vertical separation is provided between the saturated zone and pavement layers, as well as considering the judicious placement of drainage blankets in addition to subsoil drainage to ensure long term pavement viability.

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It is recommended that future allotments be required to provide a gross pollutant capture device (Gross Pollutant Trap, Litter Screen or Litter Baskets or similar) prior to the point of connection with the Council trunk drainage system to ensure the stormwater swales are adequately protected, and are not impacted by silt/sediment or gross pollutants and litter. Where a proposed development is likely to produce/generate oil or grease within runoff from the site, it is recommended that the provision of suitable additional measures are mandated as part of any future DCP applicable to the site.

Although not considered as part of the stormwater quality modelling process in accordance with current PMHC preference, the provision of rainwater tanks within each individual allotment should be strongly encouraged as part of any future DCP for the area. The provision of rainwater tanks for on-site re-use will reduce the total volume of stormwater being discharged to the drainage swale network. The provision of the tanks will also assist to increase the overall performance of the stormwater treatment train and the quality of stormwater discharge from the site.

The landform at the outlet being part of the floodplain of the Hastings River was considered a mitigating factor however for stormwater quantity outflows. The impact of higher flows when considering the large surface area, results in negligible increases to water levels within the wetlands. It is therefore considered that stormwater detention is not required in this instance.

A maintenance plan has been formulated to assist in the establishment and continued operation of the proposed stormwater treatment infrastructure, including recommendations on species selection and maintenance intervals.

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Stormwater Management Plan Port Macquarie Airport Business Precinct

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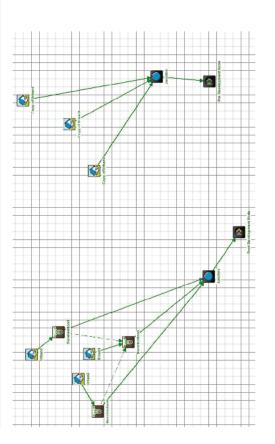
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APPENDIX TWCMP_1 - MUSIC STORMWATER QUALITY MODELS AND OUTPUT

N Pre & Post Developed Catchment Model Layor



N Catchment MUSIC Summary Repo

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Conference Conference	20	20	16	10	35	26
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eepage Kate (%) tormflow Total Suspended	2.15	2.15	2.15	2.15	2.15	2.15
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tomflow Total Phosphorus	-0.6	9.0-	-0.6	-0.6	9.0-	9.0-
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tormflow Total Phosphorus	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Committee Total Phosphorus	0	0	0	0	0	0
tormflow Total Nitrogen	0.3	0.3	0.3	0.3	0.3	0.3
tormflow Total Nitrogen	0.19	0.19	0.19	0.19	0.19	0.19
tendard Deviation (log mg/L) tormflow Total Nitrogen	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
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aseflow Total Suspended	1.2	1.2	1.2	1.2	1.2	1.2
olids Mean (log mg/L) laseflow Total Suspended lolids Standard Deviation (log	0.17	0.17	0.17	0.17	0.17	0.17
ng/L) raseflow Total Suspended	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
aseflow Total Suspended	0	0	0	0	0	0
aseflow Total Phosphorus	-0.85	-0.85	-0.85	-0.85	-0.85	-0.85
iaseflow Total Phosphorus	0.19	0.19	0.19	0.19	0.19	0.19
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aseflow Total Nitrogen Mean	0.11	0.11	0.11	0.11	0.11	0.11
aseflow Total Nitrogen	0.12	0.12	0.12	0.12	0.12	0.12
aseflow Total Nitrogen	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
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oad (kg/yr))UT - TP Mean Annual Load	24.2	29.9	15.6	13.4	8.53	16.0
(g/yr))UT - TN Mean Annual Load	197	259	136	91.6	56.3	110
(g/yr))UT - Gross Pollutant Mean	1.95E3	2.33E3	1.22E3	442	277	530
imual Load (kg/yr) tain In (ML/yr) T Loss (MI An)	103.013	123.335 16.4055	64.4708 8 57562	103.013	64.4708	123.335
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otal Stormflow Out (ML/yr)	3,33013 88,5433 89 1886	3.93009 106.011 106.784	5.4149 55.8187	39.5106 45.3181	24.7277 28.3624	47.3052 54.2584
hange in Soil Storage	0.122251	0.146368	0.0765105	1.10025	0.688595	1.31731
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(g/yr) SS Total Outflow (kg/yr) P Baseflow Out (kg/yr) P Total Stormflow Out	17141.8 0.095801 24.0706	19146.8 0.121379 29.8044	10008.6 0.0634483 15.5796	7255.59 0.897168 12.4698	4800.9 0.548948 7.98058	8686.97 1.07416 14.9299
(g/yr) P Total Outflow (kg/yr) N Baseflow Out (kg/yr) N Total Stormflow Out	24.1664 0.843401 196.5	29.9258 1.0391 258.256	15.643 0.543168 134.997	13.367 7.49417 84.0626	8.52953 5.03135 51.2964	16.004 8.97262 100.646
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verflow weir width (m) votional Detention Time (hrs) vrifice Discharge Coefficient	2	2	2			

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n/yr) otal Suspended Solids - C* ng/L) otal Suspended Solids - C*	20	20	20
ng/L) otal Phosphorus - k (m/yr) otal Phosphorus - C* (mg/L)	6000 0.13	6000 0.13	0.13
otal Phosphorus - C** (mg/L) otal Nitrogen - K (my/K) otal Nitrogen - C** (mg/L) otal Nitrogen - C** (mg/L) hroshodt Lloderalia - Lodeing	500	500 1.4	1.4
nresnou Hydraunc Loading x C** (m/yr) lorizontal Flow Coefficient teuse Enabled	3 Off	3 Off	3 Off
fax drawdown height (m) nnual Demand Enabled nnual Demand Value	Off	Off	Off
ML/year) nnual Demand Distribution nnual Demand Monthly			
Nstribution: Jan Annual Demand Monthly Nstribution: Feb			
nnual Demand Monthly listribution: Mar			
nnual Demand Monthly listribution: Ann			
nnual Demand Monthly			
Annual Demand Monthly			
Annual Demand Monthly			
nnual Demand Monthly			
Nistribution: Aug Annual Demand Monthly			
Vistribution: Sep Annual Demand Monthly			
Vistribution: Oct nnual Demand Monthly			
histribution: Nov nnual Demand Monthly			
histribution: Dec taily Demand Enabled	Off	JU.	Ü
laily Demand Value (ML/day) ustom Demand Enabled	 0ff	JIO	JJ0
Sustom Demand Time Series			
Sustom Demand Time Series			
iller area (sqm)	750	1750	143
Ther depth (m)	0.01	0.01	0.01
mer median Paricie Nameter (mm)			
aturated Hydraulic conductivity (mm/hr)	100	100	100
nfiltration Media Porosity	0.35	0.35	0.35

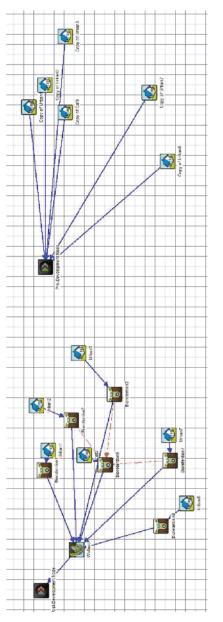
'egetation height (m)			
'egetation Type	Vegetated with Effective Nutrient Removal Plants	Vegetated with Effective Nutrient Removal Plants	Vegetated with Effective Nutrient Removal Plants
otal Nitrogen Content in	400	400	400
inter (mg/kg) orthophosphate Content in	35	35	35
ilter (mg/kg)		:	
s Base Lined?	N0 Vec	No Ves	No Ves
Submerged Zone Present?	Yes	Yes	Yes
ubmerged Zone Depth (m) for Media Soil Texture	0.75 13	0.75 13	0.75 13
roportion of upstream			
Xiftration Rate (mm/hr)	0.1	0.1	0.1
vaporative Loss as % of ET	100	100	100
lepth in metres below the			
rain pipe SS A Coefficient			
SS B Coefficient			
P A Coefficient P B Coefficient			
N A Coefficient			
N B Coefficient			
J. ∗.	0.61	0.61	0.61
. 3	0.11	0.11	0.11
: =	0.05	0.05	0.05
max (m/day)	0.008	0.008	0.008
w (m/day)	0.001	0.001	0.001
VI - Mean Annual Flow	2769	/01	22.8
V - TSS Mean Annual Load	17.1E3	19.2E3	10.0E3
(g/yr) √ - TP Mean Annual Load	24.2	30.0	15.6
(g/yr)	107	261	28
(d/k)	121	107	001
V - Gross Pollutant Mean	1.95E3	2.33E3	1.22E3
nnual Load (kgyr))UT - Mean Annual Flow	87.0	102	55.3
WL/yr) UT - TSS Mean Annual	367	393	291
oad (kg/yr))UT - TP Mean Annual Load	11.9	15.3	90'9
(g/yr) VUT - TN Mean Annual Load	84.5	84.5	5.57
(g/yr)	8	00 0	000
nnual Load (kg/yr)	0.00	0.00	0.00
bw In (ML/yr) T Loss (MI/yr)	89.1886	107.112	55.8187
filtration Loss (ML/yr) ow Flow Bypass Out (ML/yr)	1.39444	3.42055	0.44027
ligh Flow Bypass Out (ML/yr)	0 87 0354	101 923	0 54 0230
/eir Out (ML/yr)	0	0	0.327923

0 0 0 1.01555 10008.6 0 3.02575	0	271.427 20.0389 0	0 0 0 97.0878 15.643	0 0.0545135 0	0	6.02093 0.0419925 0	000	61.242 135.54 0	0.548316	0	87,0371 1.49624 0	000	34.6813	000	0	000	0
0 0 0 4,92811 19166.9 0 14,7451	0	393.417 0 0	0 0 0 97.9474 29.9678	0 0.473758 0	0	15.3285 0 0	000	48.85 260.791 0	3.15635	0	84.5174 0 0	000	67.5919 2332.63	000	0	0 0 0	0
0 0 0 2.42539 17141.8 6.65573	0	366.823 0 0		0 0.186672 0	0	11.8796 0 0	000	50.8424 197.343 0	1.38501	0	84.4991 0 0	000	57.1817 1948.28		0	0 0 0	0
iransler Function Out (MUyn) teure Supplied (MLyn) teure Supplied (MLyn) teure Bergested (MLyn) 6. Reuse Demand Met 6. Load Reduction SS Flow in (kg/yn) SS FL Loss (kg/yr) SS FL Loss (kg/yr) SS Irans (kg/yr) SS Low F bw Bypass Out	(g/yr) SS High Flow Bypass Out	glyy) SS Orifice / Filter Out (kg/yr) SS Weir Out (kg/yr)	(4)/y) SS Reuse Supplied (kg/yr) SS Reuse Requested (kg/yr) SS % Reuse Demand Met SS % Load Reduction P Flow In (kg/yr)	P ET Loss (kg/yr) P Infilration Loss (kg/yr) P Low Flow Bypass Out	(g/yr) P High Flow Bypass Out	P Orifice / Filter Out (kg/yr) P Weir Out (kg/yr) P Transfer Function Out	P Reuse Supplied (kg/yr) P Reuse Requested (kg/yr) P Reuse Demand Met	P % Load Reduction N Flow In (kg/yr) N ET Loss (kg/yr)	N Infiltration Loss (kg/yr) N Low Flow Bypass Out	(g/yr) 'N High Flow Bypass Out colvr)	Norifice / Filter Out (kg/yr) N Weir Out (kg/yr) N Transfer Function Out	N Reuse Supplied (kg/yr) N Reuse Requested (kg/yr) N W Dougo Domond Mot	N % Load Reduction SP Flow In (kg/yr)	P Infiltration Loss (kg/yr) P Low Flow Bypass Out	(g/yr) P High Flow Bypass Out	Porition / Filter Out (kg/yr) P Weir Out (kg/yr) P Transfer Function Out	(g/yr) P Reuse Supplied (kg/yr)

	Draina Link 11 13 Not Route	128	20.7E. 37.9	258	1.25E	128	20.7E	37.9
	Drainage Link 12 11 Not Routed	54.3	8.69E3 16.0	110	530	54.3	8.69E3	16.0
	Drainage Link 3 8 Not Routed	244	1.03E3 33.2	256	0.00	244	1.03E3	33.2
	Drainage Link 10 11 Not Routed	28.4	4.80E3 8.53	56.3	277	28.4	4.80E3	8.53
	Drainage Link 9 11 Not Routed	45.3	7.26E3 13.4	91.6	442	45.3	7.26E3	13.4
	Secondary Drainage Link 7 5 Not Routed	0.328	20.0 42.0E-3	1.50	0.00	0.328	20.0	42.0E-3
	Drainage Link 7 3 Not Routed	54.9	271	87.0	0.00	54.9	271	6.02
	Drainage Link 6 7 Not Routed	55.8	10.0E3 15.6	136	1.22E3	55.8	10.0E3	15.6
	Drainage Link 5 3 Not Routed	102	393 15.3	84.5	0.00	102	393	15.3
Pre-Development Node 13 PrebevelopmentNode 128 20.7E3 37.9 258 1.25E3 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Secondary Drainage Link 2 5 Not Routed	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0 100 2.1 100 1.00 1.00 1.25 20.7 2.00 1.25 3.7.9 2.00 1.25 3.7.9 2.00 1.25 3.7.9 2.00 1.25 3.7.9 2.00 1.25 3.7.9 2.00 1.25 3.7.9 3.7.9 2.00 1.25 3.7.9 3.7.9 2.00 1.25 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.7.9 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Drainage Link 2 3 Not Routed	87.0	367 11.9	84.5	0.00	87.0	367	11.9
0 0 100 2.1 Post-Development Node 8 Post-Development Node 244 1.03E3 33.2 256 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Drainage Link 4 5 Not Routed	107	19.1E3 29.9	259	2.33E3	107	19.1E3	29.9
0 0 100 2.1 Junction 3 3.2 244 1.03E3 33.2 256 0.00 244 1.03E3 33.2 256 0.00 248 1.03E3 33.2 256 0.00 248 1.03E3 33.2 256 0.00 248 1.03E3 33.2 256 0.00 248 1.03E3 33.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 1.03E3 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 248 37.2 256 0.00 266 0.00 27 27 27 27 27 27 27 27 27 27 27 27 27	Drainage Link 1 2 Not Routed	89.2	17.1E3 24.2	197	1.95E3	89.2	17.1E3	24.2
1: P. Reuse Requested (kg/yr) 1: P.% Reuse Demand Met 1: P.% Load Reduction 1: T. Scaling Factor 1: Sc	inks ocation ource node ID arget node ID fuskingum-Cunge Routing	fuskingum K fuskingum theta V - Mean Annual Flow VIL/yr)	v - TSS Mean Annual Load (g/yr) v - TP Mean Annual Load	(g/yr) V - TN Mean Annual Load (g/yr)	V - Gross Pollutant Mean	VUT - Mean Amual Flow	VUT - TSS Mean Amual oad (ko/vr)	VIT - TP Mean Annual Load

cg/yr) >UT - TN Mean Annual Load	197	259	84.5	0.00	84.5		87.0	1.50	91.6	56.3	256	110	258
(1977) UT - Gross Pollutant Mean 1. Innual Load (kg/yr)	1.95E3	2.33E3	0.00	0.00	0.00	1.22E3	0.00	0.00	442	27.7	0.00	530	1.25E
atchment Details													
atchment Name	5271 - Airport Rezone - North Pre and Post												
imestep	Day												
tart Date	1/01/1972												
ind Date	31/12/1975												
tainfall Station	Coastal_MUSIC												
T Station	Coastal MUSIC												
fean Annual Rainfall (mm) fean Annual ET (mm)	1752 1484												

S Pre & Post Developed Catchment Model Layor



SW Catchment MUSIC Summary Repo

ny of Urban8 an SourceNo 2425671641 1	98	
Copy 21 Urbar de 4.32 0.434 7911 3.885 209		
Copy of Urban7 20 20 UrbanSourceNo de 4.77 177 4.2050820895 522	180	e –
Urban1 Urban2 Cat9 Urban3 Lopy of Urban3 Copy of U	99	es ←
Copy of Cat9 18 18 UrbanSourceNo de 1.28 0.12384477611 9403	180	e –
Copy of Urban2 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	99	e -
Copy of Urban1 Copy of 10 Urban2 16 17 17 17 19 2.85 2.85 0.19400820895 0.28648 5.224 015 2.853517 173 599179104 2.85351 478	99	
Urban8 11 11 UrbanSourceNo de 4.32 3.902023880597 02 02 0.417976119402 985	980	
Urban7 1 Urban5curceNo 1 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	080	.,
Urban3 L L 7 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Cat9 Unba 5 7 7 100 Unban SourceNo Unba 6 4.21 1.156155223880 3.85 6 18 18 10123844776119 0.41		e ←
nn2 Cat9 5 nnSourceNode Urba de 1.28 27705223880 1.15 6 6 72284776119 0.122	180	м <u>г</u>
11 Urban2 3 3 SourceNod UrbanSs 2.85 265298507 2.55277 6 6	180	ю <u>г</u>
s ion Ion Type Area vious	1a) ield 99 apacity inim) envious 180 rea iffication apacity apacity	ervious 3 rea infliration apacity xponent - b npervious 1

119	25	10	25	25	0	2.15	0.32	Slochastic	0	-0.6	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	-0.6	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	-0.6	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	-0.6	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	-0.6	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	25	0	2.15	0.32	Stochastic	0	9.0-	0.25
119	25	10	25	52		2.15	0.32	Stochastic	0	9.0-	0.25
urea Rainfall hreshold nmyday) 'ervious rea Soil itorage	repond nm) ervious 2 rea Soil	torage (% f Capacity) sroundwater 1 nitial Depth	nm) sroundwater 2 bailty	centarge tate (%) sroundwater 25 taily	tate (%) stroundwater 0 laily Deep	tate (%) tomflow otal			Stimation Nethod Itomflow Otal Uspended	olids Serial correlation cormflow otal	fean (log ng/L) yg/L) yoral tomitibw (c) otal frosphorus tandard eviation og mg/L)

Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
Stochastic	0	0.3	0.19	Stochastic	0	1.2	0.17	Stochastic	0	-0.85	0.19
tormflow otal	Nethod tormflow otal hosphorus				Stimation Nethod tormflow otal	erial correlation aseflow otal uspended	Mean VL) w ded	cours tandard leviation og mg/L) taseflow otal uspended		- I	Nean (log ng/L) taseflow otal thosphorus

Stochastic	0	0.11	0.12	Stochastic	0	JJ0		33.3
Stochastic	0	0.11	0.12	Stochastic	0	ШО		36.8
Stochastic	0	0.11	0.12	Stochastic	0	ШО		32.9
Stochastic	0	0.11	0.12	Stochastic	0	ШО		9.87
Stochastic	0	0.11	0.12	Stochastic	0	#5		22.0
Stochastic	0	0.11	0.12	Stochastic	0	JJ0		14.9
Stochastic	0	0.11	0.12	Stochastic	0	JJ0		65.5
Stochastic	0	0.11	0.12	Stochastic	0	JJ0		72.4
Stochastic	0	0.11	0.12	Stochastic	0	110		64.8
Stochastic	0	0.11	0.12	Stochastic	0	Off		19.4
Stochastic	0	0.11	0.12	Stochastic	0	JJ Ott		43.2
Stochastic	0	0.11	0.12	Stochastic	0	JJ Ott		29.3
tandard leviation og mg/L) laseflow		10	Nean (log ng/L) taseffow otal				encation as to flow based on stituent encation - encation - entation entation entation entation - entation entation - ent	

nnualFlow

6.20E3	9.67	77.9	325	75.6832	41.5799	0	4.26677	6.95552	22.0727	29.0282	33.2949	0.80835	69.8053	6125.46	6195.27	0.63067	9.04231	9.67298	5.76521
6.84E3	10.7	86.1	359	83.5668	45.9111	0	4.71123	7.68006	24.3719	32.0519	36.7632	0.892553	77.0766	6763.53	6840.61	0.696364	9.98422	10.6806	6.36575
5.34E3	7.79	72.5	321	74.8072	41.0986	0	4.21738	6.87502	21.8172	28.6922	32.9096	0.798994	74.5829	5260.82	5335.4	0.643393	7.14477	7.78817	5.58243
1.35E3	2.76	19.5	96.3	22.4247	12.32	0	1.26423	2.0609	6.54005	8.60094	9.86517	0.239511	21.1285	1328.34	1349.47	0.194781	2.5681	2.76288	1.71781
3.00E3	6.15	43.4	214	49.9299	27.4312	0	2.81488	4.58871	14.5618	19.1505	21.9654	0.533287	47.0439	2957.64	3004.68	0.433692	5.71804	6.15174	3.82482
2.77E3	4.32	34.8	145	33.8122	18.5762	0	1.90622	3.10745	9.86116	12.9686	14.8748	0.361138	31.1861	2736.61	2767.79	0.281758	4.03974	4.32149	2.57566
12.2E3	20.2	146	1.43E3	75.6832	10.067	0	0.474085	62.5997	2.45252	65.0522	65.5263	0.0898168	8.20894	12159.8	12168	0.072571	20.1215	20.1941	0.656089
13.2E3	21.1	163	1.58E3	83.5668	11.1157	0	0.52347	69.1205	2.70799	71.8285	72.352	0.0991725	8.9584	13234.8	13243.7	0.0852148	21.0553	21.1405	0.697525
11.3E3	18.0	138	1.41E3	74.8072	9.9505	0	0.468598	61.8752	2.42413	64.2993	64.7679	0.0887773	8.15439	11295	11303.1	0.076211	17.8976	17.9739	0.637995
3.55E3	5.67	43.9	424	22.4247	2.98282	0	0.14047	18.5481	0.726672	19.2748	19.4152	0.0266123	2.40393	3551.47	3553.88	0.0228668	5.65005	5.67291	0.187177
7.42E3	11.0	97.3	944	49.9299	6.64145	0	0.312765	41.2984	1.61798	42.9164	43.2292	0.059254	5.53113	7411.74	7417.27	0.0477145	10.9386	10.9863	0.413997
4.71E3	8.42	65.2	339	33.8122	4.49757	0	0.211802	27.967	1.09568	29.0627	29.2745	0.0401265	3.46354	4706.96	4710.42	0.0331078	8.38365	8.41675	0.283489
ML/yr) VUT - TSS 4	omual Load (g/yr) (UT - TP 8 (ean		cg/yr) VUT - Gross 639 Vollutant Nean					np. 2 np. 2 tormfbw				ML/yr) :hange in 0 :oil Storage			out (kg/yr) SS Total 4 outflow	-		out (kg/yr) P Total 8 outflow	cg/yr) N Basefbw 0.283489)uf (kg/yr)

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32.2487	34.8243	152.243		Wetland 14 WetlandNode	0		100	0	2000	ì	0.2			20	0.5	200		20	2 67	10:1	9.0		1.7	4
145.391	146.047	1442.01		Bioretention8 12 1 BioRetentionNod	eV4 0		100		1140		0.2							2					1.7	33
162.802	163.5	1592.22		Bioretention7 10 I BioRetentionNod	eV4 0		100		1740		0.2							2					1.7	3
137.212	137.85	1425.32		Bioretention3 8 BioRetentionNod	eV4 0		100		1950		0.2							2					1.7	3
43.687	43.8741	427.262		Bioretention9 6 BioRetentionNod	eV4 0		100		1140		0.2							2					1.7	3
96.8753	97.2893	951.326		Bioretention Bioretention Bioretention Bioretention Wetland 4 10 12 14 14 BioRetentionNod BioRetentionNod BioRetentionNod BioRetentionNod WetlandNode	74		100		1600		0.2												1.7	3
64.9057 9	65.1891 9	644.231 9		Bioretention1 B 2 4 BioRetentionNod B			100		2000		0.2 0							2					1.7	
		cg/yr) ;P Total 64)utflow (g/yr)	lo Imported Nata Source odes	ocation Bi) 2 lode Type Bi	Va 0 flow 0	ypass rate :um/sec)		um/sec) net pond				epth (m) lumber of airmater	anks	'ermanent 'ool Volume subic	netres) roportion	getated quivalent	ipe Nameter	nm))verflow 2 reir width	n) Intional	etention	ime (hrs))rifice	lischarge loefficient		lumber of 3

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8000	20	0009	0.13	200	1.4		8	JJO	Off			
8000	82	0009	0.13	200	1.4		65	JJO	Off			
0008	20	0009	0.13	200	1.4		es	Off	JJO			
0008	20	0009	0.13	200	1.4		8	JJO	JJ0			
8000	20	0009	0.13	200	1.4		es	JJO	Off			
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	475	480	0.01		100	0.35					500		40		No	Yes		Yes	0.75	13
	740	375	0.01		100	0.35				Vegetated with Effective Nutrient Permoval Plants	500		40		No	Yes		Yes	0.75	33
	403	206	0.01		100	0.35			,	Vegetated with Effective Nutrient Pomoval Plants	Kelliowal Fights 600		40		No	Yes		Yes	0.5	13
	360	320	0.01		100	0.35				Vegetated with Effective Nutrient Removal Plants	200		40		No	Yes		Yes	0.75	13
	640	250	0.01		100	0.35				Vegetaled with Effective Nutrient Removal Plants	200		40		No	Yes		Yes	0.75	
ime Series ile Justom lemand ime Series	rea	n) r meter		ilter Median 'article Nameter nm)	ated utlic uctivity	_	orosity ength (m) ed slope ase Width	n) op width (n		egetation / ype E		litrogen content in	g) phosph	1 Filter ng/kg)	s Base I		inderdrain resent?	pa	sent? merged e Depth	n) I for Media I oil Texture Yoportion of pstream npervious

rea freated xfiltration	0.1	0.1	0.1	0.1	0.1	0.1	0.05
tate nmvfrr) vaporative oss as % of	100	100	100	100	100	100	125
'ET lepth in letres							
rain pipe							
SS B							
coefficient P A							
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coefficient if:	0.61	0.61	0.61	19:0	0.61	0.61	
	0.37	0.37	0.37	0.37	0.37	0.37	
N.C.	0.05	0.05	0.05	0.11	0.11	0.05	
.max n/day)	0.008	0.008	0.008	0.008	0.008	0.008	
w (m/day) V - Mean	0.001	0.001 43.2	0.001 19.4	0.001 64.8	0.001 72.4	0.001 65.5	285
ML/vr)							
V - TSS	4.71E3	7.42E3	3.55E3	11.3E3	13.2E3	12.2E3	1.18E3
nnualLoad							
(g/yr)	8.42	11.0	5.67	18.0	21.1	20.2	45.3
fean nnual Load							
(g/yr) V - TN	65.2	97.3	43.9	138	163	146	292
fean nnuall oad							
(g/yr)	029	DVO	VCV	1./152	1 5.05.2	1.425.2	8
ollutant	3		į	3			
nnualLoad							
(g/yr))UT - Mean	27.1	41.9	18.4	62.6	70.6	64.4	283
nnual Flow							
VILLYN) VUT - TSS	102	176	6.69	250	303	279	1.53E3
nnualLoad							
UT - TP	4.80	6.64	2.62	10.4	10.9	9.83	32.2
nnual Load							
UT - TU	21.5	44.2	16.4	57.4	79.5	72.8	311

minall oad							
(g/yr))UT - Gross 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
fean innual Load							
(g/yr) low ln	29.2745	43.2292	19.4152	64.7679	72.3519	65.5263	285.005
T Loss	0.636841	0.345602	0.399517	0.727341	0.44982	0.38091	1.80959
ML/yr) ifiltration	1.47556	0.923571	0.601727	1.35614	1.32001	0.763474	0.516837
oss (ML/yr) ow Flow sypass Out	0	0	0	0	0	0	0
VIL/yr) ligh Flbw sypass Out	0	0	0	0	0	0	0
VIL/yr) Vriffice / iiter Out	27.1224	41.9378	18.3973	62.6385	70.5525	64.3561	161.923
Veir Out	0	0	0	0	0	0	120.763
ransfer unction Out	0	0	0	0	0	0	0
ML/yr) teuse upplied	0	0	0	0	0	0	0
ML/yr) teuse tequested	0	0	0	0	0	0	0
ML/yr) 6 Reuse	0	0	0	0	0	0	0
6 Load	7.35132	2.98724	5.24297	3.28784	2.48704	1.78588	0.81367
SS Flow In	4710.42	7417.27	3553.88	11303.1	13243.7	12168	1180.34
(g/yr) SS ET	0	0	0	0	0	0	0
SS (kg/yr)	6.22362	4.57434	2.60232	6.117	6.55697	3.84763	5.50645
oss (kg/yr) SS Low	0	0	0	0	0	0	0
low Bypass Jut (kg/yr) SS High	0	0	0	0	0	0	0
low Bypass Jut (kg/yr) SS Orifice /	101.783	176.395	69.9235	250.453	302.67	279.114	1013.91
(g/yr) SS Weir	0	0	0	0	0	0	512.825
out (kg/yr) SS	0	0	0	0	0	0	0
unction Out							
SS Reuse upplied	0	0	0	0	0	0	0

0	0	-29.3468	45.2735	0	0.0580738	0	0	13.5204	18.7099	0	0	0	0	28.8098	291.763	0	0.914888	0	0	176.224	134.455	0	
0	0	97.7062	20.1941	0	0.116609	0	0	9.83167	0	0	0	0	0	51.3141	146.047	0	0.841774	0	0	72.8171	0	0	
0	0	97.7146	21.1405	0	0.203378	0	0	10.9316	0	0	0	0	0	48.2905	163.5	0	1.41854	0	0	79.5398	0	0	0
0	0	97.7842	17.9739	0	0.214428	0	0	10.4464	0	0	0	0	0	41.88	137.85	0	1.37304	0	0	57.3919	0	0	0
0	0	98.0325	5.67291	0	0.0807408	0	0	2.62404	0	0	0	0	0	53.7444	43.8741	0	0.63942	0	0	16.3608	0	0	c
0	0	97.6218	10.9863	0	0.143432	0		6.64334			0		0	39.5305	97.2892	0	0.978526		0	44.1898		0	
		97.8392	8.41675		0.238322			4.79629						43.015	65.1892		1.42702			21.4642			
(g/yr) SS Reuse 0 tequested	(g/yr) SS % 0	ag jet		(g/yr) P ET Loss 0		filtration oss (kg/yr) P Low Flow 0 voass Out	(g/yr) P High 0 Iow Bypass		(g/yr) P Weir Out 0	eg/yr) P Transfer 0 unction Out	cg/yr) P Reuse 0 upplied	(g/yr) P Reuse 0 tequested	(g/yr) P % Reuse 0			NET LOSS 0	(g/yr) N 1.	oss (kg/yr) N Low 0	low Bypass Jut (kg/yr) N High 0 Iow Bypass		(g/yr) N Weir Out 0	(g/yr) N Transfer 0 unction Out	(g/yr) N Reise 0

0 0	0 0	50.1414 -6.48344	1431.39 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	100 100	2.1					
0	0	51.3516	1580.49	0	0	0	0	0	0	0	0	0	0	100	2.1					
0	0	58.3663	1414.82	0	0	0	0	0	0	0	0	0	0	100	2.1					
0	0	62.7097	424.115	0	0	0	0	0	0	0	0	0	0	100	2.1		ent nt			
0	0	54.5789	944.318	0	0	0	0	0	0	0	0	0	0	100	2.1		Post-Development Node 15 PostDevelopment	283	1.53E3	
0	0	67.074	639.486	0	0	0	0	0	0	0	0	0	0	100	2.1		Pre-Development Node 13 PreDevelopment	150	25.5E3	
upplied cg/yr) N Reuse	92 15			L055		oss (kg/yr)		out (kg/yr) SP Orifice/ liter Out	(g/yr) ;P Weir Out 0	~ ±		(g/yr) ;P Reuse tequested	(g/yr) ;P % Reuse	iP % Load	ET Scaing actor	lo Generic eatment odes	Ocation J lode Type	WG	V - TSS Vean	neo Hellow

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311

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ORDINARY COUNCIL 17/07/2019

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	a Drain nk ge Lii	20	13	Not ed Route	36.8	3 6.84E
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	Draina k ge Lin	2	14	Not d Route	27.1	3 102
	Second Draina Draina Draina Draina Draina Draina Bra any ge Link ge Li	14	15	Not Not Not Not Not Not Not Not Routed Route	283	279 1.53E3 102 2.77E3 3.00E3 1.35E3 6.84E3 6.20E3 5.3
	Draina ge Lin	12	14		64.4	
		≦ 	9	Not Routed	0.00	0.00
	Drainage Link	80	14	Not Routed	97.29	250
	Secondary Drainage Link	10	9	Not Routed	0.00	0.00
	Drainage Link Brainage Link Secondary Drainage Lii	10	14	Not Routed	70.6	303
		9	14	Not Routed	18.4	6.69
	Secondary Drainage Link	4	9	Not Routed	0.00	0.00
	Drainage Link Drainage Link Secondary Drainage Link	4	14	Not Routed	41.9	176
	Drainage Link	E	12	Not Routed	65.5	12.2E3
	Drainage Link	6	10	Not Routed	72.4	13.2E3
	Drainage Link Drainage Link Drainage Link	7	80	Not Routed	64.8	11.3E3
	Drainage Link	rc.	9	Not Routed	19.4	3,55E3
	Drainage Link Drainage Link	3	4	Not Routed	43.2	7.42E3
	Drainage Link	_	2	Not Routed	29.3	4.71E3
inks	ocation	onrce node	arget node 2	fuskingum- Not Routed kunge kouting fuskingum	fuskingum neta V - Mean	VIL/yr) V - TSS

	7.7	72.	32.	32.	5.3	7.7	72.	32.	
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	10.7	86.1	359 3	36.8	6.84E3 6	10.7	86.1 7	359	
	2.76	19.5	96.3	9.87	1.35E3 (2.76 1	19.5	96.3	
	6.15 2	43.4	214 9	22.0 9	2.77E3 3.00E3 1.35E3	6.15 2	43.4 1	214 9	
	4.32	34.8	145	14.9	2.77E3	4.32	34.8	145	
	4.80	21.5	0.00	27.1		4.80	21.5	0.00	
	32.2	311	0.00	283	1.53E3 102	32.2	311	0.00	
	9.83	72.8	0.00	64.4	279	9.83	72.8	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	10.4	57.4	0.00	62.6	250	10.4	57.4	0.00	
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	10.9	79.5	0.00	9.07	303	10.9	79.5	0.00	
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	20.2	146	1.43E3	65.5	12.2E3	20.2	146	1.43E3	
	. •		•	_		. •		•	
	21.1	163	1.58E3	72.4	13.2E3	21.1	163	1.58E3	
	2	_	-	7	,	2	-	-	
	18.0	138	1.41E3	64.8	11.3E3	18.0	138	1.41E3	
	=	=	-	9	—	22	=	-	
	5.67	43.9	24	19.4	3.55E3	5.67	43.9	\$5.	
	5.0	43	424	16	3	5.4	43	424	
					E3				
	11.0	97.3	944	43.2	7.42E3	11.0	97.3	944	- U U
					~				5271 - Airport Rezone - South Pre and Post 1031 31/12/1975 Coastal_MUSIC 1752
_	8.42	65.2	639	rg/yr))UT - Mean 29.3 .mual Flow	4.71E.	8.42	65.2	s 639	5271 - Rezon Pre an Pre an Day 1/01/18 (Coasta 1752)
Iddi Ludi.	(g/yr) V - TP Nean	cg/yr) V - TN Nean Nean	(g/yr) V - Gross 'ollutant fean	(yr) T - Mean ual Flow	ML/yr))UT - TSS fean	(g/yr) (UT - TP (ean	Idai Lven (yr) T - TN M	(g/yr) VIT - Gross 639 Ollutant Nean Amual Load	achment achment leasis achment lame imestep tran Date in Date infantal itation T. Sation Yean mm.)
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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 8 - TPS Group Traffic Report 2016

PP2015 - 3.1 5/7/2019



Tony Thorne King & Campbell

27th June 2016

Dear Tony,

Port Macquarie Airport Business Park Development Assessment of Operation of Hastings River Dr / Boundary St Intersection Response to Council

I refer to our most recent meeting with Council officers on Tuesday 31st May and your request for further advice regarding the above matter. I now submit the following assessments based on an intersection layout understood to be described in a report by GHD consultants titled "Port Macquarie Airport Precinct Traffic Study ("GHD Intersection Layout").

This report has also been prepared in the context of the following direction from Council officers.

.... only **Scenario 2** (Upgrade of Hastings River Drive / Boundary Street intersection but no Secondary Access Road) will be the subject of further traffic analysis at this stage for informing the ongoing planning process.

High quality access to Port Macquarie Airport is critical to the local economy. For the foreseeable future there will only be one access road to the Airport - Boundary Street via Hastings River Drive. Therefore the efficient operation of this route needs to be safeguarded. The performance of this route is primarily a function of the Hastings River Drive / Boundary Street intersection and therefore efficient operation of this intersection is critical and a good level of service is required.

The following sections of this response outline and comment on the assumptions used in the intersection assessment, results obtained from SIDRA 7.0 intersection analysis software and conclusions derived from the analyses.

1. The GHD Intersection Layout

The GHD Intersection Layout is shown in Fig 1.1.

This intersection has been used as the basis for this response.

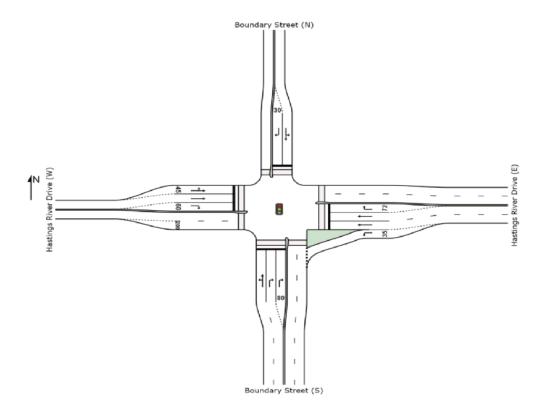


Fig 1.1 The GHD Intersection Layout

2. The Assumed Development

Table 2.1 shows the assumed development floor areas which were applied into making estimates of future development traffic generation and future traffic volumes at the subject intersection. These estimates were provided to TPS by King & Campbell.

Table 2.1 Assumed Future Development

Business Park Development Area	Land Area (Ha)	Yield	GFA	Type
Airport Land	19.54	50.00%	97700	Bus Park
Nissen, Gilson and Ireland Land	8.04	50.00%	40200	Bus Park
TOTAL	27.58		137900	

Existing Development Areas

Airport	Estimates are based on an
Newman College	assumption that these
Sports Facilities	developments will generate
Other Existing	100% more traffic by 2030.
Development	100% more traffic by 2030.

3. Estimated Future Traffic Generation

Traffic generation rates for "business park" have been based on the "regional average" rates reported by RMS in Technical Direction TDT 2013/04aGuide, an extract of which is shown below. These rates were adopted in view of the difficulty associated with making an accurate estimate of the likely future distribution of floorspace between industrial, warehouse, office, retailing etc..

Business parks and industrial estates

In 2012 eleven of these two types of sites were surveyed, four within the Sydney urban area, four within the Lower Hunter, one in the Illawarra and one in Dubbo. Summary vehicle trip generation rates were as follows:

Weekday Rates	Sydney	Sydney	Regional	Regional
	Average	Range	Average	Range
AM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.52	0.15-1.31	0.70	0.32-1.20
PM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.56	0.16-1.50	0.78	0.39-1.30
Daily total vehicle trips	4.60	1.89-10.47	7.83	3.78-11.99

Note: Extract from RMS Technical Direction

Table 3.1 shows estimated future traffic generation associated with the anticipated Airport Business Park and other development in the subject area before 2030.

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Table 3.1 **Estimated Future Traffic Generation** in Area Serviced by Boundary Street south of Hastings River Drive

				Al	M Peak Ho	ur	PI	PM Peak Hour				
Business Park Development Area	Land Area (Ha)	Yield	GFA	Туре	AM / 100	PM / 100	Total	In	Out	Total	In	Out
Airport Land	19.54	50.00%	97700	Bus Park	0.70	0.78	684	547	137	762	152	610
Nissen, Gilson and Ireland Land	8.04	50.00%	40200	Bus Park	0.70	0.78	281	225	56	314	63	251
Total	27.58		137900		0.70	0.78	965	772	193	1076	215	860

Existing	Deve	lopment	t Areas

District Section Street, section 1												
Airport	Estimates are based on an					120	84	36	160	64	96	
New man College				As Exists	As per Surveys		80	44	36	35	5	30
Sports Facilities		assumption that these	0				0	0	80	35	45	
Other Existing Development	developments will generate 100% more traffic by 2030.			50	45	5	50	40	10			
Total							250	173	77	325	144	181
TOTAL							1215	945	270	1401	359	1041

Note: The above estimates are based on an assumed peak hour directional split of 80:20.

The above estimates indicate an additional 1215 vehicle trips and 1401 vehicle trips in and out of the area via Boundary Street in the 2030 AM and PM peak hours respectively relative to vehicle movements in 2015.

Traffic surveys indicate that Boundary Street currently carries approximately 3,000 vehs/day to the immediate south of Hastings River Drive. The above estimates indicate that this traffic volume will increase to approximately 16,000 vehs/day by 2030 if all anticipated development shown in Table 2.1 occurs.

4. Assumed Distribution of Traffic to Hastings River Drive.

The distribution of traffic to/from east and west at Hastings River Drive has been a matter of discussion and agreement with Council officers some time ago. In summary, the following assumptions have been used to generate 2030 peak hour traffic volume estimates.

For Existing Road Network

80% to/from East of Boundary Street 20% to/from West of Boundary Street

Whilst TPS has adopted the above distribution we are of the view that the 80:20 distribution underestimates the likely 2030 distribution of future traffic to/ from west of Boundary Street, we are of the view that approximately 70% or more of traffic could be expected to travel to and from the east in 2030. This compares with approximately 82.5% in 2015.

Estimates indicate that the effect of assuming a 70% distribution of traffic to and from the east via Hastings River Drive (compared with 80%) is equivalent to approximately a 3% gain in intersection capacity.

5. Existing and Future 'Base' Traffic Volumes'

Recently surveyed traffic volumes have been previously reported to Council.

Surveyed AM (0800 – 0900) peak hour and PM (1615 – 1715) peak hour traffic volumes are shown in attachments and summarised below.

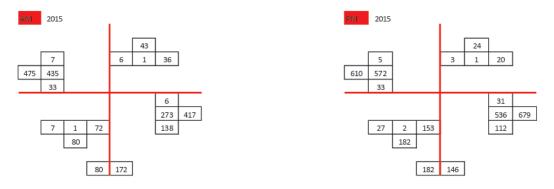


Fig 5.1 Surveyed AM and PM Peak Hour Traffic volumes (2015)

'Base' 2030 traffic volumes have been estimated based on an assumption that traffic volumes in Hastings River Drive (other than movements to and from Boundary Street) will grow at an annual linear rate equivalent to 2% of surveyed volumes in 2015.

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6. Estimated Future (2030) Peak Hour Traffic Volumes

Figs 6.1 to 6.3 show estimated 2030 peak hour traffic volumes for the existing road network for each of the development scenarios investigated.

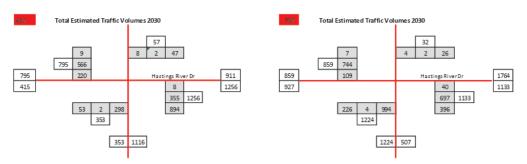


Fig 6.1 Existing Road Network - Estimated 2030 AM and PM Peak Hour Traffic volumes For All development described in Table 3.1

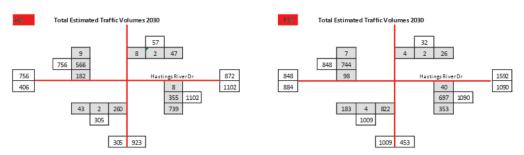


Fig 6.2 Existing Road Network - Estimated 2030 AM and PM Peak Hour Traffic volumes For 75% of Business Park Development described in Table 3.1

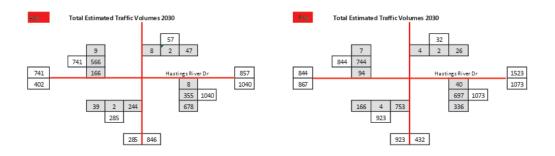


Fig 6.3 Existing Road Network - Estimated 2030 AM and PM Peak Hour Traffic volumes For 65% of Business Park development described in Table 3.1

7. Assumed Intersection Phasing & Cycle Times

TPS has adopted a cycle time of 120 seconds for all intersection performance estimates. This cycle time has been adopted because whilst it approaches the generally acknowledged maximum desirable cycle time of 150 seconds it also represents the desirable maximum from the perspective of motorist delay, pedestrian delay and the maintenance of lane capacities and vehicle platoons in signal systems.

Also, it was considered desirable to maintain cycle times and phase designs constant across all intersection analyses in order to allow a more concise comparison of the effects of varying intersection layouts and geometries.

The assumed phasing for all AM and PM peak hour estimates is shown below.

The operation of the intersection is very sensitive to pedestrian phase and clearance times due to the relatively low traffic demands on the north approach and the need to operate a double right turn from the south approach. TPS has assumed a pedestrian volume of 50 persons/hour across all approaches (as per SIDRA default) with staged pedestrian crosswalks across the east and west approaches. Minimum "walk" and clearance times for those crosswalks have been set to provide for "walk" beyond the median (12 sec) and clearance to or from the median (10 sec). The SIDRA analysis assumes that a pedestrian crosswalk phases will all activate in every signal cycle.

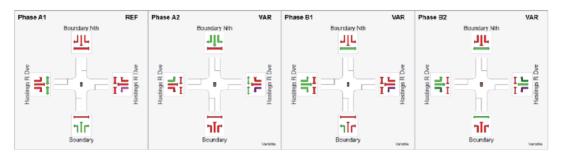


Fig 7.1 Assumed Signal Phasing

8. Assumptions in SIDRA Estimates - Comments

8.1 Saturation Flow and Peak Hour Factor

The estimates were undertaken using SIDRA 7.1 intersection analysis software with background assumptions based on Council's SIDRA Intersection User Guidelines (see attached) and TPS variations in order to demonstrate sensitivities to the assumptions. These key background assumptions were;

- Base saturation flow rate (ie. lane capacities)
- Peak hour factor (ie. variations in flow rates within the peak hour)

TPS views regarding the appropriate quantities to adopt for the above factors and other Council requirements described in the Council Guidelines are as follows.

Base Saturation Flow Rate

The Council Guidelines specify that a rate of 1800 tcu/hr should be used in SIDRA analysis. This compares with a default rate in SIDRA software of 1950 tcu/hr for an operating environment of the type which will prevail at the subject intersection.

Saturation flow rate is not a constant and varies from as low as 1300tcu/hr up to 2300tcu/hr. This has significant consequences for the practicality of model "calibration" as discussed later in this section.

The following factors affect saturation flow rates.

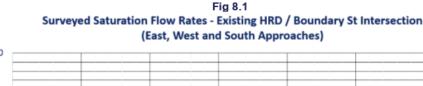
- The degree of intersection congestion Motorists travel at shorter headways when driving in more congested circumstances. That is, saturation flow rate increases over time as congestion increases.
- The extent of signalisation in the road network Saturation flow rates tend to be higher in networks where motorists are more familiar with driving in signalised road systems.
- The quality of the traffic environment Higher quality intersection layouts yield higher saturation flow rates. Wider lanes, the elimination of 'trap' lanes, short lanes and merge lanes and improved downstream lane arrangements all serve to increase saturation flow rates. For example, saturation flow rates in the Middle East are very high (2100 tcu/hr) due to very high quality and expansive intersection layouts.
- The length of cycle and phase times Very short and very long cycle and phase times tend to reduce saturation flow rates due to the effects of "start loss" and "stragglers". Generally, a cycle time of 120 seconds will maximise saturation flow rates provided phase times are relatively evenly distributed through the cycle.
- The quality of the vehicle fleet Saturation flow rates have increased significantly over recent decades as the quality of cars have improved. For example, smaller vehicles with automatic gear boxes have allow motorists to respond quicker to signals and accelerate more quickly and more smoothly. (Saturation flow rates in USA have historically been lower than Australia due to larger vehicles).

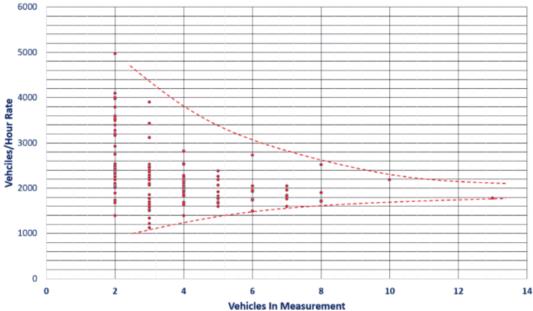
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In the past a saturation flow rate of 1800 tcu/hr was considered appropriate for most intersection assessments where an intersection was expected to be congested. In our view the higher SIDRA default rate of 1950tcu/hr is appropriate to use in the circumstances recognising that for Port Macquarie the probable changes in all the factors affecting saturation flow rates over the period to 2030 will have the effect to increase rates, including at the above intersection.

Surveys conducted by King & Campbell (under TPS direction) at the existing intersection reveal saturation flow rates which vary widely depending on the extent of queuing at the end of each red phase. The results from the surveys are shown in Fig 8.1. Whilst the surveys were limited in extent they provide evidence that current average saturation flow rates are at least 1800tcu/hr and are likely to increase in the period to 2030.

The "default" and other saturation flow rates which can be selected in the SIDRA software are based on experience and research. They are practical to achieve in certain operating environments for particular traffic engineering design qualities. TPS has little doubt that a base saturation flow rate of no less than 1950 tcu/hr is achievable and will apply to the subject intersection in 2030.





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Peak Hour Factor

The Council SIDRA Guidelines specify that a peak hour factor of 95% should be used in analysis. That is, an assumption that the average flow rate in the peak hour is 95% of the peak flow rate over say 15 minutes in the same hour. The effect of the peak hour factor in SIDRA is to simply multiply traffic volumes which are input to the model (eg. x 1/0.95=1.05) and so provide an estimate of the operating character of the intersection for a 15 minute period, rather than to provide an estimate averaged across an hour.

Surveys in 2015 have identified that the peak hour factor at the subject intersection was 97% in the morning peak hour and 91% in the afternoon peak hour.

Peak hour factor reduces as congestion increases due to the "spreading of peak" which arises from traffic volumes approaching or exceeding intersection capacities. For example, in congested metropolitan areas of major capital cities the peak hour factor tends towards 100% as peak periods extend to 2 hours and more.

In view of the extensive period before 2030 and the expectation that the subject intersection will be congested, it is appropriate to adopt a peak hour factor approaching 100%.

However, a degree of saturation of 90% is considered to be an acceptable maximum operating condition because at that rate the intersection is able to respond to random flow fluctuations which occur across a peak hour. For example, if there were hypothetically no fluctuations in the flow rate over the peak hour then the intersection could technically operate at or near a degree of saturation of 100% without extensive queueing.

Notwithstanding the likelihood that the peak hour factor in 2030 at the subject intersection will approach 100%, we accept that there may continue to be traffic demand fluctuations in the peak hour if the subject intersection continues to be isolated from other intersection signals which would otherwise have the effect to 'meter' traffic flows and destroy randomness. Consequently, we support the application of a 95% peak hour factor in the interests of being conservative.

Calibration of the SIDRA Model

The Council SIDRA Guidelines specify that the SIDRA model should be "calibrated" which is a process whereby background assumptions in SIDRA are adjusted in order to make the model replicate existing

intersection operations (eg. delays, queue lengths etc.). This "calibrated" model is then used as the basis for making estimates of future intersection operation. Saturation flow rate is one of the major variables used to "calibrate" the model.

TPS disagrees with a proposition that the SIDRA model should in this instance be "calibrated" because to do so would be to suggest that current operational characteristics such as saturation flow rates will be sustained into the long term future. It would also suggest that improvements in the engineering quality of the intersection are unable to be achieved. These situations will clearly not be the case

That is not to suggest that SIDRA "calibration" is never appropriate. For example, SIDRA should be calibrated when it is being used to test the effect of relatively modest changes in intersection layout and signal operations etc. in the short and medium term. That is, when changes in the factors described under the earlier heading of "base saturation flow rate" such as traffic demands, intersection layout and signal operations etc. are not so significant as to cause changes in motorist behaviour and vehicle performance.

Nearly all aspects of the driving and physical intersection environment will be varied significantly in order to provide for future traffic demands at the location. Each of the engineering changes will in fact be aimed at ensuring that the effect of intersection deficiencies which affect saturation flow rate will be minimised. Consequently, it would be misleading to base estimates of future intersection operation on a calibration of existing driver behaviours and intersection operation.

If the intersection operating capacities etc. contained in SIDRA were not possible to achieve then they would not be contained in the SIDRA model options. Accordingly, TPS has relied on the strong reputation of SIDRA software, industry and TPS experience which supports that SIDRA software has the ability to represent the operating character of signalised intersections under the combined effects of significantly changed traffic demands, intersection configuration and signal arrangements.

The range of base saturation rates and peak hour factors applied into the analyses described in this report provide a sound opportunity to assess the probable operation of the intersection under various development scenarios and gauge the sensitivity of intersection operations to various assumptions in the model. Also, a concern for the accuracy of the SIDRA model needs to be viewed in the context of the potential for gross inaccuracy arising from the inability to accurately predict the nature and extent of development in 2030.

9. Estimated Intersection Operations

SIDRA estimates of future intersection operations are shown in Tables 9.1 to 9.3 for various intersection arrangements and assumptions regarding base saturation flow and peak hour factor.

All estimates are for the existing road network. That is, in the absence of any future alternative access road such as a new road link to and from south of the airport precinct.

Intersection options shown in the Tables are described in the next page in Figs 9.1 ad 9.2.

Table 9.1
Estimated Intersection Operations - Existing Road Network/Council SIDRA Parameters (1800tcu, 95% PHF)

		Development		Intensification Deve		Development Total		Doggo	o of Cot	uration			Lau	ol of Cou	n sin n	
Year	Intersection Option	Extent	Peak Hour	vph	vph	Aditional vph	Degree of Saturation					Level of Service				
							N	S	E	W	Overall	N	S	E	W	Overall
2015	Existina	Existing	AM				0.16	0.34	0.35	0.35	0.35	D	E	В	В	С
2015	Existing	Existing	PM				0.13	0.71	0.75	0.44	0.75	Е	E	С	В	С
2030	GHD Layout	All	AM	250	965	1215	0.25	0.57	0.86	0.41	0.86	Е	D	D	В	С
2030	GHD Layout	All	PM	325	1076	1401	0.14			0.99	1.10	Е	F	F	Е	F
2030	Above + Modified	All	AM	250	965	1215	0.25	0.57	0.86	0.41	0.81	Е	D	С	В	С
2030	Sth App		PM	325	1076	1401	0.14	0.99		0.89	1.02	Е	E	E	D	E
2030	Above + Modified	All (70:30)	AM	250	965	1215										
2030	Sth App	All (70.30)	PM	325	1076	1401	0.13	0.94	0.96	0.78	0.96	Е	E	D	С	D
2030	Above + Modified	65%	AM	250	627	877										
2030	Sth App	05%	PM	325	699	1024	0.14	0.91	0.89	0.78	0.91	Е	E	D	С	D
2030	Above + Extended	All	AM	250	965	1215	0.25	0.52	0.82	0.38	0.82	Е	D	С	В	С
2030	Left in East App	All	PM	325	1076	1401	0.14	0.97	0.97	0.91	0.97	Е	E	D	D	E
2030	Above + Extended	75%	AM	250	724	974										
2030	Left in East App	13%	PM	325	807	1132	0.14	0.91	0.89	0.78	0.91	Е	Е	D	С	D

Table 9.2
Estimated Intersection Operations - Existing Road Network / 1950tcu, 95% PHF

Estillian	sumated intersection Operations - Existing Road Network / 1950lcu, 95% PHF															
Year	Intersection Option	Development Extent	Peak Hour	Intensification vph	Development vph	Total Aditional	Degree of Saturation						Leve	el of Ser	vice	
		Extent		vpn		vph	N	S	Е	W	Overall	N	S	Е	W	Overall
2015	Existing	Existing	AM				0.15	0.32	0.33	0.31	0.33	D	D	В	В	В
2013	Lasting	Lasting	PM				0.12	0.69	0.69	0.39	0.69	Е	E	В	В	С
2030	GHD Layout	All	AM	250	965	1215	0.23	0.53	0.83	0.38	0.83	E	D	В	В	С
2030	GHD Layout	All	PM	325	1076	1401	0.13			0.90	1.05	E	F	E	D	E
2030	Above + Modified Sth App	All	AM	250	965	1215	0.23	0.53	0.83	0.38	0.83	Е	D	В	В	С
2030		All	PM	325	1076	1401	0.13	0.94	0.96	0.78	0.96	E	E	D	С	D
2030	Above + Modified	All (70:30)	AM	250	965	1215										
2030	Sth App	All (70.30)	PM	325	1076	1401	0.13	0.93	0.93	0.72	0.93	Е	E	D	С	D
2030	Above + Modified	75%	AM	250	724	974										
2030	Sth App	15%	PM	325	807	1132	0.13	0.89	0.92	0.76	0.92	E	D	D	С	D
2030	Above + Extended	All	AM	250	965	1215	0.23	0.48	0.81	0.35	0.81	Е	D	В	В	С
2030	Left in East App	All	PM	325	1076	1401	0.13	0.91	0.90	0.81	0.91	E	D	D	D	D
2030	Above + Extended	85%	AM	250	821	1071										
2030	Left in East App	0376	PM	325	914	1239	0.13	0.84	0.83	0.76	0.84	E	D	С	С	D

Table 9.3
Estimated Intersection Operations - Existing Road Network / 1950tcu, 100% PHF

Louinnat	Samuelou intersection operations - Existing Road Network 7 1838/04, 1907/1111															
Year	Intersection Option	Development Extent	Peak Hour	Intensification De vph	Development vph	Total Aditional		Degree	e of Sat	uration			Leve	el of Ser	vice	
		LAGIR			VpII	vph	N	S	Е	W	Overall	N	S	Е	W	Overall
2015 Exist	Existing	Existina	AM				0.15	0.30	0.30	0.29	0.30	D	D	В	В	В
2015	Existing	Existing	PM				0.12	0.65	0.65	0.37	0.65	Е	Е	В	В	С
2030	CUD It	All	AM	250	965	1215	0.22	0.50	0.79	0.35	0.79	Е	D	В	В	С
2030	GHD Layout	All	PM	325	1076	1401	0.12			0.81	1.01	Е	F	Е	D	F
2030	Above + Modified	All	AM	250	965	1215	0.22	0.50	0.79	0.35	0.79	Е	F	Е	D	F
2030	Sth App	All	PM	325	1076	1401	0.12	0.88	0.90	0.72	0.90	Е	D	D	С	D
2030	Above + Extended	All	AM	250	965	1215	0.22	0.45	0.76	0.33	0.76	Е	D	В	В	С
2030	Left in East App	All	PM	325	1076	1401	0.12	0.86	0.81	0.74	0.86	Е	D	С	С	D

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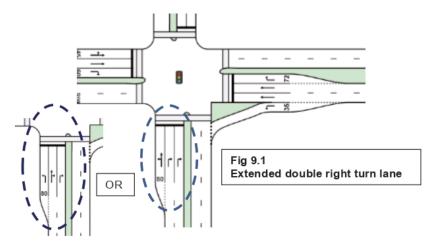
The estimates shown in Tables 9.1 to 9.3 are associated with the following three intersection options.

GHD Intersection Layout

As shown in Fig 1.1.

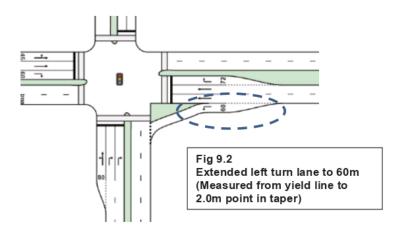
Above + Modified South Approach

The GHD intersection layout plus a change in the lane arrangement in the south approach to provide two extended right turn lanes as shown below. No additional land acquisition would be required.



Above + Extended Left in East Approach

The GHD intersection layout plus the above described change in the southern lane configuration plus an extension of the left turn lane in the eastern approach.



The estimates shown in Tables 9.1 to 9.3 indicate the following primary findings. These findings are based on maintaining movement degrees of saturation at or about 90%.

- The GHD intersection layout is not capable of servicing all the anticipated development in the area served by Boundary Street even under the more favourable set of intersection operating assumptions.
- Provided the GHD intersection layout includes the provision of two extended right turn lanes in the south approach as shown in Fig 9.1, the intersection would be capable of providing for 65% and 75% of overall Business Park development based on base saturation rates of 1800tcu/hr and 1950tcu/hr respectively together with an assumed 95% peak hour factor.
- If the assumed distribution of development traffic to and from the east at Hastings River Drive
 was to be 70% rather than 80%, then 2030 intersection capacity would effectively improve by
 approximately 3%.
- Based on a base flow saturation rate of 1950 tcu/hr and peak hour factors of 95% and 100%, the intersection would operate at or about a degree of saturation of 90% with all development provided that the southern and eastern approach were to be as shown in Fig 9.2. However, under the less conservative peak hour factor of 100% the subject intersection would not necessarily require the extension of the east approach left turn lane as shown in Fig 9.2, albeit that it would be desirable.
- If an operating level of service limit of Level C was to be required for the intersection, overall
 Business Park development would need to be restricted to approximately 75% of anticipated
 maximum development based on a base saturation flow rate of 1800 tcu/hr and peak hour
 factor of 95%. This increases to approximately 85% or slightly more of anticipated maximum
 development if a base saturation rate of 1950 tcu/hr is applied into the assessment.

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10. Comments, Conclusions & Recommendations

- 1. Estimates undertaken by TPS indicate that the GHD Intersection would function better if the lane arrangements in the south approach were to be as shown in Fig 9.1. The modified lane arrangement would contribute approximately an additional 5% of intersection capacity. The lane modification would only require a change in lane markings relative to those shown in the GHD Intersection provided to TPS by Council. Consequently, the following conclusions are based on the modified lane arrangements in the south approach as shown in Fig 9.1.
- TPS has investigated intersection operations under a range of development intensities and technical assumptions. The following findings are based on technical assumptions proposed by Council officers and on an alternative set of assumptions preferred by TPS.
- 3. Whilst TPS agrees with Council officers that a Level of Service C limit is a desirable objective in intersection operation, TPS holds the view that the estimated degree of saturation (ie. volume to capacity ratio) is a far better measure of future intersection conditions. For example, as is evident for some movement shown in Tables 9.1 to 9.3, a movement can have a very low volume to capacity ratio whilst having a very low Level of Service due to the combined effects of a long cycle time and very short phase time. Whilst Tables 9.1 to 9.3 show estimated degrees of saturation and Levels of Service, the following conclusions are based solely on an objective to maintain the degree of saturation for intersection movements at or near 90%.
- 4. Base Saturation Flow Rate 1800 tcu/hr and Peak Hour Factor 95% as proposed by Council
 - a) The GHD Intersection will only be capable of providing for approximately 65% of overall Business Park development in 2030, or approximately an additional 13,000 vehs/day. That is, assuming that existing development served by Boundary Street expands to such an extent by 2030 as to double current development traffic generation.
 - b) However, if the left turn lane in the east approach is extended from 35m to 60m as shown in Fig 9.2, the intersection will be capable of providing for up to 75% of overall Business Park development in 2030, or 15,000 vehs/day of Business Park traffic.
- 5. Base Saturation Flow Rate 1950 tcu/hr and Peak Hour Factor 95% as preferred by TPS
 - a) The GHD Intersection will be capable of providing for approximately 75% of overall Business Park development in 2030, or approximately an additional 15,000 vehs/day. That is, assuming that existing development served by Boundary Street expands to such an extent by 2030 as to double current development traffic generation.
 - b) However, if the left turn lane in the east approach is extended from 35m to 60m as shown in Fig 9.2, the intersection will be capable of providing for all Business Park development traffic in 2030, or 20,000 vehs/day of Business Park traffic.

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- 6. Based on all the assessments shown summarised in Tables 9.1 to 9.3, TPS concludes that the only intersection configuration which will provide a reasonable probability of providing for all Business Park development is one which includes two extended right turn lanes in the south approach and an extended left turn lane in the east approach as shown in Figs 9.1 and 9.2.
- 7. In the event that the above lane arrangement can be achieved within the GHD Intersection concept then TPS is of the view that Business Park development of the extent and type represented in Tables 2.1 and 3.1 of this report can be incorporated into the road network before 2030.

Glen Holdsworth Specialist Transport / Traffic / Parking Engineer Ref : TPS31RFI6

TTM Reference: 15SYD264

Location: Boundary St & Hastings River Dr

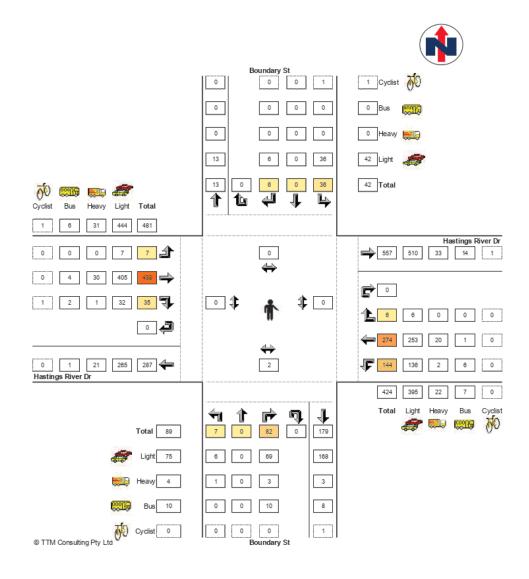
Suburb: Port Macquarie

Date: Thursday, 15 October 2015

AM Peak: 0800-0900 Weather: Fine



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TTM Reference: 15SYD264

Location: Boundary St & Hastings River Dr

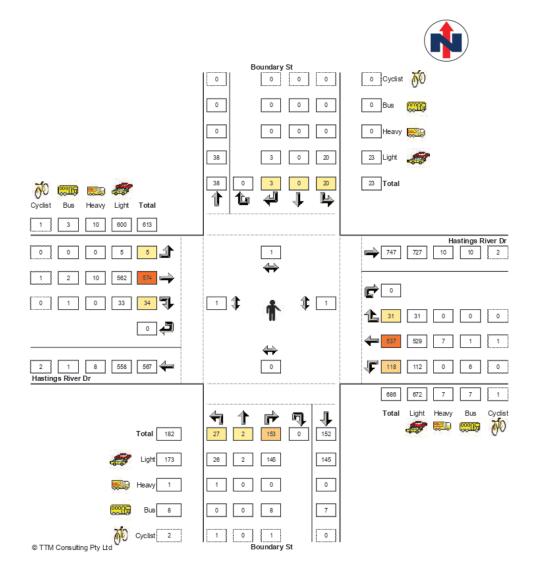
Suburb: Port Macquarie

Date: Thursday, 15 October 2015

PM Peak: 1615-1715 Weather: Fine



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Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 9 - SLR Peer Review 2017

PP2015 - 3.1 5/7/2019



Port Macquarie Airport Business Precinct

Traffic Engineering Analysis and Peer Review

Report Number 620.11821-R01

27 April 2017

King & Campbell Pty Ltd

PO Box 243

PORT MACQUARIE NSW 2444

Version: v2.0

Report Number 620.11821-R01 27 April 2017 Version v2.0 Page 2

Port Macquarie Airport Business Precinct Traffic Engineering Analysis and Peer Review

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This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Reference	Date	Prepared	Checked	Authorised
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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by King & Campbell Pty Ltd to undertake a traffic engineering analysis and peer review of the TPS Group (TPS) and Port Macquarie Hastings Council (Council) traffic analysis and reporting prepared in relation to the Planning Proposal for the proposed Port Macquarie Airport Business Park.

- 1. Port Macquarie Airport Business Park Development TPS Group dated 27 June 2016
- Proposed Airport Business Park Traffic Study TPS Rep 27/6/2016 Port Macquarie Hastings Council dated 7 September 2016.

Both documents primarily relate to the future Hastings River Road / Boundary Street signalised intersection and its projected peak hour traffic operation subsequent to development of land for a Business Park use.

The TPS reporting makes certain assumptions in relation to traffic analysis that is then evaluated to determine the projected yield of Airport development that can be facilitated by an upgraded form of the subject intersection. The Council report raises queries in relation to a number of the TPS assumptions and suggests that the adoption of Council preferred analysis values, which in turn would facilitate less development without the provision of a second route.

The purpose of this peer review is to provide a third party review, analysis, and comment with respect to the two existing bodies of analysis and the adopted/recommended assumptions.

It is understood that the peer review will inform ongoing discussions regarding the rezoning of the proposed Airport Business Park. The subject assumptions are introduced and discussed in the following sections of this advice.

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2 DISPUTED ASSUMPTIONS

2.1 Summary

Based on the assessment prepared by TPS and the review undertaken by Council, the disputed analysis assumptions can be summarised as follows:

- Calibration requirement
- · Peak Flow Factor period
- Pedestrian crossings
- Basic Saturation Flow
- Cycle Time
- Performance criteria
- Land Use Scenario

The disputed assumptions are discussed individually in Sections 2.1 - 2.9, while the potential cumulative impact of each of the disputed assumptions is discussed in Section 2.10.

2.2 Calibration

The Council reporting suggests that calibration of the base year SIDRA model is warranted in accordance with the Council SIDRA Guidelines.

SLR is of the view that, in this instance, calibration of the base SIDRA model is not required. SIDRA calibration is primarily necessary when the program is being used to determine current or near current intersection performance or to evaluate minor alterations that would impact performance, i.e. phasing and/or minor layout revisions.

The purpose of the analysis prepared by TPS is to determine the long-term traffic capacity, and hence the permissible development yield threshold at the 2030 time horizon. The adoption of modified assumptions determined through a calibration of existing performance would have no merit in the assessment of performance at the 2030 horizon based on consideration of the following:

- Upgraded intersection layout that will improve any existing design deficiencies which may currently reduce or affect performance, i.e. constrained geometry and visibility
- Changes in Basic Saturation Flow that are projected in accordance with the discussion made in Section 2.5
- Advanced vehicle technology and improved driver behaviour that allows for less start loss and a higher saturation flow rate.

The SIDRA Intersection 7.0 User Guide itself suggests that all input parameters related to intersection geometry and driver behaviour are important for calibrating the traffic model to represent *particular* intersection and network conditions.

SLR accepts the engineering statements made within the TPS reporting which suggest the SIDRA calibration may be appropriate for other intersections and/or scenarios, such as more modest changes to intersection layout or phasing arrangement.

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2.3 Peak Flow Factor and Period

TPS adopted a peak flow factor (PFF) of 0.95 for both peak hour assessment periods consistent with the requirements of the Council SIDRA Guidelines. The TPS reporting also notes that the adoption of a PFF of 1.00 may be appropriate when determining the threshold traffic performance at a longer-term planning horizon. SLR generally accepts this view, but suggests that 0.95 should be retained as a factor of safety.

TPS adopted a 15 minute Peak Flow Period (PFP). Council specifies a 30 minute (PFP).

SLR suggests that the adoption of either PFP parameter may be appropriate in certain conditions depending on the PFF. SIDRA specifies a 30 minute PFP while the highly regarded Highway Capacity Manual prepared by the Transportation Research Board specifies 15 minutes.

A review of the SIDRA models was undertaken to determine the effect of the PFP value. The preliminary results indicate that there was no difference in the reported Degree of Saturation measure between the two time periods. Delays and queues did increase when adopting the 30 minutes input value.

In the absence of any specific reason to alter the SIDRA input defaults, SLR generally adopts a 30 minute PFP; however, a review of SIDRA outputs suggests that the difference is minimal and not material to the evaluation of the development yield outcome when Degree of Saturation is adopted at the performance measure.

2.4 Pedestrian Crossings

TPS adopted a two-staged pedestrian crossing on the Hastings River Drive legs of the intersection. Council has stated the view that two-stage crossings are not appropriate based on safety grounds and the undesirability of having pedestrians waiting in the centre of the road.

The future intersection configuration will see three lanes in either direction on Hastings River Road at the intersection. This represents a significant crossing distance for pedestrians to navigate in one movement.

SLR is of the view that staged pedestrian crossings are appropriate in instances where traffic capacity and level of service needs to be prioritised over pedestrian movement. The Council ascertain that they "should only be an additional on ground provision to cater for those of low mobility who require far greater time periods to negotiate the crossing" is not explicitly shared by SLR. Whilst staged crossings are an appropriate solution in providing for low mobility users, this is not the only scenario where such a facility may be considered reasonable.

In this particular instance, pedestrian demands were surveyed as being between 2-4 movements during the AM and PM peak hours respectively. Accordingly, the implementation of a staged crossing is not viewed as impacting on a significant number of active travel users.

Furthermore, staged crossings need not be less safe when compared to a single stage crossing. The design of the facility should ensure that there is sufficient width for pedestrians and cyclists to store clear of traffic.

SLR suggests that the two staged crossing could be considered appropriate in this instance based on the limited impact on pedestrian users and the moderate-high benefit to traffic capacity.

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2.5 Basic Saturation Flow

The basic saturation flow rate is an indication of the potential capacity of a road segment or intersection when operating under ideal conditions.

The TPS assessment considered a saturation flow rate of 1,950tcu/hour whereas the Council SIDRA Guideline specifies 1,800tcu/hour. Council's advice refers to Table 5.4.2 of the SIDRA User Guide which is reproduced for reference as Table 1.

SLR supports the TPS adoption of the 1,950tcu/hour basic saturation flow input variable.

Table 1 SIDRA INTERSECTION Basic Saturation Flows

Environment		Basic saturation fl	ow, s _b (tcu/h)
class (area type)	Definition	Standard Left, Standard Right, New Zealand, New South Wales Software Setups	US HCM (Customary and Metric) Software Setups
1 (Ideal)	Near ideal conditions for free movement of vehicles on both approach and exit sides indicated by good intersection geometry, long distances to upstream and downstream intersections, good visibility, small numbers of pedestrians, and little interference due to loading and unloading of goods vehicles, buses or parking turnover.	1950	1900
2 (Average to Poor)	Average to poor conditions indicated by adequate to poor intersection geometry, usually closely-spaced intersection environment, possibly poor visibility, moderate to large numbers of pedestrians, and interference from standing vehicles, loading and unloading of goods vehicles, buses, parking turnover, and vehicles entering and leaving premises.	1800	1750

Source: SIDRA INTERSECTION 7 User Guide

The SIDRA specification suggests that a saturation flow rate of 1,800tcu/hour is appropriate in average to poor conditions characterised by:

- · Adequate to poor intersection geometry
- Usually closely-spaced intersections
- Possibly poor visibility
- · Moderate to large numbers of pedestrians; and
- Interference from standing vehicles, loading and unloading of goods vehicles, buses, parking tumover, and vehicles entering and leaving premises.

Whilst the existing intersection geometry results in a small deflection for through movements on Hastings River Road, it still allows for good visibility and would not result in a reduction of vehicle speeds through the intersection.

SLR suggests that many of these other poor features are also not present at the subject intersection. Accordingly, it is reasonable to assume that the intersection would facilitate a basic saturation flow that tended towards the 1,950 tcu/hour figure.

Furthermore, the proposed upgrading of the current intersection formation is likely to improve intersection geometry and visibility such that a higher saturation flow rate could be realised.

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The Highway Capacity Manual (Transportation Research Board, 2000 & 2010) both prescribe an ideal saturation flow rate of 1,900 vehicles per hour per lane.

The SIDRA user guide provides additional commentary with respect to saturation flow rates, being:

The SIDRA INTERSECTION standard values of the basic saturation flow given in the above table (1950 and 1800 tcu/h) are based on work by Cuddon (1994). More recent research (Akçelik, Besley and Roper 1999, Akçelik and Besley 2002) indicated that higher saturation flows can be achieved at urban intersections, and on the basis of this research, basic saturation flows of 2100 and 1900 tcu/h may be appropriate for environment classes 1 and 2, respectively (higher saturation flows were observed at individual sites).

The Cuddon (1994) research referred to above as part of the SIDRA user guide incorporates the following table which documents the updated saturation flow rate values based on current research. Specifically, reference is made to the Good environment class where the suggested saturation flow increased from 1,850 to 1,950tcu/hr. Of equal importance was the inclusion of a new environmental class Very Good which indicates that saturation flows can exceed 2,000tcu/h in certain instances.

Table 2 Cuddon (1994) New Basic Saturation Flows

Environment Class	General Conditions	SIDRA Basic Saturation Flow (tcu/h)	New Basic Saturation Flow (tcu/h)	Increase (%)
5	Very Good	2000	2150	7.5
1	Good	1850	1950	5.4
2	Average	1700	1775	4.4
3*	Poor	1580	1625	2.8
4*	Very Poor	1440	1460	1.4

^{*} Values for environment classes 3 and 4 were extrapolated from the other values.

Cuddon (1994) documents the following commentary with respect to the Table 8 results:

The increase in basix saturation flow may be attributed to improvements in vehicle performance and changes in driver behaviour caused by refinements in intersection design and lane layout practice. The effects of these alterations are more substantial at larger intersections where design standards have changed markedely since the late 1960's, At smaller intersections, space limitations have not enabled substantial improvements in intersection geometry so the increases in basic saturation flow are smaller

The adoption of the 1,950tcu/hour basic saturation flow rate is considered reasonable and fit-forpurposes in this instance based on consideration of the material presented above in addition to the following:

- The purpose of the analysis is to evaluate the future operation of the intersection at a 2030 planning horizon and accordingly, an input capacity assumption that is representative of threshold performance is reasonable
- That given the 2030 horizon, it is reasonable to assume that the road network perforamnce will be
 different, i.e. generally more congested, and that driver behaviour will be consistent with that
 expected of such congested networks, i.e. motorists travelling with shorter headways resulting in
 a higher saturation flow
- That the extent of signalisation in the road network will be higher and accordingly, user behaviour will be more familiar with negotiating signalised systems
- That the upgraded intersetion formation will provide improvements to the geometry and visibility compared to the current situation
- That the vehicle fleet will have continued to improve and that higher saturation flows will be
 possible without impacting on safety given improvements in vehicle breaking and acceleration.

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2.6 Cycle Time

The TPS assessment adopted a cycle time of 120 seconds for the assessment of traffic operations at the 2030 time horizon. Council reporting suggests that the current 50-60 second cycle time should be retained at the 2030 horizon.

SLR suggests that a 120 second cycle time is a reasonable assumption with respect to assessing the 2030 traffic operations.

Longer cycle and phase times are typical of urban road networks and intersections. Longer intersection timings improve traffic capacity through a reduction in the proportion time that is lost to red signals, stop/start lag, and also improvements in route progression and co-ordination which is possible with longer phase times.

2.7 Performance Criteria

The TPS reporting adopts the Degree of Saturation (DOS) output measure for the evaluation of the SIDRA analysis results. Council suggests that Level of Service (LOS) should instead be adopted and that LOS C should not be exceeded.

The NSW RMS LOS method is based on delay whilst DOS is the ratio of demand to capacity.

SLR notes that both measures are important when evaluating the performance of intersection operations. It is suggested that LOS C is an unreasonable threshold to be adopted for assessment of long-term intersection capacity thresholds in this instance. LOS D is typical of urban road networks and intersections during the critical commuter AM and PM peak periods.

2.8 Land Use Scenario

The NSW RMS guideline states that Business Park developments typically include elements of industrial, manufacture, research, warehousing, office space, retail, commercial, refreshment and recreational activity.

The TPS report is based on the estimates of future development floor areas provided by King & Campbell. The attached Port Macquarie Regional Airport Business Park Land Use Scenario plan provides details of the estimated footprints of future potential office premises, factory, warehouse and retail/mixed uses within the proposed business park. In that regard, and noting that the Traffic Assessment is being undertaken at the Rezoning Stage, the TPS report has considered the specific land uses that form part of the hypothetical development of the business park.

SLR understands that the nature of the Development Application is such that the specific component land uses and yields that can be developed on specific sites within the Business Park are not defined. Accordingly, development may proceed as long as the individual site use accords with the permissible land uses that are prescribed as forming part of a Business Park.

The adoption of a single definitive land use mix/scenario would therefore only be an approximation of one possible land use outcome, much like the adoption of Business Park is an approximation. Individual development sites will be tenanted based on market forces and the land use mix/scenario will vary over time.

SLR is of the view that the adoption of a consolidated land use definition is appropriate in the situation of Business Park given the inherent variability in land use scenarios that can eventuate depending on market forces. The use of a single land use, and hence, a single generation rate can be considered a reasonable approach subject to the adoption of a representative traffic generation characteristics.

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The adoption of individual land uses could result in an overestimation of the development trips as this would not factor in the possible reduction in vehicle trips that would likely result between the component land uses when they form part of a larger Business Park type precinct including internal trips and trip chaining.

2.9 Future Trip Generation

TPS adopted a traffic generation rate of 0.7 trips per 100m² GFA in the AM peak and 0.78 trips per 100m² GFA in the PM peak in accordance with the average regional rate identified in the NSW Government RMS Guide to Traffic Generating Developments.

SLR considers this to be an appropriate traffic generation rate for the unknown make up of a Business Park.

In addition to the trips generated by the proposed business park, the TPS assessment included provision for a doubling of the existing traffic currently generated by the existing Airport, Newman College, sports facilities and other existing development by 2030.

SLR considers that doubling the traffic associated with the existing uses provides a conservative assessment of the future trip generation of these land uses.

2.10 Cumulative Impacts of Disputed Assumptions

Whilst it is understood there is concern over the cumulative effects of assumptions used in the modelling, to simply adopt a mix of best and worst case assumptions would be poor practice and would not result in an assessment that reflects the likely future scenario.

This peer review has considered the most appropriate assumptions for the proposed rezoning. The use of alternate assumptions may result in an over-engineered solution. Given that this application is only for rezoning of the subject land, at the time of future Development Applications, it may be appropriate to give further consideration to the ultimate land uses, and basic saturation flows and peak flow factors being experienced at the Hastings River Road / Boundary Street intersection.

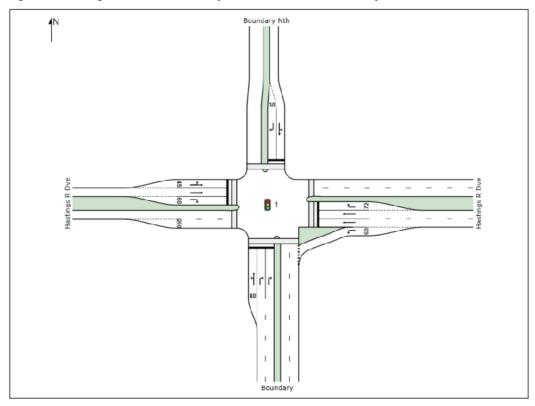
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3 TRAFFIC OPERATIONAL ASSESSMENT

3.1 Intersection Layout

The SLR intersection layout considered in the assessment is based on the TPS layout with extension of the left turn slip lane from Hastings River Drive (east) into Boundary Street (south) and changes to the movement designation on the Boundary Street (south) approach. The layout is reproduced in Figure 1 for reference.

Figure 1 Hastings River Road / Boundary Street Intersection – SIDRA Layout



3.2 Results

The TPS results for the 2030 assessment are reported in Table 7 when considering a Business Park land use definition, 1,950tcu/hour basic saturation flow, and a PFF of 100%.

Table 3 TPS Baseline SIDRA Assessment Results

	AM Peak	PM Peak
Degree of Saturation	0.76	0.86
95 th %ile Queue	110.5m	231.4m
Average Delay	23.6 sec	38.2 sec
LOS	С	D

For comparative purposes the subject intersection was assessed for the same land use scenario with the alternate basic saturation flow of 1,800tcu/hour and PFF of 95% to determine the cumulative impacts of a worse case. The SIDRA results are reported in Table 8.

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Table 4 SIDRA Assessment Results – Alternate Assumptions

	AM Peak	PM Peak
Degree of Saturation	0.82	0.97
95 th %ile Queue	146.3m	306.2m
Average Delay	24.4 sec	55.8 sec
LOS	С	E

The Table 8 results indicate that the subject intersection cannot accommodate full development of the site area based on the alternate basic saturation flow and PFF assumptions. However, given that these values are based on a scenario that is unlikely to eventuate it is considered inappropriate to adopt them for the purpose of determine the future infrastructure required to support 100% development.

There are several factors that are more likely to eventuate and permit the full 100% development at 2030. These are as follows:

- Increased saturation flow rate up to 2,100tcu/hour which may eventuate on some turning lanes and is typical of some urban intersections with good geometry and aggressive driver behaviour
- · Improvements to intersection phasing arrangements
- Refined land uses such that the ultimate trip generation is not realised or is based on a more
 detailed consideration of a possible reduction in external trips compared to the simple sum of the
 component land uses.

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4 SUMMARY

SLR Consulting Australia Pty Ltd has been commissioned by King & Campbell Pty Ltd to undertake a traffic engineering analysis and peer review of the TPS Group and Port Macquarie Hastings Council traffic analysis and reporting prepared in relation to the Planning Proposal for the proposed Port Macquarie Airport Business Park.

The purpose of this peer review is to provide third party analysis and comment on the assumptions in dispute between both reports. It is understood that the peer review will inform ongoing discussions regarding the redevelopment of the Airport land.

A review of the disputed assumptions has found the following:

- Calibration of the baseline model is not required based on the assessment being for a 2030 planning horizon by which time current calibration measures would have little material significance
- Either a 30 minute or 15 min peak flow factor period is appropriate and the adoption of either does not affect the primary SIDRA output performance parameter being Degree of Saturation
- A two-stage pedestrian crossing on the Hastings River Drive legs of the intersection could be
 considered appropriate in this instance given the relative priority of vehicle capacity over
 pedestrian level of service. The safety of a two stage crossing would be subject to the
 achievability of appropriate centre median storage areas for pedestrians and also associated
 infrastructure including fencing etc if/as necessary
- A basic saturation flow rate of 1,950 tcu/hour is more likely to represent the future operating conditions. The 1,950 value is reasonable and itself is specified by SIDRA as a default. Lower values are noted as being appropriate only where there are limitations that may include parking, loading, high pedestrian volumes and closely spaces intersection; none of which are present at the subject intersection location
- A cycle time of 120 seconds is appropriate for the assessment of traffic operations at the longerterm 2030 horizon. Cycle lengths approximating this duration are typical or urban environments and constrained road networks as would be projected at 2030
- The TPS adoption of a single Business Park land use definition and the associated NSW RMS traffic generation rate is considered a reasonable approach
- Doubling of the traffic associated with the existing uses provides a conservative assessment of the future background trip generation

This peer review has considered the most appropriate assumptions for the proposed rezoning. The adoption of a mix of best and worst case assumptions would be poor practice and would not result in an assessment that reflects the likely future scenario.

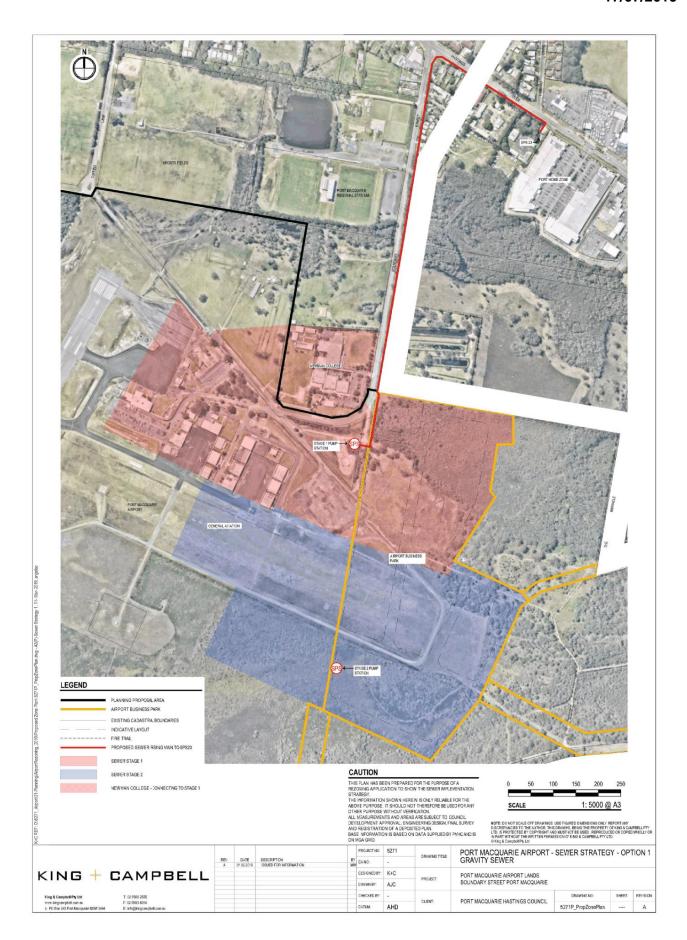
Whilst the cumulative impacts of alternate assumptions would result in a different outcome, this approach is considered inappropriate given that these values are based on a scenario that is unlikely to eventuate.

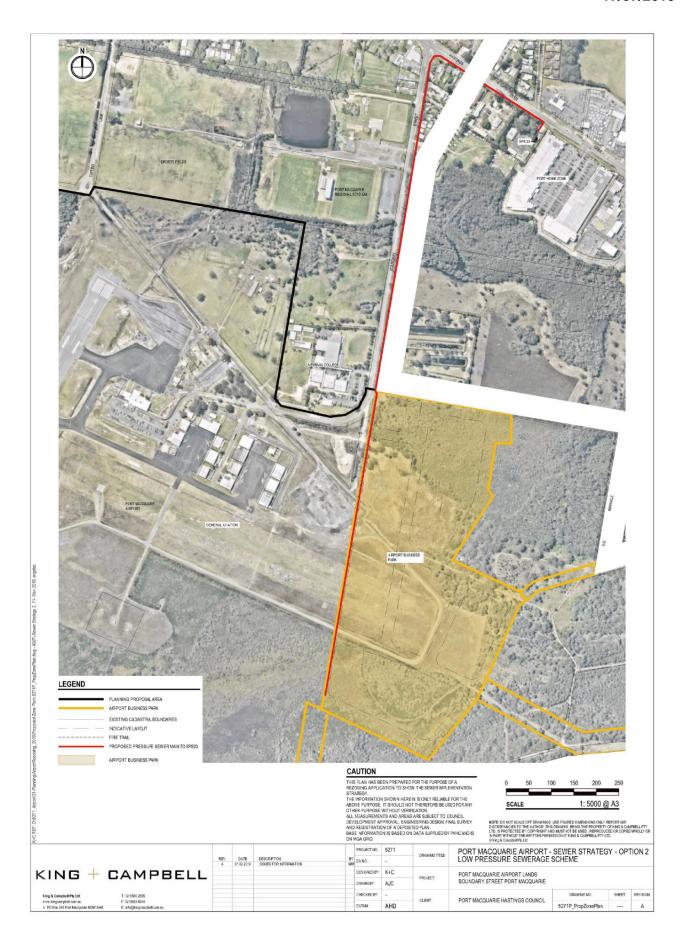
SLR agrees with the TPS conclusion that the full business park development can be incorporated at 2030 in the event that the presented lane arrangement can be accommodated within the GHD concept.

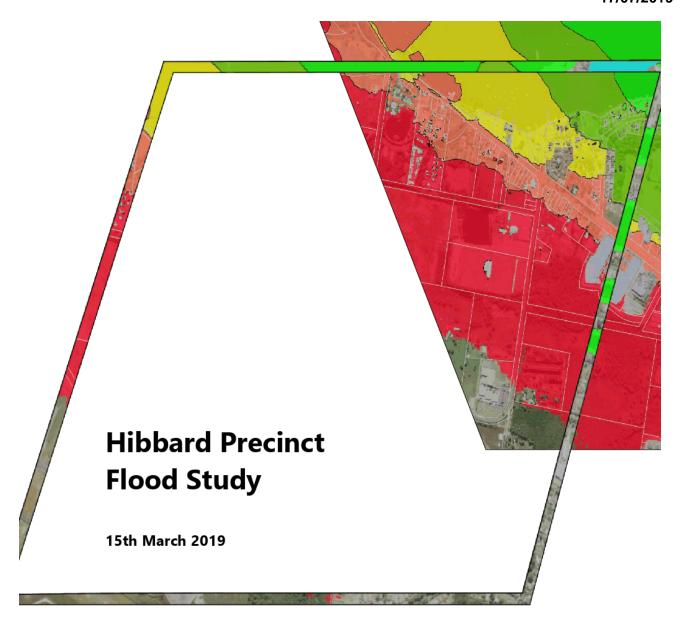
Planning Proposal - Airport Business Park under sec 3.33 of the EP&A Act 1979

Attachment 10 - Concept Sewerage Strategies

PP2015 - 3.1 5/7/2019







Level 17, 141 Walker St North Sydney NSW 2060 Australia

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Hibbard Precinct Flood Study

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Project: HIBBARD PRECINCT FLOOD STUDY

Rev	Description	Author	Reviewer	Advisian Approval	Date
A	Draft Report (Issued for Client Review)	RG	CRT	Chris Thomas	20/02/2019
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Revision B



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1 INTRODUCTION

The Hastings River Flood Study was published in 2006 and was based on flood modelling that was developed over the preceding 5 years. The study was developed from topographic and hydrographic survey data that was current at that time. The Flood Study (2006) included modelling results for the design 5%, 2%, 1% and 0.5% Annual Exceedance Probability (AEP) floods and for the Probable Maximum Flood (PMF), as well as mapping of provisional flood hazard and hydraulic categories.

The Hastings Floodplain Risk Management Study (2012) (FRMS) and the Hastings Floodplain Risk Management Plan (2014) (FRMP) examined a range of options for managing, mitigating and/or reducing the existing flood risk that the community of the lower Hastings Valley can be exposed to. This included consideration and modelling of structural measures such as levees, changes to planning controls and the preparation of emergency response community data sheets.

The FRMS (2012) also included a detailed review of the provisional floodway areas that were determined as part of the Flood Study (2006). This involved a detailed assessment of flooding patterns across floodplain areas to identify areas of significant flow followed by encroachment and blockage modelling to confirm and/or refine the extent of the floodway areas.

An updated flood study for the Lower Hastings River was published in September 2018. The *Hastings River Flood Study Update (2018)* presents updated flood characteristics for the region that have been derived from updated modelling that incorporates the physical changes to the floodplain that have occurred since 2006. The most notable of these changes include the upgrade to the Oxley Highway and construction of the new Pacific Highway between the Oxley Highway and Telegraph Point.

In addition to these topographic changes, the updated modelling included modifications to selected model parameters and an overall refinement of the RMA-2 model network to better utilise the processing and modelling capabilities of present-day computers and the RMA-2 modelling software.

The Updated Flood Study (2018) includes modelling results for the 1% AEP flood and a range of climate change scenarios. The climate change modelling considered various climate change scenarios which were identified in the 2012 and 2014 studies to provide Council with an understanding of the potential future changes to flood characteristics along the Hastings River downstream of the Bains Bridge crossing near Beechwood, as well as along the Wilson and Maria Rivers which drain the northern section of the valley.

The climate change scenario which has been relied upon for this study is based on a present day 1% AEP catchment flood event with a 900 mm provision for Sea Level Rise (*SLR*) and a 10% increase in rainfall intensity and volume due to predicted changes in emissions to the year 2100.

Following completion of the *Updated Hastings River Flood Study (2018)*, Council commissioned Advisian to undertake detailed flood modelling and investigations for the Hibbard Precinct for the purpose of better defining the floodway between Fernbank Creek and the Hibbard Precinct.



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The 2012 FRMS documented the provisional extent of this floodway and highlighted the need for it to be assessed at a local scale due to the existing development within or nearby to the floodway extent. The Implementation Plan included within the 2014 FRMP listed confirmation of the Hibbard Floodway extent as a priority item for Council's Floodplain Management Committee.

The primary goal of the Hibbard Precinct Flood Study is to define the extent of the floodway at a local scale, which will then be used to undertake a detailed investigation to assess options for maintaining the floodway into the future and for mitigating impacts associated with its adoption on affected landowners. The detailed investigation of the selected option(s) will form a future stage of this project.

Accordingly, the existing two-dimensional RMA-2 flood model (*last modified for the Hastings River Flood Study Update*) was further refined to incorporate additional topographic detail and physical features across the Hibbard Precinct. The upgraded flood model was used to confirm the importance of the floodway and to assess options for maintaining the flood function of this area of the floodplain. This report documents the findings from these investigations.



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2 DESCRIPTION OF THE HIBBARD PRECINCT

2.1 Study Area

The Hibbard Precinct is situated along the southern floodplain of the Hastings River approximately four (4) kilometres west of the central business district (CBD) of Port Macquarie. As shown in **Figure 2.1**, Hibbard is located approximately 2.1 kilometres south-east of the Maria and Hastings River confluence and approximately 6.5 river kilometres west of the river entrance.

As shown in **Figure 2.2**, the Hibbard Precinct primarily consists of a mixture of residential and commercial properties the majority of which are located along Hastings River Drive, Boundary Street and Hibbard Drive. Many of the commercial properties are caravan parks or hotel/motel accommodation reflecting the strength of the local tourism market. The Precinct also includes several large areas of open space, sporting fields, creeks and wetlands. As shown in **Figure 2.2**, Port-Macquarie Regional Airport is located immediately south of the Precinct.

2.2 Topography

The topography across the Hibbard Precinct generally ranges between 1.0 and 4.0 mAHD. Between the Hastings River in the north and the Port Macquarie Airport in the south, the floodplain is generally flat with very little overall change in elevation. The topography does increase near the Port Macquarie Airport which is typically at or above 6.0 mAHD(refer Figure 2.3).

The lowest elevations throughout the Hibbard Precinct occur within the creek channels and waterbodies (*lake and wetlands*). The topographic mapping shown in **Figure 2.3** does not reliably represent the elevation in the vicinity of these waterbodies as the topographic data has been derived using Light Detection and Ranging (LiDAR) survey techniques. LiDAR techniques are not able to penetrate water surfaces. Accordingly, the elevations shown in **Figure 2.3** are likely to represent the water surface at the time of data capture.

Locations of higher terrain, such as areas with topographic elevation above 3.0 mAHD, are generally limited to areas of development across which a fill mound had been constructed. This includes the Ultiqa Village Resort and the Riverside Residential Village, both of which are located to the west of Hibbard, the Port Home Zone and commercial lots near the centre and the residences to the east (refer Figure 2.3).



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3 REVIEW OF AVAILABLE DATA

3.1 Topographic Data

3.1.1 Aerial Laser Survey (ALS) and Light Detection and Ranging (LiDAR) Survey

The RMA-2 model that was originally developed as part of the *Hastings River Flood Study* (2006) and used extensively for flood investigations up to and including the *Updated Hastings River Flood Study* (Exhibition Draft, 2018) was developed based on Aerial Laser Survey (ALS) that covered the entire Port Macquarie-Hastings Local Government Area. The ALS data was obtained in September 2005 and comprises spot elevations across all terrestrial sections of the lower Hastings River floodplain at an average spacing of 1.4 metres. The data is understood to have been verified to a vertical and horizontal accuracy of 0.2 metres and 0.75 metres, respectively.

Further validation of the ALS data was undertaken by comparison against 1,970 test points gathered by traditional survey methods. The mean difference between ALS and field survey was found to be 0.03 metres with a standard deviation of 0.07 metres.

As part of the Hibbard Precinct Flood Study, Port Macquarie-Hastings Council provided Light Detection and Ranging (*LiDAR*) survey for the study area and it's surrounds. The metadata provided with the LiDAR survey indicates a collection date for the survey of May 2012 and vertical and horizontal accuracies of 0.3 metres and 0.8 metres, respectively.

The extent of 2012 LiDAR data made available for use in updating the RMA-2 flood model is shown in **Figure 3.1**.

A comparison of topographic elevations between the 2012 LiDAR and 2005 ALS survey is provided in **Appendix A** in **Figures A1** to **A4**. **Figures A1** and **A3** provide a comparison of topographic elevations based on an adopted low range of values of +/- 0.5 metres at intervals of 0.05 metres. **Figures A2** and **A4** provide a comparison of topographic elevations based on a high range of values of +/- 2 metres at intervals of 0.2 metres.

Figures A1 to **A4** generally indicate that changes to topographic elevations are sporadic between the two data-sets with neither clearly being higher or lower across the wider floodplain and across the Hibbard Precinct. Several locations of significant change in floodplain elevations align with known locations of development completed since 2002.

3.1.2 Hydraulic Controls

Survey data for hydraulic controls across the Hibbard Precinct was collected by Pacific Surveys at the commencement of the study. As shown in **Figure 3.2**, the survey involved collection of:

- Spot elevations along Tuffins Lane, Hastings River Drive, Boundary Street and Hibbard Drive (including road crests);
- Hydrographic survey of creek channels through and along the boundaries of the Ultiqa Village Resort to the east of Tuffins Lane;



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- Survey of footbridges located within the Ultiqa Village Resort and the Hastings River crossing located to the west of the Aquatic Caravan Park; and,
- Elevations at the base and top of the impervious fence along the western boundary the Ultiqa Village Resort (east of Tuffins Lane) and the southern boundary of the Aquatic Caravan Park (north of Hastings River Drive).

Additional survey data collected by King & Campbell covering the road surface and shoulder areas of Boundary Street and parts of Hastings River Drive were also incorporated into the topographic survey data base. The extent of this survey data is also shown in **Figure 3.2**.

Cross-sections of all surveyed bridges are included within Appendix B.

3.2 Hydrographic Data

Hydrographic survey was also collected by Pacific Surveys at seventeen locations along the creek channels that pass through and around the Ultiqa Village Resort. The location and extent of the creek cross-sections collected are shown in **Figure 3.2**.

The cross-section data is also included within Appendix B.

No additional hydrographic survey was collected to define bed elevations along the Hastings River. Bathymetric data for the Hastings River was obtained as part of the *Hastings River Flood Study (2006)* and incorporated into the RMA-2 model. It is considered to still be representative of river bed conditions in the vicinity of Hibbard and sufficiently accurate for the modelling of flood conditions.

3.3 Previous Investigations

3.3.1 Lower Hastings River Flood Study (2006)

The Lower Hastings River Flood Study (2006) was prepared by Patterson Britton & Partners (now Advisian) for Port Macquarie-Hastings Council. The primary objective of the study was to quantify and define flood characteristics along the lower reaches of the Hastings, Wilson and Maria Rivers for existing topographic and development conditions. The report provides information relating to historic and design flood behaviour along both the Hastings and Wilson Rivers, including the flood immunity of the existing Pacific Highway crossing of both rivers.

The Flood Study indicates that the Hastings, Wilson and Maria Rivers have experienced significant flooding on a number of occasions in the past. The 1963 and 1968 floods are the largest floods to have occurred over the last 70 years and are considered to approximate the 1% Annual Exceedance Probability (AEP) (also known referred to as the 100 year Average Recurrence Interval flood) flood along the Hastings River (Patterson Britton, 2006).

A RAFTS-XP hydrologic model of the Hastings, Maria and Wilson River catchments was developed as part of the study and was used to establish discharge hydrographs for the design 20, 50, 100 and 200 year recurrence floods. The RAFTS model was calibrated using available daily read rainfall and pluviometer data, as well as streamflow data for a significant flood that occurred in 1978.



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The model was also verified using available rainfall and streamflow data for a smaller flood that occurred in 1995.

Design flood characteristics for the Hastings, Maria and Wilson Rivers were defined using a fully two-dimensional hydrodynamic model that was developed using the RMA-2 software. The RMA-2 model was used to simulate flood behaviour during the design 20, 50, 100 and 200 year average recurrence floods.

The Probable Maximum Flood was also approximated using an equivalent extreme event. The extreme flood was approximated using a peak discharge equivalent to three (3) times the peak 100 year average recurrence flood discharge.

The RMA-2 model was calibrated and verified using historic flood mark information for floods that occurred in 1963, 1968, 1978 and 1995.

3.3.2 Hastings River Floodplain Risk Management Study (2012)

The Hastings Floodplain Risk Management Study (2012) (FRMS) expanded on the investigations carried out for the Lower Hastings River Flood Study (2006) by assessing a range of mitigation measures to reduce flood risk to the local community.

Several flood response (or structural mitigation) options were explored, including levees at Hibbard, Settlement Point and at two different locations at North Shore. These potential levee proposals were investigated in isolation and as part of various combinations of levees which were targeted toward protecting existing development from flooding while at the same time minimising the adverse impact of the levee on predicted peak flood levels elsewhere. A high flow bypass option was also considered for the purpose of alleviating the magnitude of flooding predicted at North Shore.

Each of the flood response options was modelled using modified versions of the existing case RMA-2 flood model. The modelling was undertaken to quantify the potential impact of each option on flood characteristics.

A triple-bottom line assessment was also undertaken to identify the flood response option that afforded the greatest benefit. The option involving construction of a levee system to protect North Shore and a concurrent levee system along Settlement Point was identified as having the best benefit relative to cost. This option was recommended in the Floodplain Risk Management Plan for further investigation with a view to developing a business case to support proceeding with implementation of the associated works.

The 2012 FRMS also addressed flood emergency management issues and provided recommendations for additions / changes to flood-related clauses within Council's existing Flood Policy. Response modification measures such as installation of extra stream flow gauges and road upgrades were proposed.

An interim assessment of climate change on flood levels was provided based on the modelling that had been completed at that time. However, it was recommended that a more detailed study be undertaken following the adoption of the Hastings Floodplain Risk Management Plan.



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3.3.3 Hastings River Floodplain Risk Management Plan (2014)

The Hastings River Floodplain Risk Management Plan (2014) (FRMP) detailed the recommended flood, property and responses modification works first proposed in the 2012 FRMS. The FRMP prioritised the proposed works into low, medium and high priority tasks and provided an indicative cost estimate for each item of work.

Updates to planning controls and policies were given highest priority and included items such as adopting floodway and flood storage extents, changing relevant sections of the DCP and LEP as well as reviewing Section 149 Certificates for flood prone properties. High priority was also given for the raising of sections of Settlement Point Road, Shoreline Drive and North Shore Drive.

The FRMP also recommended that detailed flood modelling and investigations be undertaken for the Hibbard Precinct in order to better define the identified floodway between Fernbank Creek and the Hibbard Precinct. The confirmation of the Hibbard Floodway extent was prioritised by Council's Floodplain Management Committee. Advisian has prepared this Hibbard Precinct Flood Study in accordance with recommendations in the 2014 FRMP.

3.3.4 Updated Hastings River Flood Study (Exhibition Draft, 2018)

Council commissioned Advisian to undertake an update to the 2006 Hastings River Flood Study with the primary purpose of assessing the impacts of climate change on design flood characteristics (principally peak levels), in accordance with recommendations documented in the 2012 FRMS and 2014 FRMP. The update was also to incorporate any further physical changes to floodplain topography that could impact on flood characteristics.

The existing two-dimensional RMA-2 flood model was refined for this Updated Flood Study and was used to update flood maps for the 1% AEP flood event. A range of development that has occurred across the floodplain since 2006 was also incorporated into the updated flood model. This included road embankments, bridge and culvert structures associated with the Oxley Highway upgrade and the new section of the Pacific Highway between the Oxley Highway and Telegraph Point.

The climate change assessment considered five scenarios:

- Scenario 1- 100 year ARI catchment event with 900 mm Sea Level Rise (SLR) + 10% increase in rainfall intensity and volume
- Scenario 2 100 year ARI catchment event with 900 mm SLR
- Scenario 3 100 year ARI catchment event with 400mm SLR + 10% increase in rainfall intensity and volume
- Scenario 4 100 year ARI catchment event with 400 mm SLR
- Scenario 5 PMF event with 900 mm SLR (900 mm SLR applied to the adopted 100yr Tide 2.2 mAHD)



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Aside from the PMF scenario, it was found that Scenario 1 provided the most conservative estimate for flood level increases both across tidally influenced areas and in areas further upstream.

As Scenario 1 is consistent with previous NSW SLR Policy Statement benchmarks, Council's Coast, Estuary and Floodplain Advisory Sub-Committee recommended that it be adopted for future flood planning and floodplain management policies. Accordingly, this study proceeded on that basis, providing peak flood levels and mapping based on the application of Scenario 1 in the updated flood modelling.

However, at its December 2018 meeting, Council adopted Scenario 3 as the basis for defining Flood Planning Levels (FPLs). That is, it adopted the 400 mm sea level rise scenario as the basis for defining FPLs.

The timing of this policy decision coincided with completion of most of the modelling that was undertaken for this report, which was based on Scenario 1. In order to ensure that the project is not delayed, Council instructed that the Hibbard Precinct Flood Study be completed based on the existing modelling and that further modelling to generate flood levels and flooding mapping based on Scenario 3 be completed as part of management study (options) phase.



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4 HIBBARD PRECINCT RMA-2 FLOOD MODEL

4.1 Background

The RMA-2 model adopted for the Hibbard Precinct investigations was first developed in the years preceding 2006 as part of the *Hastings River Flood Study* (2006). The model was later relied upon for a range of studies including the *Hastings River Floodplain Risk Management Study* (2012), various studies associated with the Pacific Highway Upgrade (2007 onwards) and the *Updated Hastings River Flood Study* (2018). The history of the development of the RMA-2 flood model is discussed in the following sections.

4.1.1 2006 Flood Study Model

Flood characteristics for the lower Hastings, Maria and Wilson Rivers were until recently defined by the results of flood modelling that was completed between 2004 and 2006 as part of the *Hastings River Flood Study (2006)*. A two-dimensional (2D) hydrodynamic flood model was developed as part of the Flood Study using the RMA-2 software package. The model was calibrated against significant historical floods including the 1963 and 1968 events and was applied to simulate a range of design floods including the 1% Annual Exceedance Probability (AEP) flood.

The RMA-2 model was developed from available bathymetric data for the major tributaries and Aerial Laser Survey (ALS) data that was obtained for floodplain areas extending to the predicted extent of the Probable Maximum Flood (PMF). It covered the full extent of the Hastings River floodplain from the Bains Bridge crossing near Beechwood to the ocean entrance at Port Macquarie. The model also included the floodplains of the Wilson and Maria Rivers extending downstream from the Pacific Highway crossing of the Wilson River near Telegraph Point and south along the Maria River from its headwaters near the Port Macquarie-Hastings LGA and Kempsey Shire LGA boundary.

The extent of the 2006 RMA-2 flood model is shown in Figure 4.1.

The 2006 RMA-2 model was limited in size and level of detail by the processing limitations of both the modelling software and the computer hardware that was available at the time. It is important to recognise that although the Flood Study was formally adopted in 2006, the network generation and flood modelling was largely completed by December 2004. There have been many advancements in both the software and the processing capacity of computers since then.

The 2006 model was based on topographic elevations defined at 12,900 nodes and floodplain roughness' defined across 14,450 model elements. The 2006 RMA-2 model network is shown in **Figure 4.1**.

Between 2006 and 2015, the RMA-2 model was used as the basis for numerous flood related investigations. These included the following:

 Hydrology and Hydraulics investigations for the Pacific Highway Upgrade between the Oxley Highway and Kundabung.



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This included investigations for the river crossings of the Hastings and Wilson Rivers and their associated floodplains for the Environmental Impact Statement, for the concept design and for the detail design and construction phases of the project.

The Hastings Floodplain Risk Management Study (2012).

This involved an assessment of a range of flood modification measures aimed at reducing potential flood damages that could be experienced in rural, commercial and residential areas.

In addition, the RMA-2 flood model has been used extensively as a tool to assess residential and commercial development applications proposed at a range of locations across the floodplain including, but not limited to, Wauchope, Sancrox, Hibbard, North Shore and the western areas of Port-Macquarie.

Each of the investigations completed post 2006 has involved varying degrees of updates to the 2006 RMA-2 flood model. The updates have in most cases been confined to localised network refinements completed to ensure the topography in the vicinity of the area of interest was reliably defined. In many cases, this has involved the inclusion of updated topographic data based on detailed site survey. An example of this is the work-as-executed survey obtained for the Pacific Highway Upgrade Project to define the post-development road surface and drainage infrastructure.

The updates to the RMA-2 flood model between 2006 and 2015 led to a significant increase in model size with the total number of nodes and elements increasing to 31,600 and 35,700, respectively. This represents a 250% increase in the number of model nodes and elements relative to 2006 and reflects the greater level of topographic detail that was incorporated into the model over this period. This greater level of floodplain delineation within the model network enables more reliable results to be produced.

4.1.2 2018 Updated Flood Study Model

The RMA-2 flood model that was developed as part of the *Hastings Flood Study (2006)*, and refined as part of subsequent flood investigations in the years following, was then updated to formalise the network changes that have occurred since 2006 and to ensure the model could be reliably used to simulate a range of climate change scenarios.

The following major changes to the RMA-2 model were completed as part of the *Updated Hastings River Flood Study (2018*):

- (i) Consolidation of all previous model updates to create the most up-to-date representation of the Hastings River floodplain
- (ii) Inclusion of the recently constructed Oxley Highway between Port Macquarie and Thrumster
- (iii) Model refinement along the peripheries of the floodplain in particular for areas between the 1% AEP and PMF flood extents

The changes outlined above led to an increase in the number of model nodes and elements from 12,900 and 14,450 to 49,300 and 57,800, respectively. In that regard, the present-day version of the RMA-2 model is based on four times the number of nodes and elements to define the topography and roughness compared to the 2006 version.



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An overview of the 2018 RMA-2 updated model network is shown in Figure 4.1.

A comparison of the changes to the RMA-2 model network between 2006 and 2018 is provided in **Figures 4.2** to **4.5**. The comparison shows the extent to which additional detail has been incorporated into the RMA-2 model across the entire model domain, including the Hibbard Precinct.

4.2 Flood Model Updates

4.2.1 Model Network

The RMA-2 model that was developed for the *Updated Hastings River Flood Study (2018)* was used as the base model for the Hibbard Precinct investigations which are the subject of this report. As the model had been developed and used for regional scale investigations, it was considered beneficial to further refine the model network for the local scale investigations required to assess the provisional floodway delineation previously determined for the Hibbard Precinct.

More detailed topographic data was also collected as part of the study to assist with the local scale definition of topography and key physical features. As discussed in **Section 3.1**, this included Light Detection and Ranging (*LiDAR*) survey, spot elevations of hydraulic controls such as road and fence (*brick and concrete only*) crest heights, creek cross-sections and details of bridge and culvert crossings.

The refinements in the vicinity of the Hibbard Precinct led to an increase in the total number of nodes and elements from 49,300 and 57,800 to 64,150 and 77,700, respectively. This represents an increase in the number of nodes and elements of more than 30%, all of which were incorporated only in the vicinity of Hibbard.

The final RMA-2 model network across the Hibbard Precinct is shown in **Figure 4.6**. The upgraded network includes a much finer network spacing, particularly at hydraulic controls such as roads, impervious fences, buildings and channels. In that regard, where the topography is generally flat the network spacing can be larger without affecting the reliability of the flood model predictions.

4.2.2 Model Topography

Topographic elevations within the RMA-2 model are assigned to each node based on the most reliable data source available. In that regard, most nodes across the Hibbard Precinct have been assigned elevations based on the 2012 LiDAR survey. The exceptions to this are:

- Crest elevations along Tuffins Lane, Boundary Street, Hastings River Drive and Hibbard Drive have been assigned based on surveyed spot elevations.
- Elevations at the base and crest of brick fences (such as those located along Tuffins Lane along the part of the western boundary of the Ultiqa Village Resort and at the Aquatic Caravan Park) based on surveyed spot elevations, refer Plates 4.1 and 4.2.
- Bed elevations along creeks based on surveyed cross-sections, and
- Elevation and locations of bridge approach abutments, piers and culverts.



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Plate 4.1 Brick Fence along Tuffins Lane and the western boundary of the Ultiqa Village Resort



Plate 4.2 Brick Fence along Hastings River Drive and the southern boundary of the Aquatic Caravan Park



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The final elevations assigned to the RMA-2 model nodes are shown in **Figure 4.7** as thematic terrain mapping.

Elevations for nodes outside of the study area were not changed as part of these updates. That is, all areas outside of the study area have been unchanged from the model version developed as part of the *Updated Hastings River Flood Study (Exhibition Draft, 2018)* and as discussed in **Section 4.1.2**.

4.2.3 Model Roughness Values and Distribution

Roughness values for creek channels and overbank areas were estimated across the Hibbard Precinct from aerial photograph analysis and field observations. Element types were delineated to 'pick-up' distinct variations in hydraulic roughness across the floodplain. In some instances, the RMA-2 model network was refined to allow greater delineation of element types where it was considered that a variation in roughness was warranted.

To allow for greater discretisation of roughness values throughout the study area a new set of material roughness types was created for specific use within the study area. This option was preferred as opposed to using the existing types and values that had been adopted for the remainder of the RMA-2 model domain due to the greater concentration of urban development.

The roughness types and values adopted for the Hibbard Precinct are listed in Table 4.1.

Table 4.1 ADOPTED RMA-2 MODEL ROUGHNESS PARAMETERS FOR THE HIBBARD PRECINCT

RMA-2 ELEMENT NUMBER ⁴	DESCRIPTION	ROUGHNESS PARAMETER VALUE
1	Waterway Clear	0.030
2	Waterway Overgrown	0.080
3	Bridges & Culverts	0.100
4	Grassed Floodplain	0.035
5	Light Trees / Foliage	0.055
6	Moderate Trees / Foliage	0.075
7	Dense Trees / Foliage	0.095
8	Urban Area – Open and Unobstructed	0.040
9	Urban Area – Clutter and Fences 0.0	
10	Buildings – Blocked to Flow	N/A
11	Roadways and Hardstand Areas 0.015	
12	MDST Flow Control Element ^^ N/A	

The listed element numbers and roughness types are only applicable to the RMA-2 model network across the Hibbard Precinct study area. Accordingly, the element numbers and types does not include those adopted elsewhere across the remainder of the model domain.

^{^^} MDST Flow Control Elements are used at critical flow locations (such as weirs, fences and road embankments) to reduce the potential for sub-surface flows.



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The distribution of material types across the Hibbard Precinct based on the final model network is shown in **Figure 4.8**.

4.2.4 Boundary Conditions

The Hastings River RMA-2 model has three upstream boundary conditions and one downstream boundary. The three upstream boundaries are used to input flow hydrographs into the model and are located as follows:

- (i) The Hastings River approximately 500 metres upstream of Bains Bridge (approximately 5.5 river kilometres upstream of the Wauchope Railway Bridge).
- (ii) The Wilson River approximately 3.5 river kilometres upstream of the Pacific Highway Crossing at Telegraph Point, and
- (iii) The Maria River approximately 1 kilometre north of the confluence with the Wilson River.

The only downstream boundary is located approximately 1 kilometre east of the Hastings River breakwater/river entrance and 6.5 kilometres east of Hibbard. For all simulations time-varying ocean levels are defined at the downstream boundary.

The locations and configuration of the boundary conditions adopted for the Hibbard Precinct RMA-2 model match those used for the *Updated Hastings River Flood Study* (*Exhibition Draft, 2018*) modelling.

4.3 Validation to the February 2013 Flood

Calibration and verification of any hydraulic flood model is an important step in the model development process. If an acceptable calibration of the model to recorded events can be achieved, it ensures the reliability of the results of design flood simulations such as the 1% Annual Exceedance Probability (*AEP*) flood.

As discussed in **Section 3.3**, the RMA-2 model was calibrated and verified as part of the *Hastings River Flood Study* (2006) using flood mark information recorded for floods that occurred in 1963, 1968, 1978 and 1995. Out of these four events, one flood mark was recorded in the vicinity of the Hibbard Precinct for the 1963, 1968 and 1995 events (*refer Section 6.3 of the 2006 Flood Study*).

The community consultation undertaken in the early stages of the study identified the February 2013 flood as an event of significance to the local community. Data gathered during the consultation process included the location and height that floodwaters reached at the peak of the event. Following discussions with residents, a surveyor was commissioned to collect elevations for four (4) flood marks that were identified as representative peak levels for the February 2013 at Hibbard. The location and surveyed elevation of each of the February 2013 flood marks is shown in **Figure 4.9**.

Rainfall and streamflow records were also obtained from data loggers for those gauges that were operational, and which fall within the Hastings River catchment. The locations of all streamflow gauges for which data was collected are shown in **Figure 4.10**.



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4.3.1 February 2013 Event Overview

On the 18th February 2013, a low-pressure system formed off the east coast of Australia. Over the next few days the system tracked in a westerly direction, making landfall on the north coast of New South Wales on the 22nd February (*refer* **Plate 4.3**). This resulted in widespread, persistent and heavy rainfall across the Hastings River catchment.

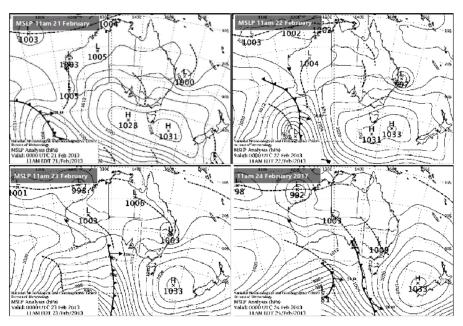


Plate 4.3 Mean Sea Level Pressure (MSLP) Plots for the February 2013 Event

Rainfall across the Hastings River catchment was well above average during February 2013 (*refer* **Plate 4.4**). Heaving rain and thunderstorms affected large parts of the New South Wales east coast between the 20th and 25th of February, with locally heavy rainfall breaking records at some locations.

Severe thunderstorms affected parts of the Hastings River catchment between the 22nd and 23rd February, with multiple rainfall gauges recording over 150 mm in a 24-hour period across the two days. The BOM rainfall gauge at Yarras recorded 415 mm in the period between 9am on the 22nd February and 9am on the 23rd February.

Cumulative rainfall totals for the month of February 2013 as recorded at various daily-read gauges and pluviographs throughout the catchment are presented in **Plate 4.5**. The data shows that significant rainfall was recorded throughout February, most notably between the 22nd and 24th.

An estimate of the Annual Exceedance Probability (*AEP*) can be determined by comparing the recorded rainfall totals to Intensity-Frequency-Duration for various durations. Due to large spatial extent of the Hastings River catchment this analysis was undertaken for rainfall data recorded across the upper, middle and lower parts of the catchment.



Hibbard Precinct Flood Study

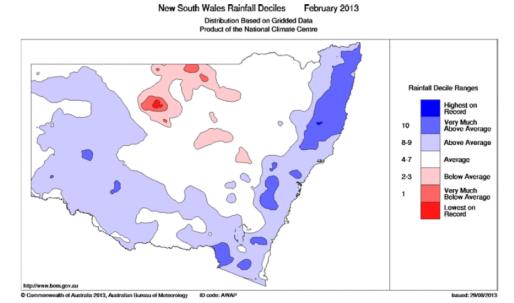


Plate 4.4 Monthly Rainfall Totals across New South Wales

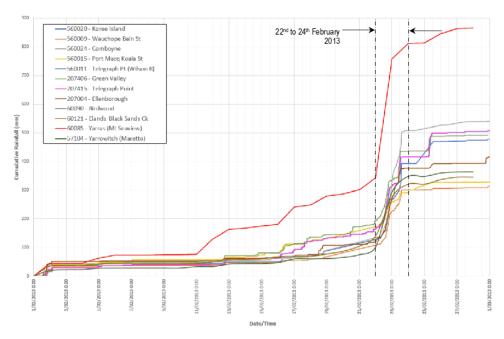


Plate 4.5 Cumulative Rainfall Totals across the Hastings River Catchment for February 2013



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As shown in **Plate 4.6**, **Plate 4.7** and **Plate 4.8** for the upper, middle and lower catchments, respectively, a maximum AEP for all gauges and durations of between 2% and 1% AEP was recorded at the Yarras Gauge (60085) for a 24 hour duration.

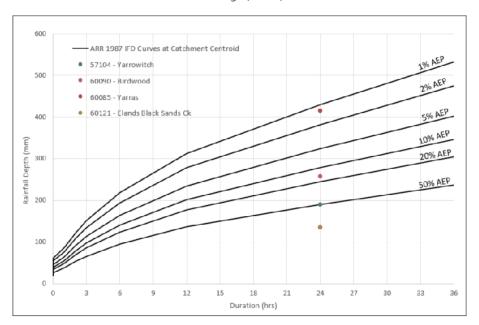


Plate 4.6 Annual Exceedance Probability (AEP) of Rainfall recorded for the February 2013 Event across the Upper Hastings River Catchment

Based on **Plate 4.6**, the rainfall recorded at the Yarras Gauge over a 24 hour period was in the order of a 1.2% AEP event; which is approximately equivalent to an average recurrence interval of 83 years.

It should be noted that each of the Yarras, Yarrowitch, Birdwood and Elands Black Sands Creek rainfall gauges referred to in **Plate 4.6** are daily read rainfall stations; that is, the depth of rainfall is measured once every 24 hours (typically at 9 am). All other gauges within the catchment are continuous recording stations which have the capacity to generate pluviographs. Therefore, for the gauges referred to in **Plate 4.6**, it is only possible to approximate AEPs for the 24-hour duration storm and hence the recorded rainfall is presented as a coloured "dot" corresponding to the different gauges.

The second largest rainfall total for the February 2013 event was recorded at the Comboyne Gauge (560024), which is located in the southern section of the Upper Hastings River Catchment. As shown in **Plate 4.7**, the Comboyne Gauge recorded 325 mm over a 24 hour period. This equates to a 5% AEP event for this duration; ie., equivalent to an average recurrence interval of once every 20 years.

All other gauges across the upper and middle areas of the catchment recorded rainfall that was approximately equivalent to the ARR 87 estimate for the 20% AEP event; ie., equivalent to an average recurrence interval of once every 5 years.



Hibbard Precinct Flood Study

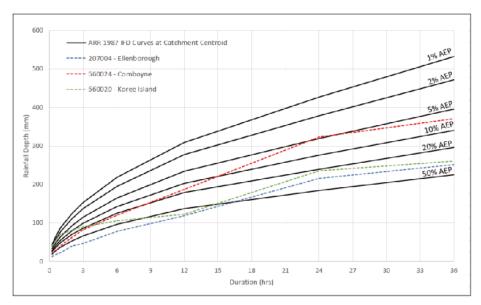


Plate 4.7 Annual Exceedance Probability (AEP) of Rainfall recorded for the February 2013 Event across the Middle Hastings River Catchment

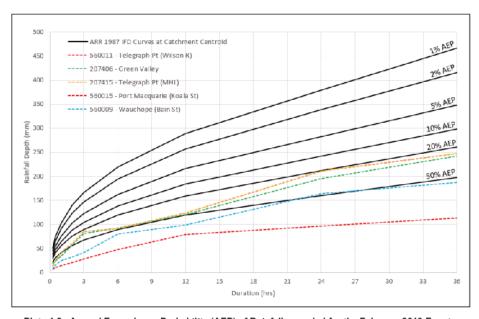


Plate 4.8 Annual Exceedance Probability (AEP) of Rainfall recorded for the February 2013 Event across the Lower Hastings River Catchment



Hibbard Precinct Flood Study

4.3.2 Hydraulic Model Inflows – XP-RAFTS Modelling

The validation was completed using an updated version of the XP-RAFTS hydrologic model that was developed as part of the *Updated Hastings River Flood Study* (*Exhibition Draft, 2018*). This updated version of the model was adopted as it incorporates increased sub-catchment definition downstream of the boundary inflow locations to the RMA-2 hydraulic model which can be used to validate predicted flows against those recorded at available streamflow gauges.

An overview of the rainfall gauges relied upon and the spatial distribution adopted to simulate the February 2013 event in XP-RAFTS is shown in **Figure 4.11**. Rainfall data from a total of eleven (11) gauges was used to define the rainfall distribution across the catchment.

Due to the lack of pluviometers in the upper catchment, sub-catchments west of Ellenborough and Kindee Bridge relied on daily rainfall totals which were temporally distributed according to the temporal distribution recorded at Ellenborough (207004) and Comboyne (560024), respectively.

Figure 4.12 and **Figure 4.13** provide a comparison between discharge hydrographs simulated using XP-RAFTS and hydrographs derived from rating curves and data recorded at the Ellenborough gauge (*Hastings River*) and at Avenal Gauge (*Wilson River*), respectively.

As shown in **Figure 4.12**, the predicted flow hydrograph at Ellenborough matches well to the recorded data. It has a similar shape to the recorded hydrograph and generates a similar peak discharge $(3,567 \text{ m}^3/\text{s compared to } 3,660 \text{ m}^3/\text{s})$.

As shown in **Figure 4.13**, validation of the model to recorded data from the Avenal Gauge is less convincing. It was not possible to match both the recorded peak discharge and the double peak evident in the recorded hydrograph shape. The multiple simulated hydrographs presented in **Figure 4.13** show the extensive scenario testing that was undertaken to achieve better validation by using different combinations of recorded temporal distributions and daily rainfall totals.

Because a reasonable fit between predicted and recorded discharges could not be achieved at the Avenal Gauge (*Wilson River*) it was decided that the recorded flows would be adopted for input into the RMA-2 model. This was the case only for the Wilson River inflow with all other inflows (*boundary and element*) based on results derived from the "validated" XP-RAFTS model.

4.3.3 RMA-2 Model Validation

Validation of the Hibbard RMA-2 model was undertaken by adopting the inflow hydrographs extracted from the XP-RAFTS model at the Hastings River and Maria River inflow locations. For the reasons outlined above, the recorded hydrograph for the Wilson River was adopted as the upstream boundary condition at Telegraph Point. Flows generated from rainfall falling across sub-catchments within the RMA-2 model domain were input as local element inflows.



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A comparison of predicted flood level hydrographs to recorded levels at gauges located within the RMA-2 model domain are shown on:

- Figure 4.14 for the Hastings River at Wauchope Railway Bridge Gauge (207401)
- Figure 4.15 for the Wilson River at Telegraph Point Gauge (207415)
- Figure 4.16 for the Hastings River at Dennis Bridge Gauge (207444)
- Figure 4.17 for the Hastings River at Settlement Point Gauge (207418), and,
- Figure 4.18 for the Hastings River at Port Macquarie Gauge (207420).

Flood levels predicted by the RMA-2 model for the February 2013 event are considered to match reasonably well to the recorded data. In particular, the shape of the flood level hydrographs are well replicated and differences in peak levels were generally within 0.2 to 0.3 metres, or better. As the focus of this study is the Hibbard Precinct, the validation evident by the comparisons outlined above were considered to be adequate.

Accordingly, no modifications were made to the RMA-2 model network or adopted roughness parameters to try to improve the validation to recorded gauge data.

A comparison of peak February 2013 flood levels predicted using the Hibbard RMA-2 flood model against flood marks recorded in the vicinity of Hibbard is presented in **Figure 4.19**.

The RMA-2 flood model generates peak flood levels which are in good agreement with the two HWMs surveyed at a residential property located along Boundary Street. Predicted and recorded flood levels are within 0.01 and 0.04 metres at these locations. Predicted flood levels generated from the RMA-2 model are within 0.09 metres of the recorded HWM located along Hibbard Drive and along the river frontage.

A final HWM located on the banks of the 'Southern Cove' is considered to be unreliable due to conflicting information provided by the landowner.

Overall the Hibbard RMA-2 flood model is considered to predict flood levels for the February 2013 event that are in good agreement to the three (3) reliable flood marks located within the study area. The good agreement to these flood marks, and the reasonable agreement to the available gauge records, indicates that the RMA-2 flood model that has been developed for the Hibbard Precinct is a reliable tool for use in predicting design flood characteristics across the precinct.

4.4 Sensitivity Analysis

An analysis was completed for the 1% AEP flood to assess the sensitivity of the results generated by the Hibbard RMA-2 flood model to variations in adopted parameters and to changes to model inputs. The following sensitivity scenarios were simulated.

- Sensitivity Scenario 1 Modelling of buildings within the precinct based on the allowing them to be "flooded" but applying a roughness of 0.15 as opposed to having the buildings completely "blocked out" such that no flow travels through them during a simulation.
- Sensitivity Scenario 2 20% increase to the roughness value for all elements within the study area.



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- Sensitivity Scenario 3 20% decrease to the roughness value for all elements within the study area.
- Sensitivity Scenario 4 Reduced ocean tailwater levels from peaks of 2.2 mAHD to 0.5 mAHD; reduction by 1.7 metres.

Flood level difference mapping was prepared for each sensitivity scenario and is presented in **Figures 4.20** to **4.23**.

As shown in **Figure 4.20**, peak flood levels for the 1% AEP event were not sensitive to changes to the approach adopted for modelling buildings (*Sensitivity Scenario 1*). By allowing floodwaters to enter the building footprints, albeit with a high roughness value, peak 1% AEP flood levels reduced slightly (*by up to 0.02 metres*) across areas south of Hastings River Drive. The reduction in levels is attributed to a minor increase in available flood storage.

Sensitivity Scenarios 2 and 3 were found to cause the smallest change to peak 1% AEP flood levels across Hibbard. As shown in **Figure 4.21** and **4.22**, the changes to roughness values caused maximum changes to flood levels of +/- 0.01 metres.

It is worth noting again that the changes to roughness values were only applied to those parts of the network within the study area. Areas outside the Hibbard Precinct were not altered from the roughness values adopted in the modelling undertaken for the Updated Hastings River Flood Study (*Exhibition Draft, 2018*).

Sensitivity Scenario 4 generated the largest change in peak 1% AEP flood levels across Hibbard. As shown in **Figure 4.23**, 1% AEP catchment flood levels across Hibbard would be lowered by about 0.35 metres if the assumed peak ocean level is reduced from 2.2 to 0.5 mAHD. This indicates that the level that floodwater reach at Hibbard during large floods is particularly influenced by ocean entrance conditions and specifically ocean storm surge levels. The 1963 flood is considered to be the largest recorded flood in the lower Hastings Valley. It was characterised by elevated ocean levels which prevented floodwaters from the upper catchment discharging to the ocean. This led to elevated flood levels across the area downstream of Dennis Bridge, including Hibbard.

Notwithstanding, the results of Sensitivity Scenario 4 also show that it takes a substantial reduction in ocean level to result in a modest reduction in peak 1% AEP flood level at Hibbard – compare a 1.7 m reduction in ocean level to a resultant reduction in 1% AEP flood level at Hibbard of only 0.35 m. In reality, the meteorology that would generate major flooding in the Hastings Valley is unlikely to be independent of an elevated ocean condition. For example, an East Coast Low similar to that which made landfall at Newcastle in June 2007 is considered to be characteristic of the weather event that would cause major flooding in the Hastings. East Coast Lows typically generate ocean levels that exceed 1.8 mAHD.

Therefore, although the choice of ocean level for modelling is shown by Sensitivity Scenario 4 to have the potential to lower 1% AEP flood levels at Hibbard, the adoption of an ocean level for the generation of flood levels for planning purposes (e.g., setting minimum floor levels for residential development) would necessitate the adoption of an ocean level of 1.8 mAHD or higher, which in turn would result in very little reduction in the 1% AEP flood levels generated for this report.



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5 DESIGN EVENT MODELLING

5.1 General

Design floods are hypothetical floods that are commonly used for planning and floodplain risk management investigations. Design floods are based on statistical analysis of rainfall and flood records and are defined by their probability of occurrence. For example, a 1% Annual Exceedance Probability (*AEP*) flood is the best estimate of a flood that will have a 1 chance in 100 of occurring in any given year.

Design floods can also be expressed by their expected interval of occurrence, for example the 1% AEP flood can also be expressed as the 100 year Average Recurrence Interval (ARI) flood. That is, it represents a flood that is likely to occur on average, once in every one hundred years.

It should be noted that there is no guarantee that the design 1% AEP flood will occur just once in a one hundred year period. It may occur more than once, or at no time at all in the one hundred year period. This is because the design floods are based upon a statistical 'average'.

5.2 Hydrodynamic Modelling

5.2.1 Design Simulations

The Hibbard RMA-2 flood model that was developed for the project was used to simulate flooding of the Hastings River across the Hibbard Precinct and adjoining floodplain. The model was used to simulate the design 5% and 1% AEP flood events, and an adopted Extreme Flood.

The design simulations were based on a range of boundary condition data which is described in the following sections.

5.2.2 Inflow Hydrographs

Upstream boundary conditions were defined for each design flood based on the inflow hydrographs generated using the RAFTS hydrologic model developed as part of the *Lower Hastings River Flood Study* (2006). In that regard, the adopted inflow hydrographs are unchanged to those adopted for the 2006 Flood Study.

The peak flows for each design event at the three upstream inflow locations to the RMA-2 model are listed in **Table 5.1**. As shown in **Table 5.1**, the adopted Extreme flood event has been assumed to correspond to a flood that is three (3) times the magnitude of the peak flow for the 1% AEP flood. Inflow hydrographs for the 5% and 1% AEP floods and the adopted Extreme Flood are shown graphically in **Figures 5.1 to 5.3** for the Hastings, Wilson and Maria Rivers, resepctively.

5.2.3 Ocean Levels

Ocean boundary conditions for each design flood are defined based on the varying tide levels adopted as part of the *Lower Hastings River Flood Study* (2006). Accordingly, a varying tidal boundary condition with a peak level of 2.2 mAHD was adopted for all design flood simulations.



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The adopted tidal boundary condition is shown graphically in Figure 5.4.

Table 5.1 Peak Flows for Design Events Extracted from the Flood Study (2006)

Inflow _ Location	Peak Flow (m³/s)		
	5% AEP Event	1% AEP Event	Extreme Flood
Hastings River	4,565	6,848	20,550
Wilson River	1,740	2,707	8,115
Maria River	420	711	2,130

5.3 Design Flood Modelling Results

5.3.1 Peak Flood Levels and Extents

Peak flood level estimates were extracted from the modelling results and were used to generate flood extent and flood level plots for each design events. The plots show the variation in flood levels across the Hibbard Precinct at contour intervals of 0.1 metres. Mapping for the 5% and 1% AEP flood events are shown in **Figures 5.5** and **5.6**, respectively. Mapping for the adopted extreme event is presented in **Figure 5.7**.

The variations in peak flood levels between design events are listed in **Table 5.2** for six points scattered across the Hibbard Precinct. The locations of each point selected for this comparison are identified on **Figures 5.5** to **5.7**.

Table 5.2 Comparison of Peak Flood Levels Predicted for Each Design Event at Points
Throughout the Hibbard Precinct

Flood Level	Pi	redicted Flood Levels (mA	HD)
Comparison - Points ^	5% AEP Flood	1% AEP Flood	Extreme Flood Event
Α	2.53	3.24	7.57
В	2.53	3.23	7.51
С	2.53	3.23	7.38
D	2.50	3.12	7.35
E	2.51	3.16	7.40
F	2.40	2.95	7.26
G	2.39	2.96	7.12
Н	2.35	2.88	7.00

Point locations are identified on Figures 5.5 to 5.7

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5.3.2 Peak Flood Depths

Peak flood depth estimates were extracted from the flood modelling results and were used to generate depth mapping for each of the design events. The plots show the variation in flood depths across Hibbard at the peak of each event.

Peak depths for the 5% AEP flood event are shown in **Figure 5.8**. The variations in flood depths are shown at intervals of 0.3 metres and for depths up to 3.0 metres. As shown in **Figure 5.8**, flood depths are predicted to exceed 3.0 metres only within watercourses such as creek and river channels (*refer yellow shading*).

Similar mapping of peak flood depths for the 1% AEP flood event is presented in **Figure 5.9**. Depths for the 1% AEP event are shown at 0.5 metres and to a maximum depth of 5.0 metres. Flood depths are only predicted to exceed 5 metres within the Hastings River channel and in parts of the canal subdivision located downstream of Hibbard.

Flood depth mapping for the adopted extreme flood event are shown in **Figure 5.10**. Depth mapping is presented at intervals of 1.0 metre to a maximum depth of 8.0 metres.

As shown in **Figure 5.10**, most of Hibbard is predicted to be inundated to flood depths of between 4.5 to 7.0 metres at the peak of the extreme event.

5.3.3 Peak Flow Velocities

Mapping showing the variation in peak flow velocities predicted across Hibbard for the 5% and 1% AEP floods and the adopted Extreme event are shown in **Figures 5.11** to **5.13**, respectively.

The mapping indicates that flow velocities for the 5% AEP event will generally range between 0.0 and 0.4 m/s across Hibbard (refer Figure 5.11). Flow velocities are predicted to increase slightly for the 1% AEP flood with typical velocities of between 0.1 and 0.5 m/s across Hibbard (refer Figure 5.12). Localised flow paths with higher velocities are shown to form in between buildings and at locations where road embankments are overtopped.

For the extreme flood event, peak flow velocities are predicted to range between 0.3 and 1.2 m/s across Hibbard (refer Figure 5.13).

5.3.4 Comparison to Previous Studies

Flood level difference maps have been prepared to compare the Hibbard Precinct RMA-2 results to those generated as part of previous studies (*refer* **Section 3.3**). The comparison plots have been prepared to cover the entire model domain with an inset included focusing on the Hibbard Precinct.

Table 5.3 lists the design events simulated as part of the Hibbard Precinct study along with any previous simulations from previous studies for which a comparison plot has been prepared.



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Table 5.3 Comparison of Hibbard Design Flood Modelling Results to Results
Determined from Previous Studies

Design Flood - Event	Previous Studies		
	Lower Hastings River Flood Study (2006)	Updated Hastings River Flood Study (Exhibition Draft, 2018)	
5% AEP	Refer Figure C1 in Appendix C	I	
1% AEP	Refer Figure C2 in Appendix C	Refer Figure C3 in Appendix C	
1% AEP Climate Change Scenario	1	Refer Figure C5 in Appendix C	
Extreme Flood	Refer Figure C4 in Appendix C	1	



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6 IMPACT OF CLIMATE CHANGE ON FLOOD CHARACTERISTICS

6.1 Background

A detailed assessment of the potential impact of climate change on peak flood levels in the Hastings River was recently completed and documented in the *Updated Hastings River Flood Study (Exhibition Draft, 2018*). The updated flood study included assessment and modelling of five climate change scenarios with different magnitudes of sea level rise and/or increases in rainfall intensities.

The five climate change scenarios considered were:

- Scenario 1 1% AEP catchment event with 900 mm Sea Level Rise (SLR) + 10% increase in rainfall intensity and volume
- Scenario 2 1% AEP catchment event with 900 mm SLR
- Scenario 3 1% AEP catchment event with 400mm SLR + 10% increase in rainfall intensity and volume
- Scenario 4 1% AEP catchment event with 400 mm SLR
- Scenario 5 Extreme event with 900 mm SLR (900mm SLR applied to the adopted 100yr Tide_2.2 mAHD)

The report recommended that Climate Change Scenario 1 be adopted for the purpose of flood planning and floodplain management (i.e., a 1% AEP event with 900 mm Sea Level Rise and 10% increase in rainfall intensity).

Scenario 1 is also consistent with the NSW Sea Level Rise Policy Statement benchmarks, existing planning directions of Port-Macquarie Hastings Council, and reflects the certainties of sea level rise while acknowledging the limitations of the predicted rainfall increases. Although the NSW Sea Level Rise Policy is no longer in effect, the guideline documents are still considered to represent a reliable guide to the potential changes to sea levels and rainfall intensities due to climate change.

6.2 Modelling of Climate Change Impacts

6.2.1 Boundary Conditions

The boundary conditions adopted in the modelling undertaken for the *Updated Hastings River Flood Study (Exhibition Draft, 2018*) were also assumed to assess the potential impact of climate change on peak flood levels for the Hibbard Precinct. That is, Climate Change Scenario 1 was applied using the Hibbard Precinct RMA-2 flood model.

The magnitude of flows entering the RMA-2 flood model at the peak of the 1% AEP event with and without climate change are listed in **Table 6.1**. As shown in **Table 6.1**, a 10% increase in rainfall intensities during the design 1% AEP rainfall event is predicted to increase peak flows entering the study area by between 15.3% and 19.3%.



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Table 6.1 Comparison between Existing and Predicted Year 2100 Flood Flows

Inflow – Location	Peak Flow (m³/s)		
	1% AEP Event	1% AEP Event with 10% Rainfall Increase	Difference (%)
Hastings River	6,848	7,896	+15
Wilson River	2,707	3,122	+15
Maria River	711	848	+19

The ocean boundary conditions used for modelling of the 1% AEP event was modified by increasing the tidal elevation at each timestep in the simulation by 900mm. This resulted in a peak tidal elevation for Climate Change Scenario 1 of 3.1 mAHD; i.e., 2.2 mAHD plus 0.9 metres SLR.

6.2.2 Results

Predicted flood levels and extents at the peak of the adopted 1% AEP climate change scenario are shown in **Figure 6.1**. Variations in flood depths and flow velocities are shown in **Figures 6.2** and **6.3**.

A comparison of flood levels across the Hibbard Precinct for the 1% AEP flood with and without climate change are listed in **Table 6.2**. The location of each comparison point is identified on **Figure 6.1**.

Table 6.2 Comparison of Peak Flood Levels Predicted for Each Design Event at Points
Throughout the Hibbard Precinct

Flood Level Comparison Points —	Predicted Flood Levels (mAHD)		
	1% AEP Flood	1% AEP Flood with Climate Change	Difference
А	3.24	3.92	+ 0.68 m
В	3.23	3.87	+ 0.64 m
С	3.23	3.85	+ 0.62 m
D	3.12	3.82	+ 0.70 m
E	3.16	3.82	+ 0.66 m
F	2.95	3.72	+ 0.77 m
G	2.96	3.69	+ 0.73 m
Н	2.88	3.63	+ 0.75 m

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Difference mapping comparing peak flood levels predicted for the 1% AEP flood with climate change based on modelling undertaken using the Hibbard RMA-2 hydrodynamic model to the results documented in the *Updated Hastings River Flood Study (Exhibition Draft, 2018)* are shown in **Figure C5** of **Appendix C**.



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7 PROVISIONAL HAZARD MAPPING

7.1 Adopted Criteria

The personal danger and physical property damage caused by a flood varies both in time and place across the floodplain. Accordingly, the variability of flood patterns across the floodplain over the full range of floods, needs to be understood by flood prone landholders and by floodplain risk managers.

Representation of the variability of flood hazard across the floodplain provides floodplain risk managers with a tool to assess the existing flood risk and to determine the suitability of land use and future development. The hazard associated with a flood is represented by the static and dynamic energy of the flow, which is in essence, the depth and velocity of the floodwaters. Therefore, the flood hazard at a particular location within the floodplain, is a function of the velocity and depth of the floodwaters at that location.

The NSW Government's 'Floodplain Development Manual' (2005), characterises hazards associated with flooding into a combination of three hydraulic categories and two hazard categories. Hazard categories are broken down into high and low hazard for each hydraulic category as follows:

- Low Hazard Flood Fringe
- Low Hazard Flood Storage
- Low Hazard Floodway

- High Hazard Flood Fringe
- High Hazard Flood Storage
- High Hazard Floodway

As a result, the manual effectively divides hazard into two categories, namely, high and low. An interpretation of the hazard at a particular site can be established from **Figures L1** and **L2** on the following page, which have been taken directly from the manual.

As shown in the **Figures L1** and **L2**, flood hazard is a measure of the degree of difficulty that pedestrians, cars and other vehicles will have in egressing flooded areas, and the likely damage to property and infrastructure. At low hazard, passenger cars and pedestrians (adults) are able to move out of a flooded area. At high hazard, wading becomes unsafe, cars are immobilised and damage to light timber-framed houses would occur.

Figure L1 and **L2** show that the flood hazard throughout the floodplain is categorised according to a combination of the flow velocity and the depth of floodwaters. The hazard categories are defined by lower and upper bound values for the product of flow velocity and floodwater depth.

The 'Hastings River Flood Study' (2006) found that by adopting the Low and High criteria for hazards defined in the 'Floodplain Development Manual' (2005) the majority of land within the lower Hastings Valley would be classified as high hazard for large events such as the 1% AEP flood. For the purposes of better understanding the variability of hazard throughout the floodplain the high hazard category was further subdivided into High Hazard, Yery High Hazard and Extreme Hazard. Similarly, the low hazard category defined in the manual was subdivided to create Low Hazard and Medium Hazard categories.



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This greater discretisation of hazards was adopted as it allows for a greater understanding of the flood hazard affecting existing development and areas of potential future development, the low and high hazard categories were further subdivided. A summary of the criteria adopted for each hazard category is listed in **Table 7.1** and shown in **Plate 7.1**.

TABLE 7.1 ADOPTED HAZARD CRITERIA

HAZARD CATEGORY	CRITERIA	PRACTICAL APPLICATION
Low	• Depth (d) < 0.4m & Velocity (v) < 0.5m/s	Suitable for cars
Medium	 exceeding Low criteria, and d ≤ 0.8m, v ≤ 2.0m/s, and vxd ≤ 0.5 	Suitable for heavy vehicles and wading by able bodied adults
High	 exceeding Medium criteria, and d ≤ 1.8m, v ≤ 2.0m/s, and vxd ≤ 1.5 	Suitable for light construction, timber frame, brick veneer etc
Very High	exceeding High criteria, and 0.5m/s < velocity < 4m/s and vxd ≤ 2.5	Suitable for heavy construction, steel frame, concrete etc
Extreme	exceeding Very High criteria and ν > 5m/s	Unsuitable for development - indicates significant conveyance of flow or floodway

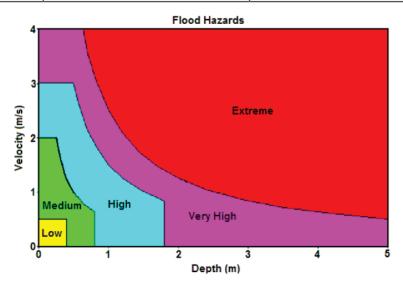


PLATE 7.1 CHART OF ADOPTED HAZARD CRITERIA

7.2 Updated Provisional Flood Hazards

The modelling results described in **Section 5** for design flood events and **Section 6** for the adopted climate change scenario we used to prepare provisional flood hazard mapping for the Hibbard Precinct. Accordingly, the model results were analysed to determine those parts of the

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floodplain that fall within each of the Low, Medium, High, Very High and Extreme Hazard categories that are listed in **Table 7.1**.

Provisional flood hazard mapping for the 5% and 1% AEP floods and the adopted climate change scenario (*refer* **Section 6**) are presented in **Figures 7.1** to **7.3**, respectively.



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8 UPDATED HYDRAULIC CATEGORIES

8.1 General

A major component of the Hibbard Precinct Flood Study is the re-assessment of hydraulic categories in the vicinity of Hibbard. This has involved a review of the existing floodway corridor, which when defined as part of the *Hastings River Floodplain Risk Management Study* (2012), was based on modelling that was broad scale and which reflected the regional focus of that study.

As discussed in **Section 4.2**, the regional Hastings River flood model has been updated to incorporate additional detail in the Hibbard area. The updates include network refinement to incorporate building footprints, hydraulic controls such as impervious fences, culverts, bridges and road crests, as well as general refinements to better reflect the floodplain topography. These updates have resulted in a flood model that has greater capacity to simulate the pattern of flooding through Hibbard which in turn, can be used to better define the hydraulic function of areas within the precinct.

8.2 Definitions

The NSW Floodplain Development Manual (2005) defines three hydraulic categories of flood prone land; viz., floodway, flood storage and flood fringe. Each of these hydraulic categories are combined with flood hazard to define the variation in risk across flood-prone areas. The combination of hydraulic categories and food hazard can be used to assess the risk to existing development and to identify appropriate types of development for different areas of the floodplain.

Floodways are those areas of a floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels and are areas that if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood level. By definition, floodways are areas of high flow conveyance and can often be identified by areas of high flow velocity (NSW Office of Environment & Heritage, 2013).

The blocking of floodways typically results in significant impacts on flood characteristics such as increases in predicted peak flood level and changes in flow velocities. Therefore, it is important to define floodways in floodplain risk management so that areas where development is undesirable can be identified.

8.3 Previous Investigations

Hydraulic category mapping for the lower Hastings River floodplain is documented in Section 9 of the *Hastings River Floodplain Risk Management Study* (2012).

In order to delineate the floodway corridor a three-stage approach was adopted based on a methodology outlined by Thomas et at (2012). Stage 1 of this approach involved delineation of a 'preliminary' floodway extent that was based on a detailed review of existing flood modelling results that considered the following:

the location of flood storages readily identifiable from aerial photography;



Hibbard Precinct Flood Study

- available ALS / LiDAR terrain data;
- the location and potential impacts of hydraulic controls;
- mapping of contours of 'velocity-depth' product (V x D);
- mapping of the variation in flood depths and peak flow velocities; and,
- the distribution of floodwater flow, including the area required to carry 80% of the peak flow in the 1% AEP flood.

The 'preliminary' floodway corridor determined from this Stage 1 analysis was then tested and verified as part of the second stage of the process which involved selective encroachment analysis.

The Stage 2 analysis involved flood modelling to test whether the "blockage" of areas outside of the preliminary floodway corridor would result in significant increases in local flood levels; i.e., increases of more than 100 mm. Where encroachment modelling results in flood level increases that are greater than 100 mm it follows that the preliminary floodway corridor is too narrow requiring it to be widened and re-tested. This iterative approach led to the development of the Stage 2 floodway corridor.

The final and third stage involved a joint review of the Stage 2 floodway corridor by representatives from Council, the Office of Environment and Heritage (OEH) and Advisian (WorleyParsons at the time). The review relied upon flood engineering judgement and experience and a practical "common sense" check of the floodway line against cadastral and property constraints to "fine tune" the floodway extent mapping

Once the floodway extent was defined, investigations were undertaken to determine the flood storage and flood fringe. In order to determine the boundary between flood storage and fringe, the variation in peak flood depths in areas outside of the floodway extent were mapped. A depth of 0.3 metres was selected as the transitionary point between flood storage and fringe; i.e., an area is designated as flood fringe if the flood depths are 0.3 metres or less.

8.4 Re-Assessment of the Hibbard Floodway Corridor

As discussed in **Section 8.3**, the floodway corridor determined as part of the Hastings River FRMS (2012) was delineated based on a review of predicted flood behaviour and then tested and further refined by encroachment modelling. Because both of these stages of assessment relied on the broad scale flood model developed as part of the *Lower Hastings River Flood Study* (2006) there existed limitations in the amount of local scale detail that could be taken into consideration. Having the local scale detail is especially important in urbanised areas such as Hibbard where floodwaters can be obstructed and/or re-directed by hydraulic controls such as buildings, fences and road embankments.

These localised features have now been incorporated into the Lower Hastings River/Hibbard Precinct flood model and the refined model has been used to re-simulate design flood conditions. With this new information available a re-assessment of the floodway corridor was undertaken by applying the same methodology adopted for the *Lower Hastings Floodplain Risk Management Study (2012)*. The method also considered the findings of additional research documented in Thomas et al (2018).



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As the floodway re-assessment was focused only on a localised part of the lower Hastings River floodplain that covers less than 1% of the total floodplain assessed as part of the floodplain risk management study, it is possible that the previously adopted flood level increase criteria, that is the 100 mm increase, may not be entirely applicable.

This recognises that the encroachment/blockage testing will be applied only to the southern floodplain and the presence of a significant flood storage area upstream of Hibbard which would dampen the peak magnitude of any resulting increases in flood levels.

The applicability of the increase threshold value, and the findings of the Stage 1 and Stage 2 investigations are documented in the following sections.

8.4.1 Applicability of the Stage 2 Flood Level Increase Criteria

As discussed in **Section 8.3**, the Stage 2 analysis undertaken as part of the FRMS (2012) involved flood modelling to test whether the "blockage" of areas outside of the Stage 1 floodway corridor would result in flood level increases of more than 100 mm. Where the encroachment modelling indicated that flood level increases were greater than 100 mm, this indicated the floodway corridor was too narrow requiring it to be widened and retested.

Although this same approach can be applied to test floodway corridors at Hibbard the 100 mm increase criteria may only be applicable at a 'local' scale such as directly against a blockage point instead of across a widespread area. This is particularly the case for any flood level increases that extend upstream of Hibbard (*i.e.*, west of Tuffins Lane) due to the large flood storage area located upstream and to the south-west which would act to dampen the peak magnitude of any increase in flood level due to a localised floodway encroachment.

A secondary reason the 100 mm increase criteria will not be possible to achieve over an extended area is due to the encroachment/blockage testing applying only to Hibbard and the southern floodplain.

In that regard, the encroachment/blockage scenarios will not apply to the full "width" of the floodplain which would typically be necessary to cause the widespread 100mm increase to occur. For example, the main Hastings River channel and the Kings Point floodway channel crossing were retained as "unblocked" flow paths during the analysis carried out to assess the extent of the Hibbard Precinct floodway.

Notwithstanding, the encroachment/blockage modelling can still be applied at Hibbard to test whether a proposed floodway extent has been sized sufficiently for the passage of local flood flows. Accordingly, the 100 mm criteria was adopted and used to assess the impact of encroachment scenarios on peak flood levels immediately upstream of Hibbard or adjacent to the floodway itself.



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8.4.2 Stage 1 - Delineating the Floodway based on Existing Modelling Results

The Stage 1 analysis involved a detailed review of the flood modelling results documented in **Section 5.3**.

The analysis involved identifying those parts of the floodplain across which velocities, depths and the velocity-depth product were 'locally' high and indicative of an area with high hydraulic importance and/or an area conveying a significant amount of the flow occurring 'locally'. The emphasis on 'locally' is included to reinforce that floodway runners can be formed away from and separate to the greater floodplain. This scenario of a flood runner is considered applicable to the Hibbard Precinct with floodwaters arriving overland from the west and not from flows leaving the Hastings River which is located immediately north of the Precinct (refer Figure 8.1).

This separation of the flows that are conveyed through Hibbard from those to the north (within the Hastings River and the northern floodplain) is evident by comparing the magnitude of the velocity-depth product.

In that regard, the velocity-depth product for the 1% AEP event across Hibbard is predicted to reach up to 1.2 m²/s compared to 2.6 m²/s across the floodplain north of the Hastings River (*refer* **Figure 8.1**). The difference in flood characteristics is even more evident when comparing the magnitude of flows through the northern and southern (*Hibbard Precinct*) floodplains at the peak of the 1% AEP flood.

As shown in **Figure 8.1**, a peak flow magnitude of 900 m³/s is predicted across the northern floodplain compared to 280 m³/s through Hibbard.

Application of Stage 1 of the assessment procedure led to identification of a 'preliminary' floodway extent for the Hibbard Precinct. This is shown in **Figure 8.2**.

The Stage 1 floodway corridor includes a main floodway arm that crosses Tuffins Lane before turning towards the north to cross Hastings River Drive. Before crossing Hastings River Drive the floodway arm splits into two branches which flow to the east and west of the Riverside Resort and the brick fence that exists along its frontage (*refer* **Figure 8.2**).

A secondary floodway arm that starts immediately east and downstream of Tuffins Lane conveys floodwaters through the Ultiqa Village Resort and along the narrow canal and creek system. As shown in **Figure 8.2**, this floodway arm joins the western floodway branch upstream of Hastings River Drive.

In determining the Stage 1 floodway corridor, flow distributions were analysed relative to the predicted velocity-depth product. As shown in **Figure 8.2**, the Stage 1 floodway corridor aligns generally well with a velocity-depth value in the range of $0.7 \text{ m}^2/\text{s}$ to $1.2 \text{ m}^2/\text{s}$.

Although there are several locations where flow paths exhibit velocity-depth values within or near this range these were not included as they either conveyed a relatively (assessed based on local flow distributions) low proportion of the local flow and/or were separated from the main floodway arm by a band of lesser hydraulic importance. For locations falling in the latter category inclusion of the area was only considered where it was required to maintain the conveyance capacity of the corridor.



Hibbard Precinct Flood Study

Thomas et al (2012 and 2018) and the Hastings River FRMS (2012) determined that for most situations the area of the floodplain that conveys 80% of the peak 1% AEP flow is representative of the floodway extent. However, a strict application of this criterion to the Hibbard Precinct, when considered in isolation, is not considered appropriate. This is because if the full width of the Hastings floodplain at Hibbard is considered, those areas to the north of Hibbard that were identified in the 2102 FRMS already convey over 80% of the total flow.

Therefore, in applying a flow criterion to the <u>Hibbard floodway arm</u> a value of 60% of the total local flow was initially adopted.

8.4.3 Stage 2 - Encroachment/Blockage Modelling

Encroachment modelling was undertaken for the Stage 1 floodway corridor to assess whether the corridor was sufficiently sized to ensure all local flows could be conveyed without causing flood level increases of greater than 100 mm locally and adjacent to blockage locations.

Five encroachment scenarios were set-up and simulated by gradually increasing the encroachment extent. This approach was adopted in lieu of simulating a single scenario in which the whole floodway extent was blocked on the basis that any impacts at the upstream limit of testing could influence impacts for sections downstream. Therefore, this issue was avoided by simulating gradual increases in the encroachment extent.

The results of the five encroachment scenarios are presented as flood level difference mapping in **Figure 8.3** to **Figure 8.7**.

The flood level difference plots indicate that the maximum flood level increase caused by any of the modelled scenarios is predicted to be 100 mm. This maximum increase occurs for the second encroachment scenario. This scenario was the first to include blockages to areas outside of both floodway arms, including blockage of Boundary Street (*refer* **Figure 8.4**). This indicates that the width of both floodway arms is sufficient to ensure flood level increases locally do not exceed 100 mm.

For all other blockage/encroachment scenarios the maximum flood level increase is predicted to be 50 mm. Although this magnitude of increase is below the target criteria of 100 mm, the large spatial extent across which it occurs (extending approximately 4.2 km upstream to Dennis Bridge and the Pacific Highway and 5.0 km to the south-west into the large flood storage area) makes it an unreasonable target (refer discussion under Section 8.4.1).

In order to confirm the importance of maintaining the two floodway arms that cross Hastings River Drive to the west and east of the Riverside Resort, a final encroachment scenario was run that blocks the eastern floodway arm as far south as Hastings River Drive. As shown in **Figure 8.8**, blockage of the eastern floodway arm causes flood levels to increase locally by up to 120 mm, which is in excess of the 100 mm criterion.

As for other blockage scenarios, the extent of flood level increases are significant. They extend across all of Hibbard and include areas upstream and west of Tuffins Lane.



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8.4.4 Final Floodway Extent

The Stage 2 encroachment modelling shows that the Stage 1 floodway corridor will lead to flood level increases locally of up to 100 mm (*refer* **Figure 8.4**). Blockage of the eastern floodway arm is predicted to cause flood levels to increase locally by up to 120 mm which is above the threshold target and therefore indicates blockage of a floodway (*refer* **Figure 8.8**).

Although flood level increases further upstream of the two floodway arms are only predicted to reach up to 50 mm, these increases are effectively "damped" by the extensive floodplain storage upstream and to the south-west of Hibbard. This floodplain storage feeds floodwaters into the Hibbard floodway during major flooding of the Hastings River. Although the predicted increases are less than the 100 mm criteria that is typically adopted, the extent of the floodplain over which they would occur indicates that the associated blockage of the Hibbard floodway arms would result in significant impacts (refer Figure 8.4 to Figure 8.7).

Therefore, based on the discussion above and the results of the Stage 2 encroachment modelling, it is proposed that the floodway corridor delineated through the Stage 1 analysis be adopted for the Hibbard Precinct.

8.5 Flood Storage and Fringe

As discussed in **Section 8.2**, in the Hastings River FRMS (2012) the transition between areas categorised as flood storage and flood fringe was delineated based on mapping flood depths of up to 0.3 metres. Accordingly, flood storage and flood fringe were defined as:

- Flood Storage those parts of the floodway outside of the floodway corridor and with depths
 of over 0.3 metres at the peak of the 1% AEP flood.
- Flood Fringe those parts of the floodway outside of the floodway corridor and with depths
 of <u>up to</u> 0.3 metres at the peak of the 1% AEP flood.

It is proposed that these criteria for flood storage and fringe areas be retained for the mapping of hydraulic categories at Hibbard.

Notwithstanding, as design flood behaviour has changed as a function of the hydraulic model updates made as part of this study (*refer* **Section 4.2**) remapping of storage and fringe areas is recommended.

8.6 Hydraulic Category Mapping for the Hibbard Precinct

Mapping of hydraulic categories for the Hibbard Precinct are shown in **Figure 8.9** for the 1% AEP flood.



Hibbard Precinct Flood Study

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The Hibbard Precinct is an area to the west of Port Macquarie that has developed as "strip" development adjacent to Hastings River Drive which served historically as the major connection between the CBD and the Pacific Highway. Development occurred due to proximity to infrastructure, the river and Port Macquarie Regional Airport. This includes service industries to support the airport, tourism facilities including accommodation, and more recently, commercial and bulky goods development that could take advantage of the relatively flat land and good access afforded by the road network.

However, parts of Hibbard are very low lying and have historically served to convey floodwaters from the extensive flood storage area located to the south west of the airport back into the main channel of the Hastings River. The Hastings River Floodplain Risk Management Study (2012) identified the importance of the connection between this flood storage and the main channel of the Hastings River. Investigations completed for the FRMS identified a provisional floodway corridor through the Hibbard Precinct and sought to formally recognise the need for the free passage of floodwaters to be maintained into the future.

Notwithstanding, the FRMS recognised that floodway mapping prepared at that time was based on a broad scale assessment of flood characteristics commensurate with the valley wide scale of the study. The FRMS recommended that a more detailed investigation was required to confirm the existence of a floodway through the Hibbard Precinct, and if one existed, to more accurately define its extent and function.

Investigations completed for this study have confirmed that a floodway corridor does exist through the Hibbard Precinct. Flood modelling of blockage scenarios has established that if a floodway is not retained through the Hibbard Precinct then 1% AEP flood levels in areas upstream and particularly to the south-west can be expected increase. This could reduce the level of service currently afforded by important infrastructure, including the Port Macquarie Regional Airport.

Notwithstanding, the investigations have established that the extent of the floodway required is less than the extent that was provisionally determined as part of the 2012 FRMS. The recommended floodway is presented in **Figure 8.9.**

9.2 Recommendations

The follow recommendations are made:

- (i) Revised 1% AEP flood levels for the Hibbard Precinct be adopted based on the peak flood levels presented in **Figure 5.6** and **Table 5.2**.
- (ii) Revised 1% AEP Hazard Categories be adopted based on the mapping presented in Figure 7.2.
- (iii) Revised Hydraulic Categories, including the "new" floodway, be adopted based on the mapping presented in **Figure 8.9.**



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(iv) Revised Flood Planning Levels for the Hibbard Precinct be considered in the floodplain risk management study phase



Port Macquarie Hastings Council

Hibbard Precinct Flood Study

10 REFERENCES

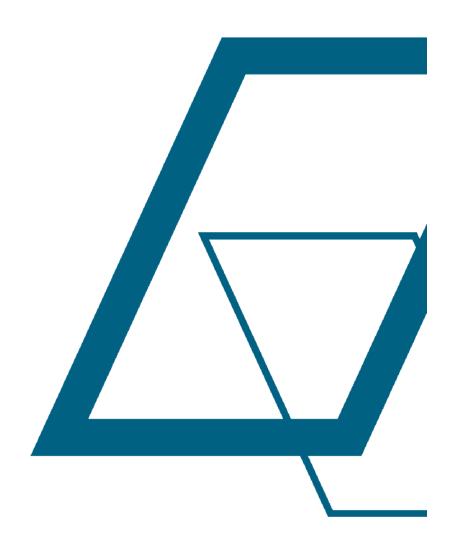
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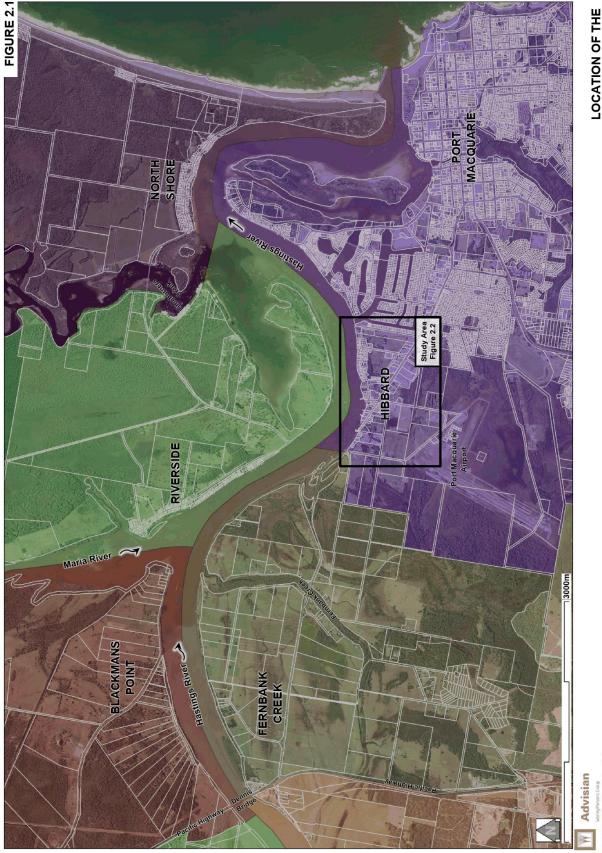


Port Macquarie Hastings Council

Hibbard Precinct Flood Study

Figures



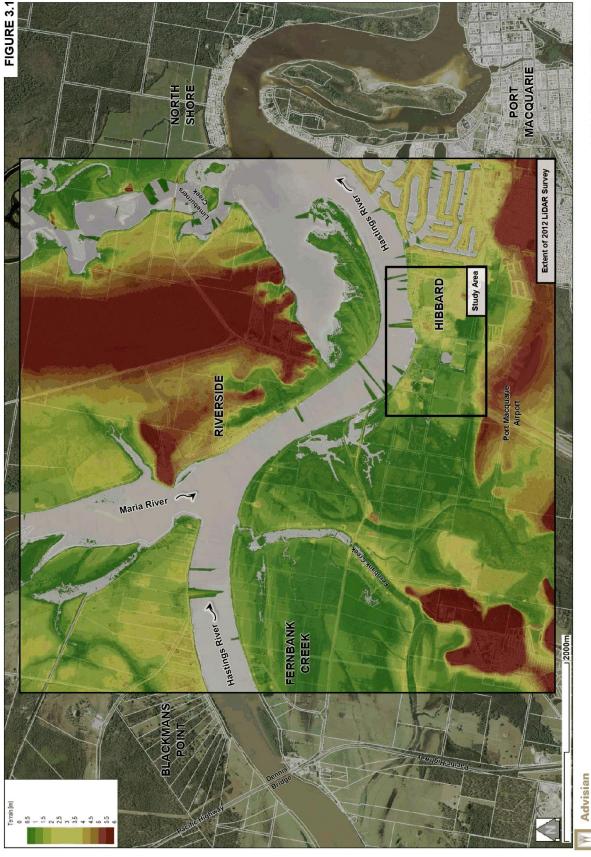


whring/Parsons Erroup 301015-03826-Hibbard Floodway Investigation fg301015-03826Ht80904_Fig 2.1 Shudy Area docx

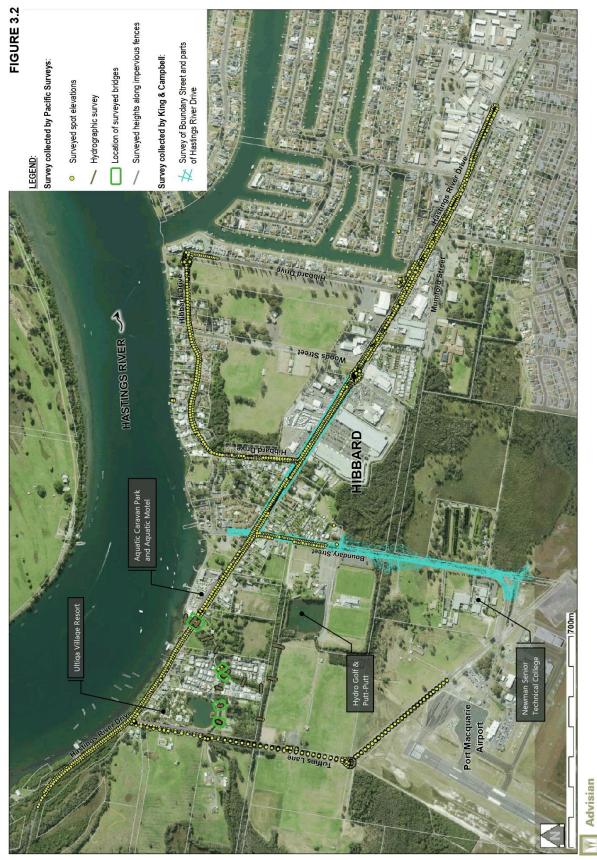


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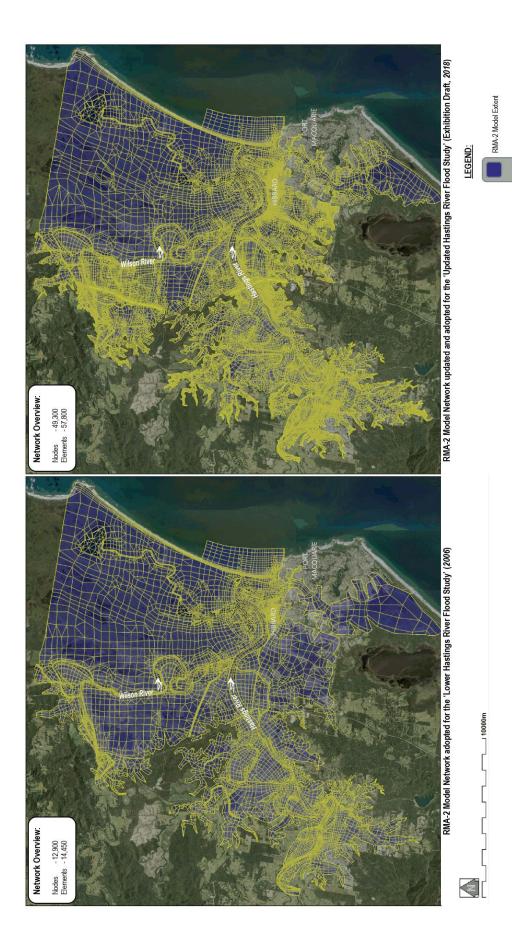
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RMA-2 Model Network//Grid

COMPARISON OF 2006 AND 2018 FLOOD STUDY RMA-2 NETWORKS [Overview]



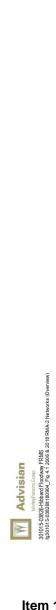
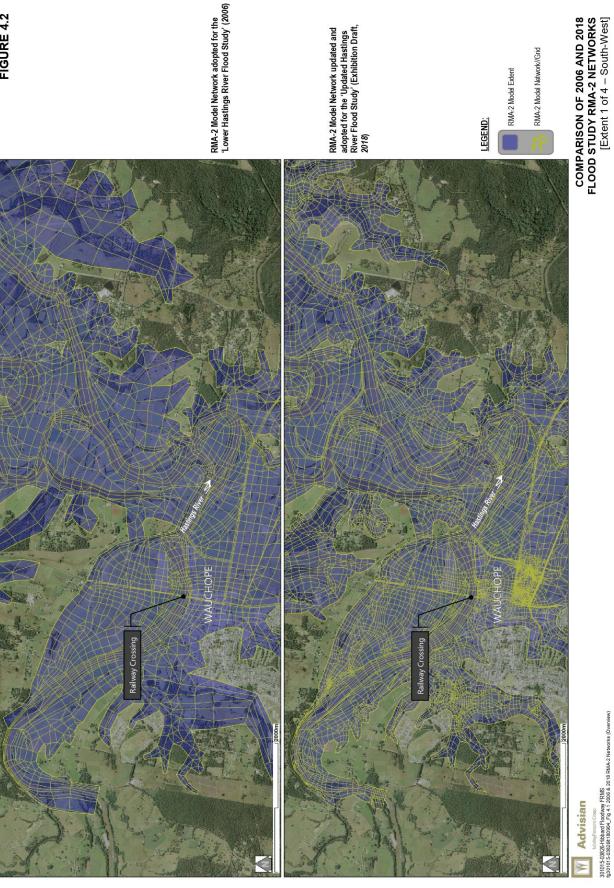
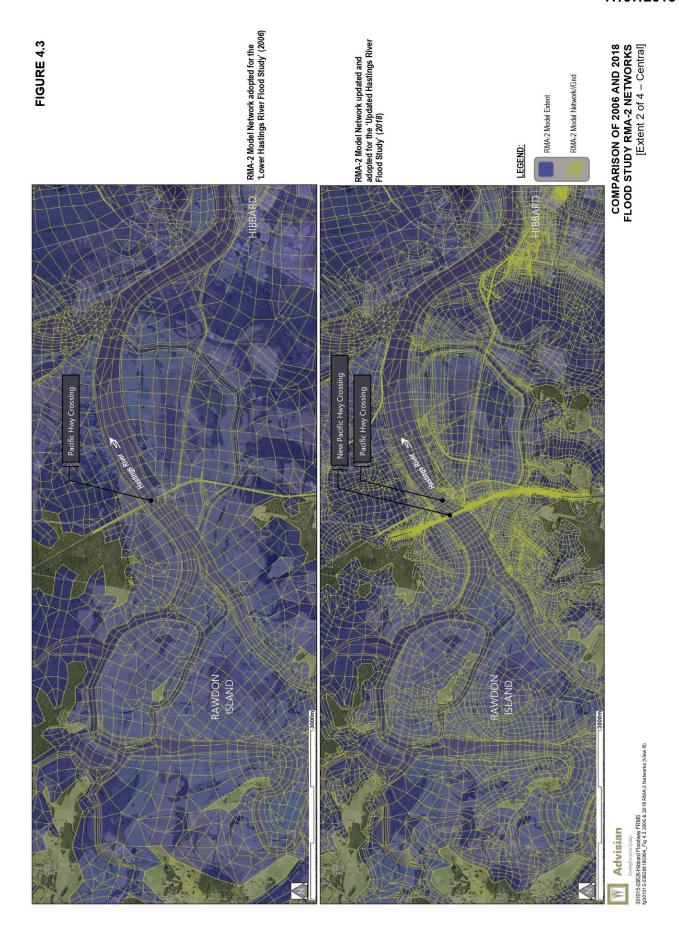
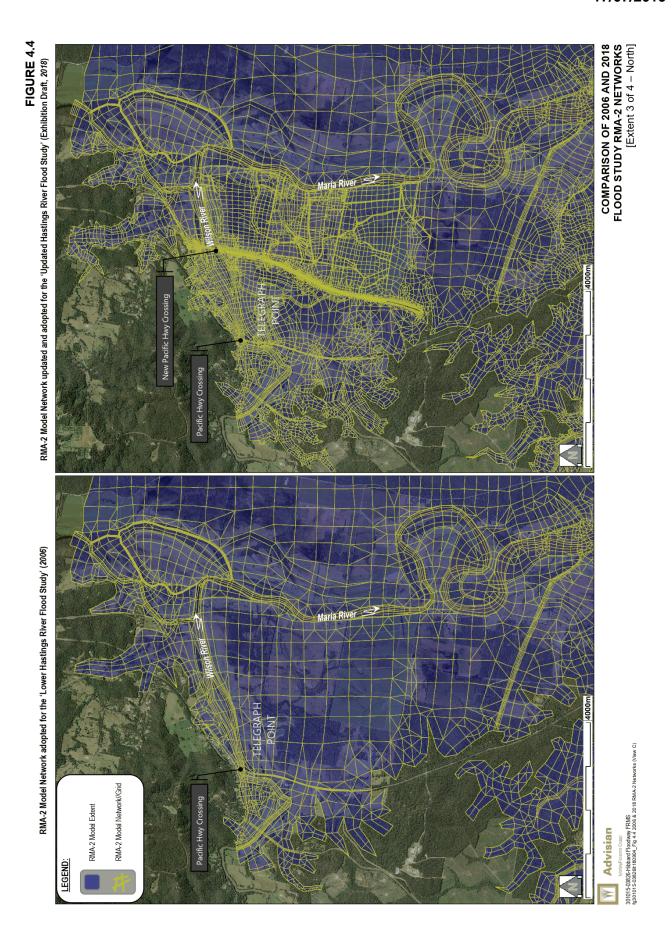


FIGURE 4.2



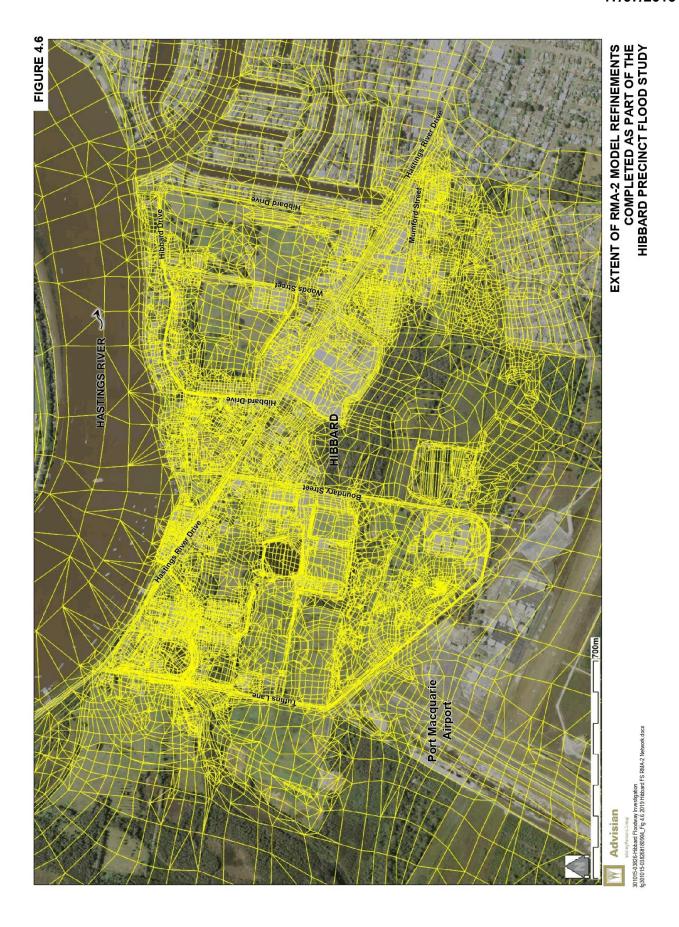


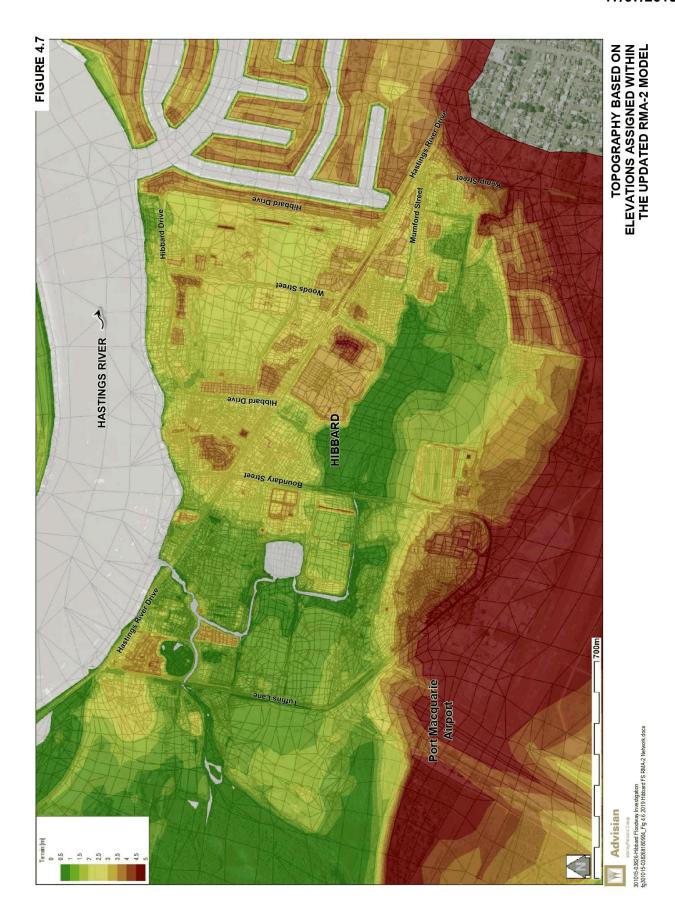


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FIGURE 4.5 RMA-2 Model Network updated and adopted for the 'Updated Hastings River Flood Study' (Exhibition Draft, 2018) COMPARISON OF 2006 AND 2018 FLOOD STUDY RMA-2 NETWORKS [Extent 4 of 4 - South East/Town] John Oxley Highwa RMA-2 Model Network adopted for the 'Lower Hastings River Flood Study' (2006) 001015-03826-Hibbard Floodway FRMS 9301015-03826k 180904_Fig 4.5 2006 & 2018 RMA-2 Networks (View D) RMA-2 Model Network//Grid RMA-2 Model Extent Advisian LEGEND:

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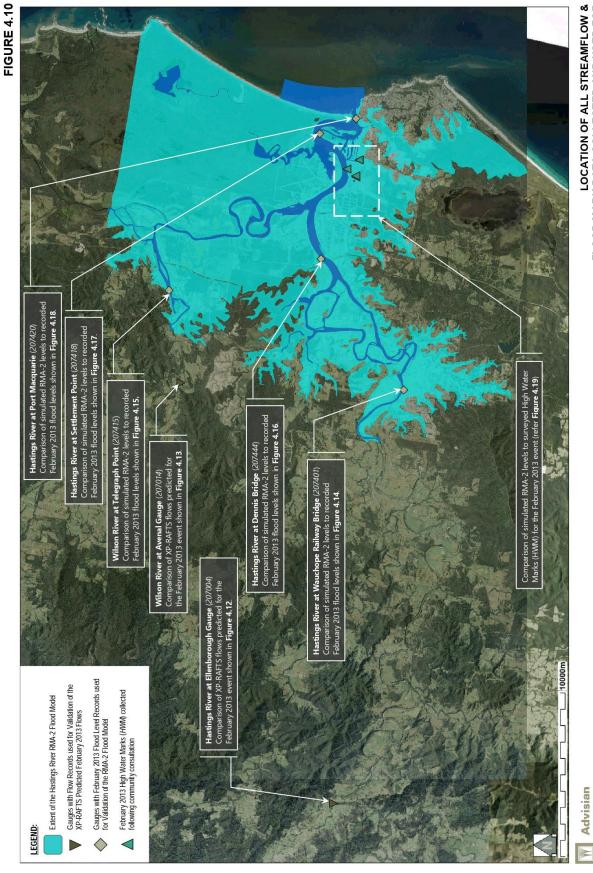


LOCATION AND SURVEYED ELEVATION OF THE HIGH WATER MARKS COLLECTED FOR THE FEBRUARY 2013 EVENT



301015-03826-Hibbard Floodway FRMS 1g301015-03826g180718_Fig 4.9 - Feb 2013 Flood Marks.doox

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LOCATION OF ALL STREAMFLOW & FLOOD MARK DATA COLLECTED AND USED FOR VALIDATION TO THE FEBRUARY 2013 EVENT

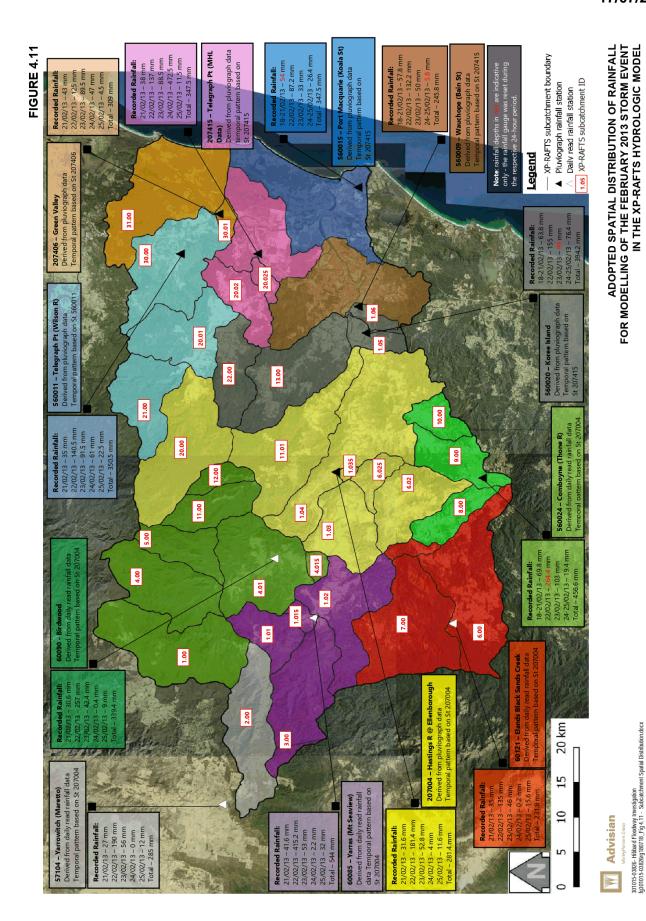
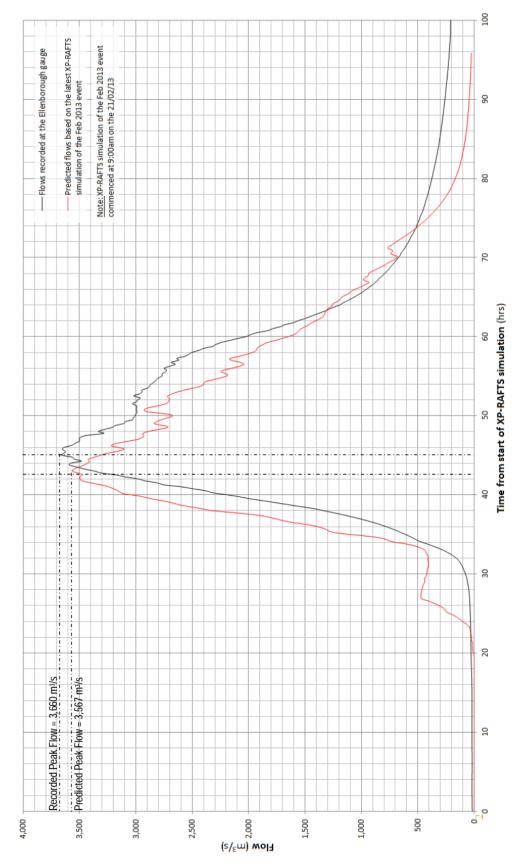
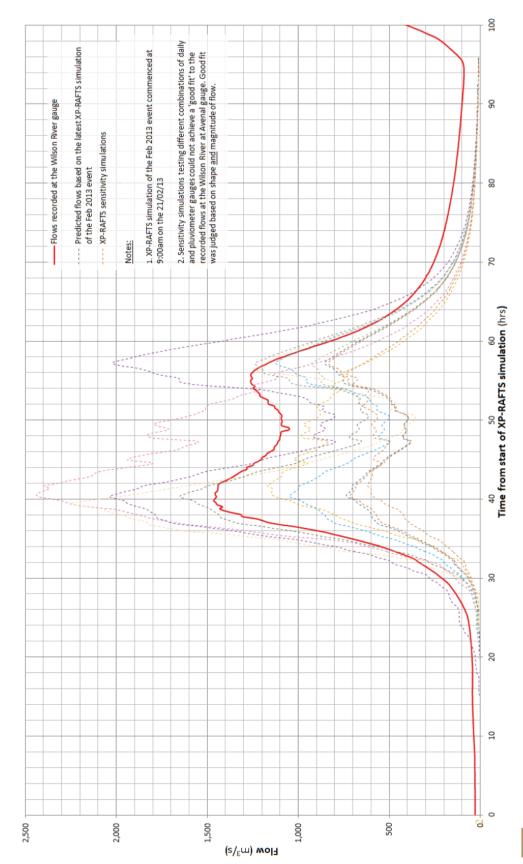


FIGURE 4.12



COMPARISON OF PREDICTED XP-RAFTS FLOWS TO RECORDED FLOWS AT THE ELLENBOROUGH GAUGE (207004)

FIGURE 4.13



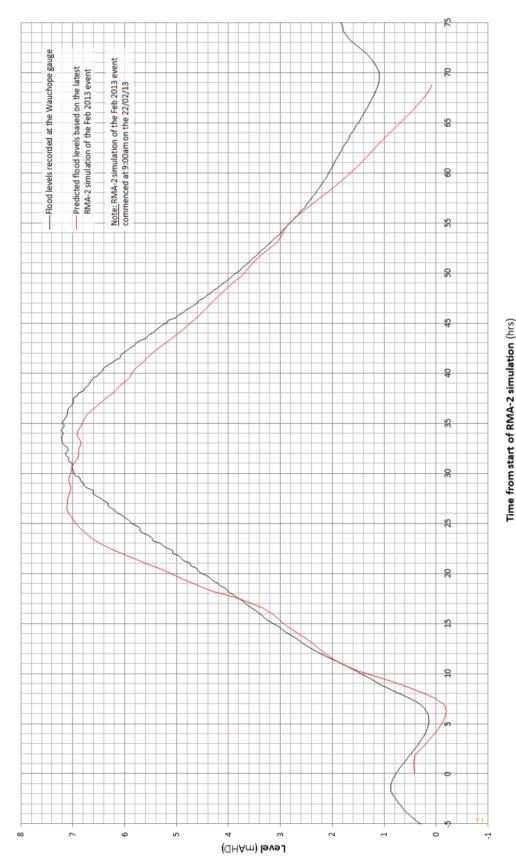
COMPARISON OF PREDICTED XP-RAFTS FLOWS TO RECORDED FLOWS AT THE WILSON RIVER AT AVENAL GAUGE (207014)

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COMPARISON OF PREDICTED RMA-2 FLOOD LEVELS TO RECORDED LEVELS AT THE HASTINGS RIVER AT WAUCHOPE GAUGE (207401)

FIGURE 4.14



301015-03826-Hitbeard Floodway FRMS fg301015-03826eg180718_Fig 4.14 - RMA-2 Validation to Wauchope Gauge docx

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COMPARISON OF PREDICTED RMA-2 FLOOD LEVELS TO RECORDED LEVELS AT THE WILSON RIVER AT TELEGRAPH POINT GAUGE (207415)

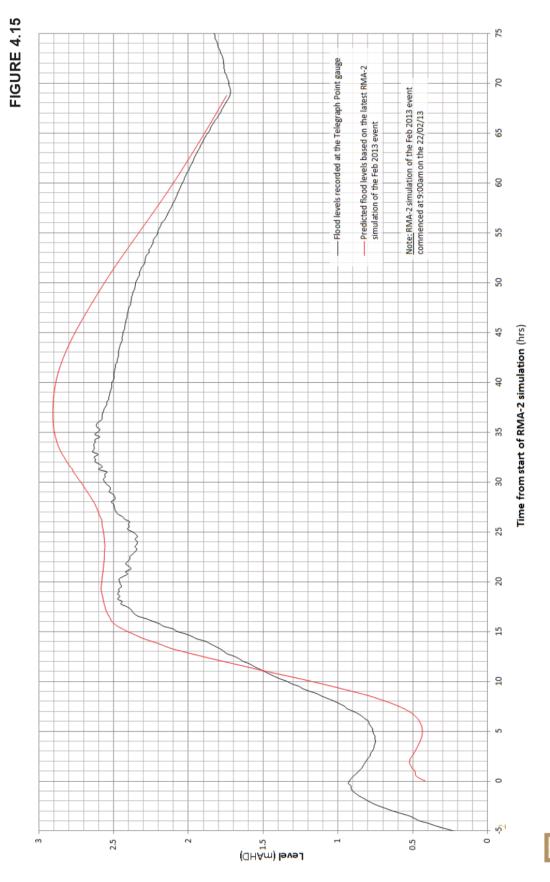
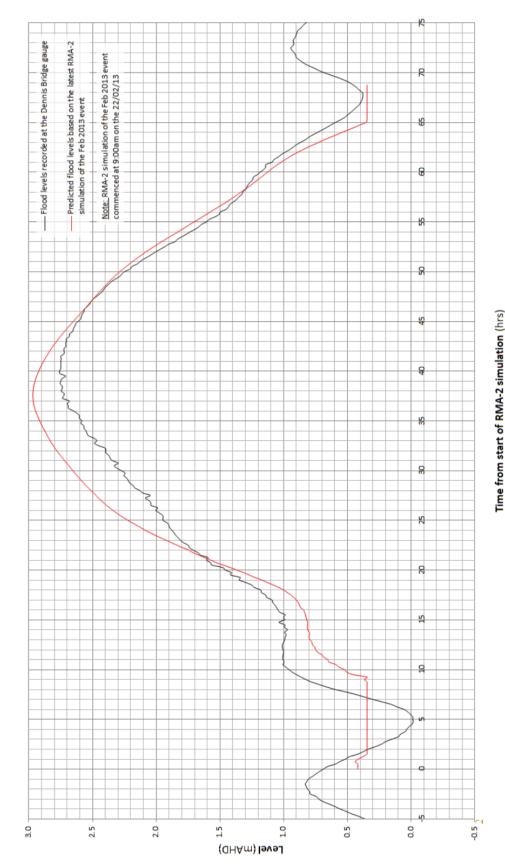


FIGURE 4.16

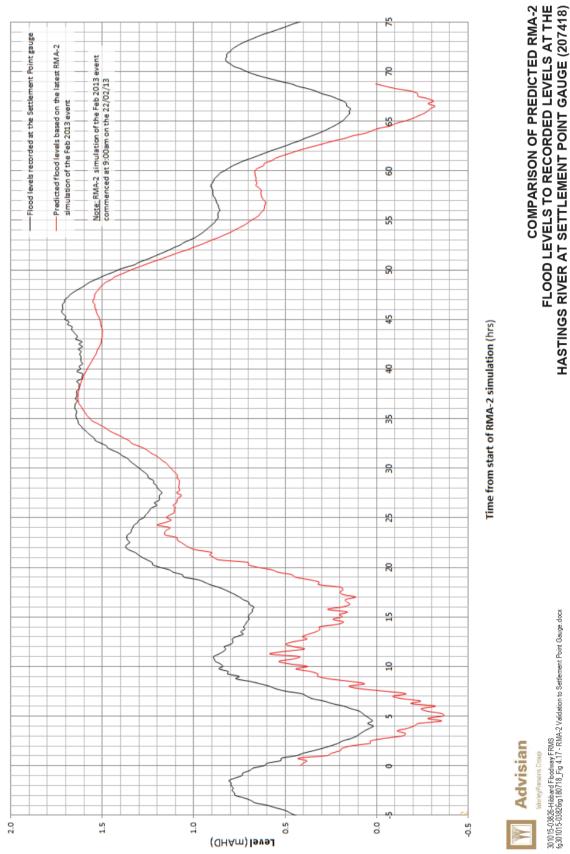


COMPARISON OF PREDICTED RMA-2 FLOOD LEVELS TO RECORDED LEVELS AT THE HASTINGS RIVER AT DENNIS BRIDGE GAUGE (207444)

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19301015-03826g180718_Fg 4.16 - RMA-2 Validation to Dennis Bridge Gaugedocx

FIGURE 4.17



301015-03826-Hibbard Floodway FRMS 1g301015-03826g180718_Fig 4.17 - RMA-2 Validation to Settlement Point Gauge. doox

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FIGURE 4.18

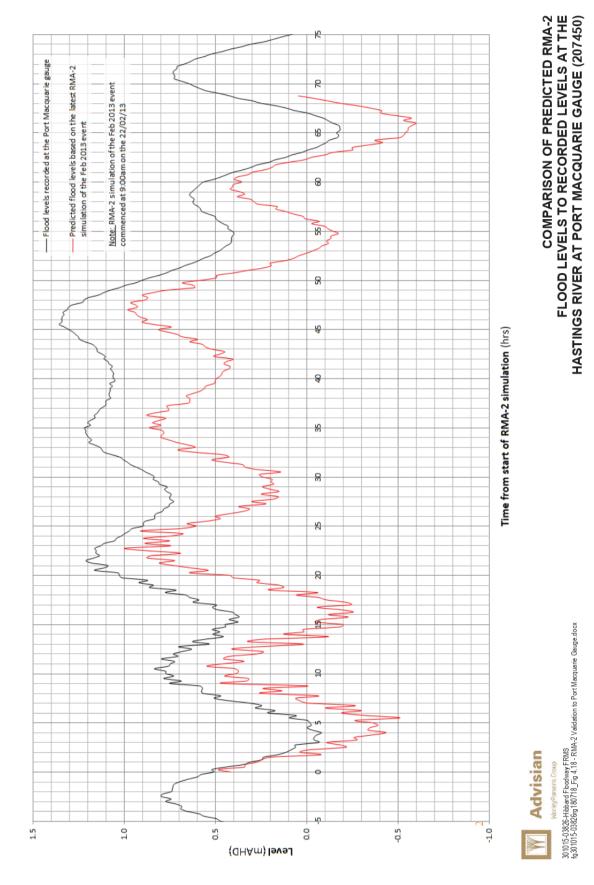


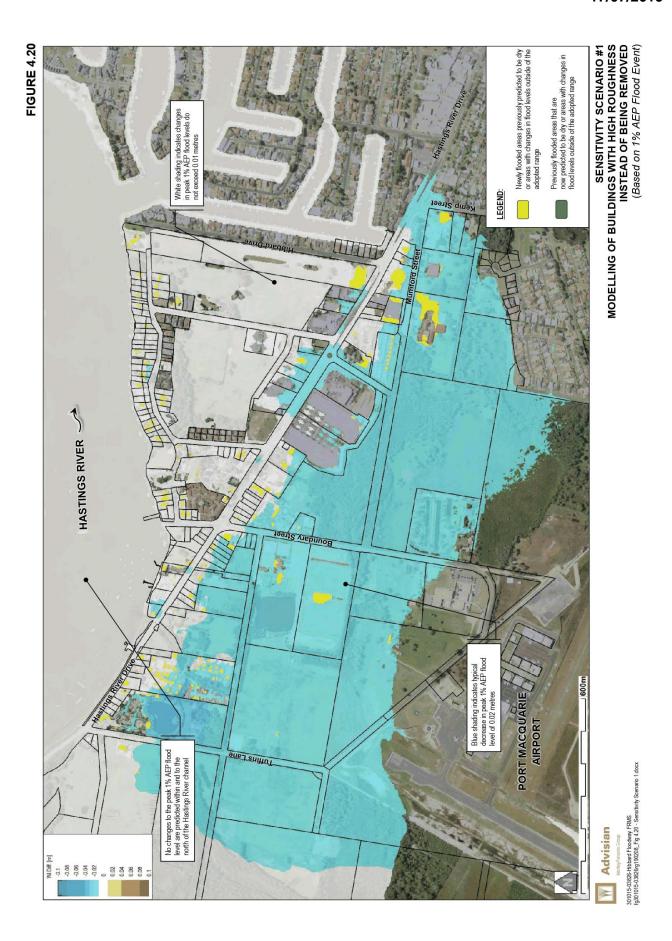
FIGURE 4.19

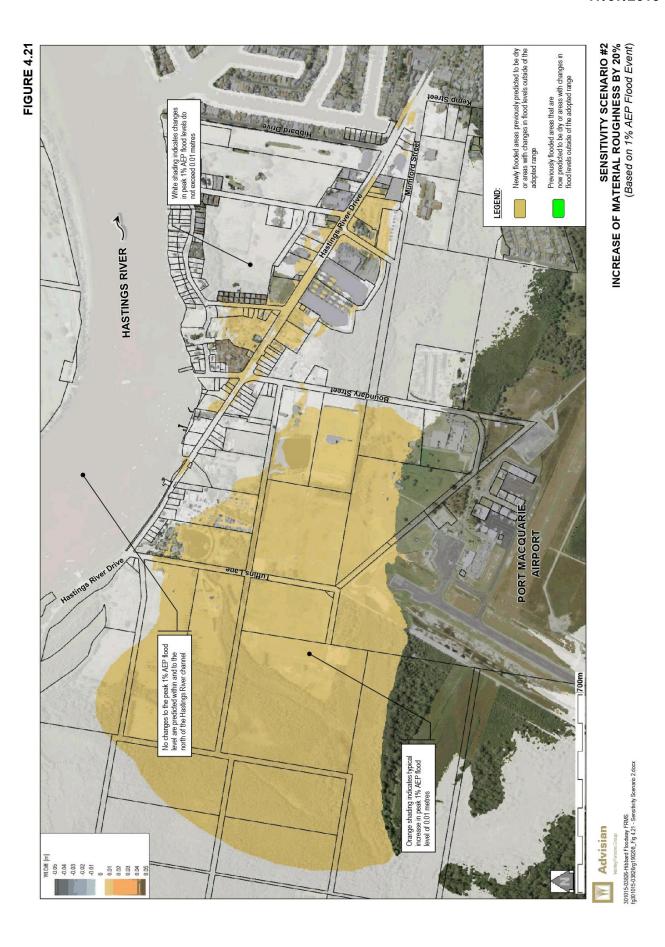


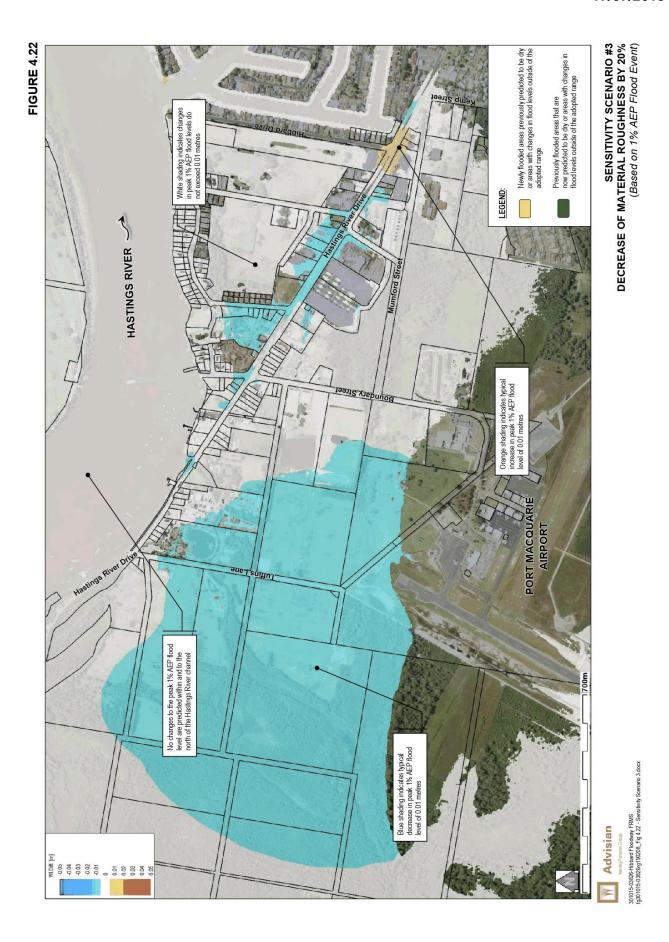
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301015-03828-Hibbard Floodway FRMS 1g301015-03826g180718_Fig 4:19 - Feb 2013 RMA-2 Validation to HWM docx

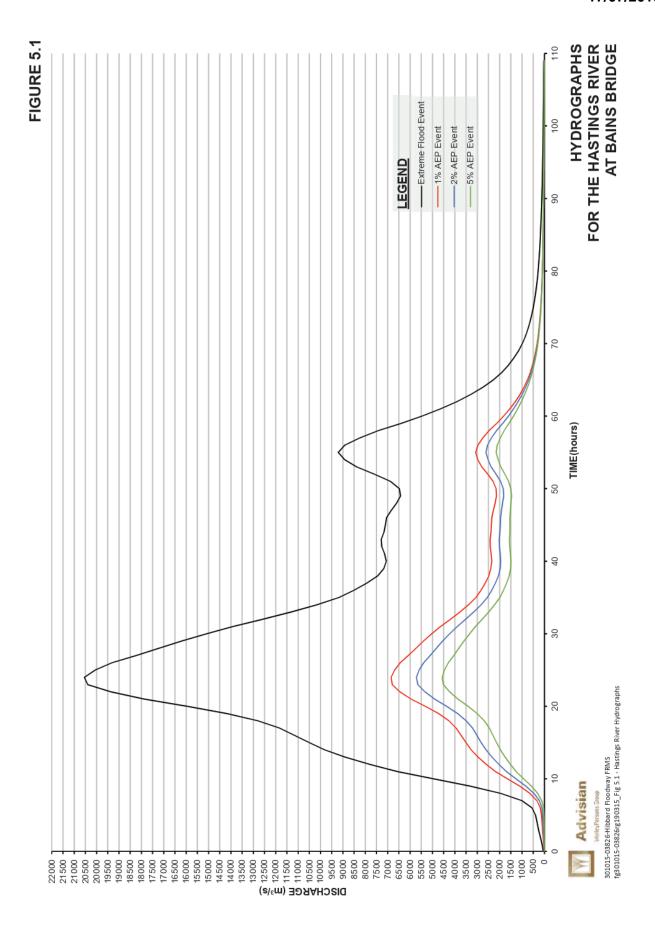




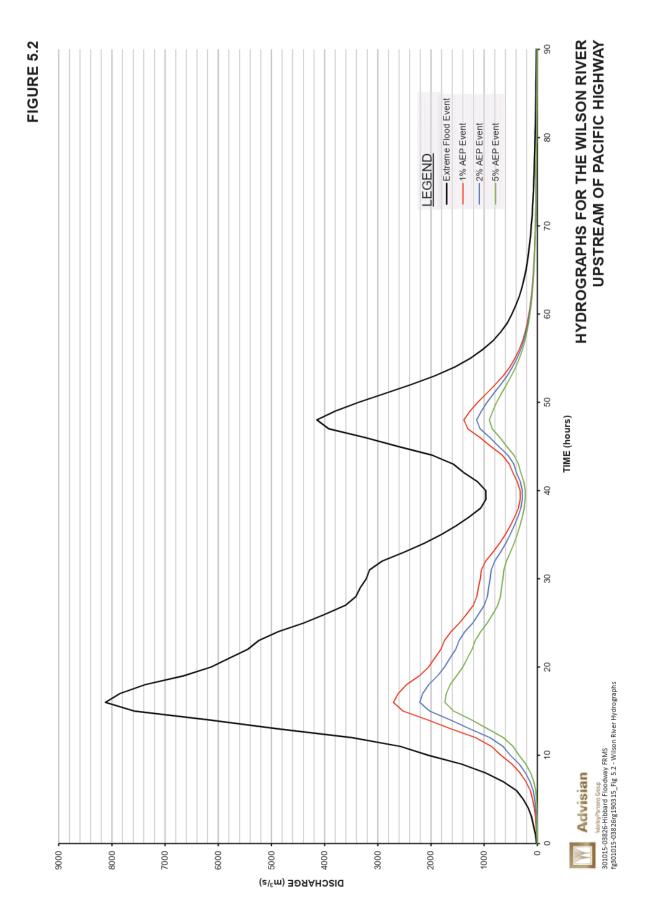


SENSITIVITY SCENARIO #4
ADOPTION OF LOCAL TAILWATER LEVELS
(Based on 1% AEP Flood Event) **FIGURE 4.23** Newly flooded areas previously predicted to be dry or areas with changes in flood levels outside of the adopted range Previously flooded areas that are now predicted to be dry or areas with changes in flood levels outside of the adopted range LEGEND: HASTINGS RIVER HITT Boundary Street Fuffins Lane Blue shading indicates typical decrease in peak 1% AEP flood level of 0.33 metres 301015-03826-Hibbard Floodway FRMS 1g301015-03826rg190208_Fig 4.23 - Sensitivity Scenario 4.docx Decrease of 0.37 metres in peak 1% AEP flood levels predicted within Hastings River channel Advisian

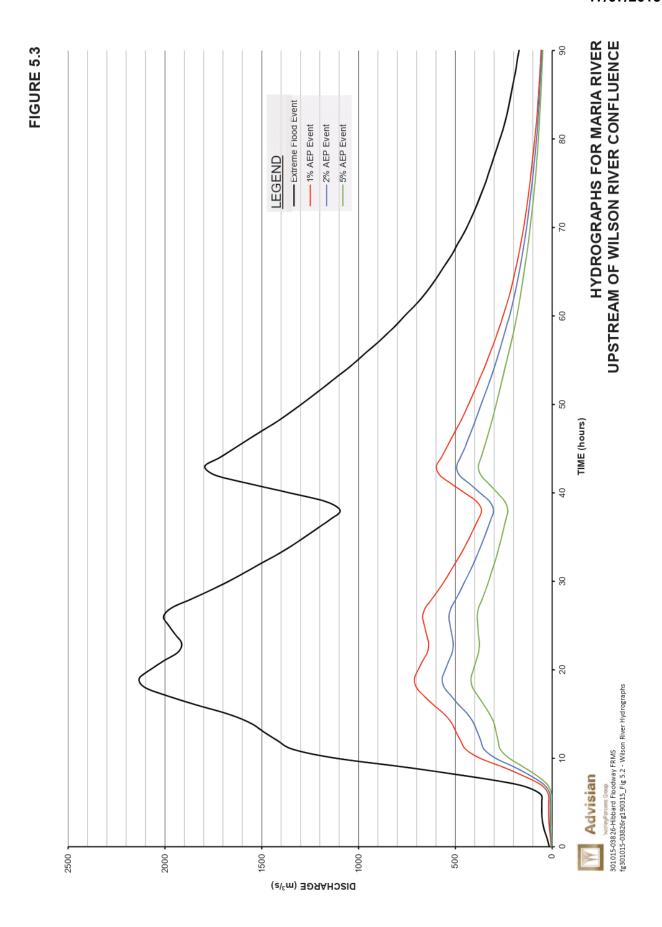
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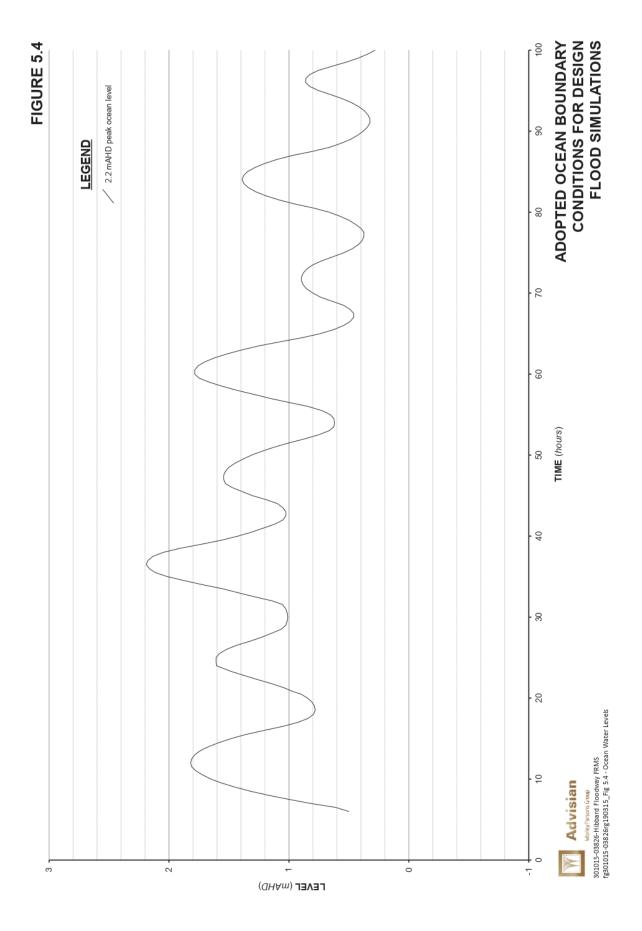
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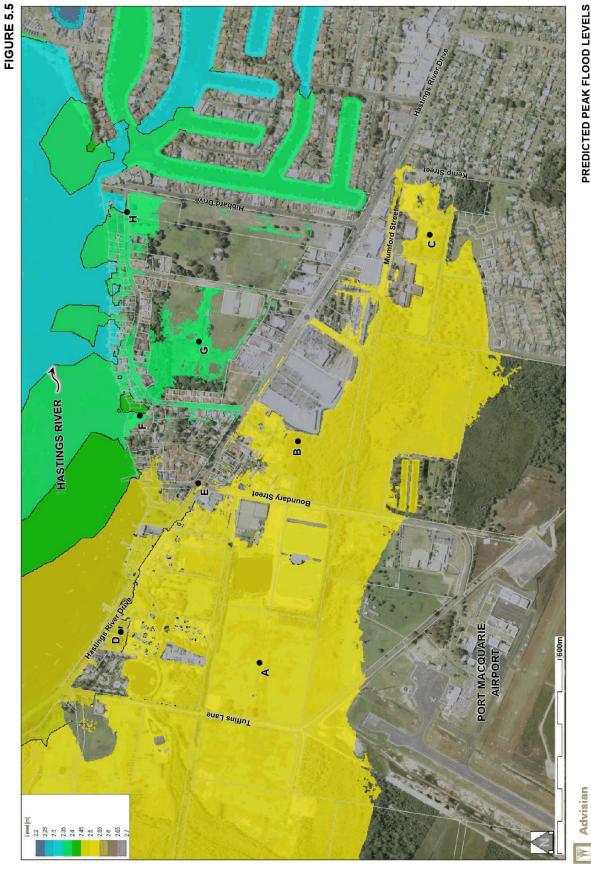


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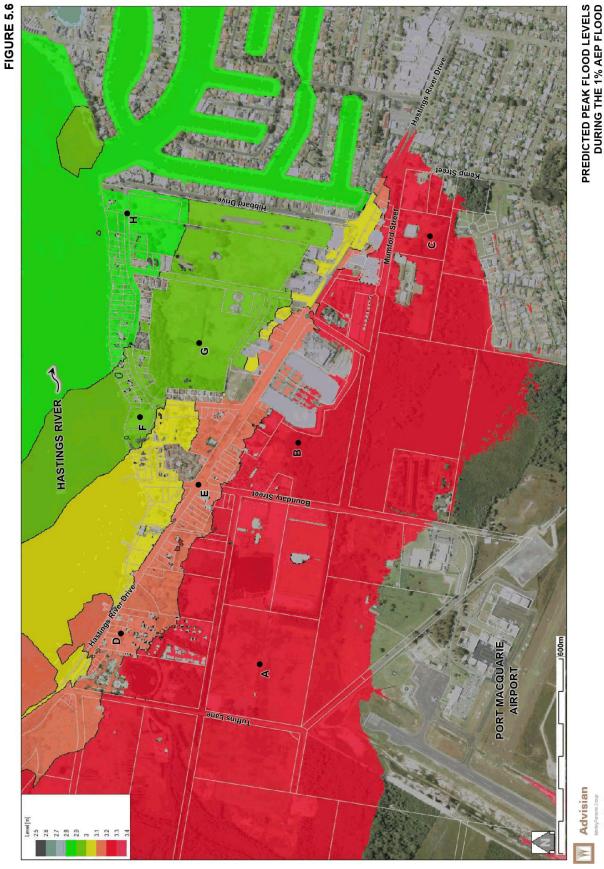


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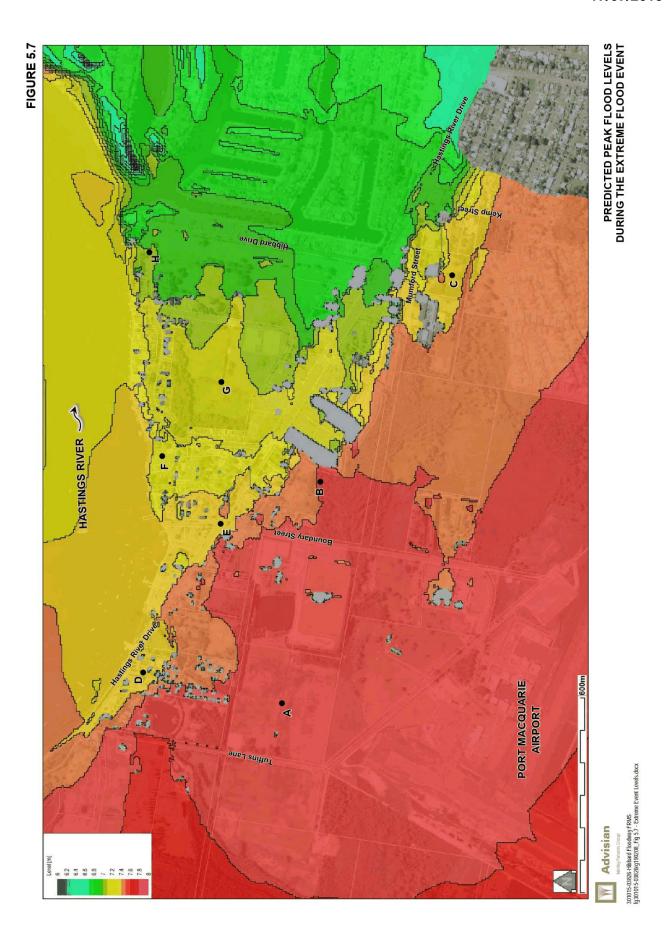
PREDICTED PEAK FLOOD LEVELS DURING THE 5% AEP FLOOD



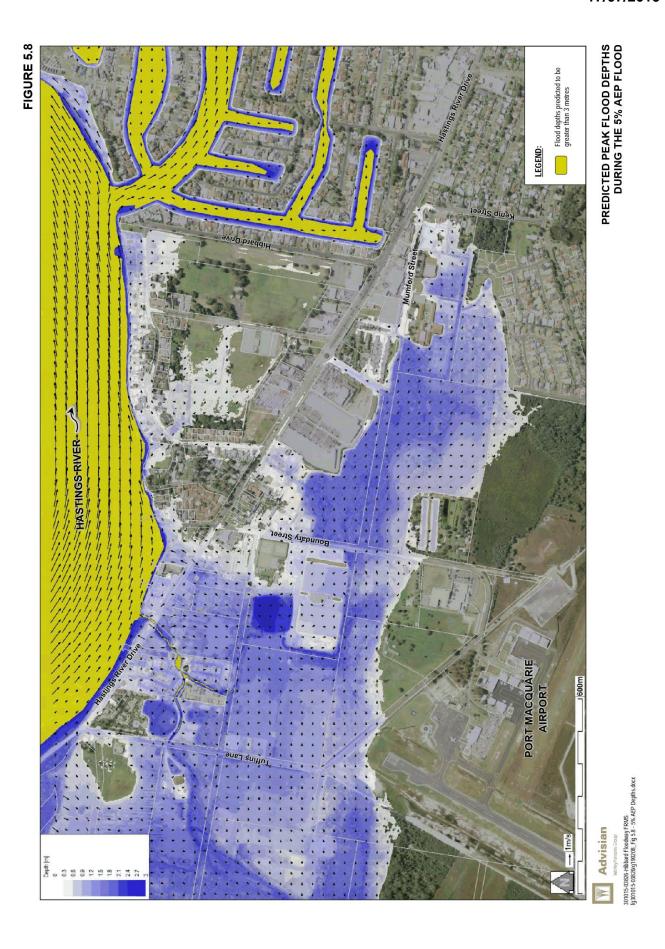
PREDICTED PEAK FLOOD LEVELS DURING THE 1% AEP FLOOD



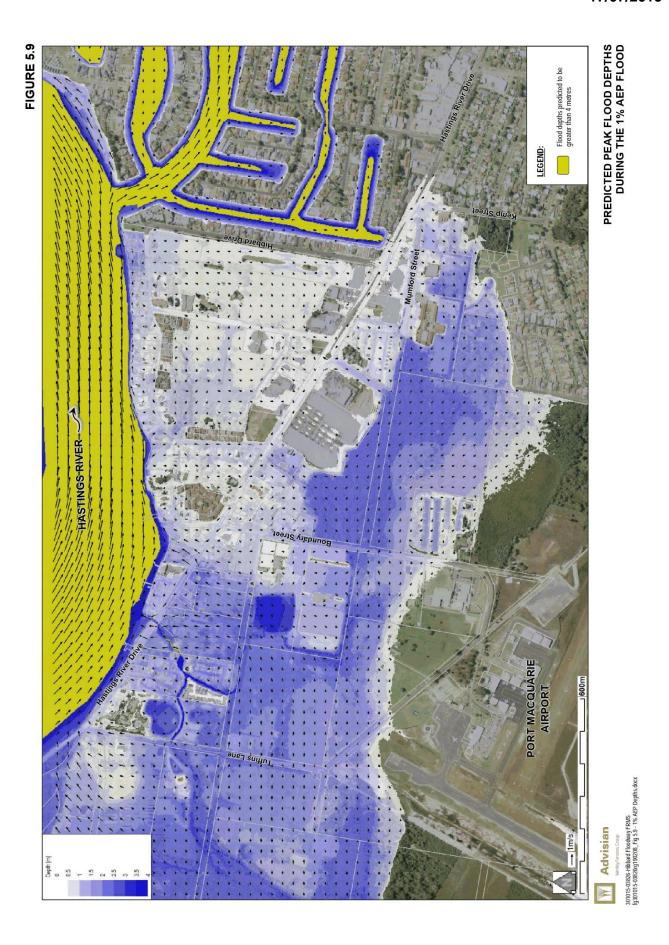
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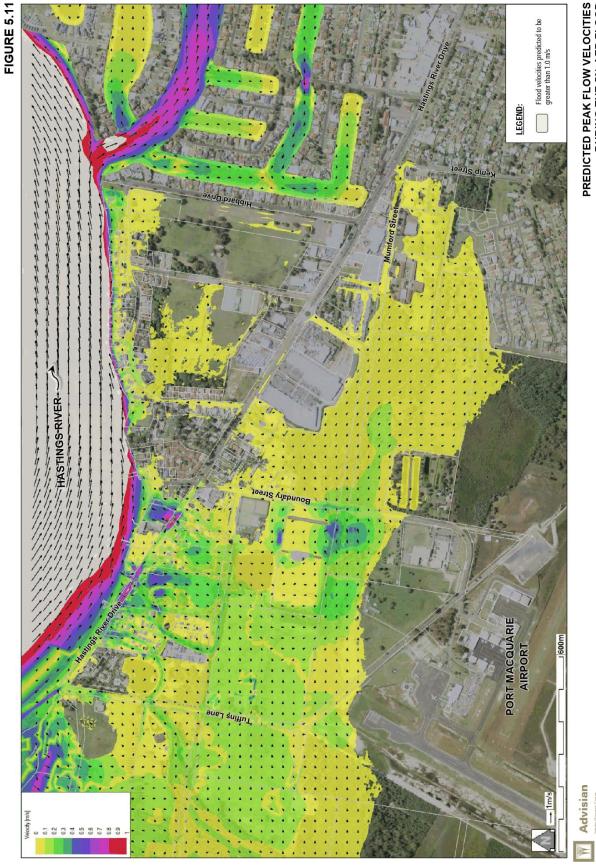
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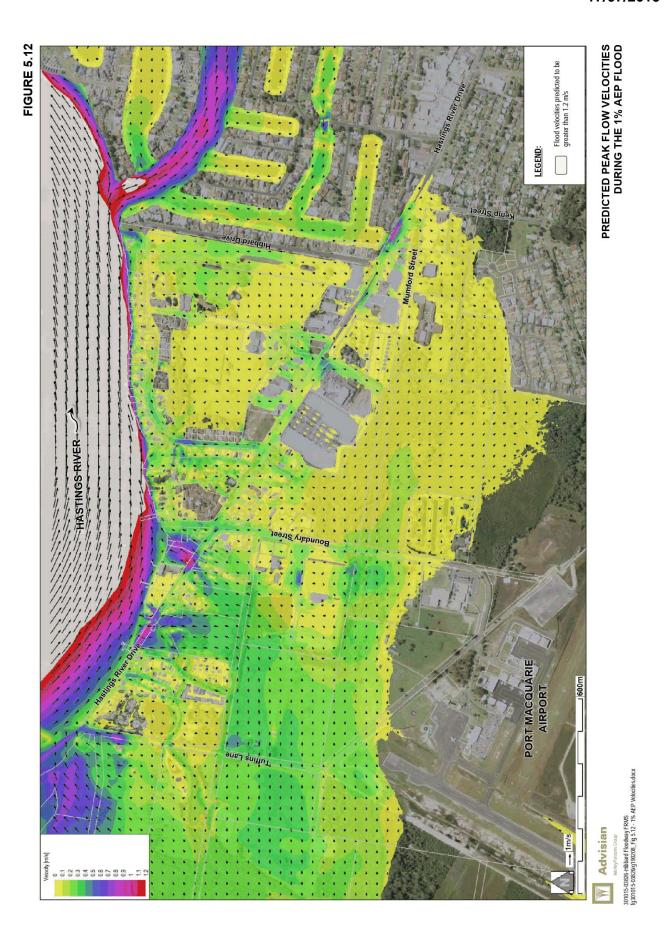
Item 13.06 Attachment 1 Page 1047



Item 13.06 Attachment 1 Page 1048



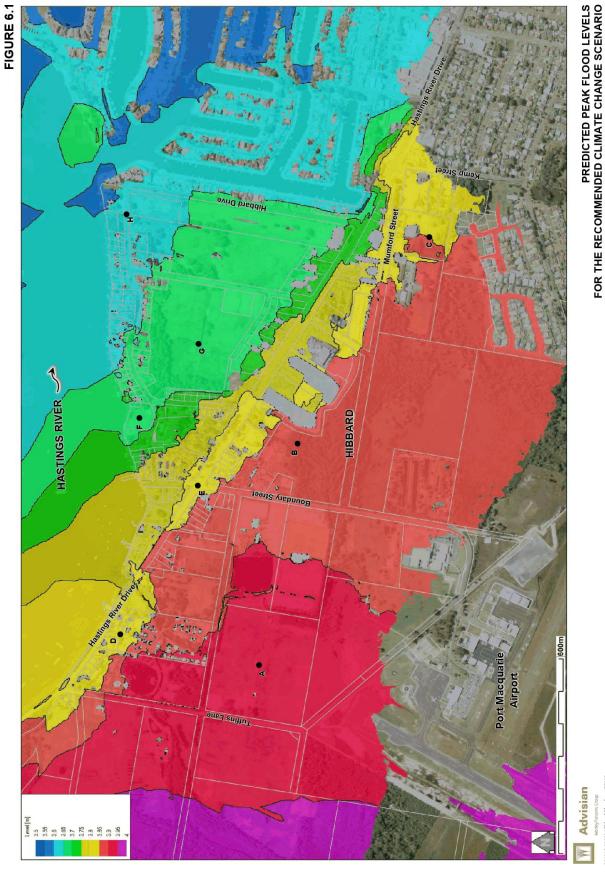
301015-03826-Hibbard Floodway FRMS 1g301015-03826rg190208_Fig 5.11 - 5% AEP Velocities.docx

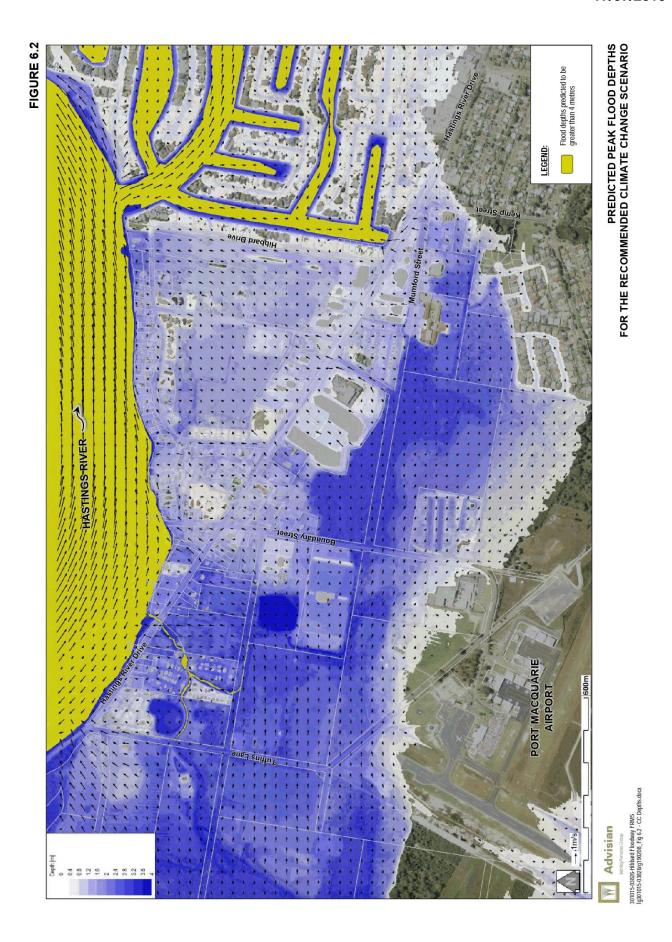


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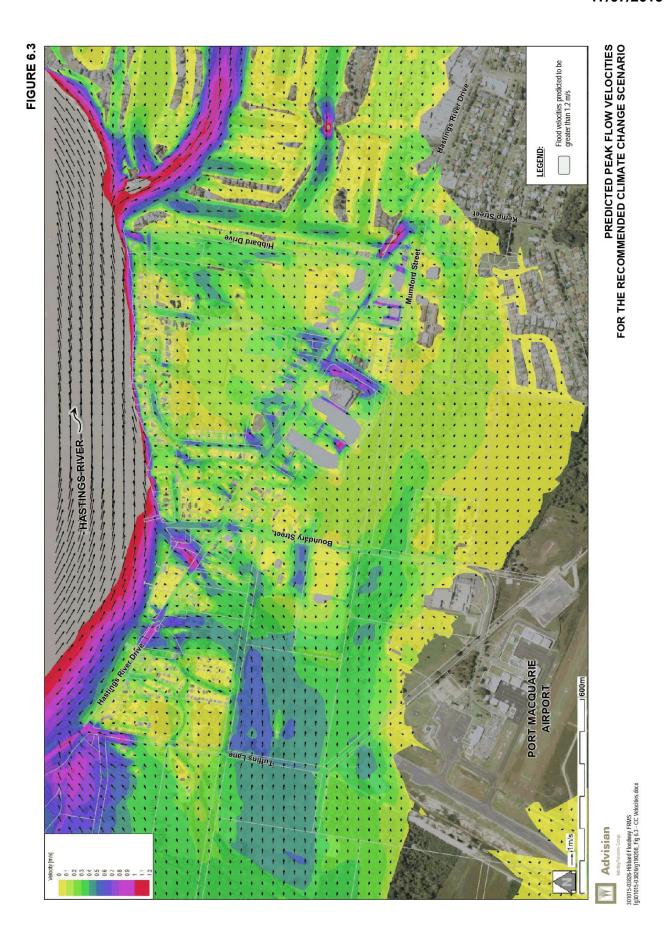


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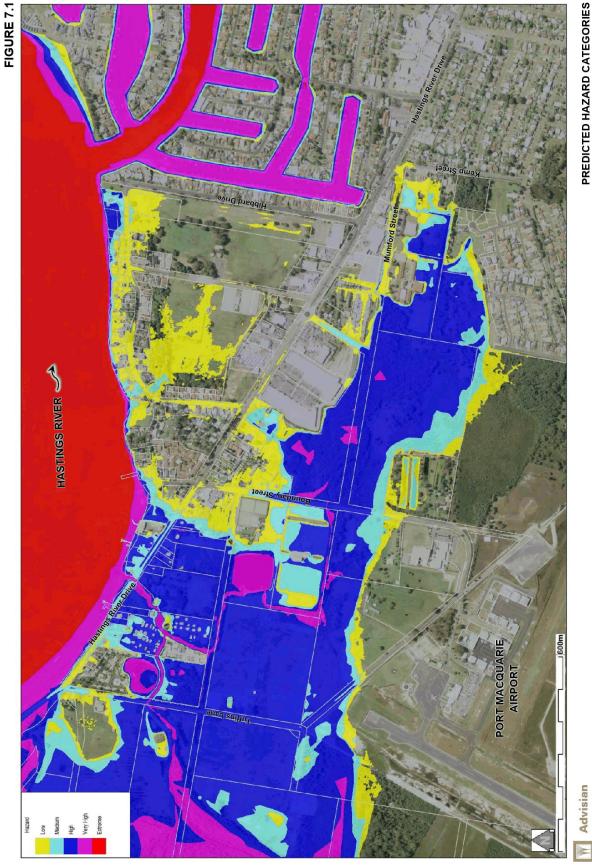


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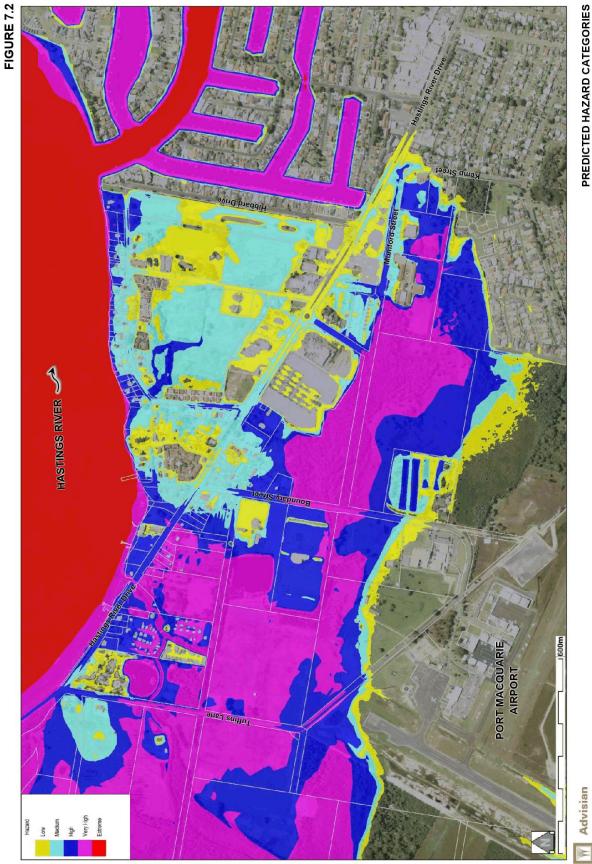


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PREDICTED HAZARD CATEGORIES FOR THE 5% AEP FLOOD

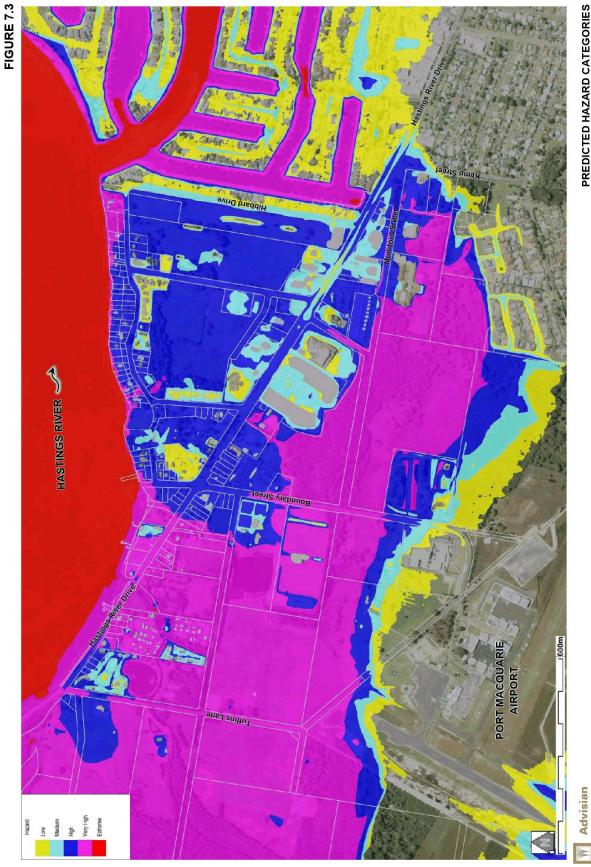


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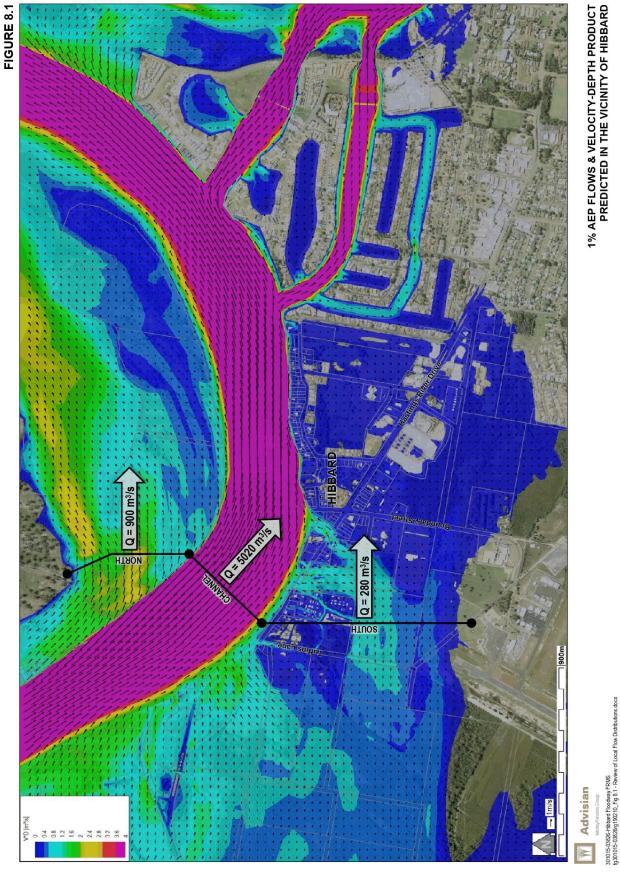


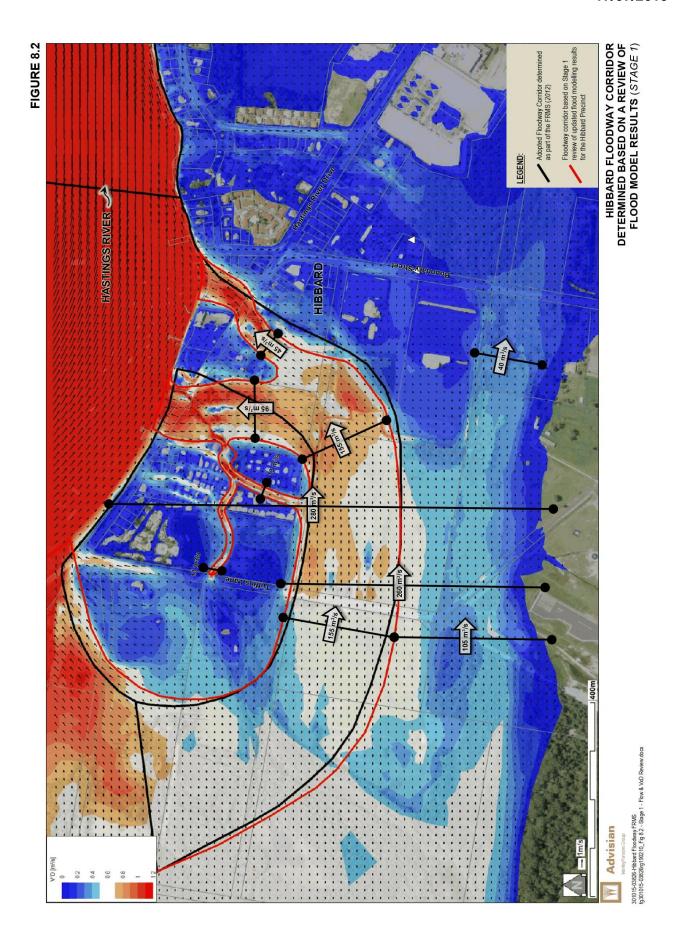
301015-03826-Hibbard Floodway FRMS 1g301015-03826rg190208_Fig 7-2 - 1% AEP Hazard.docx

PREDICTED HAZARD CATEGORIES FOR THE RECOMMENDED CLIMATE CHANGE SCENARIO

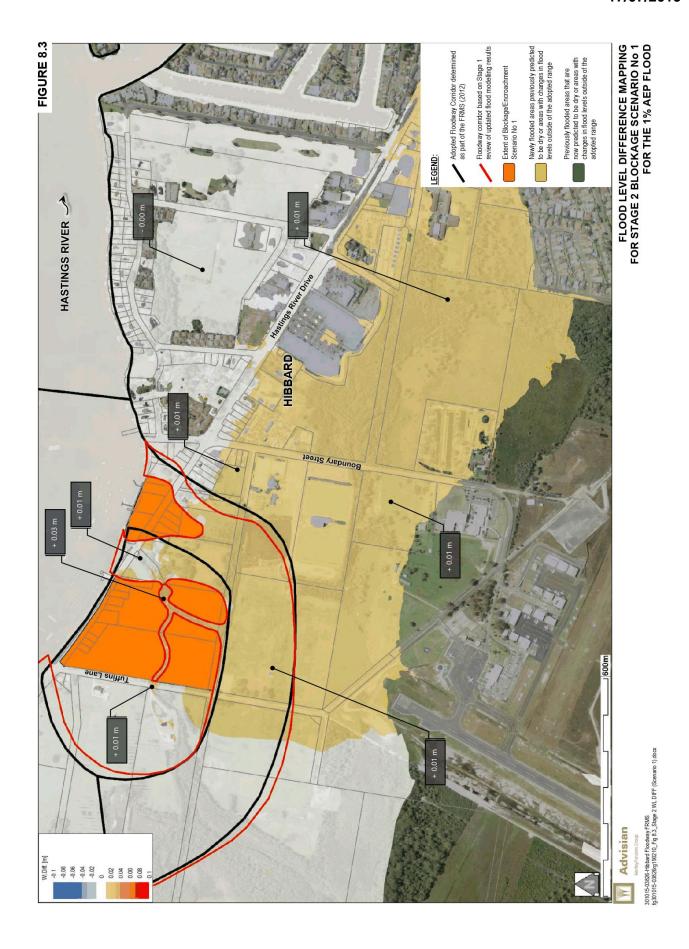


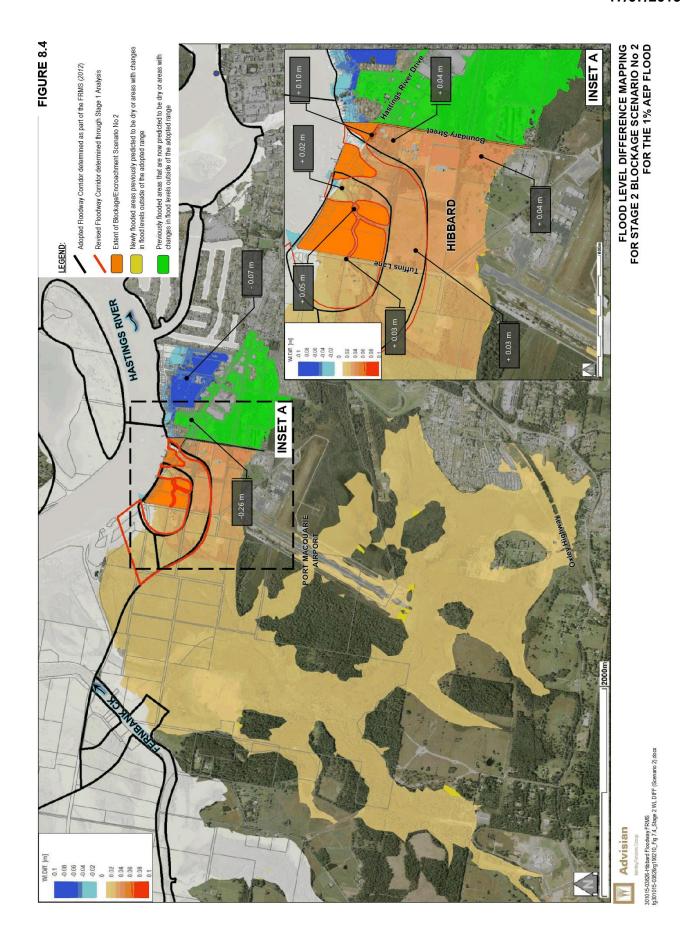
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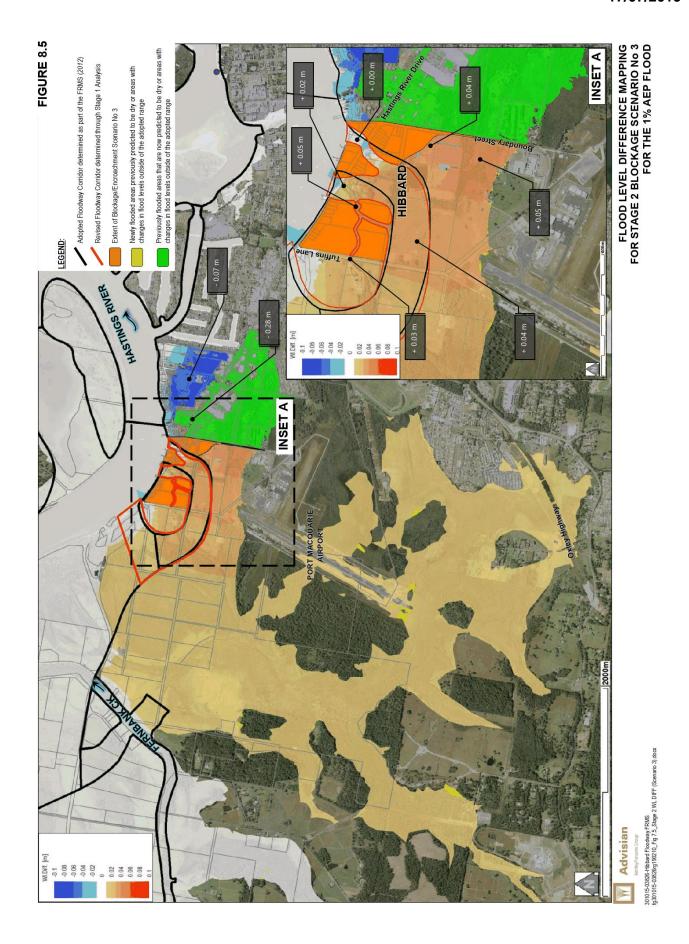


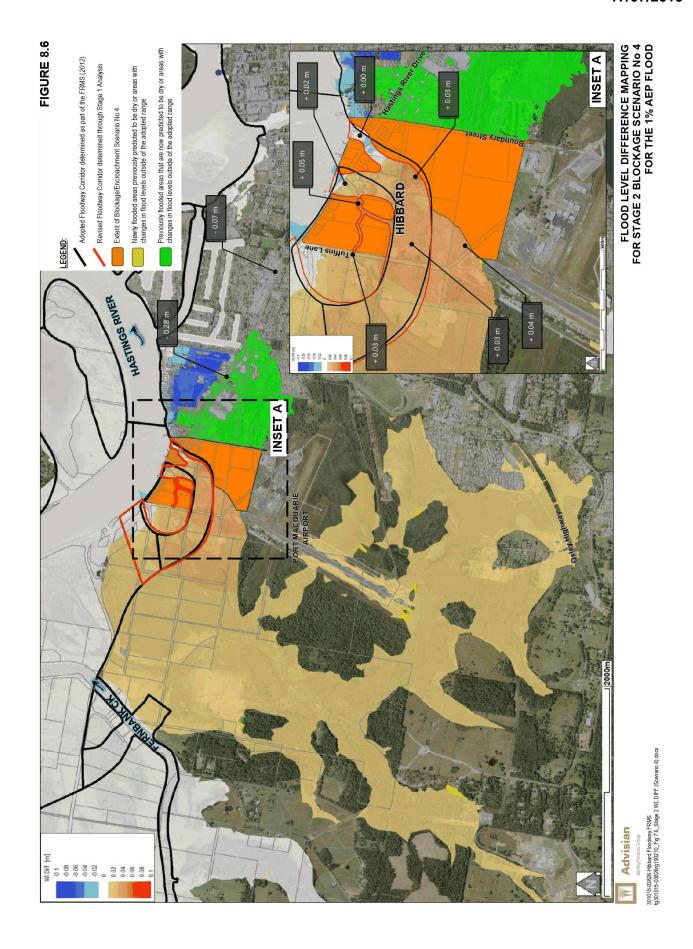


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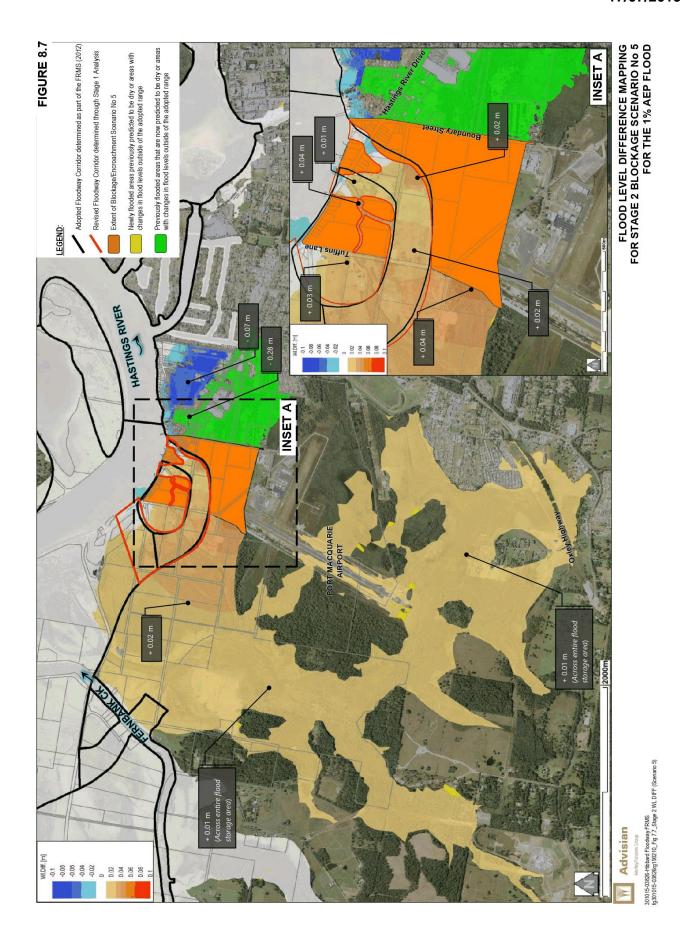


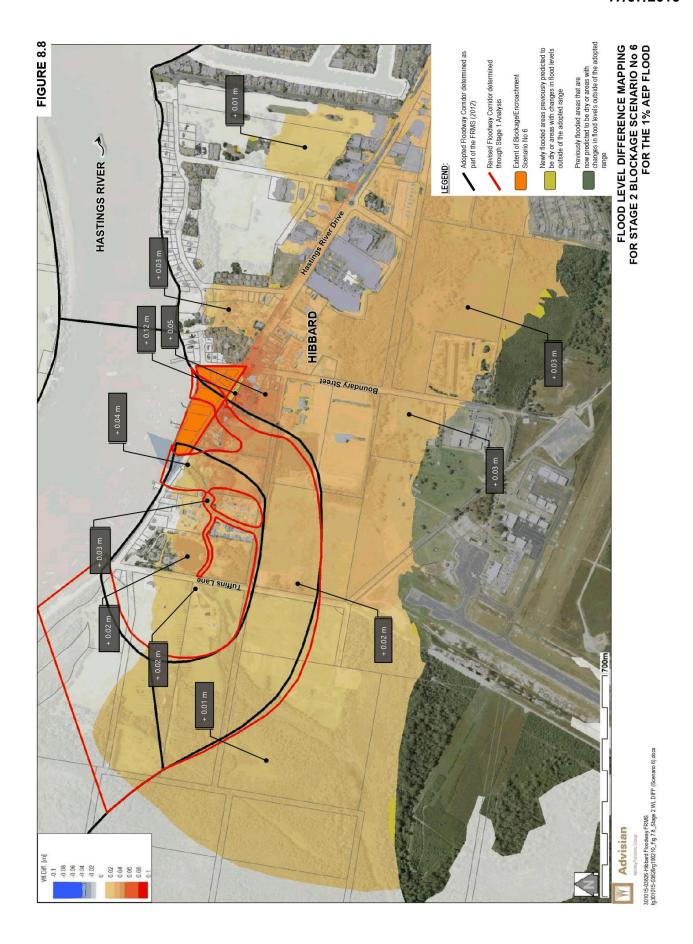


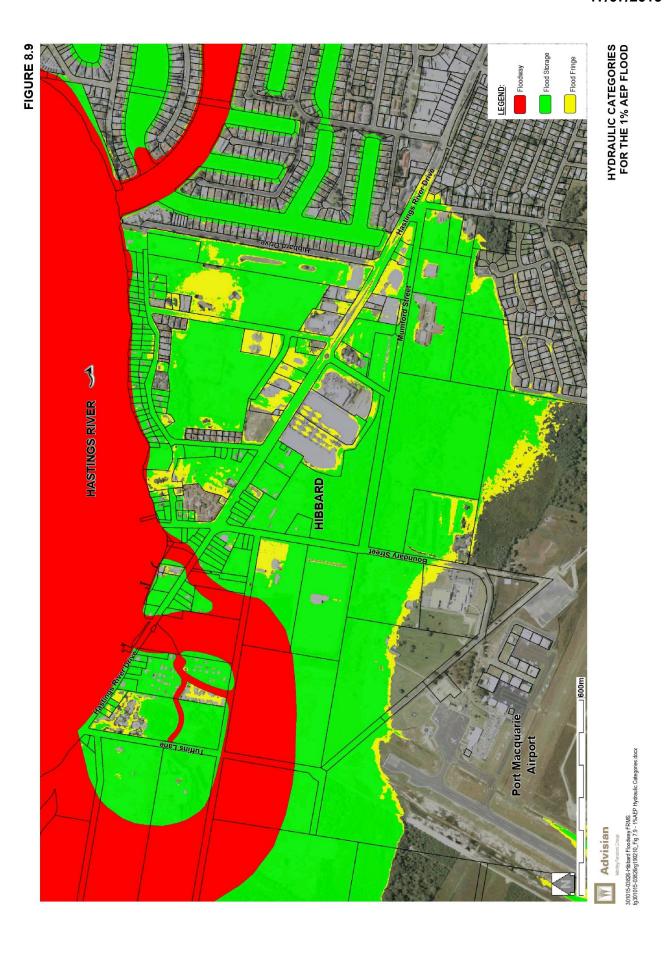




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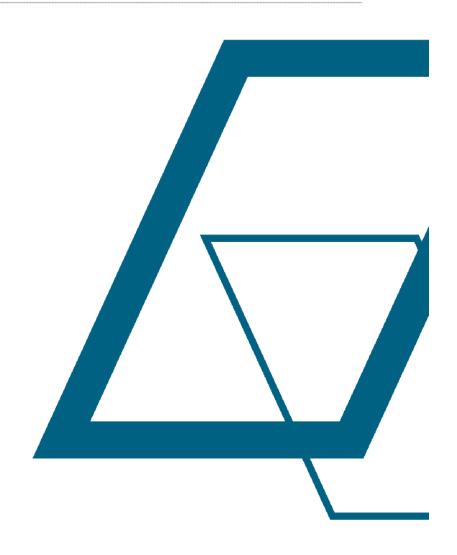


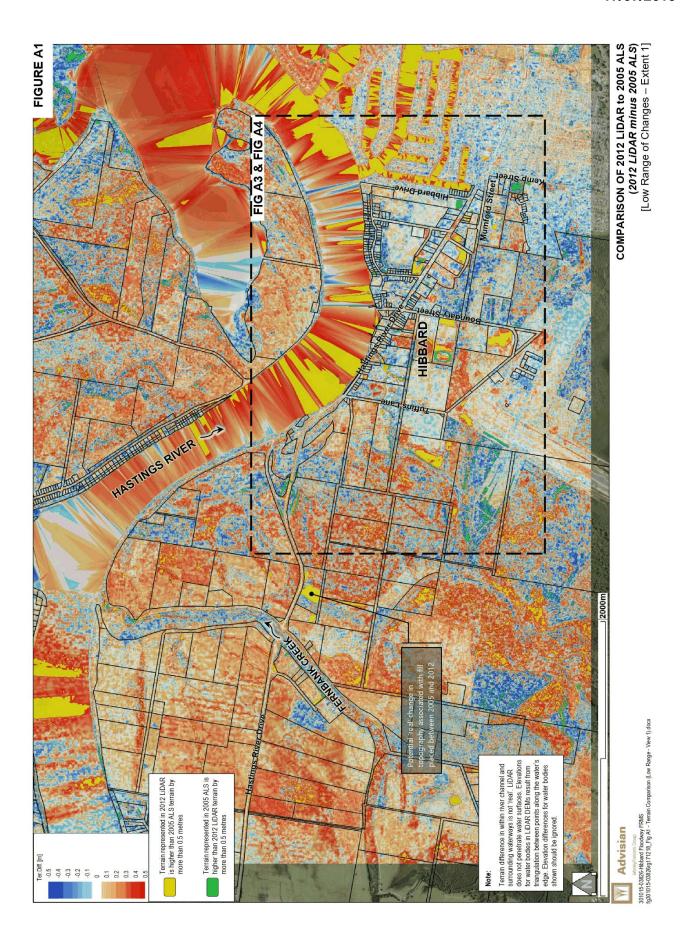
Port Macquarie Hastings Council

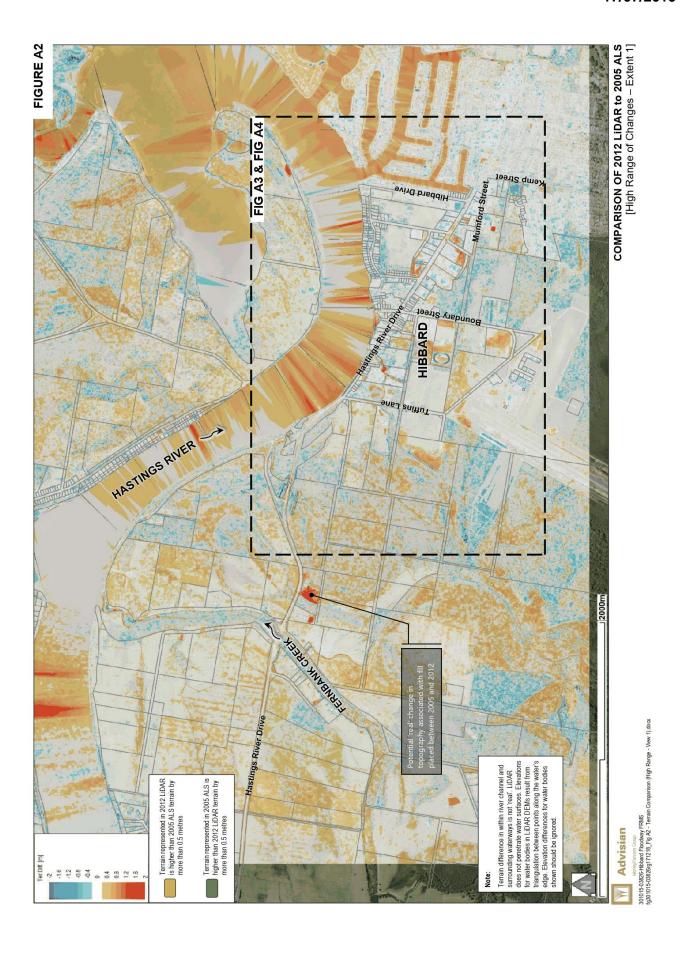
Hibbard Precinct Flood Study

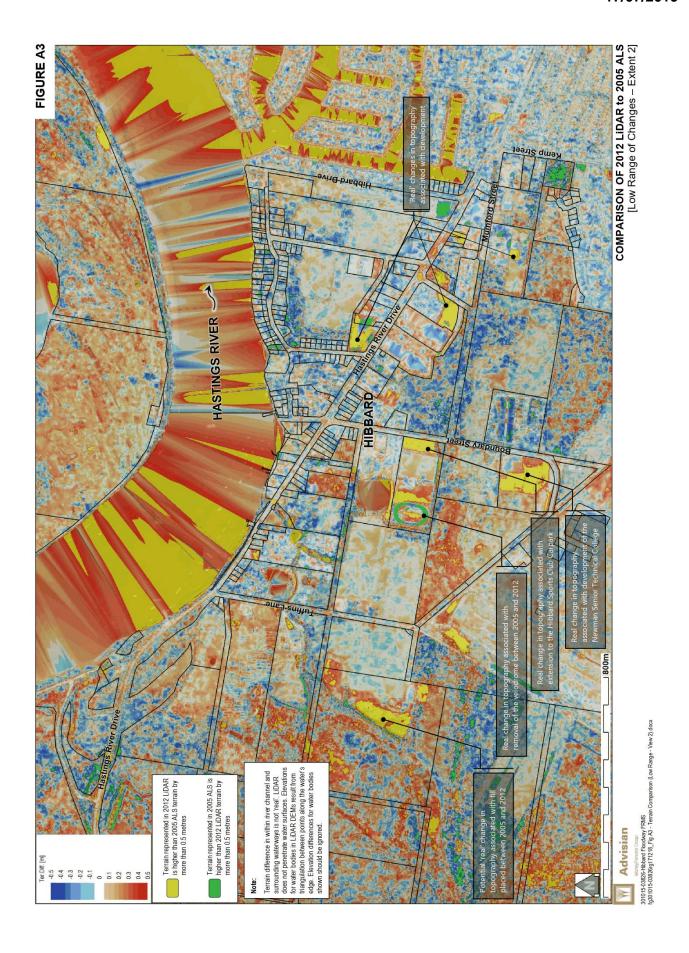
Appendix A

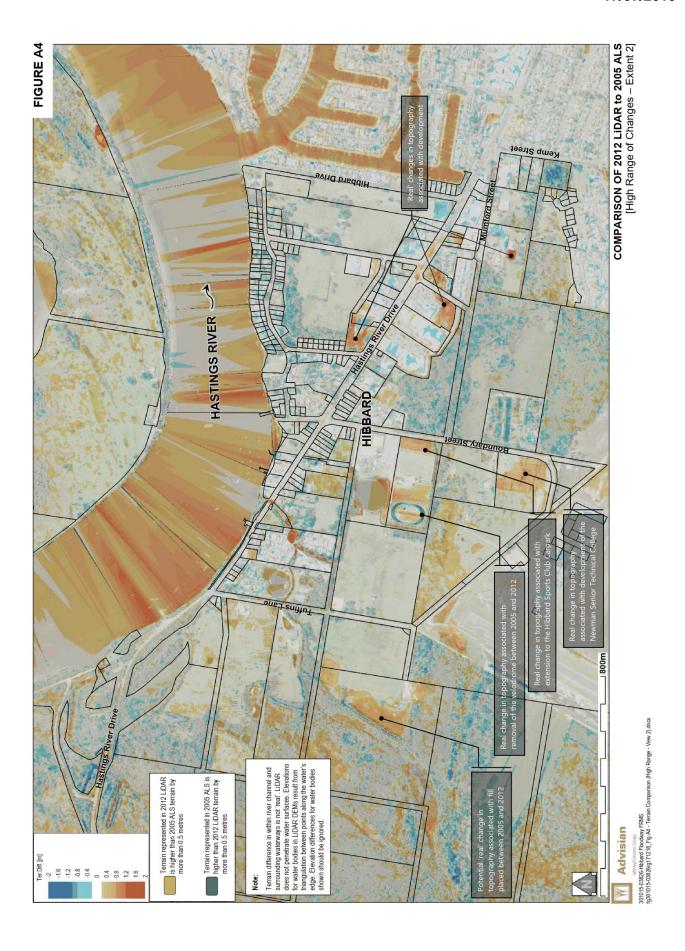
Comparison of 2005 ALS Survey and 2012 LiDAR Topographic Data











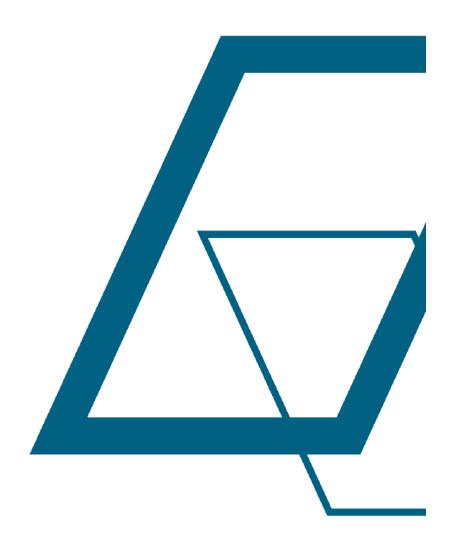


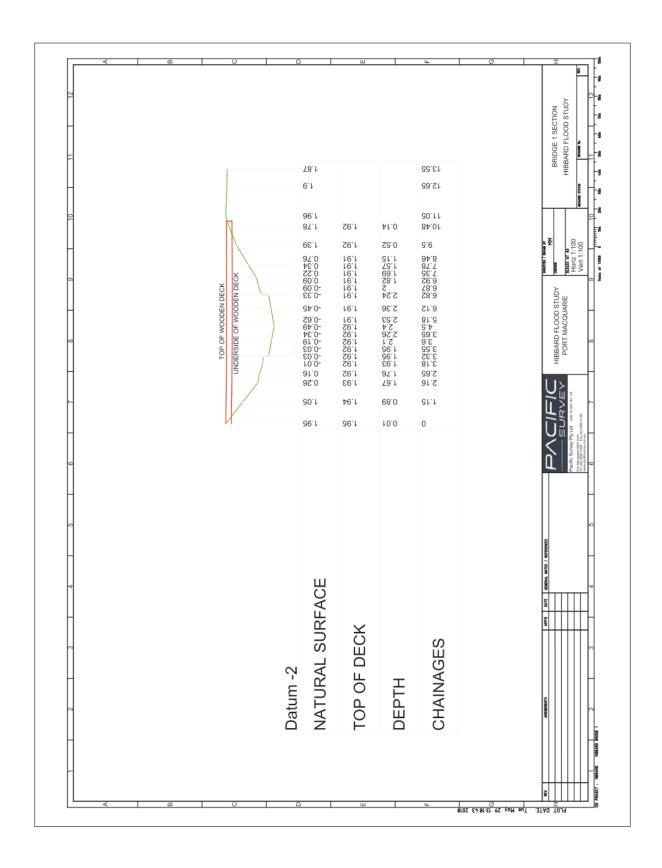
Port Macquarie Hastings Council

Hibbard Precinct Flood Study

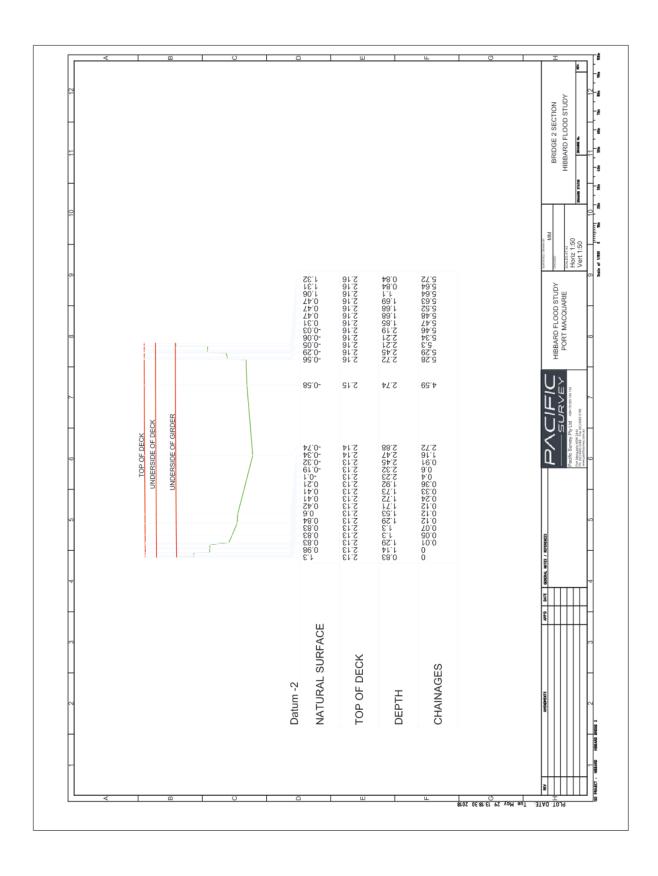
Appendix B

Survey Data provided by Pacific Surveys (Bridges & Creek Cross-Sections)

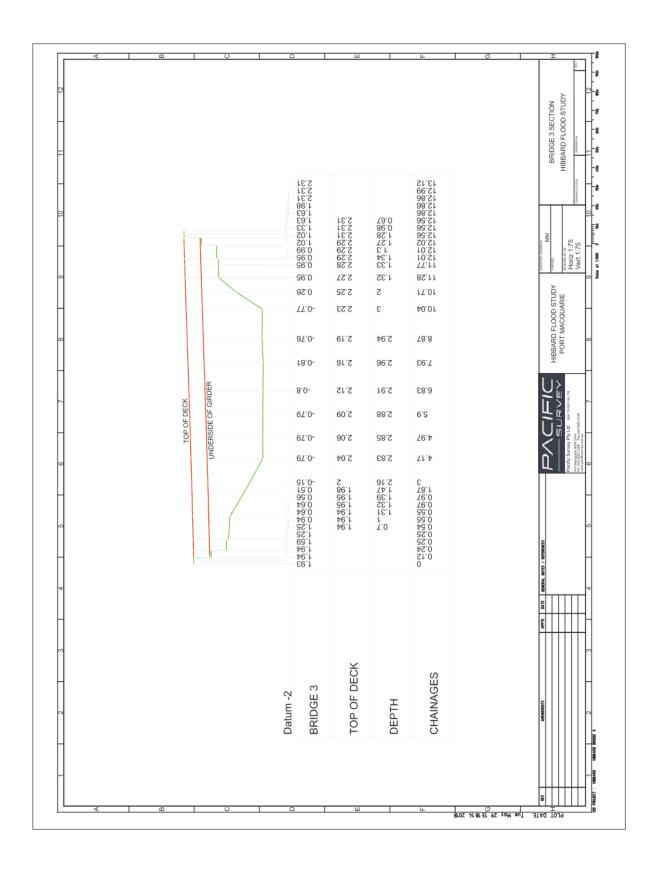




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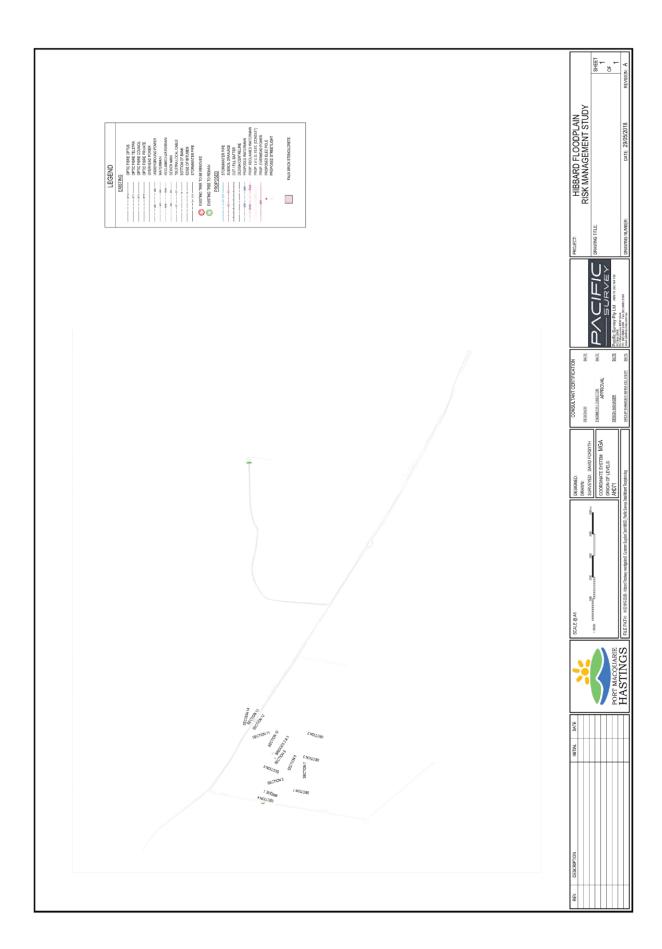
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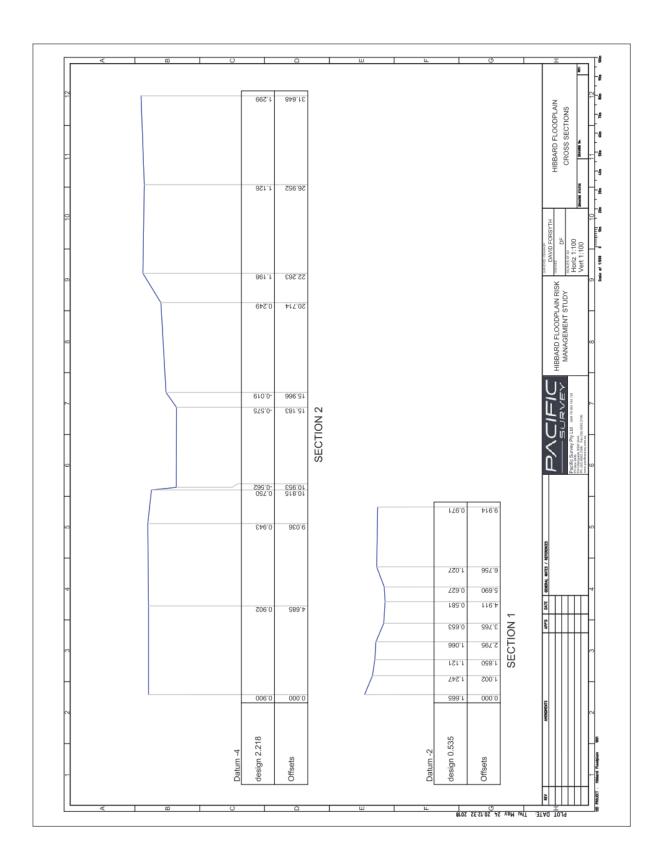


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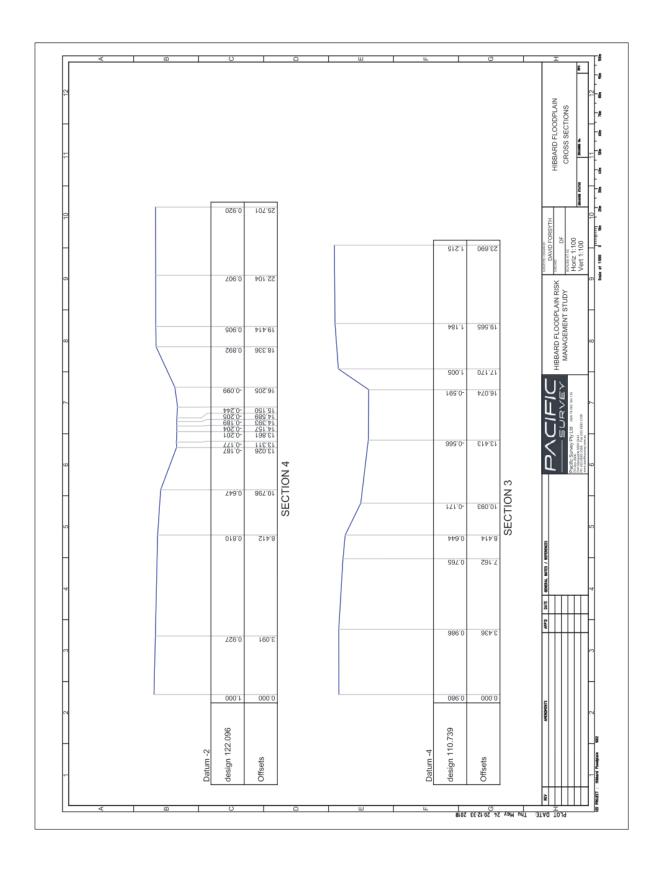


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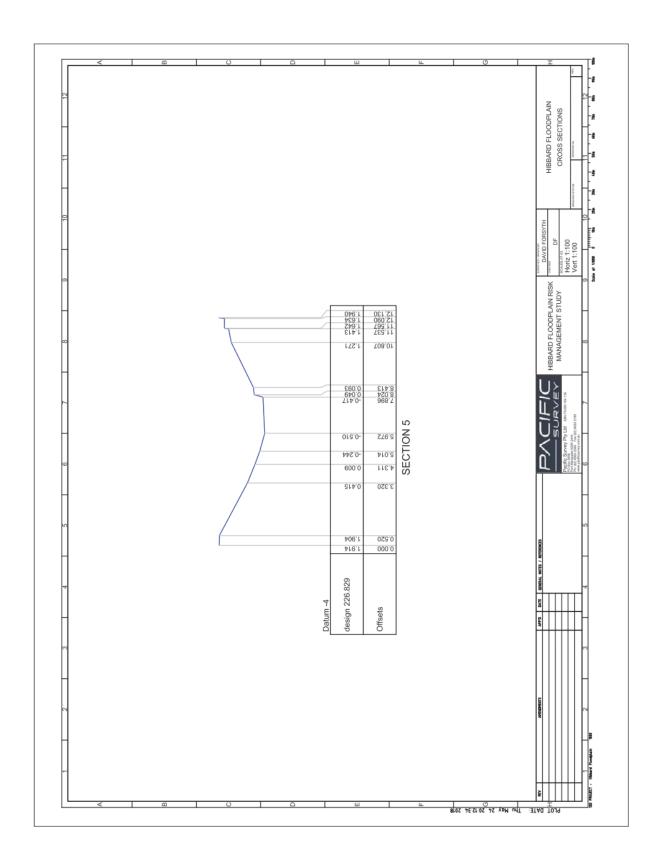




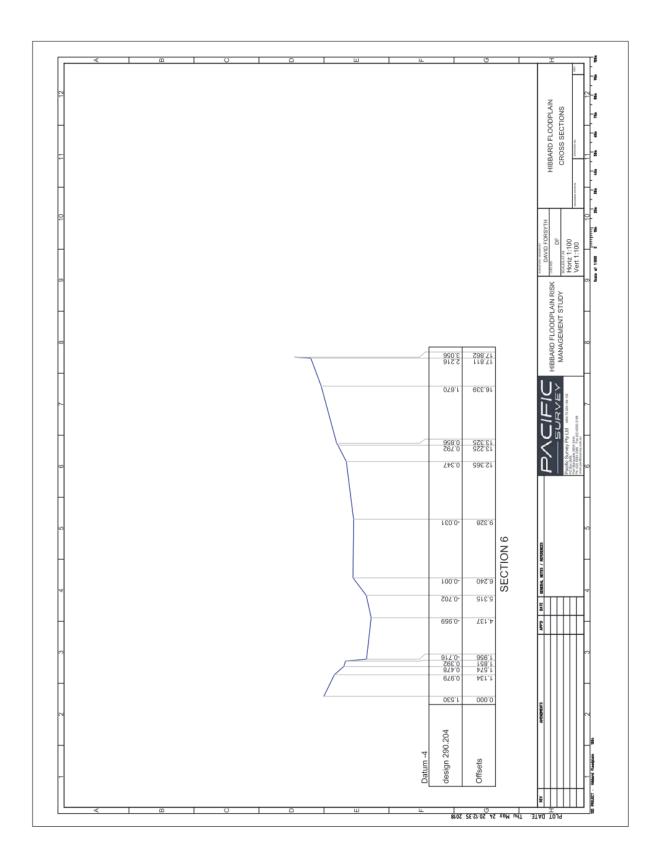
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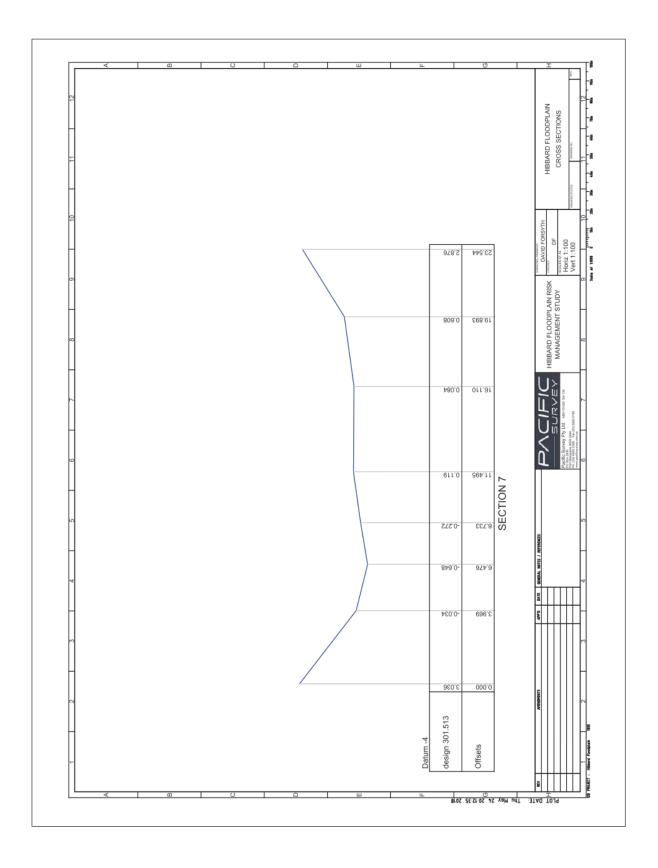
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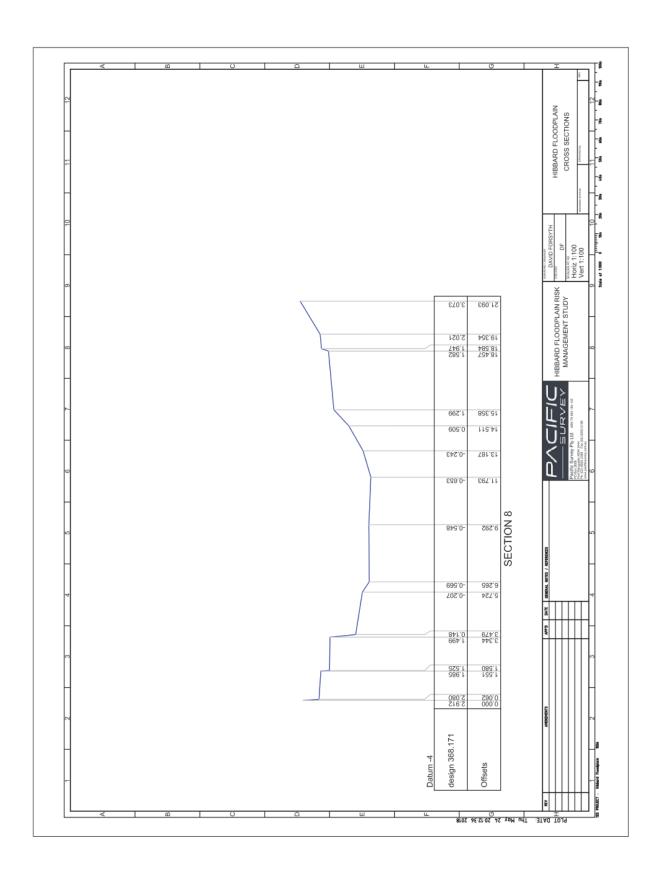
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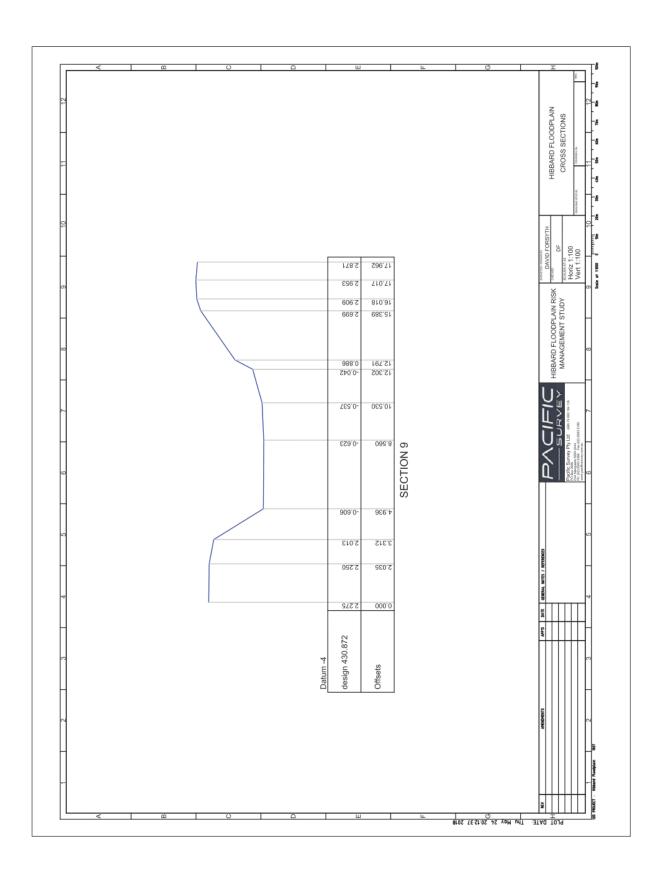
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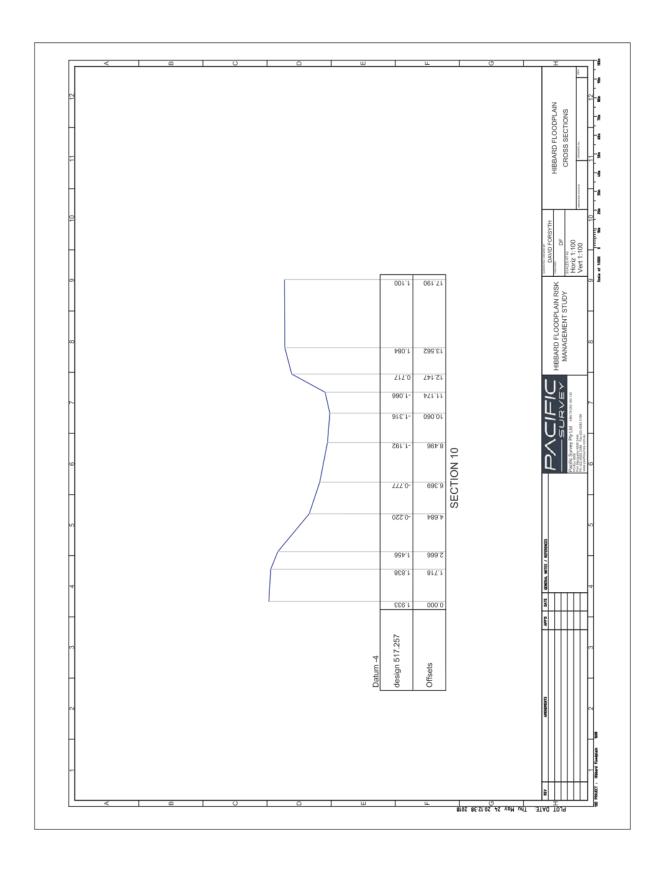
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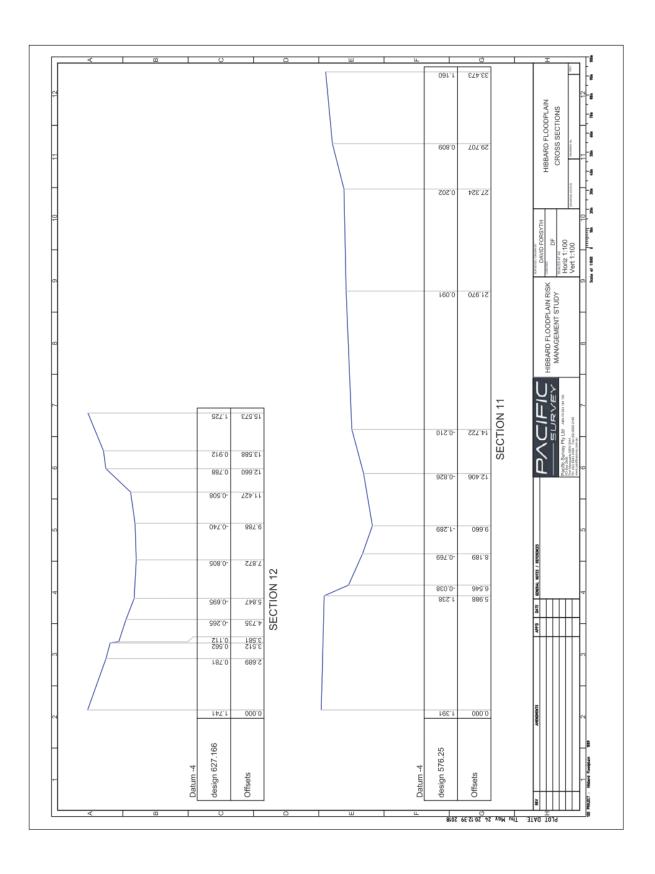
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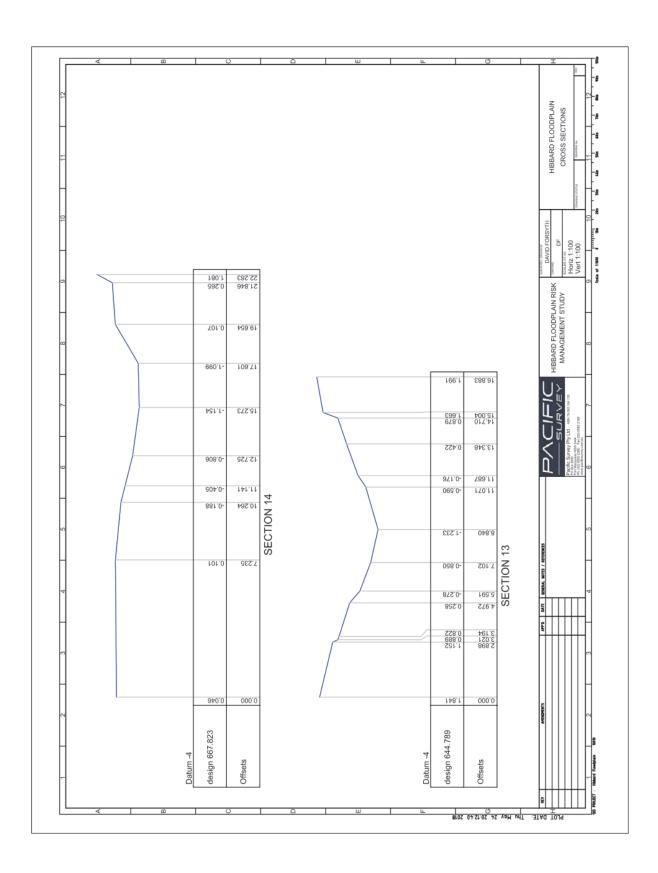
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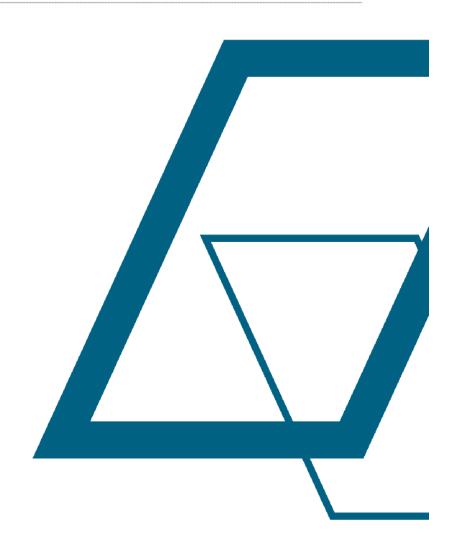


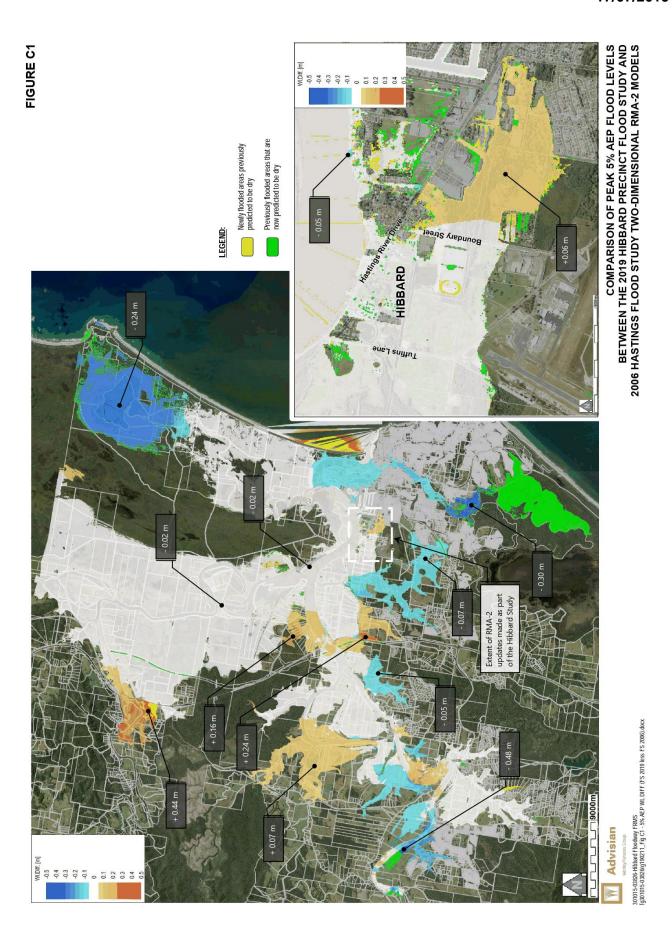
Port Macquarie Hastings Council

Hibbard Precinct Flood Study

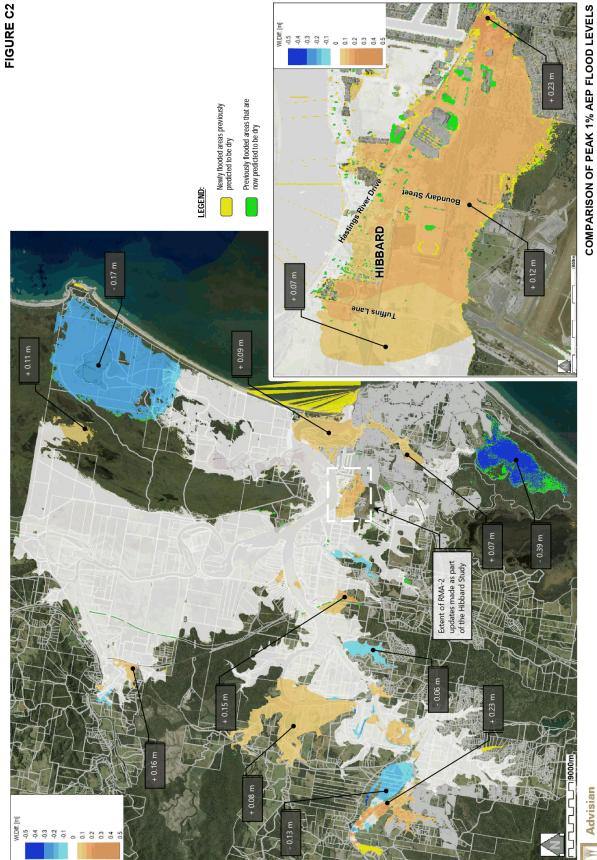
Appendix C

Comparison of Hibbard Design Flood Modelling Results to Previous Studies



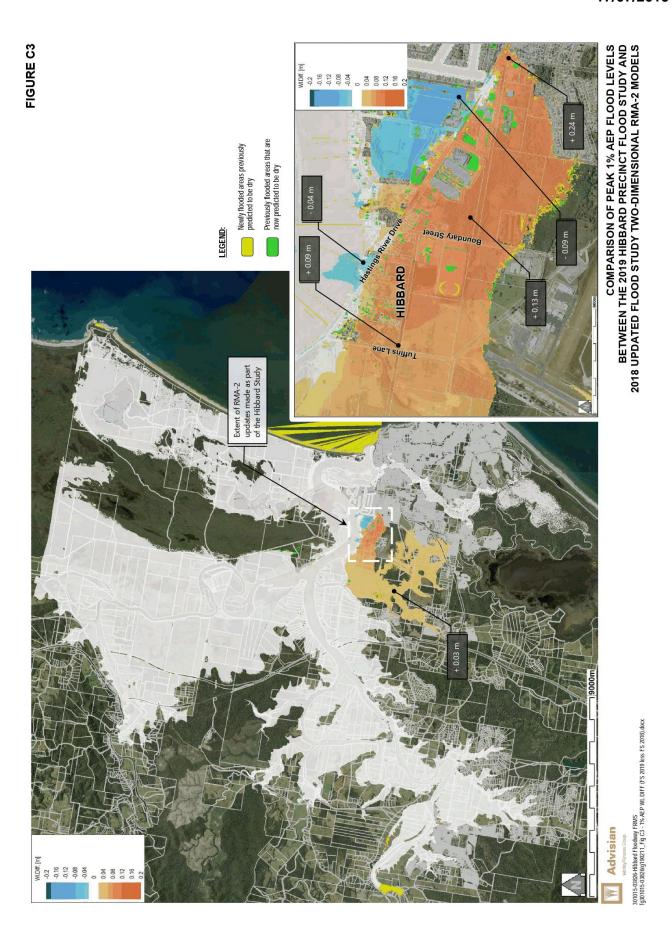


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301015-03826-Hibbard Floodway FRMS g301015-03826rg190211_Fig C2 - 1% AEP WL DIFF (FS 2019 less FS 2006).docx



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