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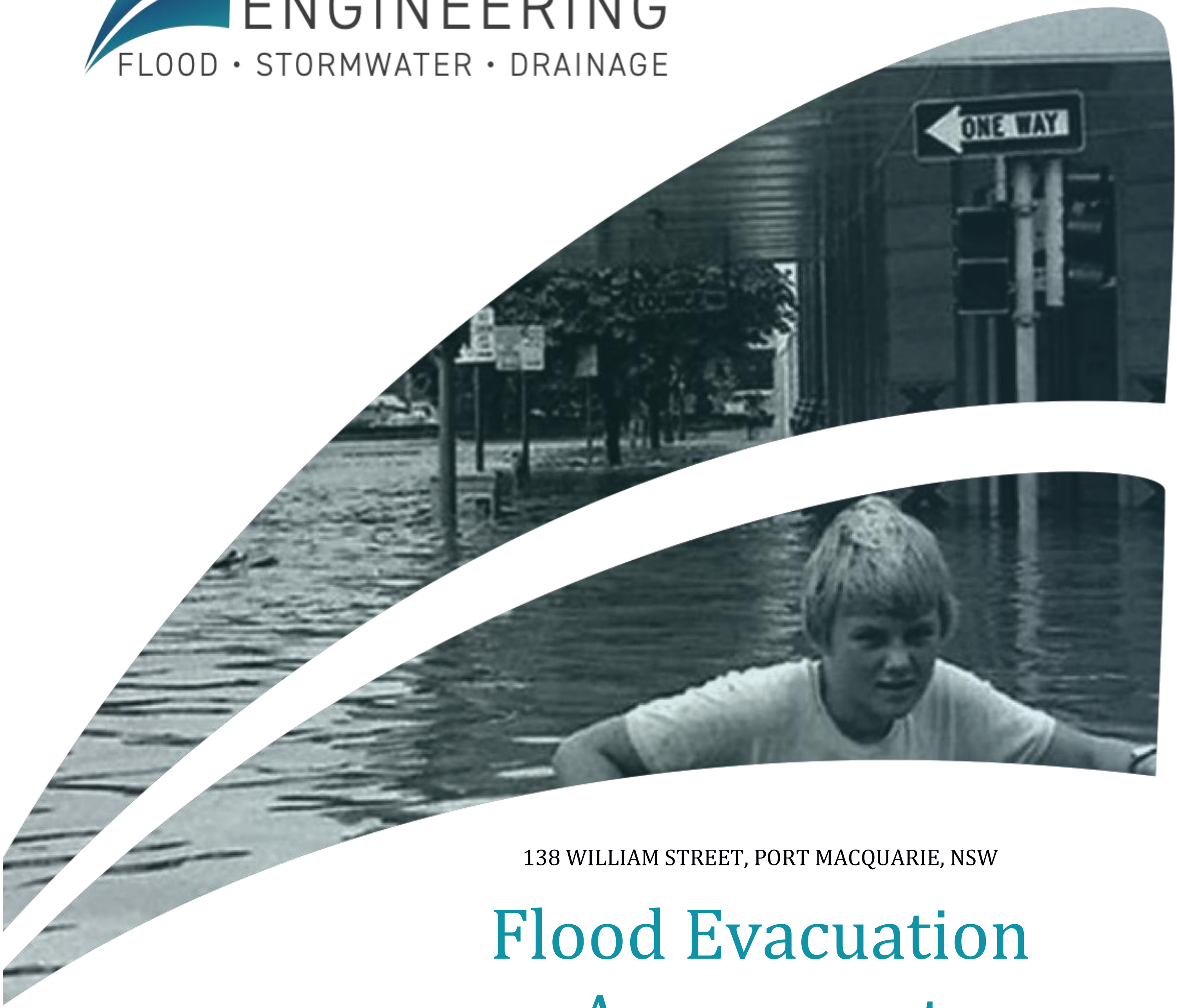
FLOOD • STORMWATER • DRAINAGE



138 WILLIAM STREET, PORT MACQUARIE, NSW

Flood Evacuation Assessment

FMDS0157-RP-FIA-00/ 08 September 2022

PALM COURT MOTEL

Floodplain Management and Development Services
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Flood Expert Declaration

I Jacob John Franklin hereby declare the following:

- 20 years' experience in hydrological and flood hydraulic assessment associated with stormwater flooding;
- Bachelor of Environmental Engineering, Hons;
- Registered Professional Engineer of Australia (RPENG);
- I have read the Expert Witness Code of Conduct (Uniform Civil Procedure Rules 2005) and agree to be bound by it; and
- This report has relied upon the best available information and base data at the time of undertaking the assessment.

Document Control Register

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Version Register

Version	Status	Authors	Reviewer	Change from Previous Version	Authorised for Release	
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Transmission Register

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1. Introduction

FloodMan Engineering has been engaged by Palm Court Motel to assess the flood evacuation time available for a proposed development at 138 William Street, Port Macquarie, NSW.

To reduce risks associated with adhering to Councils latest Flood Policy 2018 our client requested that a first step in preparing documentation for the change of Development Application is to ensure that a minimum of 8 hours flood evacuation time is achievable during the 1% Annual Exceedance Probability (AEP) flood and due to considerations to climate change scenarios. Hence, ensuring compliance with Council's latest Flood Policy (PMHC, 2018).

The second step was to assess risks and develop an evacuation management plan accordingly.

2. Site Details

2.1. Location and Access

The subject site is located at 138 William Street, Port Macquarie, NSW within the Port Macquarie Hastings Council (PMHC) Local Government Authority (LGA) and classified under land zoning as Commercial Core (B3). As it exists, the site is bound by Kooloonbung Creek to the west, William Street to the north and is surrounded by Commercial Core properties to the southeast of the site. Access to the site is gained via William Street to the north. Aerial imagery and locality of the subject site have been respectively provided in Figure 2.1 and Figure 2.2.

Figure 2.1 Aerial Imagery of Subject Site

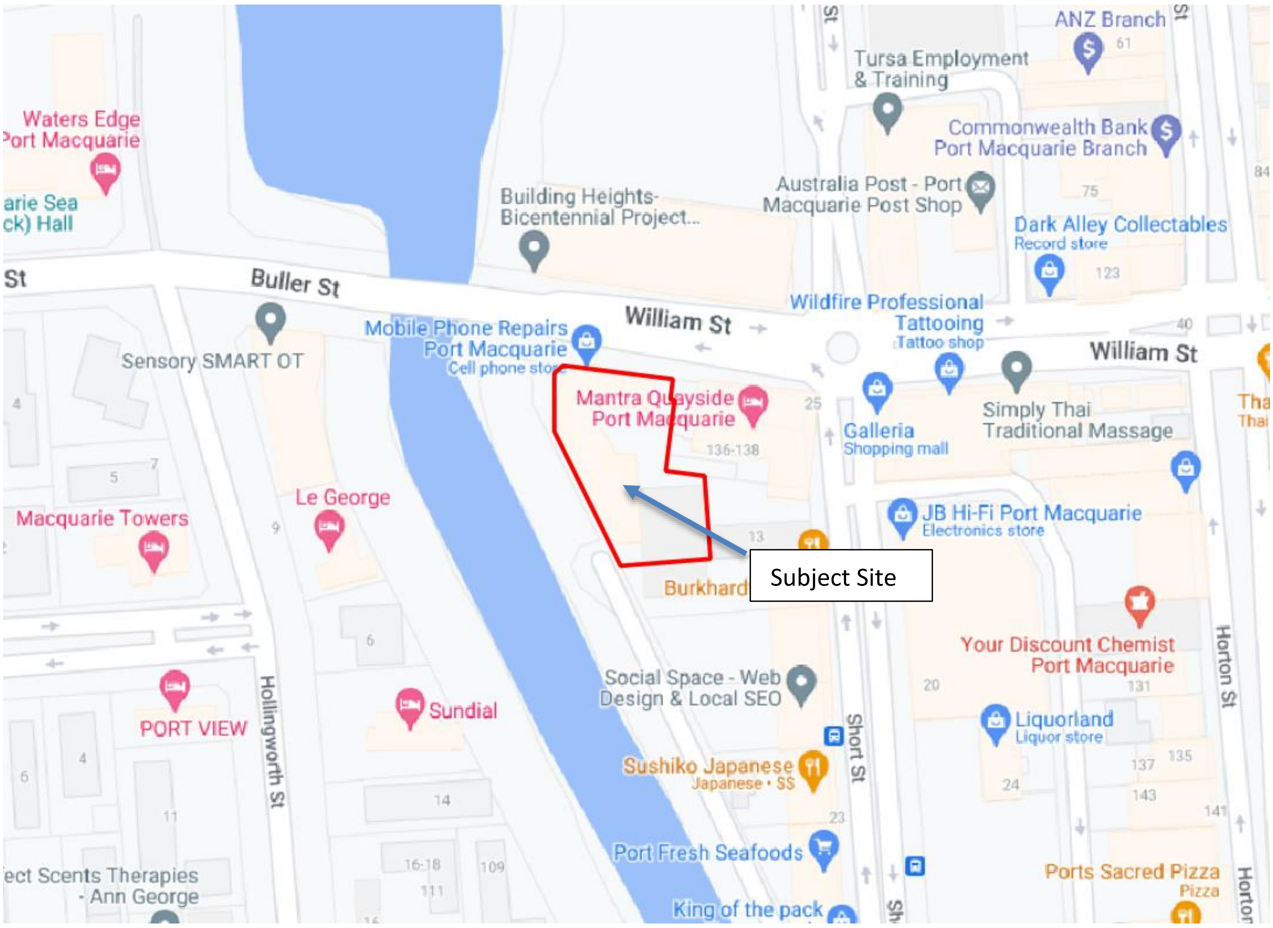

Figure 2.2 Locality of Subject Site

2.2. Topography

FloodMan Engineering has acquired the latest regional flood model data from Council flood consultant, Advisian. The data collected was provided in waterRIDE format and covers the flood planning area from Wauchope Bridge to the Hastings River entrance.

For the Pre-development scenario, a digital elevation model (DEM) was created using the following data:

- 1m grid LiDAR data from PMHC LiDAR data project; and
- 2m grid bathymetry data from the Advisian RMA-2 regional model for Hastings River and Caswell Channel.

3. Flood Evacuation Time Assessment

The proposed evacuation route for the development is attached. Along the route the lowest sag level point was identified using latest flood model topographic data covering this area and found to be the north to the side on William Street.

Design flood event water level time series data was extracted from the waterRIDE project file obtained for both the 1% AEP with and without climate change scenario at the Bureau of Meteorology (BOM) Wauchope Bridge flood alert gauge and at the sag point on the route.

Flood conditions over the road at the sag point are deemed to be unsafe at an H2 hazard category in accordance with Australian Rainfall and Runoff 2019 (0.3m flood depth).

The following figure presents the flood level hydrographs with critical levels superimposed.

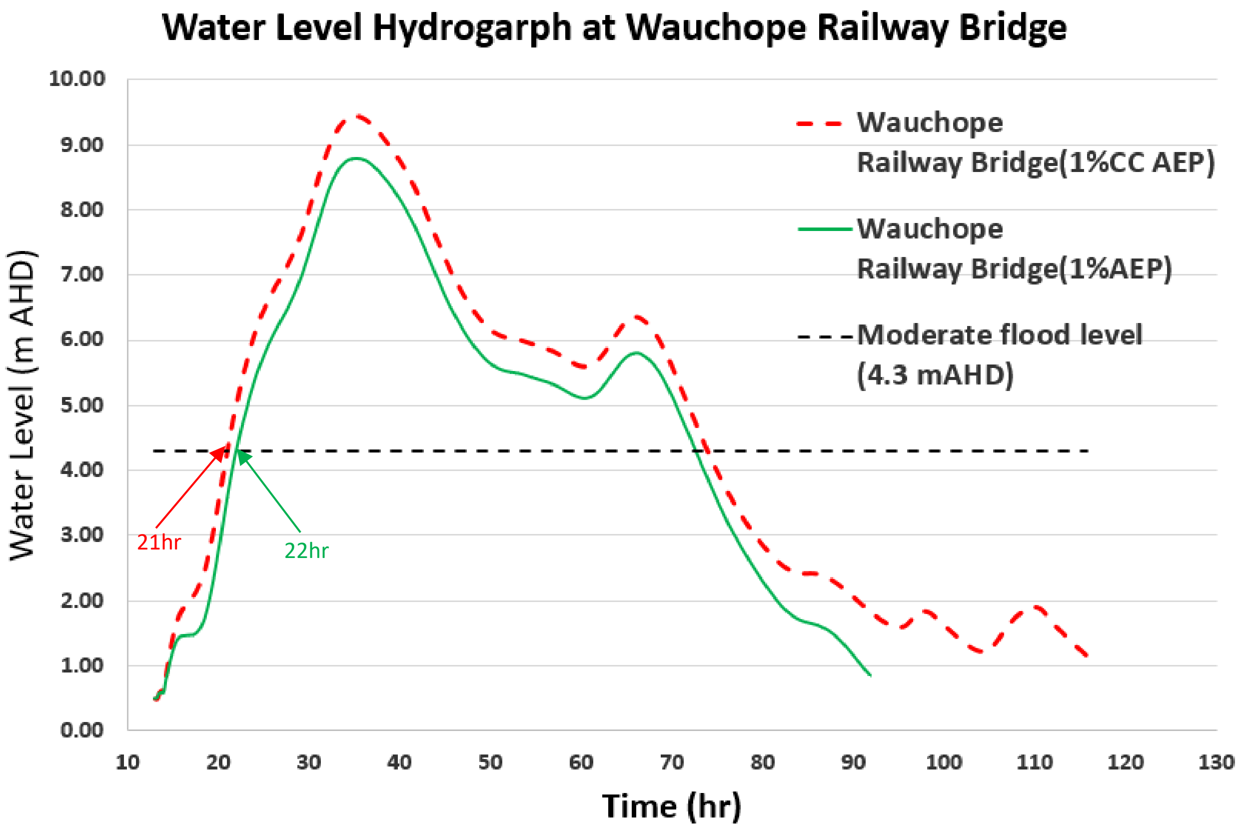

Figure 3.1 Water Level Hydrogarph at Wauchope Railway Bridge

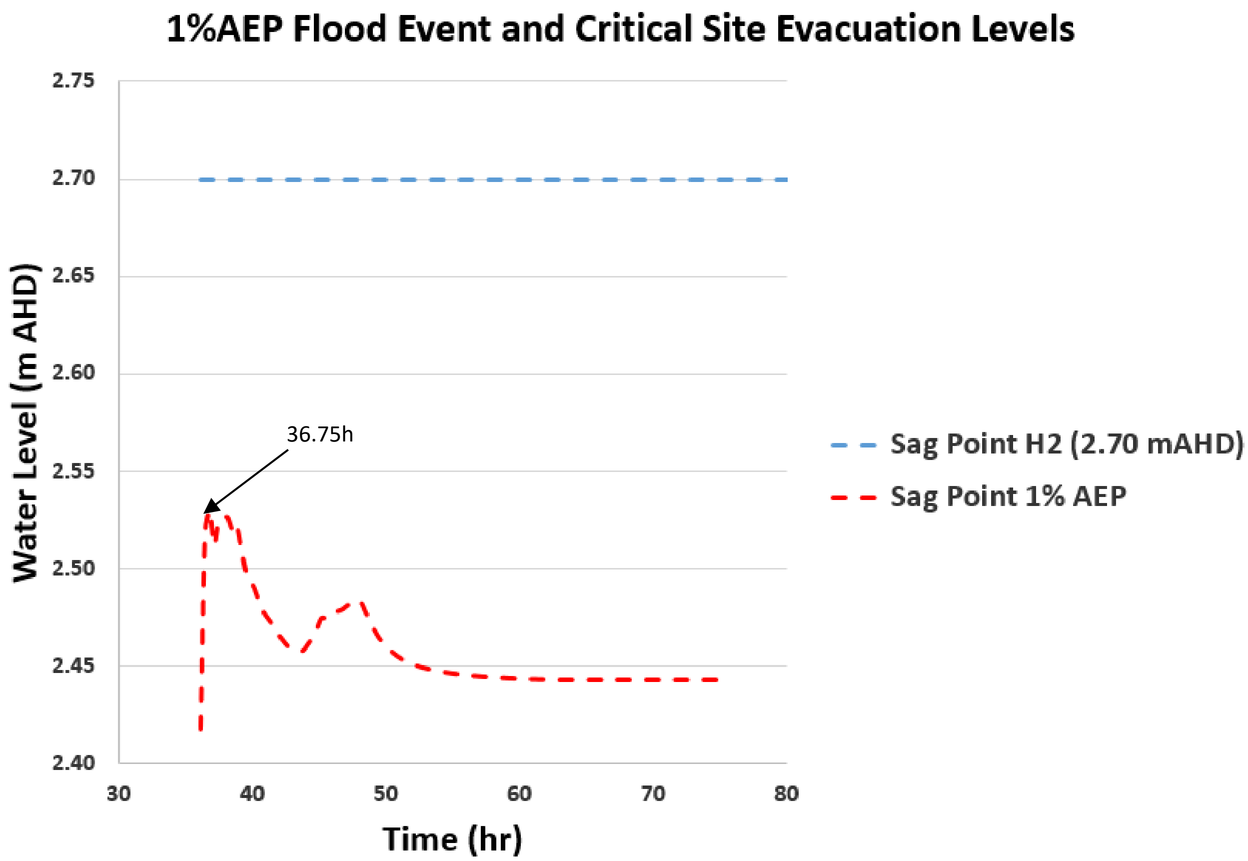

Figure 3.2 1% AEP Assessment for the Subject Site

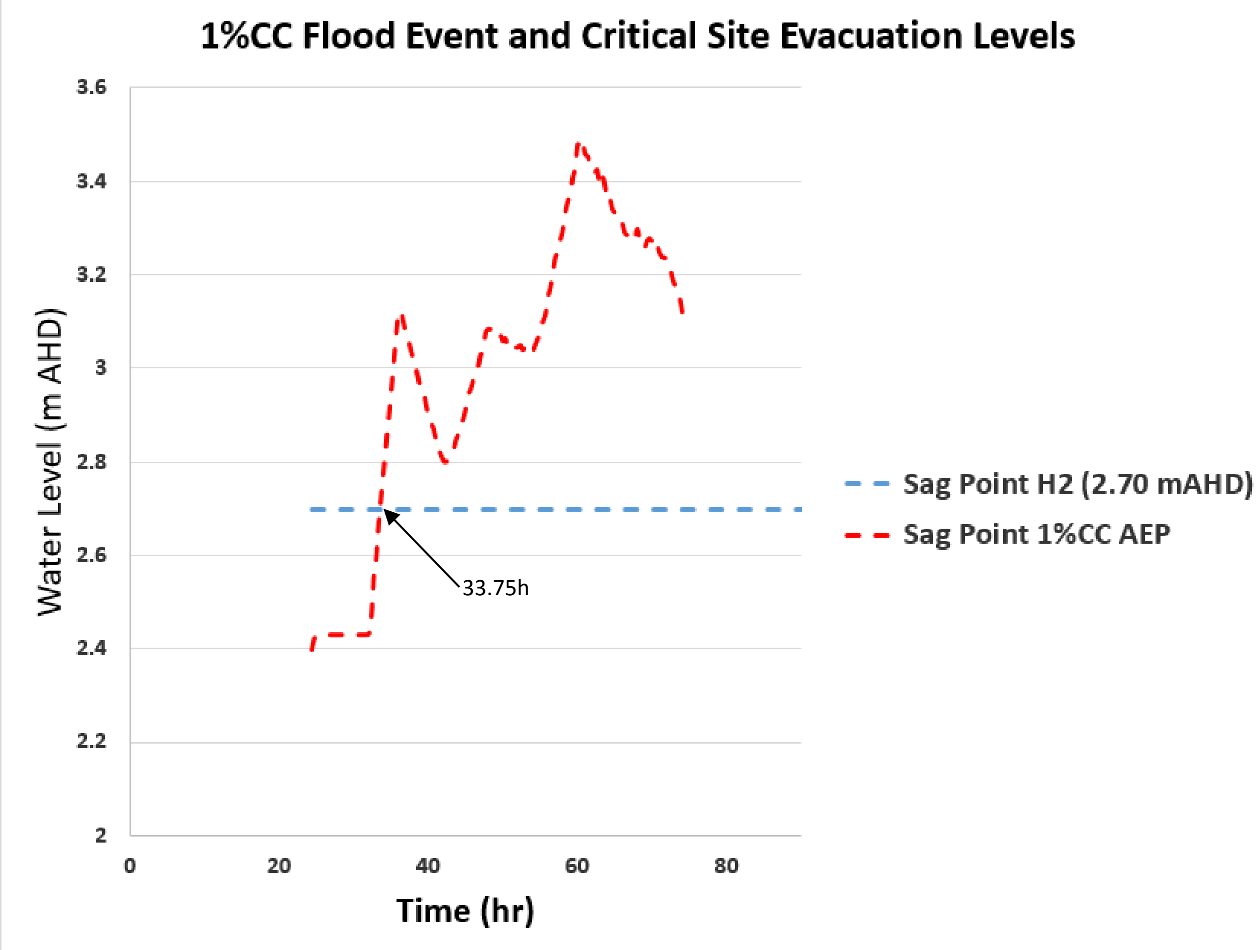

Figure 3.3 1% AEP Climate Change Assessment for the Subject Site

The following table presents the available flood evacuation time for the proposed development for both with and without climate change 1% AEP flood scenarios.

Table 3.1 Predicted Lag Times Base on Wauchope Railway Bridge Gauge

Flood Scenario	Time Evacuation (hr)
1% AEP CC	12.75
1% AEP	14.75

As demonstrated once a moderate flood level has been reached at the BoM Wauchope Gauge residents of the proposed development would have in excess of 8 hours to safely evacuate along the proposed route. Therefore, complaint with Council's Flood Policy.

Figure 3.4 summarises the location and route to the evacuation point.

Figure 3.5 summarises the location and route to the evacuation point and the Wauchope RWY Bridge gauge location.

Figure 3.6 provide the flood extent from TuFLOW and Council model, with the surface elevation from Lidar data. The difference in the flood extent is because of the updated Lidar information.

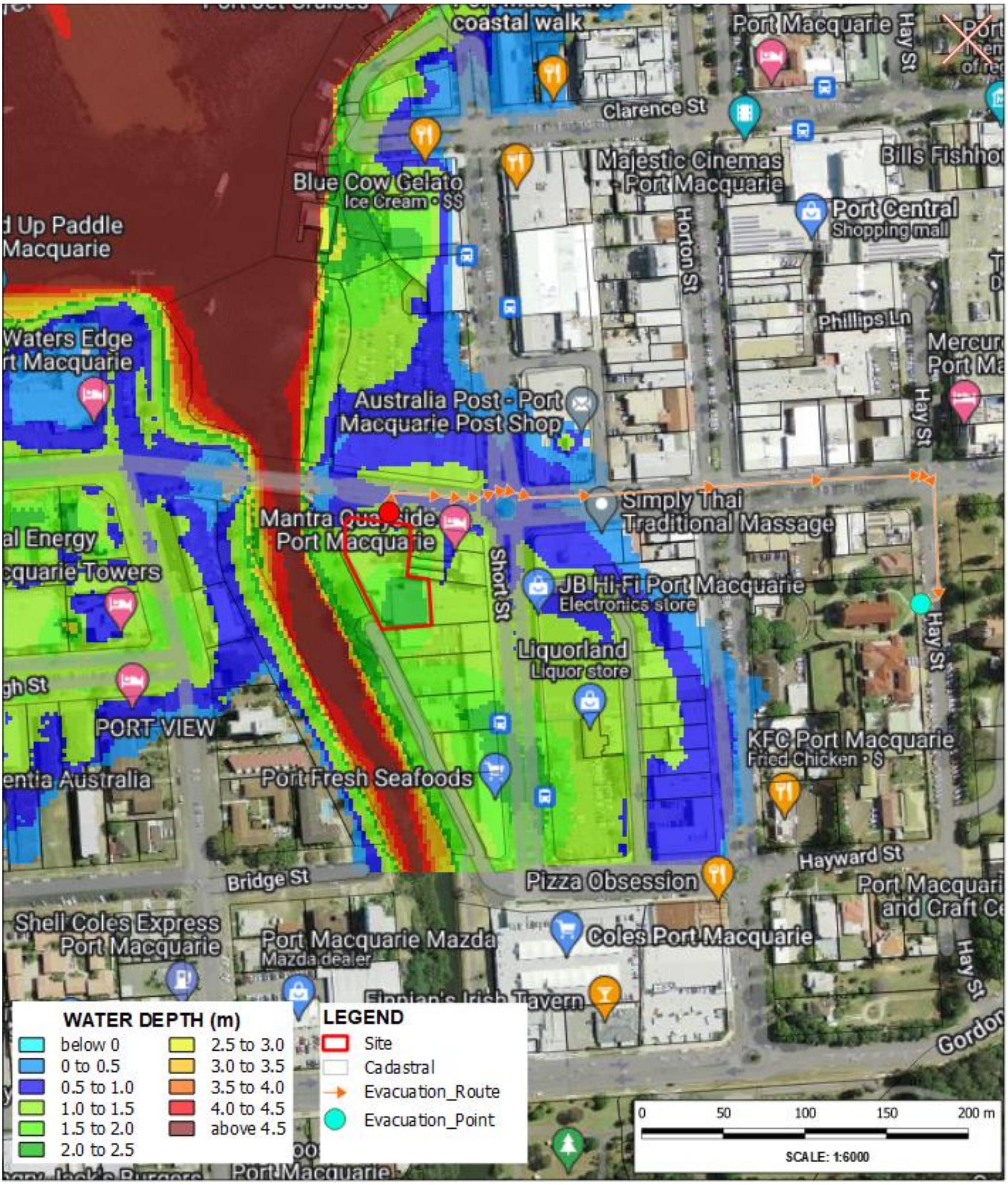

Figure 3.4 Route to Evacuation Point

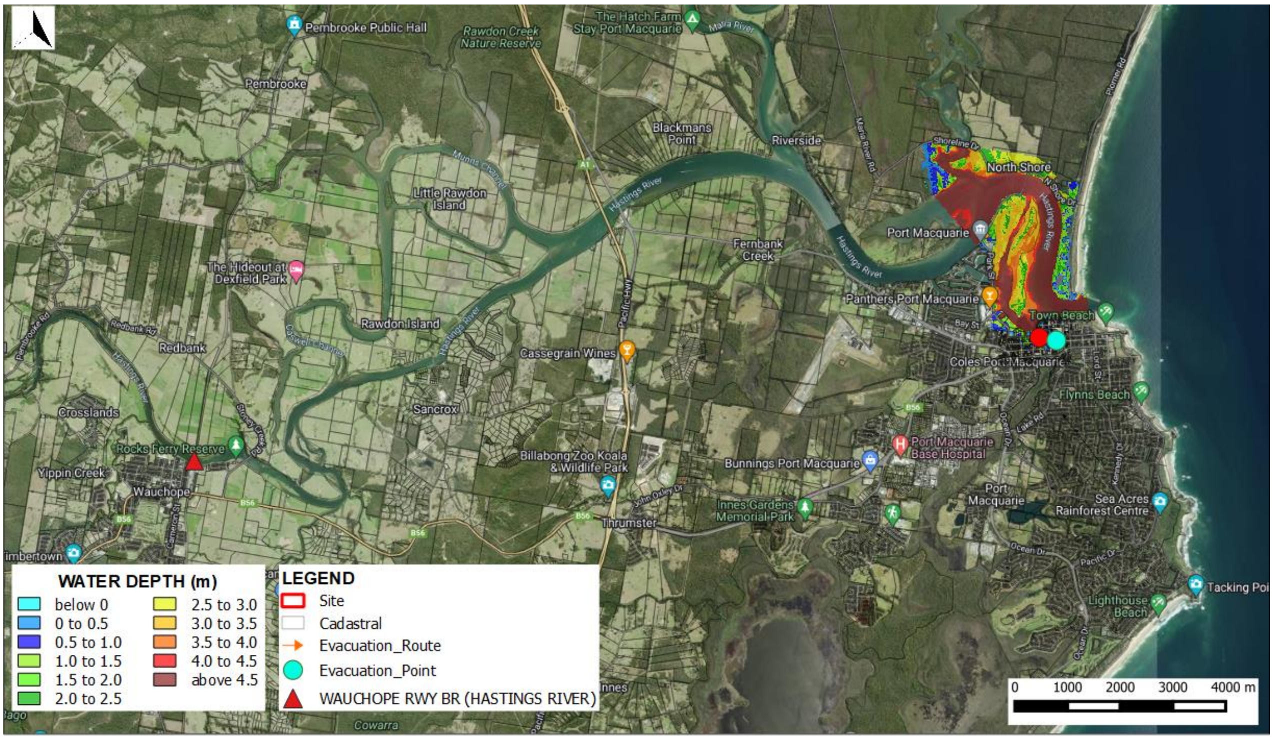

Figure 3.5 Route to Evacuation Point and Flood River Warning Gauge

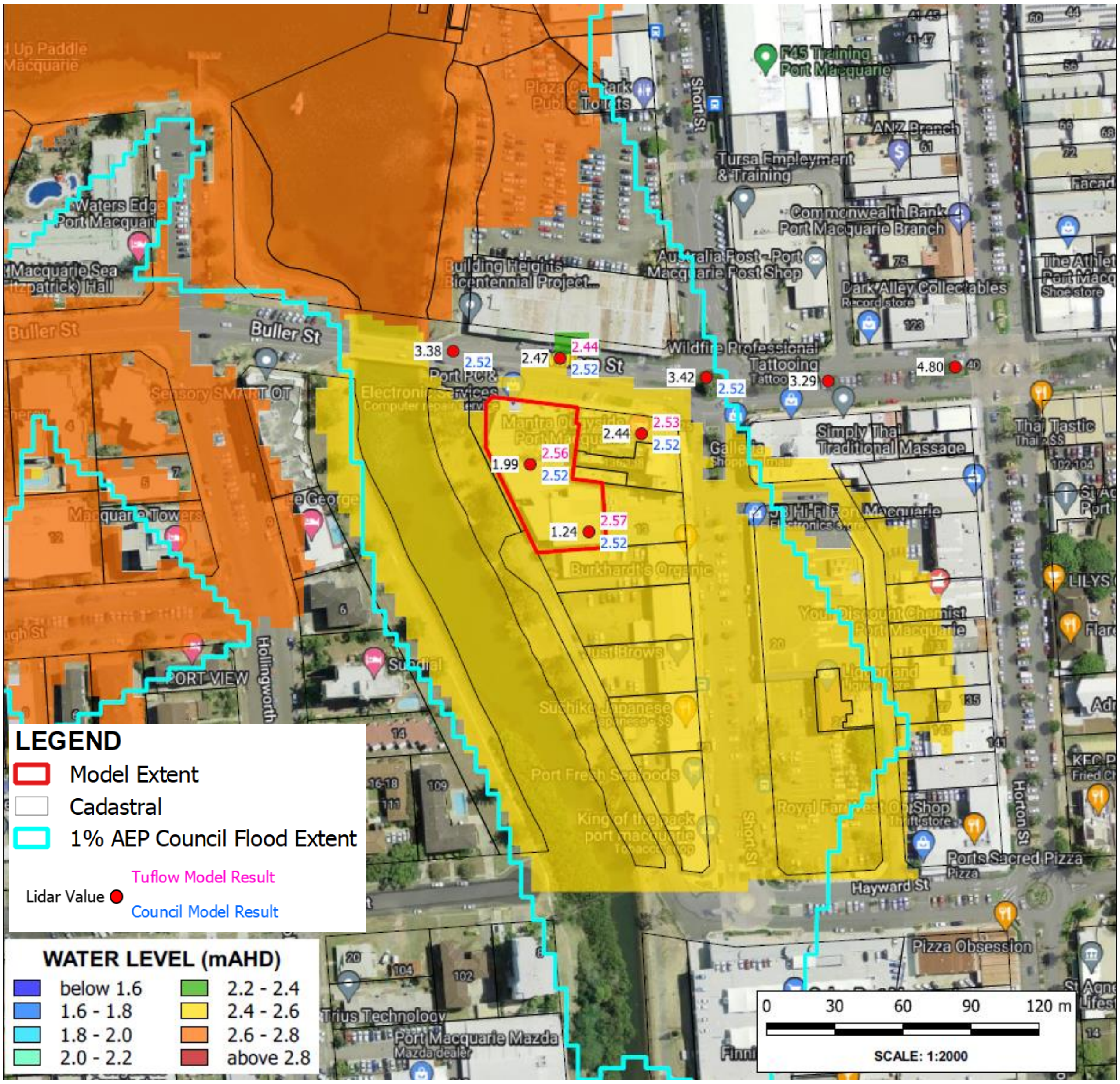

Figure 3.6 1% AEP Peak Water Level Between TuFLOW model and Council Model Results

4. Design Flood Hydraulics

Design flood data at the site was sourced directly from the TuFLOW model created by FloodMan Engineering as described above. The design peak flood levels at the subject site (development location) are shown below in Table 4.1 for the 1% AEP and the 1% AEP with Climate Change (CC) considerations.

Table 4.1 Subject Site Flooding Characteristics

Flood Event	Maximum Water Level (m AHD)*
1% AEP	2.572
1% AEP CC	3.485

*Note: *The water level was taken from model results at the entrance to the subject site so maximum water levels may slightly vary across the site.*

During a 1% AEP flood event, the maximum velocity of floodwaters flowing across the site is 0.567 m/s, and the flood depth is 1.51 m above the natural ground level.

Figure 4.1 below depicts Council Flood Policy (2015) requirements regarding the Flood Planning Level (FPL) of proposed developments.

Table 4: Flood Planning Level (FPL) Categories

Category	Proposed - FPL Category Description
FPL1	20 year ARI Flood level (No allowance for Climate Change, No Freeboard)
FPL2	100 year ARI Flood level + Climate Change Allowance (No Freeboard)
FPL3*	100 year ARI Flood level + Climate Change Allowance + 500mm Freeboard
FPL4	Probable Maximum Flood (PMF) as defined in Table 2

* Defines the Flood Planning Area (FPA) in the PMHC LEP.

Figure 4.1 PMHC Flood Policy 2018 Flood Planning Level Requirements

4.1. Flood Risk

In terms of floodplain management, hazard can be defined as a source of potential harm or a situation with potential to result in loss of life. Hence, the primary hazard is the result of a flood event that has the potential to cause damage or harm to the community. Associated with the hazard is the probability of its occurrence.

There are a number of factors to be considered where assessing the hazard associated with floods. The usual starting point is to predict the flood characteristics and particularly the flow characteristics of the floodplain's inundated areas. The main characteristics of interest typically are the flow depth and flow velocity. In addition, the assessment of the flood hazard needs to consider a range of other social, economic and environmental factors, though these are often more difficult to quantify.

The magnitude of flood hazard can be variously influenced by the following factors:

- Velocity of Floodwaters;
- Depth of Floodwaters;
- Combination of Velocity and Depth of Floodwaters;
- Isolation During a Flood;

- Effective Warning Time; and
- Rate of Rise of Floodwater.

The base data underpinning floodplain risk assessment typically comprises the flow characteristics (the flow depth and velocity) in the flood-affected areas within the catchment.

When quantifying and classifying flood hazard, it is important to understand the underlying causes of the hazard level. For example, if the hazard level is classified as 'high', it is important to understand the key reason it is high e.g. high depth, high velocity, high velocity and depth in combination, isolation issues, and short warning time. Best Management Practices have been used in assessing the hazards of the subject site. This assessment is also in accordance with the PMHC Flood Policy (2015) and the relating documents. The Australian Rainfall and Runoff (ARR) 2019 hazard categories are considered best management practices and used in this assessment. Figure 4.2 and Table 4.2 below illustrates the different hazard classifications and the relationship to water depth and velocity combinations. Table 4.3 below outlines acceptable uses for buildings at the maximum design flood for each modelled AEP.

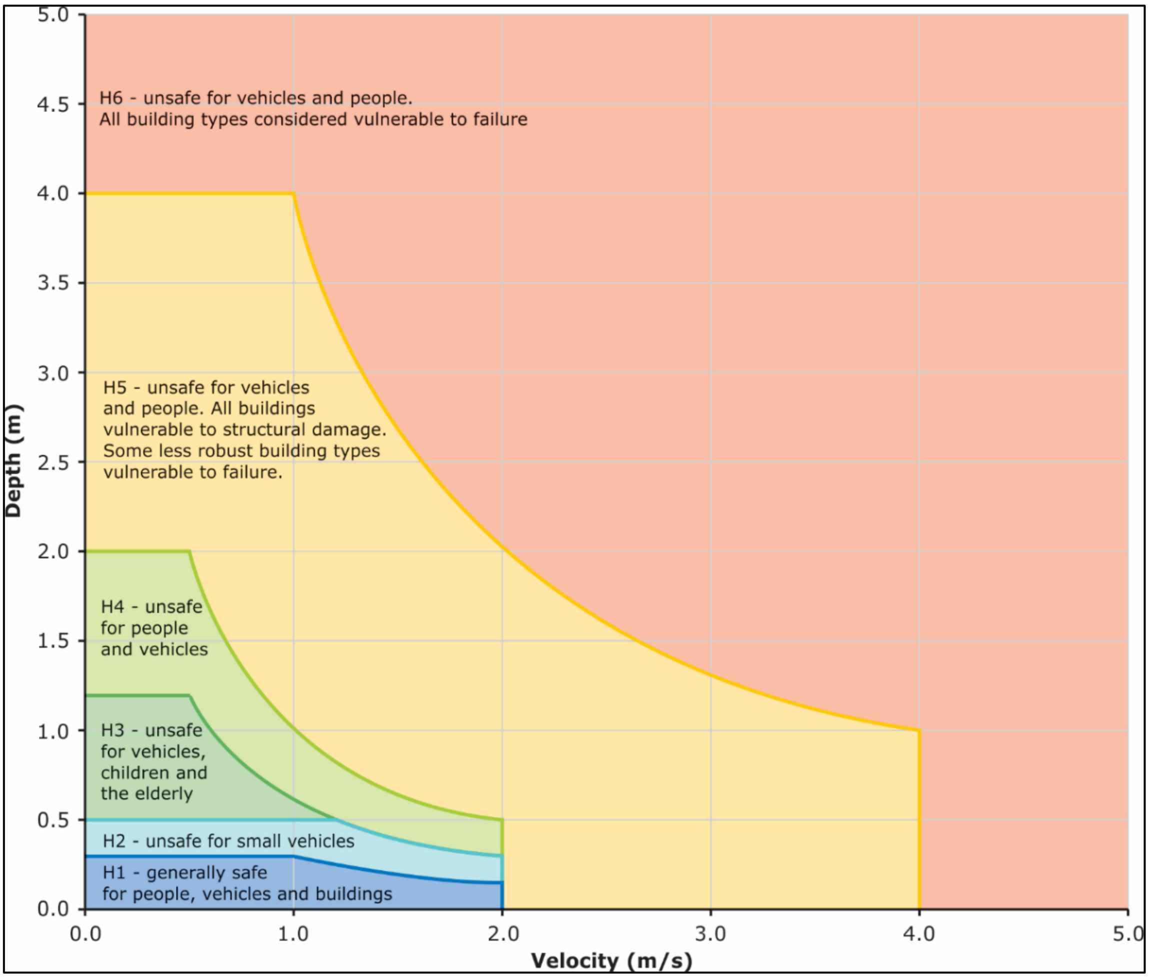

Figure 4.2 Combined Flood Hazard Curves (ARR 2019)

Table 4.2 Combined Hazard Curves - Vulnerability Thresholds Classification Limits (ARR 2019)

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (m)	Limiting velocity (m/s)
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

Table 4.3 Combined Hazard Curves - Vulnerability Thresholds (ARR 2019)

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles. children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

The flood hazard categorise at the proposed recreation area can be seen below in Table 4.4.

Table 4.4 Flood Hazard Classification At The Proposed Site

Flood Event	Maximum Water Depth (m)	Maximum Water Velocity (m/s)	DxV (m2/s)	Hazard Vulnerability Classification
1% AEP	1.51	0.57	0.86	H4
1% AEP CC	2.42	1.05	2.54	H5

5. Response to Port Macquarie Hastings Council LEP 2011 Part 5.21: Flood Planning

The proposed development complies with the requirements of the LEP Part 5.21 for the following reasons:

1. The proposed development footprint and extent of vertical area exposed to flood flow forces does not significantly increase compared to the existing exposure of the building structure and hence potential impacts now and into the future are deemed negligible;

2. There are no development plans to intensify the extent of exposure in the future and hence cumulative impacts are negligible;

3. Peak flood flow velocities for the present day and climate change (year 2100) 1% AEP design flood scenarios are relatively low and hence the risk of impacts from impedance is insignificant; and

4. The risk of debris loading and blockages is low due to the low predicted flood flow velocities and site location within the floodplain. The risk does not change from pre to post-development nor from the present day to the year 2100 climate change scenario.

Figure 5.1 and 5.2 below show the Peak 1% AEP and CC Velocity at the site location:

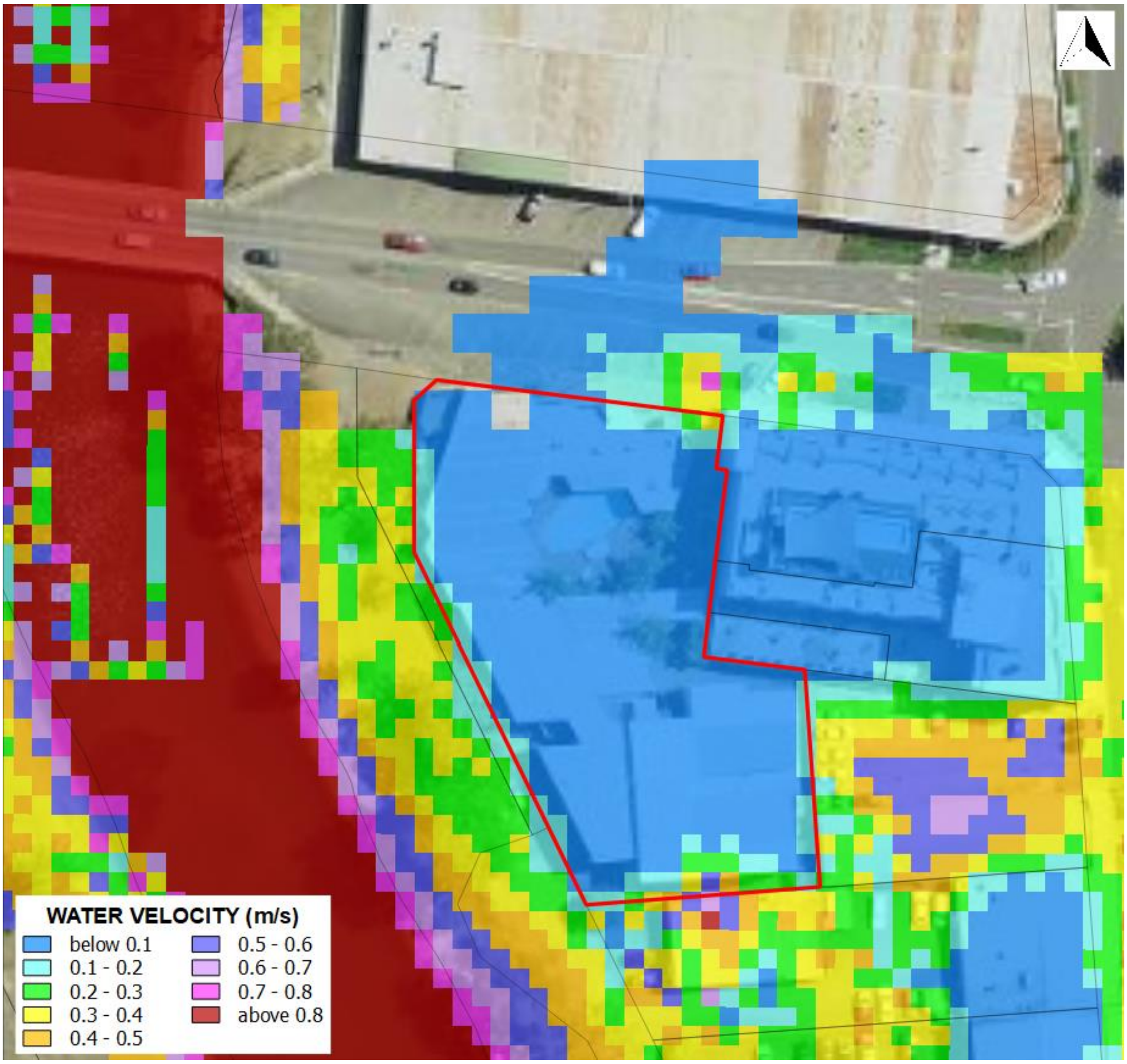

Figure 5.1 1% AEP Flood Velocity

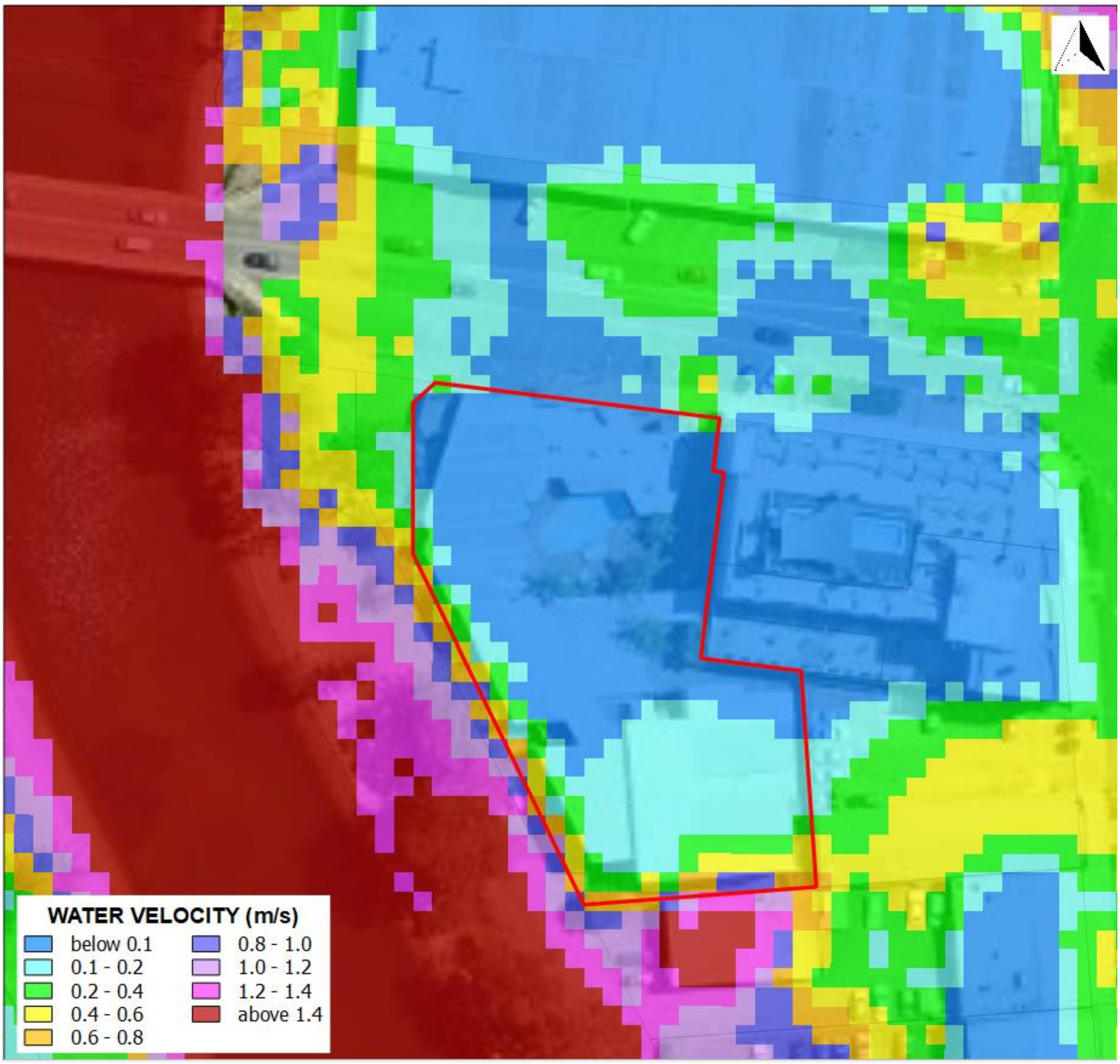

Figure 5.2 1% Climate Change AEP Flood Velocity

Appendix A Development Plans

ENCOMPASS
DRAFTING AND DESIGN

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No.	Description	Date
1	PRELIMINARY ISSUE	15-6-22
1	DA ISSUE	28-7-22

FRANCIS MOKLS PTY LTD

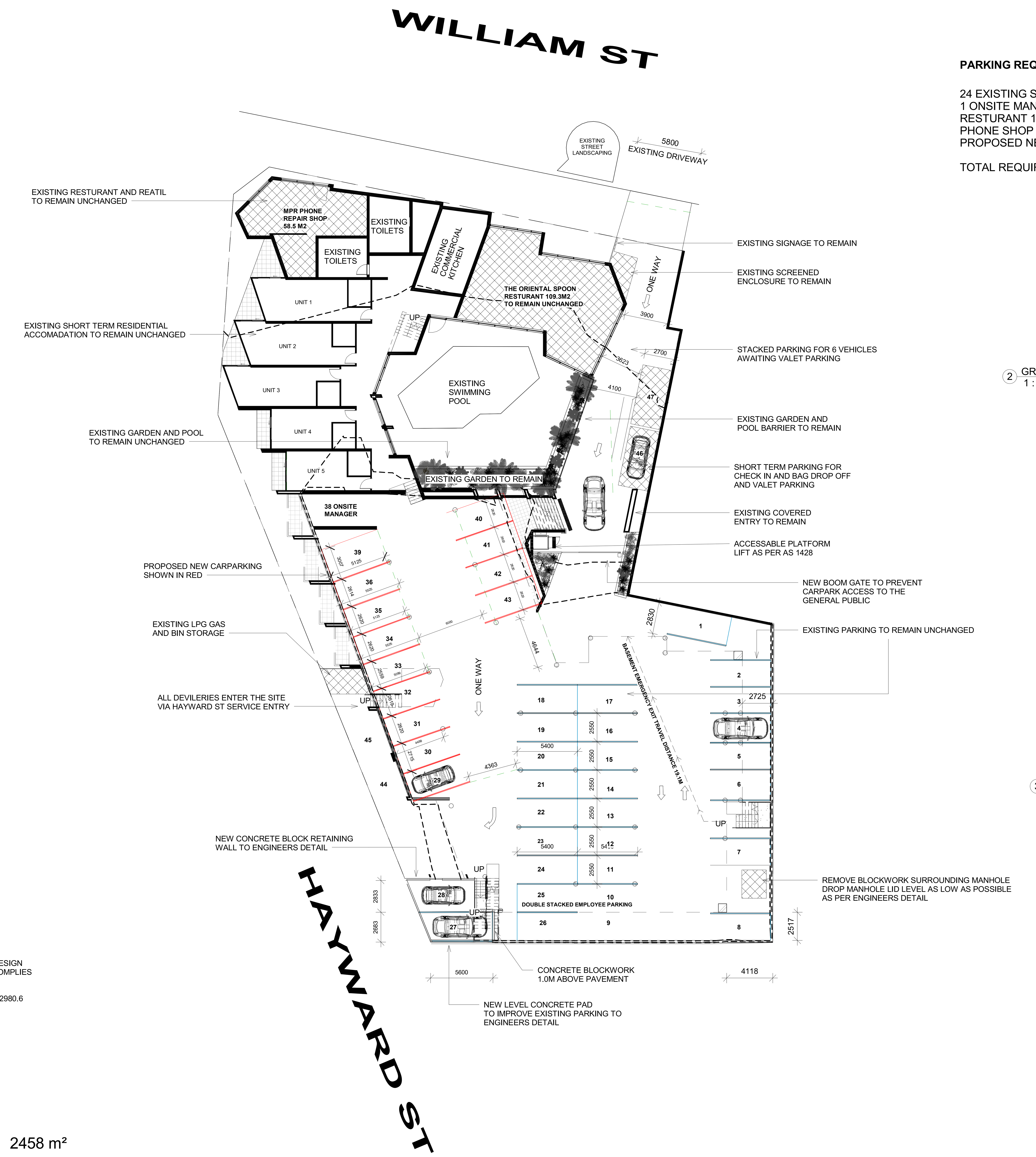
138 WILLIAM ST PORT MACQUARIE NSW 2444

SITE PROPOSED

Project number	2010
Date	26/11/10
Drawn by	DK
Checked by	RC
	A05.1
Scale	As indicated @ SHEET SIZE A1

PARKING REQUIREMENTS AS PER DCP 2013

24 EXISTING SHORT TERM ROOMS	27
1 ONSITE MANAGER + 2 STAFF	3
RESTURANT 109.3 M2	4
PHONE SHOP 58.5 M2	2
PROPOSED NEW ROOMS X 10	11
TOTAL REQUIRED	47



PARKING CERTIFICATION

I DAMIAN KEEP AS THE PRINCIPLE DRAFTSPERSON OF ENCOMPASS DRAFTING CERTIFY THE PARKING DESIGN FOR THE NEW AREAS PROPOSED COMPLIES WITH

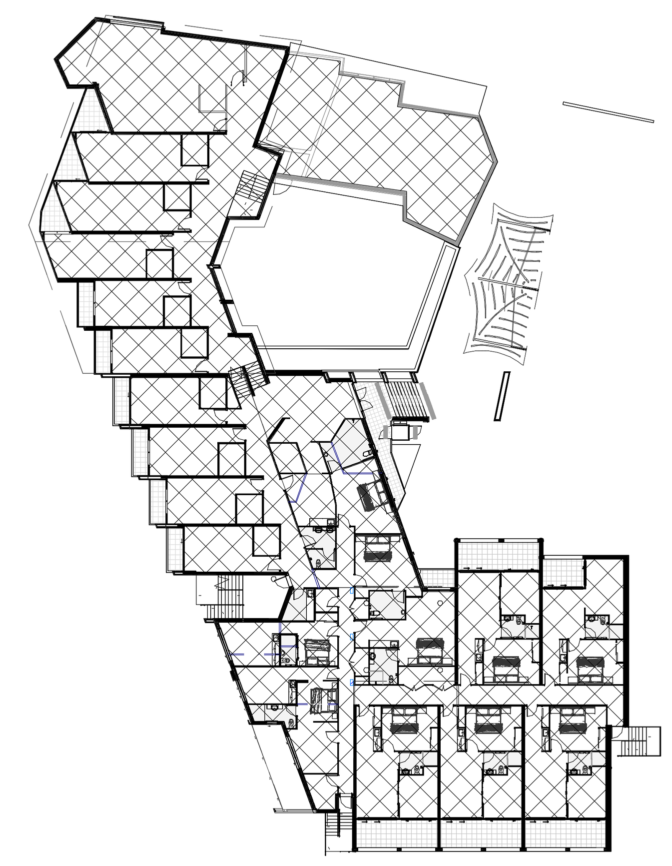
AS 2890 AS 2890.1 AS 2980.2 ANS AS 2980.6

1 SITE PARKING 2458 m²
1 : 200

NETT FSR NO DEDUCTIONS 2356M2

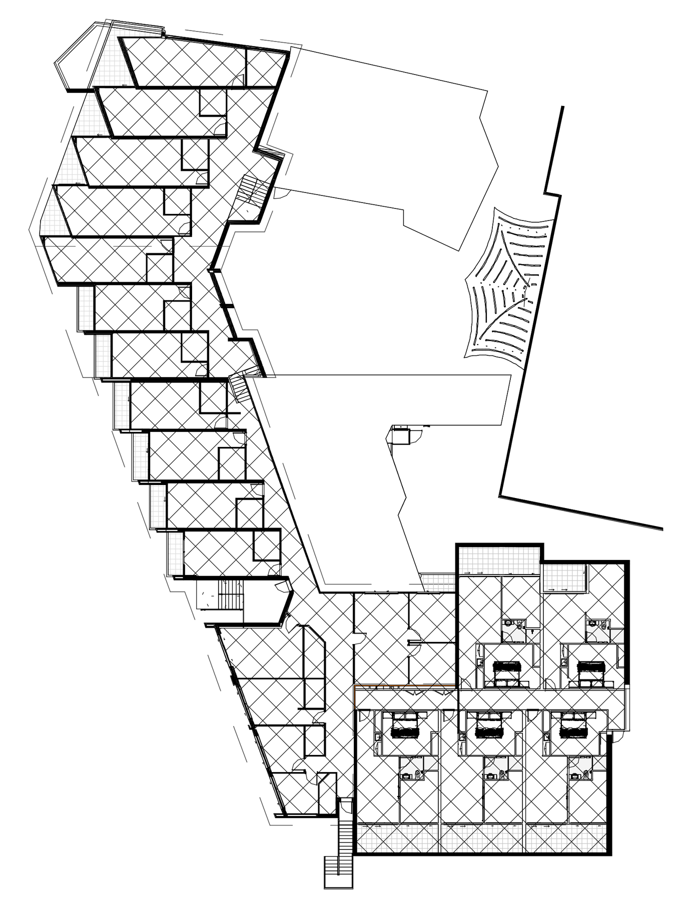
FSR = 0.96 : 1

2 GROUND FLOOR FSR
1 : 500



NETT FSR 1301M2

3 FIRST FLOOR FSR
1 : 500



NETT FSR 1055 M2

ENCOMPASS
DRAFTING AND DESIGN

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