

**ORDINARY COUNCIL**

**LATE REPORTS**

**Wednesday 21 June 2017**

**attachments**



**PORT MACQUARIE  
HASTINGS**

## Ordinary Council Meeting

Wednesday, 21 June 2017

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**PORT MACQUARIE  
HASTINGS**

## Looking After Our Environment

### What are we trying to achieve?

We understand and manage the impact that the community has on the natural environment. We protect the environment now and in the future.

### What will the result be?

- Accessible and protected waterways, foreshores, beaches and bushlands.
- Renewable energy options.
- Clean waterways.
- An environment that is protected and conserved for future generations.
- Development outcomes that are ecologically sustainable and complement our natural environment.
- Residents that are environmentally aware.
- A community that is prepared for natural events and climate change.

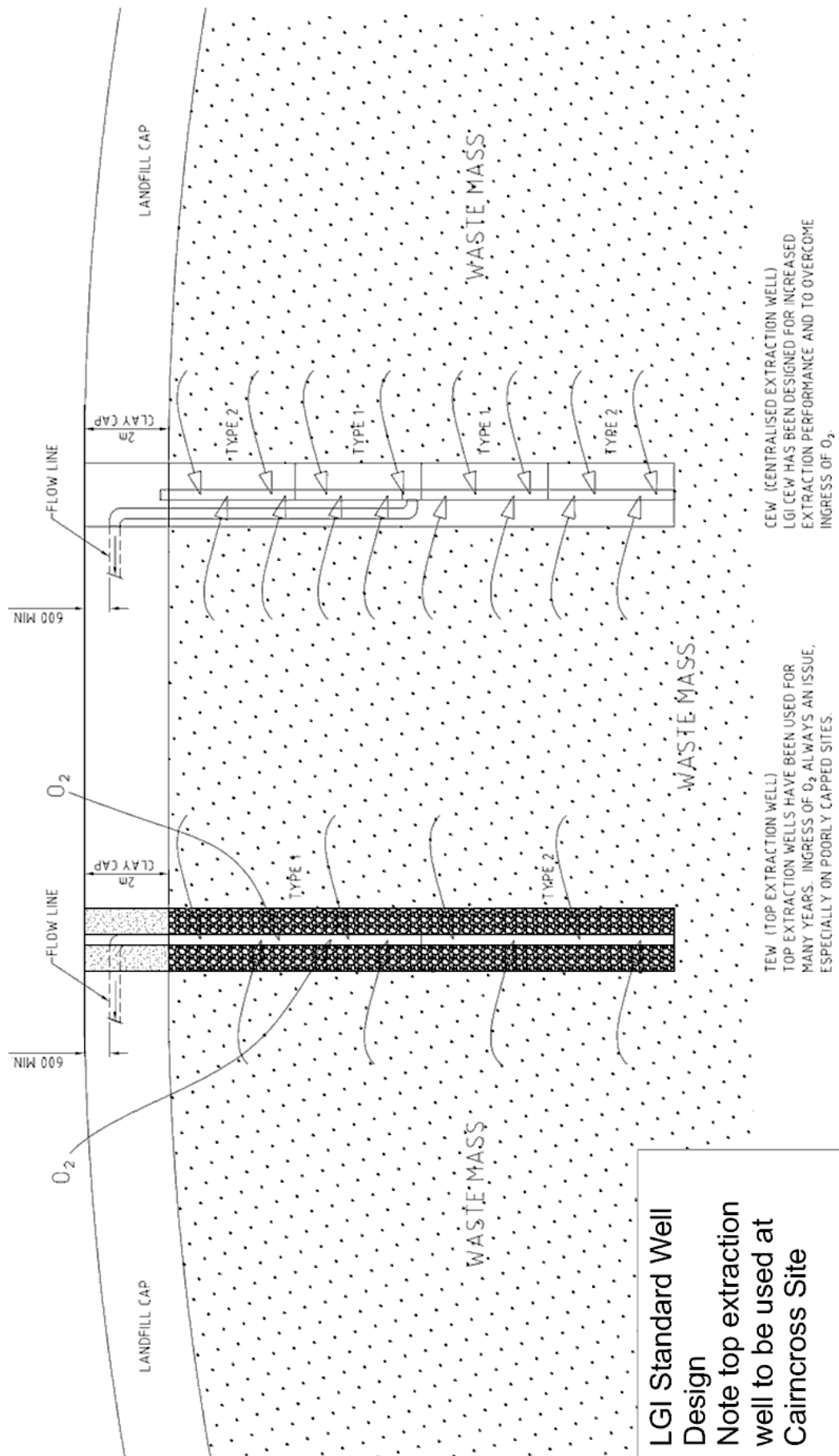
### How do we get there?

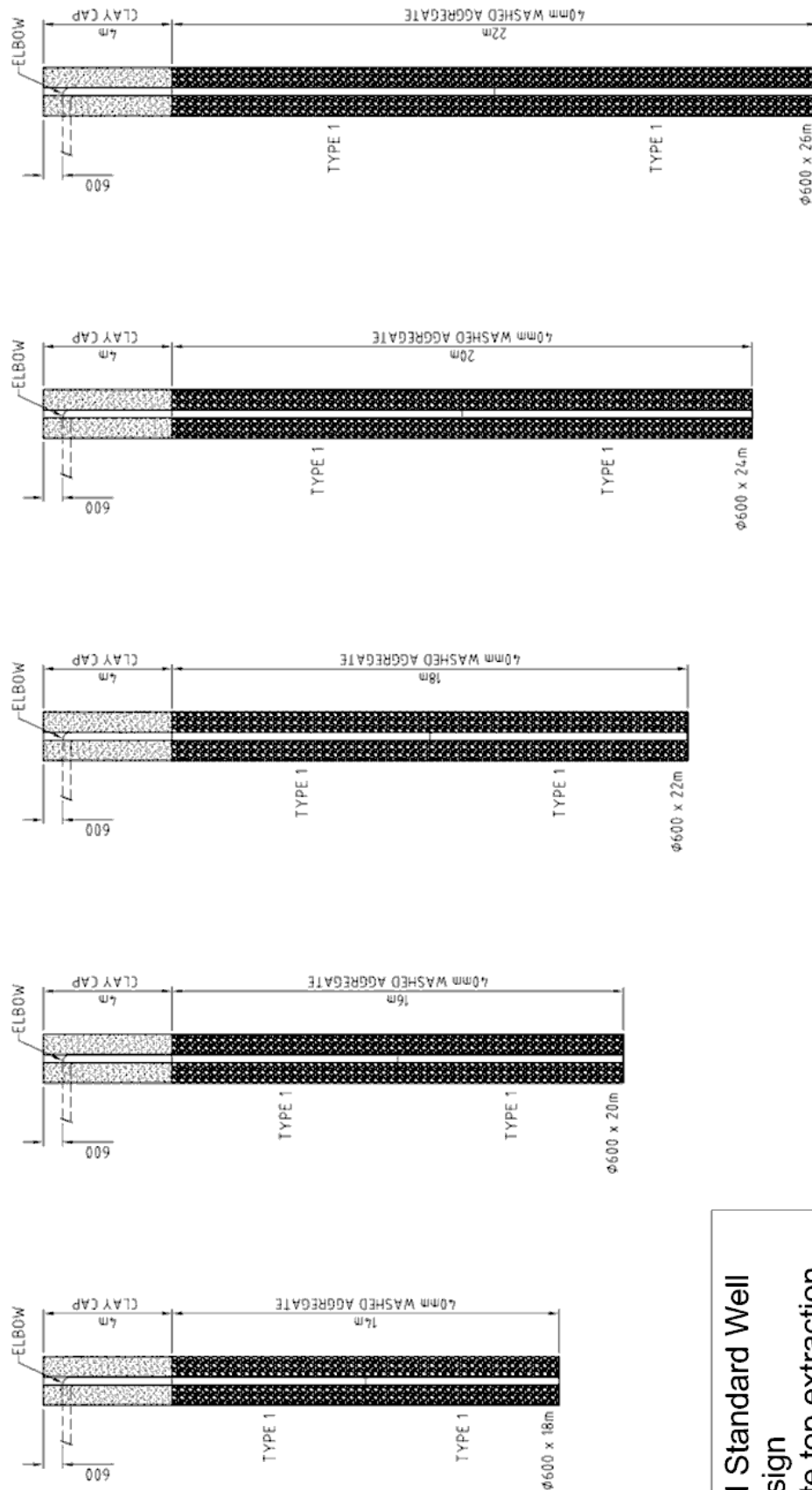
- 4.1 Protect and restore natural areas.
- 4.2 Ensure service infrastructure maximises efficiency and limits environmental impact.
- 4.3 Implement total water cycle management practices.
- 4.4 Continue to improve waste collection and recycling practices.
- 4.5 Provide community access and opportunities to enjoy our natural environment.
- 4.6 Create a culture that supports and invests in renewable energy.
- 4.7 Increase awareness of and plan for the preservation of local flora and fauna.
- 4.8 Plan and take action to minimise impact of natural events and climate change.
- 4.9 Manage development outcomes to minimise the impact on the natural environment.



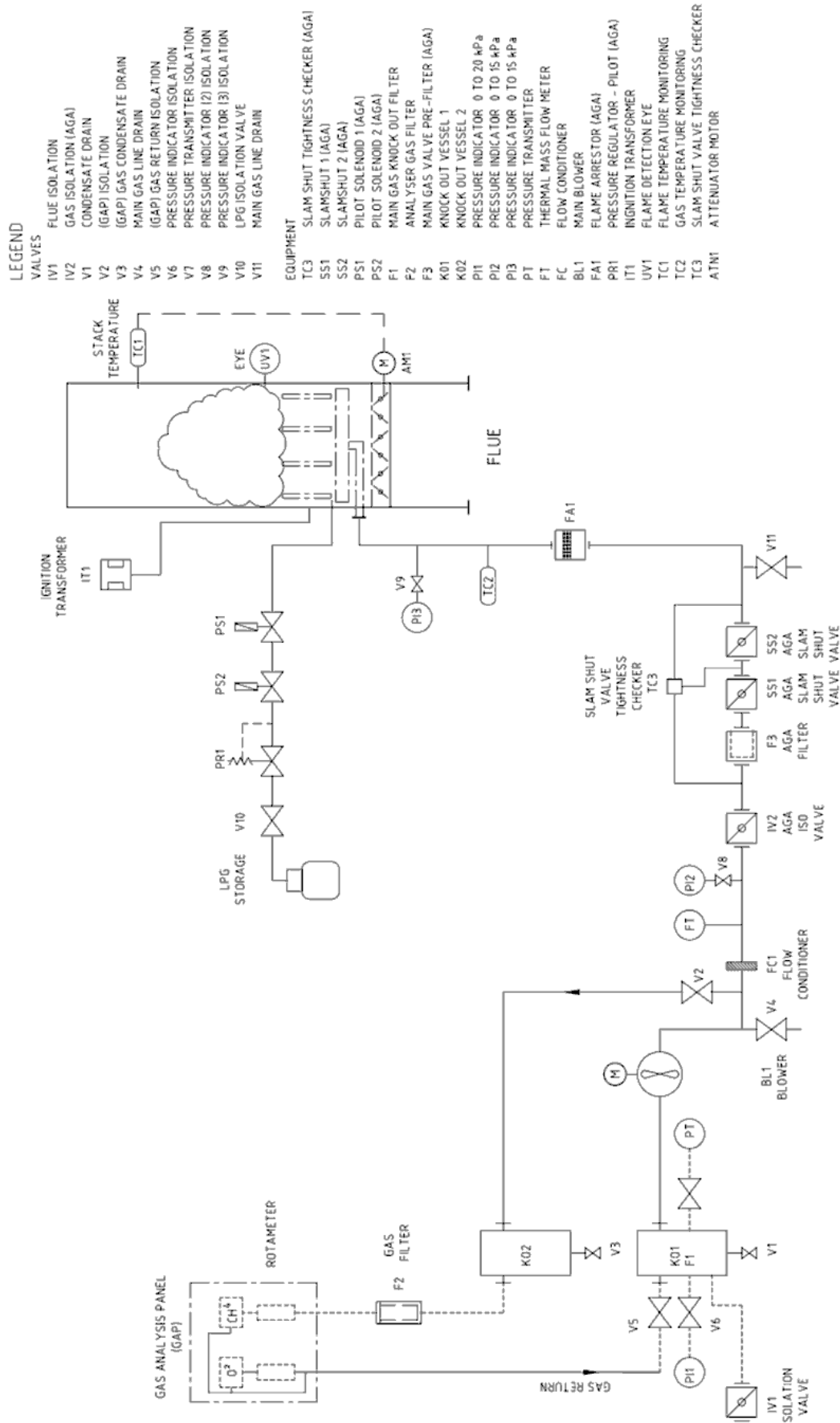


# Standard Drawings & Typical Pumping Trial Installation



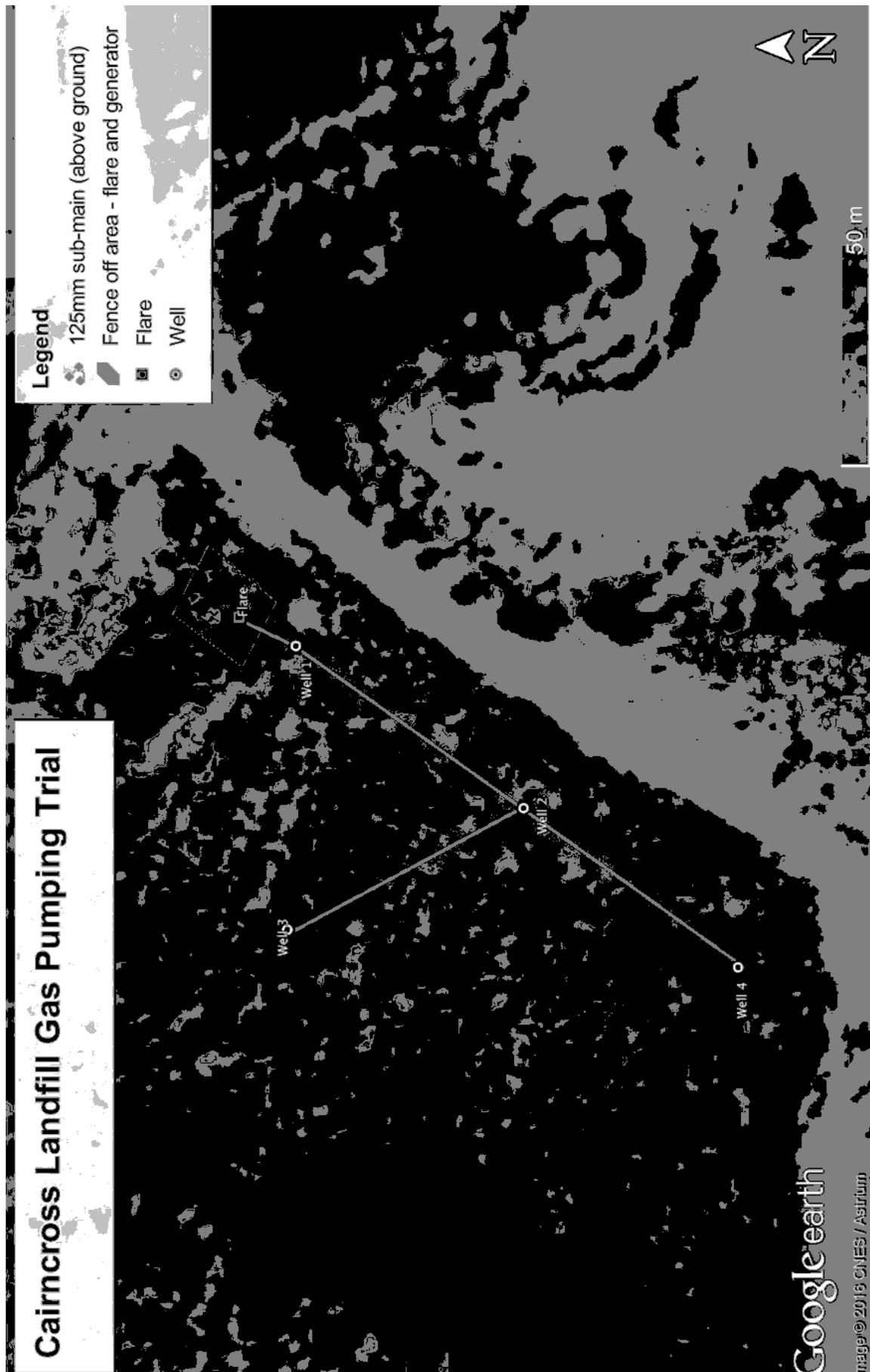


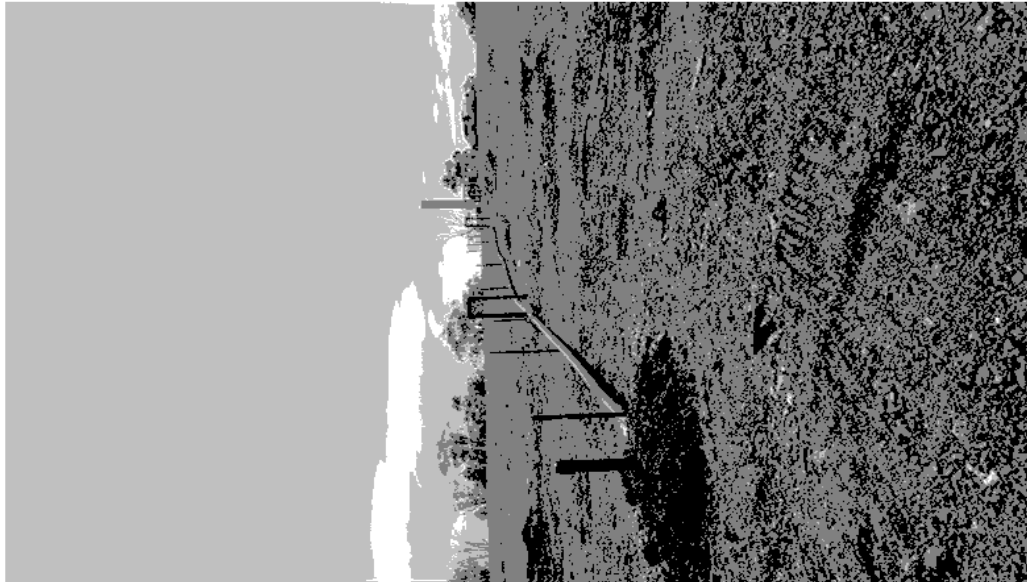
LGI Standard Well  
Design  
Note top extraction  
well to be used at  
Cairncross Site











LGI 500 Series Flare  
Above ground well connections  
and gas main



LGI 500 Series Flare  
Above ground well connections  
and gas main



Port Macquarie-Hastings Council  
Landfill Gas Pumping Trail  
Concept Design

## PREPARED BY:

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This report has been prepared for Port Macquarie-Hastings Council in accordance with the terms and conditions of appointment agreed in principle on 16 January 2017. Landfill Gas Industries Pty Ltd cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

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## DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked
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	Rev2	11/04/2017	TM	JD

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## 1.0 PROJECT SUMMARY

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Port Macquarie-Hastings Council (PMHC) has engaged Landfill Gas Industries Pty Ltd (LGI) to design, install, and conduct a Landfill Gas (LFG) pumping trial at Cairncross Waste Management Facility (CWMF), NSW. The objective of the gas pumping trial is to assess:

- The actual rate of methane (CH<sub>4</sub>) generation from a 'typical' zone within the landfill,
- The concentration of CH<sub>4</sub> during active extraction, and
- Provide a forecast of future extraction rates/concentrations within the landfill.

This will provide PMHC with information to help minimise the risk of any future exposure to carbon liability and landfill gas migration issues, and potentially generate revenue through carbon offsets opportunities.

On completion of the trial, LGI will prepare a report summarising the system performance, verifying LFG generation rates for the site, and provide recommendations for gas management at the landfill. In addition, the report will assess the implications of the current carbon legislation for PMHC, revenue potential through generation of Australian Carbon Credit Units (ACCUs) under the Emissions Reduction Fund, and possible future reporting / financial liabilities.

### 1.1 SITE INSPECTION

LGI staff members Jarryd Doran (Chief Operating Officer), and Mark Harper (Operations Manager) attended a site inspection February 1st 2017 with PMHC staff. The following matters were noted / discussed:

1. Current site activities, and agreed area to locate the flare,
2. Proposed well locations, and the estimated drilling depth in relation to the depth of waste around the site,
3. Overview of the sites boundary monitoring results, and
4. Location of existing / nearby utilities i.e power and water.

### 1.2 COUNCIL SUPPLIED DOCUMENTS SITE INSPECTION

LGI has reviewed the following documents supplied by PMHC in preparation of the Concept Design:

1. Cairncross Waste Management Facility Concept Design - Typical Cross Sections, Stage 1, Stage 2, Stage 3, Final Landforms Levels, Stage E (existing) and Landfill Floor Excavation Levels,
2. Cairncross Landfill Expansion - Future disposal capacity requirements,
3. Cairncross EIS - GHG preliminary findings\_20160330,
4. Cairncross OEMP November 2016,
5. MidWaste Regional Waste Forum Carbon Pricing Mechanism and Council Landfill Review 2012.

## 2.0 PROPOSED LAYOUT

Figure 1 below shows LGI's proposed layout for the PMHC Cairncross LFG pumping trial.

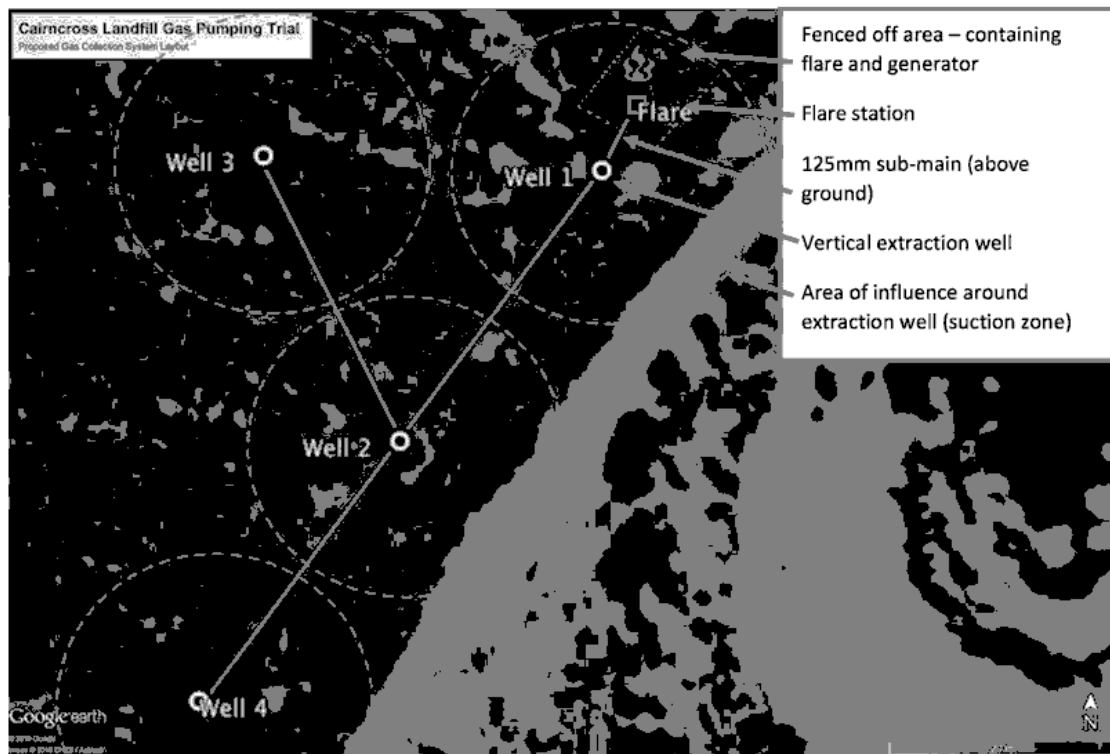


Figure 1 Proposed layout of LFG collection system

The following components form key to the system design:

- High Density Polyethylene (HDPE) pipe in varying diameter and wall thickness will be used for the extraction wells, flow-lines, and gas mains to provide greater durability,
- 600mm drilling diameter for each extraction well to help provide an increased area of suction,
- A 30m well spacing has been proposed to set-out the collection points. This provides an adequate cross section of the landfill's gas potential, while minimising the operational impacts of the trial to the broader site,
- Installed well depth with target an average of 15-20m below ground level around the site (depending on approved drilling depth). The wells will be approximately 3m from the base of the landfill waste,
- An LGI 500 series (500m<sup>3</sup>/hr capacity) flare, powered by LGI's mobile diesel generator.

### 3.0 METHODOLOGY AND CONCEPT DESIGN

#### 3.1 GAS SYSTEM INSTALLATION

LGI intends to install four (4) vertical wells on the site as per the concept design.

LGI's vertical gas wells are designed to maximise gas extraction with minimal oxygen (O<sub>2</sub>) ingress. Figure 2 below compares standard 'top extraction well' (TEW) and LGI's modified 'centre extracted well' (CEW).

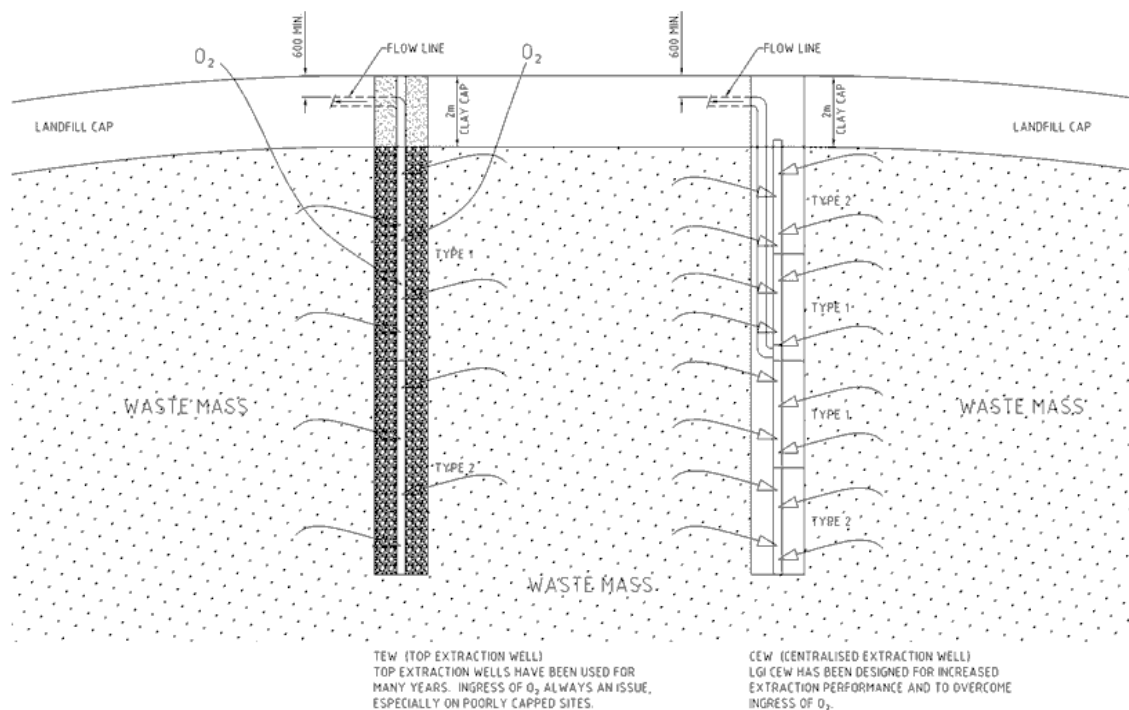


Figure 2 Extraction well schematics

Upon drilling the well, the appropriate well type is selected based on the capping quality, and layering of waste. For sites good quality, or 300mm+ thick capping, a TEW format is used. For sites with low quality, or shallow capping, a CEW format is used to minimise O<sub>2</sub> ingress.

Our standard construction methodology is presented in the following sections.

The proposed site at the CWMF has clay capping that exceeds 300mm, therefore it's proposed that a TEW will be used.



### 3.1.1 Construction Methodology

Vertical wells will be constructed to 3 m off the base of the landfill waste, where possible. LGI uses a foundation piling rig to achieve the desired depth, and circular excavation. To minimise waste handling and odour, waste removed from each well during the drilling process is loaded directly into our tip-truck, and directed to the tip face.

A well “stringer” consisting of high density polyethylene (HDPE) piping with staggered perforations provides the conduit to collect gas, and transport it back to the surface connection point. The stringer is packed with 40mm minus aggregate (igneous or metamorphic equivalent) to support the pipe in the centre of the well. As landfill gas tries to move from areas of high to low pressure, the rock pack around the stringer also provides a void for the gas to move into.

The upper 1m of the well is backfilled / capped with bentonite clay to seal the well. Flow lines are typically connected to the well heads and run back to a centralized manifold in the area. The flow line is laid with a minimum 2% fall to allow condensate to run back to the well and into the landfill cell. Manifolds are located in a centralised area in relation to the wells they service. A manifold leg consists of an orifice plate for measurement of gas flow; and gas sample points to sample the gas composition. A valve is located in each leg of the manifold that allows for controlled change to suction pressure on the given flow line. Figure 3 below presents a typical flowline and manifold when installed above ground by LGI:

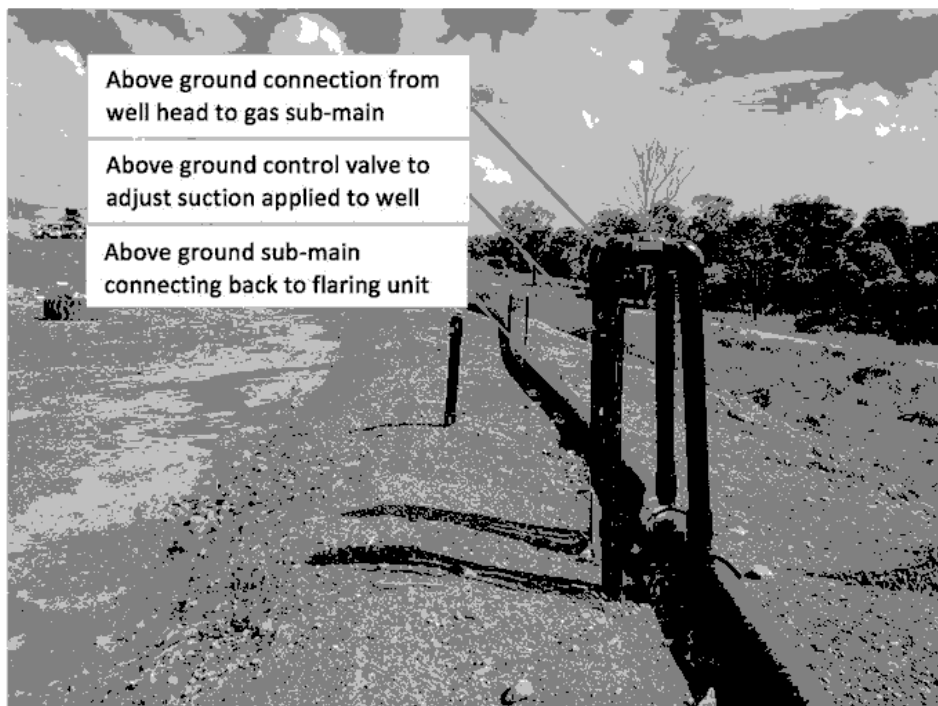


Figure 3 Typical flowline and manifold

For the CWMF LGI intends to run these flow lines above ground to the flare. The proposed system is designed around a maximum pressure of -20kpa; this pressure range allows for a gradual and controlled extraction of gas. Once the system is installed, changes to well suction are made regularly and in very small increments as to not stress the landfill cell. The system consists of a network of PE piping connected to a main suction line. All pipe joins are either made by butt welding or by electrofusion welding. These techniques ensure a robust joint is made.

The main line is sized according to distance and the landfill's potential to produce gas. The main line generally runs through the centre of the gas field. When 2% fall cannot be achieved across the system, condensate traps are also installed to ensure the capture of condensate. These traps are designed in such a way that the condensate is released back into the landfill cell without the need for a mechanical pump. An 'As Constructed' drawing with accurate GPS coordinates and levels will be provided for the site detailing all new infrastructure including wells, condensate traps, flowlines and manifolds

Table 1: Material specifications for LGI gas field installations

Main Line Piping	125mm PN 10 PE Piping
Manifolds	single leg in pit with integrated orifice plate and valve
Isolation Valves	225mm stainless butterfly and throat
Well flow valves	50mm Teflon lined Poly gate valve
Lateral wells	Nil
Condensate traps	125mm PN8.0 PE piping and butt welded elbows
Flow lines	90mm PN 8.0 PE Piping
Wells	125mm PN 10 PE Piping
Aggregate	40mm minus washed basalt aggregate or equivalent
Bedding Material	Basalt crusher dust or equivalent
EF Couplings	Friatec Heavy Duty Electro fusion fittings ( SDR11) gas
EF Welder	Friatec ECO
Butt Welder	90-315 World Poly
Condensate vessel	500mm with bolted flanged lid
Well capping	Bentonite chip

### 3.2 FLARING UNIT SPECIFICATION

LGI will supply a LFG500 (500m<sup>3</sup>/hr @50% CH<sub>4</sub> capacity) flare unit, designed and manufactured by LGI. Our assessment of the Carincross site indicated that a 250+ m<sup>3</sup>/hr capacity unit is sufficient. LGI's design does not require independent certification – our LFG flares have demonstrated their compliance with Australian regulations and standards:

- AS 4323.1 – Stationary Source Emissions: Method 1: Selection of Sampling Positions (1995);
- AS 3814 – Industrial and Commercial Gas Fired Appliances 2009;

In addition to meeting the above-mentioned standards, LGI flares have the following features:

- a. Enclosed flare stack,
- b. Continuous temperature and flow monitoring devices,
- c. Adjustable Dampers to maintain a steady temperature,
- d. Continuous flow and temperature recording devices (at least every 15 minutes),
- e. Automatic shutdown for low and high temperature, low CH<sub>4</sub>, high O<sub>2</sub>,
- f. CH<sub>4</sub> and O<sub>2</sub> analysers,
- g. A flow monitoring device on the landfill gas inlet capable of being calibrated annually,
- h. Flare arrestor and double block gas valve setup,
- i. Variable speed controlled gas blower and a condensate knockout vessel,
- j. All components suitable for untreated LFG,
- k. A turndown ratio of 10:1 (please note that a 10:1 turndown ratio is applicable to 50-500 m<sup>3</sup>/hr capacity units),
- l. An independently measured destruction efficiency (DE) rating in excess of 98%

LGI's flare units meet or exceed the following performance criteria:

- A minimum exhaust gas residence time of >0.6 seconds within the flare chamber at a minimum temperature of 760 deg C, under all operating conditions,  
**Note: low calorific operation i.e: CH<sub>4</sub> content of less than 25 % may result in a lower combustion temperature.**
- A minimum destruction efficiency of 98% for Non-Methanogenic Organic Compounds (NMOC) or a maximum total Volatile Organic Compound (VOC) exhaust gas concentration of 5 mg/Nm<sup>3</sup>. Destruction efficiency will be determined based on the calculated landfill gas inlet NMOC mass rate and the measured flare exhaust gas NMOC mass emission rate.
- A maximum NMOC concentration in the flare exhaust gases of less than or equal to 20 ppm

Table 2: LGI LFG 500 Flaring Unit Technical Specifications:

Flaring Capacity	50 – 500m <sup>3</sup> /hour (minimum 25 % CH <sub>4</sub> ) >0.6 sec residence time >98% destruction efficiency
Enclosed Stack	6.0m cylindrical section, fabricated from 5mm 304 stainless with stainless hardware, for ease of transport. Each section is lined with a 50mm layer of thermal ceramic wool.
Liquid and Particle Knockout	304 stainless or hot dipped galvanized vessel with slip in stainless coalescing pad. Condensate indicator and drain.
Gas Delivery	Gas feed is via a single stage 7.5kw centrifugal blower. This is designed with a maximum combined pressure of 20kpa. This unit is fabricated for landfill gas applications with built in drain, stainless steel fan and motor shaft, magnetic seal and Ex D rated motor.
Gas Flow control	Variation in flow is controlled via an ABB variable speed drive.
Gas Isolation	Gas isolation is achieved using a double block and prove arrangement. Krom and Schroder leakage detection is utilized in this arrangement. There are also 2 manual isolation valves contained within the system.
Gas Monitoring	Gas quality is measured constantly with appropriate shut down interconnection. CH <sub>4</sub> and O <sub>2</sub> content are monitored in accordance with Gas safe Victorian guidelines. Carbon Dioxide (CO <sub>2</sub> ) is available for coal gas applications.  O <sub>2</sub> alarm at 1%  O <sub>2</sub> trip at 5%  CH <sub>4</sub> alarm at 30%  CH <sub>4</sub> trip at 25%
Gas Flow	Gas flow is measure via E&H ultra sonic B200 type flow meter. This meter is calibrated annually.
Combustion	Combustion is via 9 LGI design cluster burners with built in flame retention nozzles.
Combustion Temp	Combustion temperature is monitored via high temp thermo-couple (Type S) and is inputted to control system.
Stack Aspiration	Stack is aspirated via 1 large louvered vent. These are adjusted to

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	maintain a constant combustion temperature.
System Control	The system is controlled via Panasonic PLC, Red Lion touch screen and Krom and Schroder BCU burner controller (Figure 2). It features:  Auto restart  Auto alarm dial out via GSM  Dial in remote control and monitoring.  Basic data logging
Flame Detection	Flame detection is via Krom and Schroder UV eyes for main flame and pilot flame.
TYPE B Gas Appliance Approval	n/a in NSW.

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LGI's flares comply with the following standards:

- AS 4323.1 – Stationary Source Emissions: Method 1: Selection of Sampling Positions (1995);
- AS 3814 – Industrial and Commercial Gas Fired Appliances 2009;

Please refer to **Appendix A** for a copy of the LFG500 flaring unit technical layouts and markup.

### 3.3 INSTALLATION TIMEFRAME

LGI expect to be onsite on the Cairncross landfill site on Monday the 29th of May 2017, with installation of the wells and flare expected to be completed by Friday the 2nd of June 2017. These dates are dependent upon the development consent.

### 3.4 GAS SYSTEM OPERATION

LGI flares are equipped with dial-in remote controls, which enable the dedicated technician to monitor 24-hrs a day. Technicians are automatically notified via email and SMS if the flare shuts down, and units can often be re-started remotely. During early stages of system operation, a gas field technician will visit the site to adjust the flow in individual wells. Once the field settles into a pattern, the technician will schedule regular site visits and will be on-call as necessary for manual flare re-starts and maintenance. Due to the high standard of LGI's flare design and construction, and the care taken during well installation, our gas extraction and combustion systems generally require minimal attention during the first 12-24 months.

## Prescribed System Checks:

Assessing gas quality	Measure and record the CH <sub>4</sub> , CO <sub>2</sub> and O <sub>2</sub> content of LFG at flare inlet test point using appropriate gas analysing equipment. These results are indicative of how the gas collection network is performing and should therefore be checked on a daily basis.
Checking flow rate	This is the amount of LFG entering the flaring unit measured in m <sup>3</sup> /hr and should be checked daily.
Checking cumulative flow	This is the total amount of LFG which has been flared whilst the unit has been in operation and is measured in m <sup>3</sup> . This figure is imperative in the calculation of gas destroyed.
Checking operational hours	This figure represents the total run time of flaring unit. It can be used to determine the duration of shutdowns over a period of time.
Checking stack temperature	The stack temperature is measured using an S-Type thermocouple which is located on the side of the flue and above the burners. The temperature is moderated using the actuator which increase or decreases the flow of air underneath the stack. A temperature of 760 degrees Celsius or higher, ensures over a 90% destruction rate of CH <sub>4</sub> .
Checking the inlet pressure	This is the suction pressure or vacuum being applied to the gas collection system. Altering this pressure affects the flow rate.
Checking the outlet pressure	This is the pressure upstream of the fan blower. An unusually high outlet pressure is indicative of an obstruction between the blower and the burners.
Checking for obstructions to air dampeners	If dampeners are obstructed, the actuators will be unable to maintain the set stack temperature.
Maintenance of fan blower assembly	Check fan belt tension and wear. Adjust tension or replace belts as required. Grease blower bearings; grease electric motor bearings. Check motor windings and terminations. All maintenance to be performed in accordance to manufacturers specifications.

Flow meter calibration	This is to be carried out annually by an independent qualified technician. This test is performed to verify the flow and total flow of the flare.
Inspect electrical wiring and terminations	During the normal course of operation, it is possible for electrical wire to deteriorate and wire terminations to loosen due to heat, vibration or rodents for example. A deterioration of cable insulation creates risk of electric shock or short circuiting. Loose terminations may cause arcing across conductors. These scenarios can result in equipment failure, equipment damage or even fire. It is LGI's recommendation to have all wiring and terminations inspected by a qualified electrician at least once a year.
Condensate Knockout Vessel (CKV) maintenance	The main CKV is located downstream of the gas flaring unit. The purpose of this vessel is to trap gas condensate which forms within the gas extraction main line. From there, it is pumped back into the landfill cell. Maintenance and checks will be required to be performed on the CKV pump and magnetic float switch to ensure against blockage of the main line.
Monitoring and Adjustment of LFG wells	This is performed using suitable gas analysing equipment and differential pressure meter. The flow of each individual well is able to be calculated by measuring the differential pressure across the orifice plate within each leg of the manifold located inside the test stations. Flow restrictions or increases to each well can be made by adjusting the nylon ball valve located above the orifice plate. Adjustments are generally based on LFG control and collection system objectives. LGI recommends monitoring be carried out at least on a monthly basis.
Maintenance around flare and manifold compound	This should be performed periodically to ensure the gas extraction system is functioning as intended. Maintenance includes ensuring accessibility to pipe work and entry ways, replacing or repairing any damaged or faulty components of the gas collection system, maintaining a suitable level of aesthetics.

## 5.0 CLOSURE

This report has been prepared by Landfill Gas Industries Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

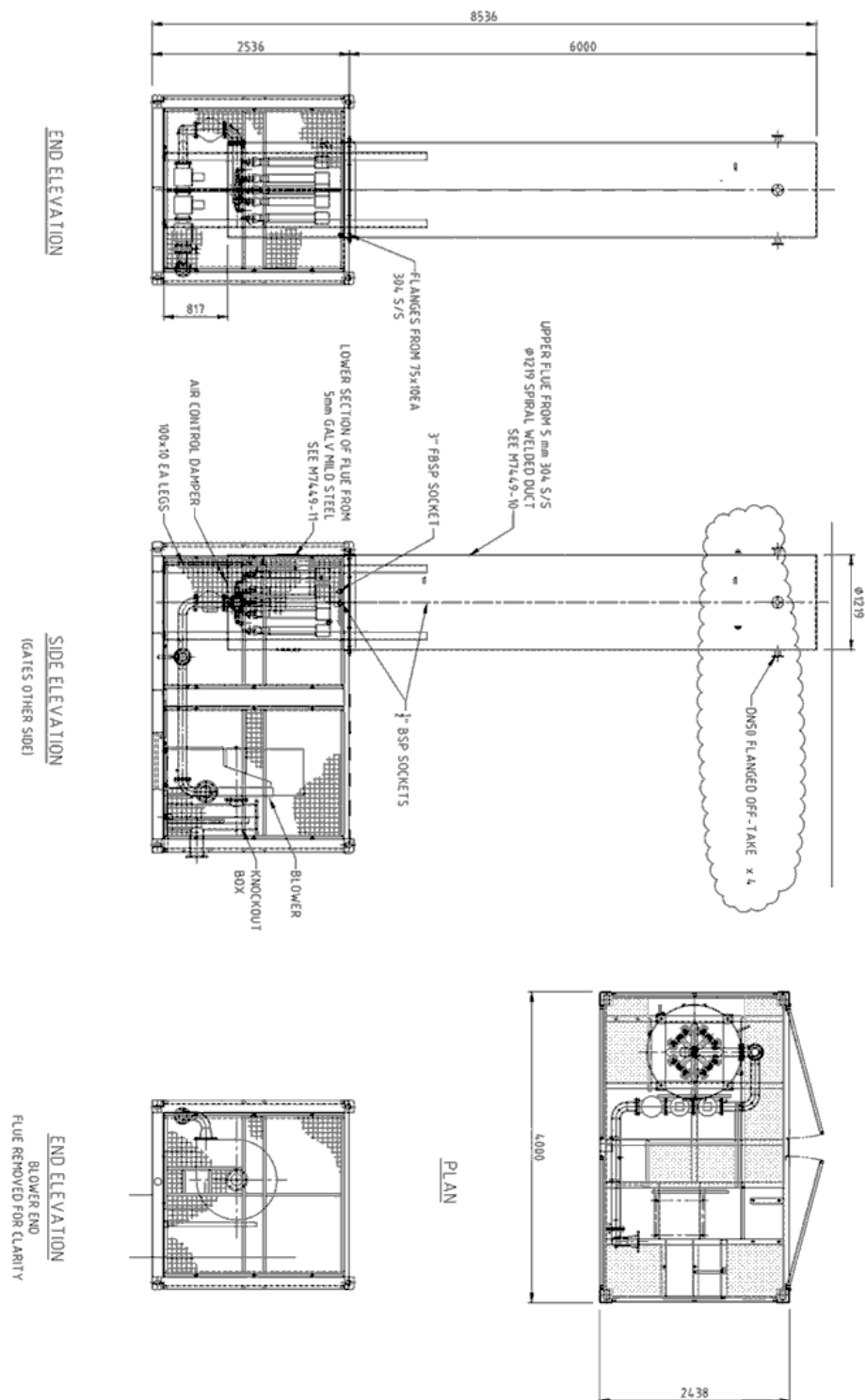
This report is for the exclusive use of PMHC. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from LGI.

LGI disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Upon completion of the pumping trial, the site owner/operator must review the Carincross LFG System As-Constructed and Commissioning Report provided by LGI regarding the extraction system infrastructure (i.e location of vertical extraction wells, and pipes below ground), prior to undertaking earthworks, or excavations, or any disturbance of ground or subsurface conditions on the site.



**APPENDIX A – FLARING UNIT TECHNICAL LAYOUT**



**FOR USE BY PLANNERS/SURVEYORS TO PREPARE LIST OF  
PROPOSED CONDITIONS****NOTE: THESE ARE DRAFT ONLY****DA NO: 2017/328****DATE: 7/06/2017****PRESCRIBED CONDITIONS**

The development is to be undertaken in accordance with the prescribed conditions of Part 6 - Division 8A of the *Environmental Planning & Assessment Regulations* 2000.

**A – GENERAL MATTERS**

- (1) (A001) The development is to be carried out in accordance with the plans and supporting documents set out in the following table, as stamped and returned with this consent, except where modified by any conditions of this consent.

<b>Plan / Supporting Document</b>	<b>Reference</b>	<b>Prepared by</b>	<b>Date</b>
Development plans	Standard drawings and typical pumping installation	Landfill industries gas	
Port Macquarie-Hastings Council Land fill Gas pumping trial of Environmental Effects		Landfill industries gas	11 April 2017

In the event of any inconsistency between conditions of this development consent and the plans/supporting documents referred to above, the conditions of this development consent prevail.

[REDACTED]

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**From:** Debbie & Jim [REDACTED]  
**Sent:** Sunday, 14 May 2017 8:34 PM  
**To:** Council  
**Subject:** Submission: Application 328

To the General Manager

Application: 328

I received notification with regards to the following:  
Landfill Gas Infrastructure Associated with Waster Management Facility  
Lot 1 DP 1202080  
Pacific Highway, Pembroke

I wish to express my concerns/objections with regards to the development proposal.

- Smell
- Lowing the value of our property
- Noise

Regards  
Debbie Rowsell  
1173 Pembroke Road, Pembroke

[REDACTED]