ESSO AUSTRALIA PTY LTD

Hastings Generation Project

Environmental, Safety & Security Information for Planning Permit Application

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Abbreviations

AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
ARR	Australian Rainfall and Runoff
BOM	Bureau of Meteorology
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
DELWP	Department of Environment Land, Water and Planning (Vic)
DJPR	Department of Jobs Precincts and Regions
EPA	Environment Protection Agency (Vic)
GDE	Groundwater Dependent Ecosystems
HZS	Hastings Zone Substation
km	kilometre
kWh	Kilowatt hour
kV	Kilo Volts
LIP	Long Island Point
MW	Megawatt
MWh	Megawatt hour
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
PM	Particulate Matter
ppm	Parts per million
PPWCMA	Port Phillip and Westernport Catchment Management Authority
Project	Hastings Generation Project
vpd	Vehicles per Day
VRO	Victorian Resources Online

1. Introduction

This document summarises the information collected for the EPA's Development Licence Application and the DELWP Environmental Effects Statement – Self Assessment; to be used in the Planning Permit Application. It also includes additional regulatory and security information to address other planning concerns.

1.1. Project Location

Figure 1 identifies the Hastings Generation Project (Project) location in relation to the surrounding environment.

The Project has four key design objectives to minimise the environmental footprint, being:

- locating the proposed power plant next to the Esso Long Island Point facility (LIP), thus minimizing the length of new piping that is required to transport ethane gas
- locating the proposed facility onto land already zoned for industrial use
- placing the power plant in an area previously cleared
- placing the power plant in an area already connected to the existing electrical transmission system.

The proposed site is situated on land next to Long Island Point (LIP) Fractionation Facility. It is owned by Esso Australia Resources Pty Ltd (Esso) and BHP Petroleum (Bass Strait) Pty Ltd. This land is zoned Special Use Zone 1, which is suitable for port and industrial use. Long Island Point is a predominantly industrial area, with some commercial activities, agriculture and a very small number of residential properties (all of which are located on the far side of LIP).

The Project site was previously leased and used for the manufacture of garden supply products.

The close proximity of the Project to LIP enables ethane gas to be transferred to the power generators with minimal impact upon the environment. The pipework will be installed on Esso owned land that has been previously cleared.

The electricity generators and transformers will be placed in an area already cleared.

Any further clearing of vegetation will be limited to a small number of shrubs/trees for the purposes of:

- Piping installation;
- Placement of the control room / office / kitchen;
- Stormwater culvert maintenance;
- Fence access and maintenance; or
- For bushfire management.

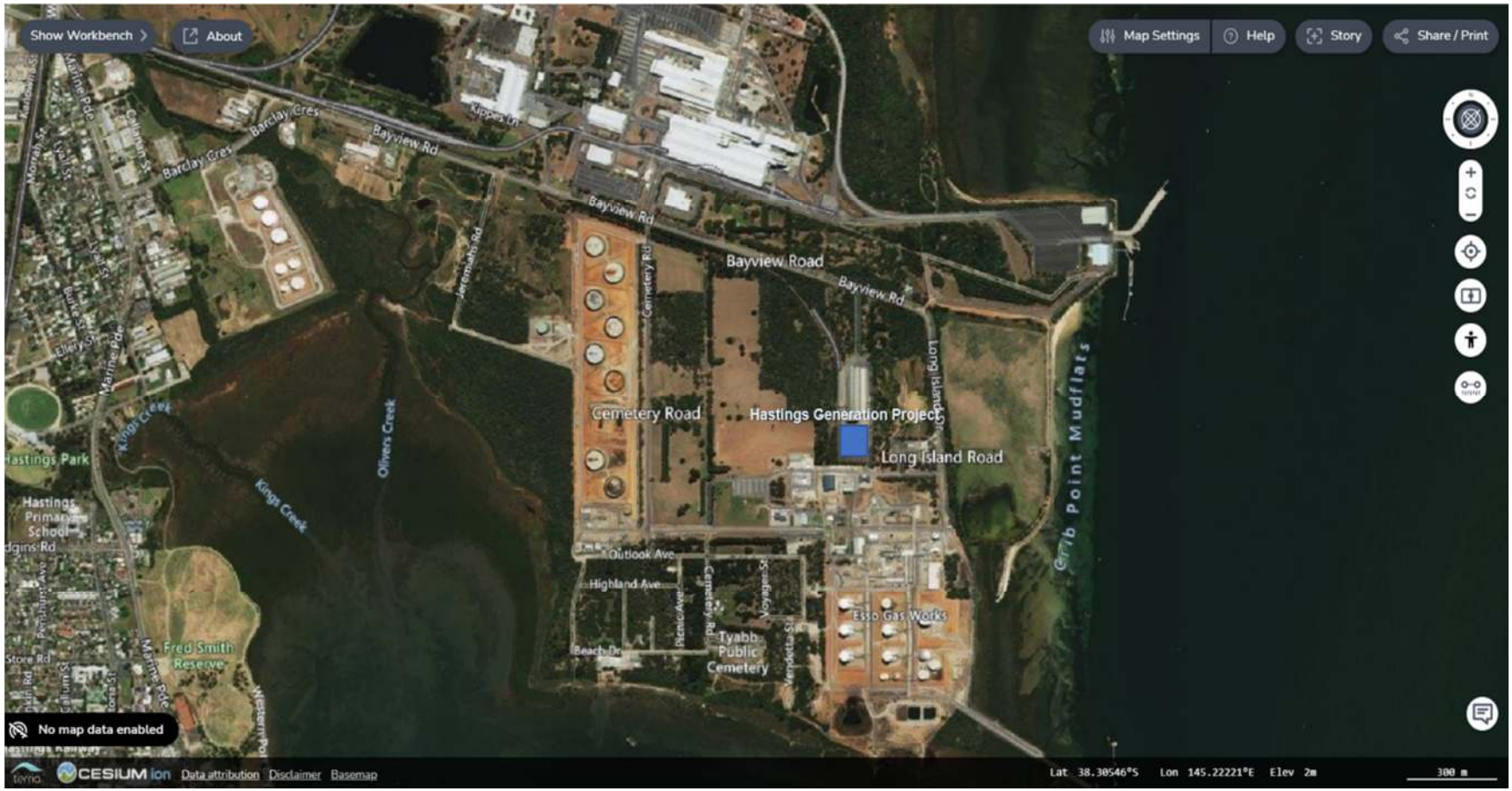
The site is connected to the Victoria electricity network via an existing 22 kV transmission line. An additional 66 kV line is planned to be installed beside the existing line as part of the project. This is expected to require the installation of two or more additional poles. Note that all works and approvals associated with the transmission line are being undertaken by United Energy, and are outside of the scope of this application.

Potable water and firefighting water are already available on site via an existing water main that connects to LIP. Some refurbishment of these utilities will be required.

Sewerage (black and grey waters from the kitchen / toilets) generated from the site during the operations phase of the development will be discharged to LIP's sewerage system, through an existing sewerage line that connects the site to LIP.

The closest residential neighbours to the Project area are approximately 700 m to the south-south-west, on the far side of the LIP facility.

Figure 1: Hastings Generation Project Location



1.2. Project Description and Rationale

Oil and gas from the Bass Strait field is sent to Longford for processing into crude oil, natural gas and other gas liquids. The natural gas liquids (ethane, propane and butane) are sent to Long Island Point Fractionation Plant (LIP) for further processing prior to LPG being exported via trucks or ships and the ethane being transported via pipeline to a downstream customer in Altona.

The ethane produced at LIP is currently used in the manufacture of plastics, such as polythene and polystyrene, which in turn are used to manufacture food wraps, bottles, bags, polystyrene foam etc.

Esso's ethane customer announced on 20 May, 2021 that it plans to close one of two ethylene production units by the end of 2021. An alternative use for this under subscribed quantity of ethane is sought. The total quantity of ethane is expected to be less than 190 tonnes per day averaged over a year.

The supply of natural gas from the Longford Plant to the state of Victoria is considered to be an essential service under the Essential Services Act 1958, and this will remain the case for the near future. For this essential service to continue there needs to be a continued means of disposing of products that are produced with the natural gas, in this case ethane, butane and propane. If the normal offtake of ethane ceased or was significantly reduced, the ability to continue to produce and deliver natural gas in Victoria at the normal rate would be interrupted. Currently Esso produces 80% of the Victorian gas market.

To deal with the excess ethane and allow the supply of natural gas to continue, Esso are proposing to install an ethane fired electricity generation on a site adjacent to LIP.

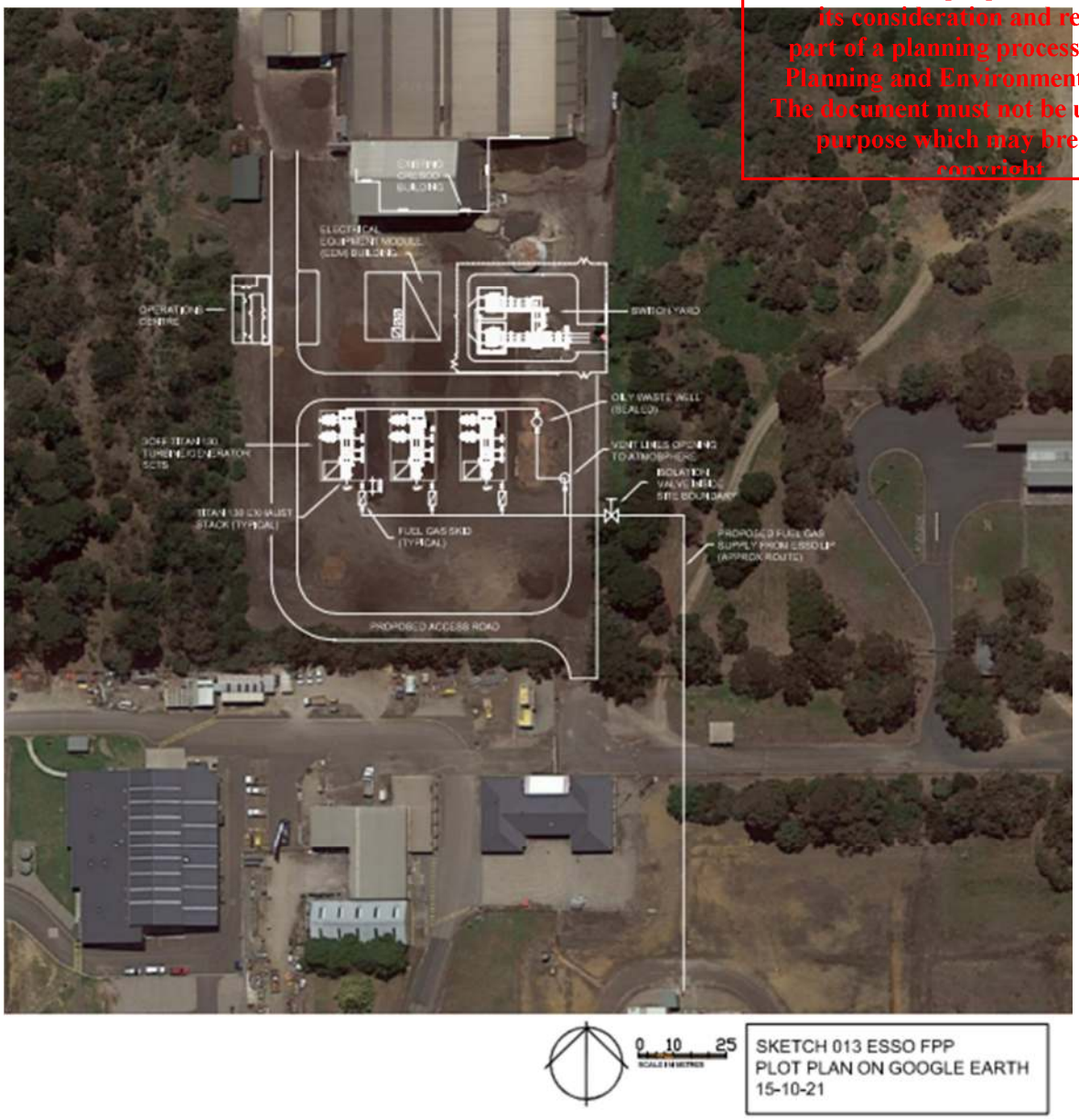
This means of ethane disposal is the preferred option as it has the lowest environmental impact and provides the societal benefit of electricity generation into the grid. When compared with electricity generated from coal production, the Project will provide a net reduction of 206 kt of CO_{2e} per year at the Project's peak generation.

There were a number of alternative options considered for ethane use, and these are described further in the next Section.

The project scope, shown in Figure 2, includes the following:

- Install gas turbine generators on the Esso owned land that was previously leased to Evergreen (inclusive of associated equipment such as fuel gas conditioning skids, instrument air compressors, stacks, etc).
- Install associated equipment rooms and electrical infrastructure to enable 66 kV power export
- Engage United Energy to install additional electrical infrastructure to enable 66 kV power export from the Project site to the Hastings Zone Substation (HZS), at Tyabb
- Install ethane supply piping from the LIP site to the Project site.
- Install facilities so that the new equipment on the Project site can be suitably operated and maintained (e.g. security requirements, crib rooms, offices, etc).

Figure 2: Hastings Generation Project Layout



The project will be a power generation facility with four primary components:

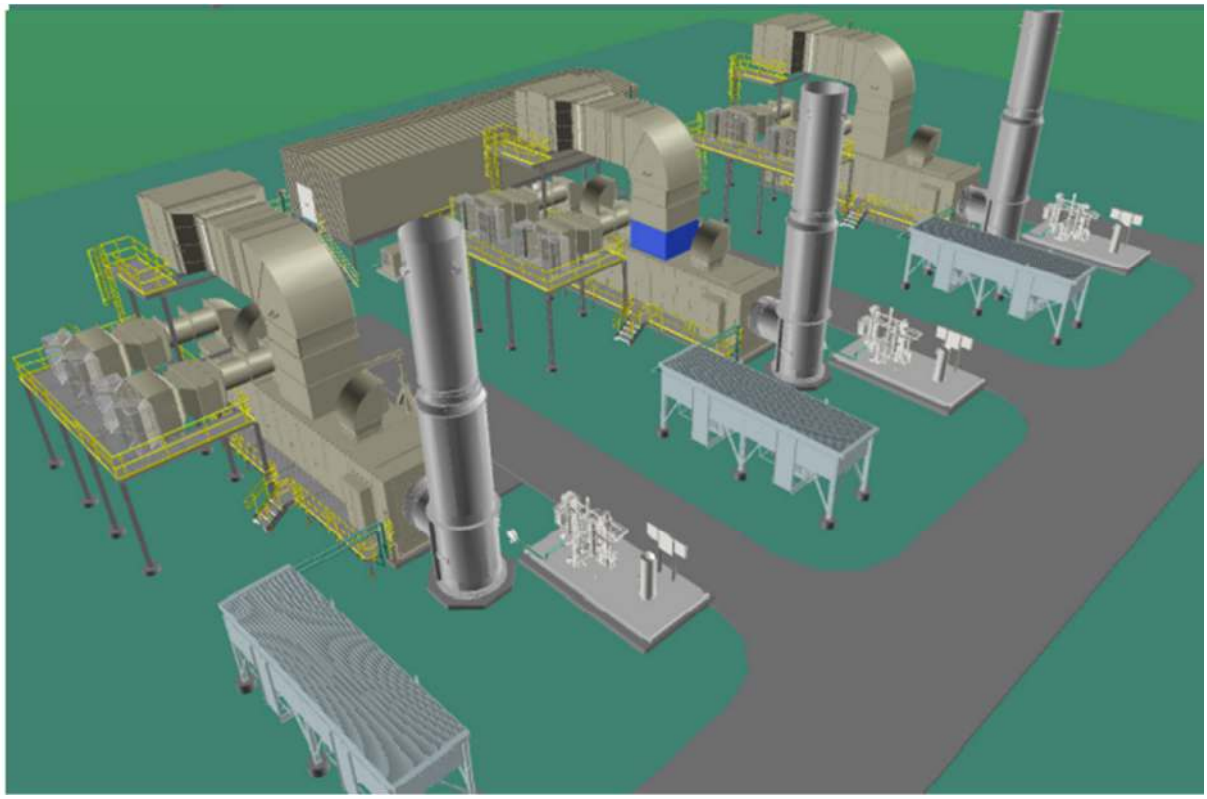
1. Installing ethane supply piping from the LIP site to the Project site.
2. Installing 3 x Solar Titan 130 gas turbine generators (inclusive of associated equipment such as fuel gas conditioning skids, instrument air compressors, stacks, etc).
3. Installing associated equipment rooms and electrical infrastructure to enable power export of 66 kV power
4. Installing facilities so that the new equipment on the Project site can be suitably operated and maintained (e.g. crib rooms, offices, etc).

The total plant area is approximately 1800 m^2.

The Project is a small-scale electricity provider, generating approximately 40MW (at its peak) of power to the existing Victoria electricity generation market. Generating power from ethane, will enable Esso to safely and reliably utilise undersubscribed ethane, thus avoiding the need to flare this gas at LIP or

reduce natural gas production for the south east Australian gas market. When gas and ethane production rates reduce, so will the power generated by the Facility. Figure 3 shows a preliminary 3D model of what the facility will look like at completion.

Figure 3: Hastings Generation Project General Arrangement 3D Model



1.3. Project Alternatives

As a result of changing commercial conditions from 2022 onward, Esso examined alternative ethane disposition methods. A number of alternatives were examined for feasibility, timing, environmental implications and cost. These alternatives include:

1. Increasing ethane consumption either at LIP or Longford.
2. Incorporating a higher percentage of ethane gas into the natural gas, sales gas pipeline.
3. Find an alternative market.
4. Decreasing production of oil and gas in the Bass Strait
5. Reinjection; or
6. Flaring of excess gas at LIP.

1.3.1. Increasing Ethane Consumption within ExxonMobil

Initial studies have shown that LIP can increase its consumption of ethane gas by approximately 20 tonnes per day after undertaking some facility modifications. The Project's gas production figures have taken this volume into account. A further increase of ethane consumption at LIP or Longford is unlikely, and any additional consumption methods will take considerable time to implement (beyond 2022) and therefore will result in a significant amount of flaring at either LIP or Longford before they could be implemented.

1.3.2. Increasing the Ethane Content of Sales Gas

There is some scope to increase the ethane content of sales gas, and still meet sales gas composition requirements. However, the requirement to blend ethane at a certain rate into the natural gas flow to meet the AEMO required Wobble index criterion means that full disposition of ethane gas cannot be guaranteed.

Additionally, sales gas is processed at Longford Gas Plant and enters the sales gas pipeline at Longford. While ethane gas is separated from other natural gas liquids at Long Island Point. Currently no method of being able to mix additional ethane gas into the sales gas is available.

To be able to undertake this option a new ethane pipeline and injection facilities would need to be installed between LIP and the sales gas pipeline. The most suitable spot would be at the Dandenong City Gate, blending facility. This would require the construction of a 5-kilometre-long pipeline through urban industrial areas of Dandenong. It would be unlikely that this could be achieved prior to the end of 2024, making this option impracticable given the required start time for alternative disposition of ethane gas.

In addition to scheduling considerations, this option would also present more complex social, cultural, environmental and regulatory considerations. It was concluded that this was not a desirable disposition option.

1.3.3. Alternative Market

This option is a desirable option; however, it is dependent upon sourcing a new market and/or customer. Neither of which have been sourced to-date. Marketing uncertainty makes scheduling for the upcoming need to utilise surplus gas unpredictable.

This option is not viable at this time.

1.3.4. Decreasing Production

As Victoria moves to Net Zero in 2050, the Victorian government is in the process of developing a Gas Roadmap Strategy. This Strategy will identify ways that Victoria can reduce its dependence on natural gas in line with its commitments made under the Climate Change Act (2017). The successful implementation of this Strategy will result in the reduced reliance on natural gas, resulting in gas production from the Bass Strait to decline and ultimately cease. The reduction and eventual cessation of natural gas will also result in a decline and cessation of ethane.

1.3.5. Reinjection of Ethane Gas

Esso currently, has the ability to reinject surplus gas at the Bream Platform from Longford's Gas Plant 1 when sales gas demand is reduced. However, Longford does not have the capability to remove ethane from the natural gas liquids steam. This process is done at LIP.

There is currently no dedicated ethane pipeline running between LIP and the Longford Plant. As such, ethane reinjection would only be possible if a new 187-kilometre pipeline were to be installed between the two facilities for the transport of ethane.

The installation of a new ethane pipeline would result in complex social, cultural, environmental and regulatory considerations. In addition, it is highly unlikely that this option would be available before 2024/5 resulting in flaring of ethane at the LIP facility.

It was concluded that this was not a desirable disposition option.

1.3.6. Flaring

Flaring produces light pollution that could have negative impacts upon wildlife, in particular bird behaviours. Birds that migrate or hunt at night navigate by moonlight and starlight. Artificial light can cause them to wander off course and towards the night-time landscape of cities or other major light sources.

Migratory birds depend on cues from properly timed seasonal schedules. Artificial lights can cause them to migrate too early or too late and miss ideal climate conditions for nesting, foraging and other behaviours[1].

LIP is located close to Western Port Bay, which lies 700 metres to the east and 1000 metres to the south. Western Port is declared a Ramsar Site under the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, Iran 1971). Western Port supports over 30 bird species that are international migrants and listed under migratory agreements with China, Japan and the Republic of Korea[2]. Therefore, continuous flaring at LIP could have an impact on wildlife behaviours in the immediate area.

Community sentiment has been clear on its disapproval of excess flaring at LIP, with incidents being recorded in the media[3]. Flaring also results in greenhouse gas emissions with no commensurate benefit to the community.

Continuous flaring of excess ethane gas will result in Esso exceeding its environmental licence conditions for LIP and would require the Minister (under the emergency provisions) to provide an exemption for flaring until such time as alternatives were made.

Esso's parent company ExxonMobil is a signatory to the World Bank's Zero Routine Flaring by 2030 initiative. Therefore, any disposition method that results in routine flaring would be a failure of corporate commitments.

Esso is dedicated to minimise its impacts upon the environment and human health as far as reasonably practicable. Continuous flaring does not meet this objective.

[1] Light Pollution Effects on Wildlife and Ecosystems | International Dark-Sky Association (darksky.org)
[2] DELWP (2017) *Western Port Ramsar Site Management Plan*
[3] Flare up mars plant's anniversary - MPNEWS

2. Regulatory

In addition to requiring planning permission, the Hastings Generation Project is potentially subject to a number of regulatory approvals, and these are listed below.

2.1. Environmental Protection Act 2017

As the HGP is a power plant it requires a development and operating licence under the Environmental Protection Act 2017, for the following categories:

- K01 – Power Generation
- L01 – General Emissions to Air

A Development Licence application was submitted to the Environmental Protection Agency (EPA) in December 2021, application number APP009563.

2.2. Environmental Effects Act 1978

The Environment Effects Act 1978 (EEA) provides for assessment of proposed projects that can have a significant effect on the environment. Projects that are considered to have a significant effect are referred to the minister for determination of whether an Environmental Effects Statement is required. Environmental effects are assessed under a set of referral criteria from the Ministerial Guidelines for Assessment of Environmental Effects (Vic DSE, 2006), which are used to determine whether the impact is considered significant enough to consider referral for a decision.

Esso has undertaken an assessment against the referral criteria and there are no triggers for referral. The self-assessment has been submitted to DWELP for transparency purposes.

2.3. Pipelines Act 2005

The HGP accepts feedstock from the adjacent Long Island Point Plant in a 100mm diameter pipe. This pipe is not classified as a pipeline under section 2(b) (Exclusions) of Schedule 1 of the Act, i.e it is

> *a pipeline entirely within a petroleum processing plant, refinery, factory, railway yard, airport or port (including any port within the meaning of the Port Management Act 1995);*

As a result there are no submissions required under the Pipelines Act.

2.4. National Electricity (Victoria) Act 2005

Under the National Electricity Rules (NER) the Project is required to register as a generator with the Australian Energy Market Operator (AEMO). HGP have received a letter from AEMO approving their application as an intending participant in the National Energy Market (NEM).

Connection to the transmission network occurs through application for a connection enquiry as an embedded generator with the Network Service Provider, in this case United Energy (UE) and with the market operator, AEMO. Esso are currently working through this staged connection process with UE and AEMO.

2.5. Electrical Industry Act 2000

This Act regulates the Victorian electricity supply industry. It requires persons who generate, transmit, distribute, supply or sell electricity to obtain a licence from the Essential Services Commission of Victoria (ESC). Esso will ensure that they have this licence prior to the start of electricity generation.

2.6. Electrical Safety Act 1998

This Act regulates the safety of electricity supply and use in Victoria, and the efficiency of electrical equipment. It is administered by Energy Safe Victoria (ESV).

The Electrical Safety Act requires that the supplier of equipment:

- provides a certificate of conformity for the equipment
- be registered as a responsible supplier by ESV

Esso must take reasonable care to ensure that all parts of the complex electrical installation that it owns or operates (a) are designed, constructed, operated, maintained and decommissioned in accordance with the regulations; and (b) are safe and operated safely.

Under the definition of the Electrical Safety Act 1998, the project will be installing a complex electrical installation, and this requires compliance with the Electricity Safety (General) Regulations, 2019 which include design safety standards and testing and inspection requirements.

2.7. Gas Safety Act 1997

The Gas Safety Act 1997 covers the safe conveyance, sale, supply, measurement, control and use of gas and to generally regulate gas safety. Energy Safe Victoria (ESV) administers the Act and the subordinate regulations.

The power generation facility will be defined under the Act as a 'complex gas installation' and as such the design must be submitted to ESV for acceptance. Applications are made through the online GasTrac system.

2.8. Occupational Health and Safety Act 2004 and Regulations (2017)

Operation of the project (including maintenance) will need to comply with the Act and all the subordinate regulations, particularly in terms of duties relating to health and safety, licences, registrations, permits and other requirements for equipment and persons undertaking work at the premises.

The application of the major hazard facility aspects of the Occupational Health and Safety Regulations 2017 are triggered by the presence and quantity of 'materials' as listed in Schedule 14. For this project 'presence' is defined as the maximum capacity of process vessels (fuel gas conditioning skid and generators) and interconnecting piping systems to contain the materials. Ethane is a Class 2.1 Flammable gas material and its trigger quantity is 200 tonnes.

Under a separate regulation (R360), an operator is required to notify the Authority if Schedule 1 materials (in this case ethane) are likely to be present in a quantity exceeding 10% of their threshold quantity but less than their threshold quantity. The quantity of ethane expected to be held on site will be significantly below this quantity and no notification is required.

2.9. Dangerous Goods (Storage and Handling) Regulations, 2012

Due to the presence of ethane on the site, and small quantities of lube oils and other materials used for routine maintenance, the Dangerous Goods (Storage and Handling) Regulations, 2012 will apply to the project. Placarding of the facility will need to be installed consistent with the regulations.

2.10. Aboriginal Heritage Act 2006

This Act provides for the protection of Aboriginal cultural heritage in Victoria. A cultural heritage due diligence assessment has been commissioned which has confirmed that a CHMP is not required. This is described further in Section 12.6.

2.11. Victorian Heritage Act 2017

The Heritage Act 2017 (the Act) is administered by Heritage Victoria and is the Victorian Government's main cultural heritage legislation. The Act identifies and protects heritage places and objects that are of

state - level cultural heritage significance to Victoria. This is not impacted by the Project as described in Section 12.6.

3. Neighbouring Dwellings

There are a small number of dwellings, both residential and commercial within 1 kilometre of the HGP site; and these are listed in Table 1. All of the residential dwellings are located on the far side of LIP, to the south west of the Project site. The industrial / commercial facilities are to the north, with the exception of Crib Point Engineering, which is to the south west. Further information on the surrounding community is provided in Section 12.

Table 1: Dwellings within 1 kilometre of the Project Site

Name	Address
BlueScope Steel	28 Bayview Road, Hastings VIC 3915
Scout Hall	2b Bayview Road, Hastings VIC 3915
Hydrogen Energy Supply Chain Project	Port of Hastings, Bayview Road, Hastings VIC 3915
Port of Hastings – LIP Jetty	PO Box 249, Crib Point VIC 3919
Residential Dwelling	11 Cemetery Road, Hastings VIC 3915
Residential Dwelling	34 Cemetery Road, Hastings VIC 3915
Residential Dwelling	15 Picnic Avenue, Hastings VIC 3915
Residential Dwelling	20 Picnic Avenue, Hastings VIC 3915
Residential Dwelling	23 Picnic Avenue, Hastings VIC 3915
Residential Dwelling	7 Beach Drive, Hastings VIC 3915
Residential Dwelling	21 Beach Drive, Hastings VIC 3915
Residential Dwelling	22 Beach Drive, Hastings VIC 3915
Crib Point Engineering	31 Beach Drive, Hastings VIC 3915
Residential Dwelling	47 Beach Drive, Hastings VIC 3915

4. Site Access

The Project site is fully fenced with the main access being via 11 Bayview Road (refer to Figure 4). The current entrance roadway is sealed with bitumen and is able to carry heavy wide loads. There are no plans to modify or upgrade the existing driveway as it meets the Project's requirements to deliver personnel and equipment to the site without causing disruption or delay to other road users on Bayview Road. Previously, the site was a compost manufacturing facility and used B-double flat-bed trailers for the delivery of soil products to site, and the export of bagged product.

Figure 4: Entrance to Hastings Generation Facility

An additional entrance to the site is available at the southern end of the property, via LIP. This route is only accessible during emergency situations or with prior LIP approval. The additional access route is via 4 Long Island Drive, utilising LIP's sealed road past the Truck Loading Facility (refer to Figure 5). There are no plans to access the site via LIP during the the construction phase of the Project and as such will remain closed.

Figure 5: 4 Long Island Drive, Emergency Access to the Project Site

Both access routes are highlighted in Figure 6.

Figure 6: Emergency Access Route through LIP

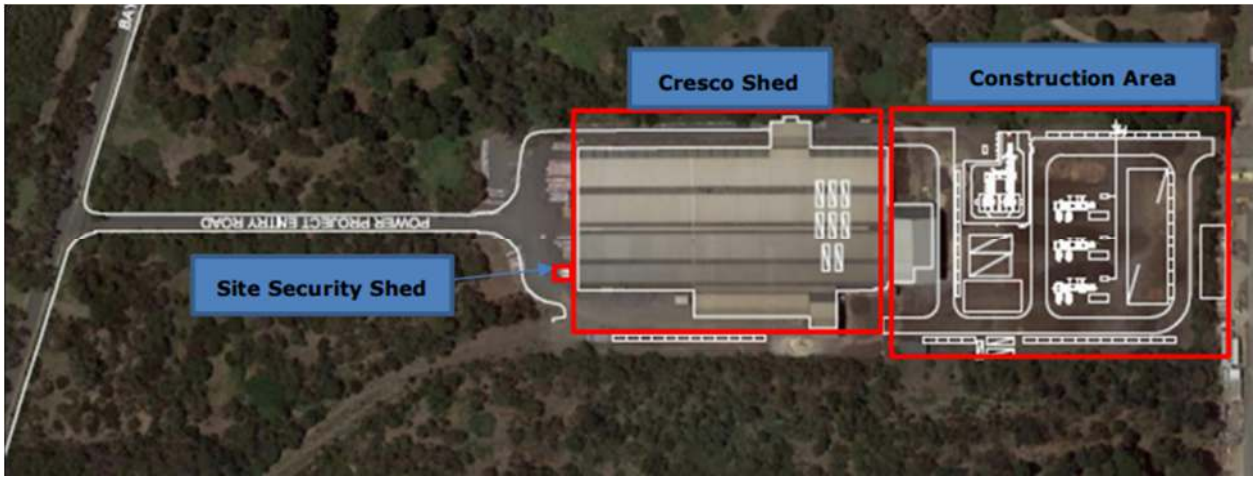
4.1. Site Security

The project construction is controlled by a Site Security Management Plan, which is summarised here.

For security purposes, the site is virtually divided into three main areas, with one access point as illustrated in Figure 7 and described below.

- **Construction Area**: the construction area is located at the southern end of the site plot, where the actual construction activities will take place. It is the area where the turbines, electrical equipment and the control centre shall be erected.
- **Cresco Shed Area**: the existing buildings (known as the Cresco Shed) lie to the north of the construction area and contain the construction site offices and amenities, construction workers facilities and project warehouse.
- **Site Security Shed**: located opposite to the main entrance of the site, where site operations will be monitored through CCTV cameras. All access to the site will be controlled from this point.

Figure 7: Site Security Areas



4.1.1. Security Controls

Controls

All visitors shall present and report to the Site Security Shed to obtain permission to access the site, to meet with persons at site and the conditions on which such permission is granted.

Construction and delivery vehicles shall not enter the site without obtaining permission from the site beforehand.

Only workers of contractors having met contract pre-conditions and having satisfactorily completed a site safety induction may enter the site.

Any person accessing the site shall sign an attendance record on entry.

All visitors to the Project Office shall sign the Visitors Registration Log. Visitors to the project site offices will be escorted from the Site Security Shed to the respective site office by one of the project team.

Site Fencing

The site shall be completely fenced. At suitable locations signs shall be erected on or near the fences stating that:

THIS SITE IS PRIVATE PROPERTY

VISITORS ARE NOT PERMITTED TO ACCESS THE SITE WITHOUT THE EXPRESS PERMISSION OF SITE MANAGEMENT. ACCESS WITHOUT PERMISSION MAY BE TREATED AS TRESPASS

CONSTRUCTION AND DELIVERY VEHICLES SHALL NOT ENTER SITE WITHOUT THE EXPRESS PERMISSION OF SITE MANAGEMENT

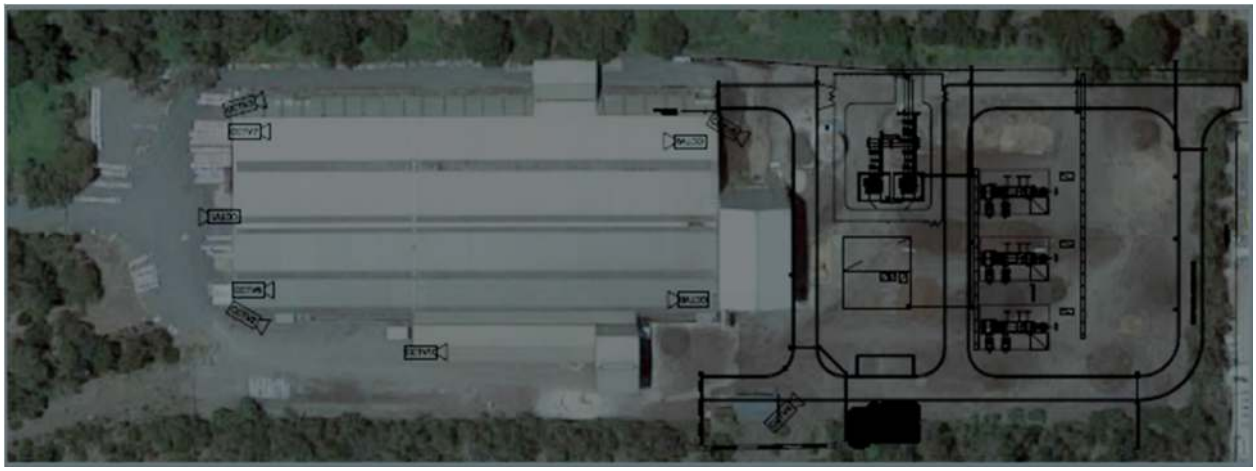
Site Surveillance

A total of 10 CCTV cameras will be installed at site to properly monitor the site during and after construction hours. Equipment, plant and employees' vehicles will be registered in the site electronic security system and will be recognized using an automatic number plate recognition camera installed at the entrance driveway facing north refer Figure 8. The CCTV will send real time monitoring footage to the Site Security Shed.

Surveillance Systems will include the following:

1. Communication devices for each the security personnel.
2. 10 CCTV cameras installed on the project site with 20-day storage.
3. Remote supervision is available 24/7.

Figure 8: Construction CCTV Layout



Entrance to the Site

A Site Attendance Record book shall be located at the Site Security Shed. All personnel authorised to enter the site shall record their name, induction number and times of entry and departure. Signs shall be displayed at the entrances of all work areas stating the following:

ENTRANCE TO THIS AREA IS ONLY ALLOWED FOR SITE CONSTRUCTION WORKERS AND PROJECT VISITORS

VISITORS AND NEW WORKERS ARE NOT PERMITTED TO ACCESS THIS AREA WITHOUT THE EXPRESS PERMISSION OF SITE MANAGEMENT

ACCESS WITHOUT PERMISSION MAY BE TREATED AS TRESPASS

NEW WORKERS AND VISITORS SHALL PRESENT TO A SITE INDUCTION PRIOR TO COMMENCING WORK ON SITE

APPOINTMENTS ARE NECESSARY

Construction Vehicle Entrance to Construction Zone

A Construction Vehicle Site Attendance Record book will also be located at the Site Security Shed.

All drivers and associates authorised to enter the site must be registered with site management beforehand. Site management will conduct random audits on the construction vehicles to ensure that each driver is registered in the Project site's records.

At the entrance of the site a CCTV camera with plate number recognition will be installed, which will generate an alarm in case non registered vehicle entered the project site.

Non-Working Hours

During non-working hours, the site gate will be locked to secure the site from intruders or the general public. Esso LIP Security team will perform surveillance on the project site twice daily after the site working hours.

5. Project Construction

5.1. Construction Schedule

The construction activities will take approximately six to nine months to complete. Commissioning and start-up are likely to take a further month. Construction work will take place between 7.00 am and 6.00 pm Monday to Saturday, for the majority. Some work may be required outside of these working times, but will comply with EPA requirements for noise.

Upon receipt of all licenses and permits, construction activities, from site preparations to commissioning, are intended to occur between second quarter (2Q) 2022 and first quarter (1Q) 2023.

5.2. Construction Workforce

It is anticipated that approximately 60 people will be employed at the peak of construction. Working hours will potentially be 24-hour operations, 7 days a week. High noise activities will be limited to be undertaken between 7 am and 6 pm, Monday to Saturday.

Parking is provided onsite for all construction personnel and visitors (refer to Section 13).

5.3. Piping Construction

Piping construction would comply with all relevant codes and standards for piping. The construction would also be guided by the environmental requirements specified in the Project Environmental Management Plan (EMP) (Attachment A).

Figure 9 shows the intended piping route from LIP's C-train through to the gas turbine generators on the Project site. The new piping to be installed is approximately 600 metres in length, with approximately 280 metres of pipe being hung on existing racking and approximately 242 metres of piping will be installed underground by trenching up to the Project site boundary. The balance of the piping within the Project site will run as above ground piping in open culverts

The 150 mm piping will be constructed of grade B seamless steel that meets ASTM A106.

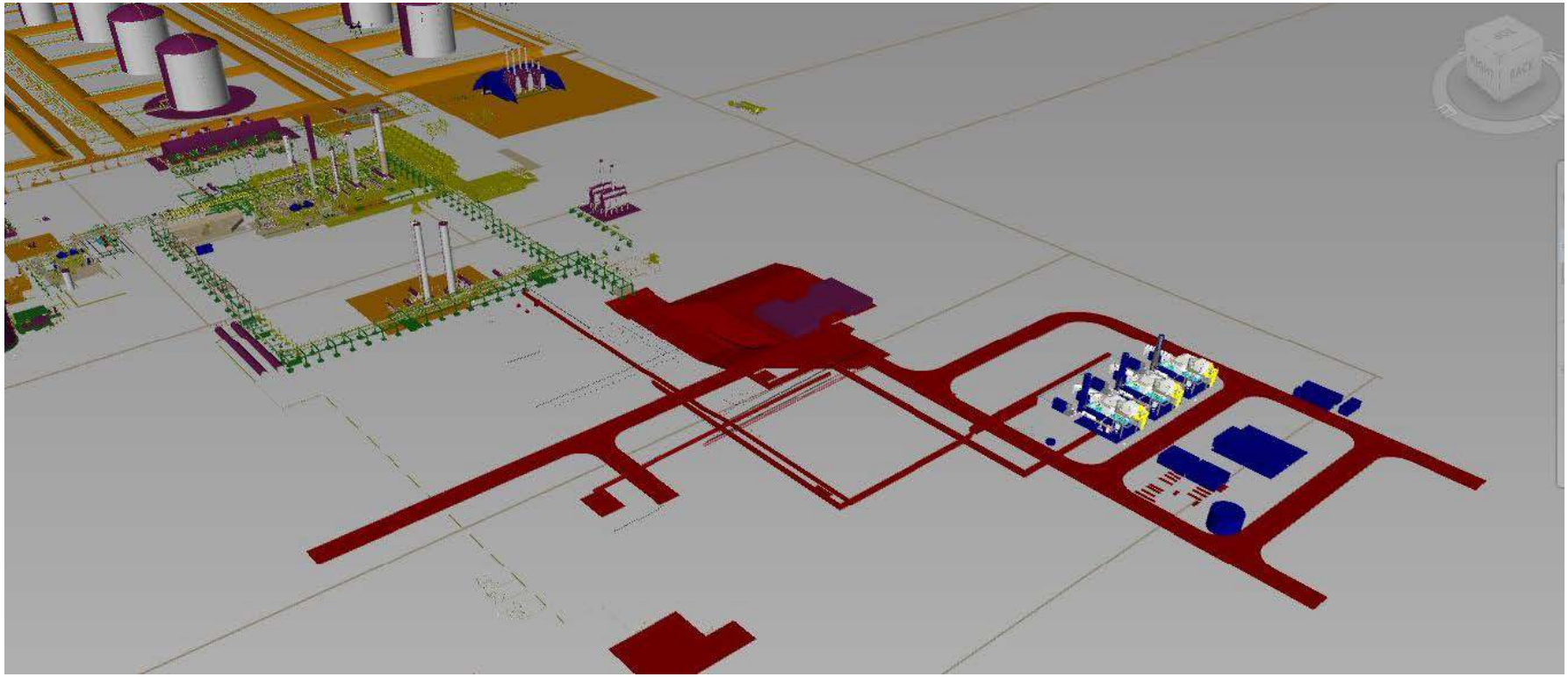
The piping route has been designed to avoid native vegetation removal and minimise disruption to existing LIP infrastructure, utilities and personnel, as far as practicable.

5.3.1. Construction Laydown and Pipe Stockpiling Areas

Construction laydown and pipe stockpiling will be placed in an area that causes minimal disturbance to other construction, both at the Project site and ongoing LIP activities.

At the completion of construction, all temporary construction equipment, fencing and plant will be removed from the construction site.

Figure 9: Ethane Piping Route

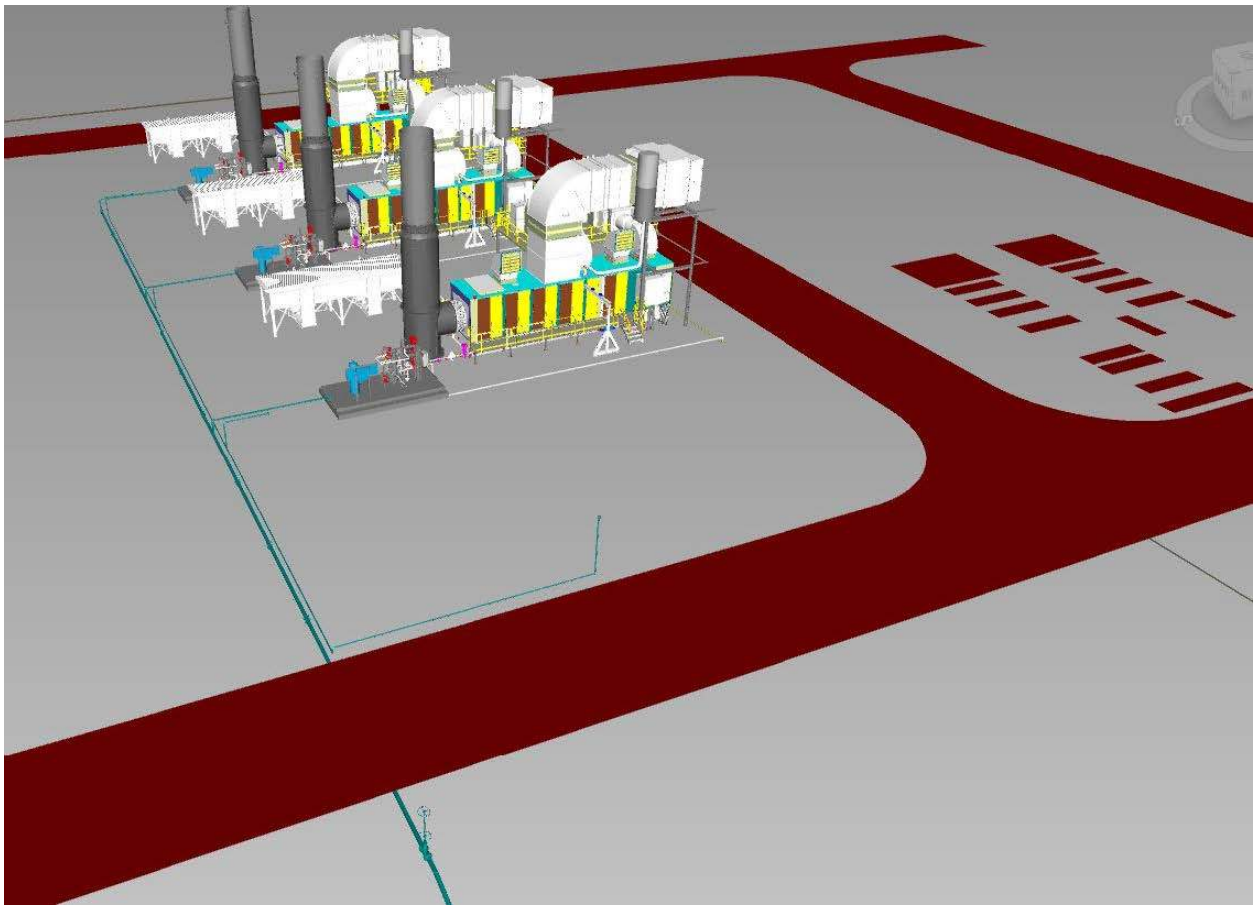


5.3.2. Piping Construction

Piping installation will comply with ASME B31.3.

Hastings Generation Piping

Figure 10: Project Site Piping



The majority of the new ethane piping on the Project site shall be installed above ground in open culverts.

The ethane pipe will be isolatable from LIP by a valve. The first section of site piping (approximately 10 metres) from the Project site fence will be installed in an open culvert with trafficable lids to protect the piping from site road traffic. The remaining section of pipe to the gas conditioning skids (approximately 50 metres) will be laid within an open concrete culvert that is covered by grating.

Some piping will be installed between equipment and the relief blow down vent. This piping will be installed on pipe supports with concrete foundations at a depth of at least 500 mm and spacing of approximately 5 metres.

Pipe footings will be a mix of precast footings and in-situ casting. Final design will determine the construction technique to be used.

LIP Tie-in Line

The buried section of the ethane pipe within LIP will be placed into a 600 mm wide trench. The alignment is shown in Figure 11 and Attachment B. A typical construction footprint for piping construction occurs within a construction right-of-way (ROW) that includes space for vegetation and spoil stockpiling; pipe laydown and vehicle access. This is illustrated in Figure 12.

The pipe construction sequence and activities are described in Table 2. It is expected that the pipe construction and installation will take approximately 6-8 weeks.

Figure 11: Ethane Piping Trench Alignment within LIP

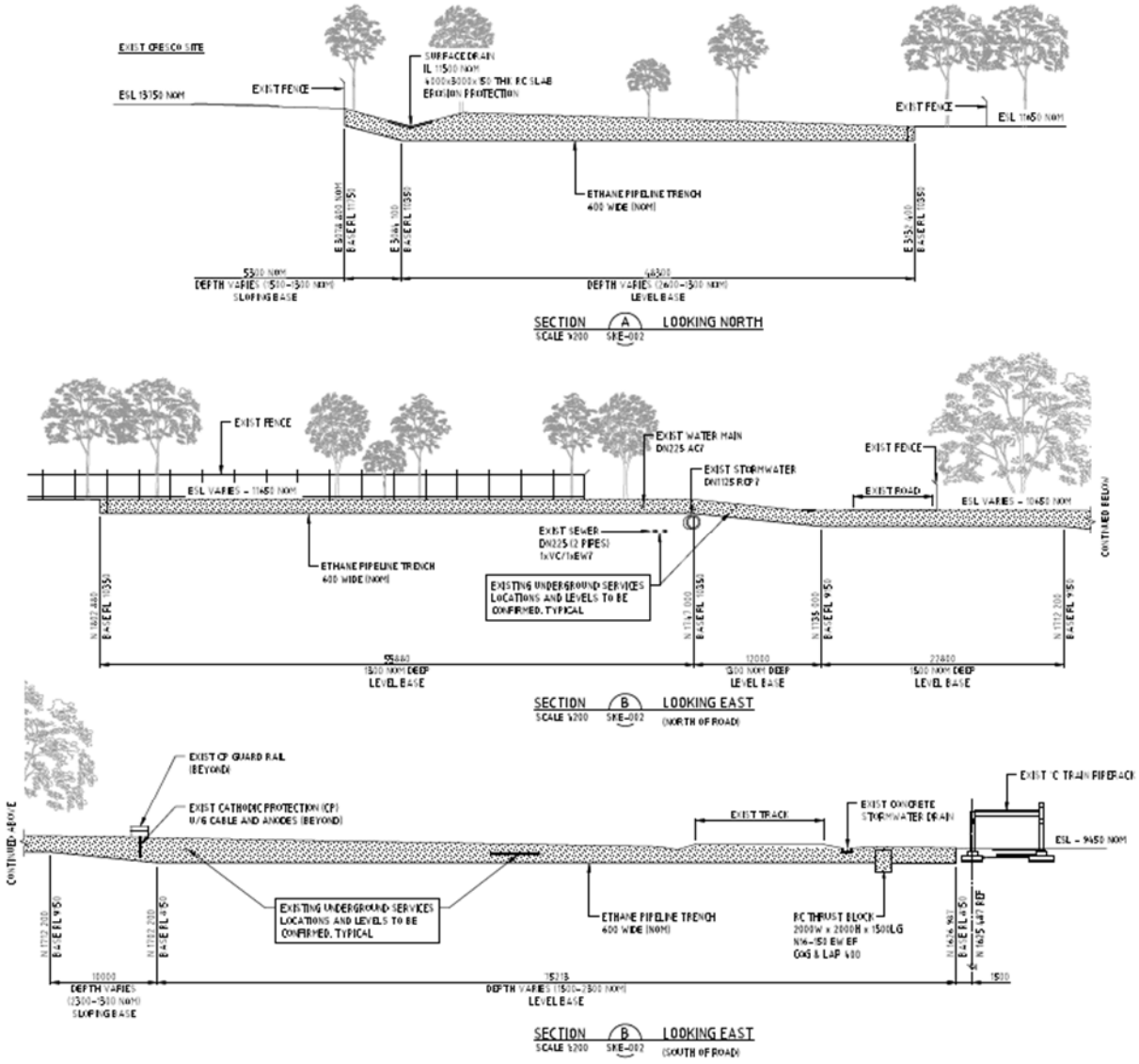


Figure 12: ROW Alignment for a Pipe

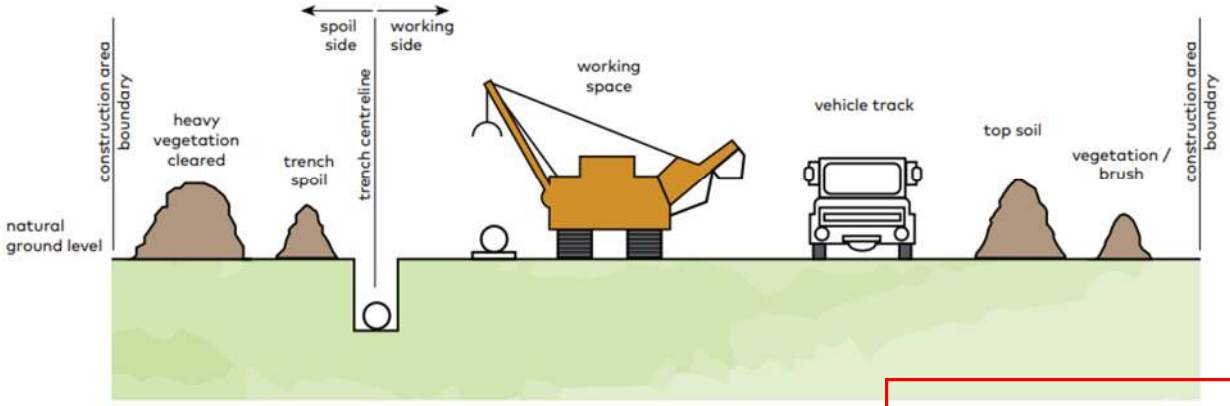
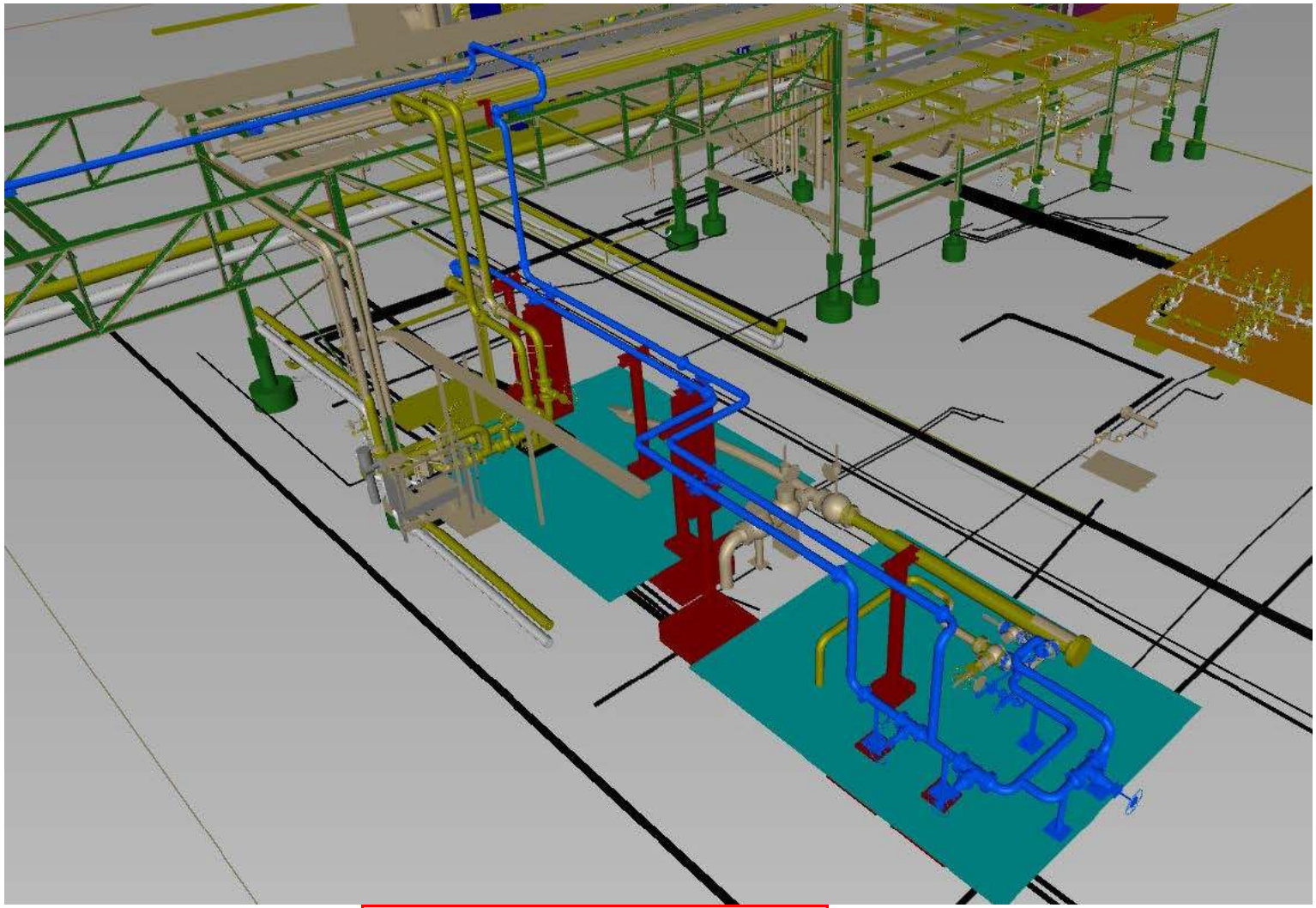
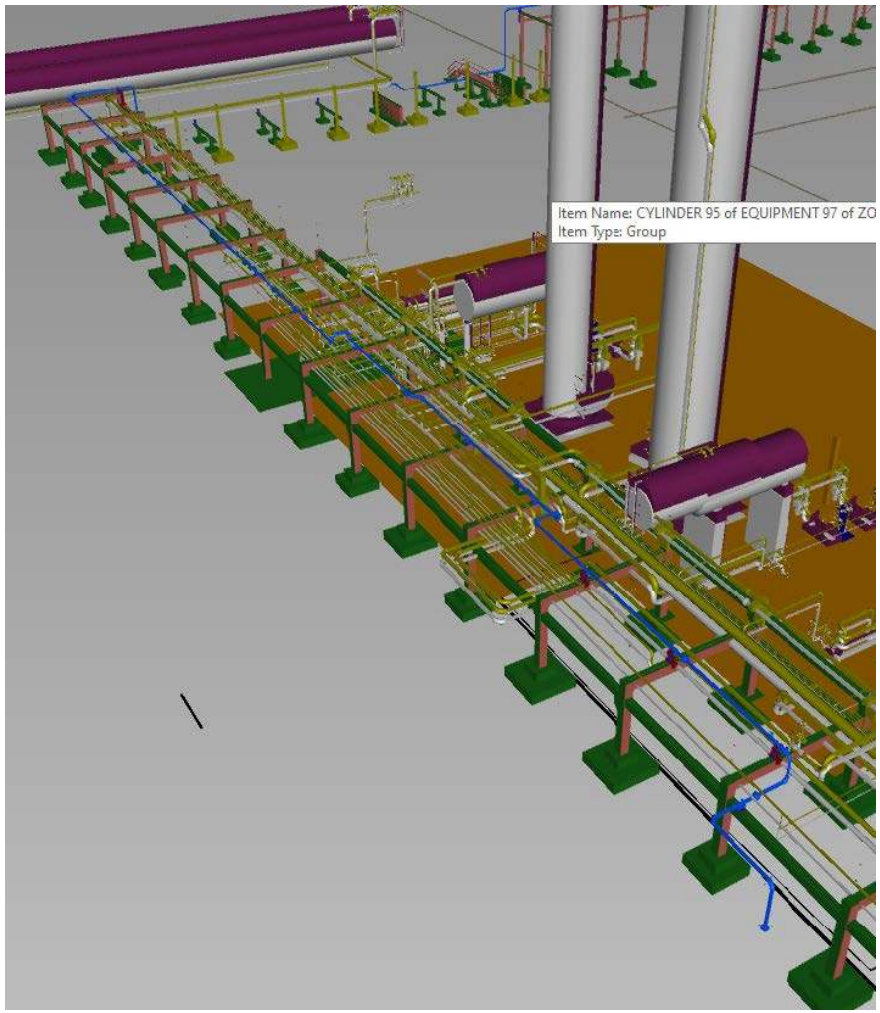


Figure 13: Piping Installed in Pipe Racks at LIP





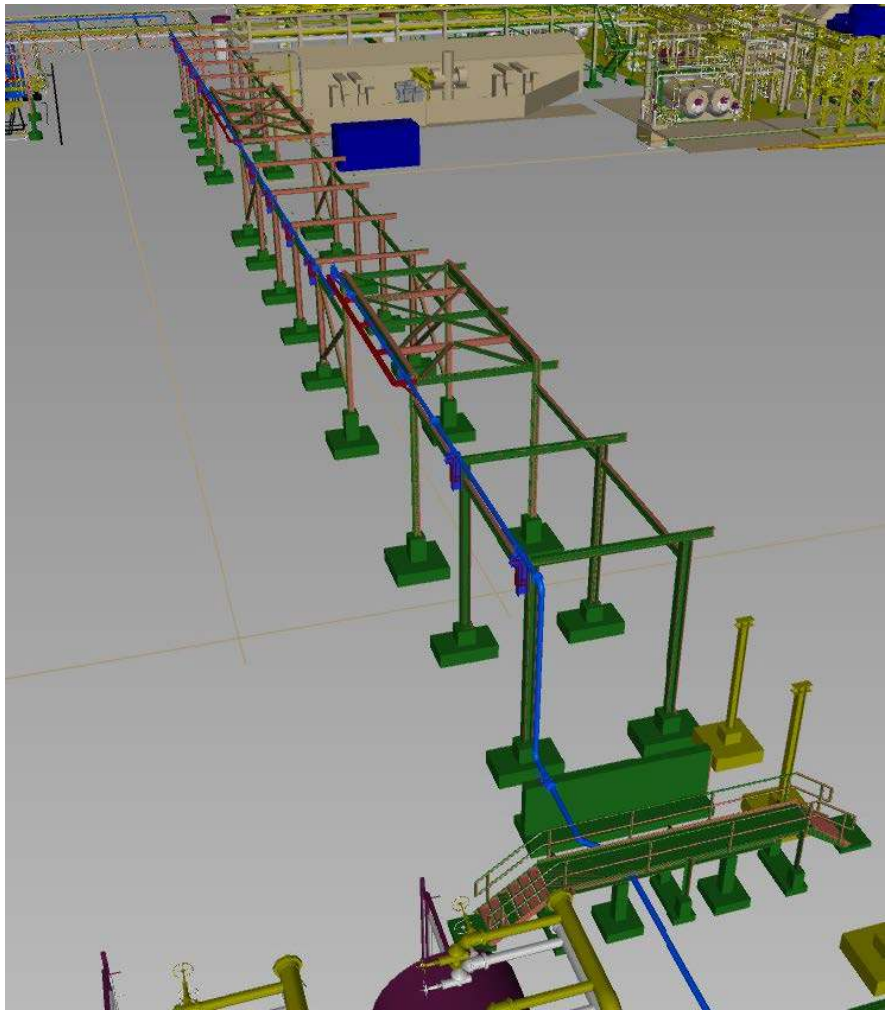


Table 2: Pipe Construction

Construction Sequence	Activity	Description
1	Clearing of vegetation from the construction ROW	Clearing of vegetation and topsoil within the construction ROW is required to provide a safe and efficient area for construction activities. Surface vegetation will be removed to a depth of 50 mm, then topsoil to a minimum depth of 100 mm. Soil and vegetation will be stockpiled for re-use during rehabilitation. Soil will be segregated into topsoil and subsoil to aid rehabilitation. Temporary material will be placed along this section to make the area trafficable for construction equipment, if required.
2	Pipe string	Pipe will be laid along the ROW on sandbags and wooden skids in preparation for welding.
3	Pipe bending	Where required, pipe lengths would be bent using a hydraulic bending machine to match changes in either elevation or directions of the alignment.
4	Welding, out of trench	Where possible, pipe segments will be welded together manually outside of the installation trench. All welds are examined for quality using either X-ray or ultrasonic inspection techniques. Any unacceptable defects in the welds are either repaired or replaced and tested again.
5	Trench excavation	An excavator would be used to dig the trench, the pipe is laid in. The trench would be excavated to a minimum depth of approximately 1.3 m to achieve a depth of cover of about 1 m to the natural ground level. Excavated material would be stockpiled to the spoil side of the trench area and would be reused during backfilling activities. Egress ramps will be installed at each end of the trench to allow animals that may enter the trench to escape. Should the trench flood at any time, the water will be pumped out and discharged to land onto a filter bed (such as geofabric or filter socks) to reduce the risk of erosion and sedimentation, as required.

Construction Sequence	Activity	Description
6	Lowering in	Pipe segments would be positioned on wooden skids and sandbags to protect the pipe coating from damage. The welded pipe strings are lifted off the wooden skids/ sandbags and lowered into the trench using side-boom tractors or excavators. The pipe coating is inspected and tested for defects immediately before lowering the pipe into the trench. Bedding and padding material may be placed around the pipe to protect the pipe coating from damage due to materials in the excavated spoil. Bedding and padding material may be either imported using trucks or, where the excavated material is suitable, produced by sieving the excavated material on site.
7	Welding, non-destructive testing and joint coating – in trench	Where required a select number of welds will be completed within the trench – this is typically required for connection to service crossings and also at the proposed change of direction. All welds are examined for quality using either X-ray or ultrasonic inspection techniques. Any unacceptable defects in the welds are either repaired or replaced and tested again.
8	Testing and commissioning	The pipe is pressure tested before commissioning to ensure that the pipe is structurally sound and without leaks. This is done through a process called hydrostatic testing whereby the pipe is filled with water and then pressurised. This is further discussed in Section 5.3.3.
9	Coating of weld locations	Following hydrotesting all welds field welds will be cleaned by abrasive blasting and coated to prevent corrosion
10	Backfill	The trench is backfilled using the excavated spoil, and excess excavated material may be collected and transported for disposal at appropriately licensed facilities in accordance with EPA Victoria's waste classification and spoil transportation requirements.
11	Rehabilitation of the ROW	Disturbed areas would be re-profiled to a stable landform consistent with original contours and drainage lines and vegetated with shallow-rooted vegetation where appropriate.

Where utilities are encountered, the pipe will be installed below the shallow utilities. Exception being, the existing stormwater drain that has been installed to a depth of 1.8 m, allowing for the pipe to be safely installed above it.

Where the pipe crosses roads, the trench will pass through the road as per the above-described trenching methods. On completion, the road will be reinstated to the original condition.

The pipe will be installed under the eastern open stormwater culvert. To facilitate this, the culvert will be temporarily dammed to allow for pipe installation. Installation will be per the trenching method described above. Upon completion the culvert will be reinstated, utilising concrete erosion barriers as necessary, and damming materials removed.

5.3.3. Hydrotesting and Commissioning

The pipe coating would be tested to ensure it is of a satisfactory standard before and after installation. If the pipe fails a coating integrity test after installation, the pipe would be excavated and repaired.

The pipe would be pressure tested before commissioning to ensure it passes strength and leak tests. This is done through a process called hydrostatic testing whereby the pipe is filled with water and then pressurised.

The majority of pre-fabricated piping spools will be hydrotested and cleaned prior to delivery. Pressure testing of pre-fabricated piping spools is generally limited to a service test using inert gas to ensure integrity of the piping flange joints.

The underground piping installation will be hydrotested by filling with water and pressurising the entire piping installation. The test procedure then calls for the pressure to be increased for approximately four hours to assess the strength of the test section. The pressure is then reduced and held for a minimum of 24 hours to determine if the pipe is leak free.

Hydrostatic testing would require approximately 11 kilolitres of water in total. There are no plans to use biocides or chemicals in the hydrotesting process.

Water for hydrostatic testing would be sourced from the mains water supply. As the hydrotest water is conducted on new, clean piping; the water would typically be discharged to the site stormwater system on completion.

When the dewatering process is complete, the pipe would be dried using compressed air or nitrogen.

The pipe would be commissioned following completion of hydrostatic testing and would include as a minimum the following activities:

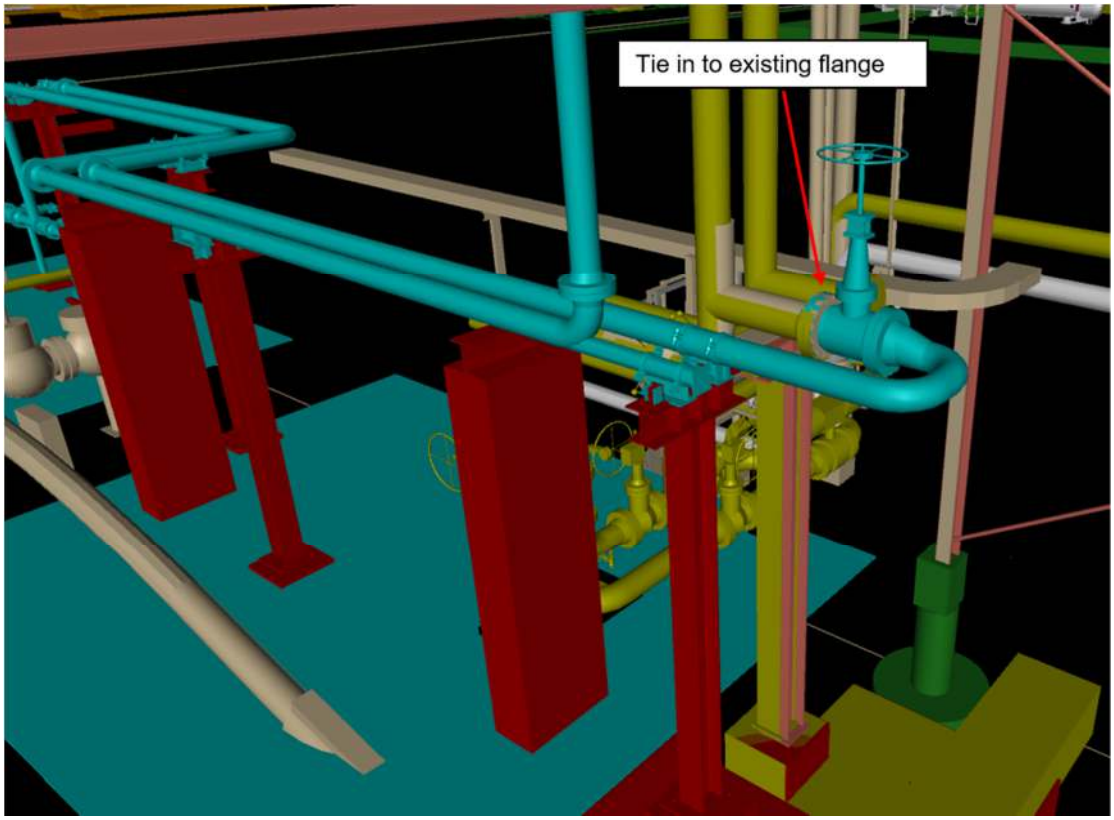
- instrument calibration
- control system functionality
- safety system testing
- purging of air and gas filling
- pressurization
- testing and commissioning of stations and valves.

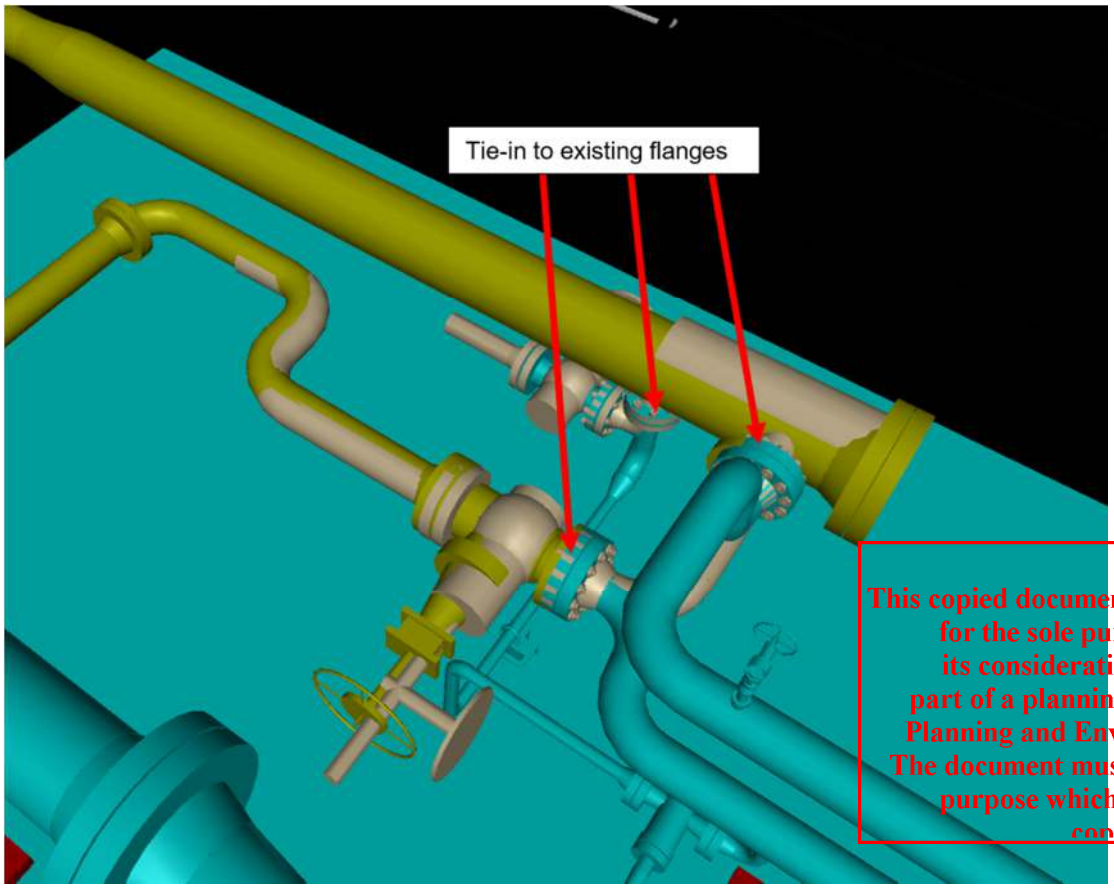
Following commissioning, the piping assemblies that include the associated piping/valving would be tied-in to the pipe.

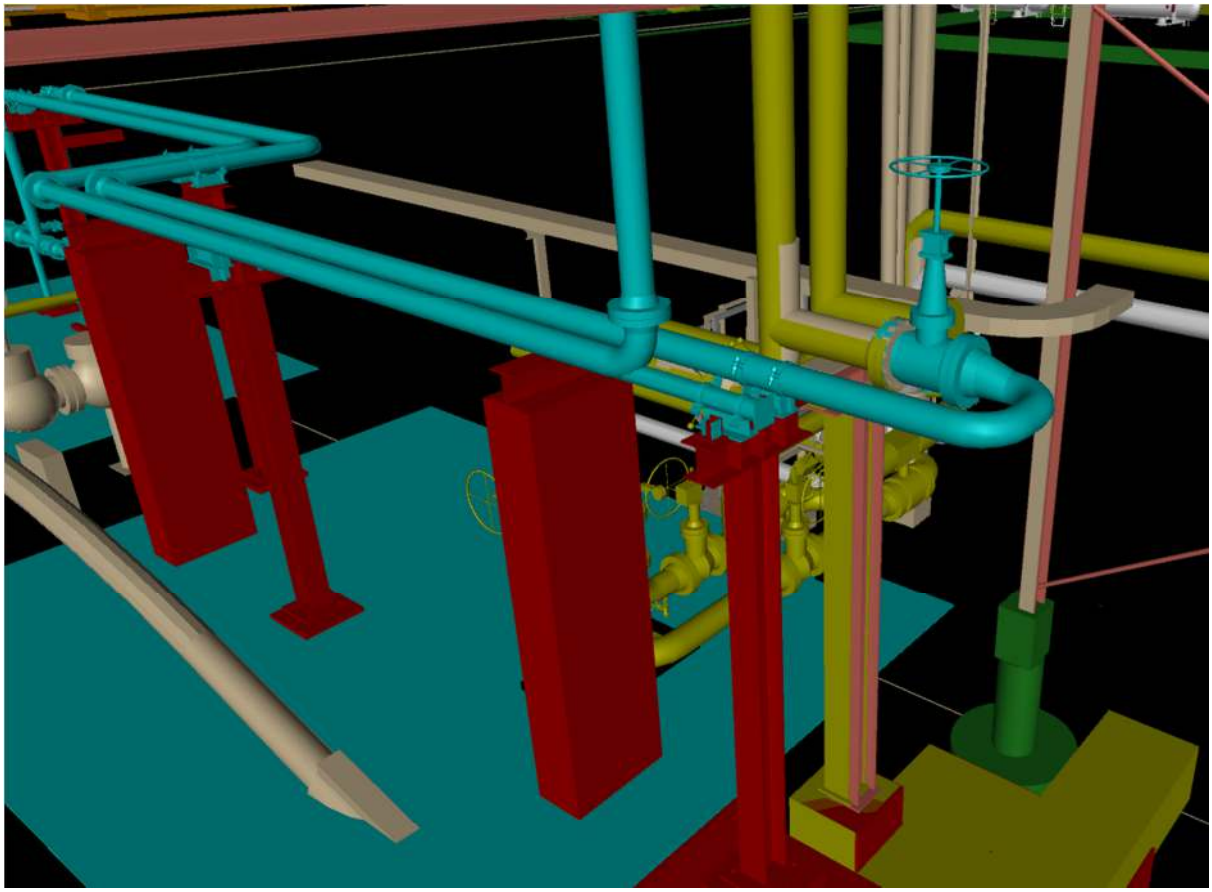
5.3.4. LIP Tie-In

The connection to the existing LIP pipework will be made using bolted connections to the existing flanges in the area of the ethane sales gas pig launcher (refer to Figure 14)

Figure 14: Tie-in to Existing LIP Flange







5.4. Power Generation Plant Construction

Construction of the power generation facility would be undertaken by specialist crews across key distinct phases of works. These include initial earthworks and civil construction and assembly of the modular power plant packages (as described in Table 3).

The Titan 130 gas turbine generator sets are supplied as a modular power plant. The equipment will be mechanically and electrically completed prior to shipping, then assembled on site as described in Table 3. Commissioning can proceed after connections and interfaces are made on site.

Some advantages to the modular system are:

- Design and fabrication in a controlled shop environment
- Small team required for site assembly
- Installation reduced to assembly tasks

Table 3: Hastings Generation Facility Construction Activities

Construction Sequence	Activity	Description
1	Site set-up	Site set up within the construction footprint is required to provide a safe and efficient area for construction activities. This includes site offices and site facilities (toilets, lunch rooms etc.), prepping lay down areas, clearing vegetation or degradable non-soil material, such as mulch that may be remaining from previous activities. (if required), and relocating existing services if required. Any removed material will be stockpiled for reuse. The site is already fenced and has pre-existing haulage roads.
2	Earthworks	Existing ground levels would be excavated/built up and levelled to the required design levels. The existing or exposed subgrade will then be proof rolled. Backfill and/or fill material will be laid during this process to meet the design criteria for concrete foundations and stormwater management.
3	Civil works	Strip or pad footings will be embedded to a depth of 1-1.15 metres to allow for a proportioned allowable bearing pressure of 100 kPa. The concrete will be poured in two separate pours – 1) slab footings and 2) the slab. Steel reinforced concrete foundations will be poured into pre-built formwork. The hardstand areas will be constructed to include bunding and a sump. Attachment B shows the site layout including the hardstand arrangements. Upon the hardstand areas the permanent buildings, modular power plant, equipment and supports would sit on and be fixed to.
4	Assembly	Once the concrete foundations are installed, the modular power plant packages will be assembled. This involves ensuring equipment is level and can be bolted up without over-stressing connections. Specialist crews would install structural supports, mechanical equipment, electrical equipment, cabinets and panels, cabling, instrumentation (sensors etc.), buildings, tie-in piping and walkways for each of the three packages.

Construction Sequence	Activity	Description
5	Testing and commissioning	Mechanical and electrical equipment are mechanically and electrically tested to make sure they have been installed correctly and are ready for commissioning. Pre-commissioning involves leak testing pressure containing piping using inert gas and function testing instrumentation. Commissioning involves fine tuning of equipment and instrumentation by running the facilities through various operating ranges. Commissioning will include validation that the exhaust emissions meet the 25 ppm limit for NOx and CO; and the 85 dB(A) noise limit as detailed in the design standards. Once the facility passes all checks per the commissioning plan, it is ready to be handed over to Operations and start generating electricity.
6	Roads, landscaping and reinstatement	Final touches within the final facility such as permanent roads, kerbs, pavement and landscaping would be constructed. Reinstatement of construction areas which are not part of the final facility would also be finished to leave the facility in its finished state.

5.4.1. Power Plant Equipment Packages

The following sections provide more detail on the individual equipment packages that make up the Hastings Generation power plant. Figure 15 and Figure 16 show preliminary 3D modelling of the gas turbine packages once installed.

Figure 15: Preliminary 3D Model of Installed Titan 130 Gas Turbine Generator

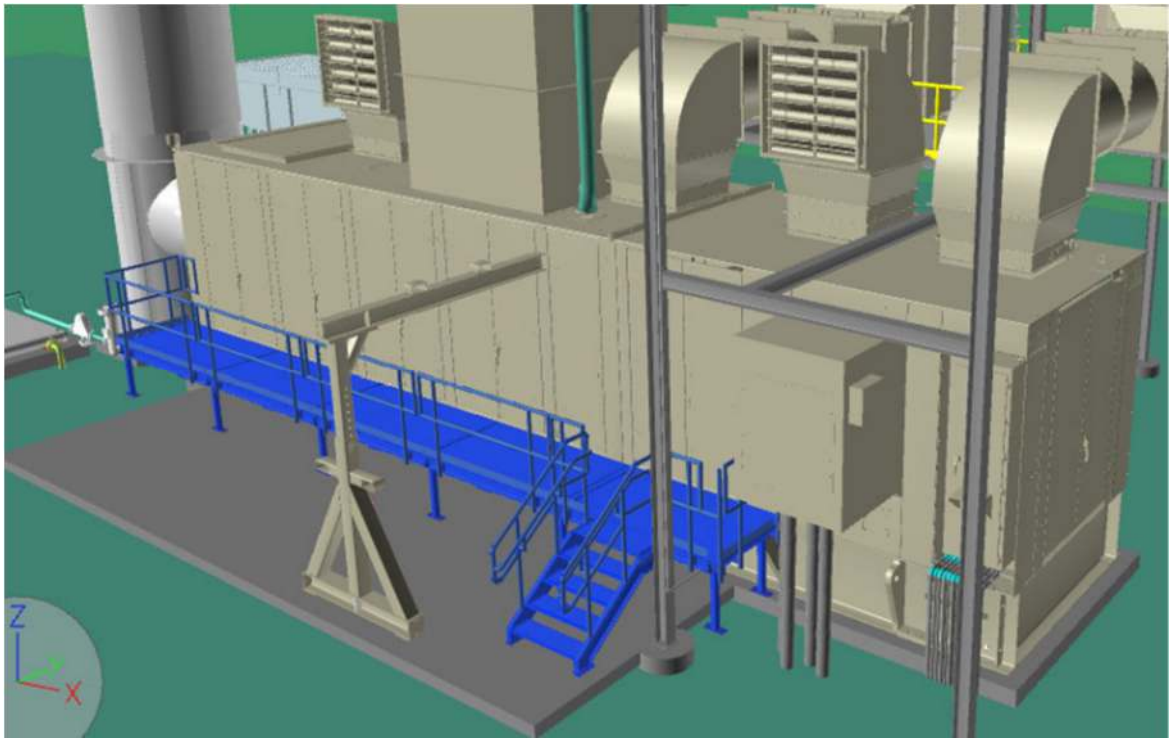
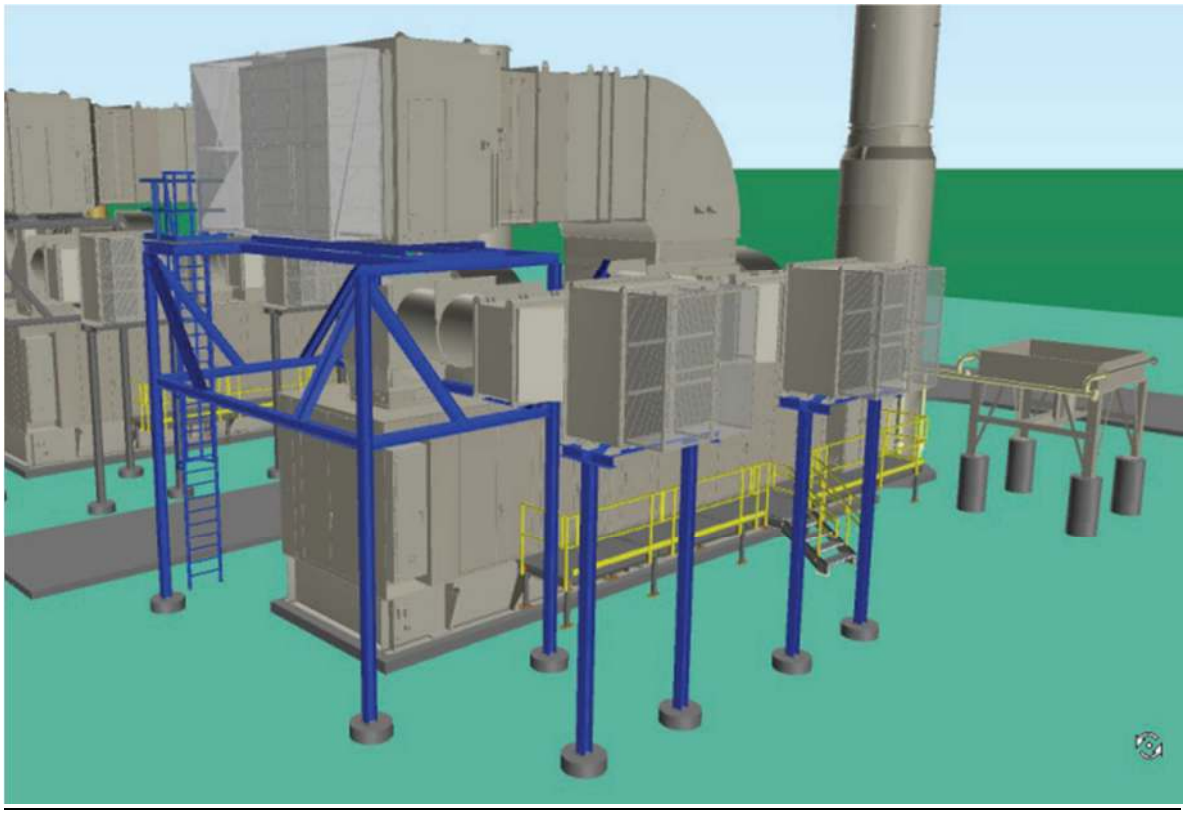


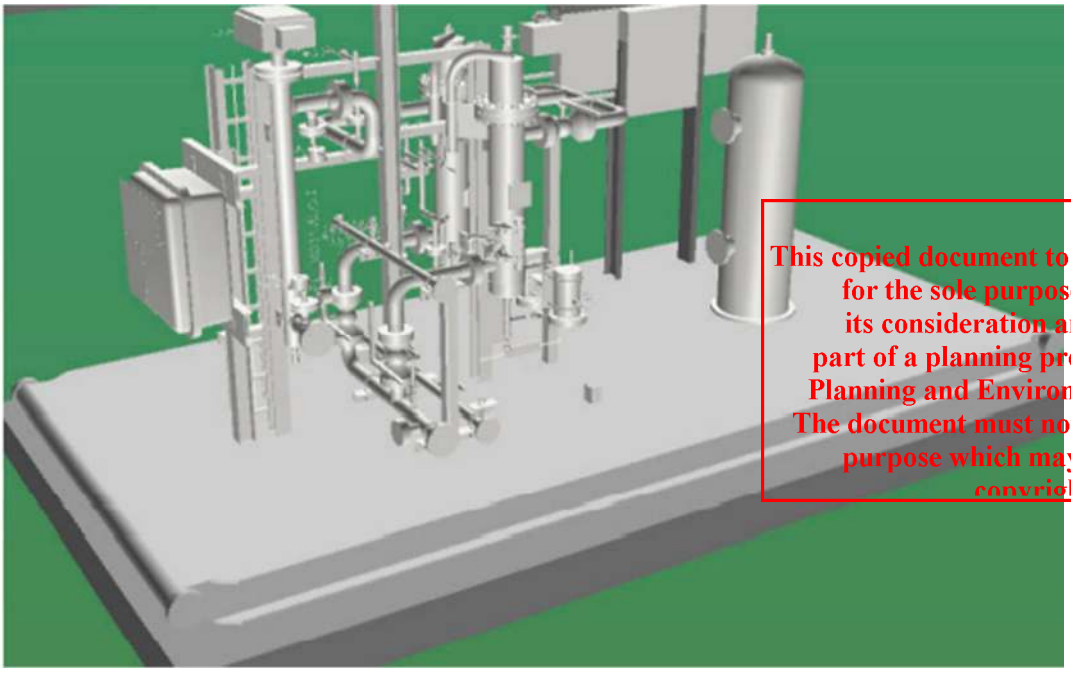
Figure 16: Preliminary 3D Model of Titan 130 Gas Turbine Generator, Including Air Inlet Filter & Enclosure Vent Filter, Access Platforms and Support Structures



5.4.2. Fuel Gas Condition Skid

Ethane will be distributed to each of the three gas turbine generators. Before reaching the gas turbines, the ethane will flow through a fuel gas conditioning skid (Figure 17). This skid will include a filter coalescer, liquids knockout vessel and a heater so as to ensure that the fuel gas contains no liquids, no particulates and is of a suitable feed temperature. After fuel gas conditioning the ethane will flow directly into the gas turbine.

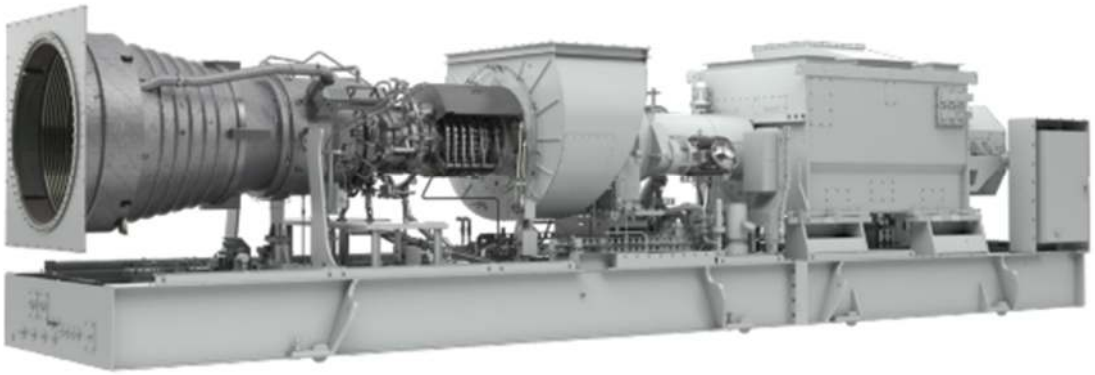
Figure 17: Fuel Gas Conditioning Skid



5.4.3. Gas Turbines

The Titan 130 gas turbine generator set consists of an axial-flow gas turbine engine, generator, and reduction-drive gearbox (Figure 18). These components are installed in-line on a heavy-steel base frame referred to as the skid. The skid is a structural steel assembly with beam sections and cross members welded together. The two sections of the skid are separated to facilitate handling and shipment but when bolted together they form a rigid structure suitable for three-point mounting. The gearbox is bolted directly to the engine. Drip pans are installed in the skid to collect any potential liquid leakage.

Figure 18: Solar Titan 130 Gas Turbine Generator Skid



Each gas turbine generator package is enclosed in a completely self-contained, weather proof, insulated and sound-attenuated system. The enclosure is mounted on the skid package. The enclosure panels are

treated with fiberglass material for sound attenuation and thermal insulation. The enclosure ventilation openings are equipped with silencers.

In order to connect the Solar gas turbine generator package to the national network, they must comply with the rules outlined in the NER (National Electrical Regulations). An important part of the is process is ensuring that the controls that manage the GTG's are compliant with the AEMO Automatic Access Standard. A number of dynamic and static assessments have been undertaken as part of the connection application process to assure that this is the case.

5.4.4. Lubricating System

The lubrication system circulates oil under pressure to the gas turbine and driven equipment. Lube oil is supplied from the lube oil tank located in the driver skid. An off-skid lube oil vent coalescer removes oil vapour from the lube oil tank vent airflow. The coalescer drains trapped oil vapour back to the lube oil tank and allows the remaining vent airflow to exhaust to atmosphere. The lube oil tank will be located within the bunded area that is sized to hold 110% of lube oil tank contents. It is not anticipated that the lube oil will need replacing during the life of the project. This will eliminate the need to store large quantities of oil on site. If oil is required to supplement the oil in the lubricating system, oil will be delivered to site at the time.

5.4.5. Controls System

A control system provides automatic starting, acceleration to operating speed, sequencing control, engine and driven equipment monitoring during operation, and normal and malfunction shutdown. Additional controls include:

- Vibration control – monitors vibration levels, and will shut the system down in the event of unacceptable levels being generated.
- Backup shutdown system
- Fire and gas system – enclosed packages require fire and gas control protection. If a fire is detected, an extinguishing water mist is released into the turbine enclosure.

5.4.6. Relief Blowdown System

All hydrocarbon piping will be able to be depressurised to a relief and blowdown system. The relief location will be an atmospheric vent (not flared). The release vent is a single vent at height. The release of unburnt hydrocarbons will be minimized by minimizing volumes required to be depressurised during regular maintenance activities and generator trips. Bulk depressurisation of the facility during a prolonged shutdown (inclusive of the ethane supply piping from LIP) will be managed from the LIP facility end so that the unburnt hydrocarbon is not released to atmosphere but is routed back into the LIP system. The volume of ethane sent to the vent during generator shutdown as production fluctuates is expected to be in the order of ½ kg ethane per event.

Ethane will also be routed to the relief blowdown system during periods of emergency shutdown. It is anticipated that the volume of gas vented during this time would be approximately 10 kilograms; and it is estimated that not more than one emergency shutdown would eventuate in a year.

During a routine shut down for maintenance a small quantity of ethane would be sent to vent, again in the order of ½ kg per shutdown.

5.5. Electrical Generation & Transmission Construction

The site is classified as an existing low voltage (LV) customer connected at low voltage via an existing 22 kV feeder. The scope of work for this project is to establish a new 66 kV connection from United Energy's upstream Hastings Zone Substation (HZS) by completing the works outlined in Table 4.

Table 4: Project Electrical Transmission Scope of Works

Scope of Work	Responsibility
Overhead lines – constructing a new 66kV line from HZS along Barclay Crescent, Bayview Road and Long Island Drive[1]	United Energy
Substation works • At Hastings Zone Substation[1] • Establish a new Zone Substation on the Project site	United Energy
Provide a dedicated control room to house the United Energy protection and control equipment	Project
Provide a switchyard including civil works	Project

[1] Subject to separate planning application by United Energy

5.5.1. Electricity Transmission

The power plant will connect into the Victorian Grid via two new 40/60 MVA transformers and a 66 kV transmission line. The new electrical transformer will transfer the electricity produced at the power plant to the regional electricity transmission and distribution system.

A 66 kV line runs between the HSZ and BlueScope Steel (located at 28 Bayview Road). From BlueScope Steel a 22 kV transmission line runs down Bayview Road, then into Long Island Drive, finally connecting to the Project area (2 Long Island Drive). A 66 kV transmission line will be constructed parallel to the existing 22 kV line (approximately 3.3 kilometres). The transmission lines located in the Project area are currently operational at 22 kV. The transmission line changes will be undertaken by United Energy.

The route of the transmission line from the roadside on Long Island Drive across the 2 Long Island Drive property will follow the route of the existing 22kV infrastructure that crosses the eastern portion of the block. The additional 66kV lines will require the installation of two additional poles. This and the installation activity may cause damage to any remaining native vegetation in proximity to the line, and this has been addressed in the Nature Advisory native vegetation assessment for the block [1].

5.5.2. Electrical Switchyard / Transformers

The proposed location of the new electrical switchyard and transformers is shown in the site layout drawings, in Attachment B.

Generator Transformers

The power plant's transformer system will consist of 2 x 40/60MVA, 11/66kV generator transformers, each capable of supporting the power station's full load capacity of 40.5MW. A normally open bus tie is located between the 11kV switchboards to enable 100% of load to be transferred to either of the Generator Transformers if required The transformers will be provided with disconnectors and earthing switches that fulfil the requirements of AS 62271.102, AS 1170 and AS 60137.

Two 2MVA, 0.415kV/11kV auxiliary transformers will also be provided. Each auxiliary transformer is capable of supporting the full load capacity if required. The auxiliary transformers service the auxiliaries for the three turbine generators.

The transformers are designed in accordance with Australian Standard 60076 and be designed to be capable of withstanding various operational and extraneous stresses such as rapid temperature change, fault currents and the various electromagnetic forces. Being able to sustain continuous operation at any tapping position for all service conditions.

The transformer system will be installed on a concrete slab with anti-vibration pads between the structural foundations and oil tank.

The 66kV and 11 kV transformers will be installed in a bunded area.

66 kV Switchyard

A single radial overhead line circuit from Hasting Zone Sub Station is provided on site via a dedicated air insulated overhead line, fitting with an isolating switch and dead tank circuit breaker with associated CT's and VT's. The equipment will be located and form part of the 66kV switchyard system. The respective hardstand area will be demarcated between the UE and ESSO equipment areas.

The air-insulated switchyard and associated equipment will be designed in accordance with AS2067, AS3000 and associated referenced standards. The design considers the site environmental conditions. All metalworks will be adequately protected for corrosion including all auxiliary components.

Table 5: AS 2067 Specifications

Item	Value
Nominal system voltage (kV)	66
Highest continuous operating voltage (kV)	72.5
Impulse withstand (kV)	325
Power frequency withstand (kV peak)	140
Short time withstand (kV for 3 seconds)	25

66 kV Circuit Breakers

The 66 kV circuit breakers will be designed, constructed, and tested in accordance the specifications outlined AS 62271. The circuit breakers will be live tank SF6 outdoor circuit breakers.

66 kV Disconnectors

The 66 kV disconnectors and earthing switches are to be provided for each 66kV transformer and fulfil the requirements of AS 62271.102, AS 1170 and AS 60137. Disconnector design includes a motorised mechanical interlock and associated earthing switch, operable from the control room. This will prevent the disconnector and earth switch being either closed or open at the same time. These mechanical interlocks use a Key and Lock system and are capable of manual operation. Disconnectors are 3 pole gang operated complete with support structures, insulators, bus connectors. Locking provision can be made for the "open" and "closed" position of the disconnector and earth switch. The racking equipment is capable of remote racking.

Busbars and Connectors

The busbars and connectors have the capability to withstand all mechanical and electrical stresses that may be imposed on them during normal operation e.g. short circuits and electromagnetic forces as well as extraneous events including extreme climate conditions and seismic activity.

Insulators

Insulators will be designed and constructed to maintain integrity when subjected to the same operational and extraneous stresses as the busbars and connectors. With performance and reliability not reduced by environmental conditions.

Surge Arrestors

Surge arresters will be of the single-pole, self-supporting, base-mounted, metal-oxide type and equipped with a pressure relief device. The arrestors are equipped with discharge counters for counting every operation.

Earthings

The electrical equipment will be bonded to an earth grid as part of installation to allow the clearing of faults that may occur as a result of live assets coming into contact with metallic structures. Any metallic structures including pipes, fences or support structures within the HV switchyard or in proximity to live electrical assets will also be appropriately connected to the earth grid. Disconnector links and earth return resistors will be provided on buses and other important electrical equipment to allow for clearing of fault currents and short circuits that may occur. All electrical systems on the site will feature protection systems in accordance with IEC 60255 as well as back up protection systems and redundancy measures that are capable of clearing faults that may occur within the site.

CTs, VTs and Relays

CTs and VTs will be provided in accordance with AS 60044, AS 61869.2 and IEEE C57.13. These are specifically calibrated to the specifications of the electrical gear with the selected model. When used as protection, these calibrations must allow the primary windings of the CTs to withstand the rated short circuit fault current levels of the connected switchgear.

Communication with Power Authority

The power authority (United Energy (UE) & AEMO) require remote functionality to manage power fluctuations and have the ability to safely stop the facility in the case of a community emergency. They will have the ability to remotely shutdown the generators to manage the electrical grid operation. As a result, a dedicated optic fiber cable is required as a license condition to operate the facility. In addition as the site will be required to install 3rd party (UE) equipment, a dedicated equipment room housing proprietary control and metering equipment will be housed in a separate UE equipment room on site.

5.6. Associated Construction Activities

5.6.1. Roadways

New road ways will be constructed within the site during the construction period. The roads will be designed in accordance with Austroads Guide to Pavement Technology Part 2 [2].

As shown in Figure 19 (and Site Layout Drawing 10 – Construction Arrangements), the proposed roads for the Project site will include circumferential roads around the power plant infrastructure and a road link completing a circuit around the existing buildings on site.

These have been designed to Austroads standards and industry (subdivisional road) practice. The key features are:

- Circuit roads (no reversing required)
- Overall width back-to-back of kerb 7.5m for heavy vehicles passing
- Cross-fall 0.03 m/m for pavement drainage
- Longitudinal grades min 0.5% kerb and channel for runoff at self-cleansing velocities
- Semi-mountable kerbs (VicRoads SM2) to allow free access anywhere off-road)
- Turning for 19 m semi-trailers at intersections and bends (refer to Site Layout Drawing 9 – Truck Turning)
- Match-in points are: concrete slab NW corner, sealed road NE corner and gateway to LIP SE corner

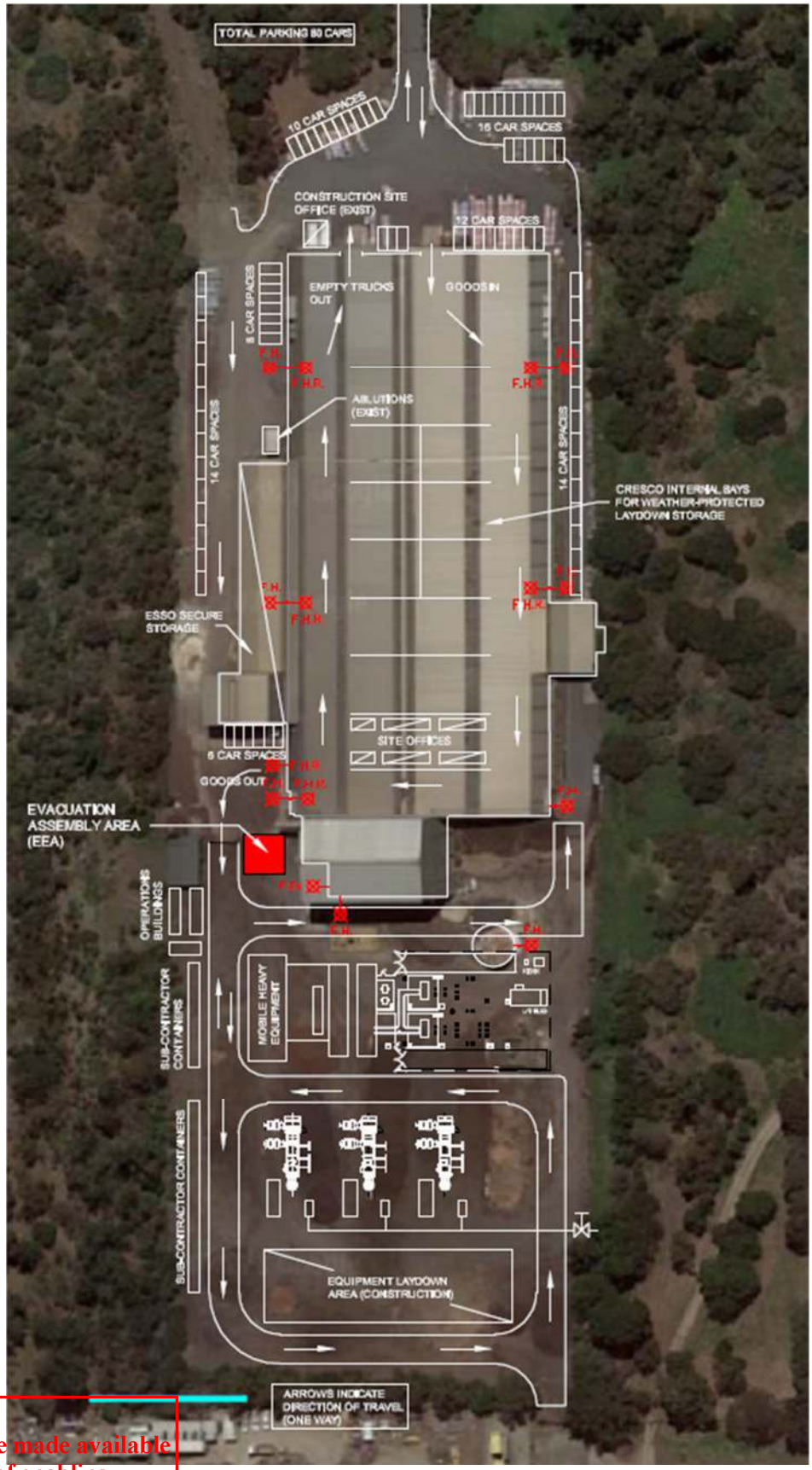
Road (pavement) design accords with Austroads methods, assuming:

- Design period 40 years
- AADT assumed 250vpd
- Percentage HV 20%
- Lane distribution 1.0
- HV growth 4%
- CBR (insitu clay subgrade) 4%

From the above, a 450 mm deep crushed rock flexible pavement with 50 mm asphalt wearing surface is deemed satisfactory for the Project site. A separate analysis of this pavement for crane damage (1x6 axle crane per day for 10 years) confirms this design as satisfactory.

Parking and turn arounds are available on site for all construction and operation vehicles (refer to Attachment B). There is onsite parking available for construction personnel and visitors, including four handicapped spaces (refer to Section 13).

Figure 19: Project Site Roadways

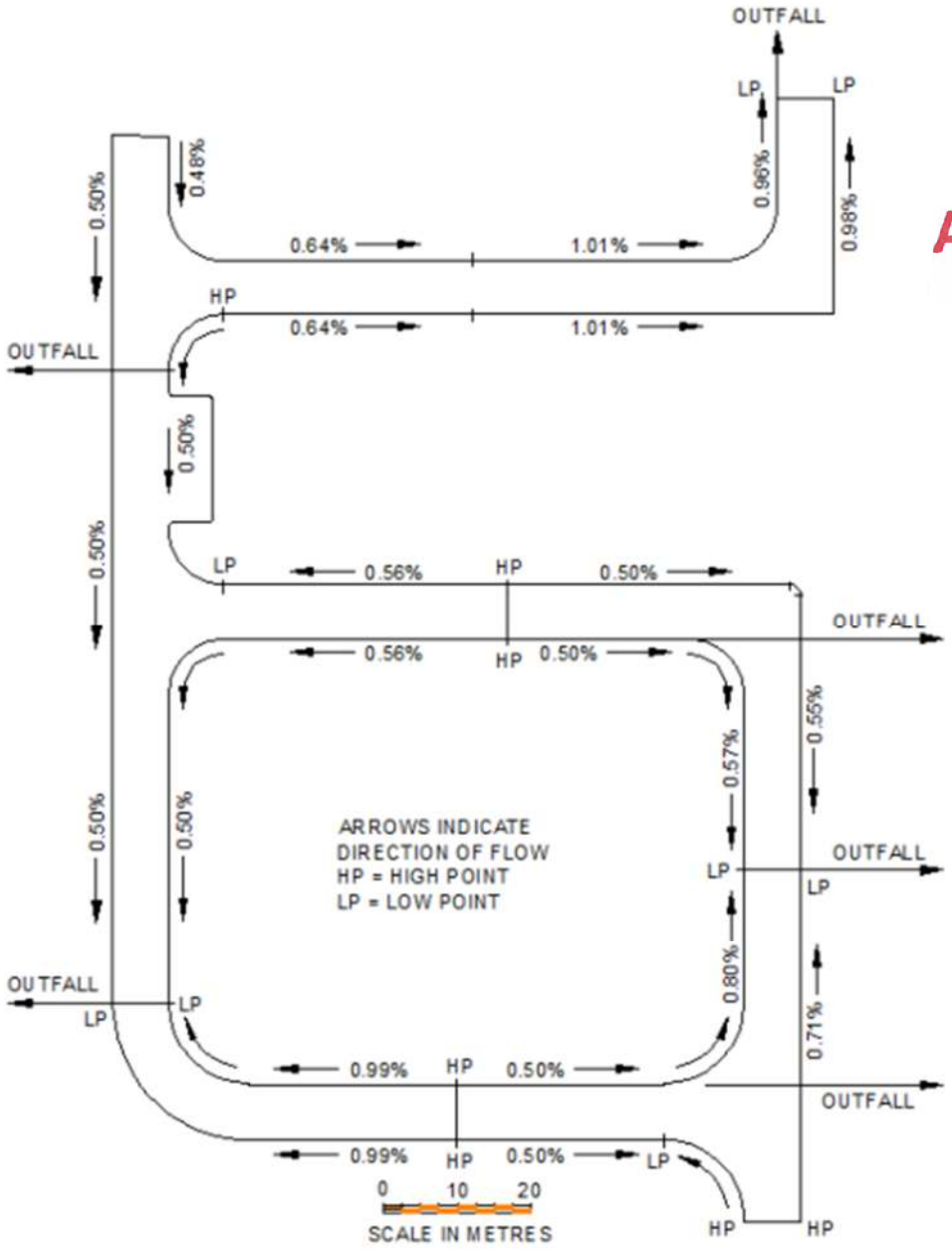


5.6.2. Site Drainage

Drainage is designed using Australian Rainfall and Runoff (ARR) data for Hastings 5% Annual Exceedance Probability (AEP). The site has been broken into sub-catchments (refer to Figure 21) and computations applied to each using Rational Method.

Kerbs have been designed to ensure rain water flows to the existing stormwater system and prevent pooling on site as shown in Figure 20.

Figure 20: Project Kerb Grading Plan



The drainage pipes located on site have been designed for inspection, cleaning and maintenance rather than catchment size and runoff, which is small, and hence the piping proposed has been sized to be larger than would normally be specified. The minimum pipe sizes to be installed on site are 225 mm diameter rubber ring jointed, reinforced concrete, and 300 mm diameter at with precast end-walls at outlets. The larger sized end walls pay off in reduced maintenance, where small outlets are easily lost in weed growth and damaged by slashers etc.

At the top of sub-catchments, where cover in some cases is limited, 300 x 225 box culverts are specified in lieu of pipes, hard under the kerb and channel. Pits are designed as standard 900 x 600 side-entry pit (SEP) or 600 x 600 junction pit (JP) The drainage design is generally shallow so that shallow pits result, not requiring step irons or ladders. Covers and lintels are rated Class D, for the heaviest category of road traffic equivalent to 8000 kilogram wheel load, 140 kN serviceability load, 210 kN ultimate limit state. Subsoil drains are specified behind kerbs, unless storm water drainage is coincident. The subsoil drains allow escape of moisture from within the road pavement, preserving the integrity and strength of the clay subgrade.

Figure 21: Catchment Plan and Drainage Layout

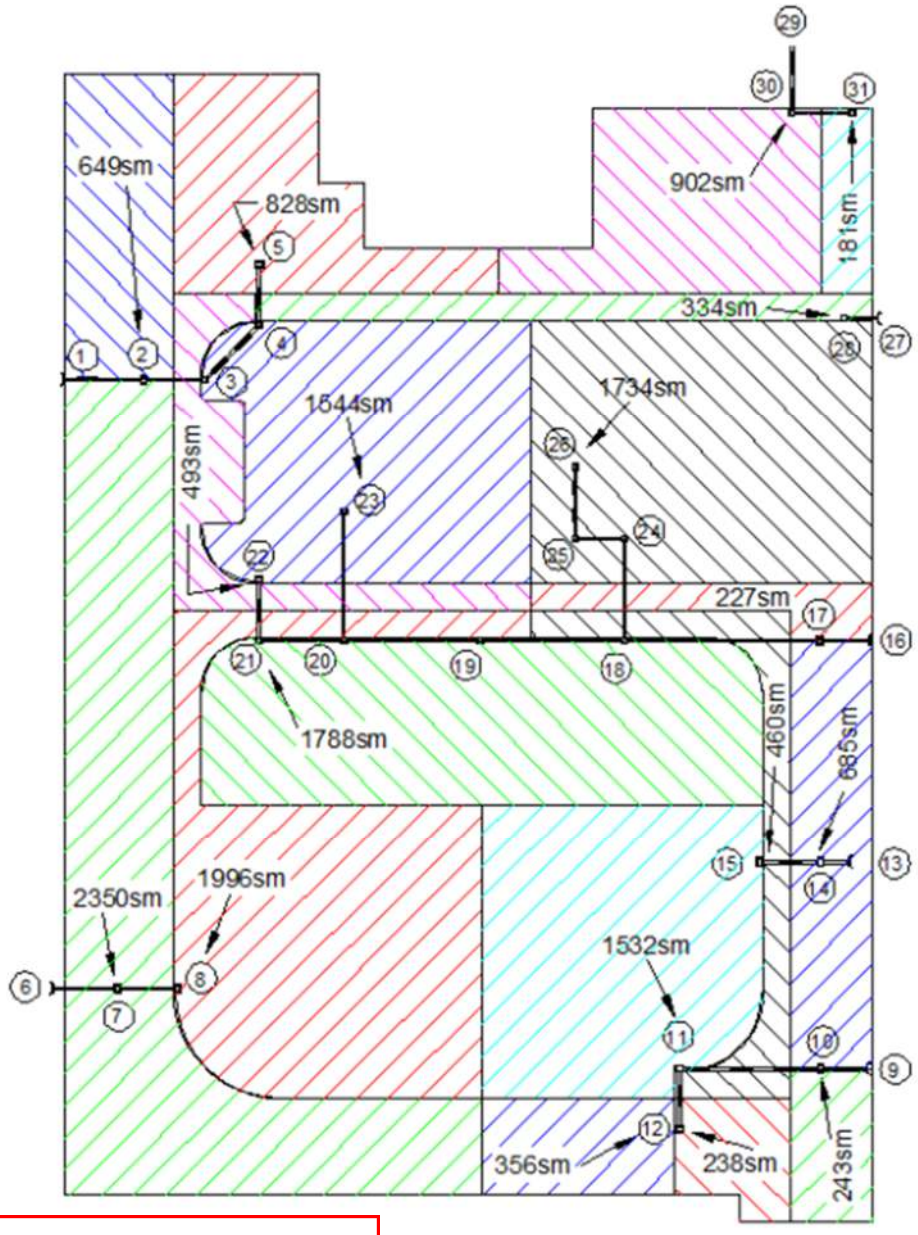
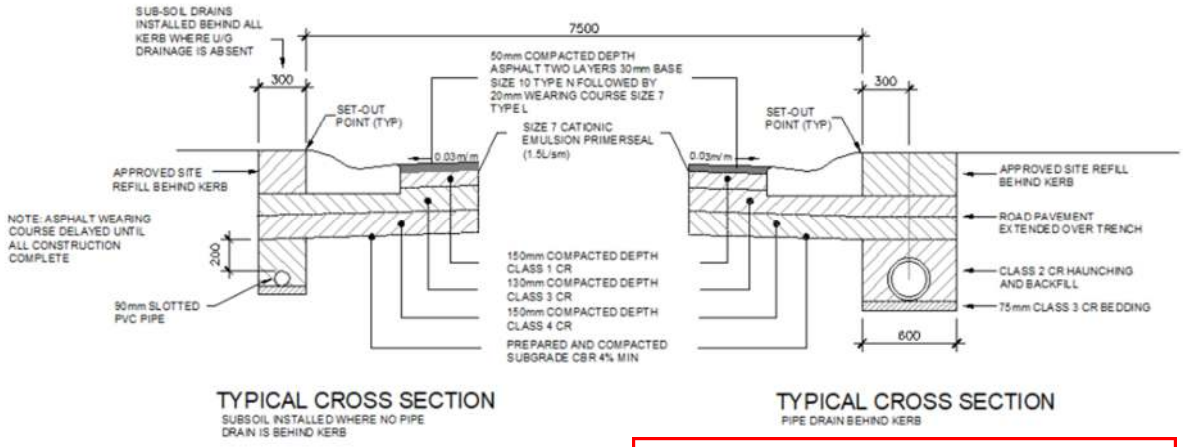


Figure 22: Kerb Drainage Cross Section



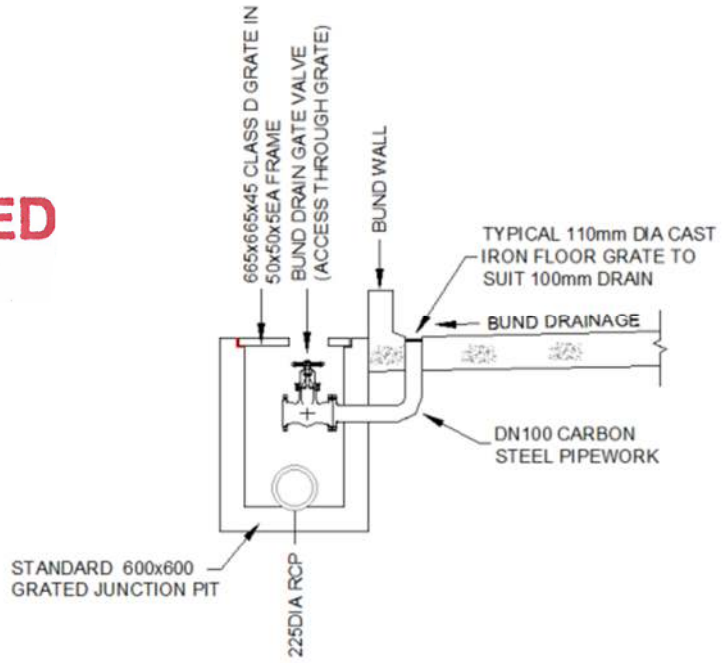
5.6.3. Bunded Drainage

Bunds are specified around and under:

- Gas turbine generators
- Switchyard transformers
- 2000kV transformers
- Hard stand area

These bunds ultimately drain into the stormwater system but with the proviso that their outlets are valved. This allows for gate valves normally open, but in the event of chemical spillage within the bund (or during maintenance as a precaution) the valves are closed trapping run-off within the bund for individual clean-up and removal from site.

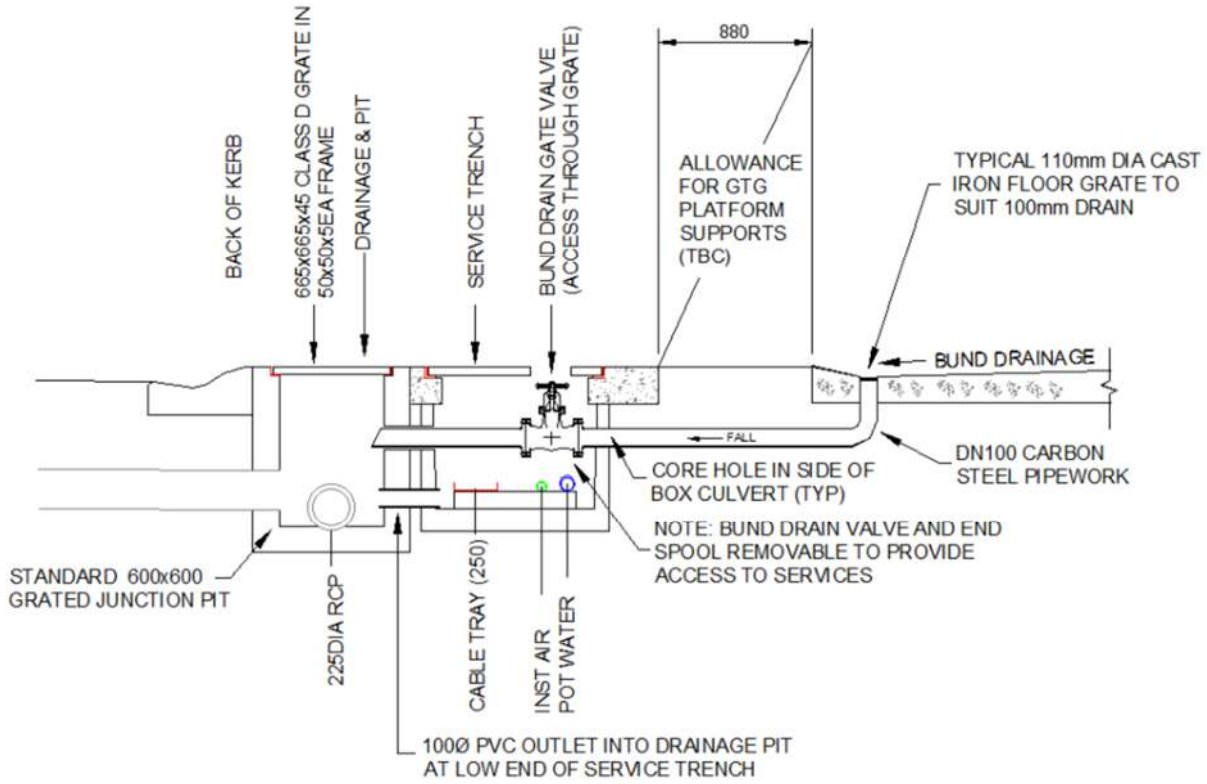
Figure 23: Bund Drainage with Gate Valve



5.6.4. Service Trenches

Two service trenches will be installed, running east-west immediately north and south of the generator site. These are based on standard pre-cast RC box culverts with a cast insitu edge beam containing a continuous steel angle as the frame for Class D grated lids. Because the trenches are open to rainfall, they are graded similarly to drainage culverts with an outlet at low points into the local drainage network. Additional service trenches are likely as the electrical design evolves.

Figure 24: North Service Trench – adjacent to road with bund drainage crossing through



The north service trench contains instrument air, potable water and electrical cable tray, and is adjacent to the road. It adopts the same kerb and channel design grades. The south service trench contains incoming fuel gas and the oily water gravity line. It traverses open land and can achieve a single grade to suit the oily water system gravity spooling, to then cross the eastern road and drain rain water into the east side open drain. This is coincident with the incoming fuel gas which will have an isolation valve at the fence line. It is likely there will be a remote valve control so there may be air and electrical lines in the service trench also.

5.6.5. Hydrocarbon Drainage System and Sump

A dedicated oily water drain will connect each turbine and gas skid to a closed well system east of the site. The oily water system will collect water contaminated with hydrocarbons as a result of maintenance on the turbines or condensate from the fuel gas.

The system is designed to gravity feed starting from the westernmost turbine with minimum cover under the bund slab. The well, a locally procured pre-cast tank, will have a capacity of 1800 litres with a high-level alarm indicating the requirement to pump out its contents for removal and treatment off-site. The well will be buried below grade, but with its lid above to ensure site rainfall/runoff cannot enter the well. The well will be vented to allow escape of aromatics via a high-level stack, in common with venting fuel gas e.g. during emergency shut down of turbines.

All wastes collected in this sump will be removed by vacuum pump for disposal at a lawful place[4], by an accredited waste removal company.

5.6.6. Stormwater System

Existing open stormwater culverts run down the east and west side of the Project area. These open drains then connect with a buried stormwater drain system on LIP. Refer to Attachment B.

At present the stormwater culverts are heavily overgrown with vegetation. As part of the bushfire mitigation study, it was deemed advisable to clear the culverts of vegetation. This will be undertaken prior to the start of construction.

Section 9.2, outlines the impact assessment of water discharges associated with the Project and the control measures put in place.

5.6.7. Water Supply

Currently water to the LIP facility is provided at a connection near to the Truck Loading Facility. Water to the Project site is fed from this system.

Water required for construction and dust suppression will be obtained from the existing mains water supply.

For the operational phase, water quality testing will be carried out on this supply prior to construction commencing to determine if it will meet the turbine specifications for washdown water. If it is unsuitable a reverse osmosis water purification system will be installed.

5.6.8. Fire Water

The site is currently connected to LIP's fire water mains. The integrity of the system is still being determined, and will repaired or replaced, as necessary. A fire safety study has been commissioned to determine required placement of any hydrants and hose reels.

An independent 10,000 litre firewater tank will also be supplied as a back-up supply. This will be provided with CFA connections.

5.6.9. Power Supply

The site is already connected to mains power and will meet all the electrical requirements for construction. This includes 240 V power for occupied buildings and 415 V power for the generators to enable turbine start up. There is no expectation that portable diesel generators will be required.

5.6.10. Instrument Air

Instrument air is required for the generators and the associated fuel gas conditioning skid. Two instrument air compressors (one standby) will be installed as part of the power plant package.

5.6.11. Use and Storage of Hazardous Materials and Substances

It is anticipated that little to no hazardous substances will need to be stored on site. Lubricating oils will be delivered to site when needed.

Any oil, fuel, chemicals and other hazardous materials requiring storage on site will be temporarily stored and contained in designated areas in accordance with the Victorian WorkSafe *Code of Practice on the Storage and Handling of Dangerous Goods*, Australian Standards and Safety Data Sheets (SDS).

A hazardous substances register will be developed for the construction activities.

[4] A "lawful place" is defined as somewhere authorized to receive industrial waste.

5.6.12. Waste

5.6.12.1. Construction Waste

The following construction waste materials are likely to be generated:

- Rock and soil overburden from pipe laying;
- Rock and soil from site leveling and foundation preparation;
- Scrap piping and other construction scrap;
- Packaging.

Waste materials will be reused and recycled on site, where possible. Surplus soil will be analysed to determine waste classification. If classified as clean fill, the surplus soil will be reused on site. Otherwise, soil will be removed from site for disposal at a licenced lawful place and tracked through the EPA's waste tracker system. Initial assessments suggest that the soil is Category D type waste.

Waste materials will be handled and stored so as to prevent offsite release. Materials that cannot be reused or recycled on site will be placed in designated bins for offsite disposal at an approved facility.

5.6.12.2. General Wastes

Domestic waste consisting of sewage, grey water and putrescible kitchen scraps, packaging materials, and other non-hazardous waste generated by site-based construction personnel at the site office location will be temporarily stored on site and periodically removed to an EPA licensed waste facility.

Solid waste materials will be separated, where possible, for recycling. Wastes will be stored in a manner that prevents the uncontrolled release of waste materials or access for vermin.

5.6.12.3. Sewerage

An existing sewerage line runs between LIP and the Project site. The current occupants of the property have not been using this sewerage line, instead employing temporary facilities, which will be removed at the end of the lease.

During construction the Project will adopt temporary ablution facilities. Temporary ablution facilities will be pumped out on a regular basis by an appropriately licensed waste transport and disposal contractor to be disposed at a lawful place.

During the operational phase of the Project, the site control room/ office / kitchen / toilet building will be connected to the existing sewerage line.

5.6.13. Existing Buildings Onsite

Two storage sheds are present on the site. The Project will utilise these buildings construction office facilities and equipment storage; and storage of equipment during operations.

5.7. Commissioning

Solar will commission the turbine generators in their manufacturing plant in the USA, prior to shipping to Esso. This testing will be performed on methane gas, in accordance with their standard commissioning practices. Testing undertaken by Solar, has shown that under steady state operations, the turbines are able to meet emissions levels of 25 ppm NOx and CO, while burning ethane gas.

Once assembly has been completed at Hastings, the turbine generators will be commissioned with ethane gas.

During the commissioning of the low emissions combustion system on ethane there may be short periods where NOx emissions are up to 100 ppm. This will be temporary while each power generation unit is being correctly tuned to minimise diffusion pilot. Once commissioning is complete higher rates of diffusion pilot should only be needed during large process upsets and will automatically reduce within 2-3 minutes.

Air modelling has been conducted to evaluate the impact of these increased emissions during the commissioning period. The modelling has been based on the maximum annual average of 189 tonnes of

ethane per day, 100% high pilot flame conditions. Modelling has shown that air emissions remain well below criteria both onsite and at sensitive receptors.

6. Climate

6.1. Existing Climatic Conditions

Climatic data is recorded at the Cerberus weather station, located 6.5 km from Hastings. The climate is considered warm and temperate.

6.1.1. Temperature

The average annual temperature is 14.7°C [3]. While the average monthly temperatures, for the Hastings area, over the last 34 years show a July low of 9.9°C to a February high of 18.9°C. With the highest recorded temperature of 45.8°C in February 2009; and the lowest at -3.2°C in May 1991 [4].

Figure 25: Long Term Monthly Average Temperature for Hastings

6.1.2. Wind

Winds are predominantly from the north (12% of the time); west-north-west (11% of the time); and south-south-west (10% of the time). With the strongest winds predominately coming from the west.

Average monthly wind speeds over the last 34 years show it to be fairly consistent, varying between 11.5 km/h and 14.2 km/h. The highest recorded wind speed was in September 2007 at 103.7 km/h [4]

6.2. Changing Climate

Victoria's climate is changing under the influence of both natural variability and global warming [5]. The average temperature has increased across the state by 1.0°C since 1910. DELWP (2019) have noted that on the Mornington Peninsular temparatures have increase from between 1.2 and 1.4°C since 1950. It is anticipated that temperatures will continue to increase by between 0.55°C and 1.3°C by 2030, depending the on the emissions scenario modelled (low to high) [5]. Not only is the temperature getting hotter but it is expected that the number of days Victoria experiences extreme heat (greater than 35°C) will increase from 8.3 days per year now to an average 14.0-16.4 days per year in 2050 [6].

Cool season rainfall has declined in the last 30 years and this decline is expected to continue. Since 1950 the annual rainfall on the Mornington Peninsula has decreased by 0-100 mm [7]. By 2030 declining winter, spring and autumn rainfall is expected. It should be noted however, that rainfall projections have larger uncertainties than temperature. DELWP (2019) have suggested that the Mornington Peninsula is expected to see an 11% reduction in rainfall by 2050. There is also expected to be an increase the intensity of extreme rainfall events.

Mean sea levels have risen approximately 11 cm since 1966 (based on records at Williamstown). By 2030, sea levels are expected to rise by another 12 cm. As part of integrated water management in Victoria, sea level rises and storm tide extents have been mapped for 2040. The area around the Project site is shown in Figure 26.

Figure 26: 2040 Sea Level Rise and Storm Tide (Source: Hydra [8])

The number of high fire danger days in Victoria is expected to increase in the future, but an approximate percentage is not known for the Mornington Peninsula. It should be noted that over the last 70 years, Victoria has seen an increase in length and severity of the fire season.

The Port Phillip and Westernport Catchment Management Authority (PPWCMA) Regional Catchment Strategy, examines the potential impact of climate change on environmental values in the Region. The findings specific to the project area are:

- No impact on natural vegetation
- No impact on waterways
- No impact on land and soil

6.3. Greenhouse Gas Emissions

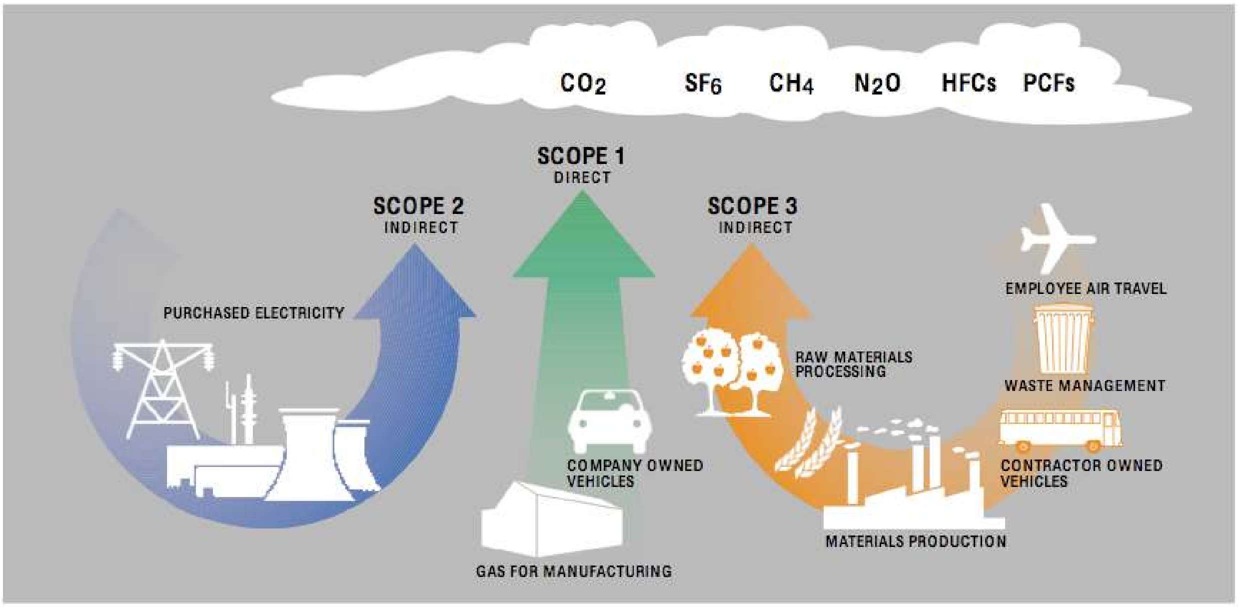
A Greenhouse Gas Assessment [9] was undertaken in accordance with the Protocol of Environmental Management (PEM) (Attachment G).

Greenhouse gas (GHG) emissions have been split into three categories, known as ‘Scopes’ (refer to Figure 27). These are defined as:

- Scope 1 – direct emissions of greenhouse gas from sources that are owned or operated by a reporting organization (examples include combustion of diesel in vehicles, plant or equipment)
- Scope 2 – indirect emissions associated with the import of energy from another sources (examples include import of electricity from the grid)
- Scope 3 – other indirect emissions other than energy imports, which are a direct result of operations of the organization, but from sources not owned or operated by them and due to

upstream or downstream activities (examples include direct upstream emissions associated with extractions, production and transport of purchased construction materials)

Figure 27: Greenhouse Gas Emission Scopes



6.3.1. Construction

Greenhouse gases could potentially be emitted as a result of the following construction activities:

- Energy use, as fuel to operate plant and equipment, and as electricity consumed at site;
- Vegetation clearing;
- Emissions embodied in materials used for construction, such as carbon dioxide (CO_2) generated during cement manufacture, or energy consumed in steel production.

The key direct emission source during construction of the power station would be diesel consumed to operate plant and equipment. It is estimated that during construction the total greenhouse gas emissions (Scope 1, 2 and 3) would be 357 tonnes of carbon dioxide equivalent (CO_{2e}). This is summarised in Table 6.

Table 6: Summary of GHG Emissions Associated with Construction

Emission Source	Project Activity	Total Emissions (t CO_{2e})		
		Scope 1	Scope 2	Scope 3
Stationary energy	Fuel consumed by construction plant / equipment	32.5	-	1.67
Transport	Fuel consumed by transport of construction materials and generators to site	-	-	1
Transport	Transport fuel consumed on site	61	-	3
Embodied carbon	Construction materials for ethane piping	-	-	13

Emission Source	Project Activity	Total Emissions (t CO_{2e})		
		Scope 1	Scope 2	Scope 3
Embodied carbon	Construction materials for generators	-	-	241
Waste	Transport of waste from construction site	-	-	0
Land use, land-use change and forestry (LULUCF)	Carbon sequestration lost due to clearing land during construction	5	-	-
Total		98	-	259

6.3.2. Operations

Emissions would result from the direct combustion of ethane within the gas turbines. The Project's ethane usage and greenhouse gas emissions (Scope 1) are shown in Table 7.

Table 7: Greenhouse Gas Emissions

Year	Annual Average Ethane to Generators (tonnes/day)	Ethane to Generators (tonnes/year)	Power from Generators (MWh/year)	Greenhouse Gas Emissions (t CO_{2e}/year)
2023	182	66,390	282,984	187,883
2024	182	66,453	283,253	188,061
2025	168	61,368	261,578	173,671
2026	189	69,135	294,686	195,652
2027	174	63,449	270,452	179,562
2028	95	34,744	148,094	98,325
2029	90	32,885	140,173	93,065
2030	58	21,037	89,670	59,535
2031	50	18,317	78,074	51,836
2032	23	8,234	35,098	23,303
2033	8	3,054	13,019	8,644
Average	111	40,461	172,462	114,503
Total				1,260,874

The total operational emissions (Scope 1, 2 and 3) are shown in Table 8.

Table 8: Summary of Greenhouse Gas Emissions Generated During Annual Operation

Emission Source	Project Activity	Total Annual Emissions (t CO_{2e})		
		Scope 1	Scope 2	Scope 3
Average Annual Emissions				
Stationary energy	Generator fuel use	114,503.0	-	-
Stationary energy	Facility electricity use	-	109.3	12.5
Fugitive emissions	Fugitive emissions from the transmission piping	-	-	0.1
Total		114,503.0	109.3	12.6
Maximum Annual Emissions				
Stationary energy	Generator fuel use	195,652	-	-
Stationary energy	Facility electricity use	-	109.3	12.5
Fugitive emissions	Fugitive emissions from the transmission piping	-	-	0.1
Total		195,652	109.3	12.6

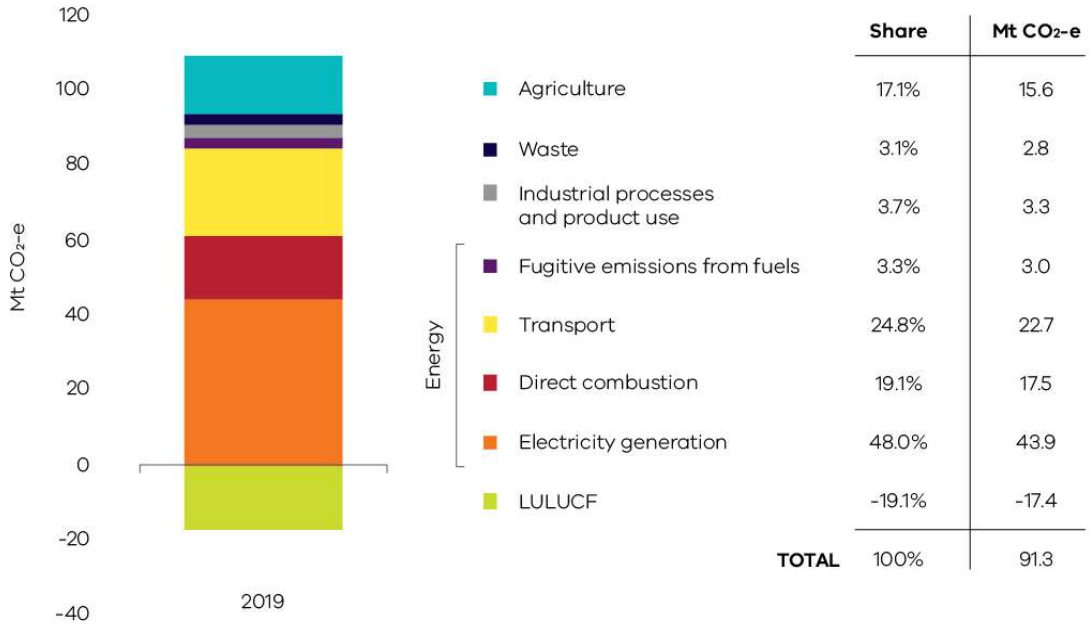
6.3.3. Comparison with Victorian emissions

In the State and Territory Greenhouse Gas Inventories 2019 report[5], Victoria's total greenhouse gas emissions were 91.33 million tonnes of carbon dioxide equivalent (Mt CO_{2e}) [10]. Of Victoria's emissions; 86.99 Mt CO_{2e} were related to energy (being the energy industry, transportation, fugitive emissions and other energy activities) [10].

The Victorian Greenhouse Gas Emissions Report 2019 [11] have illustrated the greenhouse gas emissions as shown in Figure 28. Electricity generation made up 48 percent of all emissions or 43.9 million tonnes of CO_{2e}.

[5] The 2019 greenhouse gas data is the latest figures available at the time of preparing this submission.

Figure 28: Victorian Greenhouse Gas Emissions for 2019



The project's total emissions (Scope 1, 2 and 3) in comparison to Victoria's total greenhouse gas emissions are summarised in Table 9.

Table 9: Comparison of the Project's Greenhouse Gas Emissions to Victoria's Annual Emissions

Emissions Source	Total GHG Emissions (tonnes CO_{2e}/year)	Percentage of Victoria's Annual Total Emissions (%)
Victoria 2019 (Scope 1 & 2)	91,330,000	100
Hastings Generation Project – Construction Phase (Scope 1, 2, 3)	357	0.0004
Average Hastings Generation Project – Operations Phase (Scope 1, 2, 3)	114,625	0.126
Maximum Hastings Generation Project – Operations Phase (Scope 1, 2, 3)	195,774	0.214

6.3.3.1. Victorian Emissions Targets

Under the Climate Change Act (2017), Victoria has set the following emissions reduction targets, based on 2005 emissions:

- 28-33% by 2025
- 45-50% by 2030
- net zero by 2050

Victoria's emissions in 2019 were 24.8% below 2005 emissions[6], exceeding the 2020 target of 15-20 percent reduction on 2005 emission values.

The Project will be reaching peak production around 2025, contributing an additional 0.2 percent to Victoria's total greenhouse gas emissions.

Production will have markedly reduced by 2030 and it is expected that the Project's emissions will contribute 0.06 percent to Victoria's total greenhouse gas emissions.

6.3.3.2. Energy Sector Targets

The Victorian Government has pledged to reduce energy sector emissions by an estimated 2.2 million tonnes of CO_{2e} by 2025 and 3.7 million tonnes of CO_{2e} by 2030 [12]. It is proposing to achieve this through:

- Renewable energy investment – including:
  - fuel switching options as outlined in the Gas Substitution Road Map; and
  - moving to zero emissions vehicles
- transforming energy demand, by:
  - improving energy efficiency in homes
  - reduce energy costs in business
- expanding the clean energy workforce; and
- empowering communities to take action

The Project's impact on Victoria achieving these targets is discussed further, in the following sections.

Electricity Generation

Under the *Victoria's Climate Change Strategy* [13] a target has been set to have 50 percent of electricity generated in Victoria to be sourced from renewables by 2030. In 2020, renewables accounted for 26.6 percent of Victoria's electricity, exceeding the 2020 target of 25 percent. DELWP (2021) have stated that currently only 8 percent of Victoria's electricity demands are being met by gas fired power stations or 2,612,066 MWh. This equates to 1.7 percent of Victoria's total greenhouse gas emissions, as shown in Figure 29 [11].

Figure 29: Electricity production and emissions from Victorian brown coal-fired stations and large and medium gas-powered generators in 2019

Facility		Electricity production (MWh)	Total direct emissions (Mt CO_2-e)	Share of Victoria's net greenhouse gas emissions
Brown coal power stations	Loy Yang A	15,959,544	18.5	20.3%
	Yallourn	10,133,040	13.3	14.6%
	Loy Yang B	8,443,824	9.6	10.5%
	Sub-total	34,536,408	41.4	45.3%
Large and medium GPG#		2,612,066	1.5	1.7%
TOTAL		37,148,474	42.9	47.0%*

Source: Analysis based on *Greenhouse and energy information for designated generation facilities 2018-19* (CER 2020)

* Total of 47% varies from the total of 48% presented in **Figure 15** due to the exclusion of small electricity generators in **Table 2** (e.g. generation from liquid fuels).

\# Excludes small-scale GPG which is below the threshold for NGER reporting

Note – numbers may not sum to totals due to rounding

Source Victorian Greenhouse Gas Emissions Report 2019 [11]

[6] Victoria's greenhouse gas emissions (climatechange.vic.gov.au)

This Project is looking to generate a maximum of 294,686 MWh/year, with an average of 172,462 MWh/year over the life of the project. This equates to approximately an 11 percent increase in current gas-powered generation for 2026, when the maximum power generation is expected or 6.6 percent increase on 2019 gas powered generation per year.

AEMO[7] have recorded that as of July 2021, Victoria has 7,298 MW of power being produced from fossil fuel fired power plants. A further 3,890 MW is in the planning process, making a total of 11,188 MW of fossil fuel derived electricity. This Project would represent a 0.36% increase in the total existing and planned fossil fuelled power produced in Victoria, at its peak; and 0.09% of Victoria's total electricity generated (renewables and non-renewables).

The Project is expected to peak production in 2026, with a marked decline from 2028 onwards. By 2030 the Project is expected to be producing 89,670 MWh per year or 0.02 percent of the Victoria's electricity supply.

As such the Project should not impact negatively on Victoria meeting its energy reduction targets of 50 percent renewables by 2030.

Natural Gas Usage

Natural gas is used by around 2 million Victorian households for heating and cooking, and is a key resource for industry, business, agriculture and essential services such as hospitals. The Victorian government is committed to ensure that gas reliability and security are maintained for all Victorians, while exploring sustainable alternatives. A Gas Substitution Roadmap is currently being developed, due for publication in late 2021. It details the transition pathways to achieve net-zero emissions and identify opportunities for households and businesses that use natural gas to become more energy efficient and switch to lower emissions energy sources [14].

Successful implementation of the Gas Substitution Roadmap will reduce Victoria's demand for natural gas. As described in Section 1.3, ethane is a by-product of natural gas production. Therefore, any reduction in natural gas volumes will subsequently lead to a reduction in the volume of ethane gas requiring disposition.

6.3.4. Benchmarking greenhouse gas intensity

Gas-fired turbines generate less greenhouse gases than traditional coal-fired generators. An examination of National Greenhouse and Energy Report (NGER) data shows that the Latrobe Valley coal-fired power stations are generating, on average, 1.36 tonnes of CO_{2e} for each megawatt of electricity produced [15]. While the Project is expected to produce 0.66 tonnes of CO_{2e} per megawatt.

Ethane produced from Esso's Bass Strait facilities is presently used in the manufacture of ethylene to produce plastics (polyethylene) and resins. For every tonne of ethane gas consumed, approximately 800 kg of ethylene is produced. A review of National Greenhouse and Energy Reporting shows that 2.15 tonnes of CO_{2e} are generated for each tonne of ethylene produced [15].

Table 10, compares the amount of greenhouse gas emissions from ethane fired gas turbines against emissions from current electricity providers and ethane use.

[7] AEMO | Generation information

Table 10: Greenhouse Gas Emissions based on Maximum Annual Average Production Rate of 189 tonnes of Ethane per day

Product	Throughput (t/ day)	Throughput (t/ year)	Emissions Intensity (t CO_{2e}/ t product)	Electricity (MW/year)	Emissions Intensity (t CO_{2e}/ MW)	Emissions (t CO_{2e}/ year)
Ethane	189	68,985	2.83	294,686	0.66	195,228
Coal				294,686	1.36	400,773
Ethylene	151*	55,188	2.15^			118,654

Note: * Approximately 800 kilograms of ethylene is produced from each tonne of ethane gas, therefore for 189 tonnes of ethane would produce 151 tonnes of ethylene.

^ Emissions intensity is calculated from Qenos NGER annual report of 978,936 tonnes of CO_{2e} generated for 455,000 tonnes of ethylene produced [15].

At the Project's peak, it will replace 119 kt of CO_{2e} per year from ethylene production, resulting in a net increase of 76 kt of CO_{2e} per year. To produce the same quantity of electricity from coal-fired power stations would emit 401 kt of CO_{2e} per year or an additional 206 kt of CO_{2e} per year.

7. Air Emissions

7.1. Air emission sources

The Project is expected to be in operation for 11 years, with a maximum annual average daily production of 189 tonnes of ethane per day. It is anticipated that this rate will significantly reduce from 2028 onwards. In addition to the volume of ethane varying from year-to-year, over the life of the project; the volumes are expected to vary from month-to-month, day-to-day and hour-to-hour as driven by natural gas demand and ambient weather conditions. Seasonally the ethane volume will peak in winter, to correspond with the peak in gas demand; and then subsequently falling in summer. This seasonal variation is expected to be in the order of 50 tonnes per day from winter to summer.

The Project will not be installing any gas storage facilities, and the gas turbines will ramp up and down in response to changes in gas flowrate.

The following details the air emissions generated in association with the Project's activities.

7.1.1. Construction activities

Air emissions associated with the construction activities are related to vehicle movements, earthworks and materials handling. Pollutants of interest include particulates (include PM_{10} and $PM_{2.5}$) and vehicle exhaust emissions.

Potential dust emission magnitudes for the construction project are summarise in Table 11.

Table 11: Dust Emission Magnitudes in Accordance with IAQM Guidance

Activity	Potential Dust Emission Magnitude[1]	Justification
Demolition	**Small** Total building volume <20,000 m^3, construction material with low potential for dust release (metal and wood), demolition activities <10 m above ground	• No demolition proposed during construction phase
Earthworks	**Small** Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, total material moved <20,000 tonnes	• Clearing of vegetation (native and introduced) approximately < 2 hectares • Trenching excavation volume = 1.0 x 2.0 x 50 m = 100 m^3 = 160 tonnes at 1.6 t/m^3 density • Decommissioning phase expected to require less earthworks than construction
Construction	**Small** Total building volume <25,000 m^3, construction material with low potential for dust release	• Construction of site office and installation of generators and infrastructure • Assumed construction materials have low dust generating potential (e.g. steel, cladding)

Activity	Potential Dust Emission Magnitude[1]	Justification
Trackout	**Small** <10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m	• Plant and spoil trucks leaving site • Total number of outward heavy truck movements is not expected to exceed 5 per day at any particular worksite during construction or decommissioning

[1] Definition for potential dust emission magnitude are defined in IAQM guidance.

7.1.2. Point source emission assessment

Each of the three gas turbine generators will be fitted with an exhaust stack 11 metres high.

7.1.3. Commissioning

Solar will commission the turbine generators in their manufacturing plant in the USA, prior to shipping to Esso. This testing will be performed on natural gas, in accordance with their standard commissioning practices. Testing undertaken by Solar, has shown that under steady state operations, the turbines are able to meet emissions levels of 25 ppm NOx and CO, while burning ethane gas.

During the commissioning of the low emissions combustion system on ethane there may be short periods where NOx emissions are up to 100 ppm. This will be temporary while each power generation unit is being correctly tuned to minimise diffusion pilot. Once commissioning is complete higher rates of diffusion pilot should only be needed during large process upsets and will automatically reduce within 2-3 minutes.

Air modelling has been conducted to evaluate the impact of these increased emissions during the commissioning period. The modelling has been based on the maximum annual average of 189 tonnes of ethane per day, 100% high pilot flame conditions. Modelling has shown that air emissions remain well below criteria both onsite and as sensitive receptors.

7.2. Air quality modelling report

An Air Quality Assessment (Attachment F) was undertaken in support of the EPA Development License Application.

No site-specific background monitoring data was available for this assessment; therefore, background concentrations were adopted from areas which have a greater pollution potential as a function of population and industrial emissions and is considered to be very conservative; and these are listed in Table 12.

Table 12: Adopted Background Concentrations

Pollutant	Averaging Period	Adopted Background Pollutant Concentrations	
		ppm	µg/m^{3*}
NO_2	1 hour	0.021	39.5
	Annual	0.006	11.3
CO	8 hour	0.5	570
PM_{10}	24 hour	-	24.1
	Annual	-	19.9
$PM_{2.5}$	24 hour	-	10.2
	Annual	-	7.9
SO_2	1 hour	0.0003	7.9

Note * - Gas volumes are expressed at 25°C and at an absolute pressure of one atmosphere (1013 hPa)

Table 13: Air Model Used

Model used	AERMOD
Met file used	Given the limitations of EPA monitoring stations and the potential emission sources from Esso LIP facility, background data has been sourced from the following sites: • 1 hour and annual NO2 data was sourced from Geelong • 8 hour CO data was sourced from Alphington • 1 hour SO2 data was sourced from Alphington and Geelong • 24 hour PM10 data was sourced from Dandenong • Annual PM10 data was sourced from Geelong • 24 hour and annual PM2.5 data was sourced from Alphington The background concentrations measured by the EPA are expected to be generally higher than those near the project location and their use as the background data in the assessment is considered conservative

The results of the Air Quality Assessment are summarised in Table 14.

Table 14: Comparison between Project's predicted ground level concentrations (GLCs) of emitted pollutants and design criteria

Indicator	Predicted maximum GLC (projected) µg/m^3	Background concentration µg/m^3	Predicted maximum GLCs (total) µg/m^3	Criterion µg/m^3	Project Design criteria
NOx 1-hour average 99.9th percentile	5.1	39.5	44.6	150	25 ppm
NOx 1-hour average 99.9th percentile	20.2	39.5	59.7	150	100 ppm – during commissioning
NO_2 annual average	0.17	11.3	11.47	28	25 ppm
NO_2 annual average	0.69	11.3	11.99	28	100 ppm – during commissioning
CO 8-hour average	7.8	570	577.8	10,310	25 ppm
SO_2 1-hour 99.9th percentile	0.11	7.9	8.0	260	
$PM_{2.5}$ max 24-hour average	0.82	10.2	11.0	25	
$PM_{2.5}$ max annual average	0.05	7.9	7.95	8	
VOC 1-hour 99.9th percentile	5.9	-	5.9	-	

The results from this study demonstrate no predicted exceedances of EPA Environmental Reference Standards, Ambient Air Quality criteria as detailed in the Guideline for Assessing and Minimising Air Pollution in Victoria (EPA Publication 1961) or State Environment Protection Policy (Air Quality Management) criteria for carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particular matter less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$).

7.3. Cumulative Impacts

Given the Project's close proximity to LIP, an assessment was undertaken of the Project's emissions in conjunction with LIP's to determine impact upon sensitive receptors; and this is summarised in Table 15.

Table 15: Comparison of combined LIP and Project predicted ground level concentrations (GLCs) of emitted pollutants and design criteria

Indicator	Predicted maximum GLC (projected) Project + LIP µg/m^3	Background concentration µg/m^3	Predicted maximum GLCs (total) Project + LIP µg/m^3	Criterion µg/m^3	Project Design criteria
NOx 1-hour average 99.9th percentile	54.1	39.5	93.6	150	25 ppm
NOx 1-hour average 99.9th percentile	54.1	39.5	93.6	150	100 ppm – during commissioning
NO_2 annual average	1.58	11.3	12.88	28	25 ppm
NO_2 annual average	2.10	11.3	13.40	28	100 ppm – during commissioning
CO 8-hour average	125.2	570	695.2	10,310	25 ppm
SO_2 1-hour 99.9th percentile	15.4	7.9	23.3	260	

The cumulative emissions from the Project and LIP still show no predicted exceedances of EPA Environmental Reference Standards, Ambient Air Quality criteria as detailed in the Guideline for Assessing and Minimising Air Pollution in Victoria (EPA Publication 1961) or State Environment Protection Policy (Air Quality Management) criteria for carbon monoxide (CO), sulphur dioxide (SO_2), and nitrogen dioxide (NO_2).

8. Noise Emissions

The Hastings Generation Facility will be located within the Melbourne major urban area as defined in the *Noise Limit and Assessment Protocol* [16]. This states operating time periods as shown in Table 16.

Table 16: Operating Time Periods

Period	Details
Day	0700 – 1800 Monday to Saturday (excluding public holidays)
Evening	1800 – 2200 Monday to Saturday 0700 – 2200 Sunday and public holidays
Night	2200 – 0700 Monday to Sunday

An Environmental Noise Impact Assessment (Attachment E) was conducted examining the noise impacts from construction and operations activities associated with the facility.

8.1. Construction

During construction various activities will generate noise and vibrations, being:

- Haul trucks
- Compaction equipment
- Excavators
- Ancillary plant and equipment
- Earthworks
- Reversing beepers
- Light vehicles
- Concrete crushing (if required)

Guidance was sought from the *Civil construction, building and demolition guide* [17] for construction noise limits; recommendations are provided in Table 17.

Table 17: Construction Noise Working Hours

Period	Working Hours	Description
Normal working hours	0700 – 1800 Monday to Friday 0700 – 1330 Saturday	No noise level guidelines apply
Weekend / evening	1800 – 2200 Monday to Saturday 1300 – 2200 Saturday 0700 – 2200 Sunday and public holidays	Construction noise levels should not exceed the background LA90 level by: • 10 dB(A) or more for up to 18 months after project commencement • 5 dB(A) or more, after 18 months after project commencement
Night	2200 – 0700 Monday to Sunday (including public holidays)	Noise to be in audible within a habitable room of any residential premises

Due to the transient and dynamic nature of construction noise, noise modelling of construction noise was not undertaken. It is anticipated given the nature of activities to be undertaken during construction, that noise levels generated will not adversely impact the noise sensitive receptors. There are no plans to undertake any construction activities that involve heavy machinery outside of normal working hours.

8.2. Noise Modelling

Modelling of noise levels from the project was undertaken at eight sensitive receptors, close to the HGP site. All locations are residential premises and can be seen highlighted in in Figure 30. For the full details of the noise modelling and assessment undertaken refer to Attachment E (Environmental Noise Impact Assessment and Addendum).

Figure 30: Noise Sensitive Receptors

The background noise levels were compared to the night-time zoning levels and the applicable night-time noise limits have been calculated in accordance with the *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, Part 1A, Section 1. Noise Limits – urban area method, Clause 5. The Project's noise limits are shown in Table 18.

Table 18: Project's Night-time Noise Limits

Noise Sensitive Receptor	Address	Background Noise Level dB(A)	Night-time Zoning Level dB(A)	Night-time Noise Limit dB(A)
1	11 Cemetery Road, Hastings	37	55	49
2	65 Skinner Street, Hastings	35	41	41
3	2 Hodgins Road, Hastings	37	42	42
4	15A Lyall Street, Hastings	37	43	43
5	34 Cemetery Road, Hastings	37	56	50
6	7 Beach Drive, Hastings	37	50	47

7	22 Beach Drive, Hastings	37	54	49
8	47 Beach Drive, Hastings	37	48	46

Noise emissions have been predicted under adverse weather conditions favourable for noise propagation from the facility to the nearest residences, as outlined in Table 19.

Table 19: Meteorological Model Inputs for Adverse Weather Conditions

Input	Adverse Conditions
Wind speed (m/s)	3
Wind direction	Source to receiver
Pasquill-Gifford stability class (atmospheric stability)	F
Humidity (%)	50
Temperature (degrees Celsius)	15
Air pressure (mbar)	1013.3

8.3. Operations

During operations noise is expected to be generated from the following equipment:

- Solar Titan 130 power generation package, including enclosure; enclosure ventilation; turbine air system; and combustion outlet system
- Lube oil cooler
- Fuel gas skid
- Instrument air compressor
- Water purification pumps
- Transformers

Noise levels that would be generated at the noise sensitive receptors during adverse weather conditions is summarised in Table 20.

Table 20: Predicted Noise Levels

Noise Sensitive Receptor	Address	Night-time Noise Limit, dB(A)	Predicted Noise Level, dB(A)
1	11 Cemetery Road, Hastings	49	46.4
2	65 Skinner Street, Hastings	41	33.8
3	2 Hodgins Road, Hastings	42	34.3
4	15A Lyall Street, Hastings	43	31.4
5	34 Cemetery Road, Hastings	50	45.4

6	7 Beach Drive, Hastings	47	43.1
7	22 Beach Drive, Hastings	49	42.6
8	47 Beach Drive, Hastings	46	40.9

It can be seen that during adverse weather conditions, or worst-case scenario, the Project's noise levels will cause negligible intrusion into the nearest noise sensitive receptors or residential properties; and will comply with EPA noise limits.

9. Water Emissions

9.1. Existing Hydrology and Rainfall

9.1.1. Rainfall

Hastings has a significant amount of rainfall during the year averaging 741 mm [3]. Regional rainfall data shows the monthly averages for the last 35 years to vary from a low of 37 mm in February to a high to 73 mm in August, as shown in Figure 31.

Figure 31: Long Term Month Average Rainfall for Hastings

9.1.2. Stormwater

The site lies within the Olivers Creek Drainage Sub-catchment. Stormwaters from this sub-catchment flow into local receiving environments with very high environmental values. With the coastline identified as being of state and regional significance for its flora and bird habitat. The coast line lies on Western Port Bay, which has been declared a Ramsar Site. Western Port Bay is located 700 metres to the east and 1000 metres to the south of the Project area.

Under the Planning Scheme for the Mornington Peninsula, the site does not lie within an area of inundation (LSIO – land subject to inundation overlay) or a flood zone. This is confirmed by employees at LIP who have indicated that flooding is not an issue at the Project site. In addition, the Project area sits approximately 2.5 metres higher than the surrounding LIP facilities. Site elevation varies from 14.5 metres

at the centre of the Project area, in the vicinity of the number 2 gas turbine; gently sloping to the east and west to 13.0 metres at the open stormwater culverts. Refer to Attachment B.

9.1.3. Surface Waters

No surface water is present at the Project site. Surface water near to the HGP site include:

- Olivers Creek (Ramsar wetland) – approximately 1.5 kilometres to the east.
- Western Port (Ramsar Wetland) – approximately 700 metres to the east and 1000 metres to the south
- Wetland (Nationally important wetland ID# VIC083) – approximately 500 metres to the east-south-east.

The Project site does not lie within a special water supply catchment area, as outlined in Schedule 5 of the Catchment and Land Protection Act 1994[8].

9.1.4. Sensitive Receiving Environments

The HGP site lies to the north and west of Western Port, a Ramsar listed wetland. Western Port's shores are fringed by mangrove forests, intertidal mudflats, saltmarshes and sandy beaches [18]. Seabed meadows in the northern and western arm of the bay provide critical habitat and energy for fish and invertebrates.

Deep, steep-walled tidal channels allow 2-3 metre tides to sweep through the bay four times a day.

Western Port is a key breeding area for some species such as elephant fish, school shark (Galeorhinus australis) and Australian anchovy (Engraulis australis), and a nursery area for other species such as King George whiting (Sillaginodes punctatus), yellow-eye mullet (Aldrichetta forsteri) and Australian salmon (Arripis spp.). Western Port is also important for fish species that migrate between fresh, estuarine and marine waters including the Australian grayling, black bream and the short-finned eel [18].

115 bird species have been recorded on Western Port's coasts and intertidal areas. Western Port provides important foraging and roosting areas for shorebirds and habitat for waterbirds including ducks and swans, large wading birds such as herons, ibis and spoonbills and for gulls and fish-eating birds such as cormorants, pelicans and terns [18].

Beach-nesting birds, Australian fairy terns and Caspian terns, breed on Rams Island, which is a small island located to the south of French Island. Australian pied oystercatchers breed on French Island's sandy beaches and saltmarshes. Many species of waterbird such as ibis, spoonbills and cormorants breed in swamps and wetlands outside the Western Port Ramsar site boundary but may rely on feeding grounds in the Ramsar site during nesting [18].

Threatened species found in Western Port include wetland birds such as Eastern curlews, Curlew sandpipers, Fairy terns, Bar-tailed godwits, Lesser sand plovers and Red knots.

The water quality has been rated as Good, by the EPA [19].

9.1.5. Groundwater

According to the Victorian Groundwater Beneficial Use Map Series, South Western Victoria Water Table Aquifers [20], groundwater underlying the site is likely to be part of Segment B of the groundwater environment (i.e. having a salinity of between 1,201 mg/L to 3,100 mg/L).

Based on the published geology, groundwater is expected within clays and sands of the Baxter Sandstone. Based on the location of local surface water bodies (Westernport Bay approximately 700 m

[8] Under the *Development Licence Application Guidance*, Table 2 - an application may be refused if waste water discharges are made to surface waters in a special water supply catchment area as set out in Schedule 5 of the *Catchment and Land Protection Act 1994.*

east and approximately 1000 m south of the site), groundwater is expected to be flowing to the south or east discharging into the marine environment of Western Port Bay.

WBM Oceanics Australia (2002), have identified groundwaters in the Olivers Creek drainage sub-catchment as having a moderate value.

Site geotechnical works encountered groundwater at a depth of between 10 to 12 metres (RL 2.95 metres).

9.1.6. Groundwater Dependent Ecosystems

The BOM's Atlas of Groundwater Dependent Ecosystems (GDE) [21] mapped areas of low and moderate potential terrestrial GDE's (from national assessment) on the project site itself. Surrounding the project area, areas of moderate and high potential terrestrial GDE's were mapped. Mapping suggests these areas to be likely to moderately likely to be an inflow dependent ecosystem (IDE).

Mapped areas of high potential aquatic GDE's (from national assessment) have been identified to the south-east, south and west of the project site. No subterranean GDE's have been assessed for the project area and its surrounds. Mapping suggests the areas to the south and south-east of the project area are highly likely to be inflow dependent ecosystems.

9.2. Water Assessment

A Surface Water and Groundwater Desktop Assessment was undertaken for the site (Attachment I). This assessment identified:

- There is not expected to be any change in the size of impervious areas at the project site, upon completion of the development.
- Where vegetation is required to be removed as part of the bushfire management plan or pipe installation, it will be replaced with low level vegetation such as grasses.
- All mitigated risks have been classified as Low or Negligible for both the construction and operations phase of the project.

The key measures proposed to avoid, manage and/or mitigate impacts to surface water and groundwater include:

- Preparation and implementation of:
  - CEMP;
  - erosion and sediment control measures;
  - stormwater management plan
  - waste management controls
  - emergency response plan
  - Risk Management and Monitoring Program that includes consideration of surface and groundwater
- appropriate stabilisation of earthworks where hard stands or pavements have not been installed
- installation of secondary containment around all equipment that has the potential to release contaminants

With the proposed control measures in place, surface and groundwater impacts are expected to be Low or Negligible.

9.2.1. Process Water Discharges

The Facility does not use water in normal operations and there are no planned discharges to surface water.

Water is used in small quantities (not continuous) to either aid cleaning the compressor or to purge liquid fuel passages in dual fuel injectors during fuel transfers and liquid fuel shutdown.

It is anticipated that approximately 200 litres of water would be used to wash the turbine blades for each turbine. Washing of turbine blades is expected to occur once every five years.

The dirty water generated from each of these operations will be directed to sump for collection and offsite disposal at a licenced lawful place.

As was described in Section 5.6, the onsite drainage systems have been designed to capture all contaminated waters. The collected contaminated water will be disposed offsite at an appropriately licensed facility.

9.2.2. Sewerage

The maximum number of people expected to be at site is:

- 60 people during construction; and
- 5 people during the operations phase.

During construction, temporary kitchen facilities and toilets will be utilised. The grey water (waste water from the offices and kitchens) will be collected in a holding tank that will then be pumped out and sent offsite for disposal. The black water (water from the toilets) will be collected separately. This water will also be sent offsite for disposal at a lawful place.

A permanent control/office/kitchen/toilet building (Operations Centre) will be installed for the operations phase. The preferred method for disposal of sewerage waters, is for it to be sent to LIP, through an existing sewerage line, for treatment at the LIP facility. If this is not feasible due to design constraints of the Operations Centre location, the Project will adopt the same method of collection and offsite disposal, as employed during the construction phase, and described above.

9.2.3. Stormwater Management

Existing stormwater culverts run along the east and west boundary of the Project area. These drains, drain into an existing LIP stormwater drain that flows from west to east (to Long Island Drive).

Stormwaters from the Project areas are directed to the existing stormwater drainage system.

To prevent contamination of the stormwater system the following measures will be implemented:

- The lube oil tanks and gas turbines will be housed within an enclosed module that is fitted with a drip pan to collect any spills that may occur. The drip pans drain to a sump which can be pumped out and sent to a lawful place for disposal. This sump is not connected to the stormwater drain system.
- The fuel conditioning skids, the gas turbine generators (include lube oil cooling system) modules, the electrical equipment modules and the transformers will all be installed upon bunded concrete pads. Contaminated discharge is collected within a sump that can be pumped out and sent to a lawful place for disposal when necessary.
- All maintenance, involving the use of lubricants will be conducted within the bunded concrete pads, so far as reasonably practicable. Where it is not practicable, temporary containment will be set up around the maintenance area to minimize migration of contaminants.
- Although there are roadways and concrete pads to be constructed on site, the whole area south of the existing building currently has a road base overlay, and as such there is minimal change to the ability for the HGP site to absorb water during storm events. The site civil design is based upon the 1 in 100 year storm conditions.

Although there are roadways and concrete pads to be constructed on site, the whole area south of the existing building is hardstand, and as such there is no change to the ability for the HGP site to absorb water during storm events. The site civil design is based upon the 1 in 100-year storm conditions.

Stormwater drainage for the Project area is contained with the Olivers Creek sub-catchment. A review of stormwater management in this sub-catchment found the highest risks are posed from poor waste management practices; lack of sediment and erosion control and poor site management [22].

An Environmental Management Plan (EMP) (Attachment A) has been prepared for the Project. The Principal Contractor will be required to develop their own Construction EMP that complies with the Project EMP. The Project EMP will be updated over the life of the facility.

The civil contractor will ensure that all civil works comply with EPA Publication 1834 *Civil construction, building and demolition guide* to ensure that sediments or litter are not entering the stormwater system.

Under the HGP Environment Management Plan (Attachment A) and the supporting Stormwater Management Plan (Attachment J), the following management strategies are proposed to manage risks associated with stormwater management during construction activities:

1. Construction Contractor to assess risks of stormwater management hazards associated with activities and include mitigation measures in the Construction Environmental Management Plan.
2. Barriers to be employed around stormwater drains to prevent litter and sediment entering during any dewatering activities
3. Stormwater Management Plan to be implemented
4. Have adequate drainage and flood control measures in place at all times of construction
5. Divert stormwater away from soil stockpiles
6. All concrete to be supplied as a premix
7. Construction Contractor to develop site procedures to manage and prevent the release of contaminants into the environment, for:
    a. the handling, use, storage and disposal of hazardous substances;
    b. waste; and
    c. refuelling, maintenance and servicing activities

In addition, construction personnel will undertake visual assessment of stormwater drains in, adjacent and downstream of the construction zone. Corrective action will be taken to correct any deficiency encountered.

10. Emissions to Land

There will be no planned discharge to land or groundwater.

10.1. Existing Geology and Geomorphology

10.1.1. Topography / Landform

The Project area is located within the Gippsland Plain Bioregion, which is characterised by flat to gently undulating terrain (MPS, 2015). The Project area is flat with an elevation of less than 20 metres above sea level (VRO, 2021). Recent geotechnical survey has shown the site to have a rise of approximately 1.5 metres from the centre of the Project area to the sides [23].

10.1.2. Geology / Soil

Sites of geological and geomorphological significance either represent a specific characteristic of the region or include an outstanding, rare or unique geological or geomorphological feature. The Department of Jobs, Precincts and Regions (DJPR) have identified 72 sites of international, national, state, regional or local significance around Western Port Bay [24]. None of these sites are located at or in close proximity to the Project area. The closest being the Yaringa Mangrove sedimentation (approximately 2.5 kilometres to the north) and Tyabb Baxter Formation (approximately 5 kilometres to the north).

The Geological Survey of Victoria's 1:63 360 Scale Western Port Sheet indicates the site is underlain by the Tertiary Age Baxter Group, comprising ferruginous sandstone, sand and sandy clay with occasional gravels [25].

An analysis of soil samples taken at the Project site found the ground conditions to comprise between 0.15 metres and 2.7 metres depth of fill, overlaying natural silty clay and sandy clays. The fill consisted of imported silty sandy gravels (crushed rock) and reworked local natural soils comprising gravelly silts, sands, silty clays and sandy clays [26].

VRO have mapped the soil pH in the Project area as between 6.1 and 7.4, slightly acidic to neutral. There is the possibility of coastal acid sulphate soils (CASS) along the coastline (located 700 metres east of the Project area). However, soil analysis of the site has identified pH of soils to be between 5.6 and 11.6 with an average pH of 9.0 indicating generally alkaline soil conditions. The presence of CASS was not encountered on site.

10.2. Soil Assessment

Geotechnical consultants were commissioned to test the in-situ soils prior to excavation. In addition, the site has been tested in the past as part of Esso's leasing arrangements. Since 2008 a total of 61 bores have been sampled for soil contaminants, within the Project area. Further end of lease testing is planned prior to the Project commencing any excavation works.

10.2.1. Contamination Assessment Criteria

Soils were tested for analytes comprising the EPA IWRG 702 Soil Analysis suite by a NATA accredited laboratory. The results have been reviewed against the criteria listed in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM) and EPA Publication 1828 *Waste disposal categories – characteristics and thresholds.*

Soil assessment criteria (SAC) were derived from Health Investigation Level (HIL) and Environmental Investigation Level (EIL) from Schedule B1 of the NEPM.

Health Soil Assessment Criteria

The HILs are scientifically based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic land use

scenarios. Given the past and expected future industrial land use at the site, HIL-D criteria, applicable for commercial/industrial premises, have been adopted.

Consideration of HSLs has also been given to evaluating vapour intrusion risks for any hydrocarbon contaminated soil, using criteria taken directly from Table 1A(5) of the NEPM Schedule B1. HSL-D (commercial/industrial) criteria for sandy soils (coarse textured soil) 0 m to <1 m deep have been adopted.

Environmental Soil Assessment Criteria

The use of EILs for selected metals are applicable for assessing risk to terrestrial ecosystems. ESLs are used to assess the risk to terrestrial ecosystems from selected organic compounds. EILs and ESLs apply to the top 2 m of the soil profile, which essentially corresponds to the root zone and habitation zone of most species.

Generic EILs and ESLs for different land use settings are available for various contaminants in the NEPM. EILs and ESLs applicable to an industrial land use have been adopted directly from Tables 1B(5) and Table 1B(6) of the NEPM Schedule B1.

Management Limits

The NEPM provides management limits for petroleum hydrocarbons, which are designed to address the risk of the formation of light non-aqueous phase liquids, fire and explosive hazards, and effects on buried infrastructure. When management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed. Management limits were taken directly from Table 1B (7) of NEPM.

EPA Waste Classification

To determine the waste classification of surplus soil, the soil samples were compared against the total concentration limits as listed in Table 2 of the Waste Disposal Categories – Characteristics and Thresholds (Publication 1823).

10.2.2. Soil Analysis

Comparison with Human Health Soil Assessment Criteria

One sample exceeded the Human Health Industrial criteria for $TPH_{C10-C16}$. However, this isolated exceedance is less than 2.5 times the adopted criterion.

Comparison with Environmental Soil Assessment Criteria

A total of 36 boreholes recorded exceedances of the adopted EIL criteria for one or more of the following:

- total chromium
- copper
- manganese
- zinc
- $TPH_{C10-C16}$.

While some of the individual samples did exceed the SAC by more than 2.5 times (copper and $TPH_{C10-C16}$), all of the arithmetic mean values were below the EIL criteria.

Comparison with Management Levels

A total of five samples collected exceeded the Management Level criteria for $TPH_{C10-C16}$ and $TPH_{C16-C34}$. None of the individual results exceed the criteria level by more than 2.5 times and the arithmetic mean was less than the criteria level.

Waste Classification

The samples were compared against the waste classification limits and a small number were found to exceed the clean fill criteria for:

- Copper

- Molybdenum
- Mercury
- Nickel
- Tin, and
- Zinc.

All soil samples meet the Waste Category D classification.

10.2.3. Summary of Findings

Table 21 summarises the soil contaminants that exceeded any of the assessment criteria (human health SAC, environment SAC, management level or waste classification).

Table 21: HGP Site Soil Analysis

Contaminant	National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B1			EPA Waste Classification (Publication 1823)	
	>EIL (industrial)	>HIL D	> Management Level	> Clean Fill Category	> Category D Waste
Chromium (total)	✓				
Copper	✓			✓	
Manganese	✓				
Mercury (inorganic)				✓	
Molybdenum				✓	
Nickel				✓	
Tin				✓	
Zinc	✓			✓	
TPH C6-C10			✓		
TPH C10-C16	✓	✓	✓		
TPH C16-C34			✓		

Groundwater

Groundwater analysis was not undertaken as part of the geotechnical work conducted in 2021. Previous studies, undertaken by Douglas and Partners (2014), sampled four bores, two upgradient wells and two wells within the activity area. All four bores sampled showed the groundwater recorded exceedances of the groundwater assessment criteria for cobalt, copper, nickel and zinc, aluminium, iron and manganese. Concentrations of organic analytes including hydrocarbons and phenols were all below the laboratory detection limits for all wells for both investigations.

Although some degree of variation in metal concentrations is noted between the 2008 and 2013 investigations, in general the metal concentrations are not markedly higher within down gradient wells relative to the up-gradient wells. It was therefore considered that the site was not contributing to the elevated levels of metals detected in site groundwater and that the recorded metal concentrations most likely represent regional background levels (Douglas and Partner, 2014).

No odours, sheens or free phase hydrocarbon contaminants were identified within the groundwater and the site groundwaters were not considered to require any remediation or ongoing management.

10.2.4. Conclusion

Douglas and Partners (2014) concluded that soil contamination at the site:

- Was not considered to pose an unacceptable risk to future risk users under a heavy industrial site usage;
- Was not migrating from or onto the site;
- Had not resulted in a free phase contamination within groundwater that needed to be managed or remediated; or
- Did not require remediation or further assessment works to render the site suitable for a heavy industrial use.

AMAL Analytical (2021) concluded from the sampling undertaken in 2021, that contamination was below levels of concern and soil movements could follow typical site earthworks management.

10.3. Soil Management

Soil will be excavated from the Project site during the civil works, as part of the construction activities. Some of the excavated soil will be reused as backfill or for the roadway construction. All of this soil movement will remain in the same general area. These areas will be covered with hardstand or road base, thus minimising the potential for offsite migration of contaminants.

Any surplus soil[9] not used in the civil works will be stockpiled and analysed to determine the waste category. If the soil is classified as clean-fill it will be reused on site. Otherwise, it will be disposed of offsite at a lawful place, certified to accept that category of waste soil.

Under the Hastings Generation Project Environment Management Plan (Attachment A) the following management strategies are proposed to manage risks associated with soil movements.

1. Construction Contractor to prepare and implement an Erosion and Sediment Control Plan
2. Erosion and sediment control measures to be installed prior to commencing disturbance works
3. Works to be planned to minimise the extent and duration an area remains exposed or unstabilised.
4. Manage vehicle movements to designated roads and access areas.
5. Surplus soils are to be collected for temporary storage on site and tested prior to disposal in accordance with waste category or reuse
6. Utilise dust suppression measures, such as water sprays or coverings, as needed
7. Construction personnel to wear PPE, as instructed when handling contaminated soil
8. Construction Contractor to identify the planned movement and traffic routes of vehicles on site and develop a traffic management plan
9. Use dust suppressants on roads, as needed

[9] Soil becomes surplus if it can not be used by the project during the construction activities, in the area it was removed from. If used elsewhere on site, it will be classified as surplus soil and therefore a waste material.

11. Biodiversity

The majority of construction and operation activities are to be conducted in previously cleared areas on the site.

11.1. Flora

No threatened flora species have been identified at the site through the Victorian Biodiversity Atlas. A study conducted for LIP (Nature Advisory, 2019) identified ten species listed under the EPBC Act or FFG Act that were considered likely to occur in the area. Field studies identified no threatened species. None of the threatened species identified in the LIP study have the potential to occur in the area (refer to Attachment H).

11.2. Fauna

Nature Advisory (2019) identified ten listed fauna species that are likely to occur or have the potential to occur at LIP. Of these species, two would be unlikely to be found in the Project area, based on their dependence of mangrove habitats, which are not present. The eight species likely to be found in the Project area are detailed in Attachment H and summarised below.

Potential impacts to fauna species from lighting impacts are addressed in Section 12.3.

11.2.1. Non-Migratory Birds

There are two listed non-migratory bird species that are considered to have the potential to occur in the Project area. They are unlikely to be significantly impacted by the Project's activities, as shown below.

- Little Egret – This species is likely to forage in the intertidal mudflats of Western Port Bay and has potential to roost in mangroves. No mangrove habitat exists on the site and surrounding mangrove habitat will be unaffected by the Project's activities.
- White-bellied Sea-eagle – This species forages over Western Port Bay where it hunts for fish. It has the potential to fly over the study area. Any trimming of vegetation in the Project area is unlikely to pose significant impact upon the species.

11.2.2. Migratory Birds

Three listed migratory bird species have the potential to occur in the study area.

- Rufous Fantail and Satin Flycatcher – These species are summer visitors to south-east Australia. They live in wet and dry forest/woodland and coastal scrub/woodland. There is suitable habitat for these species in the study area. Large amounts of suitable habitat exist within the surrounding regions that support these species. While there is no planned largescale removal of vegetation, the removal of small amounts of vegetation as a result of the transmission line upgrade, piping installation or earthworks will not have a significant impact upon these species.
- White-throated Needletail – this species spends the majority of its life on the wing, only coming down to land when nesting in Asia. It migrates to south-eastern Australia in the Summer. This species is unlikely to be in the area during the construction phase of this Project.

11.2.3. Mammals

One listed mammal species is considered to have the potential to occur in the Project area. The Southern Brown Bandicoot was last recorded in the area in 1970. This species is known to occur in coastal scrub habitats and around Western Port Bay further north near Warneet and Tooradin. It is considered unlikely that this species is still present in the Project area.

11.2.4. Reptiles

One listed reptile species is considered to have the potential to occur in the Project area. The Swamp Skink occurs in saltmarsh habitat south of Hastings and from swamp scrub habitat along King Creek near

Hastings. A record from 2010, located this species in saltmarsh at Long Island Point. This species is likely to occur in the area. Saltmarsh is found on intertidal mudflats. Inland components consist almost entirely of low, succulent herbs, grasses and sedges often interspersed with salt-water, brackish or freshwater. A search of DELWP's Nature Kit tool has not identified any saltmarsh occurring in the project area.

11.2.5. Frogs and Invertebrates

No listed frog or invertebrate species are considered to have the potential to occur in the study area.

11.3. Native Vegetation

There are stands of vegetation along the fence lines and north of the Project area. From a visual inspection the vegetation on site is a mix of introduced species and native vegetation.

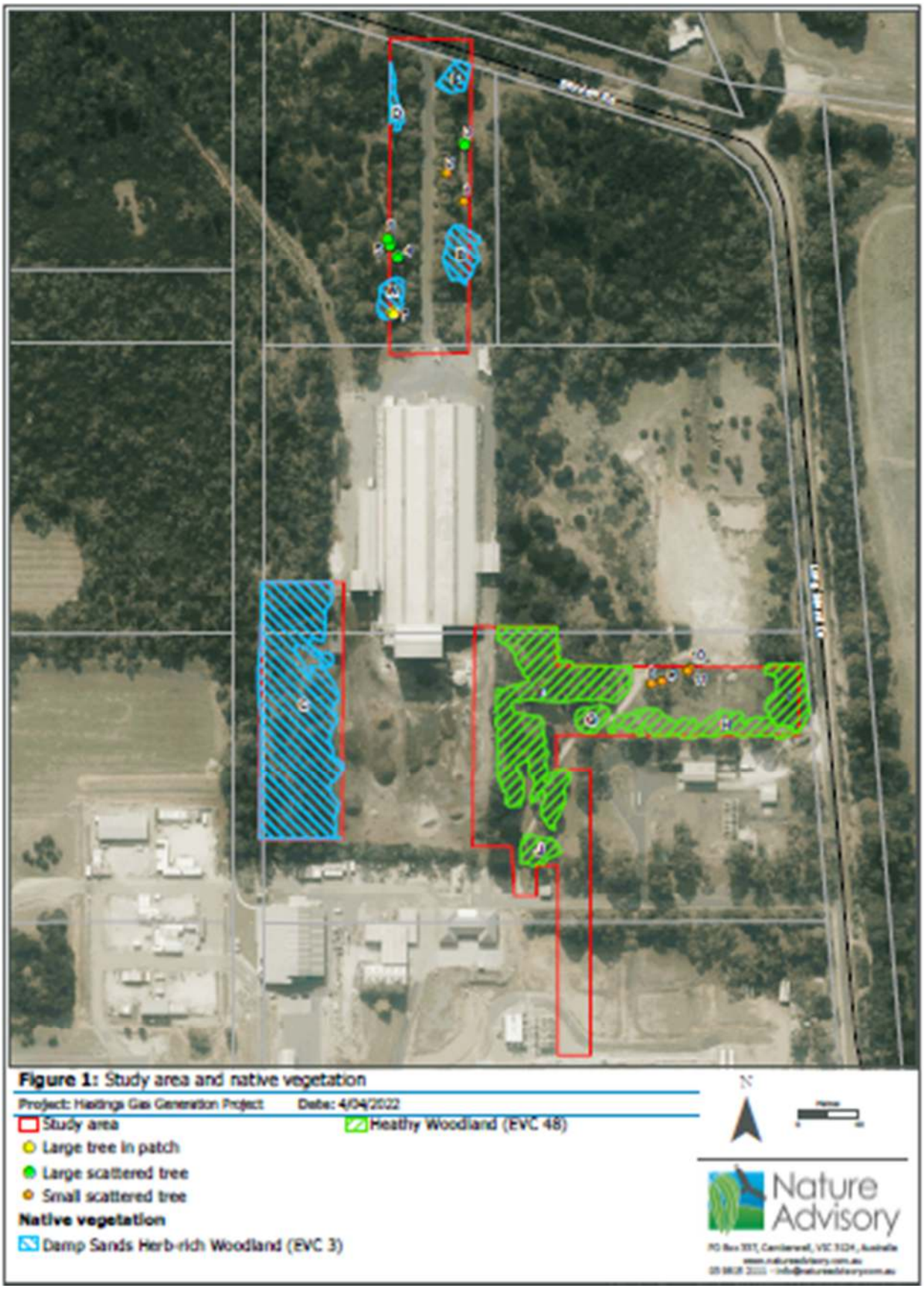
Nature Advisory have been commissioned by Esso to undertake a native vegetation assessment in support of the Planning Permit Application (Attachment K).

Vegetation within the study area consisted of an array of native and planted components, as well as a significant proportion of high-threat weeds. Native canopy in the north and south-east was primarily composed of Rough-barked Manna Gum and Swamp Gum. In the south-west, Silver-leaved Stringybark and Narrow-leaf Peppermint also contributed to native canopy cover. The native understory commonly consisted of Coast Wattle and Coast Tea-tree, with a groundcover of Weeping Grass and Wallaby Grass. Native herbs such as Kidney Weed, Common Raspwort, Variable Willow herb and Grassland Wood-sorrel were occasionally interspersed. Planted vegetation, including Southern Mahogany, Swamp Paperbark, Hakea and White Sallow-wattle, bordered the access road at 11 Bayview Road. Early Black-wattle was also widely planted in the south-eastern study area, at 4 Long Island Drive. Introduced species were commonplace throughout, and included woody weeds such as Monterey Pine, Flaxleaf Broom, Blackberry, Boneseed and Gorse. Introduced groundcover was primarily composed of Sweet Vernal, Cocksfoot and Panic Veldtgrass, with herbaceous weeds such as Spear Thistle, Common Centaury and Flatweed interspersed.

During the field assessment 68 plant species were recorded. Of these, 32 (47%) were indigenous and 36 (53%) were introduced or non-indigenous native in origin [1].

Evidence on site, including floristic composition and soil characteristics, suggested that Damp Sands Herb-rich Woodland (EVC 3) and Heathy Woodland (EVC 48), were present within the study area. Ten patches, comprising EVC 3 and EVC 48 Woodlands were identified, along with one large tree. This totalled an area of 1.71 hectares of native vegetation fall within the area examined (Figure 32).

Figure 32: Native Vegetation as identified by Nature Advisory 2021



The native vegetation study examined the extent of clearing that would be required to install power plant infrastructure, including new ethane piping on LIP and associated understory clearing for bushfire management.

The current development footprint will result in the loss of a total of 0.857 hectares of native vegetation in patches and no scattered trees. Refer to the Hastings Gas Generation Project – Native Vegetation Assessment [1], for further information (Attachment K).

12. Social and Amenity Impacts

12.1. Community

The Project is located within an industrial hub of Hastings that has a mix of large industry, commercial properties and agriculture. There are a small number of residential properties to the south west, with the nearest being approximately 700m away. These are summarised in Table 22 and shown in Figure 33. A full list of the residences within one kilometre of the Project are found in Section 3.

Table 22: Summary of Neighbouring Community Locations

ID	Easting	Northing	Description
1	343758	5759223	11 Cemetery Road
2	343696.6	5759299	34 Cemetery Road
3	343621.5	5759054	7 Beach Road
4	343511.9	5759110	Crib Point Engineering
5	344358	5760209	Scout Hall and LIP Emergency Centre
6	344470.2	5760240	Hydrogen Pilot Plant
7	344982.1	5760323	Jetty Infrastructure
8	343613.8	5760465	BlueScope Steel
9	343953.7	5760583	BlueScope Steel
10	342620	5759600	Olivers Creek
11	344860	5759600	Western Port

The Project site area is bounded by Bayview Road to the north and Long Island Drive to the east.

Figure 33: Sensitive Receptors in Proximity to the Project

12.2. Amenity Impacts

Under the Siting and Design Guidelines for Structures on the Victoria Coast [27] there are a number of fundamental elements that should be considered for any new proposal when considering impacts to amenity, being:

- Views
- Public open spaces
- Local character and sense of place
- Public access
- Increased function and adaptability

12.2.1. View

The Project's impact upon the surrounding landscape, must consider the existing visual environment.

State Wide Significance

Under Part 3AAB of the *Planning and Environment Act 1987*, Victoria has declared four areas as a "Distinctive Area and Landscape", being: Macedon Ranges, Bass Coast, Bellarine Peninsula and the Surf Coast.

While the coastline near the Project site does not fall into the category of a distinctive area, under *The Landscape Setting Types for the Victorian Coast 2008,* the entire coast of Victoria is recognised as being visually significant.

Regional Significance

The regional significance of the landscapes of the Mornington Peninsula are related to the regional use of the area for recreation and tourism activities. While the regional significance of the Mornington Peninsula is recognised, landscape settings must be evaluated from within the viewsheds that they are seen from. In the context of the Project, this is at the local level.

Local Significance

Under the Mornington Peninsula Planning Scheme, the Project area does not fall within a Significant Landscape Overlay (SLO). The area around the Project site is utilised predominantly for industrial and port activities.

The topography of the area is flat. Vegetation surrounding the site is up to 15 metres tall, shielding the Project site from public view, as shown in:

- Figure 34 shows the view from Long Island Drive looking west-ward towards the Project site;
- Figure 35 is looking south from Bayview Road onto the Project site; and
- Figure 36 shows the view north-east from the corner of Cemetery Road and Outlook Avenue. The closest residence to the site is located just south of this location.

Substantial buffers in excess of 400 metres are present to the north, northwest, west and east of the site.

The presence of vegetation and the LIP facility would also ensure that the Project would not be visible from the water in Western Port Bay.

Figure 34: View towards the Project Site from Long Island Drive

Figure 35: View towards the Project from Bayview Road

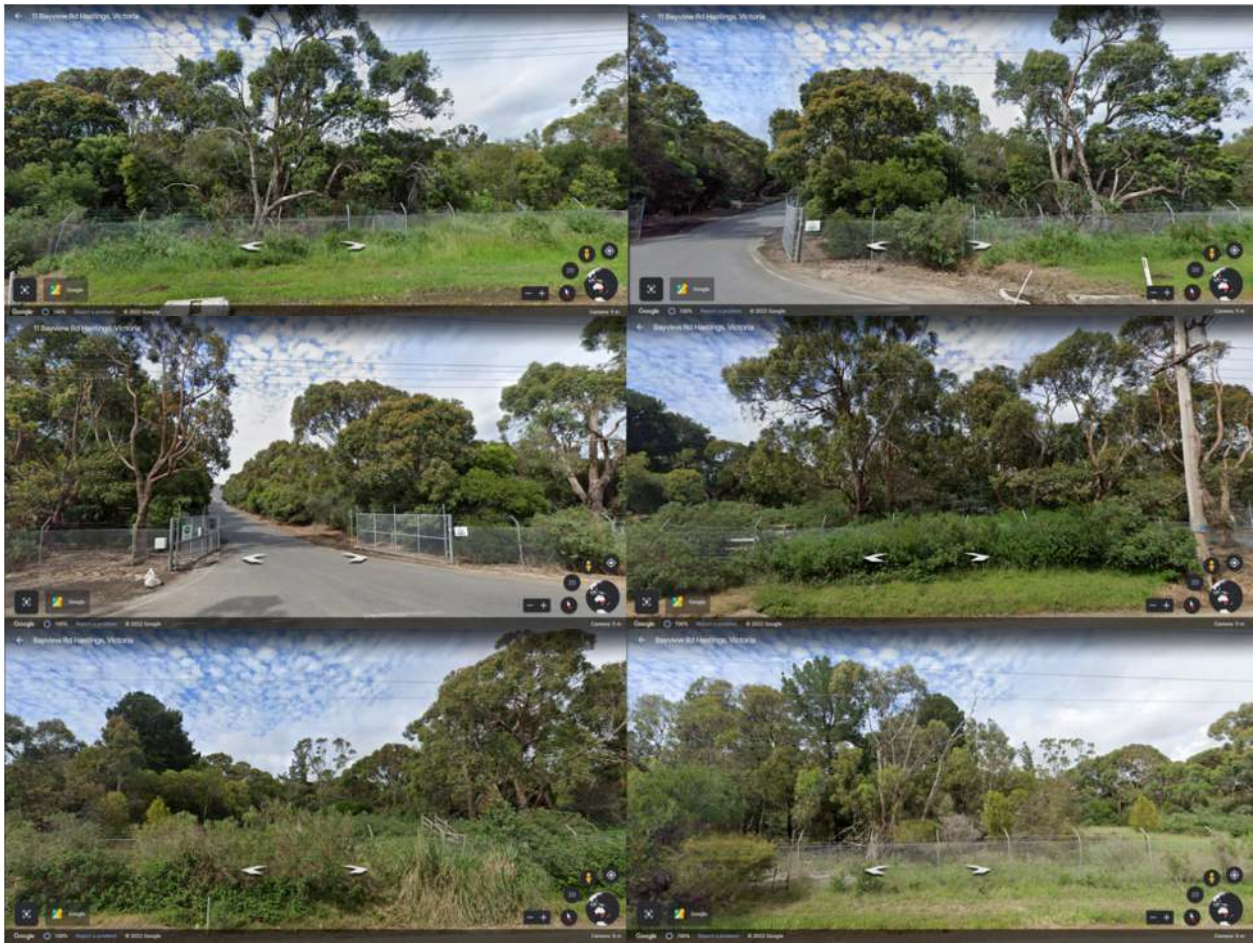
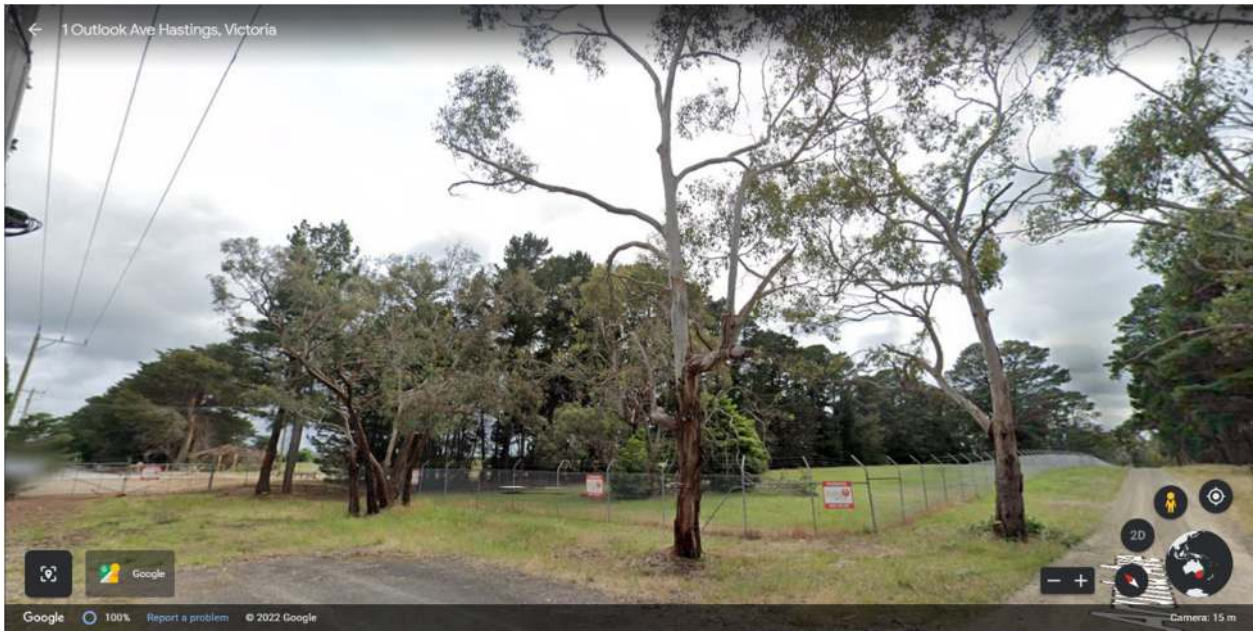


Figure 36: View from Cemetery Road



The Project area does not adjoin public land used for conservation or recreation uses.

It is located 700 metres to the west of Western Port Bay. The bay is a wetland of international importance listed as a Ramsar Site. It is also listed as an important site for shorebirds on the East Asia-Australasian Flyaway Site Networks.

The Mornington Peninsula and Western Port Bay is designated a Biosphere Reserve.

Western Port is enjoyed for recreational uses, such as fishing and boating

Vegetation modification will be minimal as outlined in Section 11.3.

A small number of residences lie 700 metres to the south west of the Project area. Industrial facilities are located to the immediate north and south of the Project area. Grazing land lies to the east of the area.

LIP is located between the Project area and the closest residences. LIP is a 24-hour operation.

All Project activities are contained within the site area defined in Section 1.

Outside of the Project boundary, upgrades will be made to existing transmission lines. Temporary access to transmission lines on Bayview Road, Long Island Drive and grazing land (owned by Esso) to the east of the project area will required. This work will be undertaken by United Energy, and is outside of the scope of this Planning Permit application.

There is not expected to be any adverse impacts upon land uses or long-term visual impacts.

12.2.2. Public Open Spaces

This fundamental element asks if a Proposal contributes to an uncluttered, clear and usable environment.

As mentioned above the Project will be shielded from the public's view.

The site has until recently been used for commercial activities and as a result, signage was posted on the entrance gate as necessary for identification, safety and security. This existing signage will be replaced with site specific signage. There is no plan for additional signage or advertisement, beyond what is required for safety and security. All signage will conform to Clause 52.05-11 of the Victorian Planning Provisions.

12.2.3. Local Character

As described in Section 12.2.1, the Project site is shielded from the public.

The site currently has two large sheds (86 m wide x 148 m long x 17 m high; and 31 m wide x 21 m long x 26 m high), clad in white metal sheeting (refer to Figure 37). When viewing the site from public roads / site boundaries, as shown in Figure 34 to Figure 36, the existing buildings and infrastructure is not visible, with the exception of the main entrance driveway.

Figure 37: Existing Buildings at Project Site

The Project buildings and infrastructure will be located on the southern end of the existing buildings, closest to LIP.

The proposal is to install the following buildings as part of the power plant. All the buildings shall be white in colour to match the existing buildings and constructed of fire rated metal skinned, cellular foam cored insulated panels, XFLAM or equivalent:

- Office / Control Room – refer to Attachment B. This building complex comprises three structures joined with a shared veranda to house the power plant's office, control rooms, kitchen and ablution facilities. The total dimensions for the buildings is 8.4 m wide x 17.0 m long x 3.400 m high.
- Esso Electrical Equipment Module – refer to Attachment B. The total dimensions for the buildings is 12.8 m wide x 24.4 m long x 3.4 m high.
- United Energy Electrical Equipment Module – refer to Attachment B. The total dimensions for the buildings is 4.0 m wide x 8.0 m long x 2.7 m high.

The gas turbines will have limited bulk, enclosed within a structure measuring 2.5 m wide x 16.0 m long x 10 m high. The attached exhaust stack will measure under 15 metres.

Attachment B – Site Layout Drawing shows the profile of the proposed project structures against the existing buildings, highlighting that they are significantly smaller, in both height and bulk.

As has been shown in Section 11.3, vegetation clearing will be minimal, predominantly to accommodate bush fire mitigation measures. Therefore, it is anticipated that the Project will have little to no impact upon the local character.

12.2.4. Public Access

The Project's activities will be fully contained on site. The Project site does not provide a public access route to coastal amenities. The Project will not hinder public access to the coast.

12.2.5. Increased Function and Adaptability

Within the Project site are two existing buildings. It is proposed to use these buildings for office and amenities during the construction phase, and for ongoing storage during the operations phase.

12.3. Lighting

12.3.1. Existing Lighting Conditions

Mapping of upward radiance of artificial light at night by satellite has been collated onto an interactive Light Pollution Map[10]. A review of this data shows night time light pollution levels to be consistent with suburban or bright suburban lighting.

Table 23 details the radiance levels for the Project site and a number of locations around it. These measurement locations are illustrated in Figure 38. The latest complete data set available is 2015, however, limited data is available for 2021. Between 2015 and 2021 there has been a slight reduction in night lighting, this may be due to operations changing as a result of Covid-19, or it could a difference in the climatic conditions, such as cloud cover, when the measurements were taken (refer to Figure 39).

[10] https://www.lightpollutionmap.info/

Figure 38: Radiance Measurement Locations in the Vicinity of the Project Site, 2015 (Source: Light Pollution Map)

Table 23: Night Time Radiance Values (Source: Light Pollution Map)

Location	Description	Bortle Class[1,2]
1	Project site	6
2	BlueScope Steel	5
3	Hasting port facilities / Hydrogen Pilot Plant	5
4	LIP facility	6
5	Cemetery Road	6
6	Beach Road	6
7	LIP jetty	5
8	Wetland at 5 Long Island Drive	6
9	Western Port Bay shoreline, south of Project site	5
10	Western Port Bay shoreline, east of Project site	5

Source: [1] World Atlas 2015 (latest data set available).

[2] The Bortle scale uses astronomical observations to measure the amount of light pollution for a given location, a description of each class is given below. As a comparison Melbourne CBD has a Bortle class of 8-9.

Bortle Class	Description
1	Excellent dark sky

Bortle Class	Description
2	Average dark sky
3	Rural sky
4	Rural / suburban transition
5	Suburban
6	Bright suburban
7	Suburban / urban transition
8	City sky
9	Inner city sky

Figure 39: Radiance Variation 2012-2021 for the Project Site (Source: Light Pollution Map)

12.3.2. Existing Light Sources

As has been described previously in this report, the Project site is located in an area of industrial and port activities. Many of which are 24-hour operations that require night-time lighting for security and safe operating conditions for site personnel. In addition, many of these facilities have been located on Long Island Point for many years, for example Esso's LIP facilities have been operational since 1970.

12.3.3. Sensitive Receptors

Sensitive receptors to night lighting from the project included neighbouring residents (refer to Section 12.1) and wildlife, in particular seabirds and migratory shorebirds (refer to Section 11).

12.3.4. Site Lighting

The site will operate 24 hours a day.

Lighting will be installed onsite to enable people to work without risk to their health and safety; move safely within the workplace and be able to safely evacuate, if an emergency occurs (refer to Attachment B).

Site lighting will meet the following standards and codes:

- National Construction Code
- Building Code of Australia – Interior artificial light and power control
- AS 3012 – Electrical Installations on Construction and Demolition Sites
- AS/NZ1680 Interior and Workplace Lighting
- AS 2293.1 – Emergency escape lighting and exit signs for building
- AS 1657:2018 – Fixed Platforms, Walkways, Stairways and Ladders – design, construction and installation – Victoria

Lighting for the site will be designed in accordance with the National Light Pollution Guidelines [28], best practice lighting designs. Specifically:

- **Add only light for specific purposes** - Lighting has been added to site for security and site safety.
- **Use adaptive light controls to manage light timing, intensity and colour** - Internal building lighting will utilise adaptive controls to manage night time lighting.
- **Light only the object or area intended** – the project will adopt shielded lighting on external fixtures as far as practicable. Where that is not possible for security or safety reasons, partial shielded will be used. Lighting will be installed at the following heights:
  - Flood lighting for security – 12 metres,
  - Road lighting – 6 metres, and
  - Task lighting on turbine walkways, building exteriors, structures, etc – 2.4 metres
- **Use the lowest intensity lighting appropriate for the task** – Lighting intensity will comply with the above-mentioned codes and standards.
- **Use non-reflective, dark coloured surfaces** – the Project has adopted to clad all site buildings in white metal. Lighter coloured buildings are shown to reflect heat, keeping it cooler and therefore be more energy efficient [29]. All existing buildings on site are a similar colour.
- **Use lights with reduced or filtered blue, violet and ultra-violet wavelengths** – to minimise the Project's night lighting impacts on shorebirds and migratory seabirds, the project will adopt the use of red-green-blue LED lights as far as practicable.

12.3.5. Management of Site Lighting Impacts

Artificial light has been demonstrated to negatively affect behaviour, survivorship and reproduction of many wildlife species [28].

The two non-migratory bird species likely to occur on or near the Project site are the little egret and white-bellied sea eagle. A study undertaken by Nature Advisory for LIP also identified Lewin's rail as being likely to occur in the mangrove habitat adjoining LIP. All are diurnal species, meaning they are active during the day, and as such are less likely to be affected by site lighting for foraging activities.

The three migratory bird species that may be present are: the rufous fantail; satin flycatcher and the white-throated needletail. Are all diurnal in nature and not known to breed in the region.

Artificial lighting can result in both positive and negative impacts upon migratory shorebirds. For example a positive influence lighting can have is an increase in nocturnal foraging behaviour as a result of increased lighting ([28]. Flashing lights can force shorebirds to leave an area. Artificial lights can disrupt roosting and can affect birds in flight causing them to alter or halt their migration [28].

As stated in Section 12.3.2, artificial night lighting has been present in the Project vicinity and surrounding shoreline of Western Port Bay for approximately 50 years. Non-migratory birds and other fauna present will have adapted to the conditions over this time period.

The impacts to migratory birds to the region would be difficult to assess as a baseline prior to industrial and port facilities commencing is not available.

The Project's contribution to night light is expected to be minimal, based on:

- The Project site has a small footprint occupying approximately 1.3 hectares.
- Existing vegetation that surrounds the Project site grows to a height of approximately 15 metres.
- The highest light source will be 12 metres in height and shielded or partially shielded.

- Vegetation removal will be kept to a minimum, and will not reduce the current shielding effects provided by the existing vegetation.

To further manage and minimise the site's artificial lighting impacts, the Project will

- Design site lighting to comply with the National Light Pollution Guidelines [28], best practice lighting designs, as outlined in Section 12.3.4
- Construction activities to be limited to daylight hours, where possible
- Night time work must have prior approval from Construction Site PIC
- If conducting night works – only essential lighting is permitted and installed at a height and orientation that ensures only the worksite is illuminated, as far as practicable
- Lighting to be switched off when not in use or if not required for site security purposes

12.4. Noise

Noise emissions are addressed in Section 8.

12.5. Odour

The Project, will be using an ethane rich fuel for the gas-fired turbines. Ethane is a by-product of natural gas and crude oil production. The ethane is treated at LIP to remove any impurities, including hydrogen sulphide. The "sweet" gas supplied to the power plant has very low concentrations of sulphur dioxide (0.0001%). As a result, odour omissions should be negligible.

Air modelling of the Project's expected emissions showed that sulfur dioxide concentrations from the plant, if sour gas is burnt, are negligible and well below the criteria (260 µg/m^3). The maximum ground level concentration, which was found onsite was less than 1 µg/m^3 (AECOM, 2021).

Odours may also result from the volatile organic compounds (VOC) found in hydrocarbons. Again, air modelling results showed that total VOC concentrations from the project were negligible and well below the criteria (benzene – 580 µg/m^3, formaldehyde 1-hour 87 µg/m^3). The Project's predicted maximum ground level concentrations of VOC are expected to be 33.1 µg/m^3.

As a result, it is not anticipated that odours will be present beyond the facilities boundary or pose a nuisance to the workforce.

12.6. Cultural Heritage

The Project area is located in the traditional lands of the Bunurong language group. Language groups were comprised of collections of neighbouring clans who shared a common dialect as well as mutual economic and political interests. They were also communally connected to specific areas of land through their spirituality, including as association with topographic features linked to deities and other mythical beings [30].

The registered aboriginal party for the Project site is the Bunurong Land Council Aboriginal Corporation.

Both the Project site and the connected ethane piping lie outside of the area declared as Cultural Heritage Sensitivity, as shown in Figure 40.

To ensure the Project wasn't impinging on cultural sensitivity and to determine the likelihood for the presence of aboriginal cultural heritage at the site or along the piping route, the Project undertook a cultural heritage due diligence desktop review as part of the Planning Permit Application (refer to Attachment D).

The Cultural Heritage Assessment found that the project area:

- did not lie inside any areas identified as having cultural heritage sensitivity (refer to Figure 40, extracted from ACHRIS).
- has undergone significant ground disturbance
- there are no aboriginal cultural heritage places within 200 metres.

- the distribution of aboriginal cultural heritage places, in the geographic region, are associated with watercourses (predominantly Olivers, Warrangine and Kings Creek)
- previous archaeological assessments in the geographical region have indicated that aboriginal cultural heritage places are likely to be located on high ground (sandy dunes adjacent to swamps and watercourses
- given the level of ground disturbance that has occurred previously, the potential for discovering aboriginal cultural heritage is low.

The piping feeding the HGP site is also outside the area of cultural heritage sensitivity. As the length of buried pipeline is approximately 240m, the construction of this pipe is also not considered to be a high impact activity under applicable clause in Regulation 46 (1) (b) (xxvii) (B) i.e is NOT *a linear project that is the construction of a pipeline with a length exceeding 500 metres.*

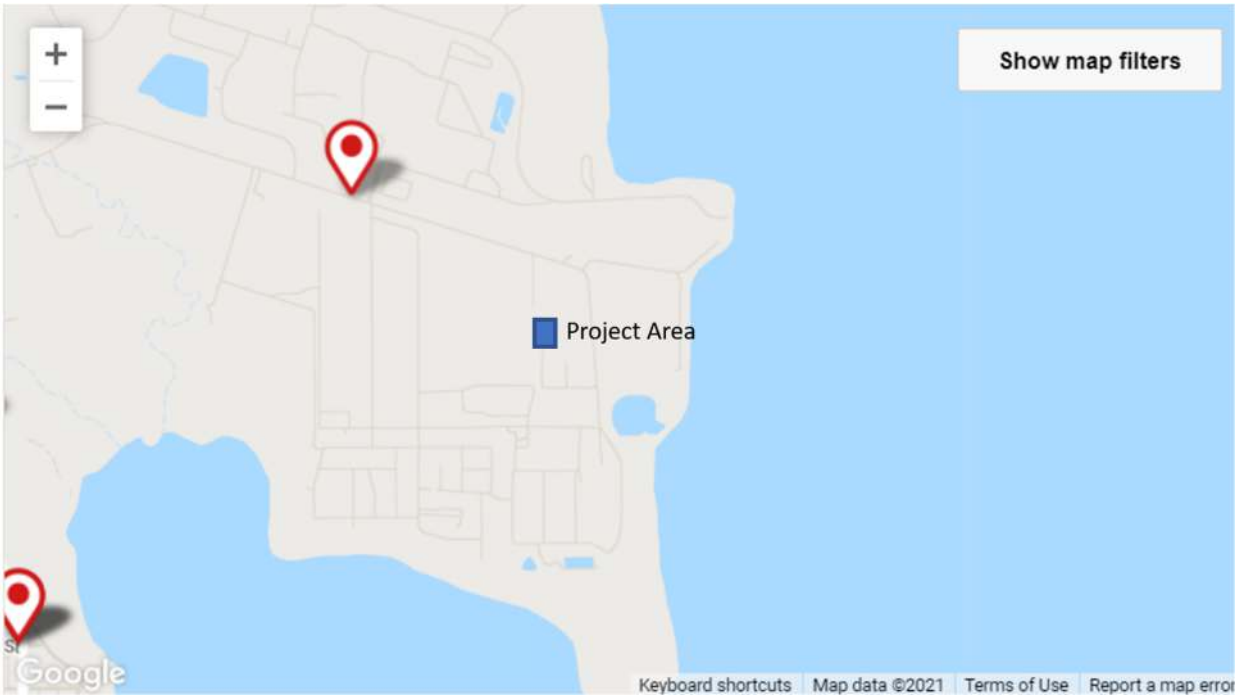
Figure 40: Aboriginal Cultural Heritage Sensitivity in the Project Area

The area shaded in green, in the above figure, illustrates the area of Cultural Heritage Sensitivity.

12.7. Heritage

A review of the Heritage Register has identified no places listed within the Project Area [31]. The closest registered place is Denham Road Farmhouse (H7921-0119), located at 28 Bayview Road (refer to Figure 41). The Projects activities will have no impact upon this site.

Figure 41: Victorian Heritage Register Listings Near Ethane Disposition Project



13. Traffic Impacts

13.1. Road Network

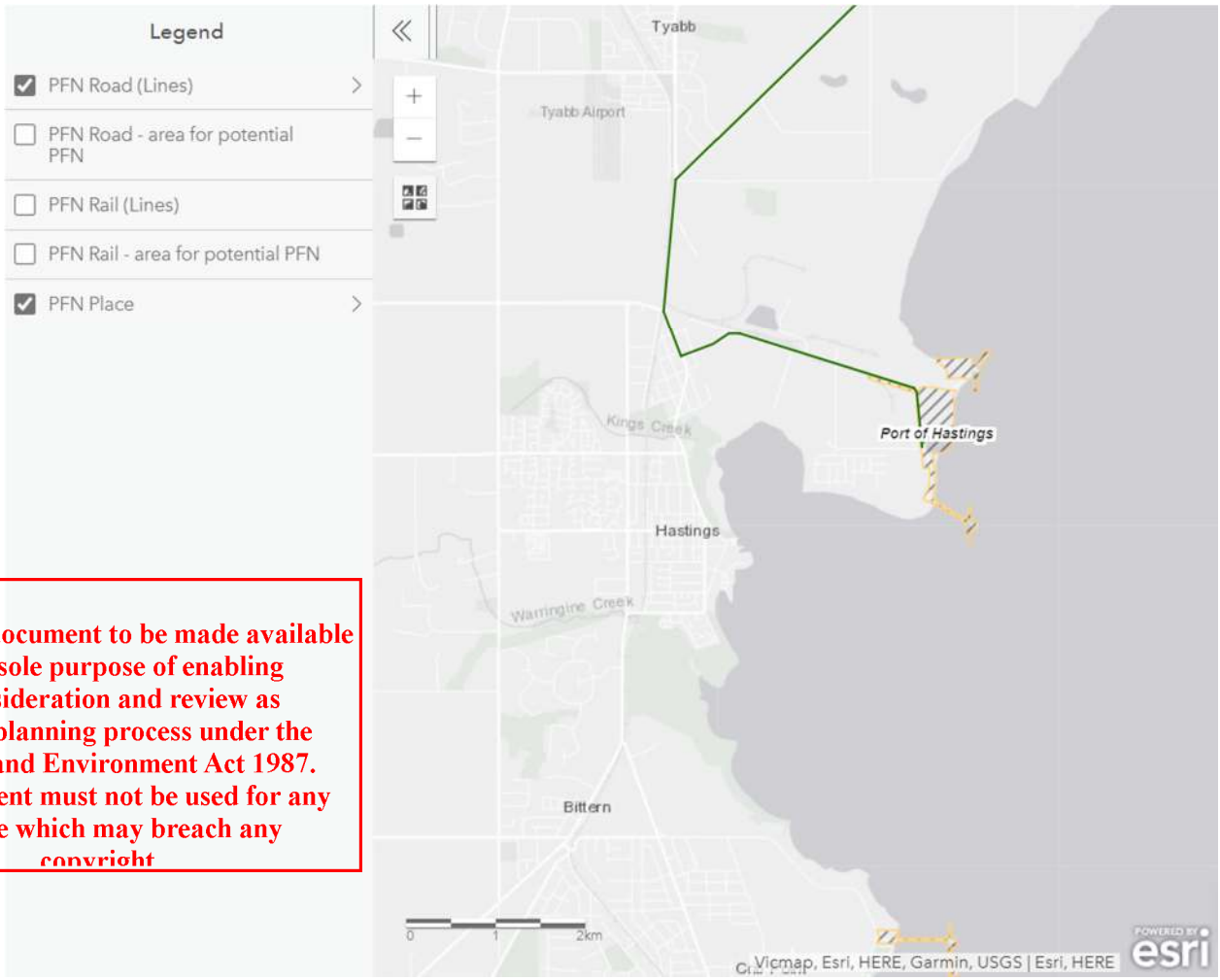
13.1.1. Bayview Road

Bayview Road is a local road, generally aligned in a west-east direction, from Marine Parade in the west to Long Island Drive in the east.

Bayview Road is a sealed road, accommodating two-way traffic flows for industrial, commercial and port facilities. It is listed in the Principal Freight Network[11] (refer to Figure 42) and is designated for oversized and over mass (OSOM) load carrying vehicles[12] as assessed by the Department of Transport's road network.

A posted speed limit of 80 km/h applies along the road near to the site.

Figure 42: Principal Freight Network



[11] Principal Freight Network | Department of Transport
[12] HVR Oversize & Overmass (OSOM) | HVR Oversize & Overmass (OSOM) | Department of Transport (arcgis.com)

13.1.2. Long Island Drive

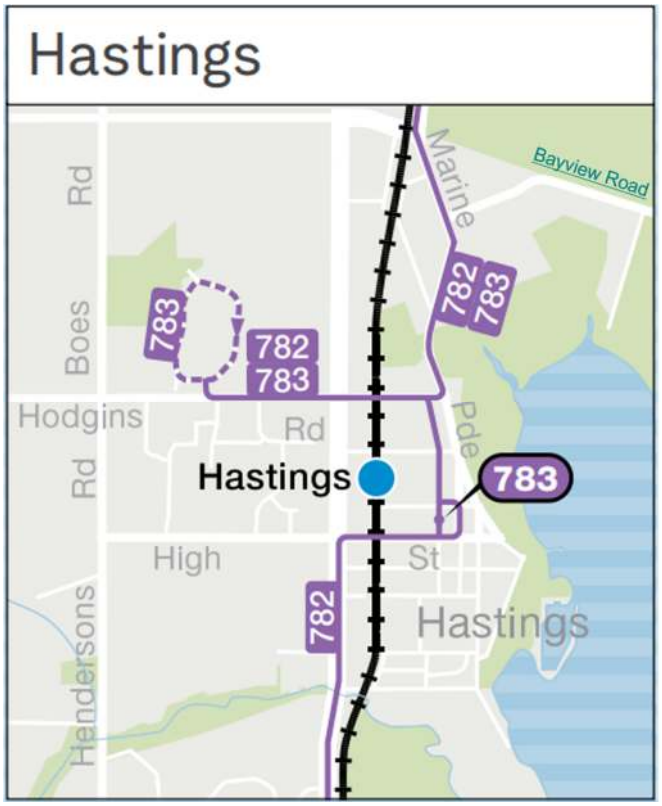
Long Island Drive is a local road, which runs north-south from Bayview Road, terminating at the LIP facility.

Long Island Drive is a sealed road, accommodating two-way traffic flows for industrial, commercial and port facilities along the road. It is listed in the Principal Freight Network (refer to Figure 42) and is designated for oversized and over mass (OSOM) load carrying vehicles as assessed by the Department of Transport's road network.

13.2. Public Transport

The public transport network within Hastings does not provide services in reasonable proximity to the Project site. The nearest bus stop is approximately three kilometres to the west, on Marine Parade. Hastings Railway Station is approximately five kilometres to the south-west of the site, on Church Street / Station Street. It is expected and planned for, that all construction and operations personnel will travel to site via private transport. Adequate parking during the construction and operational phases has been planned to cater for this requirement.

Figure 43: Hastings Public Transport (source Public Transport Victoria)



13.3. Project Traffic Considerations

13.3.1. Construction

Construction activity may occur 24-hours a day, but the majority will be Monday to Saturday from 7am to 6pm.

During construction it is expected that there will be a peak workforce of 60 personnel.

As mentioned in Section 4, the Project site is accessed via Bayview Road. For construction of the LIP ethane pipe, access will be via Long Island Drive.

13.3.2. Operations

The power generation facility will operate 7 days a week, 24 hours a day.

During operations the workforce is expected to peak at 5 people.

13.3.3. Parking

13.3.3.1. Project Site

Parking for the Project's construction will be met fully by on-site parking. Parking will be established to meet the needs of the construction workforce (at its peak estimated to be 60 persons). In addition, there will be parking for visitors (10 car parks available) and 4 car parks available for people with disabilities.

Car parking areas will be clearly designated with marked parking bays and signage displayed in the following areas:

- Parallel parking along east and west access roads (28)
- North of warehouse (16)
- North West corner of warehouse (external) (8)
- South of rail siding shed (8)
- External Northern end of warehouse (12)

13.3.3.2. Ethane Pipe

Parking for the LIP ethane pipe construction team will be fully met within the existing LIP parking provisions. No additional parking is required or planned.

13.3.4. Deliveries and Access

Deliveries will be made through the front gate, with sign-in at the Site Security Shed, as described in Section 4.

All deliveries to the site will be in accordance with the Department of Transport's Code of Practice – Traffic Management[13]. Construction traffic will be limited to sealed roads that meet the loads to be transported.

For all traffic movement, the Construction Contractor has developed a Traffic Management Plan (TMP) for the project (Attachment C) and will maintain responsibility for implementation of the TMP during construction. The TMP describes the requirements for the project, including subcontractor, transportation, plant, vehicles and their attending personnel travelling to and from the project site and movements within site. The TMP details requirements for traffic management to prevent traffic accidents, minimise disruption to traffic flow, ensure safe passage of the general public and emergency services through construction zones and ensure the safety of construction personnel. In summary, the TMP includes the following requirements:

- All heavy vehicle arrival / departure times must be planned, both inbound and outbound to ensure they do not impede existing peak traffic periods.
- Road and vehicle hygiene requirements
- Heavy vehicle movements and restrictions.
- Working hours for Monday to Saturday.
- Traffic control plans.

[13] http://www.gazette.vic.gov.au/gazette/Gazettes2010/GG2010S351.pdf

13.4. Design Considerations

13.4.1. Internal Roadways

As described in Section 5.6.1, all new roads constructed within the site will be designed to Austroads standards and industry (subdivisional road) practice. The key features are:

- Circuit roads (no reversing required)
- Overall width back-to-back of kerb 7.5 m for heavy vehicles passing
- Cross-fall 0.03 m/m for pavement drainage
- Longitudinal grades min 0.5% kerb and channel for runoff at self-cleansing velocities
- Semi-mountable kerbs (VicRoads SM2) to allow free access anywhere off-road)
- Turning for 19 m semi-trailers at intersections and bends (refer to Site Layout Drawing 9 – Truck Turning)
- Match-in points are: concrete slab NW corner, sealed road NE corner and gateway to LIP SE corner

13.4.2. Car Parking and Access

All standard car spaces meet the minimum dimension requirements of the Planning Scheme, being 2.6 metres in width and 4.9 metres in length. Accessible parking spaces have been designed in accordance with the Australian Standard for off-street parking for people with disabilities (AS2890.6:2009) being at least 2.6 metres wide, 4.9 metres long and provided with shared spaces of the same dimensions immediately adjacent the space.

Access to the parking area is via the existing sealed 8.2 metre wide driveway from Bayview Road, which accommodates two-way traffic flows. From the Site Security Shed, traffic will flow in a one-way loop around the site as shown in Attachment B. This sealed road will be 7.5 metre wide to allow for truck movements.

13.5. Traffic Considerations

13.5.1. Existing Traffic Conditions

Vic Roads [32] have estimated that the average daily traffic volume for Bayview Road is 3,900 vehicles, including 232 trucks.

13.5.2. Traffic Generation

Traffic generation data covers both the construction activities for the Project and the ethane piping at LIP.

As result of no public transport being present near the Project, it is estimated that all personnel will drive to and from the site daily.

It is assumed 100% of the vehicles will leave the site during lunch break as no canteen facilities are available on site.

Visitor numbers are assumed to be 10% of the workforce.

Truck deliveries for the site covers both equipment, consumables and waste collection. During construction it is anticipated that approximately 9 truck deliveries or waste collections will occur each day averaged over the life of the construction period. Operational deliveries will be very small (less than 1 per day, average).

Table 24 summarises the anticipated average daily traffic volumes from the Project.

Table 24: Anticipated Average Daily Traffic Volumes

Phase	Work force (vpd)	Visitors (vpd)	Truck (vpd)[1]	Existing Vehicle Number (vpd)	Existing Truck Number (vpd)	Percentage Increase in Vehicles (%)	Percentage Increase in Trucks (%)
Construction	240	24	9	3900	232	7	3.9
Operations	20	2	1	3900	232	0.6	0.4

[1]estimated

13.6. Traffic Conclusion

It is expected that the project will only result in a 7% increase in traffic over the construction period and less than one percent increase during operations. The increase to truck numbers on Bayview Road is only 4% during construction and less that 1% during operations.

As the existing road ways are designed for oversized and over mass vehicles, and part of the preferred freight network; the Project does not anticipate the need to modify or upgrade Bayview Road.

The Project site has sufficient space to accommodate all parking needs for personnel and visitors. The site will provide additional accessible parking for people with disabilities.

The Project site is able to safely accommodate all trucks entering the site, without causing a safety hazard to personnel; or interruption/hazard to traffic on Bayview Road or Long Island Drive.

14. Hazards and Security

The Hastings Generation Plant (HGP) accepts medium pressure (3000 kPag) ethane gas to generate power and there are hazards associated with the processing of flammable gas and production of high voltage electricity. The HGP is fully fenced and gated. The manned control room is located to allow visibility of both the plant itself and of visitors entering from the site roadway. The transformer yard within the site will also be fenced. The site will also be fitted with CCTV surveillance for security purposes during both construction and operations phases.

Ethane gas is fed to the site via a buried 100mm diameter gas pipe from the adjacent LIP. It passes through an isolation valve and is then distributed to the fuel gas scrubbers and into the generators where it is burnt to produce power. The quantity of ethane held onsite is low, being of insufficient quantity (less than 10%) of Schedule 14 materials to warrant notification under the Occupational Health and Safety (Major Hazard Facility) Regulations. In the event of a generator trip in an emergency, the ethane inventory is isolated and can be blown down to a local vent at height. The following measures are in place to manage the risk associated with the facilities:-

- Plant layout in accordance with ExxonMobil Global Practice and design to appropriate API, ASME and Australian Standards requirements
- Areas of hazard and ignition source (turbine exhausts and transformers) will be located at a distance from areas of potential gas release and vent stack, as per Hazardous Area Classification API RP 505 and AS 60076.
- Hot turbine exhaust surfaces and facility vent stack (in case of ignition) will be located away from the tree line to manage bushfire risk
- Bushfire management plan and emergency response plan developed for the project
- Design of the depressuring system is such that it minimises volume of gases to be vented for the differing levels of emergency shutdown whilst at the same time allowing adequate level of safety to minimize risk of an escalation in the event of a fire
- Gas detection at leak points and ESD push buttons located on site
- Turbines protected by heat, gas and flame detectors and water mist extinguishing system with ESD on confirmed detection
- Gas detectors are mounted to the air inlets to the turbine and air compressors with trip on detection
- Layout to allow safe usage and emergency escape
- Site is protected by a fire main and fire hydrants, fires can be attacked from two different aspects
- Site can be accessed from main entrance from the north and from LIP from the south in the event of an emergency

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Attachment A Project Environment Management Plan

Attachment B Site Layout Drawings

Attachment C Traffic Management Plan

Attachment D Cultural Heritage Assessment

Attachment E Environmental Noise Impact Assessment

Attachment F Air Quality impact Assessment

Attachment G Greenhouse Gas Assessment

Attachment H Threatened Flora and Fauna Likely to Occur in the Project Area

Attachment I Surface Water and Groundwater Assessment

Attachment J Stormwater Management Plan

Attachment K Native Vegetation Assessment