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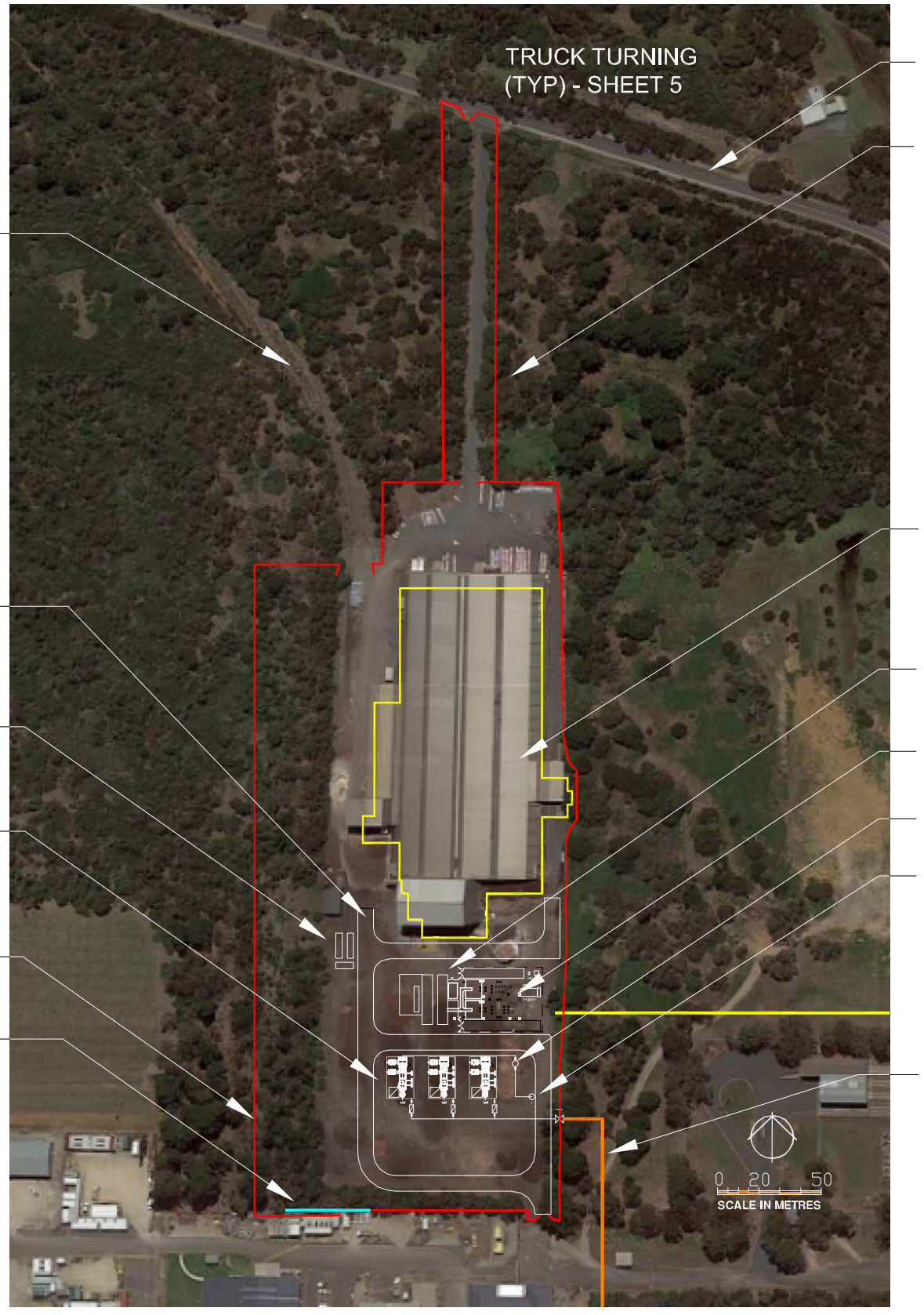

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Surface Water and Groundwater Desktop Assessment

Hastings Generation Project

Document Number: 100-12027-RPT-010

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Contents

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Abbreviations

°C	Degrees Celsius
3D	3 dimensional
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
ANZECC	Australian and New Zealand Environment and Conservation Council
ARR	Australian Rainfall and Runoff
AS	Australian Standard
bgl	Below ground level
BOM	Bureau of Meteorology
CASS	Coastal Acid Sulphate Soils
CEMP	Construction Environmental Management Plan
EC	Electrical Conductivity
EMP	Environmental Management Plan
EPA	Environment Protection Agency (Vic)
EPBC	Environment Protection and Biodiversity Conservation
ERS	Environment Reference Standard 2021
Esso	Esso Australia Pty Ltd
FEED	Front-End Engineering and Design
GDE	Groundwater Dependent Ecosystems
Ha	Hectare
HGP	Hastings Generation Project
JP	Junction Pit
km/h	Kilometres per hour
kN	Kilo Newtons
kV	Kilo Volts
LIP	Long Island Point

LSIO	Land Subject to Inundation Overlay
MNES	Matters Of National Environmental Significance
mm	Millimeter
mS	milliSiemens
MVA	Mega Volt Ampere
MW	Mega Watt
Project	Hastings Generation Project
RL	Relative Level
RMMP	Risk Management and Monitoring Program
SEP	Side-Entry Pit
SEPP	State Environment Protection Policy
SFARP	So Far as Reasonably Practicable
SUZ1	Special Use Zone 1
TDS	Total Dissolved Solids
UE	United Energy
VPP	Victoria Planning Provision
VRO	Victorian Resources Online
VVG	Visualising Victoria's Groundwater
WQI	Water Quality Indicators

1. Overview

Esso Australia Resources Pty Ltd (Esso) is proposing to develop an ethane gas fired electricity generation facility in Hastings, Victoria. When complete the plant will provide 35-40 MW of electricity to the Victorian grid. The facility is expected to be operational for 10 years, from 2023 till 2033.

- The location of the proposed development is north of Esso's Long Island Point (LIP) Fractionation Facility (LIP) on land previously developed for industrial use (

1.1.1. Power Plant Equipment Packages

The following sections provide more detail on the individual equipment packages that make up the Hastings Generation power plant. Figure 3 and Figure 4 show preliminary 3D modelling of the gas turbine packages once installed. Note that the turbines packages will be installed upon a concrete pad. The drainage associated with each pad can be isolated and sent to a sump tank for collection and disposal off-site at a registered facility. Thus reducing the risk of stormwater contamination.

Figure 3: Preliminary 3D model of installed Titan 130 gas turbine generator

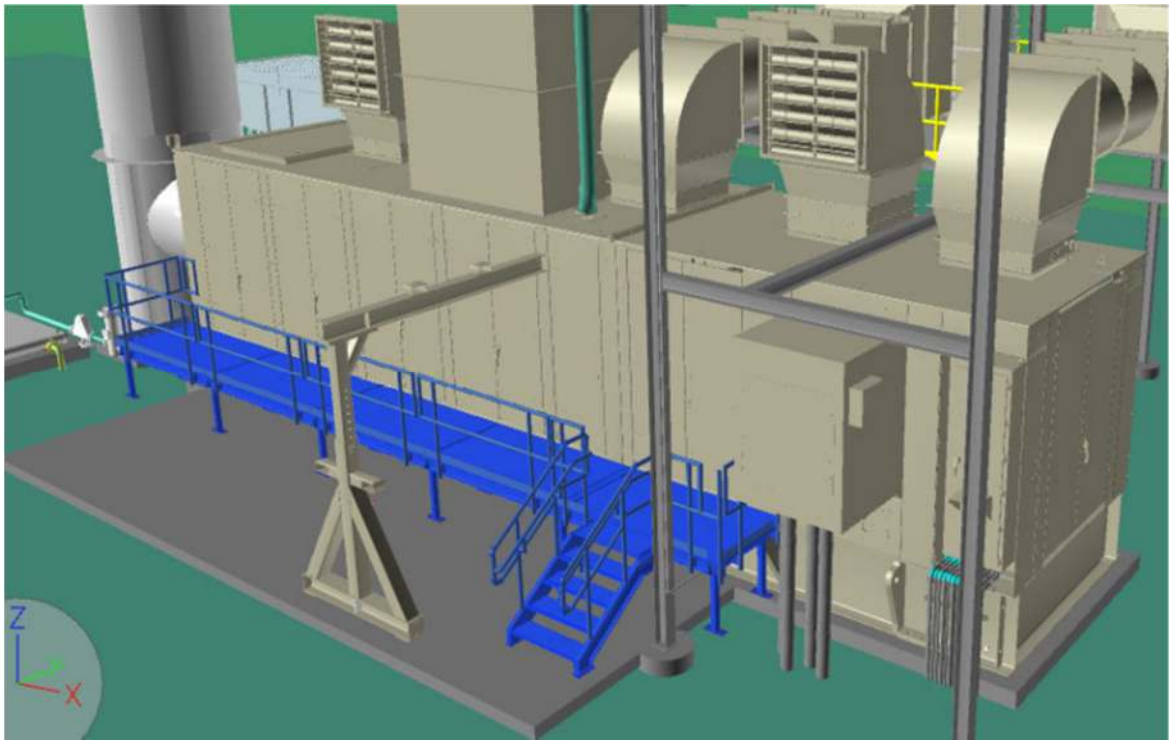
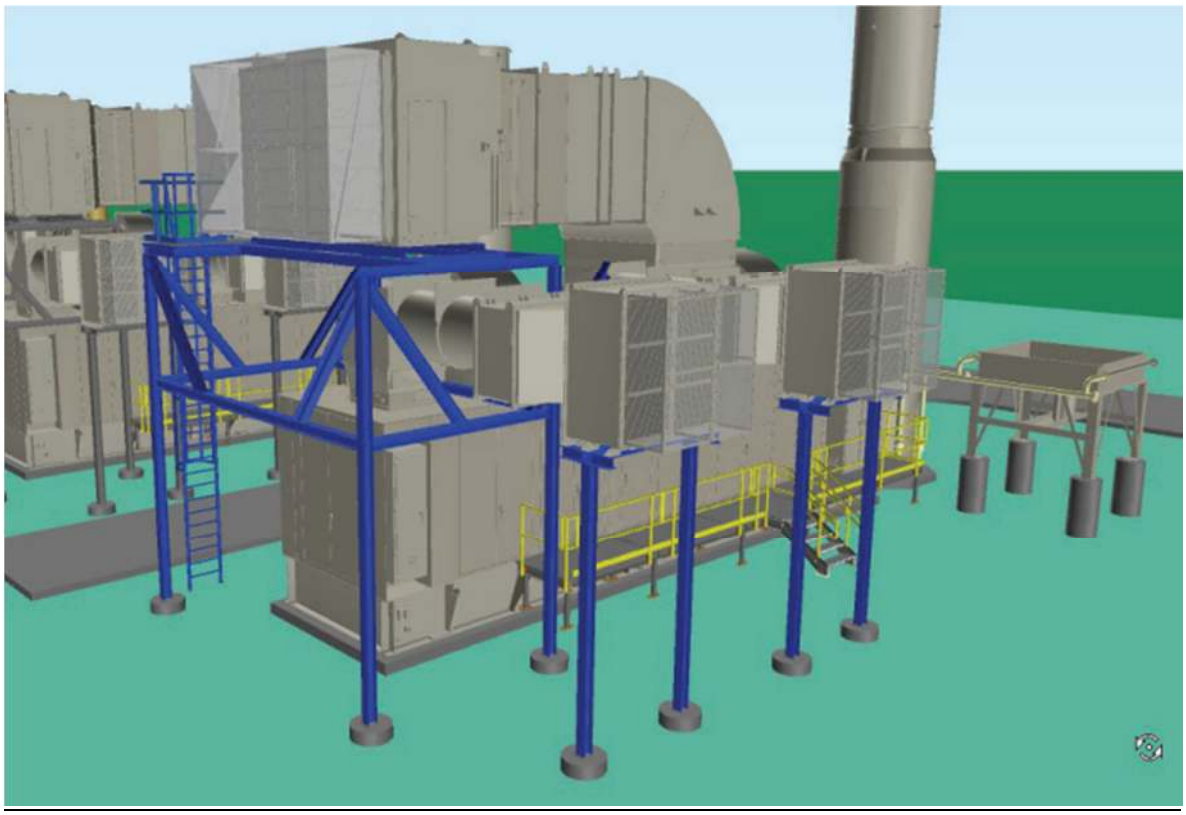


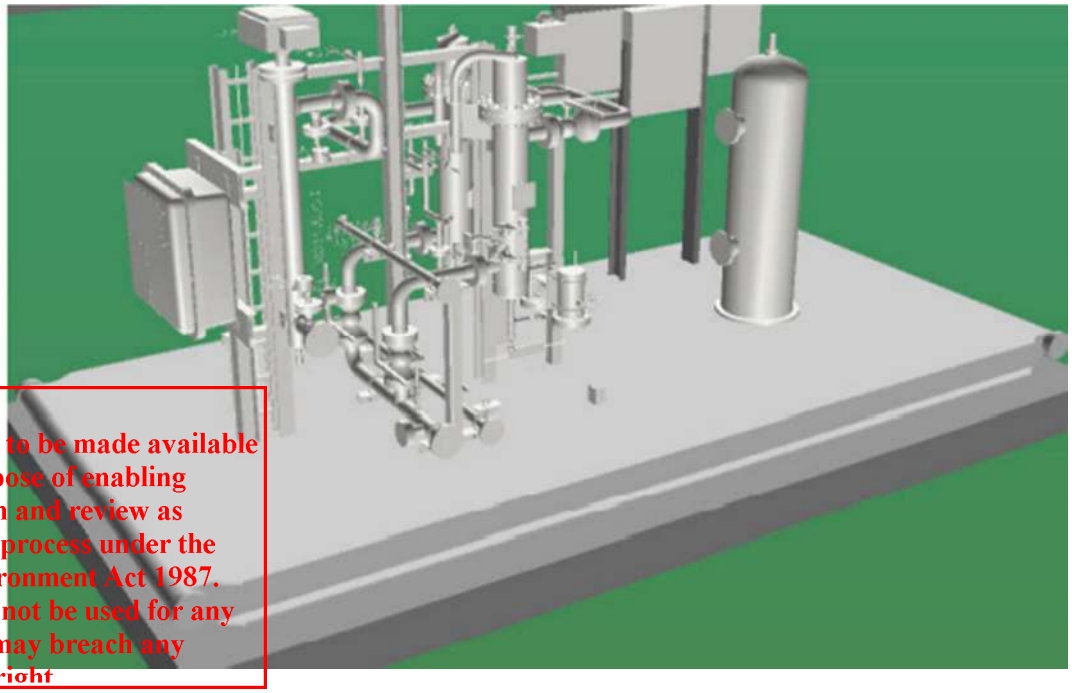
Figure 4: Preliminary 3D model of Titan 130 gas turbine generator, including air inlet filter & enclosure vent filter, access platforms and support structures



1.1.2. 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 5). 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. Each fuel gas conditioning skid is located within the turbine package concrete pad.

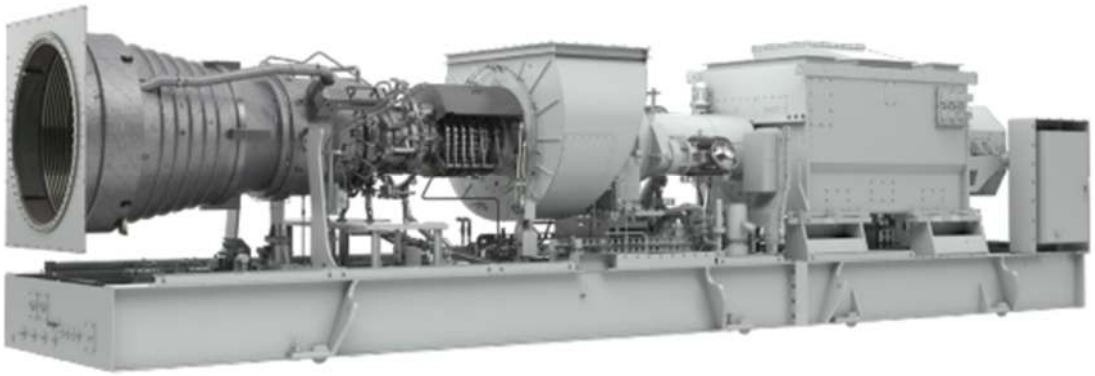
Figure 5: Fuel gas conditioning skid



1.1.3. Gas Turbines

The Titan 130 gas turbine generator set consists of an axial-flow gas turbine engine, generator, and reduction-drive gearbox (Figure 6). 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 6: 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.

1.1.4. 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 as per AS 1940. 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.

1.1.5. 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.

1.1.6. 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.

1.1.7. 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.

1.1.8. Generator Transformers

The power plant's transformer system will consist of 2 x 40/60 MVA, 11/66 kV generator transformers, each capable of supporting the power station's full load capacity of 40.5 MW.

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.

1.1.9. Switchyard

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.

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.

1.1.10. Road Layout

The road layout proposes circumferential roads around the HGP turbines and a road link completing a circuit around the existing warehouse buildings.

These have been designed to Austroad standards and industry (subdivisional road) practice. As a result, the roadways will consist of a 450 mm deep crushed rock flexible pavement with 50 mm asphalt wearing surface.

1.1.11. Drainage

As mentioned above, existing stormwater drainage runs north-south along the east and west perimeter of the project site. Most of the stormwater system on system consists of buried pipe, with the exception of an open culvert located next to the existing vacant yard. The project does not propose to alter the existing stormwater drain layout (refer to Figure 12).

New drainage will be installed in connection with the new road ways and proposed infrastructure to prevent build-up of rainwater in operational areas. This drainage is designed using Australian Rainfall and Runoff (ARR) data for Hastings 5% Annual Exceedance Probability (AEP).

Kerbs have been designed to ensure rain water flows to the existing stormwater system and prevent pooling on site as shown in Figure 7.

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 kilo Newtons (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 7: Project kerb grading plan

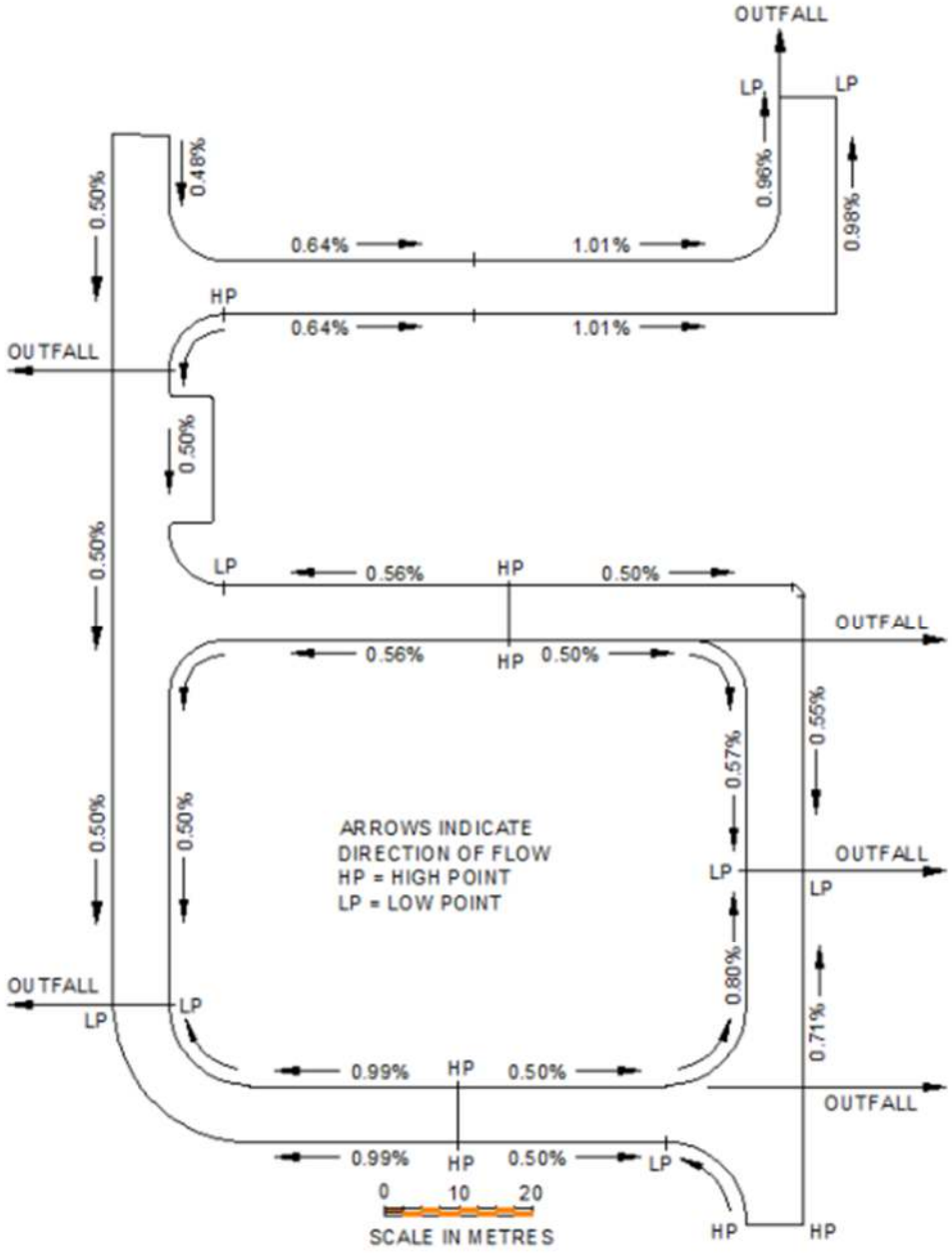


Figure 8: Catchment plan and drainage layout

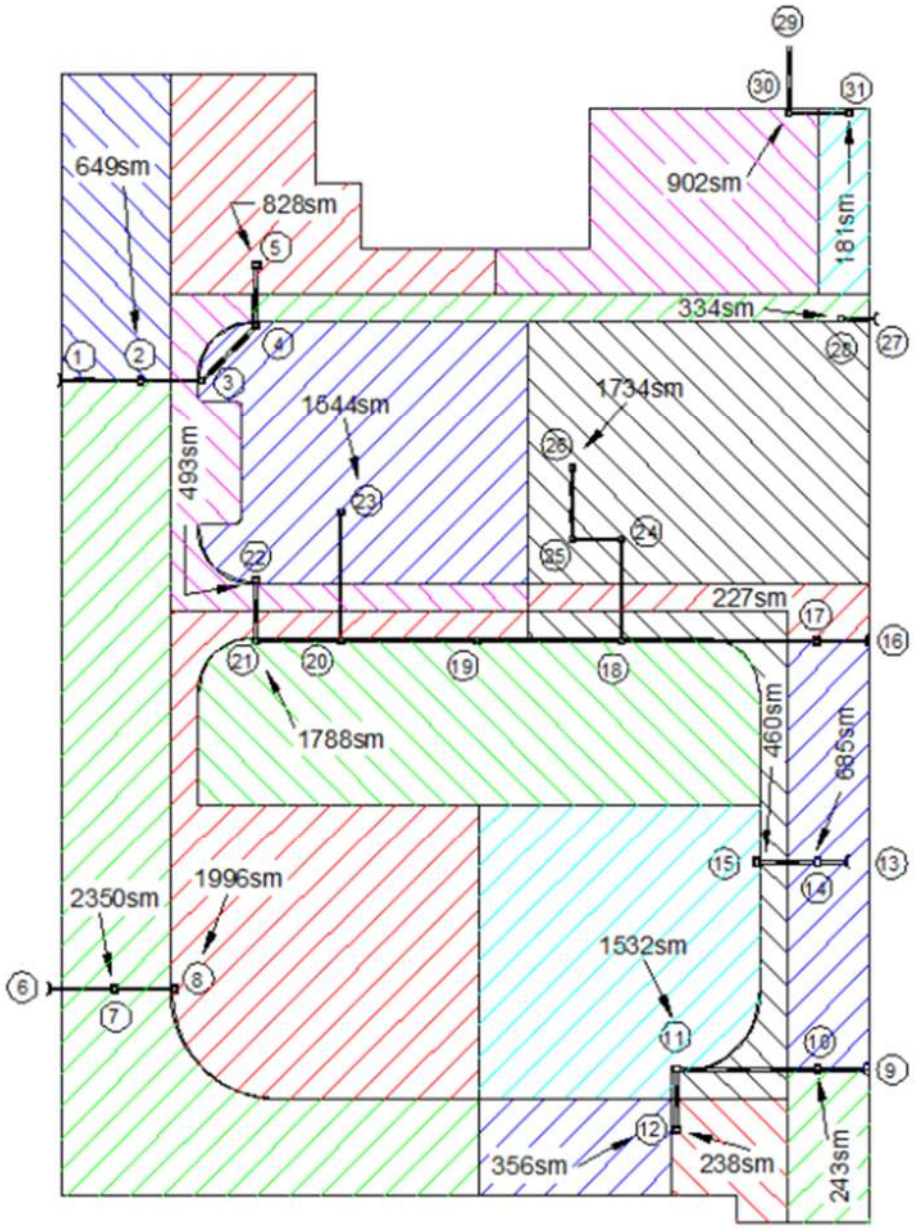
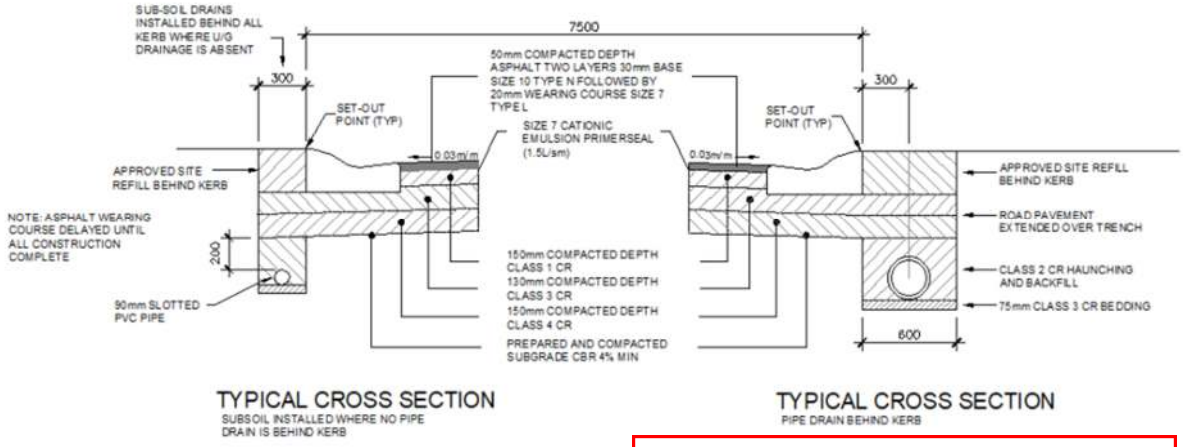


Figure 9: Kerb drainage cross section



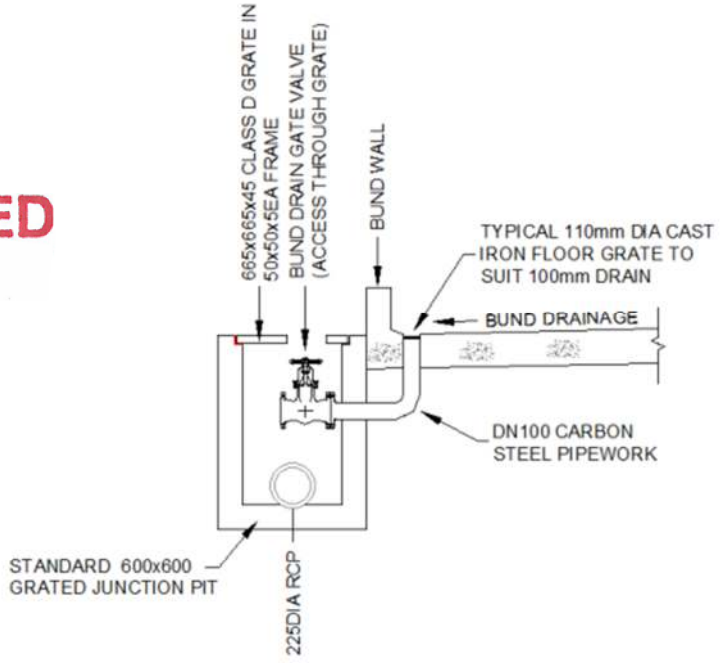
1.1.12. Bunded Drainage

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.

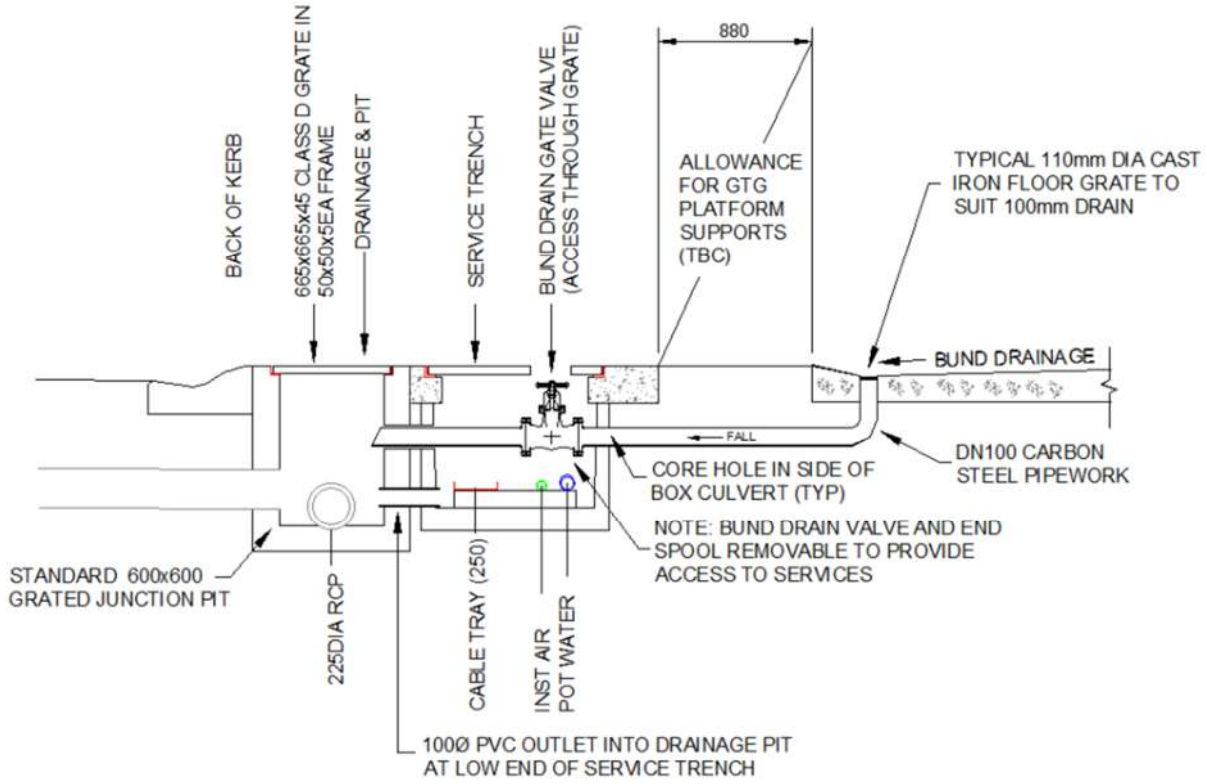
Figure 10: Bund drainage with gate valve



1.1.13. 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 11: 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.

1.1.14. 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 potentially 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. Refer to Attachment 7.

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

1.1.15. Water Supply

Currently water to the LIP facility is provided at a connection near to the LIP 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.

1.1.16. 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. The firewater tank will store rainwater collected from the Operations Centre, and supplemented from mains water to ensure it is ready for use.

1.1.17. 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 stored and contained in designated, bunded 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). Hazardous substances will be stored within the existing warehouse facilities, thus limiting their exposure to the elements.

A hazardous substances register will be in place for the construction and operations activities.

1.1.18. Waste

1.1.18.1. Construction Waste

The following construction waste materials are likely to be generated:

- Rock and soil overburden from pipe laying;
- Rock and soil from site levelling 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.

1.1.18.2. 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 Operations Centre 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.

1.1.18.3. Sewerage

An existing sewerage line runs between LIP and the Project site.

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.

Sewer design is currently on hold as it depends on investigation of the existing system inside LIP for an outfall point. It is possible to connect to the LIP treatment plant by gravity feed if the buildings are located within the vicinity of the turbines. Or the project will adopt a similar system to that used during construction of a tank and pump-out demountable building arrangements.

1.2. Commissioning

1.2.1. Piping

Following installation of the ethane piping, the pipe would be pressure tested 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.

1.2.2. Turbine Generators

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

1.3. Operations

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.

The onsite drainage systems around the process equipment have been designed to capture all contaminated waters, minimising the potential for uncontrolled releases into the stormwater system. The collected contaminated water will be disposed offsite at an appropriately licensed facility.

Hazardous substances, waste and sewerage shall be handled and disposed of as discussed in Section 2.1.17 and 2.1.18, above.

). The total land area is approximately 5.5 hectares of which 1.5 hectares at the south end will be used for the Hastings Generation Project (HGP).

Key features of the HGP are:

- 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
- Install ethane supply piping from the LIP site to HGP.
- Install facilities so that new equipment on the project site can be suitably operated and maintained (e.g., security requirements, crib rooms, offices, etc.)

Figure 1: Hastings Generation Project

1.4. Scope of work

This assessment considers surface and groundwater impacts associated with the proposal.

The assessment provides management approaches on how any potential impacts could be avoided or minimised.

The scope of the assessment included:

- An assessment, review and description of the existing hydrological conditions, both related to surface and ground water.
- An assessment of potential surface and groundwater quantity/ quality impacts associated with the proposed works.
- Nomination of management measures to mitigate any potential impacts associated with the proposed works, which may arise.

2. Project Description

The proposed development site has had various industrial uses over the years, such as a scrap metal yard and recently for bagging and distributing compost materials.

The property is fully fenced with a sealed roadway entering from Bayview Road. There are two warehouse buildings on site which occupy an area of approximately 1 hectare. Internal sealed roadways run down the east and west sides of the warehouses. To the rear of the property is a vacant marshalling / laydown yard. This vacant yard is the proposed location of the HGP.

The vacant yard has been filled and shaped to an east-west profile to assist surface runoff into deep side drains. These drains form part of the stormwater drainage system running north-south along the east and west of the site. These stormwater drains connect to LIP's stormwater system which runs easterly to the Westernport outfall.

The current profile does not suit the installation of three Solar gas turbine generators that will ideally be installed at the same level across the currently sloping site. The new switchyard will also require the site to be level.

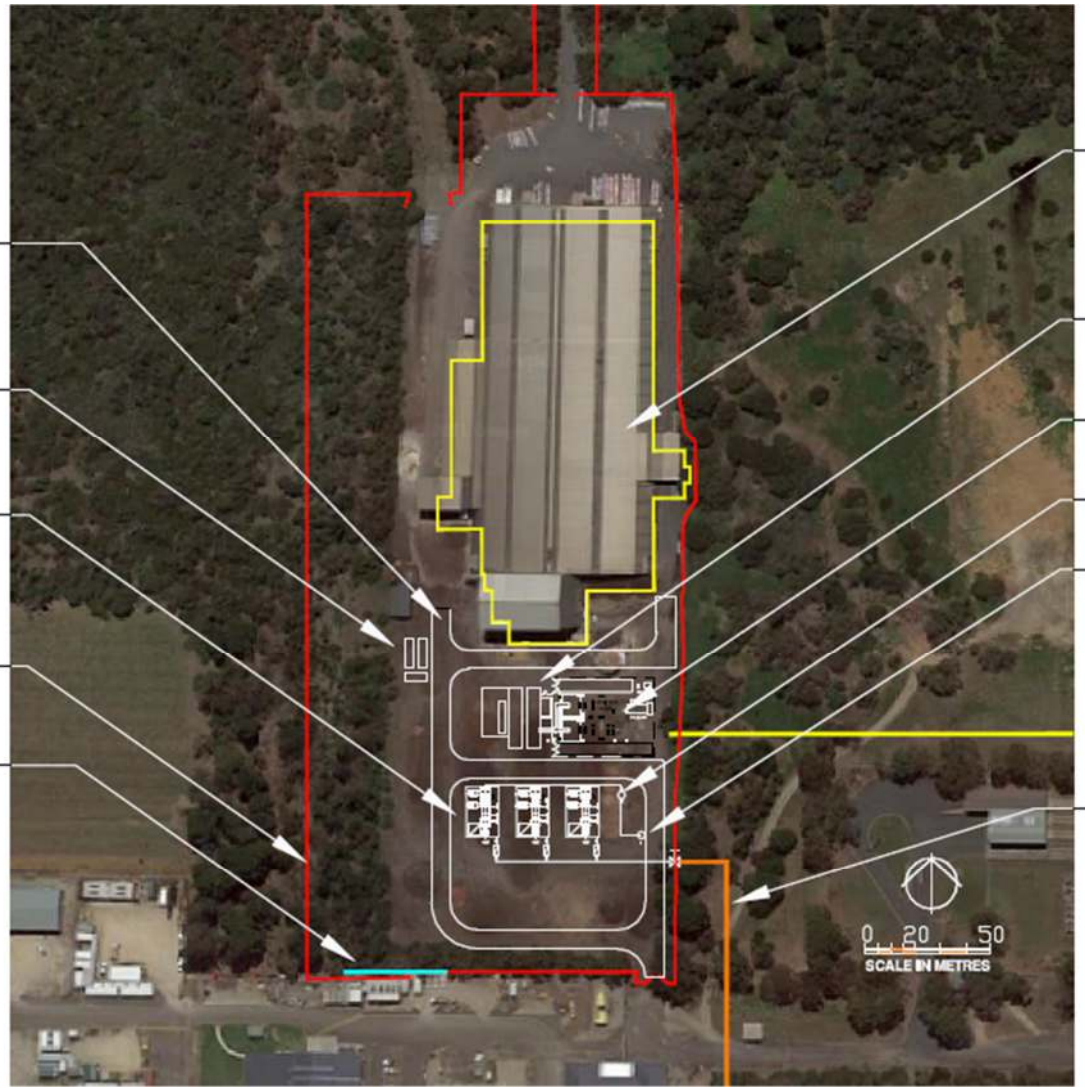
During geotechnical investigations, various buried concrete floors were discovered. A site plan has been prepared showing the redundant building slabs for grubbing, a tank for demolition and cut-to-fill earthworks to prepare the site for the HGP (refer to Attachment 1).

The total impervious areas located on site will remain at approximately 3.43 hectares, as shown in Table 1 and Figure 2. (A clearer copy of Figure 2 can be seen in Attachment 2).

Table 1: Impervious areas on site

Description	Existing Impervious Area (hectares)	Proposed Impervious Area (hectares)
Sealed roads	0.85	1.24
Warehouse / buildings	1.08	1.09
Vacant yard / laydown area	1.50	0.74
Electrical substation / switchyard	-	0.17
Gas turbine pad		0.19
Total	**3.43**	**3.43**

Figure 2: Proposed site layout



2.1. Key Construction Activities

Construction activities will be guided by a Construction Environmental Management Plan (CEMP) to ensure work is carried out to Esso's specifications within the specified work area.

The proposed construction work and methodology provided are indicative and based on the current concept design and would be further developed during detailed design. Detailed construction staging plans and methods would be determined by the construction contractor(s) after completion of detailed design in consultation with Esso.

Construction work would be expected to involve the following:

- Pre-construction identification and marking of sensitive areas as identified in CEMP.
- Site establishment (including temporary fencing and construction compound)
- Installation of erosion and sediment controls
- Vegetation removal
- Earthworks
- Pipe installation that includes trenching, placement and covering of pipe
- Hard stand work that includes placement of foundations, concrete pads and any subsequent bunding arrangements
- Pavement work that includes placement and compaction of: selected material, subbase, base and wearing surface materials
- Kerb and gutter construction
- Equipment installation, including ancillary buildings and tie-ins to existing drainage systems where applicable
- Site rehabilitation
- Site clean-up

2.1.1. Power Plant Equipment Packages

The following sections provide more detail on the individual equipment packages that make up the Hastings Generation power plant. Figure 3 and Figure 4 show preliminary 3D modelling of the gas turbine packages once installed. Note that the turbines packages will be installed upon a concrete pad. The drainage associated with each pad can be isolated and sent to a sump tank for collection and disposal off-site at a registered facility. Thus reducing the risk of stormwater contamination.

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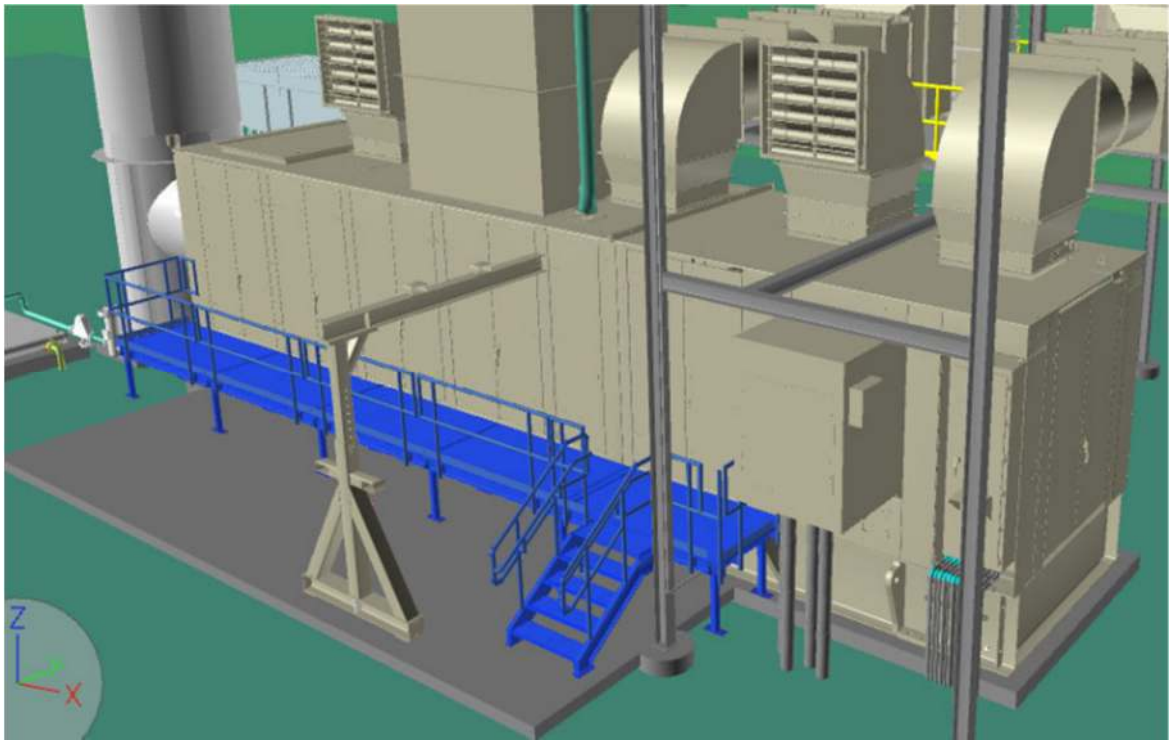

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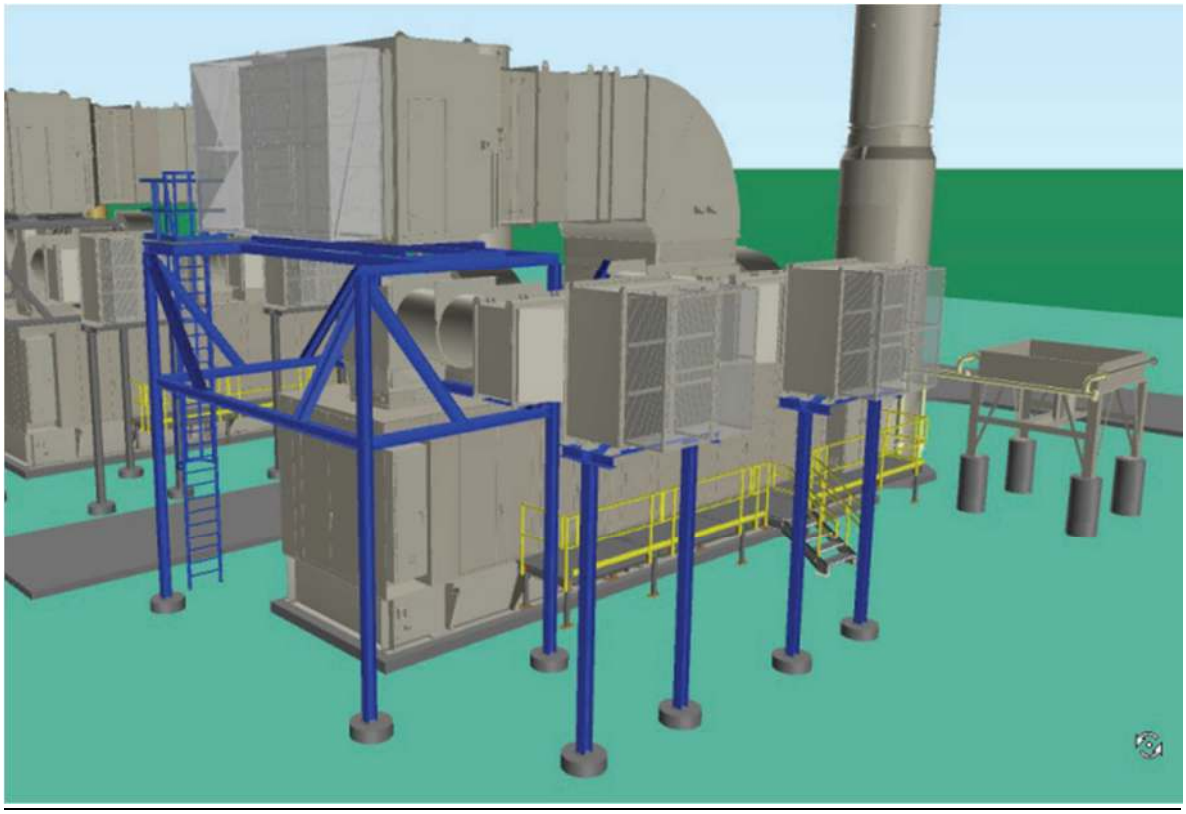
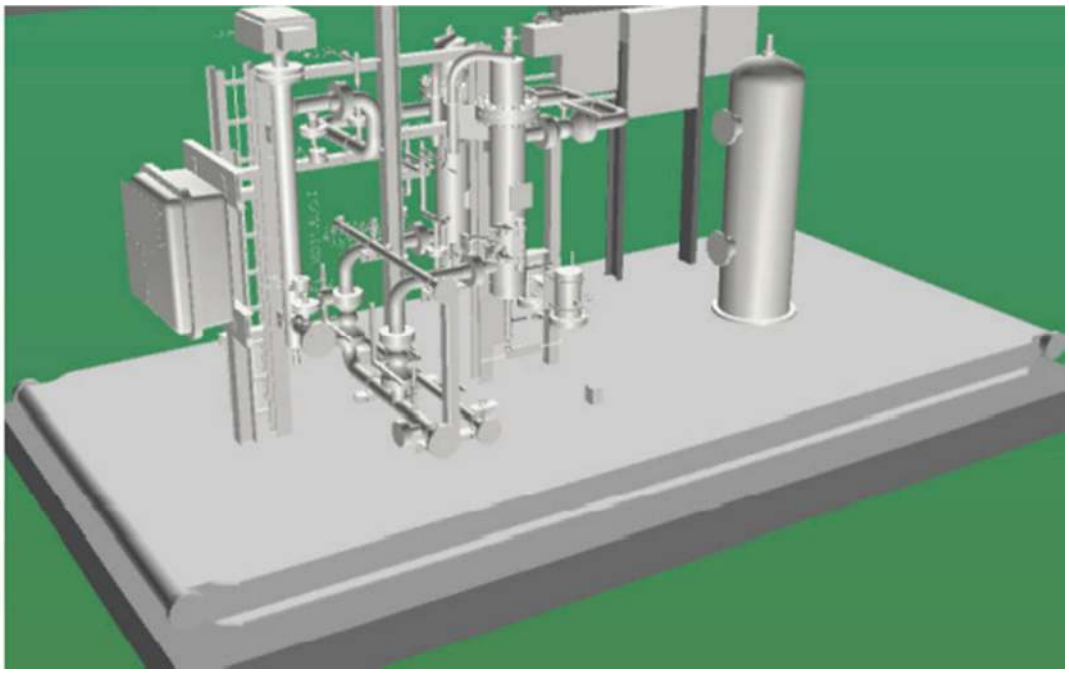


2.1.2. Fuel Gas Condition Skid

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 5). 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. Each fuel gas conditioning skid is located within the turbine package concrete pad.

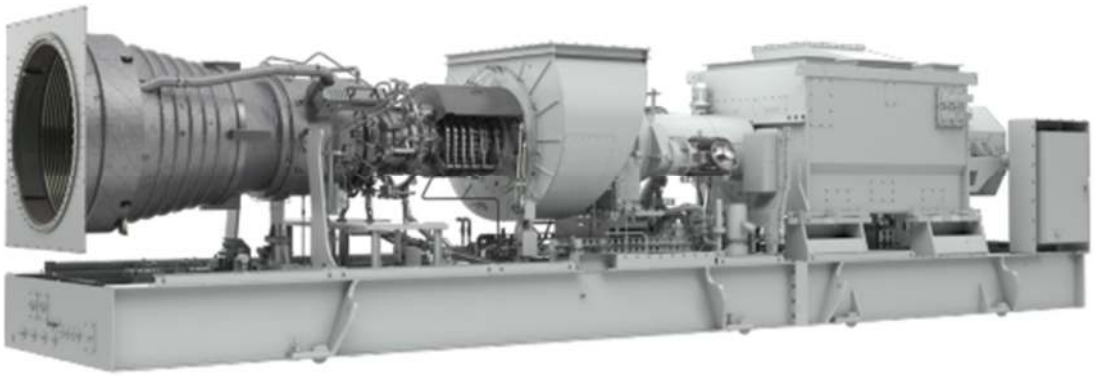
Figure 5: Fuel gas conditioning skid



2.1.3. Gas Turbines

The Titan 130 gas turbine generator set consists of an axial-flow gas turbine engine, generator, and reduction-drive gearbox (Figure 6). 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 6: 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.

2.1.4. 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 as per AS 1940. 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.

2.1.5. 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.

2.1.6. 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.

2.1.7. 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.

2.1.8. Generator Transformers

The power plant's transformer system will consist of 2 x 40/60 MVA, 11/66 kV generator transformers, each capable of supporting the power station's full load capacity of 40.5 MW.

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.

2.1.9. Switchyard

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.

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.

2.1.10. Road Layout

The road layout proposes circumferential roads around the HGP turbines and a road link completing a circuit around the existing warehouse buildings.

These have been designed to Austroad standards and industry (subdivisional road) practice. As a result, the roadways will consist of a 450 mm deep crushed rock flexible pavement with 50 mm asphalt wearing surface.

2.1.11. Drainage

As mentioned above, existing stormwater drainage runs north-south along the east and west perimeter of the project site. Most of the stormwater system on system consists of buried pipe, with the exception of an open culvert located next to the existing vacant yard. The project does not propose to alter the existing stormwater drain layout (refer to Figure 12).

New drainage will be installed in connection with the new road ways and proposed infrastructure to prevent build-up of rainwater in operational areas. This drainage is designed using Australian Rainfall and Runoff (ARR) data for Hastings 5% Annual Exceedance Probability (AEP).

Kerbs have been designed to ensure rain water flows to the existing stormwater system and prevent pooling on site as shown in Figure 7.

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 kilo Newtons (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 7: Project kerb grading plan

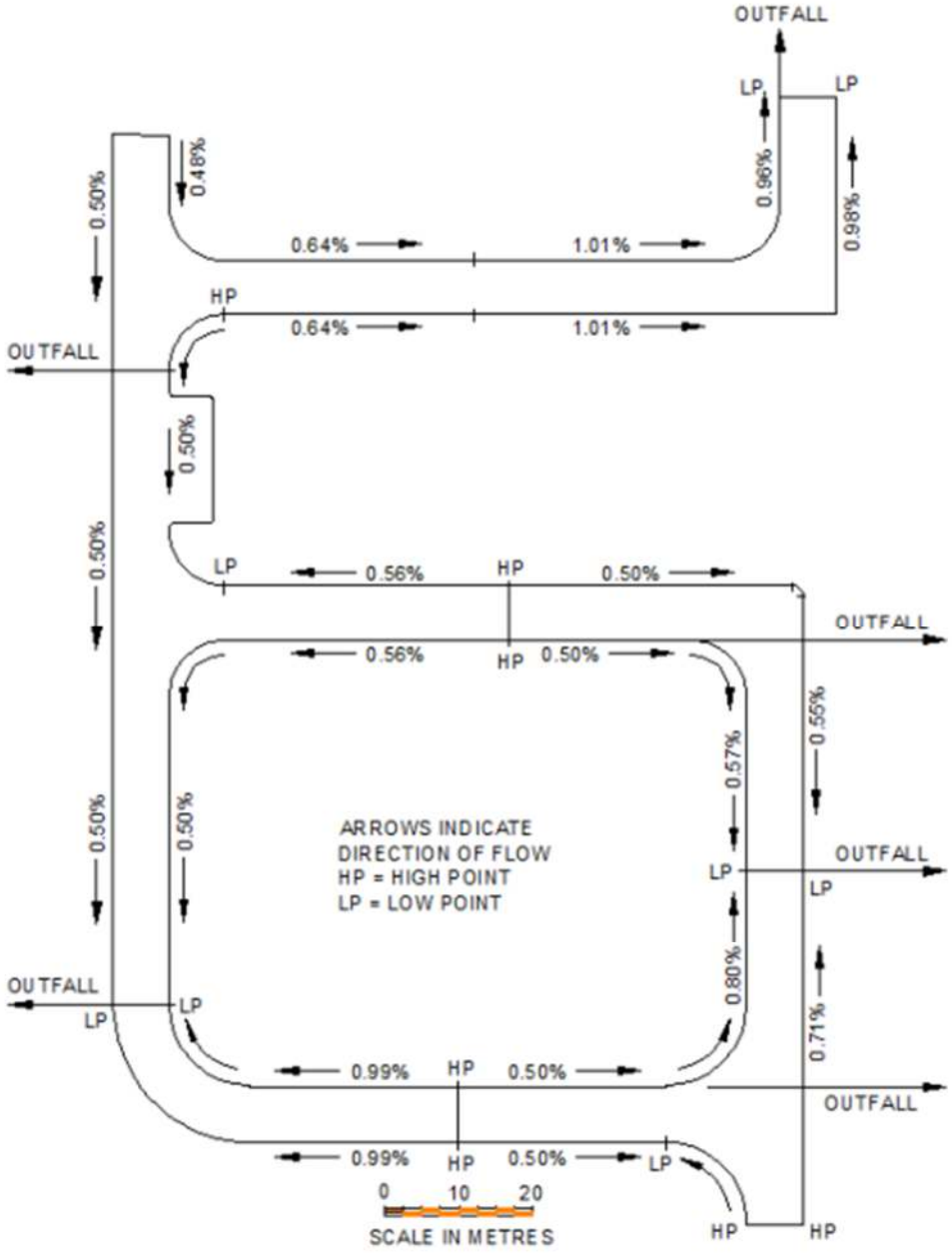


Figure 8: Catchment plan and drainage layout

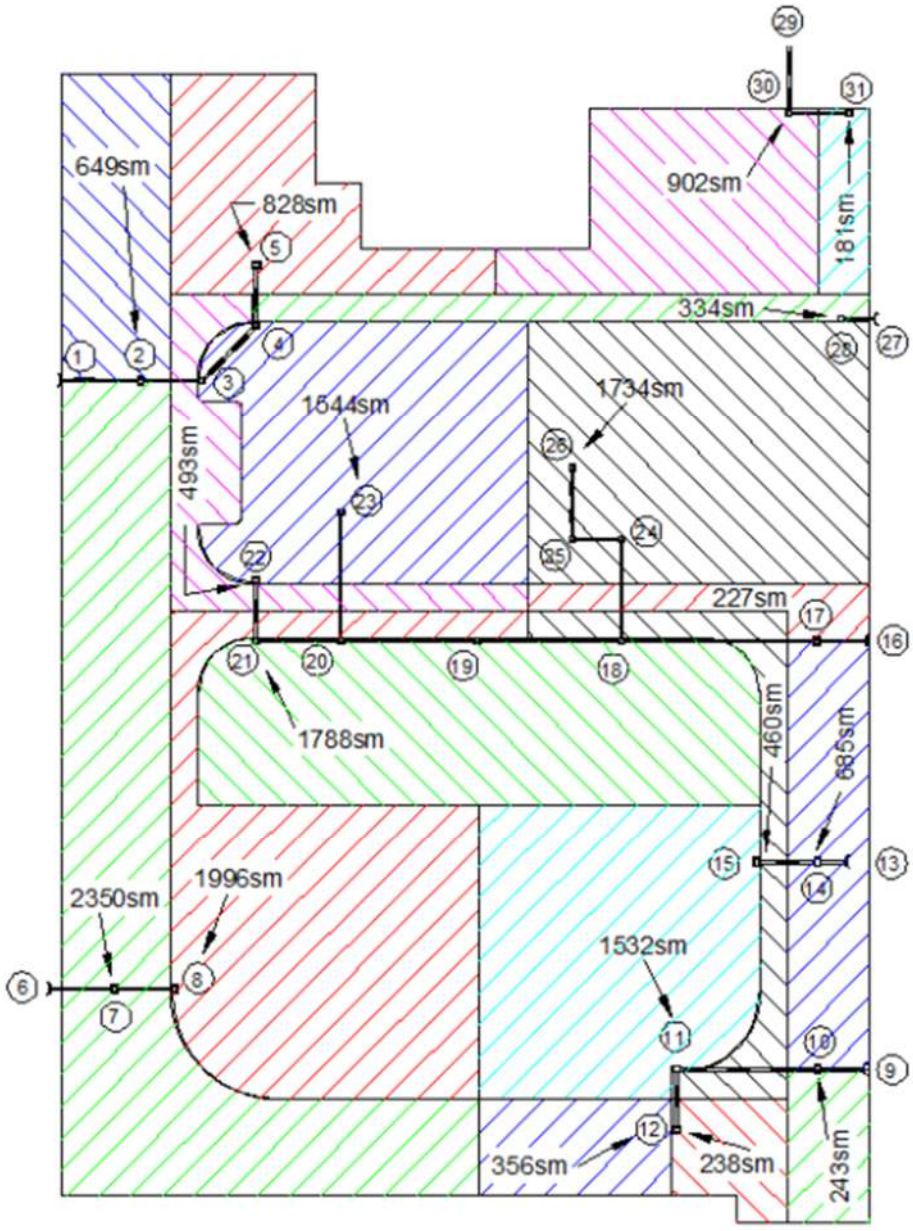
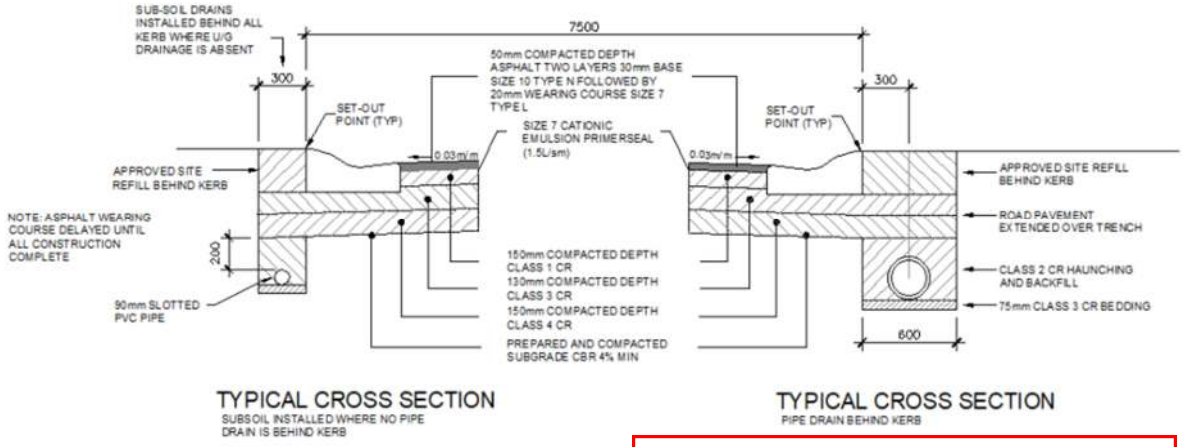


Figure 9: Kerb drainage cross section



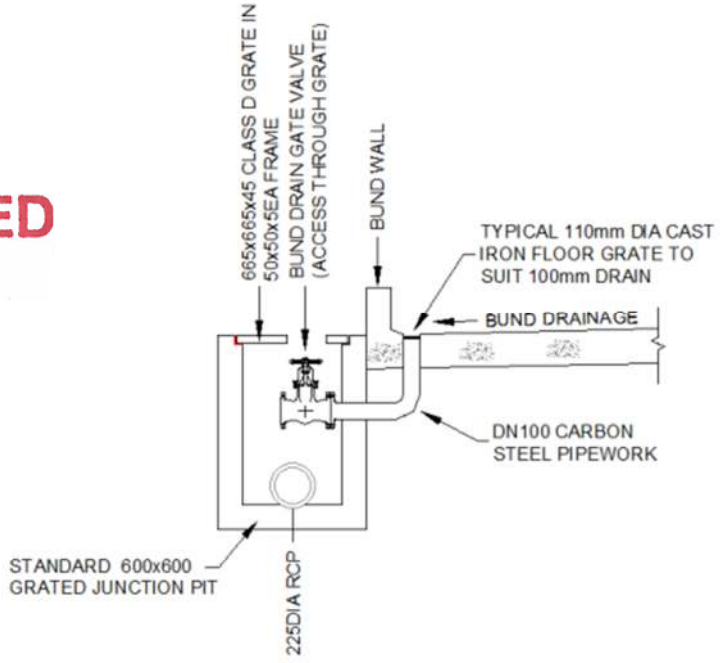
2.1.12. Bunded Drainage

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.

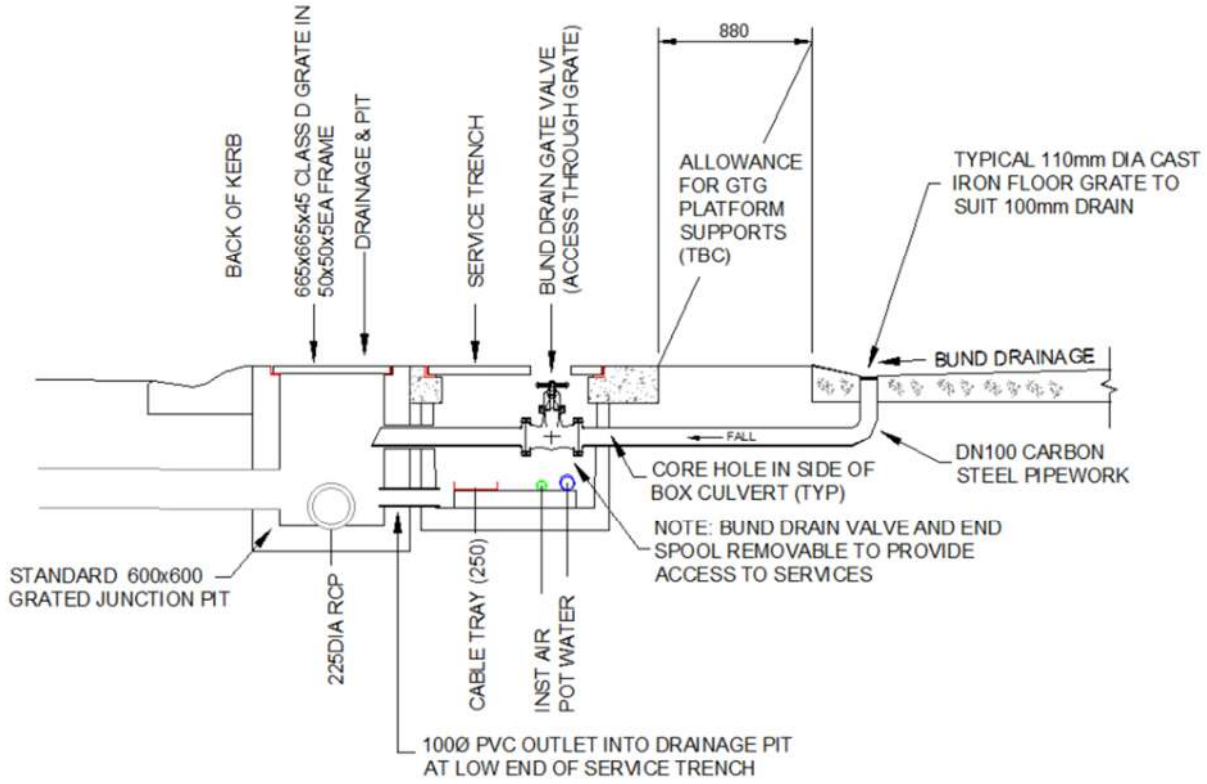
Figure 10: Bund drainage with gate valve



2.1.13. 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 11: 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.

2.1.14. 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 potentially 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. Refer to Attachment 7.

All wastes collected in this sump will be removed by vacuum pump for disposal at a lawful place[1], by an accredited waste removal company.

2.1.15. Water Supply

Currently water to the LIP facility is provided at a connection near to the LIP 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.

2.1.16. 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. The firewater tank will store rainwater collected from the Operations Centre, and supplemented from mains water to ensure it is ready for use.

2.1.17. 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 stored and contained in designated, bunded 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). Hazardous substances will be stored within the existing warehouse facilities, thus limiting their exposure to the elements.

A hazardous substances register will be in place for the construction and operations activities.

2.1.18. Waste

2.1.18.1. Construction Waste

The following construction waste materials are likely to be generated:

- Rock and soil overburden from pipe laying;
- Rock and soil from site levelling 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.

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

2.1.18.2. 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 Operations Centre 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.

2.1.18.3. Sewerage

An existing sewerage line runs between LIP and the Project site.

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.

Sewer design is currently on hold as it depends on investigation of the existing system inside LIP for an outfall point. It is possible to connect to the LIP treatment plant by gravity feed if the buildings are located within the vicinity of the turbines. Or the project will adopt a similar system to that used during construction of a tank and pump-out demountable building arrangements.

2.2. Commissioning

2.2.1. Piping

Following installation of the ethane piping, the pipe would be pressure tested 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.

2.2.2. Turbine Generators

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

2.3. Operations

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.

The onsite drainage systems around the process equipment have been designed to capture all contaminated waters, minimising the potential for uncontrolled releases into the stormwater system. The collected contaminated water will be disposed offsite at an appropriately licensed facility.

Hazardous substances, waste and sewerage shall be handled and disposed of as discussed in Section 2.1.17 and 2.1.18, above.

3. Legislative and Policy Context

3.1. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The Australian and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ 2000) has published Australian and New Zealand Guidelines for Fresh and Marine Water Quality to provide benchmarks for assessment of the existing water quality of both fresh and marine waterways.

These guidelines and objectives are dependent on nominated environmental values. The objective adopted for the protection of aquatic ecosystems is “to maintain and enhance the ecological integrity of freshwater and estuarine ecosystems, including biological diversity, relative abundance and ecological processes”. Aquatic ecosystems could be defined as ecosystems that depend on flows, or periodic or sustained inundation to preserve their ecological integrity (eg river, creeks, wetland and groundwater dependent ecosystems).

3.2. Water Act 1989

The purpose of the Water Act is to ensure a consistent treatment of surface and groundwater resources and waterways, to provide formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses, and to provide for the protection of catchment conditions.

3.3. Environment Protection Act 2017

3.3.1. State Environment Protection Policy (Waters)

Clause 34(3) of SEPP (Waters), states that owners of stormwater assets have obligations to maintain those assets.

The new *Environment Protection Act 2017* came into force 1 July 2021. Under the Transitional Regulations this clause remains in force for two years.

3.3.2. Environment Reference Standards 2021

The Environment Reference Standard 2021 (ERS) was made under the *Environment Protection Act 2017* and includes environmental values, indicators and objectives. It provides an environmental assessment and reporting benchmark. Although not a compliance standard, the ERS allows for responsible authorities to consider the ERS when deciding on planning permit applications under the *Planning and Environment Act 1987*.

The ERS considers ambient air and sound, land and water (groundwater and surface water).

The ERS, sets environmental values, indicators and objectives for groundwaters and surface waters.

3.3.3. Urban Stormwater Management Guidance

This guidance was published by EPA in June 2021and is intended to help improve the management of urban stormwater in Victoria by use of a scientific approach to minimise the risk of harm from urban stormwater flows. It provides guidance for good environmental practice and provides information that will support the planning and design of new urban stormwater management systems.

3.4. Planning and Environment Act 1987

The *Planning and Environment Act 1987* establishes a framework for planning the use, development and protection of land in Victoria. The Act provides for the preparation of planning schemes in each municipality (Mornington Peninsula for the HGP) consistent with the Victoria Planning Provisions (VPPs) and procedures by which planning schemes may be amended and planning permits obtained to govern land use and development.

3.4.1. Planning Policy Framework

Clause 19.03-3S embeds integrated water management objectives and strategies into urban land use planning. This brings together all the elements of the water cycle, including sewage management, water supply, stormwater management and water treatments to maximise community and environmental benefits.

3.4.2. Victorian Planning Provisions

Clause 53.18 – Stormwater management in urban development extends stormwater management to commercial and industrial subdivisions and developments. Stormwater management systems are required to be designed to meet the *Urban Stormwater – Best Practice Environmental Management (BPEM) Guidelines*.

Stormwater Management objectives for buildings and works - Standard W2 requires the development to be designed to minimise the impact of chemical pollutants and other toxicants.

Site management objectives - Standard W3 require a description of how the site will be managed during construction.

3.5. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth Government's role in environmental assessment, biodiversity conservation and the management of protected areas and species, population and communities and heritage items. Approval from the Commonwealth Minister for the Environment is required for projects likely to have a significant impact on 'matters of national environmental significance' (MNES). For the purposes of this assessment wetlands of international importance (Ramsar wetlands) and water resources have been considered as relevant MNES.

3.6. National Water Quality Management Strategy

The National Water Quality Management Strategy (NWQMS) is the adopted national approach to protecting and improving water quality in Australia. It consists of a number of guideline documents, of which certain documents relate to protection of surface water resources and others relate to the protection of groundwater resources.

The primary document relevant to the assessment of groundwater risks for the proposal is the Guidelines for Groundwater Quality Protection in Australia (Australian Government, 2013). This document sets out a high-level risk-based approach to protecting or improving groundwater quality for a range of groundwater beneficial uses (called 'environmental values'), including aquatic ecosystems, primary industries (including irrigation and general water users, stock drinking water, aquaculture and human consumption of aquatic foods), recreational and aesthetic values (e.g. swimming, boating and aesthetic appeal of water bodies), drinking water, industrial water and cultural values.

For the purpose of this assessment, all of the above 'environmental values' have been considered applicable, which is conservative.

4. Site Description

4.1. Location

The Hastings Generation Project (HGP) is located at 11 Bayview Road, Hastings, about 5 kilometres from the township of Hastings on the eastern side of the Mornington Peninsula, Victoria.

The land on which the HGP is planned is Lot 41 and part of Lots 40 and 39 in LP3732. The entire site is zoned for special use (SUZ1). The main project area resides within in Lot 39. Lot 40 contains the existing buildings, which will be used for equipment storage and construction phase ancillary services (i.e office and crib facilities). Lot 41 is where the entrance driveway is located.

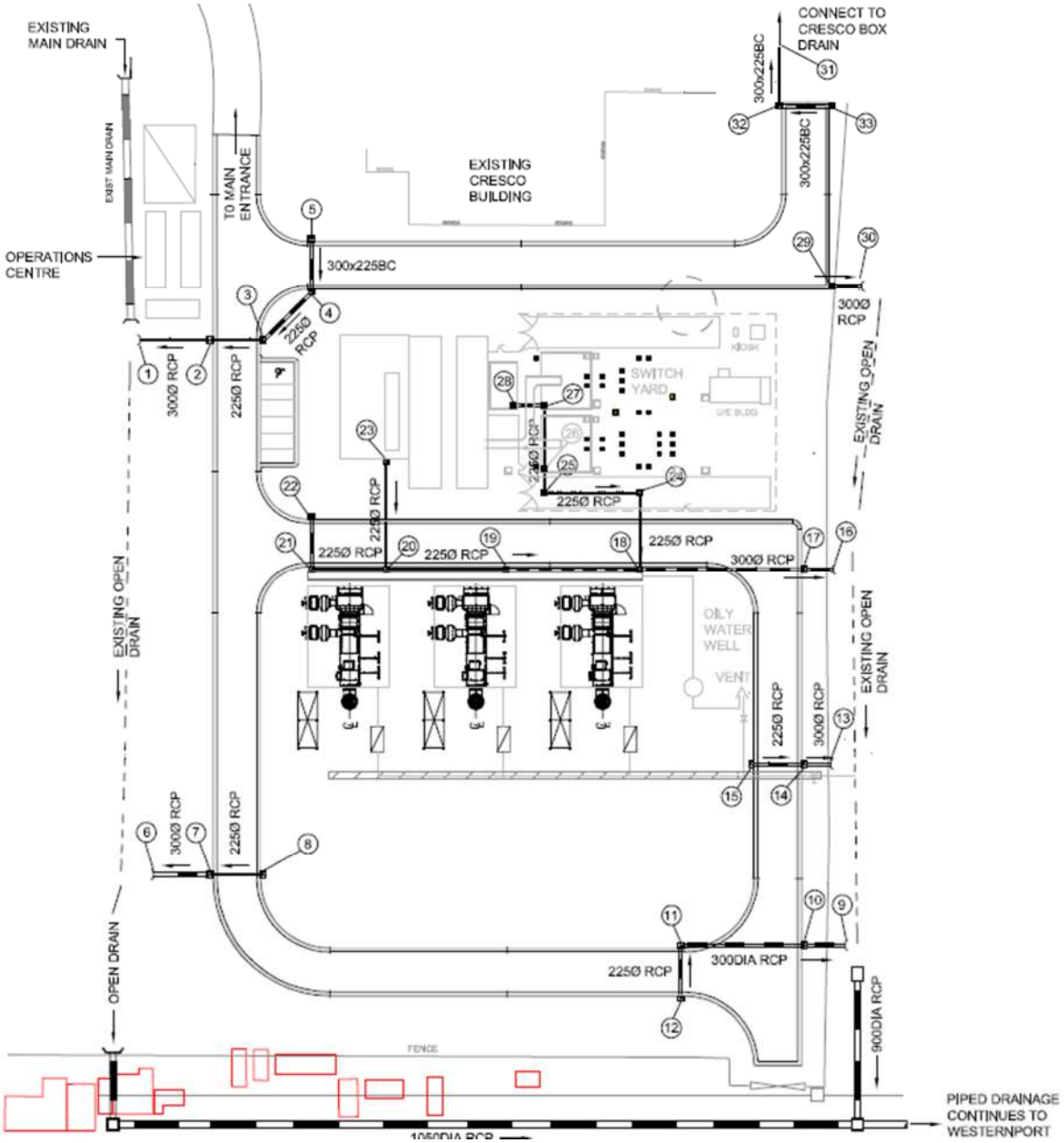
For the purpose of this report the site area is the area in which new construction activities will be undertaken in Lot 39. The site area is approximately 7,950 m^2.

Bayview Road forms the northern boundary of the site.

Most of the site is covered with crushed rock. The existing site conditions show it to be relatively well drained, except for a few localised low spots that appear to hold water [1].

The existing stormwater drains run north to south along both the east and west boundaries of the project area. These drains connect to a west-east oriented drain that lies to the south of HGP, within LIP. This stormwater system ultimately makes its way to Western Port, east of LIP. The layout of the proposed drainage for HGP can be seen in Figure 12 and Attachment 3.

Figure 12: Site drainage



4.2. Climate

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

The average annual temperature is 14.7°C [2]. 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 [3].

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 [3]

4.2.1. Rainfall

Hastings has a significant amount of rainfall during the year averaging 741 mm [2]. 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 13.

Figure 13: Long term month average rainfall for Hastings [3]

4.2.2. 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, which has been declared a Ramsar Site. Western Port is located 700 metres to the east and 1000 metres to the south of the Project area.

4.2.3. Flooding

Under the Planning Scheme for the Mornington Peninsula, the site does not lie within an area of inundation (LSIO – land subject to inundation overlay). Anecdotal evidence from LIP employees indicated the site is not known to flood.

Coastal Risk Australia [4] identifies current and future (2100) coastal flooding levels based on predicted climate change (Figure 15). The project site is outside of the present and predicted future coastal flooding zone. However, future coastal flooding will lead to inundation of the wetland located east-south-east of the project area.

Figure 14: Land subject to inundation overlay (LSIO) (Source: MPC [5])

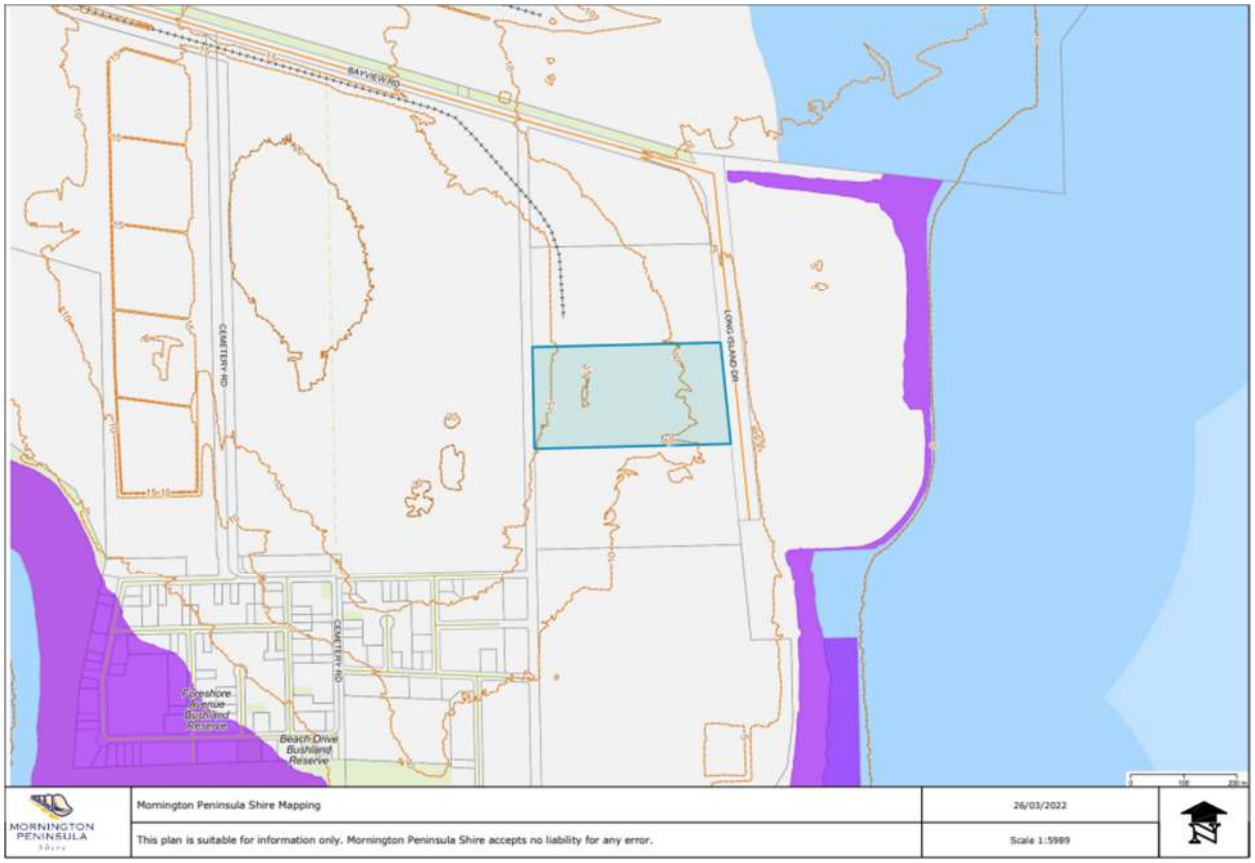
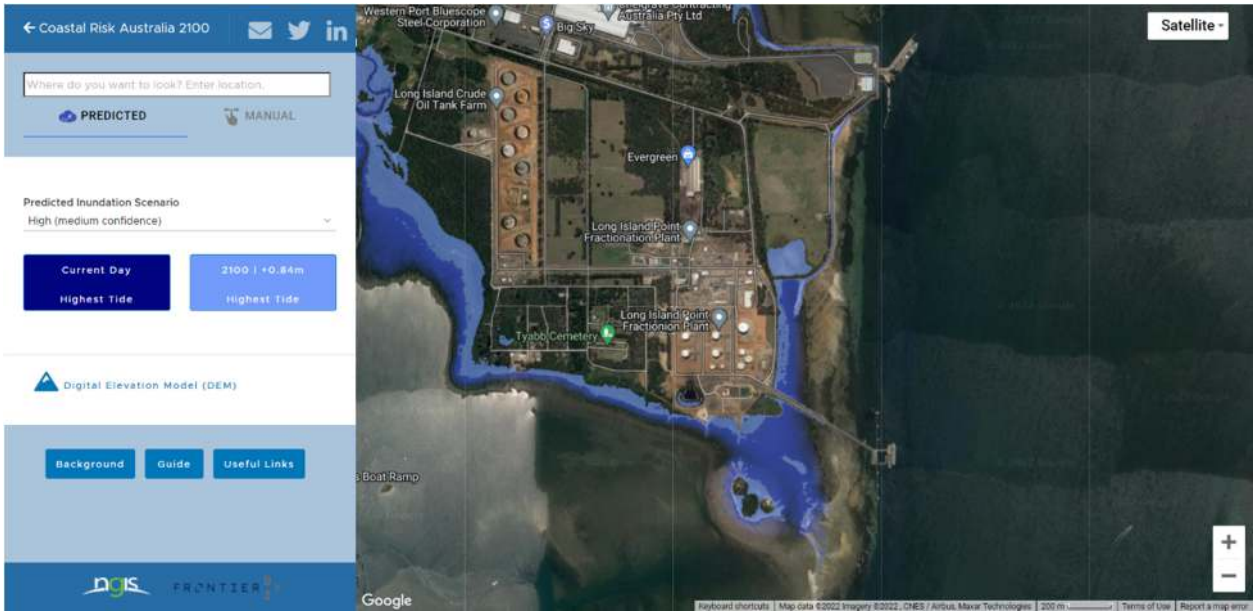


Figure 15: Coastal flooding zones (Source: CRA [4])



4.3. Changing Climate

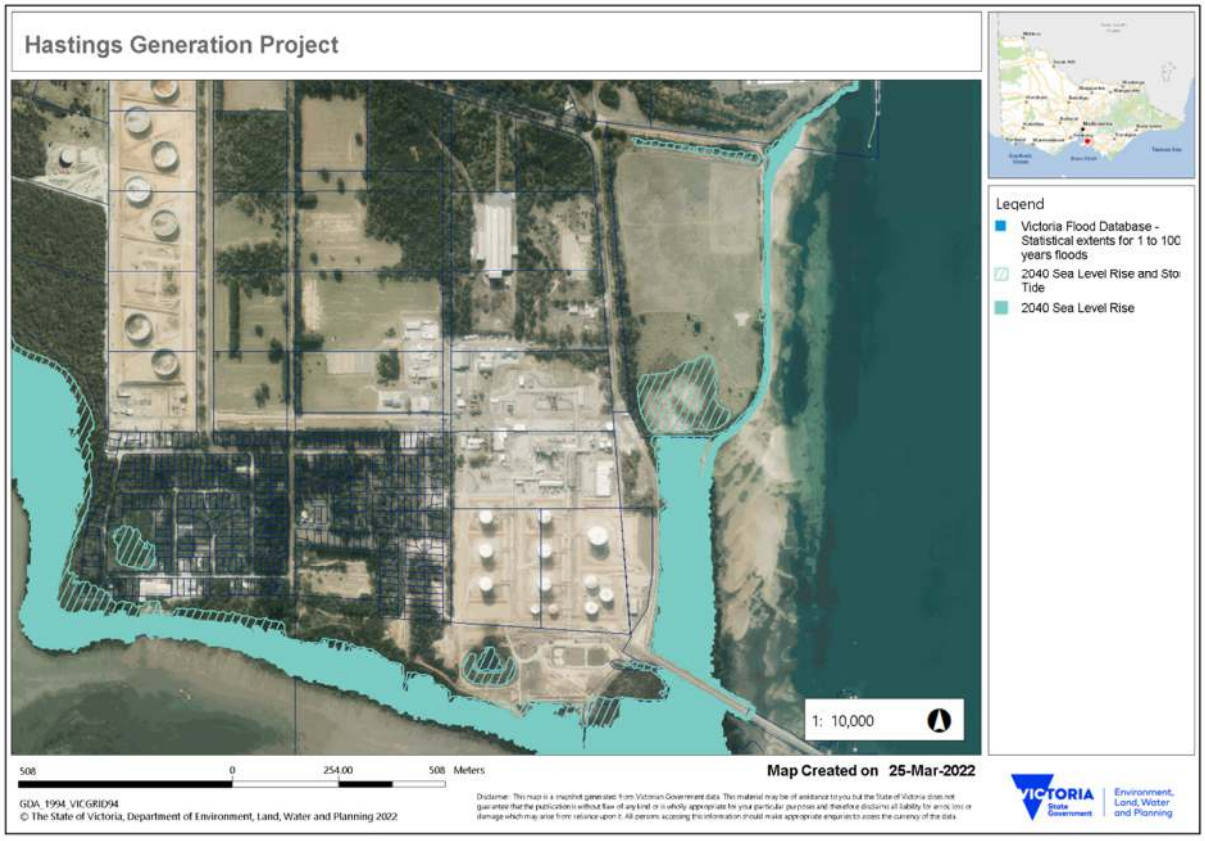
Victoria's climate is changing under the influence of both natural variability and global warming [6]. The average temperature has increased across the state by 1.0°C since 1910. DELWP [7] have noted that on the Mornington Peninsular temparatures have increase from between 1.2 and 1.4°C since 1950. It is

anticipated that temperatures will continue to increase by between 0.55°C and 1.3°C by 2030, depending on the emissions scenario modelled (low to high) [6]. 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 [8].

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 [7] 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 in 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 [9]. The area around the Project site is shown in Figure 16.

Figure 16: 2040 sea level rise and storm tide (Source: Hydra [9])



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.

4.4. Topography

The Project area is located within the Gippsland Plain Bioregion, which is characterised by flat to gently undulating terrain [10]. 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 [1]. The centre of the project area has an elevation of approximately 15 metres above sea level, approximately 2.5 metres higher than its southern

neighbour, LIP. Attachment 1 outlines the existing elevations of the site and what the final elevation will be once the cut and fill operations have been completed.

4.5. Geology and Soils

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 [11]. 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 [12].

The Geovic3 online, 1:250,000 series, Seamless Geology (2007-2014), indicates the site surface geology is Neogene period Red Bluff Sandstone, which at the site is expected to be a relatively deep deposit of unconsolidated clay and sand.

Soil samples were taken from 8 locations at the project site in 2021. The bore locations are shown in Figure 19 and borehole logs are provided in Attachment 4. 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 [13].

Figure 17: Photo of the test pit dug at BH06 (Source: Black Geotechnical [1])

Figure 18: Photo of the test pit dug at BH08 (Source: Black Geotechnical [1])

Figure 19: Borehole location plan (Source: Black Geotechnical [1])

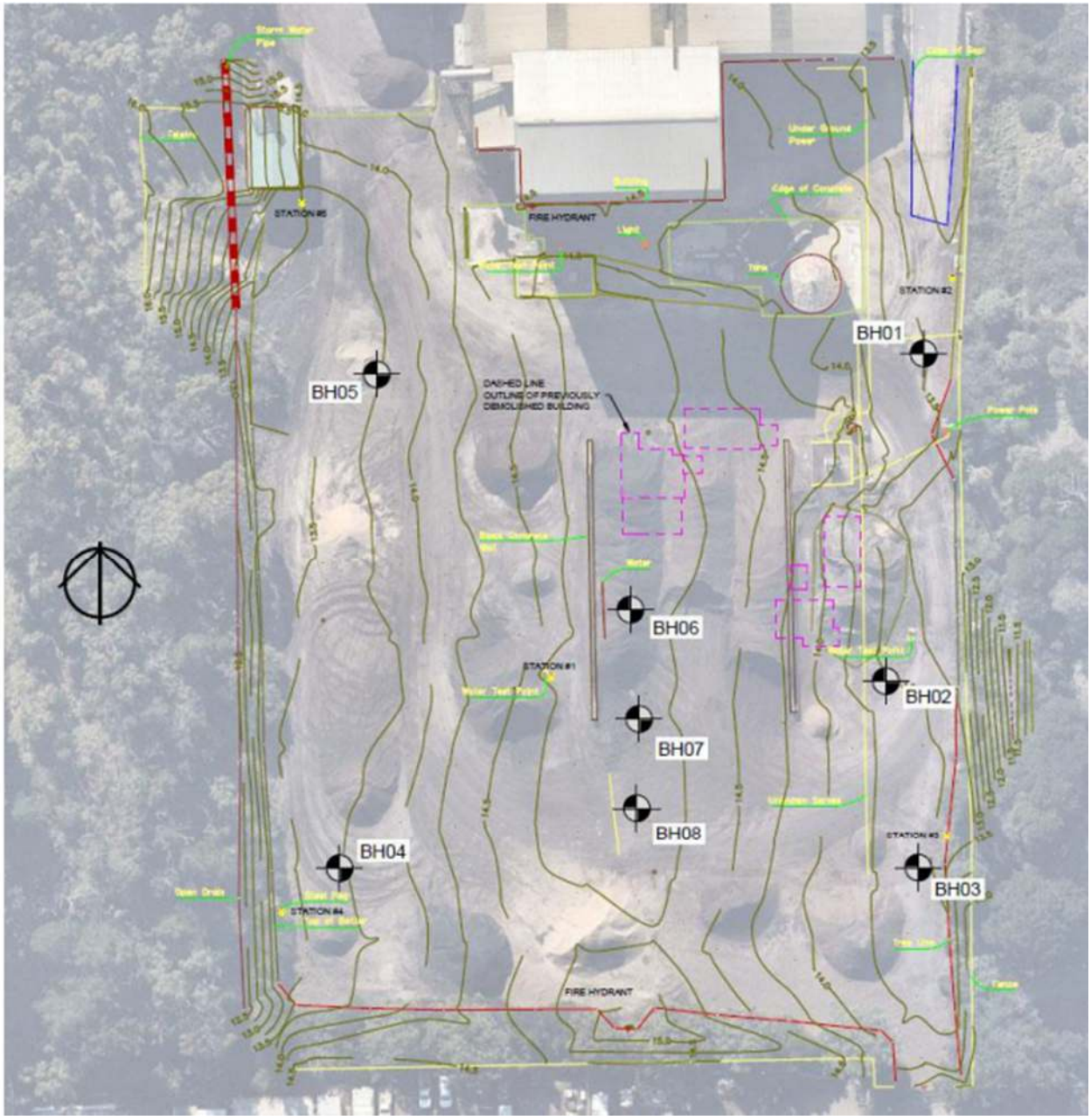


Table 2: Summary of subsurface profile (Source: Black Geotechnical [1])

Stratum			Depth & thickness (m)		
Unit	Type	Description	Top	Base	Thickness
1a	Fill	Sandy GRAVEL, dense, fine to coarse grained, grey, pale brown, dry, angular gravel 20-50 mm, with sand	0	0.4-0.6	0.4-0.6
1b		Clayey SAND, fine to coarse grained, yellow, moist with gravels (only in 2 bore holes)	0	0.1	0.1
1c		GRAVEL, dense, coarse grained, grey, wet, gravel 20 mm (only in 2 bore holes)	0.1	0.2	0.2
1d		Silty CLAY, very stiff, high plasticity, red orange (only in 2 bore holes)	0.2	0.7	0.5
		Concrete slab (in 2 bore holes)	0.06, 0.07	-	-
1e		Silty CLAY, very stiff, high plasticity, black (only in 1 bore hole)	0.7	1	0.3
2a	Red Bluff Sandstone	Silty CLAY, friable to hard, high plasticity, brown, orange, red, grey	0.4-1.0	2.0->3.0	1.5->2.6
2b		Clayey SAND, dense to fine grain, pale brown	2.0, 2.6	>3.0	>0.4, >1.0

Black Geotechnical [1] report of the project area states:

> *In summary, BH01-BH06 encountered 0.4-0.6 m (average 0.5 m) of granular fill. BH07 and BH08 in the south centre part of the site encountered 0.2 m of granular fill over very stiff clay fill to depths of 0.7 m and 1 m, respectively.*
>
> *Natural clay (Unit 2a) was relatively consistent across the site. The consistency (shear strength) of the clay was relatively uniform, being friable at the top of the stratum becoming very stiff to hard.*
>
> *BH03 is the outlier, DCP results indicate its consistency is firm below about 1.3 m. This is for some reason due to a higher moisture content in this area, which could be due to drainage or nearby faulty underground services. No major differences were observed in the nature of material excavated when comparing BH03 to other bore holes.*
>
> *Clayey sand (Unit 2b) was encountered below 2 m in BH01 and BH03. Both boreholes are on the eastern side of the site. The sand was not encountered in BH02, which is between the two boreholes. Clayey sand at depth is consistent with the reported geology.*

Victorian Resources Online (VRO) have mapped the soil pH in the region as between 6.1 and 7.4, slightly acidic to neutral [14]. 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 undertaken during the geotechnical investigation 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 [1]. The presence of CASS was not encountered on site.

4.6. Surrounding Land Use

- As can be seen in

4.6.1. Power Plant Equipment Packages

The following sections provide more detail on the individual equipment packages that make up the Hastings Generation power plant. Figure 3 and Figure 4 show preliminary 3D modelling of the gas turbine packages once installed. Note that the turbines packages will be installed upon a concrete pad. The drainage associated with each pad can be isolated and sent to a sump tank for collection and disposal off-site at a registered facility. Thus reducing the risk of stormwater contamination.

Figure 3: Preliminary 3D model of installed Titan 130 gas turbine generator

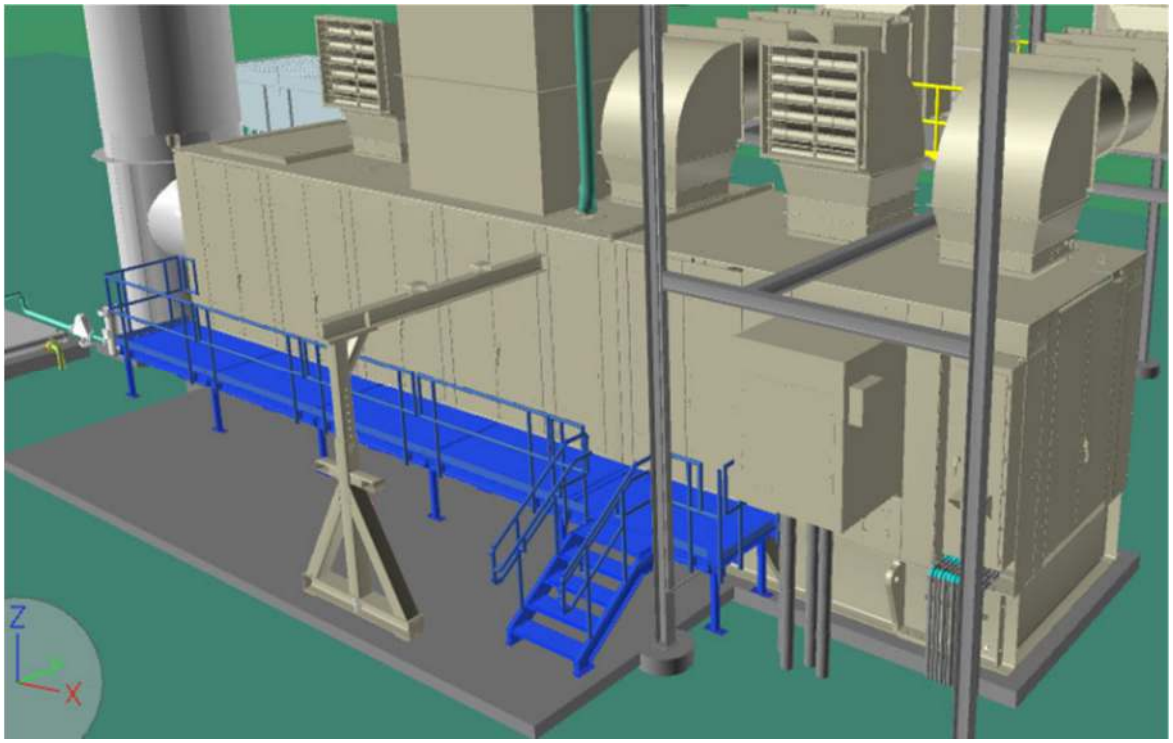
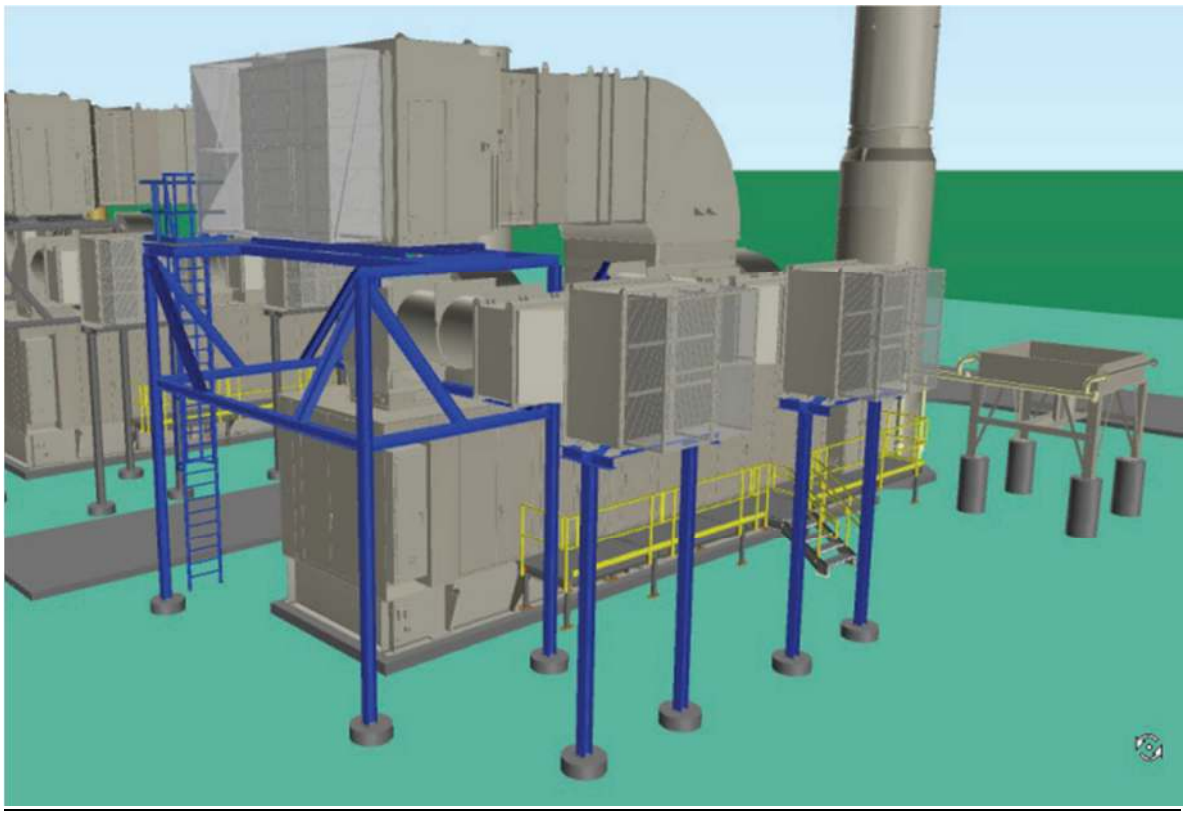


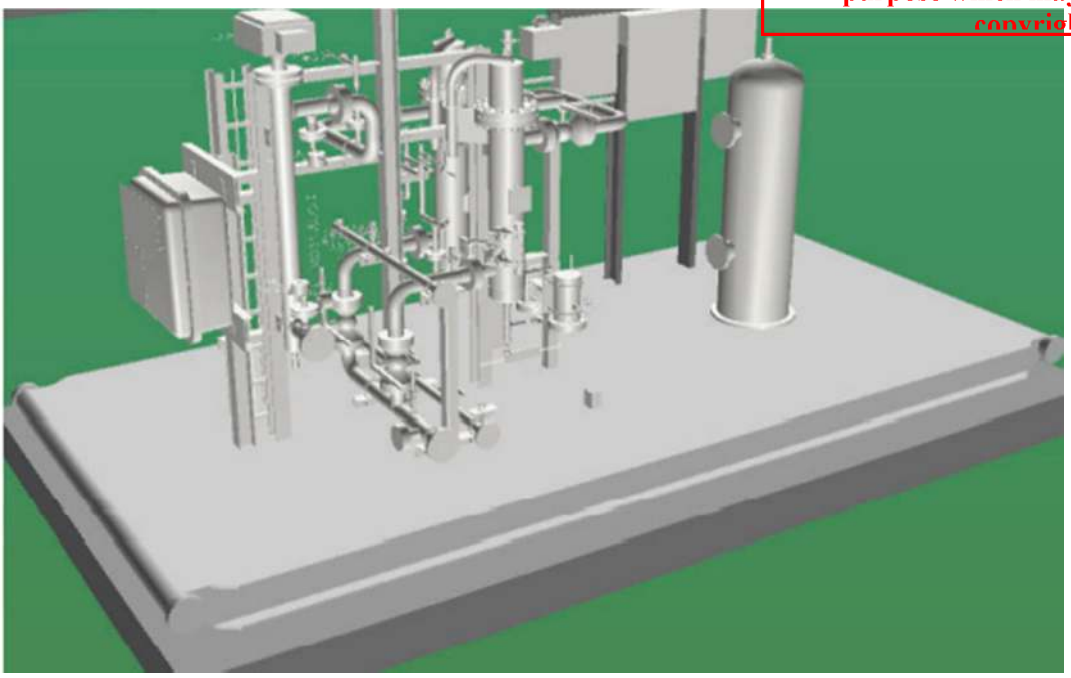
Figure 4: Preliminary 3D model of Titan 130 gas turbine generator, including air inlet filter & enclosure vent filter, access platforms and support structures



4.6.2. 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 5). 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. Each fuel gas conditioning skid is located within the turbine package concrete pad.

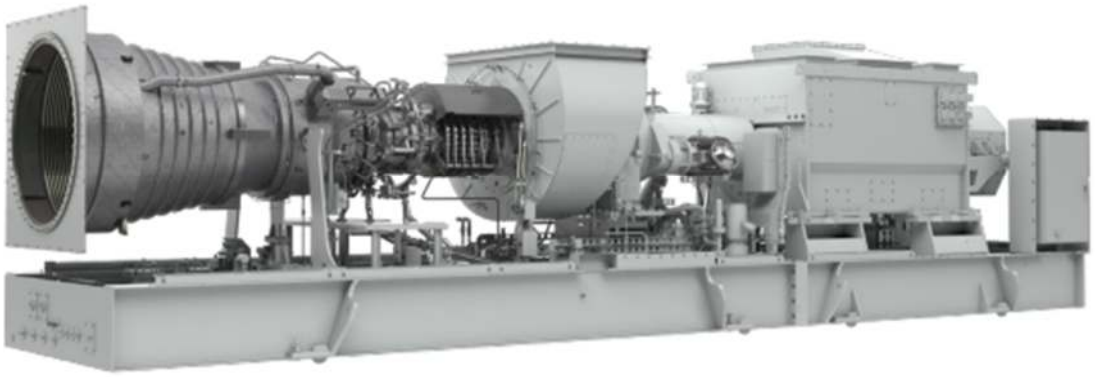
Figure 5: Fuel gas conditioning skid



4.6.3. Gas Turbines

The Titan 130 gas turbine generator set consists of an axial-flow gas turbine engine, generator, and reduction-drive gearbox (Figure 6). 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 6: 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.

4.6.4. 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 as per AS 1940. 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.

4.6.5. 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.

4.6.6. 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.

4.6.7. 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.

4.6.8. Generator Transformers

The power plant's transformer system will consist of 2 x 40/60 MVA, 11/66 kV generator transformers, each capable of supporting the power station's full load capacity of 40.5 MW.

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.

4.6.9. Switchyard

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.

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.

4.6.10. Road Layout

The road layout proposes circumferential roads around the HGP turbines and a road link completing a circuit around the existing warehouse buildings.

These have been designed to Austroad standards and industry (subdivisional road) practice. As a result, the roadways will consist of a 450 mm deep crushed rock flexible pavement with 50 mm asphalt wearing surface.

4.6.11. Drainage

As mentioned above, existing stormwater drainage runs north-south along the east and west perimeter of the project site. Most of the stormwater system on system consists of buried pipe, with the exception of an open culvert located next to the existing vacant yard. The project does not propose to alter the existing stormwater drain layout (refer to Figure 12).

New drainage will be installed in connection with the new road ways and proposed infrastructure to prevent build-up of rainwater in operational areas. This drainage is designed using Australian Rainfall and Runoff (ARR) data for Hastings 5% Annual Exceedance Probability (AEP).

Kerbs have been designed to ensure rain water flows to the existing stormwater system and prevent pooling on site as shown in Figure 7.

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 kilo Newtons (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 7: Project kerb grading plan

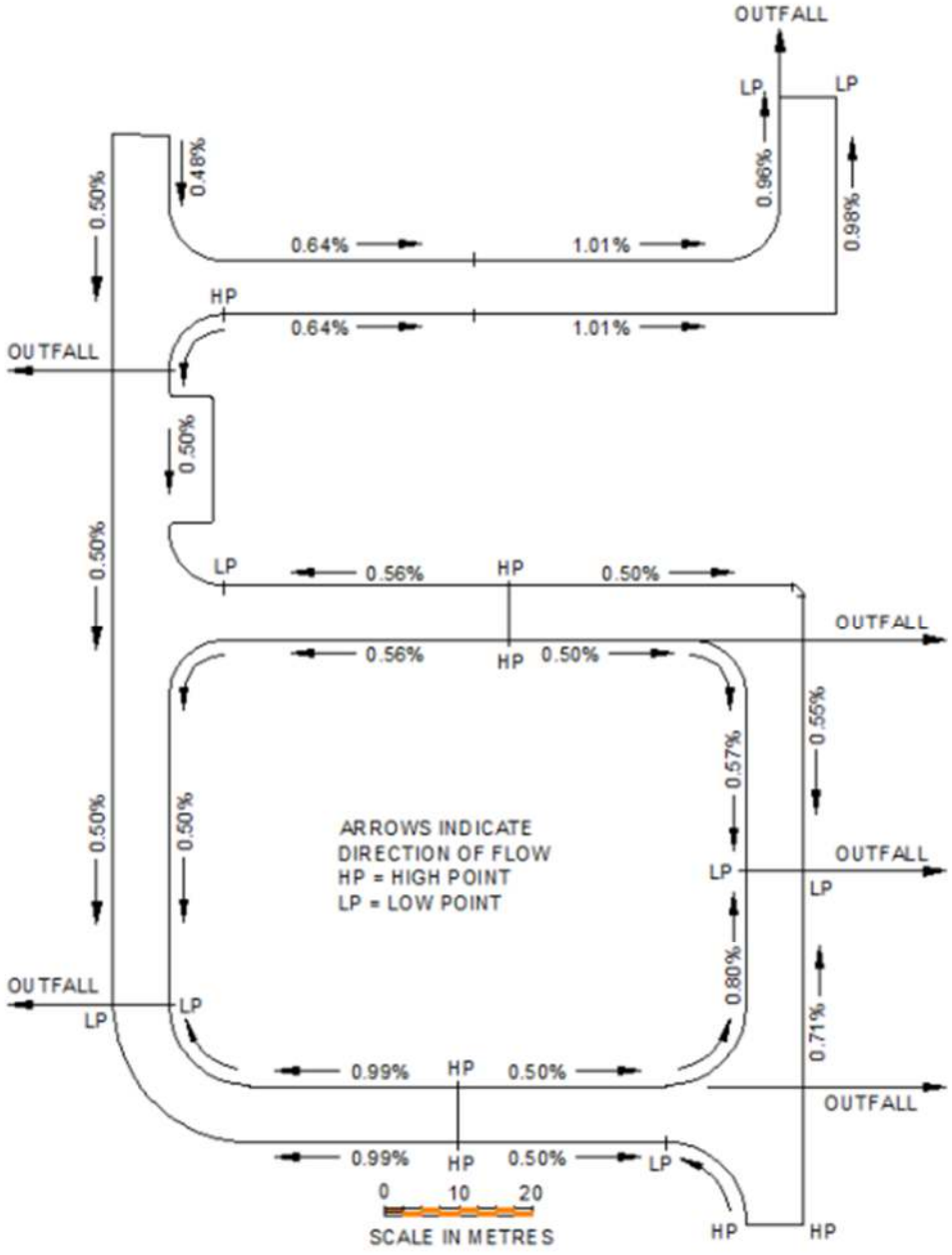


Figure 8: Catchment plan and drainage layout

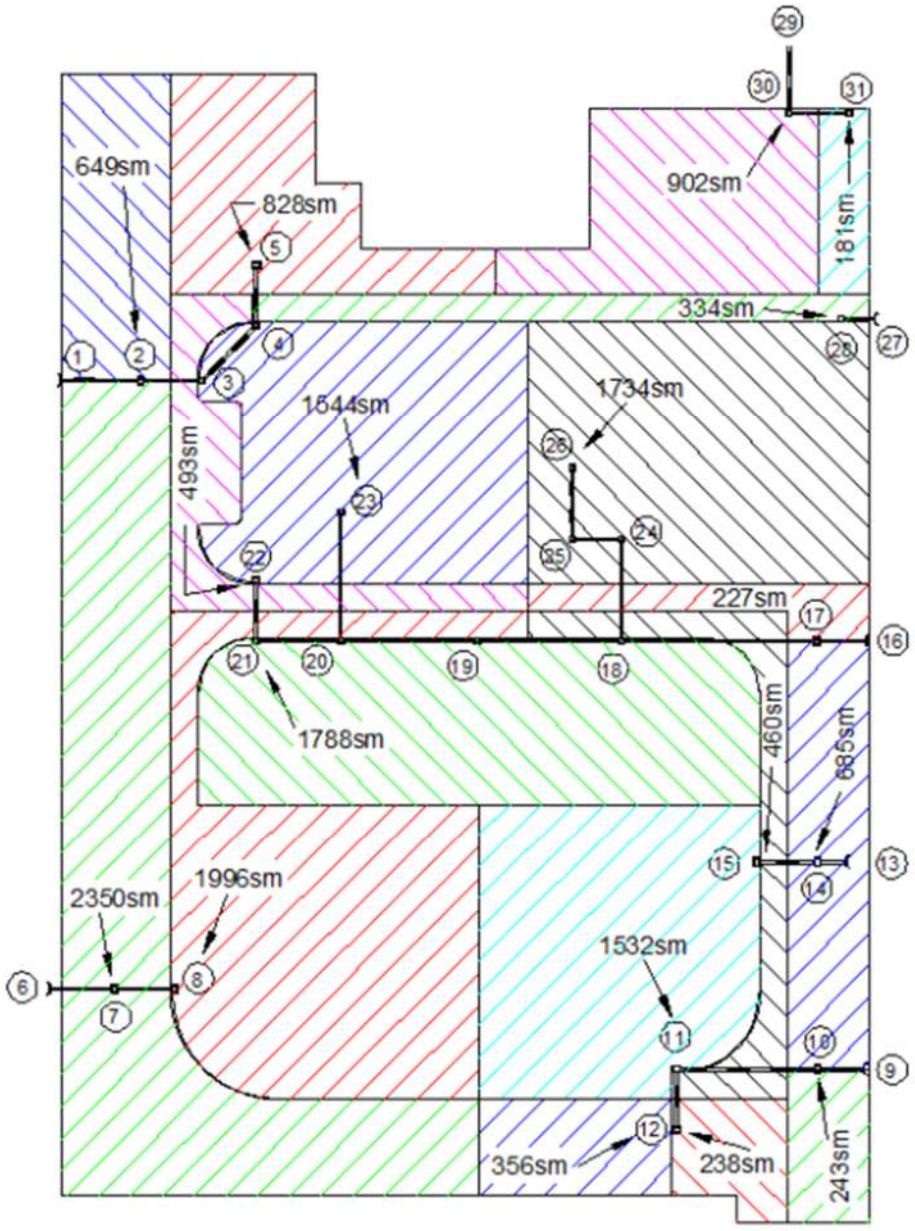
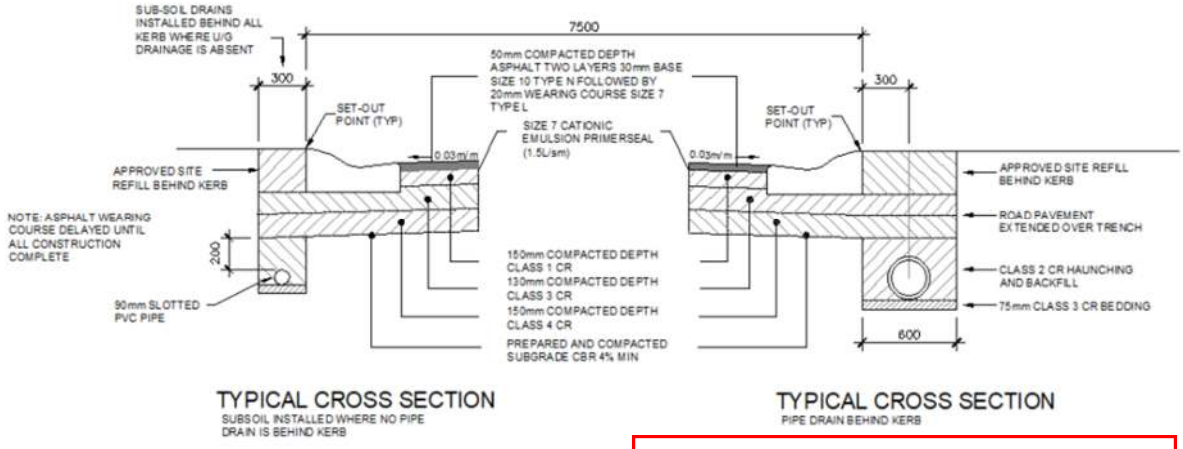


Figure 9: Kerb drainage cross section



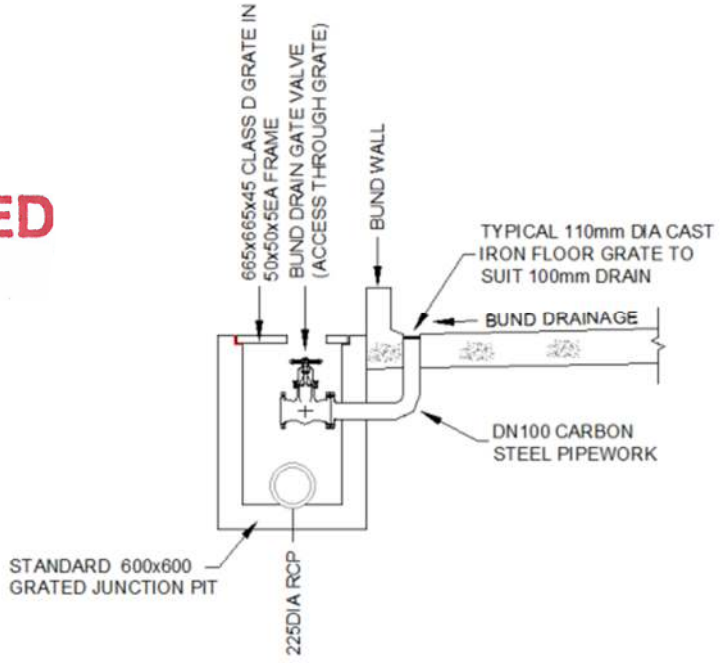
4.6.12. Bunded Drainage

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.

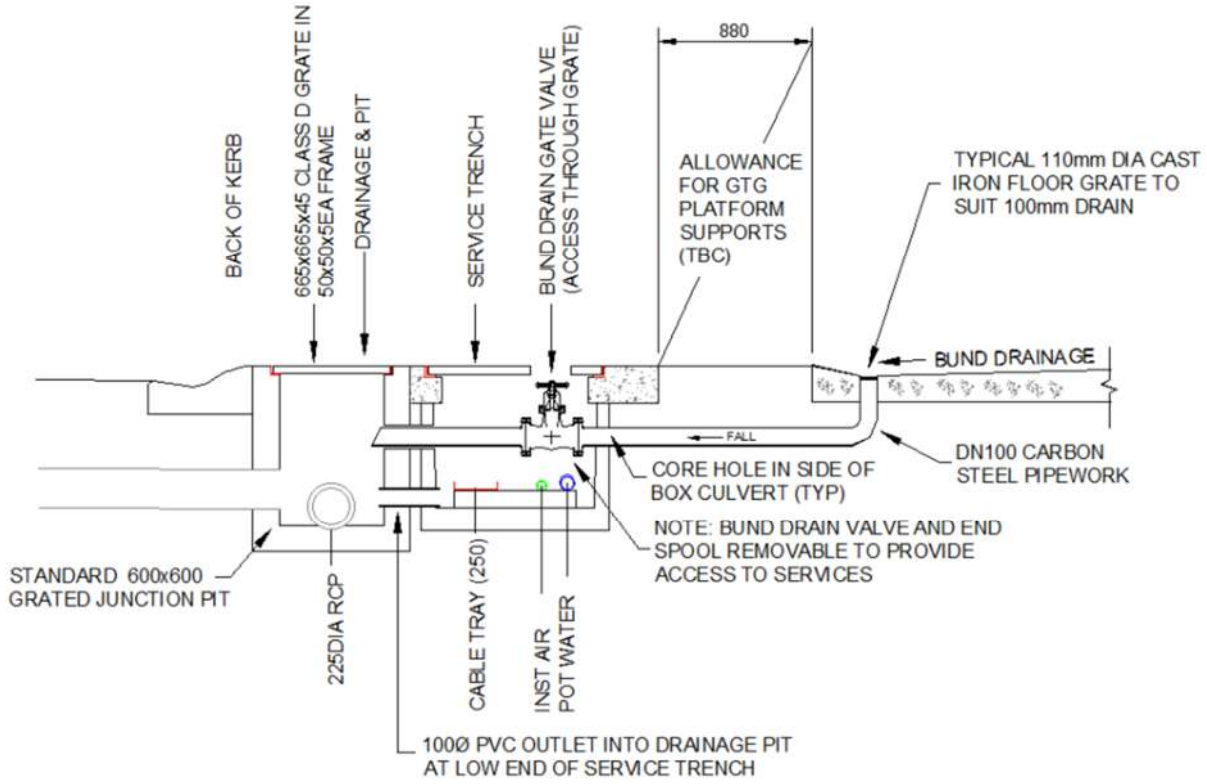
Figure 10: Bund drainage with gate valve



4.6.13. 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 11: 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.

4.6.14. 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 potentially 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. Refer to Attachment 7.

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

4.6.15. Water Supply

Currently water to the LIP facility is provided at a connection near to the LIP 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.

4.6.16. 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. The firewater tank will store rainwater collected from the Operations Centre, and supplemented from mains water to ensure it is ready for use.

4.6.17. 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 stored and contained in designated, bunded 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). Hazardous substances will be stored within the existing warehouse facilities, thus limiting their exposure to the elements.

A hazardous substances register will be in place for the construction and operations activities.

4.6.18. Waste

4.6.18.1. Construction Waste

The following construction waste materials are likely to be generated:

- Rock and soil overburden from pipe laying;
- Rock and soil from site levelling 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.

4.6.18.2. 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 Operations Centre 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.

4.6.18.3. Sewerage

An existing sewerage line runs between LIP and the Project site.

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.

Sewer design is currently on hold as it depends on investigation of the existing system inside LIP for an outfall point. It is possible to connect to the LIP treatment plant by gravity feed if the buildings are located within the vicinity of the turbines. Or the project will adopt a similar system to that used during construction of a tank and pump-out demountable building arrangements.

4.7. Commissioning

4.7.1. Piping

Following installation of the ethane piping, the pipe would be pressure tested 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.

4.7.2. Turbine Generators

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

4.8. Operations

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.

The onsite drainage systems around the process equipment have been designed to capture all contaminated waters, minimising the potential for uncontrolled releases into the stormwater system. The collected contaminated water will be disposed offsite at an appropriately licensed facility.

Hazardous substances, waste and sewerage shall be handled and disposed of as discussed in Section 2.1.17 and 2.1.18, above.

, to the north of HGP is Bayview Road and industrial facilities associated with BlueScope Steel. To the south of the project area is LIP prior to reaching Western Port. East of HGP is grazing land, dissected by Long Island Drive, prior to reaching Western Port. To the west, a buffer of native vegetation and grazing land exists between HGP and LIP's tank farm.

A small number of residential and commercial properties are located approximately 700 - 1000 metres, south west of HGP, on the far side of LIP.

5. Existing Conditions

5.1. Surface Water

Surface water is not present at the HGP site. The closest surface water to the HGP site includes (refer to Figure 20):

- 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.

Any surface runoff from the site will be directed to the stormwater system (refer to Attachment 3), therefore the potential for any site runoff migrating to Olivers Creek is extremely low.

With the site stormwater drains connecting to LIP's stormwater drain, any surface water runoff will make its way to Western Port.

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.

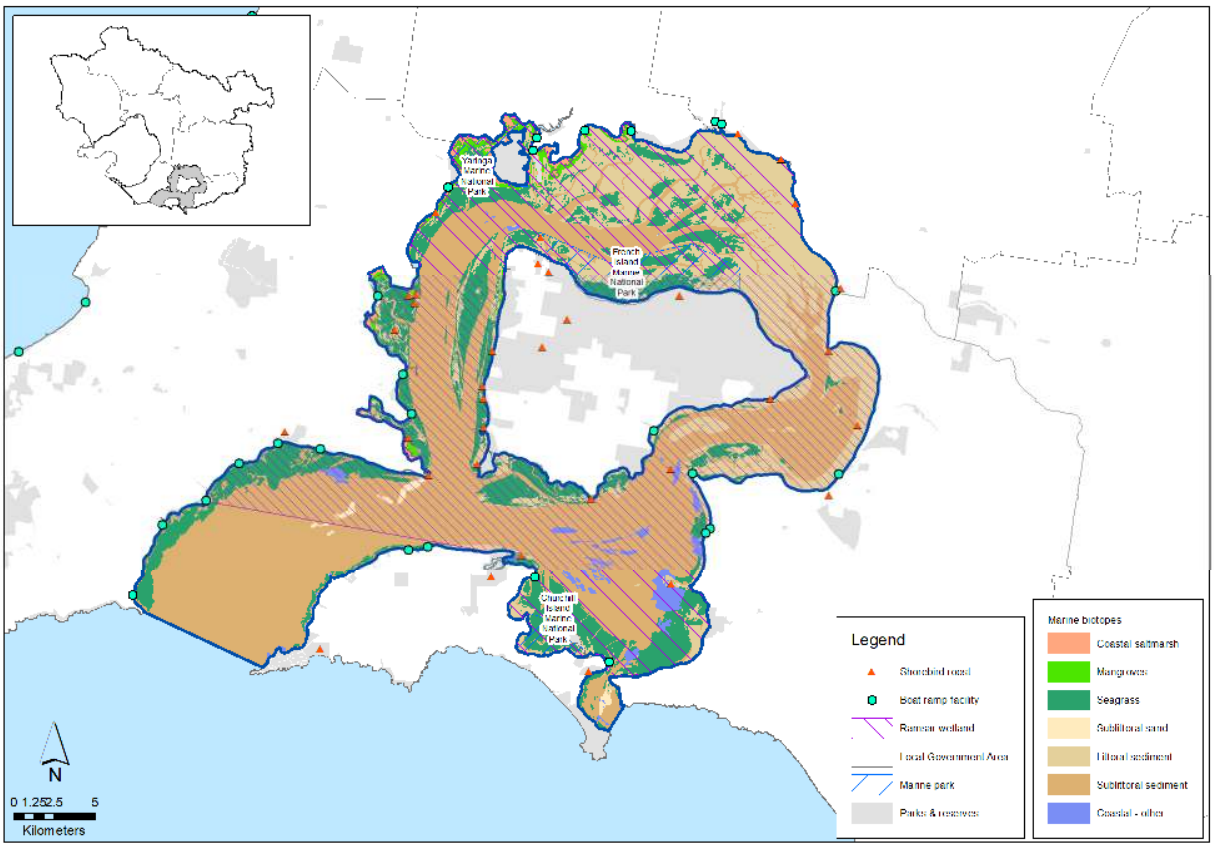
Figure 20: Surface water locations (Source: DAWE [15])

5.1.1. 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 [16]. 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.

Figure 21: Marine habitats in Western Port (Source: PPWPCMA [16])



Western Port is a key breeding area for some species such as elephant fish, school shark and Australian anchovy, and a nursery area for other species such as King George whiting, yellow-eye mullet and Australian salmon. 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 [16].

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 [16].

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 [16].

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.

Saltmarsh surveys indicated that as much as 85% of its pre-European extent has been preserved in Western Port. About 1,140 hectares remain despite substantial losses around the Hastings foreshore and marina, and industrial development at nearby Long Island Point and at The Inlets [16].

Intertidal sand and mudflats cover an area of approximately 27,000 hectares, which represents nearly half of Western Port Ramsar site area of approximately 60,000 hectares. One of the outstanding characteristics of the soft-sediment fauna of Western Port is the diversity of invertebrates including unique ghost shrimp species. Exposed at low tide, the sandbanks and mudflats are vital feeding grounds for shorebirds, including internationally migratory waders [16].

5.1.2. Surface Water Quality

The HGP lies within the Western Port Catchment. Surface water runoff and groundwaters from the project area have the potential to migrate to Western Port.

Water quality monitoring locations have been established by EPA or Melbourne Water along the key river systems (such as Cardinia Creek and Bunyip River), at Tyabb, Hastings and within the bay itself at Hastings and Corinella.

5.1.2.1. Water Quality Monitoring

The EPA undertakes an annual assessment of Western Port's water quality. Reviewing key indicators against Victoria's environmental quality objectives for relevant indicators in the ERS (2021).

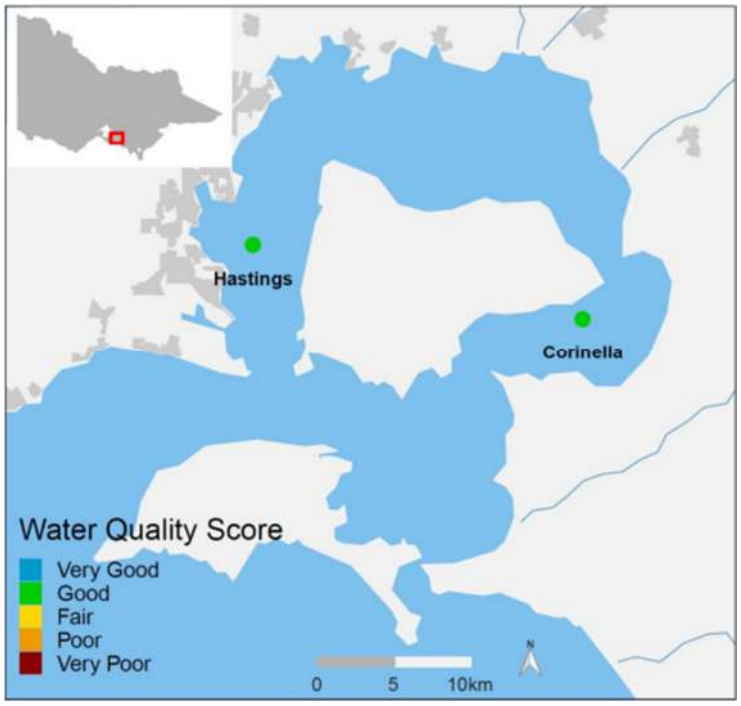


Figure 22: WQI scores of long-term EPA marine monitoring sites in Western Port (Source: EPA [17])

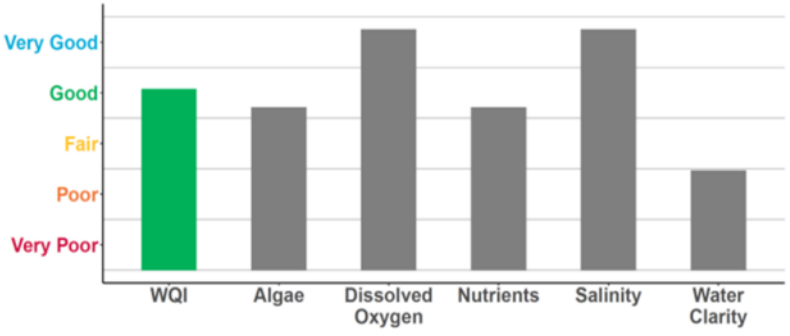
Water quality indicators used for the bay are:

- Algae (chlorophyll-a)
- Dissolved oxygen
- Metals (where data is available)
- Nutrients (total nitrogen)
- Salinity
- Water clarity

The EPA's Report Card 2020-21 [17], states the overall water quality in Western Port Bay was good, with conditions essentially remaining consistent since 2000.

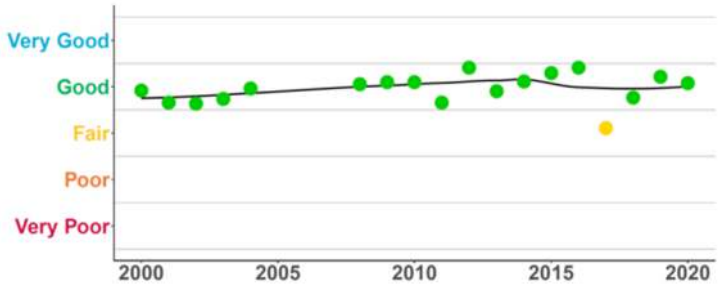
The EPA has a permanent monitoring location at Hastings. Results show the water quality at Hastings is generally Good. This area of the bay is regularly flushed and mixed with oceanic waters from Bass Strait.

Figure 23: WQI scores for Western Port Bay in 2020-21 (Source: EPA [17])



Reduced water clarity resulted in a Poor rating for this parameter (Figure 23). The northern and eastern areas of the bay are mostly intertidal mudflats dominated by inflows from Cardinia Creek, Bunyip River and Lang Lang River. These rivers are a source of pollutants (such as nutrients and sediment) from the catchment to the bay.

Figure 24: Historical WQI scores for Western Port Bay from 2000-01 (Source: EPA [17])

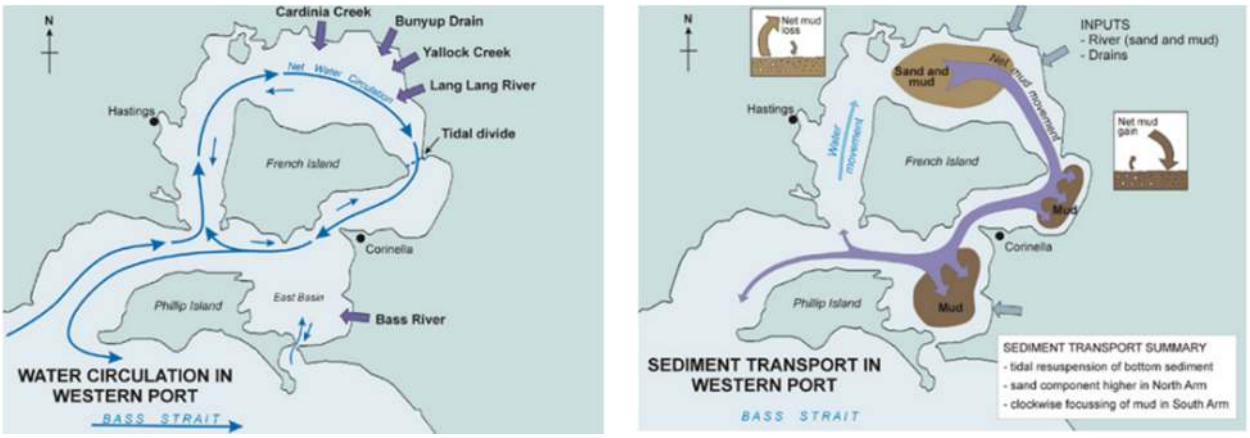


5.1.2.2. Toxicology Assessment

RMIT together with Melbourne Water have undertaken a toxicology assessment of Western Port Bay [18] [19]. Toxicant hotspots were identified north of HGP at Watsons Creek and south at Warrangine Creek and Hastings Marina.

Water circulation and sediment transport was shown to generally travel in a clock wise direction as shown in Figure 25.

Figure 25: Schematic summaries of (a) bay-wide circulation and (b) sediment transport in Western Port (Source: Melbourne Water [19])



Key findings of the toxicology assessments in Western Port are:

- Levels of heavy metals, hydrocarbons, pesticides and anti-foulants appear to be generally low across Western Port
- Storm events increase the risk of pesticide exposure, increased rainfall links with increased pesticide occurrence and concentrations.
- No site-specific impacts are apparent in fish, though fish show signs of general stress.
- The primary sediment inputs into Western Port are rivers and coastal bank erosion.

5.2. 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 (Western Port approximately 700 m 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 [13].

Groundwater monitoring was conducted at the site during 2008 and 2013 [13], and again in 2021 as part of the previous occupants's due diligence requirements [40]. Four groundwater monitoring wells were installed (GW1, GW2, GW3 and GW4) (refer to Table 3). A summary of the groundwater well construction details are provided on the Borehole Logs presented in Attachment 5.

Table 3: Groundwater bore and groundwater depth (Source: Douglas Partners [13])

Groundwater Bore ID	Drilling Date	Bore Depth (m)	Depth to Groundwater During Drilling (m)	Screened Interval (m)
GW1	June 2008	13.7	12.5	10.7 - 13.7
GW2	July 2008	12.0	10.8	9.0 - 12.0
GW3		13.7	12.5	10.7 - 13.7
GW4		13.2	10.5	10.2 - 13.2

Note: All depths below existing ground level

Based on the inferred south-easterly groundwater flow direction, monitoring well GW1 is considered to represent the up gradient well and GW3 and GW4, the down gradient wells [13].

A summary of groundwater sampling conditions encountered during sampling is provided in Table 4.

Table 4: Summary of groundwater observations during purging and sampling (Source: Douglas Partners [13])

Well ID	SWL Prior toPurging (m bgl)			Water Level Drawdown (m)		EC (mS)			Water Observations
	2021	2013	2008	2013	2008	2021	2013	2008	All years
GW1 [1]	13.43	12.30	13.10	0.3	-	1.10	1.58	-	no odour
GW2	11.53	11.33	11.30	0.01	-	1.00	1.82	-	no odour
GW3	12.08	11.17	11.90	0.62	-	2.13	4.55	-	no odour
GW4	10.54	10.38	10.50	0	-	1.22	2.07	-	no odour

bgl = Below ground level EC = Electrical conductivity mS = milliSiemens/cm

1. Note that GW1 has been reinstalled in 2021 as previous well had been destroyed. This well has been located to replicate the expected measurement conditions of the previous well [40]

The 2013 field recorded EC values equated to a TDS range of between 950 mg/L and 2730 mg/L which was consistent with laboratory determined TDS values recorded in 2008 and with Segment B of the groundwater SEPP[2].

[2] State Environment Protection Policy (Waters) - the legislative framework relevant for water quality at the time of testing

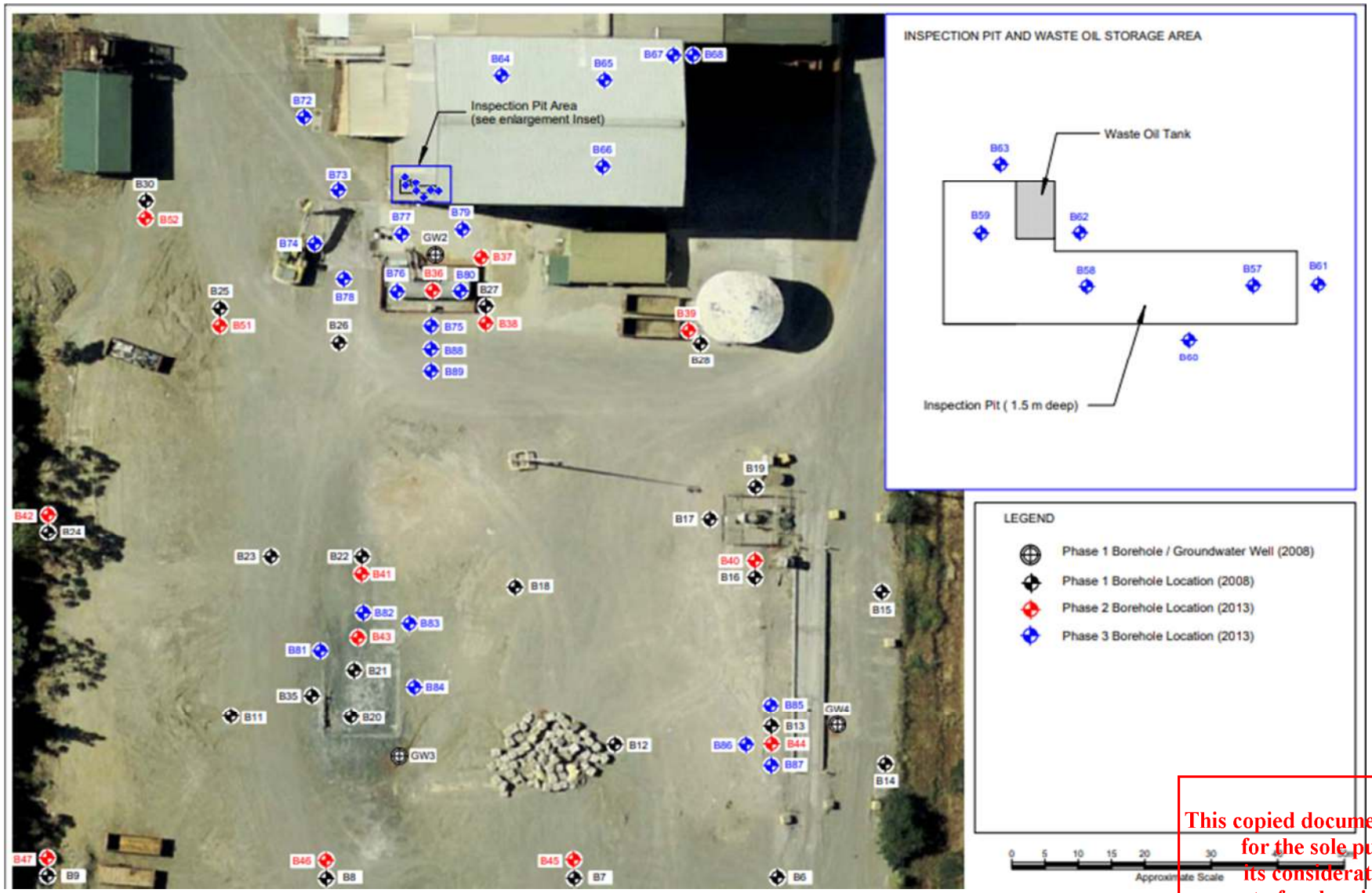
The 2021 sampling results found a TDS range from 700 to 1600 mg/litre, with one well (GW2) having a value greater than the ANZECC 2000 recreational water quality and aesthetics criteria of 1000mg/litre.

Table 5: Summary of groundwater TDS results from 2021 analysis [40]

Well ID	TDS Mg/L
GW1	740
GW2	1600
GW3	830
GW4	700

Site geotechnical work observed no groundwater in the boreholes at the time of drilling. An existing standpipe on site was dipped. Water was recorded at 10.35 m below the existing surface level at RL 2.95 metres [1].

Figure 26: Borehole locations for geotechnical study conducted 2008 and 2013 at the project site (Source: Douglas Partners [13])



5.2.1. Registered Groundwater Bores

A review of Bureau of Meteorology (BOM) Australian Groundwater Explorer [21] was reviewed to investigate registered groundwater bores in the region. While a number of monitoring and water supply wells were registered within 1 kilometre of HGP (Figure 27), bore records were only available on 17 bores registered within approximately 1 kilometre of the HGP (Table 6). The monitoring well at HGP has been decommissioned.

Table 6: Registered bores in the vicinity of the Hastings Generation Project (Source: BOM [21])

Bore ID	Bore Depth (m)	Drilled Date	Purpose	Status	Latitude	Longitude
121420	12.25	1993-10-05	Monitoring	Functioning	-38.2967	145.2093
WRK986970	13.7	2008-06-25	Monitoring	Decommissioned	-38.2965	145.2173
121421	10.5	1993-09-30	Monitoring	Functioning	-38.2938	145.207
121416	13	1993-08-31	Monitoring	Functioning	-38.2916	145.2102
97220	59.43	1966-12-31	Water Supply	Functioning	-38.3037	145.2166
121418	9.6	1993-10-08	Monitoring	Functioning	-38.2996	145.2196
121423	6.5	1993-10-07	Monitoring	Functioning	-38.299	145.2079
121413	21.5	1993-08-26	Monitoring	Functioning	-38.2943	145.2128
97222	46.33	1973-06-29	Unknown	Functioning	-38.3033	145.2142
121415	7	1993-08-27	Monitoring	Functioning	-38.3059	145.2221
121422	5.4	1993-10-07	Monitoring	Functioning	-38.3058	145.2186
97280	18	1988-03-01	Water Supply	Functioning	-38.3009	145.2138
121419	11	1993-10-05	Monitoring	Functioning	-38.2938	145.2083
113378	10.5	1992-04-13	Water Supply	Functioning	-38.3025	145.2103
121417	7.5	1993-09-01	Monitoring	Functioning	-38.2983	145.2095
121414	9.2	1993-08-26	Monitoring	Functioning	-38.3028	145.2166
97287	29	1990-08-15	Water Supply	Functioning	-38.3018	145.2101

Figure 27: Bore locations within one kilometre of HGP (Source: BOM [21]

5.2.2. Groundwater Flow Systems

The HGP lies within the local Brighton Group sediments (GFS 10). Local flow systems occur where the sand forms isolated caps on dissected ridges. Where the unit has been extensively ferruginised or silicified, the groundwater flow pattern can be locally distorted, resulting in shorter flow paths [22].

The web-GIS Visualising Victoria's Groundwater (VVG) [22] details the hydrogeology for the site as:

Aquifer type (porosity): Gravels to fine sands, silts and clays (primary porosity), ferruginised or silicified rock (secondary porosity).

Aquifer type (conditions): Unconfined to semi-confined

Hydraulic Conductivity (lateral permeability): Variable and largely unknown. Probably from 1-2 m/d to 10 m/d, with clayey facies less than 1 m/d and sandy facies 5-10 m/d.

Aquifer Transmissivity: Variable, but generally in the moderate range. Estimated to be generally less than 20 m^2/d.

Aquifer Storativity: Variable. Estimated to be from 0.05 to 0.10.

Hydraulic gradient: Estimated to be moderate or steep (0.01) in local systems. Could be locally steep at the edges of the Pliocene sand caps on dissected ridges.

Flow length: Unknown. Possibly a few metres in local systems.

Catchment size: Estimated to be very small (<1 hectare) in local systems

Recharge estimate: Highly variable depending on location and aquifer position. Recharge has been reduced by urbanisation.

Temporal distribution of recharge: Seasonal (winter and spring) where exposed at the surface, with significantly more recharge in wetter years. May be continual steady recharge where overlain by volcanics.

Aquifer uses: Minor stock and domestic use.

Based on the depth of the groundwater system and the site currently being overlaid with highly compacted gravels and silty clays, which have a hydraulic conductivity classification of semi-permeable to impermeable, it is anticipated that the interaction between any surface water that may be present on site and the groundwater system is low. The construction of new roadways and installation of hard stand areas for equipment installation will result in little change in the ability for surface water / groundwater interaction.

5.2.3. Groundwater Dependent Ecosystems

The BOM's Atlas of Groundwater Dependent Ecosystems (GDE) [23] 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 (refer to Figure 28). 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 (refer to Figure 29). 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.

Figure 28: Terrestrial groundwater dependent ecosystems (Source: BOM [23])

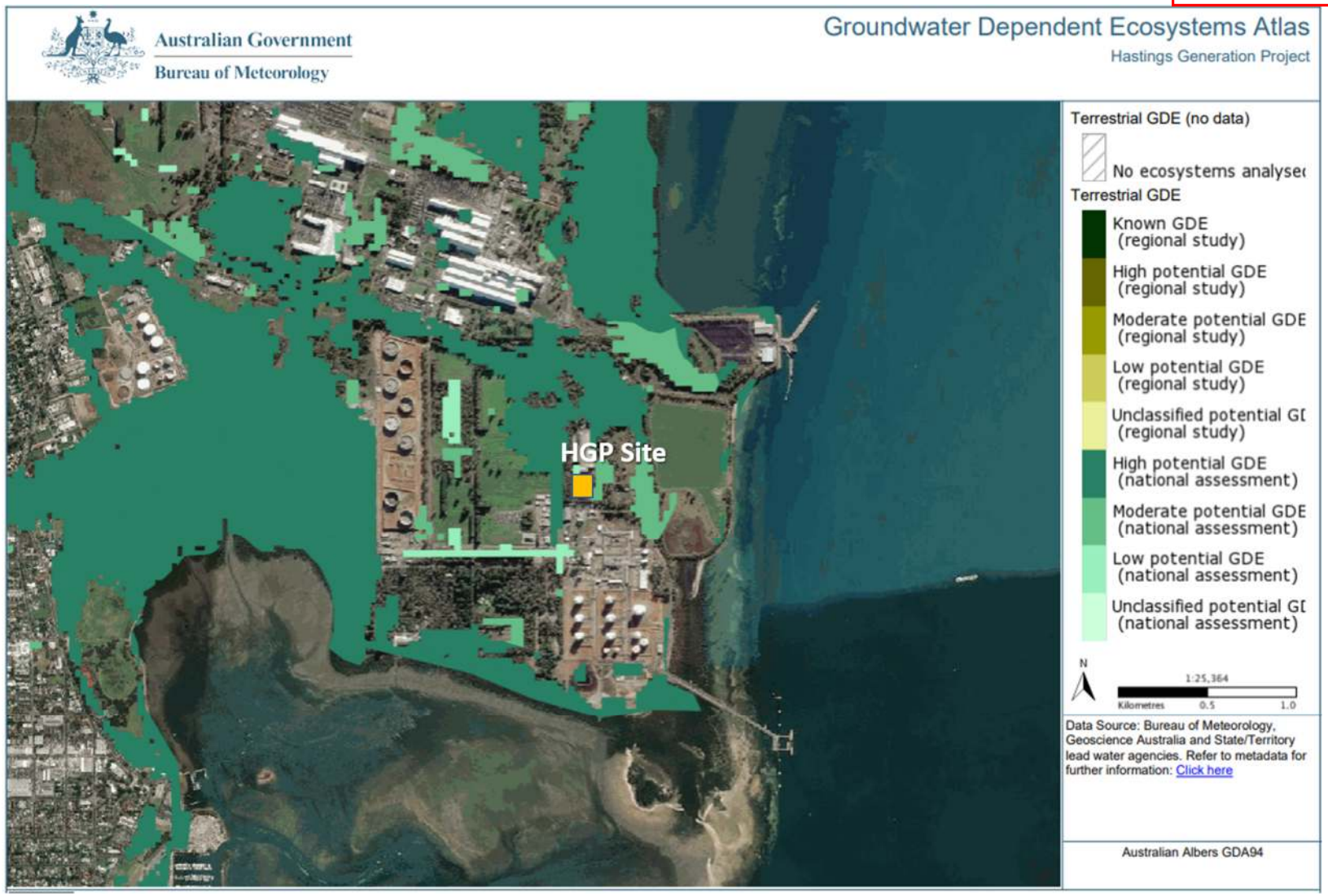
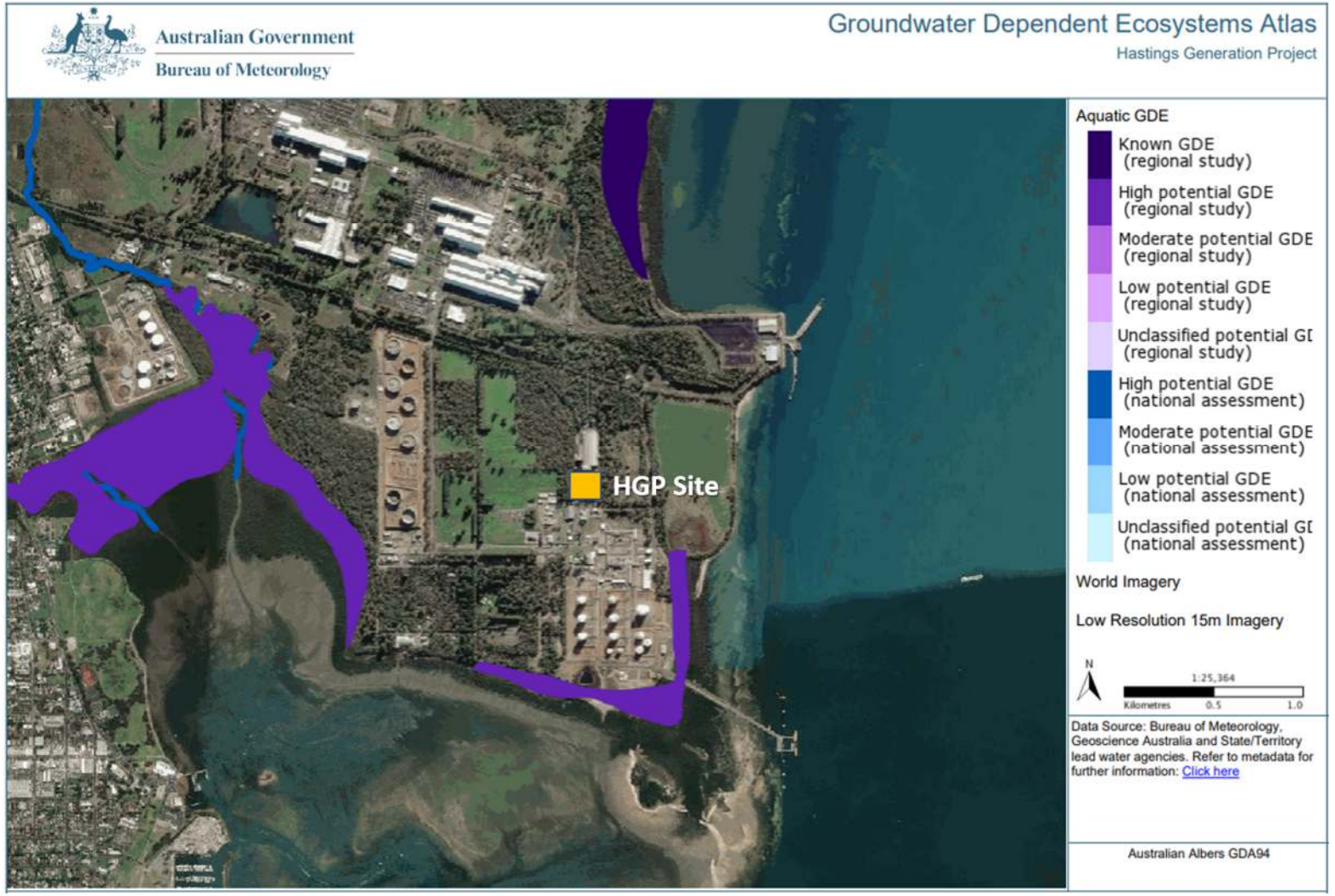


Figure 29: Aquatic groundwater dependent ecosystems (Source: BOM [23])



5.2.4. Groundwater Quality

Groundwater analysis was undertaken by Douglas and Partners [13] at the site, sampled four bores, two upgradient wells and two wells within the activity area (refer to Figure 26). 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 during 2008 and 2013 (refer to Table 7).

Table 7: Summary of metal concentrations exceeding maintenance of ecosystems criteria (Source: Douglas Partner [13])

Analyte	Concentration Range mg/L		Criteria mg/L	Recorded Exceedances	
	2013	2008		2013	2008
Cobalt	0.005 - 0.006	0.004 - 0.027	0.001	All wells	All wells
Copper	0.003 - 0.013	<0.001 - 0.005	0.001	All wells	GW2
Nickel	0.011 - 0.029	0.003 - 0.008	0.007	All wells	GW3
Zinc	0.041 - 0.053	0.014 - 0.034	0.015	All wells	GW1, GW2,GW4

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 (GW3 and GW4) relative to the up-gradient wells (GW1). 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 [13]. Further analysis from the 2021 report [40] supports this assessment.

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 [13].

6. Impact Assessment

This section examines the potential risk the project's activities pose to surface and groundwaters.

This risk assessment was undertaken utilising the risk assessment process described in Appendix B of *Guidelines for risk assessment of wastewater discharges to waterways* [24] and Section 8 of *Risk assessment guidelines for groundwater dependent ecosystems* [25]. Attachment 6 identifies the risk consequence and likelihood parameters adopted for this assessment; together with the risk matrix.

Construction activities are anticipated to commence in June 2022, following regulatory approval, and are expected to last approximately 6-9 months. Long range weather forecasting for South Eastern Australia, by BOM [26], show the Hastings area has a 50% chance of exceeding median rainfall between May and July 2022. WeatherTAB [27] have indicated that the weather in the second half of 2022 for the region will be wetter than normal but temperatures will remain in the normal range.

Melbourne Water [28] have identified the typical quantity of run-off for the Hastings area per impervious hectare is 6.3 ML/year. The HGP site has a total impervious area of 3.43 hectares (refer to Table 1). This would equate to 21.6 ML/year of runoff from the site.

Expected pollution loading from the site, based on guidance provided by Melbourne Water [28], is shown in Table 8. As noted in Table 1, the impervious area on site do not vary between what is presently at site and post construction of HGP.

Vegetation changes will be limited to type of vegetation. Approximately 0.857 hectares of native vegetation will be removed as a result of bushfire management and pipe installation. Where vegetation is removed for bushfire mitigation, the area will remain vegetated with low level vegetation. In some location it will just be the understory vegetation that will be removed. Upon completion of the ethane piping, the surface contours will be re-established and the pipe route will be revegetated with low level vegetation, such as grasses.

Table 8: Pollutant concentration data for source nodes

Surface Type	HGP area (ha)	Run-off from impervious area (ML/y)[1]	Pollutant[3]					
			Suspended solids		Total phosphorus		Total nitrogen	
			Storm flow (mg/L)	Base flow (mg/L)	Storm flow (mg/L)	Base flow (mg/L)	Storm flow (mg/L)	Base flow (mg/L)
Roof	1.09	6.9	1.3	n/a[2]	-0.9	n/a	0.3	n/a
Road and paved areas	2.34	14.7	2.4	n/a	-0.3	n/a	0.3	n/a
Vegetated areas	2.07		1.9	1.0	-0.7	-0.7	0.2	0.5

[1] based on 6.3 ML/year of runoff per impervious hectare

[2] n/a indicates that base flow does not occur from these surfaces

[3] sourced from Melbourne Water [28]

6.1. General Mitigation Measures

The project will undertake the following:

- A Development Licence will be obtained for the project from the EPA. All relevant conditions relating to soil and water management will be implemented as required by the licence.

- Esso have prepared an Environmental Management Plan (EMP) for the project. This plan will be updated throughout the life of the development. The construction contractor will be required to prepare a Construction Environment Management Plan (CEMP) that address all of requirements of the HGP EMP, ensuring to address soil and erosion management; and water management.
- Training will be provided to all construction and operations personnel, including contractors and relevant sub-contractors on erosion and sediment control practices and the requirements of the EMPs through inductions, toolboxes and targeted training.

6.2. Construction Phase

Construction of the proposal presents a risk to degradation of downstream surface water and groundwater quality if management measures are not implemented, monitored and maintained throughout the construction phase.

If unmitigated, the highest risk to water quality would occur through the following construction activities:

- Construction beneath an open stormwater culvert
- Removal of vegetation, general earthworks and pipe installation, including stripping of topsoil, excavation or filling
- Stockpiling of topsoil and vegetation
- Ancillary facilities
- Transportation of cut and/or fill materials and the movement of heavy vehicles across exposed earth
- Potential for spills/leaks.

During preliminary front-end engineering and design (FEED) a Human Health and Environment Risk Assessment [29] was undertaken for the project. The risk assessment (further details provided in Attachment 6) evaluated impacts to ground and surface waters as a result of construction activities and deemed the mitigated risk to be low.

A water risk assessment has been undertaken during detailed design, with the results shown in Table 9.

A total of 34 risks were assessed in connection to the HGP construction activities, with no extreme risks being identified.

The project identified the following unmitigated risks:

- 2 high risks associated with the impact of hazardous substances handling on aquatic ecosystems; and the impact litter has on aesthetic values.
- 17 moderate risks
- 10 low risks; and
- 5 negligible risks

An Environmental Management Plan (EMP) has been prepared for the Project. The Construction 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. With the planned and identified controls in place the risk are all managed to either a Low or Negligible risk.

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

Other specific mitigation measures for the construction phase of the Project, outside those listed above, are listed in Table 9.

Table 9: Construction phase water risk assessment

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
Uncontrolled release of sediments, soil erosion	Construction in the vicinity of stormwater drains Construction of the ethane pipe Pipe installation under the eastern stormwater culvert will require the culvert to be cut, to enable trenching to occur. Removal of vegetation, stripping of topsoil and filling Installation of ancillary facilities, such as the construction compound Stockpiling of soil and vegetation Transportation of cut and/or fill material Traffic movement on site	Cutting across the open stormwater culvert will permit sediments and other contaminants to enter the stormwater system, ultimately migrating to Western Port. A total of 0.857 hectares of native vegetation is proposed to be cleared in patches [30]. The native vegetation to be removed is not in an area mapped as an endangered Ecological Vegetation Class Mobilisation of sediment associated with general earth works can impact on water quality during the construction phase if runoff is allowed to mobilise exposed soils particularly when these sites are located close to waterways. If the site is poorly maintained litter and other contaminants could enter the stormwater system. The earthworks and movement of construction vehicles within the project area could increase erosion and sediment deposition in the stormwater system. Movement near the open stormwater culverts could potentially disturb contaminated sediments, potentially having an adverse impact on water quality	Aquatic ecosystems	2	5	Mod	Prior to works commencing on the stormwater culvert a barricade will be erected, both north and south of the work zone. Following pipe installation, the stormwater channel will be cleared of debris and the concrete culvert reinstated to the original design parameters, any silt will be removed and the barricade removed. Soils around the culvert will be stabilised and sediment control measures will remain in place until stabilised. Construction Contractor to prepare and implement an Erosion and Sediment Control Plan Erosion and sediment control measures to be installed prior to commencing disturbance works Works to be planned to minimise the extent and duration an area remains exposed. Manage vehicle movements to designated roads and access areas. Surplus soils are to be collected for temporary storage on site and tested prior to disposal in accordance with waste category or reuse Utilise dust suppression measures, such as water sprays or coverings, as needed Before earthworks or tree removal commences the pipe route and construction footprints will be clearly marked and vegetation barriers installed. Construction Contractor to identify the planned movement and traffic routes of vehicles on site and develop a traffic management plan On completion of earth works, sites will be rehabilitated as soon as possible. Sediment control measures will remain in place until stabilised. The final type, location and number of ancillary facilities would be determined by the construction contractor. Stockpiles of soil or vegetation located as close as practical to the work area where they are proposed to be used. Stockpile sites would also include erosion and sediment control measures such as sediment barriers to minimise impacts on receiving waters. Stockpiles sites would be established and managed in accordance with the CEMP.	Sediments and potential contaminants will be minimised, as far as reasonably possible, from entering the stormwater system during pipe construction activities.	Aquatic ecosystems	1	1	Neg
			Contact recreation	2	5	Mod			Contact recreation	1	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	3	4	Mod			Aesthetic, non-contact recreational, cultural and spiritual values	1	1	Neg
			Fisheries and aquaculture	2	4	Mod			Fisheries and aquaculture	1	1	Neg

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
							Management measures to reduce the risk of soil erosion and deposition in the stormwater system are covered in the EMP as EMM1 Soil and Dust Management, and EMM3 Stormwater Management.					
Water runoff/ stormwater discharge	Earthworks associated with construction of the above ground components of the ancillary facilities would result in removal of a small portion of existing vegetation, existing structures on site (such as the disused water tank and subsurface concrete pads) and re-grading the surface contours; therefore, disturbing and exposing soils. Stockpile sites would be used to temporarily store excess spoil and vegetation before their reuse on-site or disposal off-site Construction activities adjacent to drains could introduce contaminants such as oil or greases and disturb contaminated sediments, potentially having an adverse impact on water quality.	Rainfall has the potential to impact on water quality if ancillary sites are located in areas close to drains through stormwaters mobilising sediments from stock piles and exposed contaminated soils, and storage of chemicals associated with the ancillary facilities. The impact on water quality could include increased turbidity, suspended solids, nutrients and contaminants from mobilisation of soils.	Aquatic ecosystems	3	3	Mod	The environmental assessment undertaken for the HGP Development Licence Application [31] identified the site is not prone to flooding, having a greater elevation than adjoining land parcels. Construction Contractor to assess risks of stormwater management hazards associated with activities and include mitigation measures in the CEMP. Barriers to be employed around stormwater drains to prevent litter and sediment entering during any dewatering activities Construction site Person-in-Charge / SSHE Lead to approve any discharge of water offsite Have adequate drainage and flood control measures in place at all times of construction Divert stormwater away from soil stockpiles All concrete to be supplied as a premix Construction Contractor to develop site procedures to manage and prevent the release of contaminants into the environment, for: • the handling, use, storage and disposal of hazardous substances; • waste; and • 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. Construction activities will be undertaken in accordance with Stormwater Management Plan. No chemicals or biocides will be used in pipe hydrotest waters. New ethane pipe will be constructed of clean piping. Discharging of hydrotest waters will be planned, controlled and monitored to prevent soil erosion.	Construction activities adjacent to drains could introduce contaminants such as oil or greases and disturb contaminated sediments, potentially having an adverse impact on water quality. The impact of this work on water quality could include increased turbidity, suspended solids, nutrients and contaminants from mobilisation of soils.	Aquatic ecosystems	1	1	Neg
			Contact recreation	2	3	Low			Contact recreation	1	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	4	3	Mod			Aesthetic, non-contact recreational, cultural and spiritual values	2	1	Neg
			Fisheries and aquaculture	3	3	Mod			Fisheries and aquaculture	1	2	Neg
			GDE – water quality	3	3	Mod			GDE – water quality	1	2	Neg
			GDE – biological integrity	3	3	Mod			GDE – biological integrity	1	1	Neg

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
Altered groundwater hydrology	Installation of foundations for piping, turbine generator pads, switchyards Installation of subsurface infrastructure i.e., oily water tank, piping	Deep foundations have the potential to intersect the groundwater, thus providing a transmission route to groundwater. They have the potential to damage the aquifer structure leading to integrity issues or blockages. Site lies approximately 14 m above sea level, with groundwater encountered at 2.95 m RL.	GDE – water quantity	1	5	Neg	Foundations are designed from the perspective of static loads imposed on the natural clay, dynamic loads, where specified (or a factor applied where not), wind loads AS1170.2 for high structures and earthquake loads AS1170.4. These loads are combined as required by AS1170.1 to produce worse case events Preliminary design shows the deepest foundation to be at a depth of 5 m.	Site foundations are designed to avoid impact with the groundwater.	GDE – water quantity	1	5	Neg
			GDE – aquifer integrity	1	2	Neg			GDE – aquifer integrity	1	2	Neg
Loss of containment / accidental spills	Handling of hazardous substances Waste management – prescribed waste The release of potentially harmful chemicals and other substances in the environment may occur accidentally during construction due to: • spills as a consequence of equipment malfunction and maintenance or refuelling, • as a result of inappropriate storage, handing and use of contaminated sediment and • via treatment and curing processes for concrete.	Potential to impact on water quality of downstream receiving waters. These contaminants could include construction fuels, oils, lubricants, hydraulic fluids and other chemicals. Source for groundwater contamination through recharge which becomes contaminated, or by direct migration of the chemical to the water table.	Aquatic ecosystems	4	3	High	Management measures to address these risks are covered in the EMP as EMM 7 – Waste management; EMM 8 – Hazardous substance management and EMM 10 – Loss of Containment. During construction all hazardous substances will be stored within bunded areas within the existing warehouse facilities, where possible. Storage and handling of hazardous substances and prescribed waste will be done in accordance with Victorian WorkSafe *Code of Practice on the Storage and Handling of Dangerous Goods*, Australian Standards and Safety Data Sheets (SDS). Any refuelling required during construction will be undertaken within a designated bunded area with appropriate containment measures put in place to prevent offsite migration. Refuelling will be attended at all times. Spill kits will be readily available and personnel trained in their use. Any contaminated material will be disposed of at an appropriately licenced facility and used spill kit material replaced.		Aquatic ecosystems	2	1	Neg
			Contact recreation	3	2	Low			Contact recreation	2	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	5	2	Mod			Aesthetic, non-contact recreational, cultural and spiritual values	2	1	Neg
			Fisheries and aquaculture	4	2	Mod			Fisheries and aquaculture	2	1	Neg
			GDE – water quality	3	3	Mod			GDE – water quality	3	1	Neg
			GDE – biological integrity	3	3	Mod			GDE – biological integrity	3	1	Neg
Litter, uncontrolled release of general waste	Waste materials / litter have the potential to enter the stormwater system if inappropriately handled	Litter can foul water ways, causing blockages that could contribute to flooding. Litter is aesthetically unappealing. Litter, in particular plastics, can absorb contaminants such as heavy metals. Even when they have degraded/ broken down to microplastics they can still provide a toxicity hazard to wildlife.	Aquatic ecosystems	2	3	Low	Waste management practices during construction will align with the EMM 7 – Waste Management contained in the EMP.		Aquatic ecosystems	1	1	Neg
			Contact recreation	2	2	Low			Contact recreation	1	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	4	3	High			Aesthetic, non-contact recreational, cultural and spiritual values	1	1	Neg
			Fisheries and aquaculture	4	2	Mod			Fisheries and aquaculture	1	1	Neg

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
			GDE – water quality	3	3	Mod			GDE – water quality	1	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	1	1	Neg
Sewerage	The maximum number of people expected to be at site during construction is 60 people. Temporary kitchen facilities and toilets will be utilised for the construction phase.	Uncontrolled release of sewerage can lead to a nutrient overload in receiving waters. Sewerage can potentially contain pathogens and contaminants that could be harmful to flora and fauna in receiving waters.	Aquatic ecosystems	1	4	Neg	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 at appropriately licenced facility. The black water (water from the toilets) will be collected separately, and sent offsite for disposal at appropriately licenced facility.	Sewerage will not be treated or disposed of onsite.	Aquatic ecosystems	1	4	Neg
			Contact recreation	4	2	Mod			Contact recreation	1	2	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	3	2	Low			Aesthetic, non-contact recreational, cultural and spiritual values	1	1	Neg
			Fisheries and aquaculture	4	2	Mod			Fisheries and aquaculture	1	1	Neg
			GDE – water quality	3	2	Low			GDE – water quality	1	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	1	1	Neg
Acid sulfate soils	When acid sulfate soils are disturbed, they can generate large amounts of sulfuric acid, iron, aluminium and sometimes heavy metals. This can cause major impacts to the environment and to infrastructure.	Sulfuric acid can attack concrete and steel, slowly destroying pipes, roads and building foundations. Which in turn could lead to the uncontrolled release of contaminants in the environment. When acidity builds up to high levels in water, it poisons plants in and around affected creeks and ponds. It can also kill fish and other aquatic creatures if they are unable to escape. Lower levels of acidity will simply make aquatic plants and animals weaker and more vulnerable to disease, and make it harder for young organisms to reach adulthood.	Aquatic ecosystems	1	1	Neg	Based on geotechnical investigation undertaken in 2021, acid sulphate soils are considered unlikely to be found on site [1]		Aquatic ecosystems	1	2	Neg
			Contact recreation	2	2	Low			Contact recreation	2	2	Low
			Aesthetic, non-contact recreational, cultural and spiritual values	1	2	Negligible			Aesthetic, non-contact recreational, cultural and spiritual values	1	2	Neg
			Fisheries and aquaculture	4	1	Low			Fisheries and aquaculture	1	1	Neg

Application of mitigation measures has reduced the potential risk for all aspects to either Low or Negligible.

6.2.1. Monitoring

Erosion and sediment controls will be inspected at least weekly (with maintenance and modifications made where necessary). Inspections and/or maintenance during wet-weather may be increased where necessary.

Stockpiled soil will be tested to determine suitability for reuse (if clean fill) or disposal.

Monitor air quality for dust (visual) to assess the effectiveness of implemented dust controls.

Visual assessment of stormwater channels in, adjacent and downstream of the construction zone to ensure no sediment or contaminated water is being released.

Assess the effectiveness of control measures at regular intervals.

Regular inspections of any hazardous chemical storage facilities to ensure compliance with Dangerous Goods requirements

Any non-conformances, incidents or complaints received and associated corrective actions.

6.3. Operation Phase

The following operational activities could potentially lead to adverse impacts on groundwater and surface water:

- Increased impervious surfaces as a result of the road upgrade, including roadway and pavements, and installation of concrete pads resulting in increased stormwater runoff volume, frequency and rate and associated increases in pollutant loading to receiving waterways.
- accidental spills from personnel undertaking management tasks
- uncontrolled discharge of process water or other liquid wastes
- impact to groundwater through migration of contaminants
- disruption of groundwater flows or impacts to aquifer integrity

During preliminary front-end engineering and design (FEED) a Human Health and Environment Risk Assessment [29] was undertaken for the project. The risk assessment (further details provided in Attachment 6) evaluated impacts to ground and surface waters as a result of operations activities and deemed the mitigated risk to be low.

A water risk assessment has been undertaken during detailed design, with the results shown below.

A total of 34 risks were assessed in connection to the HGP operations activities, with no extreme risks being identified.

The project identified the following unmitigated risks:

- 1 high risk associated with the impact of hazardous substances handling on aquatic ecosystems
- 7 moderate risks
- 24 low risks; and
- 3 negligible risks

An Environmental Management Plan (EMP) has been prepared for the Project and will be updated prior to operations commencing.

Other specific mitigation measures for the construction phase of the Project, outside those listed above, are listed in Table 10.

Table 10: Operations phase water risk assessment

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
Process discharges	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 per turbine.	Contaminated water could potential be released into the stormwater system and Western Port	Aquatic ecosystems	4	3	High	The Facility does not use water in normal operations and there are no planned discharges to surface water. The dirty water generated around the process areas will be directed to sump for collection and offsite disposal at a licenced lawful place. Process drainage designed to be isolatable from stormwater drainage. The oily water well, will be constructed of a locally procured pre-cast tank, with a capacity of 1800 litres with a high-level alarm indicating the requirement to pump out its contents for removal and treatment off-site at an appropriately licenced facility. The well will be buried below grade, but with its lid above to ensure site rainfall/runoff cannot enter the well. Backfilled with surface compacting material to prevent movement of tank. Prescribed waste will be tracked in accordance with EPA Waste Tracker requirements, to ensure all offsite disposal	Process discharges are contained within secondary containment areas, thus minimising the potential to entering soil/groundwater or the stormwater drains. The life of the project is expected to be approximately 10 years.	Aquatic ecosystems	2	1	Neg
			Contact recreation	3	2	Low			Contact recreation	2	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	5	2	Mod			Aesthetic, non-contact recreational, cultural and spiritual values	2	1	Neg
			Fisheries and aquaculture	4	2	Mod			Fisheries and aquaculture	2	1	Neg
			GDE – water quality	3	3	Mod			GDE – water quality	3	1	Neg
			GDE – biological integrity	3	3	Mod			GDE – biological integrity	3	1	Neg
Storms / flooding	Inadequately sized drains and containment facilities allow for water to pool on site during wet weather. The project has the potential to increase the pollutant load being released from the study area as a result of the proposed increase in pavement footprint. The key pollutants contained in hardstand runoff include: • suspended solids and nutrients as a result of pavement wear, atmospheric deposition and deposition from vehicles • oil and grease and other hydrocarbons deposited by vehicles or accidental spills • Spills of hazardous materials	Any contaminants that may have collected onto the project area from drips, leaks, spills or poor handling, can transfer to rainwater runoff and migrate into Western Port or groundwater.	Aquatic ecosystems	2	3	Low	Drains, roads, kerbs and bunding designed for conditions (refer to Section 2) Good housekeeping practices will be adopted in line with the EMP. All activities involving hazardous substances, including maintenance, will be undertaken in a bunded area. Where this is not possible a Job Safety Analysis will be undertaken prior to carrying out the task and appropriate containment measures will be implemented. It is expected only small quantities of hazardous substances will be stored on site. All storage will be within the exist warehouse. Design criteria of the lube system and oily water system conform to Section 2. 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 Storage and handling of hazardous substances and prescribed waste will be done in accordance with Victorian WorkSafe *Code of Practice on the Storage*	The increase in pollutant load would be negligible, but if poorly managed could potentially result in water quality impacts such as sedimentation, reduced water clarity, increased toxicant and nutrient concentrations and lower dissolved oxygen levels within the receiving waterways. Increases in flows (frequency, rate and volume) due to an increase in impervious area may also impact waterway health.	Aquatic ecosystems	2	1	Neg
			Contact recreation	2	3	Low			Contact recreation	2	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	2	3	Low			Aesthetic, non-contact recreational, cultural and spiritual values	2	1	Neg
			Fisheries and aquaculture	4	2	Mod			Fisheries and aquaculture	4	1	Low
			GDE – water quality	3	3	Mod			GDE – water quality	3	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	3	1	Neg

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
							and Handling of Dangerous Goods, Australian Standards and Safety Data Sheets (SDS). Spill kits will be readily available and personnel trained in their use. Any contaminated material will be disposed of at an appropriately licenced facility and used spill kit material replaced. An Emergency Response Plan will be prepared and implemented for the site.					
Changes to impervious areas Recharge regime alterations	Installation of roads, paths, buildings and hard stand areas in greenfield developments has the potential to change the water flow volume and velocity; and impact surface water / groundwater recharge processes.	The HGP site is a brownfield development with an existing impervious area of 3.43 hectares. The HGP site will not increase the size of impervious areas or the existing stormwater drainage system.	Aquatic ecosystems	1	3	Neg	Keeping the footprint of the facility within the existing brownfield footprint. Maintaining existing vegetation, as far as possible, noting the need for ongoing vegetation maintenance around the facility as part of the bushfire management plan.	Increases in impervious surface area and compacted soil areas are expected to locally reduce groundwater recharge in the study area, marginally. These recharge reductions are not expected to cause material impacts to groundwater systems, including groundwater levels and flow directions.	Aquatic ecosystems	1	1	Neg
			GDE – water quantity	3	2	Low			GDE – water quantity	3	1	Neg
			GDE – water quality	3	2	Low			GDE – water quality	3	1	Neg
			GDE – aquifer integrity	3	2	Low			GDE – aquifer integrity	3	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	3	1	Neg
Erosion and sedimentation	There is a period of time following the completion of construction where recently disturbed soils are susceptible to scour and erosions from stormwater runoff.	The potential for sediment transport is dependent on status of rehabilitation, severity of rainfall event, and the slope and scale of the disturbed area.	Aquatic ecosystems	2	2	Low	Assess the erosion and sediment control established during the construction phase and develop ongoing controls as required.	Once construction is completed and site stabilisation and rehabilitation has been undertaken the opportunity for sedimentation release and erosion is greatly reduced.	Aquatic ecosystems	2	1	Neg
			Contact recreation	2	2	Low			Contact recreation	2	1	Neg
			Aesthetic, non-contact recreational, cultural and spiritual values	2	2	Low			Aesthetic, non-contact recreational, cultural and spiritual values	2	1	Neg
			Fisheries and aquaculture	3	2	Mod			Fisheries and aquaculture	3	1	Neg
Sewerage	The maximum number of people expected to be at site is 5 people during the operations phase. A permanent control/office/kitchen/toilet building will be installed for the operations phase. All	Uncontrolled release of sewerage can lead to a nutrient overload in receiving waters. Sewerage can potentially contain pathogens and contaminants that could be harmful to flora and fauna in receiving waters.	Aquatic ecosystems	2	2	Low	HGP is connected to the LIP sewerage line, therefore the base plan is to send all sewerage to LIP for treatment and disposal. However, if this is not possible due to design constraints on the location of the Operations Centre location, then sewerage will be collected and treated in same	Sewerage will not be treated or disposed of onsite.	Aquatic ecosystems	2	1	Neg
			Contact recreation	2	2	Low			Contact recreation	2	1	Neg
			Aesthetic, non-contact recreational,	2	2	Low			Aesthetic, non-contact recreational,	2	1	Neg

Activity	Cause of Impact	Preliminary Impact or Risk	Beneficial Use	C	L	Unmitigated Risk	Mitigation Measures	Final Impact or Risk	Beneficial Use	C	L	Mitigated Risk
	sewerage waters will be sent to LIP, through an existing sewerage line, for treatment at the LIP facility		cultural and spiritual values				manner as undertaken for construction. Being: • 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 at appropriately licenced facility. • The black water (water from the toilets) will be collected separately, and sent offsite for disposal at appropriately licenced facility.		cultural and spiritual values			
			Fisheries and aquaculture	2	2	Low			Fisheries and aquaculture	2	1	Neg
			GDE – water quality	1	2	Neg			GDE – water quality	1	1	Neg
			GDE – biological integrity	1	2	Neg			GDE – biological integrity	1	1	Neg
Altered groundwater hydrology	If deep piles are used which extend below the water table, they have the potential to locally alter the groundwater levels due to groundwater flow obstructions.	Preliminary engineering has indicated that foundation piles will not intersect with groundwater, being installed to a depth of: • Turbines – 5 metres • Stack – 4 metres • Lifting frame – 3 metres • Lube oil – 3 metres	GDE – water quantity	3	2	Low	Site lies approximately 14 m above sea level, with groundwater encountered at 2.95 m RL.	Foundations are designed to avoid groundwater.	GDE – water quantity	3	1	Neg
			GDE – water quality	3	2	Low			GDE – water quality	3	1	Neg
			GDE – aquifer integrity	3	2	Low			GDE – aquifer integrity	3	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	3	1	Neg
Groundwater dependent ecosystems	A reduction in groundwater can impact groundwater dependent ecosystems – both terrestrial GDEs (i.e the wetlands to the southeast of HGP); or aquatic GDEs (i.e those found in Western Port)	There is no significant change in the size of impervious surfaces as a result of the HGP development.	GDE – water quantity	3	2	Low		No material impacts to groundwater levels are expected as a result of the recharge reduction due to a change in surface materials from compacted soil to hard stand pads and roadways; and pilings. GDEs in the vicinity of the proposal are not anticipated to be impacted by changes to groundwater levels.	GDE – water quantity	3	1	Neg
			GDE – water quality	3	2	Low			GDE – water quality	3	1	Neg
			GDE – aquifer integrity	3	2	Low			GDE – aquifer integrity	3	1	Neg
			GDE – biological integrity	3	2	Low			GDE – biological integrity	3	1	Neg

Application of mitigation measures has reduced the potential risk for all aspects to either Low or Negligible.

6.3.1. Monitoring

As part of the standard Operating Licence conditions for the EPA, the site will be required to develop a risk management and monitoring program (RMMP) [32] for activities which:

> a) *identifies all the risks of harm to human health and the environment which may arise from the activities you are engaging in at your activity on site;*
>
> *b) clearly defines your environmental performance objectives;*
>
> *c) clearly defines your risk control performance objectives;*
>
> *d) describes how the environmental and risk control performance objectives are being achieved;*
>
> *e) identifies and describes how you will continue to eliminate or minimise the risks in (a) (above) so far as reasonably practicable (SFARP).*

The RMMP will include an ongoing monitoring program for surface and groundwater impacts that may include:

- Visual assessment of stormwater channels in, adjacent and downstream of the construction zone to ensure no sediment or contaminated water is being released.
- Ongoing groundwater monitoring. Four groundwater monitoring bores were installed at the HGP site in 2008. One of these was replaced in 2021. It is possible that some or all of the bores may need to be relocated as part of the construction activities. In the event of this occurring replacement monitoring bores, both up-gradient and down-gradient, will be installed in accordance with the *Minimum Construction Requirements for Water Bores in Australia* [33].
- Assess the effectiveness of control measures at regular intervals
- Recording of any non-conformances, incidents or complaints received and associated corrective actions.

7. Summary and Conclusion

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
- install secondary containment around all equipment that has the potential to release contaminant

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

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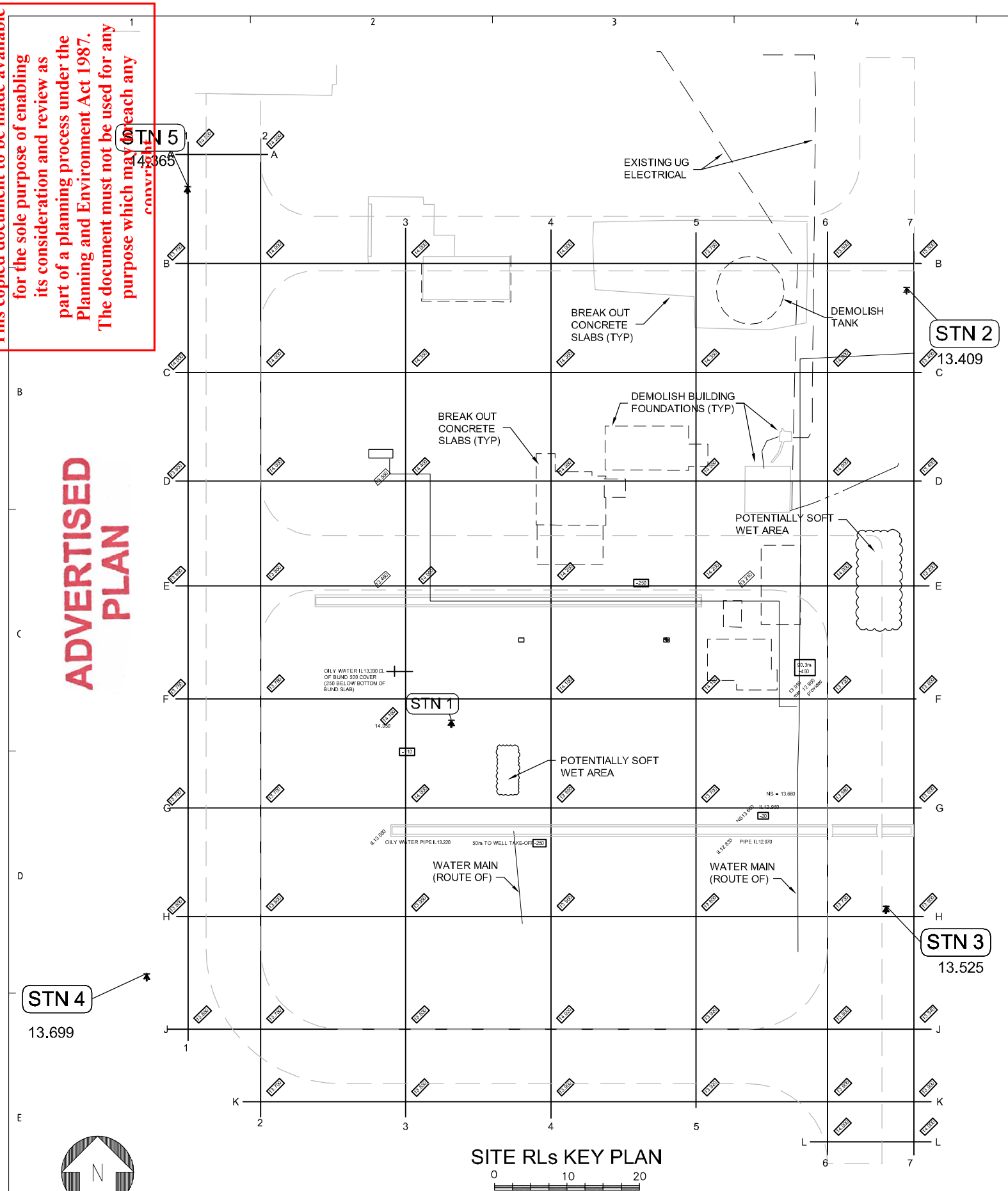
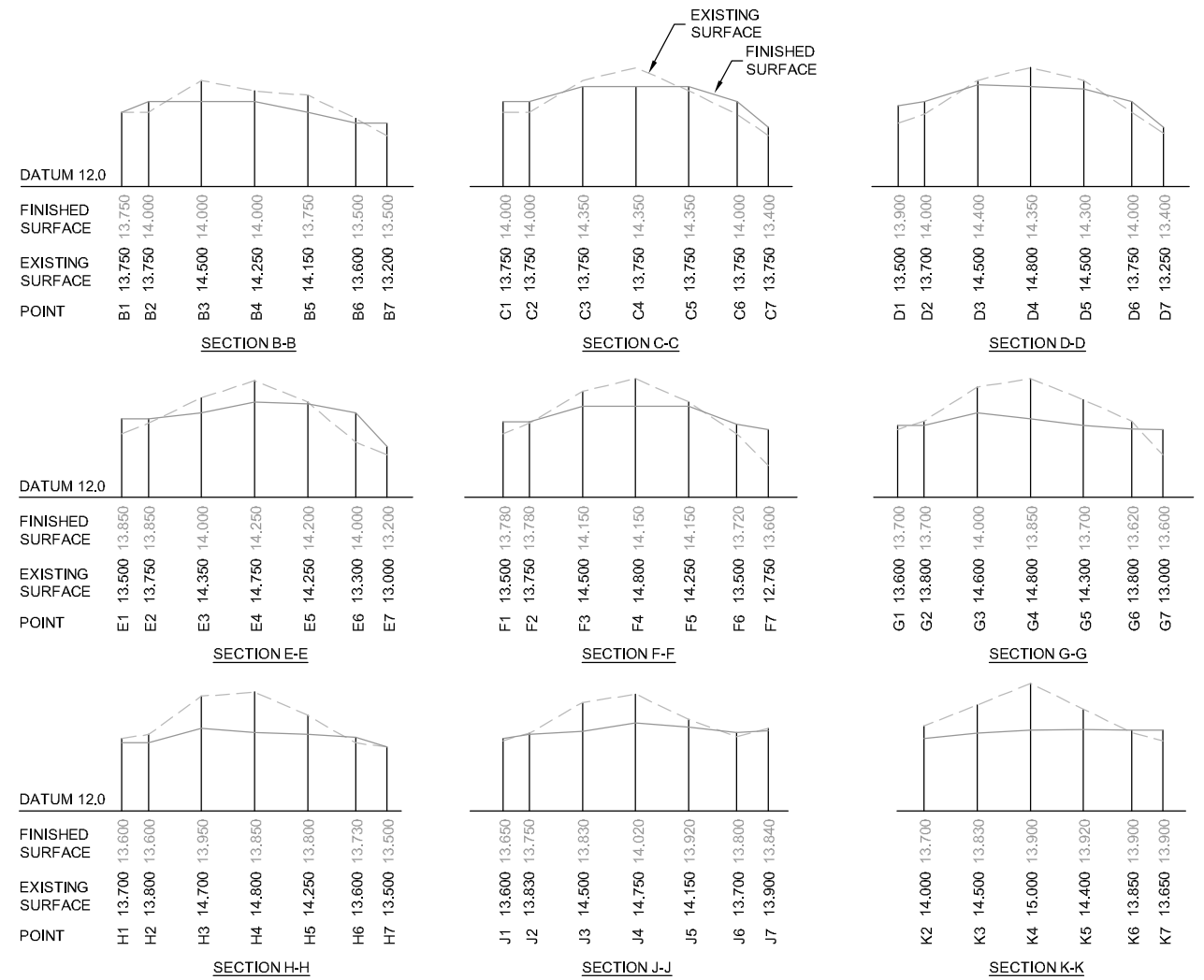
Attachment 1: Site Layout Drawing - HGP Site Preparation Cut and Fill

ADVERTISED PLAN



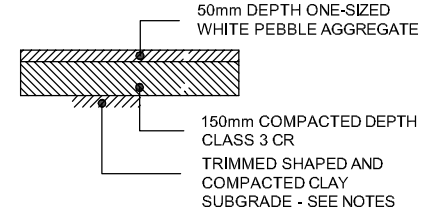


POINT	EASTING, NORTHING, RL
A1	2978869.940, 1894932.716, 14.200
A2	2988869.940, 1894932.716, 14.200
B1	2978869.940, 1879932.716, 13.750
B2	2988869.940, 1879932.716, 14.000
B3	3008869.940, 1879932.716, 14.000
B4	3028869.940, 1879932.716, 14.000
B5	3048869.940, 1879932.716, 13.750
B6	3066997.896, 1879932.716, 13.500
B7	3078869.940, 1879932.716, 13.500
C1	2978869.940, 1864932.716, 14.000
C2	2988869.940, 1864932.716, 14.000
C3	3008869.940, 1864932.716, 14.350
C4	3028869.940, 1864932.716, 14.350
C5	3048869.940, 1864932.716, 14.350
C6	3066997.896, 1864932.716, 14.000
C7	3078869.940, 1864932.716, 13.400
D1	2978869.940, 1849932.716, 13.900
D2	2988869.940, 1849932.715, 14.000
D3	3008869.940, 1849932.715, 14.400
D4	3028869.940, 1849932.715, 14.350
D5	3048869.940, 1849932.715, 14.350
D6	3066997.896, 1849932.715, 14.000
D7	3078869.940, 1849932.715, 13.400
E1	2978869.940, 1835487.715, 13.850
E2	2988869.940, 1835487.715, 13.850
E3	3008869.940, 1835487.715, 14.000
E4	3028869.940, 1835487.715, 14.250
E5	3048869.940, 1835487.715, 14.200
E6	3066997.896, 1835487.715, 14.000
E7	3078869.940, 1835487.715, 13.200
F1	2978869.940, 1819932.715, 13.780
F2	2988869.940, 1819932.715, 13.780
F3	3008869.940, 1819932.715, 14.150
F4	3028869.940, 1819932.715, 14.150
F5	3048869.940, 1819932.715, 14.150
F6	3066997.896, 1819932.715, 13.720
F7	3078869.940, 1819932.715, 13.600

WARNING: UNDERGROUND SERVICES CONTRACTOR VERIFY ALL UNDERGROUND SERVICES BEFORE COMMENCING WORK

H 0 10 50
V 0 1 2
SCALE IN METRES

POINT	EASTING, NORTHING, RL
G1	2978869.940, 1804932.715, 13.700
G2	2988869.940, 1804932.715, 13.700
G3	3008869.940, 1804932.715, 14.000
G4	3028869.940, 1804932.715, 13.850
G5	3048869.940, 1804932.715, 13.700
G6	3066997.896, 1804932.715, 13.580
G7	3078869.940, 1804932.715, 13.600
H1	2978869.940, 1789932.715, 13.600
H2	2988869.940, 1789932.715, 13.600
H3	3008869.940, 1789932.715, 13.950
H4	3028869.940, 1789932.715, 13.850
H5	3048869.940, 1789932.715, 13.800
H6	3066997.896, 1789932.715, 13.730
H7	3078869.940, 1789932.715, 13.500
J1	2978869.940, 1774432.715, 13.650
J2	2988869.940, 1774432.715, 13.750
J3	3008869.940, 1774432.715, 13.830
J4	3028869.940, 1774432.715, 14.020
J5	3048869.940, 1774432.715, 13.920
J6	3066997.896, 1774432.715, 13.800
J7	3078869.940, 1774432.715, 13.840
K2	2988869.940, 1764432.715, 13.700
K3	3008869.940, 1764432.715, 13.830
K4	3028869.940, 1764432.715, 13.900
K5	3048869.940, 1764432.715, 13.920
K6	3066997.896, 1764432.715, 13.900
K7	3078869.940, 1764432.715, 13.900
L6	3066997.896, 1758932.715, 14.000
L7	3078869.940, 1758932.715, 14.000



HARDSTAND CONSTRUCTION

NOTES:-
HARDSTAND SUBGRADE PREPARATION
1. PROOF ROLL EXPOSED SUBGRADE THREE PASSES LOADED TRUCK 750kPa TYRES < 10mm PERMANENT DEFLECTION
2. BACKFILL OR FILLING TO ACHIEVE DESIGN SUBGRADE LEVEL TO BE GRANULAR MAX PARTICLE SIZE 40mm MAX LL 35% COMPACTED IN 150mm LAYERS TO MIN DD RATIO 98% STD COMPACTION

HOLD 1

HOLD 1 - EXTENTS TO BE CONFIRMED

WHITE TECHNICS

GE | (CAD) | PROJECT MANAGER: E. PORIC | JOB No: AFE 619/21003 | REFERENCE No: 262-40015

REV No	DATE	REVISION	DRAWN	DRAFTING CHECKED	DESIGNED	ENGINEERING CHECKED	DESIGN APPROVED	CONSULTANT
B	12-03-22	ISSUED FOR REVIEW						
A	14-02-22	ISSUED FOR REVIEW	GK	BK	GK	BK	WA	WT

PROJ No: AFE 619/21003

Esso Australia Pty Ltd
ABN 49 000 018 566
PRODUCTION DEPARTMENT

PROJECT MANAGER: N. ZED | SIGNATURE | DATE: 2-03-22 | DRAWING No

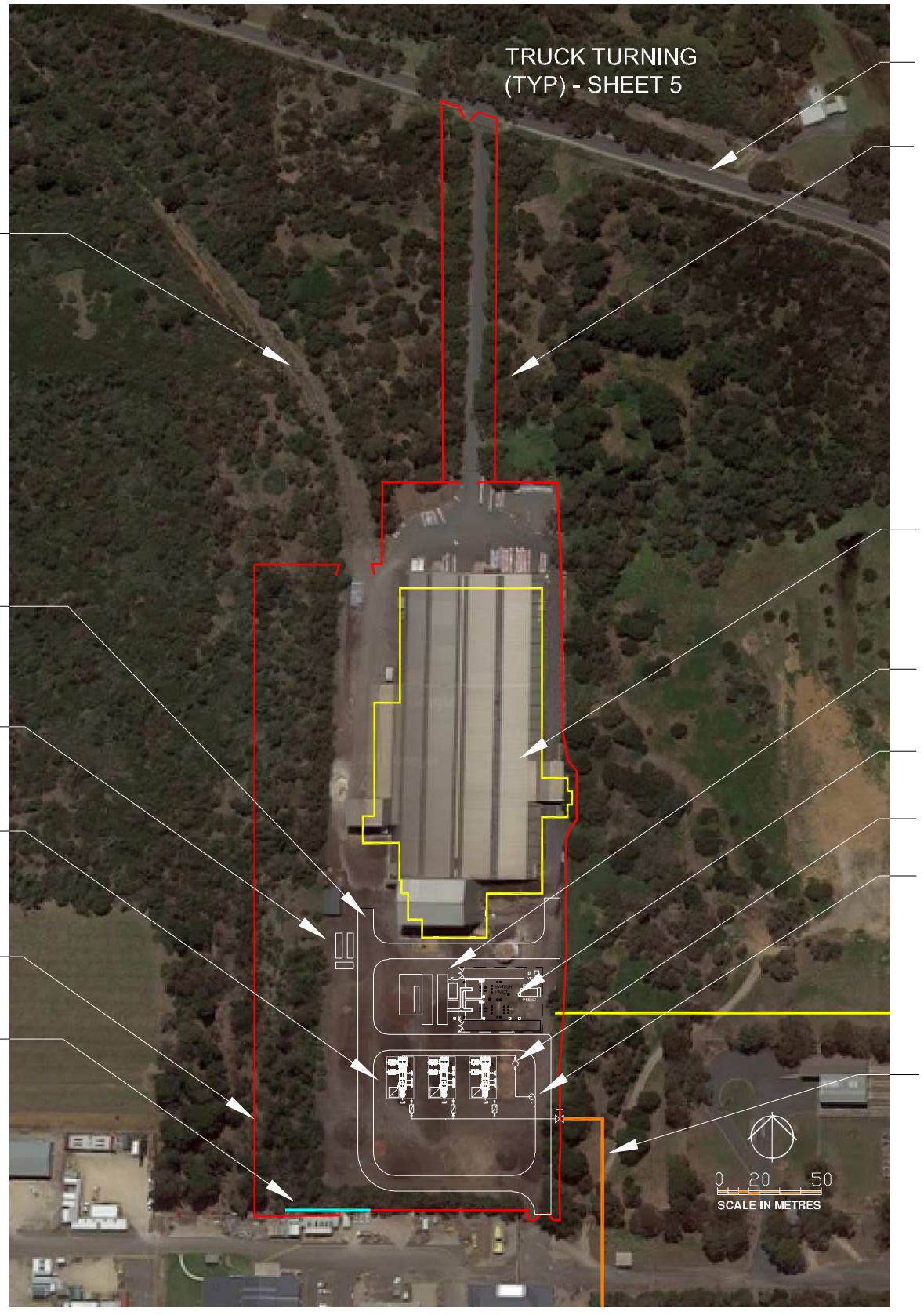
REFERENCE DRAWINGS

HASTINGS GENERATION SITE
SITE LAYOUT
SITE PREPARATION CUT AND FILL

SCALE: AS SHOWN | DRG No: 262 - 40015 | REV: B

Attachment 2: Site Layout Drawing – Site General Arrangement

ADVERTISED PLAN



CIVIL DESIGN MANAGEMENT PTY LTD
ABN 22 071 989 958
24 MANCHESTER GROVE
GLEN HUNTLY 3163
0408 406 220

No	DATE	REVISION	APP'D
E	7-02-22	ISSUED FOR AUTHORITY APP'L	NZ
D	28-01-22	ISSUED FOR REVIEW	GK
C	21-12-21	ISSUED FOR REVIEW	GK
B	16-12-21	ISSUED FOR REVIEW	GK
Z	---	ISSUED FOR REVIEW	GK

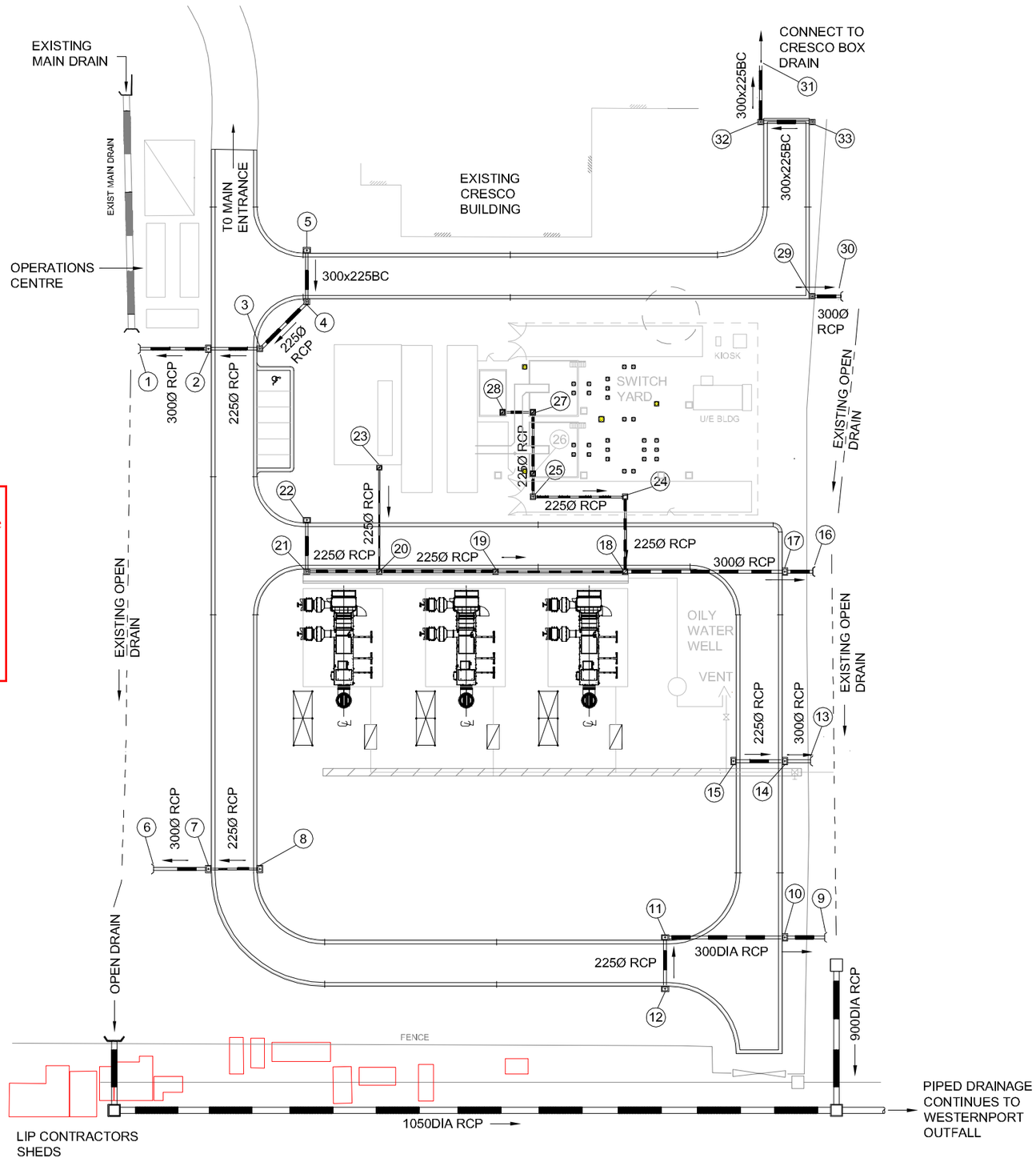
DOCUMENT PURPOSE		AUTHORITY	DESIGN
SHEET SIZE	A3	APPROVED:	DRAWN: GKing
ADVANCE COPY			DATE: Dec 2021
FOR INFORMATION		DATE:	CHECKED:
AUTHORITY APP'L	✓		
FOR TENDER ONLY		FILE No:	APPROVED:
FOR CONSTRUCTION		CONTRACT DATE:	DATE:
AS CONSTRUCTED			

EXXON MOBIL HASTINGS
HASTINGS GENERATION SITE
SITE GENERAL ARRANGEMENT

White Technics Pty Ltd
Unit 4, 36 New Street
Ringwood, VIC, 3134
Australia
Tel: +61 3 9847 0222
Fax: +61 3 9847 0333
White Technics Project No 6646

FILENAME:ESSO FPP.DWG
SHEET 1 OF 15
DRAWING No.
REV E

Attachment 3: Site Layout Drawing – Site Drainage



GAS TURBINE GENERATION PLANT
SITE DRAINAGE

0 5 10 15 20
SCALE IN METRES

CIVIL DESIGN MANAGEMENT PTY LTD
ABN 22 071 989 958
24 MANCHESTER GROVE
GLEN HUNTLY 3163
0408 406 220

No	DATE	REVISION	APP'D
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D	4-02-22	ISSUED FOR REVIEW	GK
C	21-12-21	ISSUED FOR REVIEW	GK
B	16-12-21	ISSUED FOR REVIEW	GK
Z	---	ISSUED FOR REVIEW	GK

DOCUMENT PURPOSE		AUTHORITY	DESIGN
SHEET SIZE	A3	APPROVED:	DRAWN: GKing
ADVANCE COPY			DATE: Dec 2021
FOR INFORMATION		DATE:	CHECKED:
AUTHORITY APP'L	✓		
FOR TENDER ONLY		FILE No:	APPROVED:
FOR CONSTRUCTION		CONTRACT DATE:	DATE:
AS CONSTRUCTED			

EXXON MOBIL HASTINGS
HASTINGS GENERATION SITE

SITE DRAINAGE

White Technics Pty Ltd
Unit 4, 36 New Street
Ringwood, VIC, 3134
Australia
Tel: +61 3 9847 0222
Fax: +61 3 9847 0333
White Technics Project No 6646

FILENAME: ESSO FPP.DWG
SHEET 7 OF 15
DRAWING No.
REV E

Attachment 4: Soil Sample Borehole Logs (Black Geotechnical, 2021)

DESCRIPTIVE TERMS & GRAPHIC SYMBOLS FOR SOIL

FIG. 1A

CLASSIFICATION BASED ON UNIFIED SOIL CLASSIFICATION: AS1726 – 1993

WATER

Water level at time of drilling.	GROUNDWATER NOT OBSERVED Groundwater observation was not possible due to water used in drilling process. Groundwater may be present.
Static water level.	
Water inflow to borehole or test pit.	GROUNDWATER NOT ENCOUNTERED No groundwater was encountered at time of drilling or excavation in the borehole or test pit.
Water loss in borehole.	

SAMPLES AND TESTS

SPT	Standard Penetration Test (AS1289.6.3.1 – 2004). Blows per 150 mm. N = Blows for 300 mm after 150 mm seating.	SV	Shear Vane. Measures Shear Strength (s_u). Peak Strength/Residual Strength.
DCP	Dynamic Penetrometer Test (AS1289.6.3.2 – 1997). Blows per 100 mm.	N	SPT with sample collected from spoon.
U63	Undisturbed sample (Push Tube) – 63 mm diameter. 50 mm tube may be used (U50).	N*	SPT with no sample collected in spoon.
PP	Pocket Penetrometer. Measures Unconfined Compressive Strength (UCS).	Nc	SPT with solid cone. No sample.
D	Disturbed sample	N(60)	Corrected normalised N-value. Also known as $N_{1(60)}$.
B	Bulk disturbed sample.	R	DCP / SPT refusal.

SOIL GRAPHICS (Samples)

CLAY (CL, CI, CH)	FILL	SILT (ML, MH)
GRAVEL (GW, GP)	SAND (SW, SP)	COBBLES AND BOULDERS

Graphic representation of mixed materials, such as silty clay, would be a combination of these symbols.

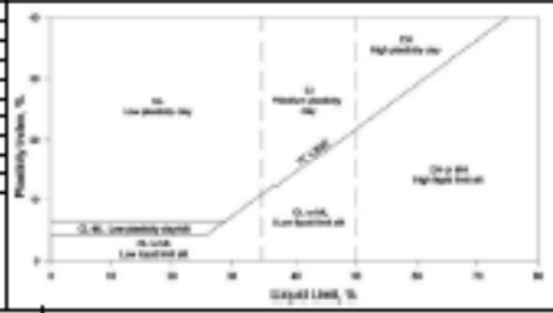
DRILLING METHOD

SSA	Solid Stem Auger	WB	Washbore
HSA	Hollow Stem Auger	ODEX	ODEX Retractable Bit System
HA	Hand Auger	AIRH	Down-the-hole Air Hammer
EX	Excavator	HE	Hand Excavation
BH	Backhoe	CC	Concrete Coring
NMLC	52mm Diameter Core	RCB	Rock Core Barrel
NDD	Non-Destructive Drilling	MC	Macro Core

PARTICLE SIZE

Boulders		> 200mm
Cobbles		63 to 200mm
Gravel	Coarse	20 to 63mm
	Medium	6.0 to 20mm
	Fine	2.0 to 6.0mm
Sand	Coarse	0.6 to 2.0mm
	Medium	0.2 to 0.6mm
	Fine	0.075 to 0.2mm
Silt		0.002 to 0.075mm
Clay		< 0.002mm

PLASTICITY PROPERTIES



PLASTICITY

Description	Liquid Limit
Low	< 35%
Medium	35 to 50%
High	> 50%

SECONDARY COMPONENT

Trace	0 to 5%
Presence just detectable by feel or eye.	
With	5 to 12%
Presence easily detectable by feel or eye.	

CONSISTENCY

s_u kPa AS1726 Table A1

Very soft	Soft	Firm	Stiff	Very stiff	Hard	
< 12	12	25	50	100	200	

For soft or sensitive clay it is desirable to use Vane.

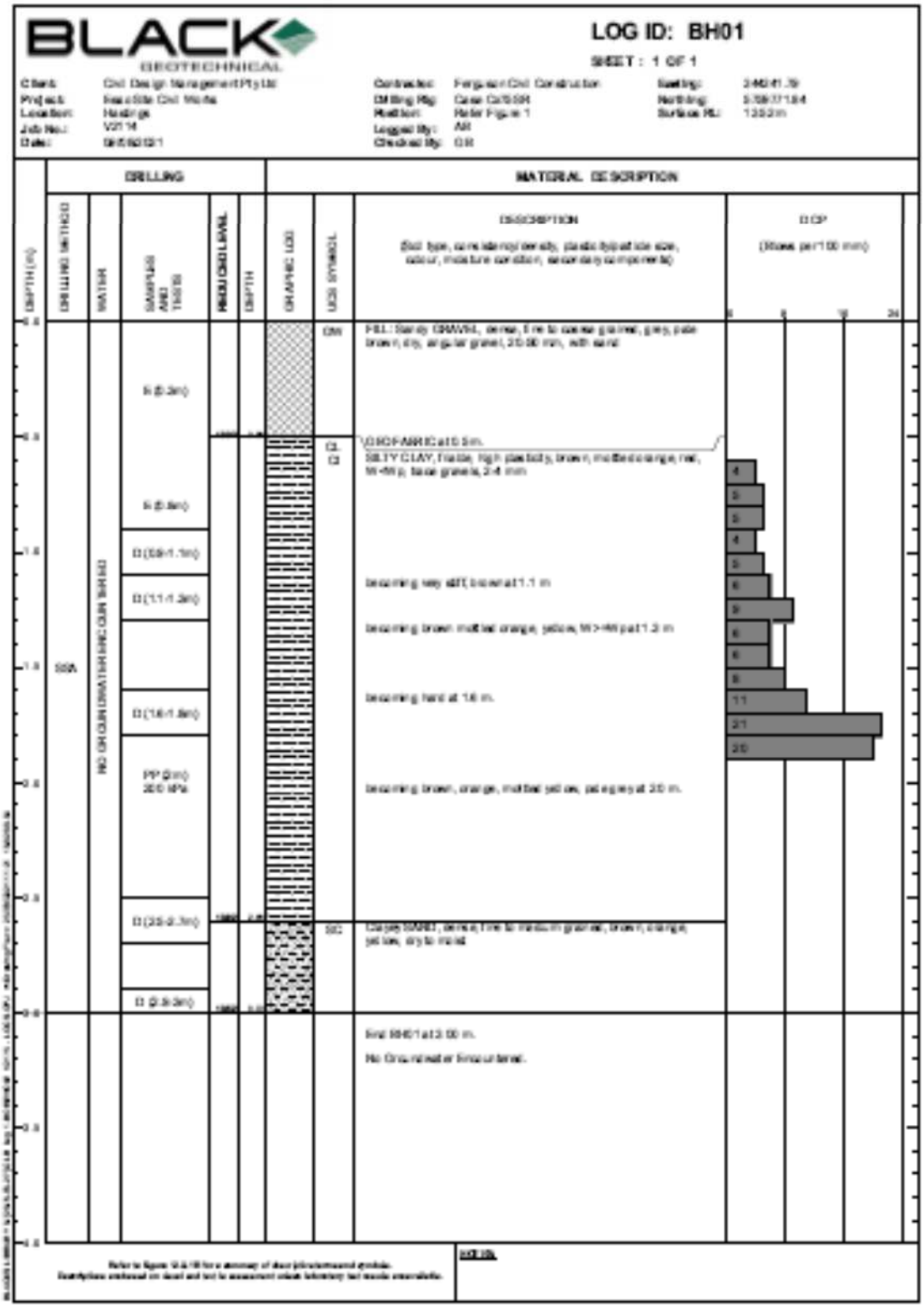
MOISTURE CONDITION

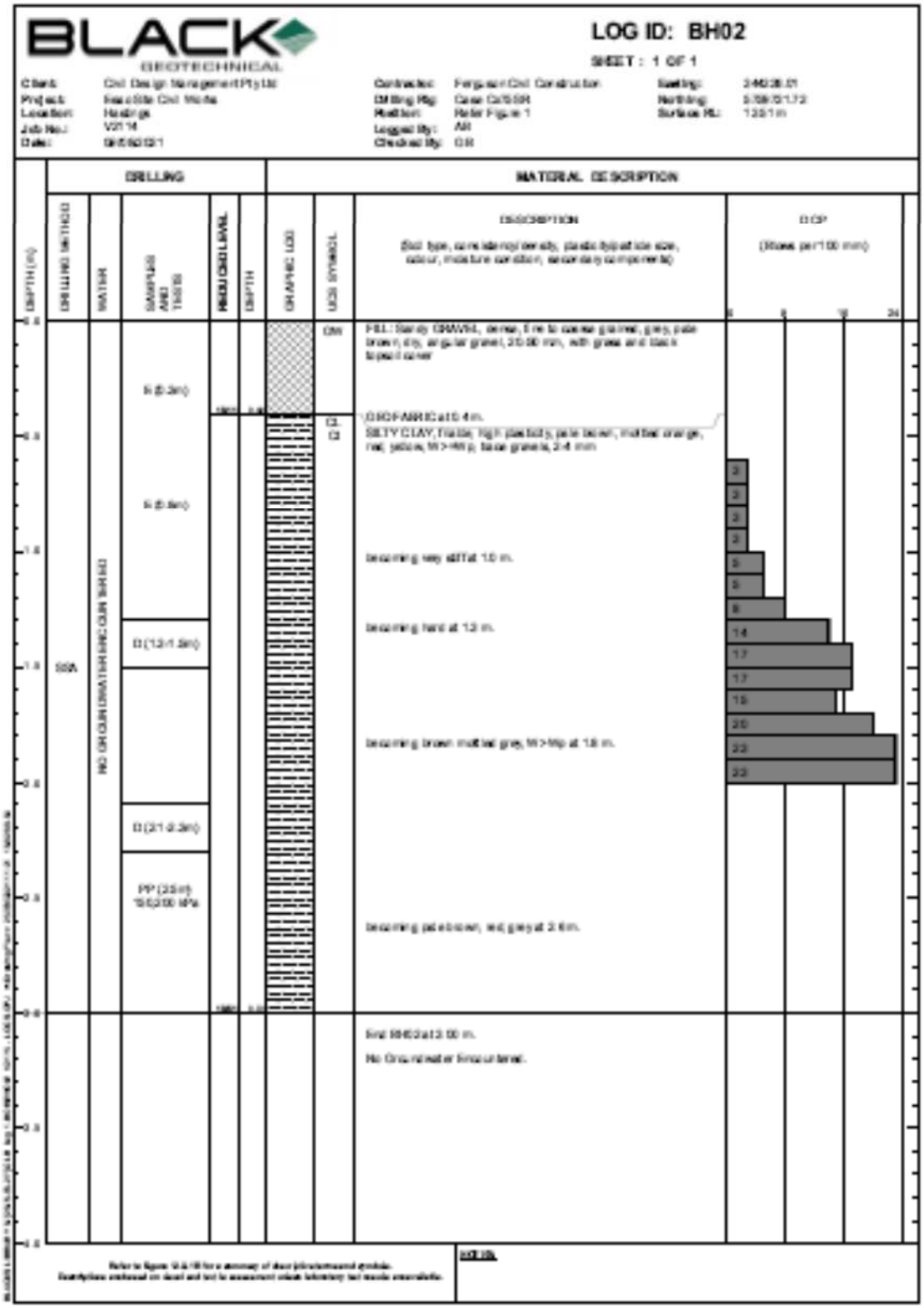
Dry	Looks and feels dry.
Moist	Feels cool, darkened in colour, no free water or remoulding.
Wet	Feels cool, darkened in colour, free water or remoulding.
w	Natural moisture content.
Wp	Plastic limit.

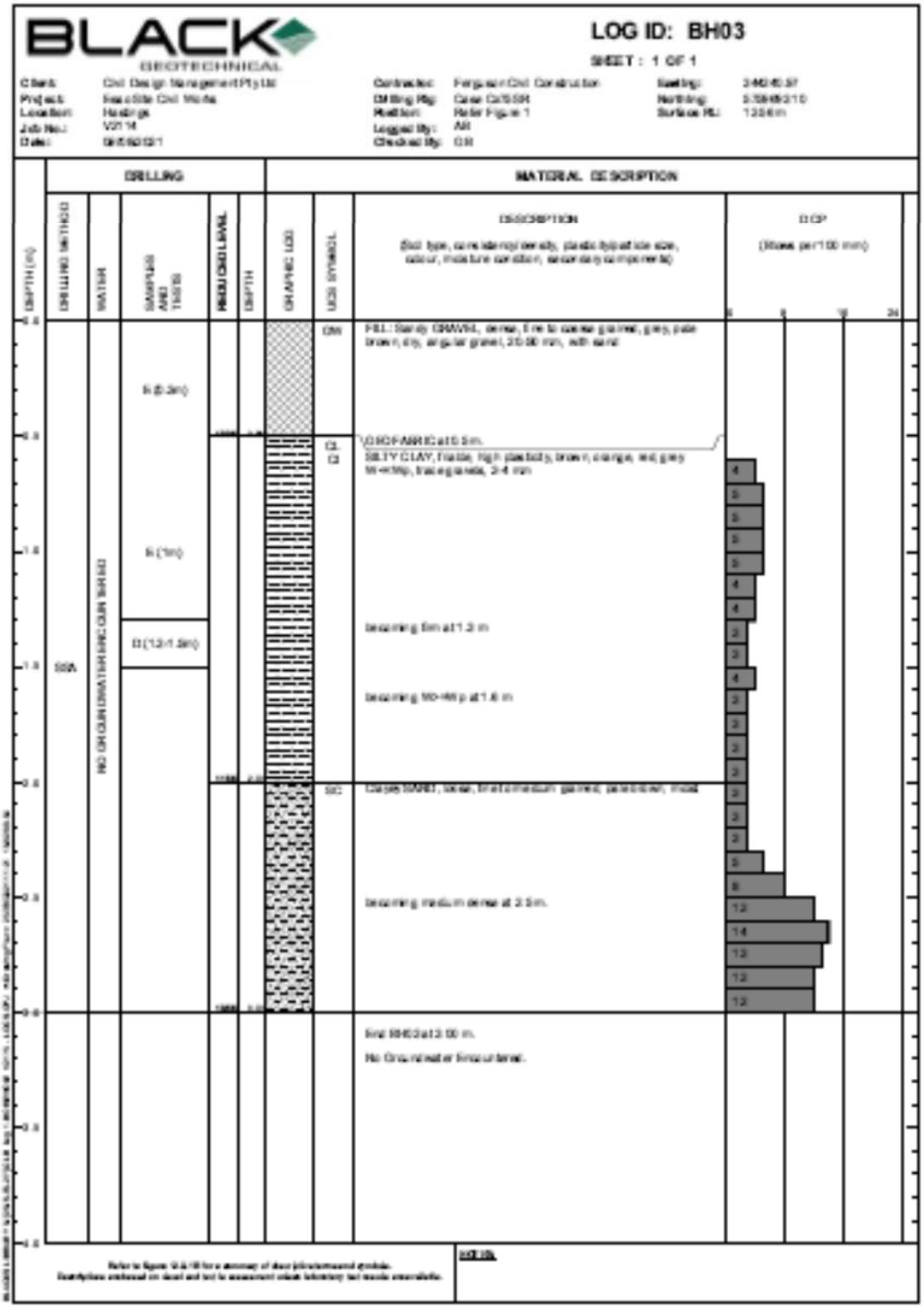
DENSITY INDEX

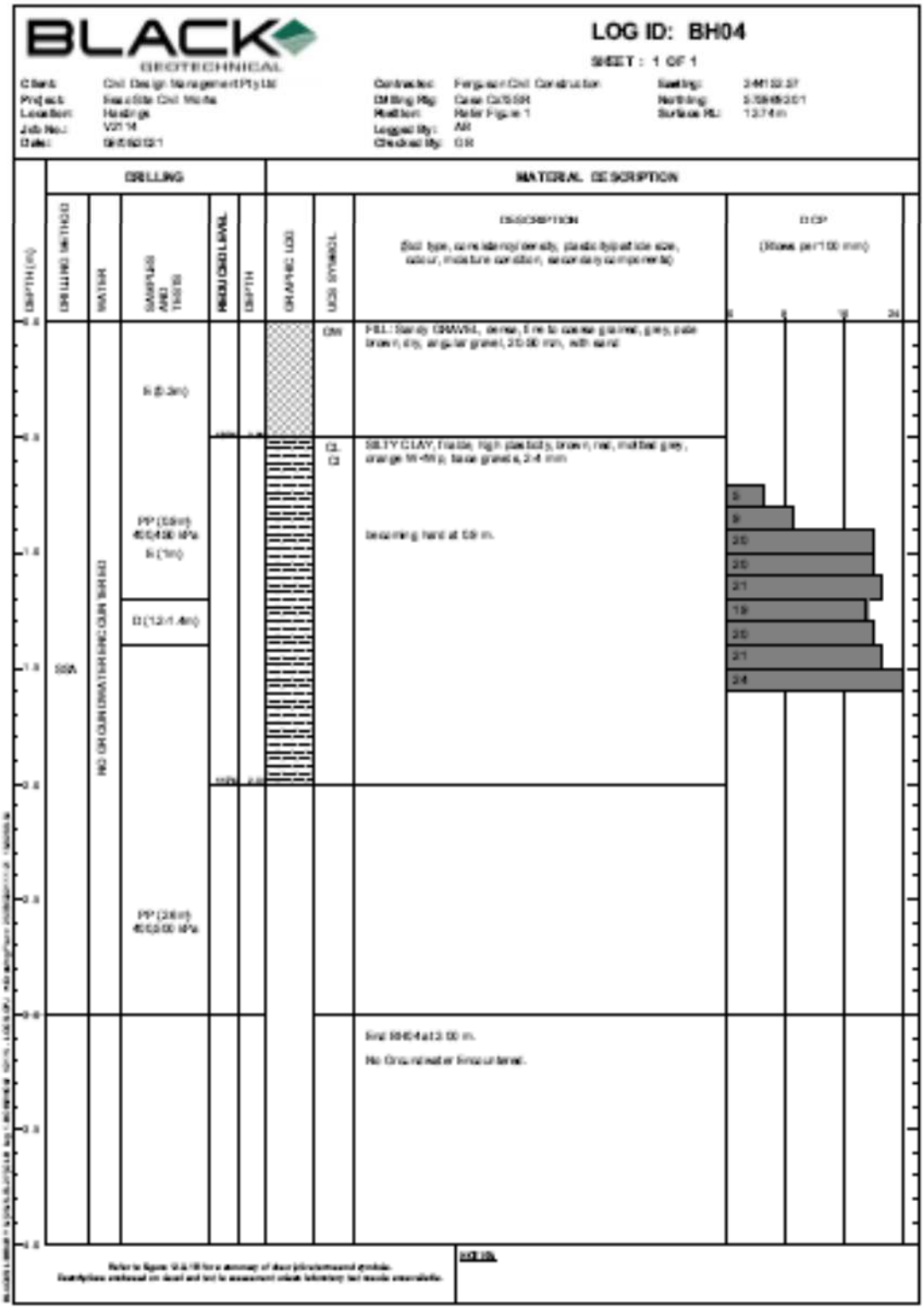
I_D % AS1726 Table A5

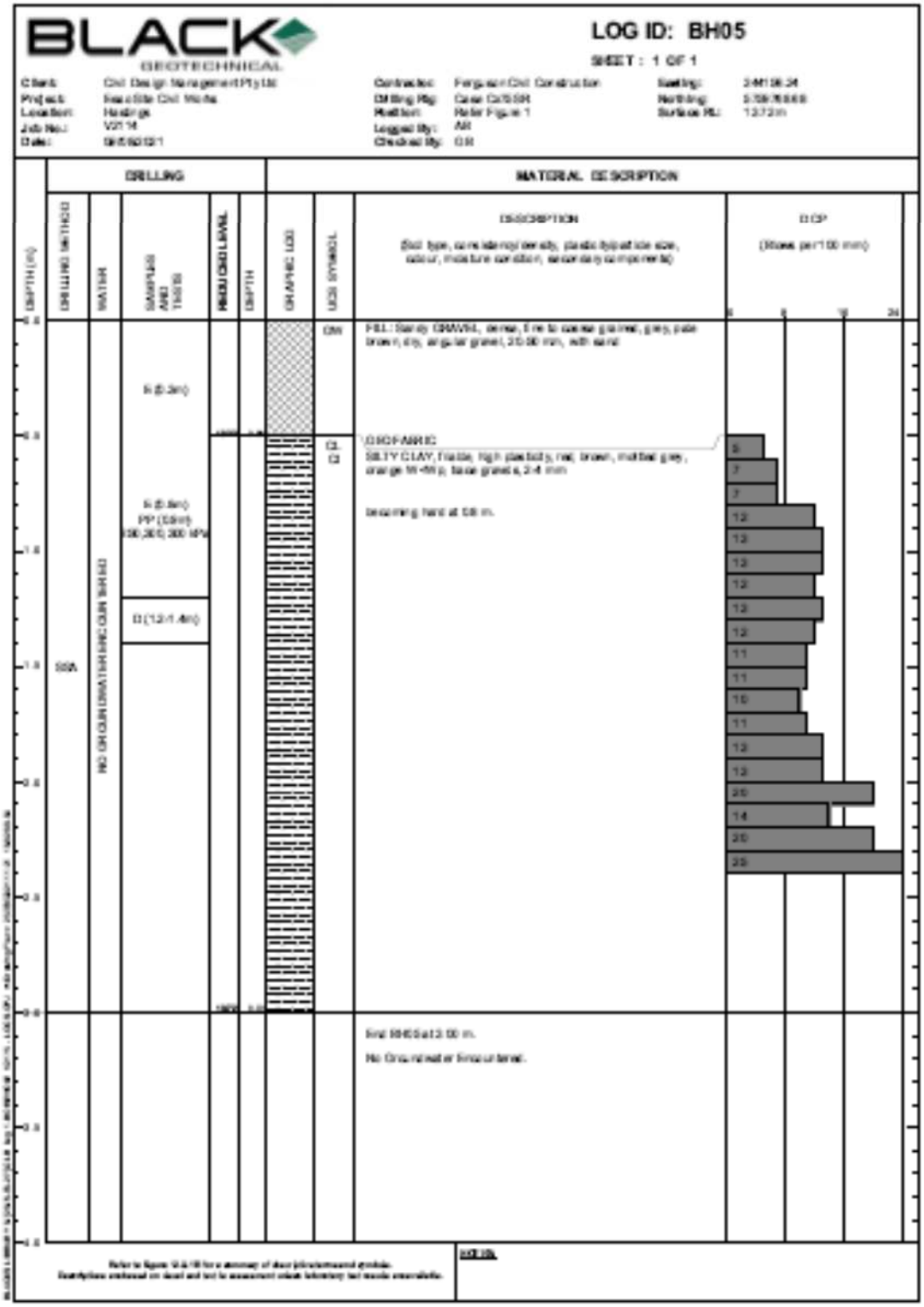
Very loose	Loose	Medium dense	Dense	Very dense	
< 15	15	35	65	85	

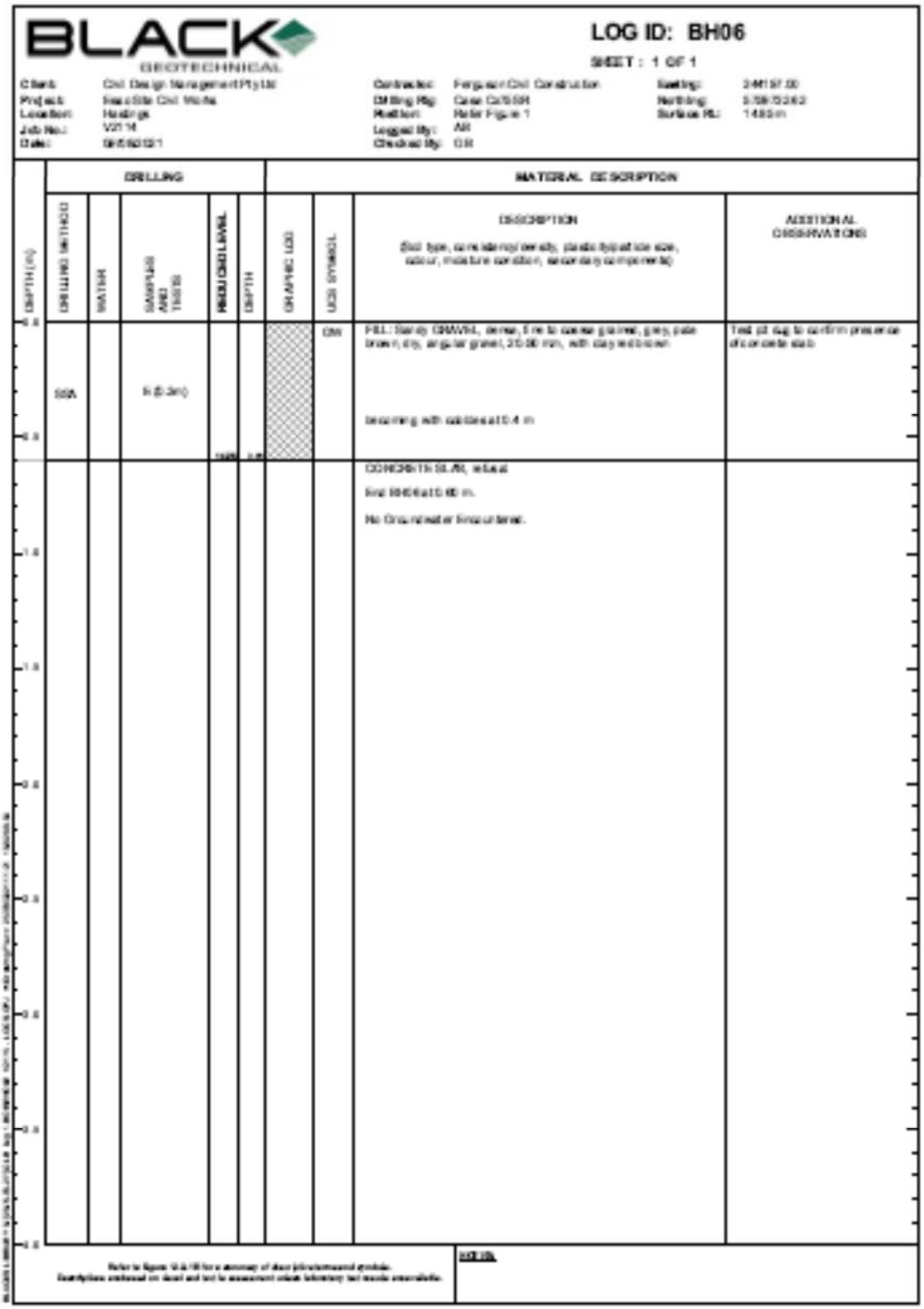


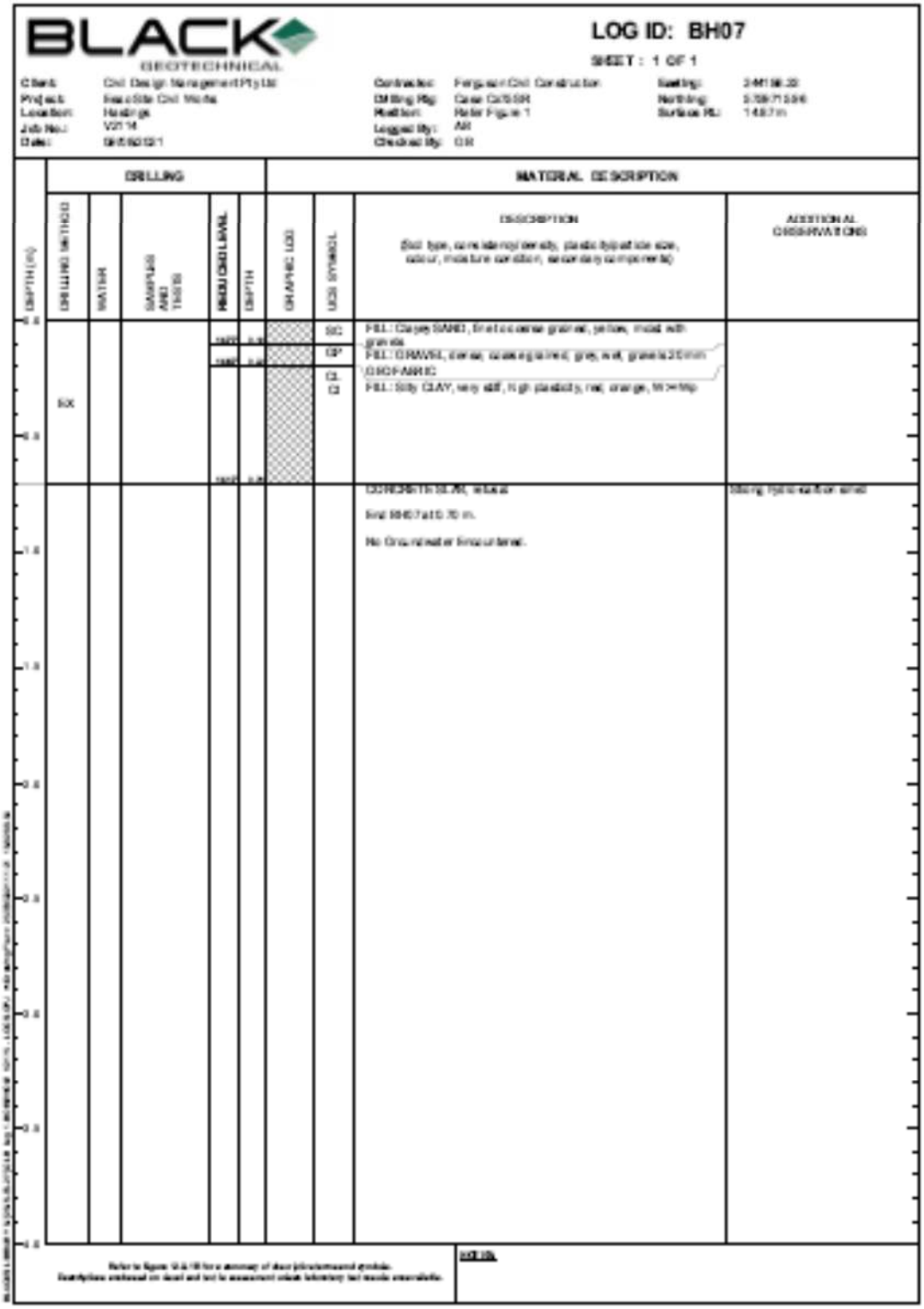


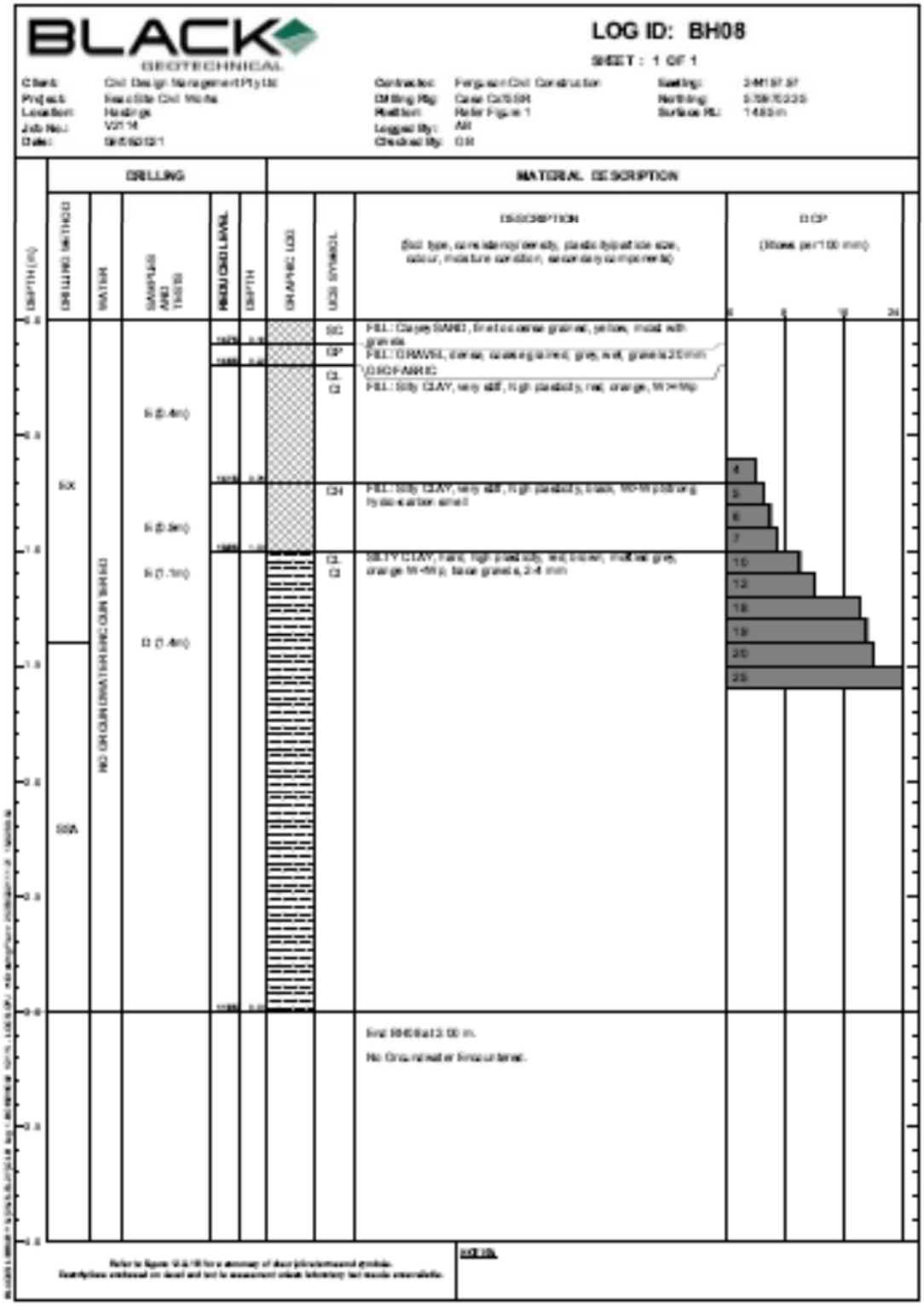












Attachment 5: Groundwater Borehole Logs (Douglas Partners, 2008)

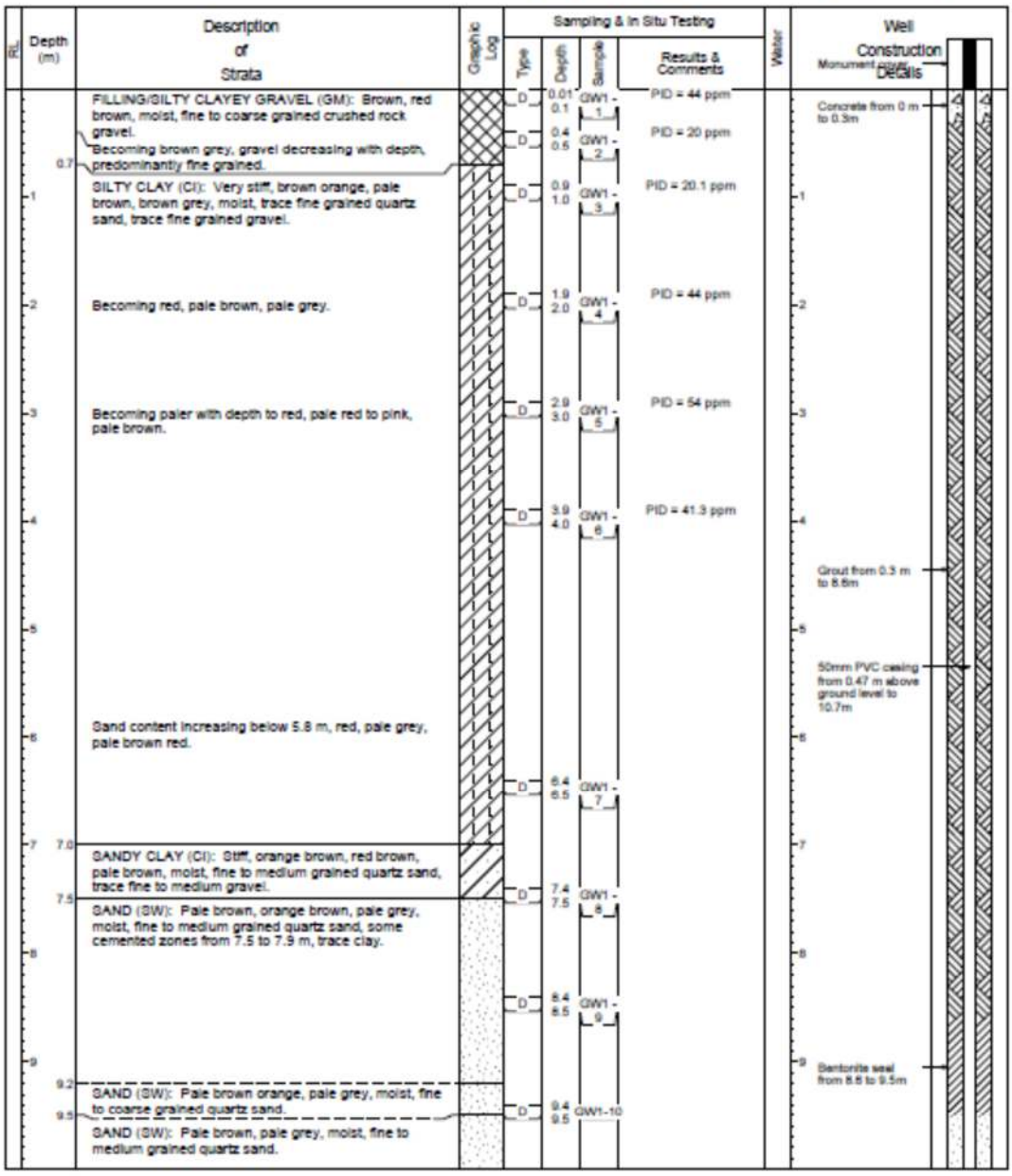
2008 2013 Borehole Locations

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344108
NORTHING: 5759790
DIP/AZIMUTH: 90°/--

BORE No: GW1
PROJECT No: 42423.00
DATE: 25 June 2008
SHEET 1 OF 2



RIG: Custom 4WD **DRILLER:** Horizon Drilling **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: Groundwater at approximately 12.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.47 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344108
NORTHING: 5759790
DIP/AZIMUTH: 90°/--

BORE No: GW1
PROJECT No: 42423.00
DATE: 25 June 2008
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	10.0	SAND (SW): Pale brown, pale grey, moist, fine to medium grained quartz sand. Yellow from 10.4 m.		D	10.9 11.0	GW1-11			Sand filter pack from 9.5 to 12.2m
	11								
	12	Becoming wet at 12.5 m.							50mm PVC screen from 10.7 to 13.7m
	13			D	12.9 13.0	GW1-12		▼	Natural sand cave in 12.2 to 13.7m
	13.7	Bore discontinued at 13.7m							End cap
	14								
	15								
	16								
	17								
	18								
	19								

RIG: Custom 4WD **DRILLER:** Horizon Drilling **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: Groundwater at approximately 12.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.47 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	PP	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

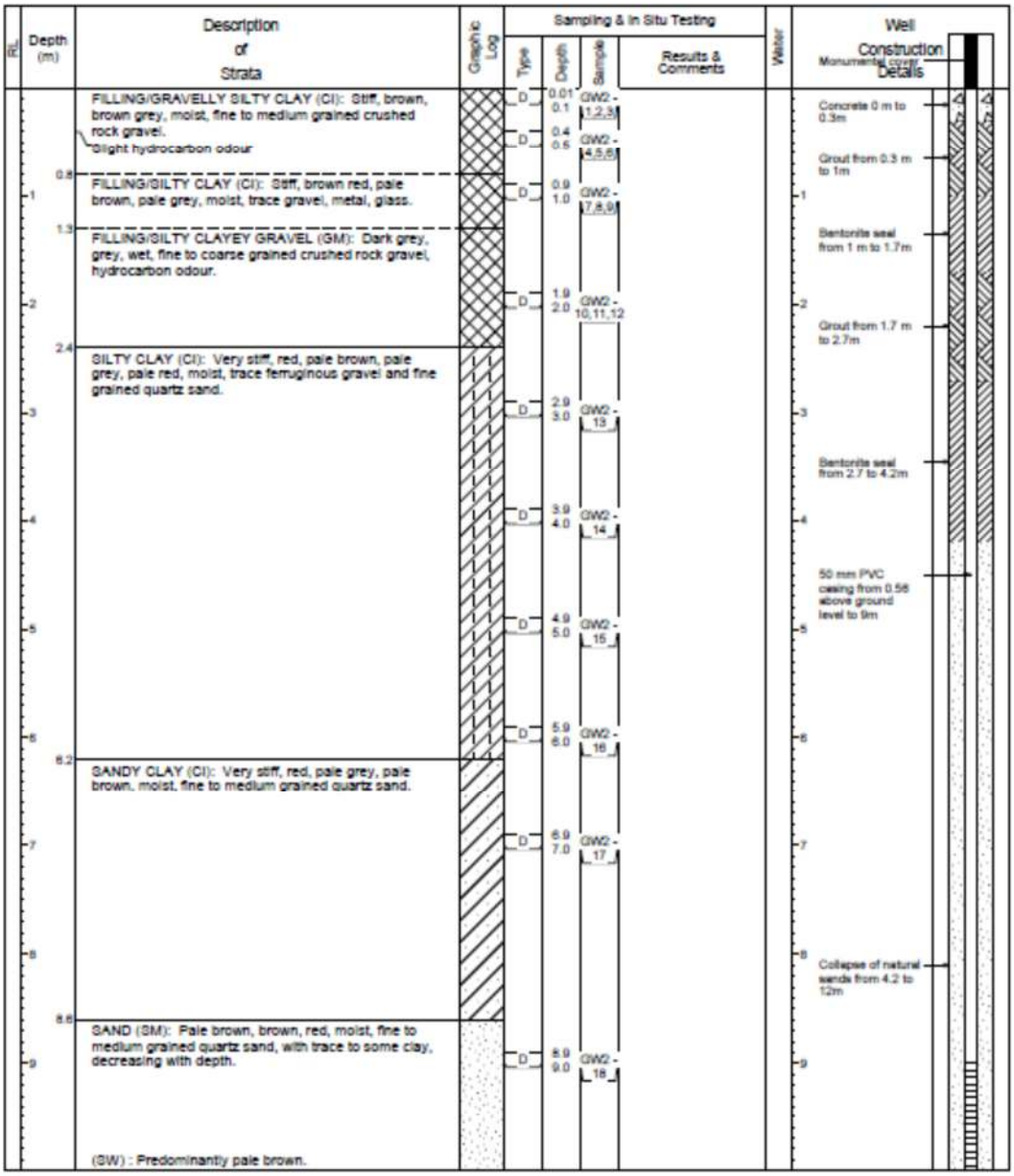
Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344245
NORTHING: 5759725
DIP/AZIMUTH: 90°/--

BORE No: GW2
PROJECT No: 42423.00
DATE: 3 July 2008
SHEET 1 OF 2



RIG: Hydco 30A DRILLER: Urban Drilling LOGGED: CJC CASING: 50 mm PVC
TYPE OF BORING: Solid flight auger & hollow flight auger
WATER OBSERVATIONS: Perched water at approximately 1.5 m. Groundwater at approximately 10.8 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.56 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344245
NORTHING: 5759725
DIP/AZIMUTH: 90°/--

BORE No: GW2
PROJECT No: 42423.00
DATE: 3 July 2008
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	11	SAND (SM): Pale brown, brown, red, moist, fine to medium grained quartz sand, with trace to some clay, decreasing with depth. *(continued)*		D	10.9 11.0	GW2 - 19		▼	50 mm PVC screen from 9 to 12m
	12 12.0	Bore discontinued at 12.0m							End cap
	13								
	14								
	15								
	16								
	17								
	18								
	19								

RIG: Hydco 30A **DRILLER:** Urban Drilling **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Solid flight auger & hollow flight auger
WATER OBSERVATIONS: Perched water at approximately 1.5 m. Groundwater at approximately 10.8 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.56 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

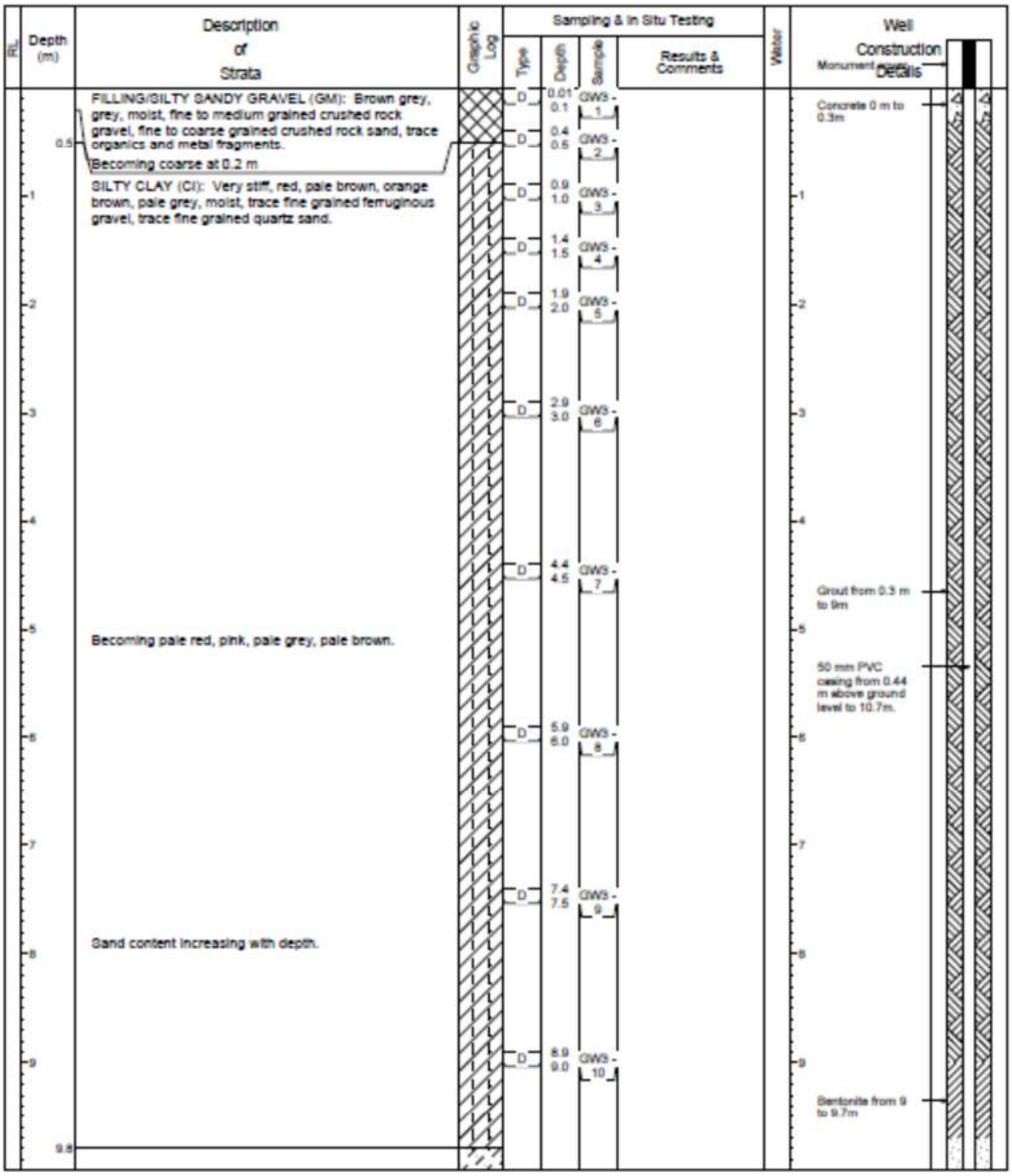
Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344181
NORTHING: 5759710
DIP/AZIMUTH: 90°/--

BORE No: GW3
PROJECT No: 42423.00
DATE: 4 July 2008
SHEET 1 OF 2



RIG: Hydoo 30A **DRILLER:** Urban Drilling **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: Groundwater at approximately 12.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.44 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	PP	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344181
NORTHING: 5759710
DIP/AZIMUTH: 90°/--

BORE No: GW3
PROJECT No: 42423.00
DATE: 4 July 2008
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	11	CLAYEY SAND (SC): Orange brown, pale brown, moist, fine to medium grained quartz sand. *(continued)*		D	10.4 - 10.6	GW3 - 11			
	12	Clay content decreasing with depth.		D	11.9 - 12.0	GW3 - 12		▼	Sand filter pack from 9.7 to 13.7m; 50 mm PVC casing from 10.7 to 13.7m
	13			D	13.4 - 13.5	GW3 - 13			End cap
	13.7	Bore discontinued at 13.7m							
	14								
	15								
	16								
	17								
	18								
	19								

RIG: Hydco 30A **DRILLER:** Urban Drilling **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: Groundwater at approximately 12.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.44 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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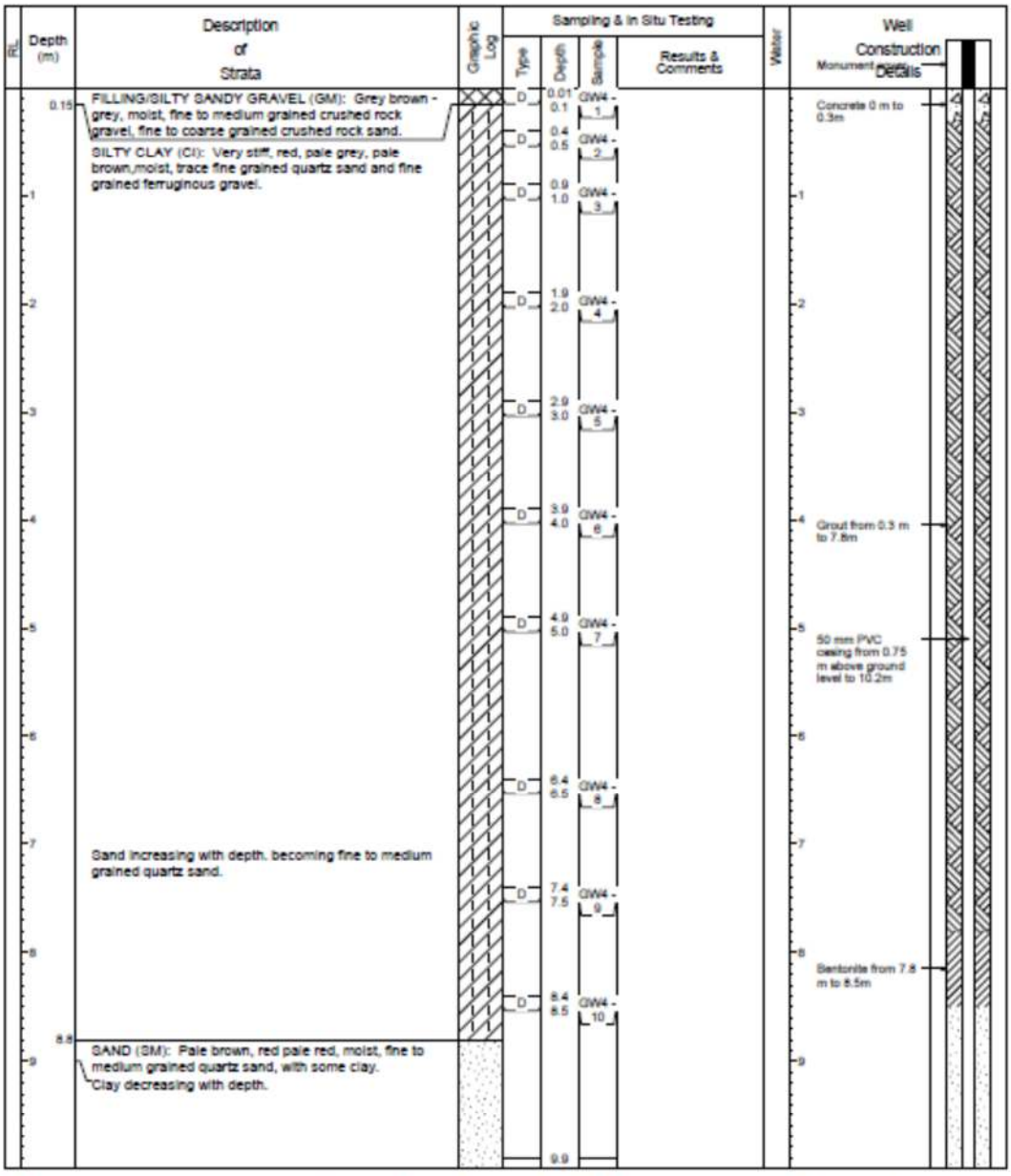
BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344236
NORTHING: 5759729
DIP/AZIMUTH: 90°/--

BORE No: GW4
PROJECT No: 42423.00
DATE: 18 July 2008
SHEET 1 OF 2



RIG: DB500 DRILLER: Aqua Drilling & Grouting LOGGED: CJC CASING: 50 mm PVC
TYPE OF BORING: Hollow flight auger
WATER OBSERVATIONS: Groundwater at approximately 10.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.75 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bluescope Steel Limited
PROJECT: Site Contamination Investigation
LOCATION: Cresco Site, Bayview Road, Hastings

SURFACE LEVEL: --
EASTING: 344236
NORTHING: 5759729
DIP/AZIMUTH: 90°/--

BORE No: GW4
PROJECT No: 42423.00
DATE: 18 July 2008
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	11	SAND (SM): Pale brown, red pale red, moist, fine to medium grained quartz sand, with some clay. (continued)		D	10.0	GW4 - 11			Sand filter pack from 8.5 m to 13.2m.
	12	Wet at 10.5 m		D	11.4 - 11.5	GW4 - 12			50 mm PVC Screen from 10.2 m to 13.2m
	13								End cap
	13.2	Bore discontinued at 13.2m							
	14								
	15								
	16								
	17								
	18								
	19								

RIG: DB500 **DRILLER:** Aqua Drilling & Grouting **LOGGED:** CJC **CASING:** 50 mm PVC
TYPE OF BORING: Hollow flight auger
WATER OBSERVATIONS: Groundwater at approximately 10.5 m
REMARKS: Datum WGS84 UTM Zone 55H. Top of casing 0.75 m above ground level.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	PP	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▶	Water seep ▼ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

Attachment 6: Water Risk Assessment

A high-level risk assessment was undertaken of risks posed to surface and ground water systems from the HGP's construction and operations activities.

The risk assessment process adopted is based on the risk assessment process outlined in EPA Publication 1287: *Guideline for risk assessment of wastewater discharges to waterways* [34], and *Risk assessment guidelines for groundwater dependent ecosystems* [25] both of which use a risk matrix approach.

It should be noted that the GDE risk assessment guidelines [25], only provide three levels of consequence (high, moderate and low). To keep consistent with the EPA's guidelines [34] of five consequence levels; this assessment will treat the GDE consequence rates as:

- high = severe (5)
- moderate = moderate (3)
- low = insignificant (1)

The high potential terrestrial GDEs identified around the site are associated with Western Port (Ramsar listed wetland), a Nationally Important Wetland and strands of Damp Sands Herb-rich Woodland (EVC 3). As such any assessment of risks to GDEs is based on them being Category 1 – High Ecological Value (HEV) / Sensitive Environmental Area (SEA).

The categorisation of likelihood and consequence to determine overall risk levels are presented in the following tables.

Table A1.1: Likelihood

Level	Descriptor	Likelihood
5	Almost certain	The event is expected to occur in most circumstances
4	Likely	The event will probably occur in most circumstances
3	Possible	The event should occur at some time
2	Unlikely	The event could occur at some time
1	Rare	The event may occur only in exceptional circumstances

Table A1.2: Consequence

Beneficial use	Consequence	Descriptor	Level
Aquatic ecosystem	Highly modified ecological assemblage dominated by a few low salinity and stress tolerant species; Deformities or reduced metabolic function in species over a wide area; High levels of cumulative contaminants in biological tissues over a wide spatial area; Acute toxicity NOEC	Severe	5
	Highly modified ecological assemblage dominated by filter and deposit feeders, grazers and blue green and green algae; Deformities or reduced metabolic function in species in identifiable area; Elevated contaminants in some species; Acute toxicity NOEC < 5 percent cause due to non-persistent substances, unlikely to satisfy SEPP (WoV).	Major	4

Beneficial use	Consequence	Descriptor	Level
	Modified ecological assemblage dominated by certain rapid growing algae, grazers and lacking sensitive species; Acute toxicity NOEC >100 percent, chronic toxicity NOEC > 5 percent cause due to non-persistent substances, may meet SEPP (WoV) with mixing zone and outfall diffuser	Moderate	3
	Modified ecological assemblage with detectable difference in species proportions and lacking some sensitive species; No acute toxicity, chronic toxicity NOEC > 25 percent cause due to non-persistent substances, likely to meet SEPP (WoV) with mixing zone and outfall diffuser.	Minor	2
	Minor change in species composition with difference in species proportions and sensitive species present; No acute toxicity, chronic toxicity NOEC > 50 percent cause due to non-persistent substances, likely to meet SEPP (WoV) with mixing zone.	Insignificant	1
Contact recreation	Recreational waters over a substantial area unsuitable for primary and secondary contact recreation at all times due to high and frequent microbiological levels.	Severe	5
	Many recreational waters frequently unsuitable for primary and secondary contact recreation due to high microbiological levels	Major	4
	Many recreational waters occasionally unsuitable for primary and secondary contact recreation due to high microbiological levels.	Moderate	3
	Some recreational waters occasionally unsuitable for primary contact recreation due to elevated microbiological levels	Minor	2
	Recreational waters almost always suitable for primary contact recreation.	Insignificant	1
Aesthetic, non-contact recreational, cultural and spiritual values	Offensive suspended solids, discolouration, odour, foams and slicks	Severe	5
	Obvious suspended solids, discolouration, odour, foams and slicks	Major	4
	Frequent detectable discolouration, odour and slicks.	Moderate	3
	Occasional detectable discolouration, odour and slicks	Minor	2
	No detectable discolouration, odour and slicks.	Insignificant	1
Fisheries and aquaculture	High potential for mortality of targeted species due to effects on water quality; Deformities or reduced metabolic function in species; High levels of cumulative contaminants in tissue over a wide spatial area	Severe	5
	Deformities or reduced metabolic function in species; Contaminants above edible standards in edible tissue.	Major	4
	Contaminants in tissue in some species significantly higher than reference sites, but comply with edible standards.	Moderate	3
	Contaminants in tissue in some species higher than reference sites, but well within edible standards	Minor	2
	Contaminants in tissue in species within range of reference sites, and well within edible standards.	Insignificant	1
GDE – water quantity	Reduction in groundwater level(s) or piezometric pressure beyond seasonal variation, resulting in permanent loss or alteration of defined habitat type.	Severe	5

Beneficial use	Consequence	Descriptor	Level
	Fluctuation in groundwater level(s) or piezometric pressure beyond established seasonal variation, resulting in permanent loss or alteration of defined habitat type. Permanent reversal of base flow conditions		
	Reduction in groundwater level(s) or piezometric pressure beyond seasonal variation, resulting in temporary loss or alteration of defined habitat type. Fluctuation in groundwater level(s) or piezometric pressure beyond seasonal variation, resulting in temporary loss or alteration of defined habitat type. Temporary reversal of base flow conditions exceeding seasonal variation.	Moderate	3
	No change to aquifer water levels or pressure. No change in timing of water level fluctuations. No change in direction of flow.	Insignificant	1
GDE – water quality	Permanent change; eg. in pH, DO, nutrients, temperature and / or turbidity Permanent change in location or gradient of salt / freshwater interface. Reduction in water quality beyond designated BU category (for identified trigger parameters).	Severe	5
	Temporary change; eg. in pH, DO, nutrients, temperature and / or turbidity. Temporary change in location or gradient of salt / freshwater interface. Reduction in water quality within designated BU category (for identified trigger parameters).	Moderate	3
	Negligible change (<5%) No change or not applicable Negligible change for identified triggers (<5%)	Insignificant	1
GDE – aquifer integrity	Permanent destruction of the aquifer matrix. Major cracking/fracturing of the bedrock/stream bed leading complete dewatering of the GDE	Severe	5
	Temporary adjustment to the aquifer matrix. Minor cracking/fracturing of the bedrock/stream bed leading to partial dewatering of the GDE.	Moderate	3
	No change	Insignificant	1
GDE – biological integrity	> 10% reduction in No. of species. > 10% change in species composition Increasing large populations of exotic flora or fauna of one or more species. > 20% removal or alteration of habitat area.	Severe	5
	10 to 5% reduction in No. of species. 10 to 5% change in species composition. Increasing species of exotic flora or fauna in small numbers. 10 to 20% removal or alteration of habitat.	Moderate	3
	No reduction in No. of species. No change in species composition.	Insignificant	1

Beneficial use	Consequence	Descriptor	Level
	No change in exotic species. No removal or alteration of habitat.		

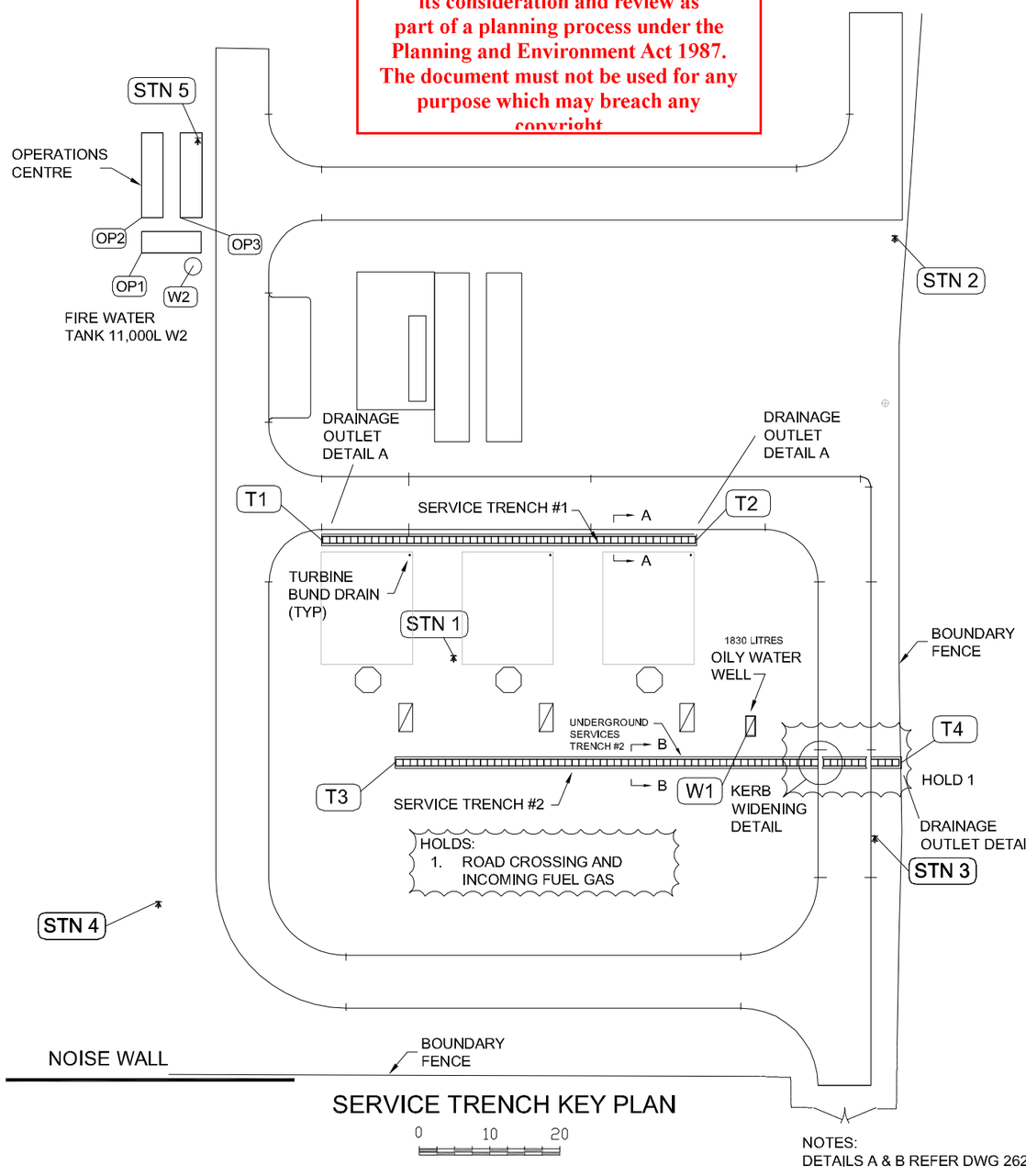
Table A1.3: Risk Matrix

Likelihood	Consequence				
	Insignificant 1	**Minor 2**	**Moderate 3**	**Major 4**	**Severe 5**
5. Almost certain	Negligible	Moderate	High	Extreme	Extreme
4. Likely	Negligible	Moderate	Moderate	High	High
3. Possible	Negligible	Low	Moderate	High	High
2. Unlikely	Negligible	Low	Low	Moderate	Moderate
1. Rare	Negligible	Negligible	Negligible	Low	moderate

Table A1.4: Risk matrix management actions for high environmental value GDEs and surface water contamination

Risk Rating	Management action short term	Management action mid term	Management action long term
Negligible – low	Protection measures for aquifer and GDEs Baseline risk monitoring.	Continue protection measures for aquifers and GDEs Periodic monitoring and assessment.	Adaptive management. Continue monitoring.
Moderate	Protection measures for aquifer and GDEs Baseline risk monitoring. Mitigation action. Investigate cause – implement mitigation measures	Protection measures for aquifers and GDEs Monitoring and periodic assessment of mitigation. Investigate cause – implement mitigation measures	Adaptive management. Continue monitoring. Investigate cause – implement mitigation measures
High – extreme	**Protection measures for aquifer and GDEs** **Baseline risk monitoring. Mitigation action.** **Senior Management Attention – Action required**	**Protection measures for aquifer and GDEs.** **Monitoring and annual assessment of mitigation.** **Senior Management Attention – Action required**	**Adaptive management.** **Continue monitoring.** **Senior Management Attention – Action required**

Attachment 7: Site Layout Drawing – Service Trench and Oily Water Tank



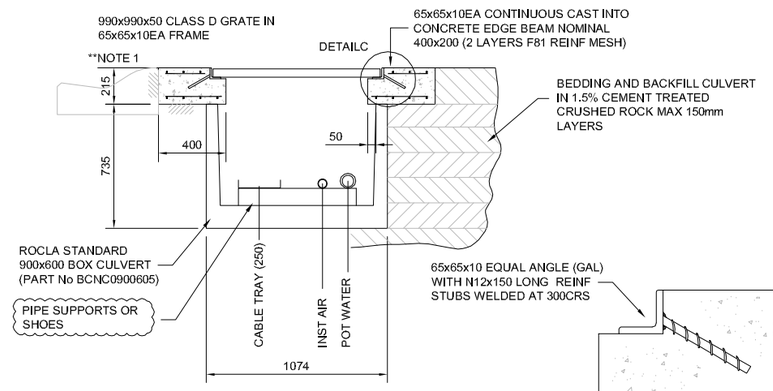
SERVICE TRENCH KEY PLAN

0 10 20

NOTES:
DETAILS A & B REFER DWG 262-40025

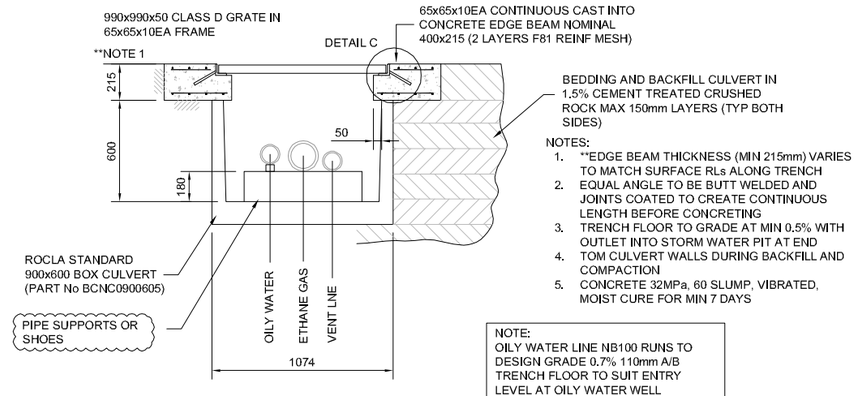
SERVICE TRENCH AND TANK SET OUT

POINT	EASTING, NORTHING, IL
T1	2996369.938, 1833432.716, 13.040
T2	3049679.938, 1833432.716, 13.200
T3	3006832.896, 1801792.846, 13.080
T4	3078822.896, 1801792.846, 12.723
W1	3056677.897, 1805551.341, 12.160
W2	2978115.405, 1872268.786, 14.500



SECTION A-A

DETAIL C



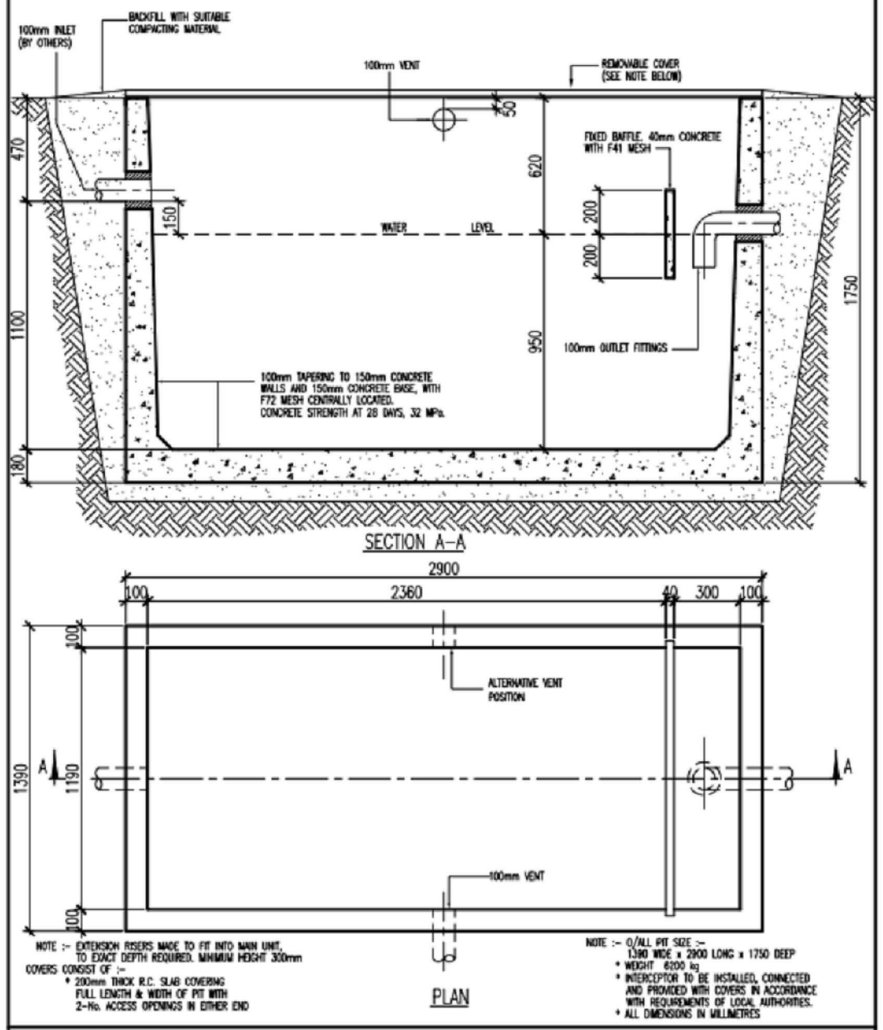
NOTES:
1. **EDGE BEAM THICKNESS (MIN 215mm) VARIES TO MATCH SURFACE RLs ALONG TRENCH
2. EQUAL ANGLE TO BE BUTT WELDED AND JOINTS COATED TO CREATE CONTINUOUS LENGTH BEFORE CONCRETING
3. TRENCH FLOOR TO GRADE AT MIN 0.5% WITH OUTLET INTO STORM WATER PIT AT END
4. TOM CULVERT WALLS DURING BACKFILL AND COMPACTION
5. CONCRETE 32MPa, 60 SLUMP, VIBRATED, MOIST CURE FOR MIN 7 DAYS

NOTE:
OILY WATER LINE NB100 RUNS TO DESIGN GRADE 0.7% 110mm A/B TRENCH FLOOR TO SUIT ENTRY LEVEL AT OILY WATER WELL

SECTION B-B

WHITE TECHNICS	GE											Esso Australia Pty Ltd ABN 49 000 018 566 PRODUCTION DEPARTMENT		HASTINGS GENERATION SITE
(CAD)		GK	BK	GK	BK	WA	WT	A	14-02-22	ISSUED FOR REVIEW	AFE 619/21003			SITE LAYOUT
PROJECT MANAGER: E. PORIC		DRAWN: GK	DRAFTING CHECKED: BK	DESIGNED: GK	ENGINEERING CHECKED: BK	DESIGN APPROVED: WA	CONSULTANT: WT	REV No: A	DATE: 14-02-22	REVISION: ISSUED FOR REVIEW	PROJ No: AFE 619/21003	PROJECT MANAGER: N. ZED	DRAWING No	SERVICE TRENCH AND OILY WATER
JOB No: AFE 619/21003	REFERENCE No: 262-40003											SIGNATURE / DATE	REFERENCE DRAWINGS	SCALE: AS SHOWN / DRG No: 262 - 40003 / REV: A

3110 litre Settling Tank

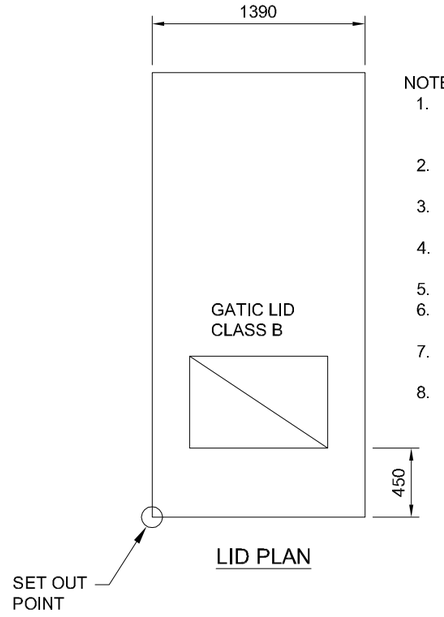


MELBOURNE WATER TYPE

FCP INDUSTRIES

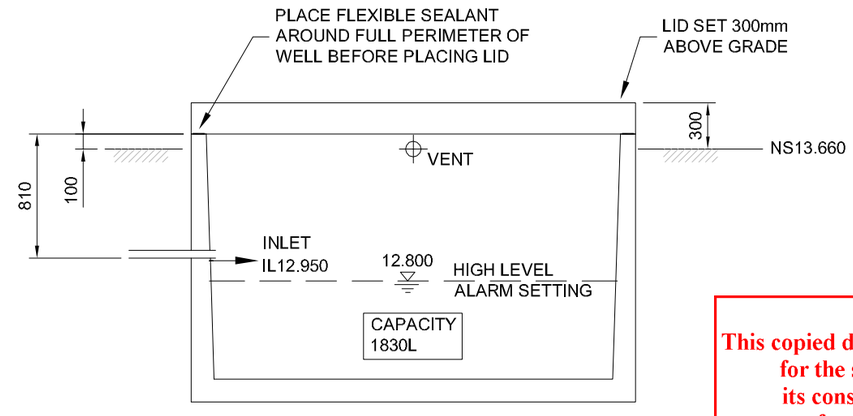
Frankston Concrete Products
30-44 MILES GROVE
P.O.Box 306
SEAFORD, VICTORIA 3198
Tel.(03)9786 3111 Fax.(03)9786 3208
web site – www.frankstonconcrete.com.au
email – sales@frankstonconcrete.com.au

DRAWN	M.D.S.
CHECKED	M.M.
APPROVED	N.Z.
DRAWING No.	82/13007

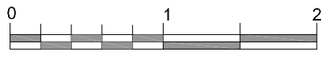


LID PLAN

NOTES:-
1. OILY WELL TO BE PROCURED VIA PRE-CAST MANUFACTURER EG FRANKSTON CONCRETE PRODUCTS (SETTLING TANK SHOWN) OR SIMILAR
2. STANDARD CAPACITY 3110 LITRES (1830 LITRES AS CONFIGURED BY ESSO)
3. TANK TO BE TESTED WATERPROOF PRIOR TO DELIVERY
4. INLET OPENING 810 BELOW TOP EDGE - VENT OPENING AS SHOWN, TO SUIT ESSO PURPOSES
5. DELETE OUTLET AND BAFFLES
6. TANK TO BE FITTED WITH MEDIUM DUTY CLASS B GATIC LID 900x600 PERSONNEL ACCESS
7. INSTALLATION TO BE SEALED FROM RAIN WATER OR SITE DRAINAGE
8. ESSO TO FIT HIGH LEVEL ALARM (FLASHING AND AUDIBLE) ON TANK. ALARM ALSO CONNECTED REMOTELY TO OPERATIONS CENTRE



ELEVATION



SCALE IN METRES

WHITE TECHNICS
(CAD)

GE											
	GK	BK	GK	BK	WA	WT	A	14-02-22	ISSUED FOR REVIEW	AFE 619/21003	
PROJECT MANAGER	E. PORIC	DRAWN	DRAFTING CHECKED	DESIGNED	ENGINEERING CHECKED	DESIGN APPROVED	CONSULTANT	REV No	DATE	REVISION	PROJ No
JOB No AFE 619/21003	REFERENCE No 262-40027										

Esso Australia Pty Ltd
ABN 49 000 018 566
PRODUCTION DEPARTMENT

PROJECT MANAGER	N. ZED		
SIGNATURE		DATE	

DRAWING No | REFERENCE DRAWINGS

HASTINGS GENERATION SITE
OILY WATER WELL
DETAILS

SCALE AS SHOWN | DRG No 262 - 40027 | REV A