REFERRAL OF A PROJECT FOR A DECISION ON THE NEED FOR ASSESSMENT UNDER THE *ENVIRONMENT EFFECTS ACT 1978*

REFERRAL FORM

The *Environment Effects Act 1978* provides that where proposed works may have a significant effect on the environment, either a proponent or a decision-maker may refer these works (or project) to the Minister for Planning for advice as to whether an Environment Effects Statement (EES) is required.

This Referral Form is designed to assist in the provision of relevant information in accordance with the *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Seventh Edition, 2006). Where a decision-maker is referring a project, they should complete a Referral Form to the best of their ability, recognising that further information may need to be obtained from the proponent.

It will generally be useful for a proponent to discuss the preparation of a Referral with the Impact Assessment Unit (IAU) at the Department of Environment, Land, Water and Planning (DELWP) before submitting the Referral.

If a proponent believes that effective measures to address environmental risks are available, sufficient information could be provided in the Referral to substantiate this view. In contrast, if a proponent considers that further detailed environmental studies will be needed as part of project investigations, a more general description of potential effects and possible mitigation measures in the Referral may suffice.

In completing a Referral Form, the following should occur:

- Mark relevant boxes by changing the font colour of the 'cross' to black and provide additional information and explanation where requested.
- As a minimum, a brief response should be provided for each item in the Referral Form, with a more detailed response provided where the item is of particular relevance. Cross-references to sections or pages in supporting documents should also be provided. Information need only be provided once in the Referral Form, although relevant cross-referencing should be included.
- Responses should honestly reflect the potential for adverse environmental effects. A Referral will only be accepted for processing once IAU is satisfied that it has been completed appropriately.
- Potentially significant effects should be described in sufficient detail for a reasonable conclusion to be drawn on whether the project could pose a significant risk to environmental assets. Responses should include:
    - a brief description of potential changes or risks to environmental assets resulting from the project;
    - available information on the likelihood and significance of such changes;
    - the sources and accuracy of this information, and associated uncertainties.
- Any attachments, maps and supporting reports should be provided in a secure folder with the Referral Form.
- A USB copy of all documents will be needed, especially if the size of electronic documents may cause email difficulties. **Individual documents should not exceed 10MB as they will be published on the Department's website.**

- A completed form would normally be between 15 and 30 pages in length. Responses should not be constrained by the size of the text boxes provided. Text boxes should be extended to allow for an appropriate level of detail.
- The form should be completed in MS Word and not handwritten.

The party referring a project should submit a covering letter to the Minister for Planning together with a completed Referral Form, attaching supporting reports and other information that may be relevant. This should be sent to:

Postal address

Minister for Planning
PO Box 500
EAST MELBOURNE VIC 8002

Couriers

Minister for Planning
Level 16, 8 Nicholson Street
EAST MELBOURNE VIC 3002

In addition to the submission of the hardcopy to the Minister, separate submission of an electronic copy of the Referral via email to ees.referrals@delwp.vic.gov.au is required. This will assist the timely processing of a referral.

PART 1 PROPONENT DETAILS, PROJECT DESCRIPTION & LOCATION

1. Information on proponent and person making Referral

Name of Proponent:	**GeelongPort Pty Ltd**
Authorised person for proponent: **Position:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Bilal Ali Khan General Manager, New Markets PO Box 344 Geelong Victoria 3220 Australia b.khan@geelongport.com.au (03) 5247 0200 N/A
Person who prepared Referral: **Position:** **Organisation:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Rhys Armstrong Technical Director – Planning & Approvals GHD Pty Ltd Level 9, 180 Lonsdale Street Melbourne Victoria 3000 Australia rhys.armstrong@ghd.com (03) 8687 8691 N/A
Available industry & environmental expertise: (areas of 'in-house' expertise & consultancy firms engaged for project)	GeelongPort Pty Ltd (GeelongPort) manages critical wharf and land-side infrastructure owned by Ports Pty Ltd (Ports) at Port of Geelong which handles more than 12 million tonnes of product annually across a broad range of industry segments, including crude oil, wood-chip, fertiliser and break bulk cargo. GHD Pty Ltd (GHD) is a large professional services consultancy who are providing a comprehensive suite of technical consulting services to support the Geelong Hydrogen Hub. These services include planning and approvals, conceptual design and options assessment, cultural heritage, terrestrial and marine ecology, hydrology, hydrogeology, contamination and spatial amongst other services.

2. Project – Brief outline

Project title:

Geelong Hydrogen Hub

Project location: (describe location with AMG coordinates and attach A4/A3 map(s) showing project site or investigation area, as well as its regional and local context)

The Project is located at the existing Port of Geelong (Appendix A Figure A-1 Project location). The Port of Geelong is located in the City of Greater Geelong, on the western shore of Corio Bay approximately seven kilometres north of the central business district. The area surrounding the port is heavily developed and industrial, with current nearby operations comprising of an oil refinery, cement manufacture and clinker grinding, and fertiliser manufacture.

Short project description (few sentences)**:**

GeelongPort is proposing to develop a facility at Port of Geelong to import liquid green ammonia, produce hydrogen and nitrogen by ammonia decomposition (catalytic process), and distribute hydrogen to gas market participants for blending with natural gas and industrial offtake users within the Port of Geelong or its immediate vicinity.

The key project components comprise:

- New berth to facilitate green ammonia shipments as an extension of Refinery Pier in Corio Bay
- Transfer pipeline to an onshore storage facility located on land owned by Ports
- Onshore storage facility for liquid ammonia (60m diameter storage tank(s))
- Catalytic cracking plant(s) to decompose ammonia into hydrogen and nitrogen
- Onshore distribution pipelines to potential industrial users within the Port of Geelong in adjacent industrial zones or other facilities in Victoria
- Vehicle refuelling facility (hydrogen)

3. Project description

Aim/objectives of the project (what is its purpose / intended to achieve?):

The objective of the project is to import green ammonia for production of green hydrogen for use in a range of local industrial applications such as industrial heating, blending with natural gas use for domestic consumption, industrial process applications (fertiliser and cement manufacture), and vehicle fuelling applications. Use of green hydrogen for these industrial processes presents a strong offset for gas production and consumption needs.

Background/rationale of project (describe the context / basis for the proposal, eg. for siting):

Rationale

As the energy sector switches from carbon-based fossil fuels and accelerates development of decarbonised and renewable energy sources, innovative methods to store and transport these forms of energy are required. One of these sources includes green hydrogen produced by electrolysis using renewable energy. GeelongPort is seeking to secure approvals for a hydrogen production facility to ensure that it can positively contribute to Victoria's transition to a green economy.

As Victoria's second largest port, GeelongPort has the potential to play a key role in the growing Australian hydrogen industry as the operator of critical port infrastructure, experience of hazardous materials handling and proximity to freight corridors and energy network.

This proposal offers the opportunity to accelerate the decarbonisation of the Victorian economy through investment to create jobs for the future in this emerging sector. The Project will deliver on the 'hydrogen-ready' approach in the Victorian Government's Victorian Renewable Hydrogen Industry Development Plan.

The import of hydrogen through GeelongPort will not only address Victoria's decarbonisation plans but also mitigate risks associated with any gas shortage in Victoria.

Why ammonia?

The low volumetric density of hydrogen inhibits economic viability of storage and transport, even when compressed to high pressures or liquified. As a hydrogen "carrier", ammonia will become a dominant presence in international transportation and storage of low-carbon alternative fuels, as it is carbon free and in liquid form it allows cost effective storage and transport of large quantities of renewable energy. Ammonia can be split apart into hydrogen and nitrogen to be utilised as high purity hydrogen, with technology currently available to achieve this at a commercial scale in Victoria.

When stored and handled in accordance with national and international standards, ammonia is a safe and practical hydrogen carrier as its production technology and storage requirements are well established and understood, and it has a relatively modest liquefaction temperature (-33°C) comparative to hydrogen (-253°C). There is an existing global logistics network available to safely import and export ammonia. Green ammonia also presents a range of alternative uses to existing industry and can be directly utilised as fertiliser, a direct carbon free energy source, or be cracked and separated into high purity green hydrogen (H_2).

The Project will comply with AS/NZS 2022 Anhydrous ammonia – Storage and Handling. This standard provides distributors and users with procedures for the safe handling and storage of anhydrous ammonia. It specifies requirements for the design, repair, alteration, location, installation and operation of plant used for the storage, handling and transport of anhydrous ammonia in industrial and rural settings. The primary relevance of this standard is to define the minimum distances of the tanks and facilities from boundaries.

Siting

Onshore components
The project site within the Port of Geelong was selected due to its proximity and access to existing port infrastructure at Refinery Pier (Appendix A Figure A-2 Site layout), its proximity to potential offtake users and its ability to provide the maximum separation distance available from any impact on the community (Appendix A Figure A-3 Sensitive receptors). Additionally, the land is wholly owned by Ports and appropriately zoned for port and industrial uses.

The proposed location of the ammonia storage tank is centrally located within the port and in the northeast corner of the proposed project site, providing a substantial separation distance from the nearest sensitive uses. Sensitive uses are defined as land used for residential uses, childcare centres, kindergartens, pre-school centres or primary schools.

New berth
An options assessment was undertaken for alternative berth layouts to accommodate future imports of ammonia. The options assessment aimed to identify optimal configurations that provide safe navigation, minimise capital dredging volume and respond to the environmental aspects of the site. Two feasible options were identified for the dedicated ammonia import berth (refer to Section 4 Project alternatives, pages 8 to 11). Other option(s) with the new berth located at Lascelles to the south side of Refinery Pier would compromise the existing use of pier facilities, require extensive dredging and higher cost and therefore were not progressed as feasible alternatives in the options assessment.

The options assessment was based on desktop studies and publicly available data (such as bathymetry from Navionics and metocean (e.g. wind, wave and climate) data from the Bureau of Meteorology). For the purposes of considering product handling, the structural integrity of Refinery Pier has been considered as adequate based on the results of condition assessments undertaken for the pier in 2021. Structural assessments would be completed to support detailed design. Design vessel data has been defined through GHD review of tanker fleets, trends in vessel size over the last 20+ years, and reference to PIANC (Confidence limit 75%).

The preferred berth layout selected is based on the following key factors:
- Location within the existing dredge pocket and therefore no capital dredging is required, reducing the environmental impact and capital expenditure requirements
- Orientation of vessel to suit prevailing metocean conditions (e.g. wind, wave and climate) and vessel manoeuvrability
- Less impedance on channel and limited navigational restraints

Main components of the project (nature, siting & approx. dimensions; attach A4/A3 plan(s) of site layout if available):

The conceptual site layout (Appendix A Figure A-2) highlights the key process buildings, pipeline routes and structures. The site layout allows for future expansion or alternative applications for green ammonia and green hydrogen.

Processing, storage and supply facilities

Facilities required to produce and supply hydrogen include:

- Atmospheric pressure ammonia storage tank(s), preliminary sizing 48 m diameter x 37 m height
- Boil off gas (BOG) refrigeration plant for ammonia tank to maintain temperature of -34°C
- Vapour recovery unit to condense ammonia vapour displaced during tank filling
- Ammonia Cracking Plant(s), housed within a covered industrial building similar to the Incitec Pivot sheds on the adjacent block, and likely comprising of the following major equipment items (depending on technology selected):
  - Ammonia pumps
  - Heat exchanger(s)
  - Ammonia vaporizer
  - Ammonia cracking reactor

- Ammonia purification (e.g. molecular sieve adsorption or pressure swing absorption) (may not be required depending on selected technology)

– Hydrogen Buffer / Storage tank(s)
– Hydrogen tanker truck loading facilities (bulk hydrogen)
– Hydrogen truck fuelling facility (fuel cells)
– Relevant emergency detection and response systems including firefighting facilities
– Process Control System and control room
– Emergency Shutdown System for process plant, truck loading and fuelling facilities

Refinery Pier extension

The waterside component of the Project consists of a new trestle structure leading to an open piled berth and two new mooring dolphins, situated to the north of Refinery Pier 1. The new berth is located within the existing dredge pocket for vessels of DWT approximately 50,000. This option will therefore avoid any new capital dredging requirements and minimise the environmental impacts.

The orientation of the berth is in line with the existing Refinery Pier infrastructure, where the vessel is bow/stern to the prevailing wind from the southeast. The closest structure, approximately 200m away is Refinery Pier 1.

As the berth is a new structure removed from the existing berths, there is expected to be minimal operational and construction restrictions on current operations. There is adequate clearance to existing structures and berthed vessels, however tug assistance will likely be required to assist in the berthing and unberthing operations, similar to existing port operations.

Pipelines

Pipelines required to support the facility include:
– Ammonia Import Pipeline (up to 28 inch) from the new berth to the ammonia storage tank
– Hydrogen pipeline to industrial customer(s)
– Hydrogen pipeline to a hydrogen truck fuelling facility (fuel cells)

Ancillary components of the project (eg. upgraded access roads, new high-pressure gas pipeline; off-site resource processing):

Ancillary components include:

– St Georges Road extension
– Administration and services building
– Site utilities including potable water
– Site fencing and security gates
– Site security system
– Site lighting
– Access roads, car parking and site roads

Key construction activities:

Key construction activities include typical civil construction methods including:

– Site preparation and establishment of temporary services and other facilities required to support construction such as offices, power, communications, water, drainage, hard stand areas and other facilities
– Preparatory civil works (ground preparation, levelling, compaction, fill). Based on the current understanding of the site conditions, ground improvement works may be required.
– Install foundations, concrete hardstands and roads
– Install permanent non-process infrastructure and other ancillary buildings such as workshops, warehouse, and offices including reticulating permanent services throughout the Project site
– Install ammonia cracking plant including support utilities and facilities such as water, plant air, firefighting, gas detection/compression/refrigeration, communications, process controls and other safety systems

- Install ammonia storage tank and refrigeration system
- Install new berth using marine plant and equipment (including piling equipment)
- Install import and offtake infrastructure including pumps and pipelines to transport ammonia from the new berth to the ammonia storage tank, and hydrogen from the production plant to the vehicle fuelling stations and local users

Key operational activities:

The Project requires an ammonia supply of one Very Large Gas Carrier (VLGC) load per month of 52,000 m^3 or multiple part loads for a cumulative rate of 30,000 t/month, for production of approximately 5,000 t/month (or 140 t/day) of hydrogen. This is equivalent to the hydrogen production output of a 350-400MW electrolysis facility. Conservatively and to allow for future growth, a VLGC of 87,000m^3 capacity has been selected as the design vessel. This size design vessel has a draught of 12m and is not constrained by the existing channel (i.e. will not require capital dredging).
The project site also includes the available space to expand the facilities for future demand with a second ammonia storage tank, ammonia cracking train and associated facilities. This would permit additional loads of ammonia in any one month. This option forms part of the proposed project that is the subject of this referral.

The ammonia supply tanker would typically offload for a duration of 24 hours, with ammonia piped to the ammonia storage tank. A vapour recovery unit would be used to condense ammonia vapour displaced during tank filling. The storage tank would be refrigerated to maintain a temperature of -34°C by a Boil Off Gas (BOG) refrigeration system.

It is proposed that the ammonia cracking plant would be designed with the capability to process the full VLGC ammonia shipment in 30-days, but this would be subject to future investigations. Determination of the preferred ammonia cracking technology provider has not been finalised as there are multiple options available and procurement of the service provider will be completed once all necessary approvals have been obtained.

As gaseous hydrogen storage is particularly expensive and inefficient to achieve at large scale, the storage of hydrogen is minimised and hydrogen supplied on demand.

Hydrogen offtake options

Several offtake arrangements are under consideration and at present the proposed offtakes include hydrogen piped offtake to local users, bulk export via hydrogen or ammonia tanker (for cracking offsite), truck fuelling stations, blending with the gas network in the Victorian Transmission System (VTS) and a combination of these options. Offtake to local users via hydrogen pipeline is the preferred option given the neighbouring industry. Truck fuelling applications and bulk export via hydrogen tanker offer the potential for a scalable operation. Truck fuelling is consistent with the neighbouring port operations and industrial zones given the associated heavy vehicle uses in the area. Typical fill quantities for heavy vehicles are approximately 30-40kg. The offtake options do not affect the extent of proposed works.

Key decommissioning activities (if applicable):

Decommissioning of the facility will be required following cessation of operations. The design life of the project is a minimum of 25 years, with the potential for a design life of up to 50 years, depending on upgrades and other capital works.

Decommissioning activities will depend on the proposed land use following cessation of the Project. GeelongPort would seek to retain facilities for alternative uses where practicable, such as the new berth. Where reuse of infrastructure is not practicable, GeelongPort would seek opportunities to recycle materials, with the remaining materials disposed offsite. Contaminated materials and other wastes would be managed appropriately in accordance with Victorian and Commonwealth legislation and guidelines.

Is the project an element or stage in a larger project?

☒ No ☒ Yes If yes, please describe: the overall project strategy for delivery of all stages and components; the concept design for the overall project; and the intended scheduling of the design and development of project stages).
Is the project related to any other past, current or mooted proposals in the region?
☒ No ☒ Yes If yes, please identify related proposals. The Project is not related to any other past, current or mooted proposals in the region.
What is the estimated capital expenditure for development of the project?
Capital expenditure is not able to be estimated at this stage as detailed design has not been undertaken. It is anticipated that the capital expenditure for the project will be in the order of $130 million.

4. Project alternatives

Brief description of key alternatives considered to date (eg. locational, scale or design alternatives. If relevant, attach A4/A3 plans):

Alternative to ammonia import

The principal alternative to GeelongPort importing ammonia as the basis of a low carbon renewable power production pathway, would most likely be the use of electrolysis to produce hydrogen. Developing an electrolysis facility at the proposed site was considered.Until the cost of electrolysis comes down through efficiencies and scalability, it was determined to be not feasible as the footprint of an electrolysis facility producing the equivalent quantity of hydrogen is likely to significantly exceed the available land within GeelongPort. Giddey et al. (2017) suggest the energy required to 'crack' ammonia is approximately 1.4MWh/tonne compared to 50-55MWh/tonne of hydrogen produced via electrolysis, noting, that the energy balance should consider the lifecycle and transport energy as a true comparison. Significant additional expenditure would be required to augment the existing power supply to the region to support electrolysis and as a process, including investment in large renewable power connections to the Port.

For the preferred option, it is anticipated that the green ammonia will be sourced from one of several large-scale projects in Australia, specifically Tasmania and Western Australia.

Ammonia cracking technology

Consideration of the specific end user requirements will influence the ammonia cracking technology solution, as hydrogen purity requirements, efficiency and cost for each individual application differs.

Information available for large-scale demonstration plants or projects is commercially sensitive and is therefore limited, however the following publicly available descriptions of ammonia technologies and projects have been identified and are currently under consideration. Further investigations into the applicability of these options to the proposed project are underway:

- **The CSIRO-Fortescue Metal Membrane Technology**. In partnership, CSIRO and Fortescue have developed a membrane reactor to convert ammonia to high-purity hydrogen for use in fuel cell vehicles (FCVs). In September 2020, Fortescue announced a memorandum of understanding with Hyundai Motor company for the development and future commercialisation of its metal membrane technology. At scale, this technology could enable an ammonia-based hydrogen production, storage, and distribution infrastructure, lowering the barriers to implementation of a national network of hydrogen filling stations.
- A consortium of **Siemens, Energie,** the **Science & Technology Facilities Council and Ecuity** in the UK have a project underway to demonstrate a new ammonia cracking technology with improved compactness, flexibility, efficiency, scalability and effectiveness in producing pure hydrogen compared to state-of-the-art technologies. The Lithium Imide Catalyst developed shows great potential to improve the economics of ammonia decomposition with lower costs and higher performance than the current state of the art catalysts used.
- **Thyssenkrupp Uhde** have a strong history in ammonia synthesis plants and development of new technologies in this field. They are also investing R&D efforts into ammonia cracking technology to utilise green ammonia as a sustainable energy carrier, with efforts to increase the scale to several hundred tonnes per day (tpd) now being offered to select applications.
- **Starfire Energy** is a sustainable energy company in Colorado specialising in carbon free ammonia modular systems, green ammonia and cracker technologies. The cracked ammonia can be used to make a point-of-use NH3 + H2 blend that burns well in a wide range of equipment, or it can also be used with other equipment to make a lower cost, high purity, high pressure hydrogen source for hydrogen fuel cell vehicles. Further information is required on the scalability of the technology to >140 tonnes per day for application to a bulk ammonia to hydrogen cracking facility.

Berth options

An options assessment was undertaken to determine the location of the new berth. The options assessment aimed to identify optimal configurations that provide safe navigation, minimise capital dredging volume and respond to the environmental aspects of the site. Two options have been considered for the dedicated ammonia import berth, with 'Option 2' being the preferred option selected and presented within this referral.

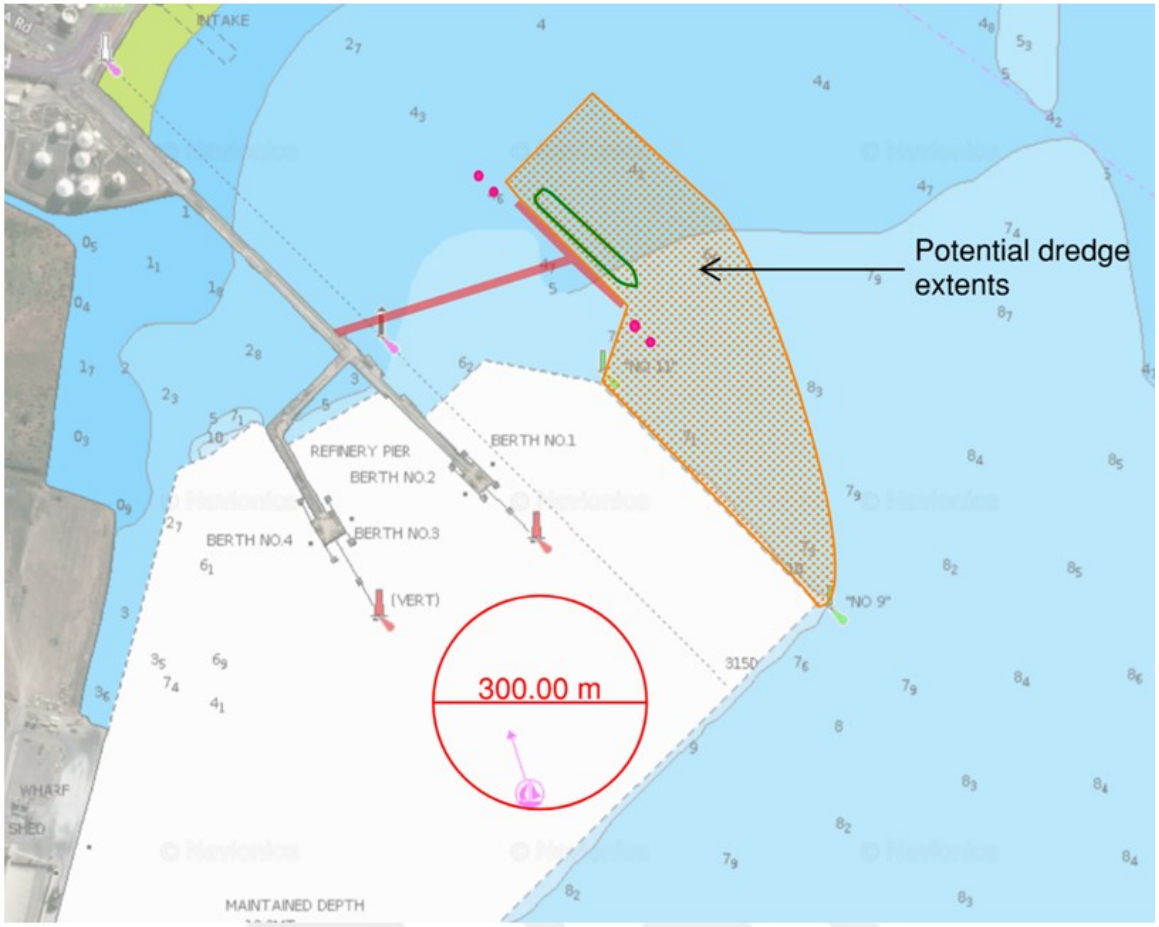


Figure 1: New berth layout – Option 1. Pink circles represent new mooring dolphins.

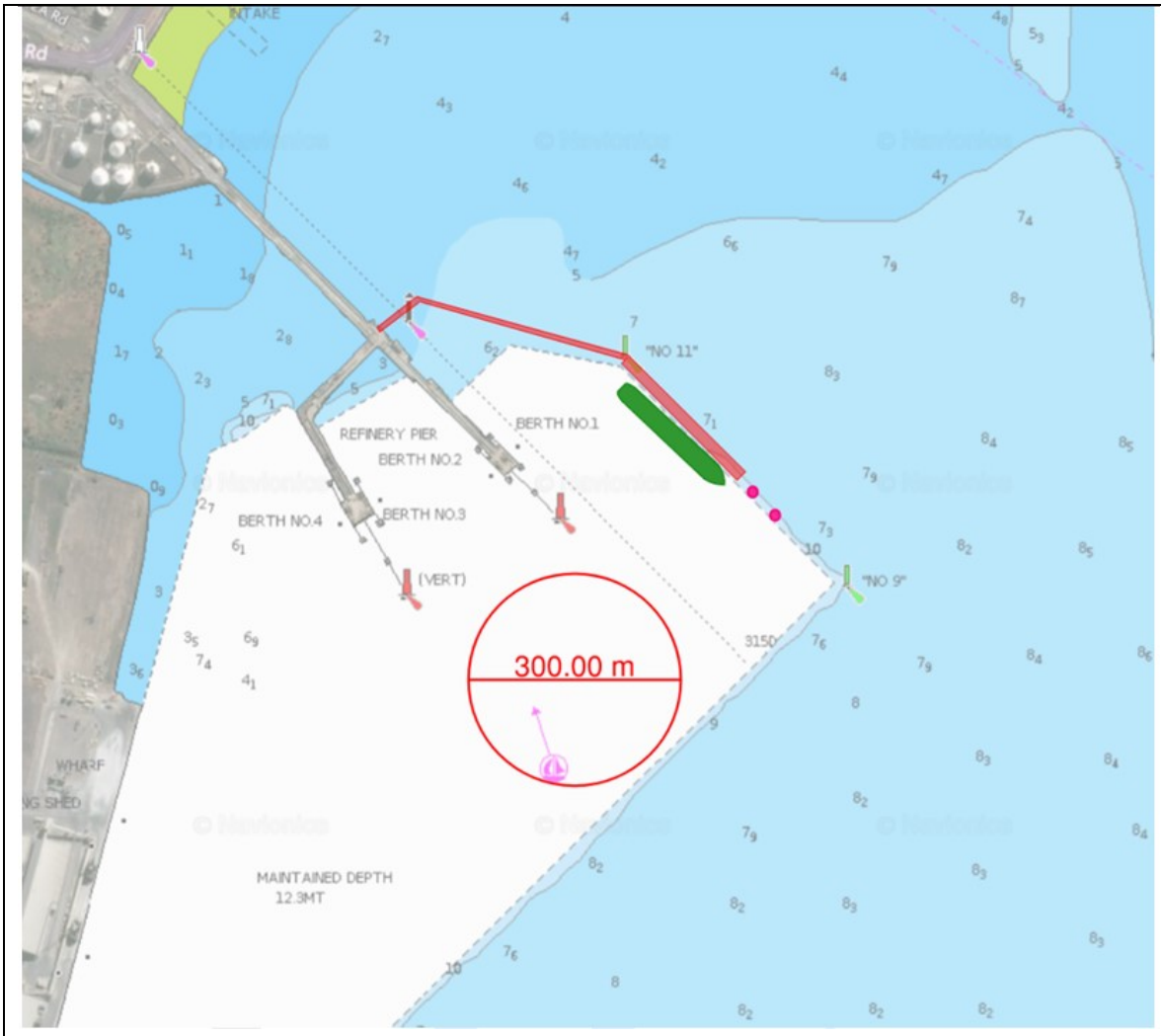


Figure 2: New berth layout – Option 2 (selected). Pink circles represent new mooring dolphins.

The results of the berth options assessment are provided in the table below. The options may be subject to revision as project design progresses and detailed simulations are undertaken.

Criteria	Option 1	Option 2
Description	New trestle and open piled berthing structure to north of Refinery Jetty, including dredging.	New trestle and open piled berthing structure not requiring dredging as berth pocket is located within existing dredge extents.
Dredge Volume	0.9M m^3 Requires comparatively significant dredging of channel extension and berth pocket.	0M m^3 No dredging requirements dependent on final chosen alignment of berth and vessel size

Approach, berthing / de-berthing of vessel	The vessel is required to manoeuvre 180 degrees before moving in astern onto the berth, likely with tug assistance. During the manoeuvre the vessel will be side-on to the prevailing south-easterly winds and within proximity of the existing Refinery Jetty. However, with tug assistance it is likely to be a straight-forward manoeuvre. This is a relatively short approach and would be similar to operations currently conducted to berth. Departure is expected to be efficient due to alignment with prevailing wind conditions. May require tug assistance for relatively sharp departure turn to stay within the channel.	The vessel is required to manoeuvre 180 degrees before moving in astern onto the berth, likely with tug assistance. During the manoeuvre the vessel will be side-on to the prevailing south-easterly winds and within proximity of the existing Refinery Jetty. However, with tug assistance it is likely to be a straight-forward manoeuvre. This is a relatively short approach and would be similar to operations currently conducted to berth. Departure is expected to be efficient due to alignment with prevailing wind conditions. May require tug assistance for relatively sharp departure turn to stay within the channel.
Navigability	Will require modification to the existing channel, including relocation of markers. A longer approach manoeuvre is also required.	No changes to extents of navigable waters.
Channel Restrictions	No impact to existing channel clearances.	No impact to existing channel clearances.
Berth relative to prevailing environmental conditions	Southeast, aligning with prevailing wind (and therefore wave) conditions.	Southeast, aligning with prevailing wind (and therefore wave) conditions.
Interactions with adjacent berths	Minimal.	Minimal impact, with minor reduction in vessel clearance. If the ammonia import berth was occupied at the same time as the adjacent Refinery Pier berth, vessel clearance would be reduced by the vessel width (~32m). the likelihood of both berths being occupied is considered low.
Construction Feasibility (Near operating berths)	Likely to have a low impact due to distance from existing infrastructure and port operations. Dredging activities are external to the channel and unlikely to impact current operations.	Medium impact and will have to be coordinated with port traffic particular vessels at berth 1.
Construction Duration	Increased duration due to dredging requirements.	Medium duration requirements.
Impacts on potential future operations / flexibility	Potential for larger vessels and additional berths in future. Possibility to capitalise on the larger dredging pocket through mixed operations.	Substantial room for growth on the alternate side of jetty if further dredging is to be conducted.
Capex Cost	Highest cost due to substantial dredging commitment.	No dredging

Brief description of key alternatives to be further investigated (if known)**:**

Ammonia cracking technology

As outlined above, several technology options for ammonia cracking have been identified and will be subject to further investigation and detailed design development. GeelongPort and its consultants will progress design of the facility as the regulatory and approvals are progressed.

5. Proposed exclusions

Statement of reasons for the proposed exclusion of any ancillary activities or further project stages from the scope of the project for assessment:

Excluded from the scope of this referral are all planning and environmental investigations and assessments, including (but is not limited to):

- Investigating, testing and surveying land
- The construction, protection, modification, removal or relocation of utility services and associated infrastructure utility works
- Site establishment works, including (but not necessarily limited to) site offices, traffic and environmental controls (e.g. sediment fencing), access points, access ways, temporary car parking, work platforms and hardstand and construction worksite / laydown areas
- Removal, destruction or lopping of vegetation, including native vegetation where required.

These investigations are required to inform project design, to secure all necessary statutory approvals for the project and to prepare the land for the construction of the project and therefore would proceed ahead of the main Project being referred within this application.

The necessary consents will be sought for seabed sediment sampling as required under the *Marine and Coastal Act 2018*.

6. Project implementation

Implementing organisation (ultimately responsible for project, ie. not contractor)**:**

GeelongPort Pty Ltd

Implementation timeframe:

A nominal timeline for the proposed project is as follows:

Planning and approvals: Year 0-2
Construction and commissioning: Year 2-4
Operations: Minimum of 25 years and up to 50 years
Decommissioning: 1 year

Proposed staging (if applicable):

Not applicable

7. Description of proposed site or area of investigation

Has a preferred site for the project been selected?

☐ No ☒ Yes If no, please describe area for investigation.

If yes, please describe the preferred site in the next items (if practicable).

General description of preferred site, (including aspects such as topography/landform, soil types/degradation, drainage/ waterways, native/exotic vegetation cover, physical features, built structures, road frontages; attach ground-level photographs of site, as well as A4/A3 aerial/satellite image(s) and/or map(s) of site & surrounds, showing project footprint):

The project site includes four separate areas, as follows:

- Ammonia storage and hydrogen facility site (including site office, truck loading and amenities)
- Refinery Pier, plus an extension to Refinery Pier (and associated ammonia import pipeline which connects to the ammonia storage tank at the ammonia storage and hydrogen facility site)
- Carpark
- Truck refuelling facility (connected to the ammonia storage and hydrogen facility site by the hydrogen offtake pipeline)

These areas are further described in Table 1 below.

Table 1 Description of project area

Project Area	Location description	Location features
Ammonia storage and hydrogen facility site	At the eastern termination of St Georges Rd, east of Incitec Pivot Fertilisers and south of the Terminals facility.	Approximately 7.3 hectares. Accessed by an extension to St Georges Rd.
Refinery Pier plus extension	Refinery Pier extends 600m offshore from the eastern extent of the Terminals facility. An additional berth extending from Refinery Pier to the north is proposed, to approximately 200m north of Berth 1.	Located within existing dredge pocket, so no new dredging required. Orientation of new berth to be in alignment with the existing Refinery Jetty infrastructure, with the vessel bow/stern to the prevailing wind from the southeast.
Carpark	To the east of Shell Parade and west of the coastal reserve.	Located wholly within GeelongPort land, with access from Shell Parade.
Truck refuelling facility	North-western corner of the St Georges Rd and Lowe St intersection, south of Cuthbertson's Creek / Rollerama Drain.	Up to 50m wide, and approximately 100m long. Accessed from St Georges Rd.

Photographs of the site features are provided in Plate 1 to Plate 8 below.

Plate 1: Area of proposed ammonia storage and hydrogen facility site

Plate 2: Are of proposed H2 Truck Fuelling Site north of St Georges Rd

Plate 3: Madden Avenue road reserve

Plate 4: Area of proposed carpark on Shell Parade

Plate 5: Manmade drainage channel at the eastern end of Greta St

Plate 6: Highly vegetated Cuthbertson's Creek / Rollerama Drain

Plate 7: Area north of Refinery Pier between Shell Parade and the shoreline, containing grassland and shrubland

Plate 8: Area north of Refinery Pier along the shoreline

Built structures
The ammonia storage and hydrogen facility site, as well as the truck refuelling site, are separated from existing structures.

Refinery Pier is an existing jetty structure extending into Corio Bay comprising two arms and four berths. It is GeelongPort's primary location to receive liquid bulk products and supports numerous pipelines to facilitate this. The Refinery Pier currently handles hazardous liquids including bitumen, chemicals, fuels and oils for Quantem (Terminals) and the Geelong refinery.

The carpark site contains numerous existing pipelines which connect Refinery Pier with the Geelong refinery.

Vegetation
No species within the Victorian Biodiversity Atlas (VBA) records were recorded within 500 m of the project area. Within 10km of the project area the VBA records identified 59 *Flora and Fauna Guarantee Act 1988* **(FFG Act)** and/or *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act)** listed rare and threatened flora species. Of these, 16 species were considered possible to occur, 37 species considered unlikely to occur, and 6 species considered highly unlikely to occur.

The ecological field assessment (Attachment A) identified approximately 0.023 ha of EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion) within the project area, occurring within Cuthbertson's Creek / Rollerama Drain, next to the H2 Truck Fuelling Site north of St Georges Rd and where St Georges Rd crosses over the drain. The EVC was dominated by *Typha* sp. (Bulrush). No EPBC Act listed threatened ecological communities were identified within the project area during the field survey.

Scattered native plants were identified within the project area at the east end of St Georges Rd, including *Acacia pycnantha* (Golden Wattle), *Einadia nutans* (Nodding Saltbush) and *Rytidosperma* sp. (Wallaby Grass).

Topography/landform
The topography of the area is highly modified due to the industrial history of the area. The ground surface is generally flat with a gentle slope downward towards Corio Bay. Between one to eight metres of fill have previously been recorded.
The site is underlain by Quaternary and Tertiary age sediments. Quaternary coastal dune deposits are mapped along the coastal strip. These in turn overlie the Moorabool Viaduct Sand (or time equivalents). Further west of Seabeach Avenue / Lowe Street, lava flows of the Newer Volcanics have been mapped.

Contamination
The proposed site is reported to have been landfilled with municipal solid waste to reclaim swampy coastal land around the original Oyster Cove. The landfill was operated until 1979 and was capped with about a metre of silty clay and sand between 1979 and 1985. An indicative footprint of the former landfill is presented in Appendix A Figure A-4. It was noted in an environmental audit (CARM's number 30986-1, dated 17 June 1997) that generation of landfill gases was still occurring, and that land subsidence was probably continuing.

The Victorian Government introduced the *Environment Protect Act 2017* which came into effect on 1 July 2021. The new Act is centred around minimising harm to human health or the environment from pollution and waste. A new General Environmental Duty (GED) is the cornerstone of the new laws, and this duty applies to all Victorians. There are also specific duties for those in control of potentially contaminated land and GeelongPort provided the necessary support to its tenants in fulfilling their obligations under the Act.

Soils
Soil material across the investigation area is generally composed of top fill material and underlying Quaternary and Tertiary aged sediments to depths ranging between 1 to 2 m below ground level (bgl), with silty clay and sandy clay underlying these sediments at deeper depth.

The soils fronting Corio Bay to the north of Refinery Pier have a high probability (very low confidence) of the occurrence of Coastal Acid Sulfate Soils (CASS). There is a low probability (very low confidence) of occurrence of CASS elsewhere across the project area.

Waterways
Waterways in and around the site include Cuthbertson's Creek/ Rollerama Drain, which bisects the site, and Oyster Bay Creek/Shell Effluent Channel, which is predominantly located north of the site. Both waterways are connected to Port Phillip Bay east of the site's landside area.

Site area (if known): 7 hectares (approximately) ……

Route length (for linear infrastructure) …N/A……. (km) **and width** ……N/A…….. (m)

Current land use and development:

GeelongPort operates the largest regional port in Victoria, handling 25 per cent of Victoria's exports including petroleum products, bulk grain and woodchips. Materials imported through the Port include crude oil, petroleum products, hazardous materials and fertiliser raw materials.

The proposed site within the Port is currently vacant. The site of the carpark currently contains oil pipelines connecting the Geelong refinery with Refinery Pier.

Description of local setting (eg. adjoining land uses, road access, infrastructure, proximity to residences & urban centres):

The Port of Geelong (the Port) site is located on the North Shore of Geelong, north-west of the suburb of Norlane, and immediately south of the Geelong Refinery (as shown in Appendix A Figure A-1). The site lies east of the Melbourne to Geelong Railway line and Lowe Street, and a number of heavy industrial and bulk storage activities, including the Incitec Pivot fertiliser storage facility on St Georges Road and the Quantem Terminal to the north. The environment immediately surrounding the site is dominated by industrial and port related activities.

To the north the site is bounded by Wharf Road and the Geelong Refinery. To the south the site is bounded by Greta Street and industrial activities deriving their access from Madden Avenue and the Esplanade, including Omya Australia Pty Ltd. Further to the south is Lascelles Wharf and the adjacent Incitec Pivot production plant.

Primary road access is via Route C115 comprising Arbery Road, Seabeach Parade, Lowe Street and Wharf Road. The land parcel has an approximate area of 15.7 hectares and is generally flat. The northern boundary of the site comprises an open drainage channel known as Oyster Bay Creek / Shell Effluent Channel, which drains a predominantly residential catchment east of the Melbourne to Geelong Railway line and the Princes Highway and north of St Georges Road. Oyster Bay Creek / Shell Effluent Channel, where it flows alongside Wharf Road, is also the receiving water for the cooling water discharge from the Geelong Refinery stilling basins.

The site is historically known to have been occupied by a municipal refuse disposal operation for putrescible waste. This resulted in the progressive reclamation of low-lying land and sandy beach between the two waterways in the period between 1972 and 1985. The subject site was modified in association with other land reclamation activity to establish or extend Lascelles Wharf.

The southern boundary is also formed by another open drainage channel known as Cuthbertson's Creek or Rollerama Drain. This watercourse also drains a predominantly residential catchment northwest of the Princes Highway along with commercial and industrial land uses between the highway and the railway line.

Both watercourses comprise a mix of piped drainage lines within the residential areas and open watercourses east of the Princes Highway. Various reaches have been modified and channelised over time. The lower reaches also appear to be tidal for some distance from their point of discharge into Corio Bay.

Whilst the project site is a highly modified environment impacted by many years of industrial activity and development, a component of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located approximately 1.3 km northeast of Refinery Pier. This Ramsar site covers 22,650 hectares and holds significant environmental, socioeconomic and cultural value.

Planning context (eg. strategic planning, zoning & overlays, management plans):

Planning Provisions

The City of Greater Geelong Planning Scheme (the 'Planning Scheme') applies to the project area. The Planning Scheme extends approximately 600m offshore and covers both the landside infrastructure and marine component (new berth).

Zone

The project infrastructure falls within the Port Zone (PZ), which provides for a wide range of port related land uses on a "*permit not required basis*". Industry is identified as a Section 1 – Permit not required use under the Port Zone, subject to conditions, including that:

- *The land must be at least the following distances from land (not a road) which is in an Activity Centre Zone, Capital City Zone, Commercial 1 Zone, Docklands Zone, residential zone or Rural Living Zone, land used for a hospital, an education centre or a corrective institution or land in a Public Acquisition Overlay to be acquired for a hospital, an education centre or a corrective institution: The threshold distance, for a purpose listed in the table to Clause 53.10*

Must not:

- *Exceed a fire protection quantity under the Dangerous Goods (Storage and Handling) Regulations 2012*
- *Require a notification under the Occupational Health and Safety Regulations 2017*
- *Require a licence under the Dangerous Goods (Explosives) Regulations 2011*
- *Require a licence under the Dangerous Goods (HCDG) Regulations 2016*

The proposed use is classified as 'industrial gases production' for the purposes of Section 53.10 of the planning scheme and has a threshold distance of 1,000m. The nearest residential areas to the Project are located approximately 470 m west of the hydrogen truck refuelling station and 920 m west of the administration and services building and over 1,000 m west of the ammonia cracking plant (Appendix A Figure A-3 Sensitive receptors).

As the facility will have more than 200 tonnes of ammonia on site, it will be subject to the requirements and the legal duties described in the Victorian *Occupational Health and Safety Regulations 2017* Part 5.2 Major hazard facilities. Accordingly, the proposed facility will be a Section 2 – Permit required use under the provisions of the Port Zone.

In addition, a permit will also be required for Buildings and Works associated with the facility.

Overlays

Under the Planning Scheme, the subject site is affected by the Land Subject to Inundation Overlay Schedule 2 (LSIO2), the Special Building Overlay (SBO) and the Environmental Significance Overlay Schedule 2 (ESO2).

A breakdown of the project components affected by these overlays is provided in Table 2 below.

Table 2 Summary of proposed structures within flood risk overlays.

Structure	LSIO2	SBO	ESO2
Ammonia Cracking (60m x 110m)	X	X	
Ammonia Cracking (Expansion)	X	X	
Carpark			x
H_2 Truck Fuelling Site	X	X	
Utilities Footprint (H_2, NH_3 and power)	X	X	

LSIO2
Two general areas of the site are subject to LISO2. The first area relates to a reach of Cuthbertson's Creek / Rollerama Drain which drains into Oyster Bay immediately north of Lascelles Wharf. This waterway drains a small catchment of residential land northwest of the railway line, and an industrial area on the seaward side of the railway line. The LSIO is confined to the creek and its immediate vicinity and applies to a portion of the site of the proposed truck refueling facility. The second area relates to Oyster Bay Creek / Shell Effluent Channel and the foreshore along the project area. This area of the site is proposed to be used for the ammonia cracking facility, future expansion of the ammonia cracking facility and the H2 truck loading facility, and also overlaps with some utilities.

The purpose of the LSIO is to identify land in coastal areas that may be inundated by the combined effects of the 1% Average Event Probability (AEP) flood event plus 0.8 metre sea level rise. In addition, the LSIO is intended to ensure that any new development is suitably designed to ensure that it is compatible with the flood hazard and local drainage conditions.

A planning permit will be required for buildings or works proposed to be carried out within the LSIO.

SBO
The project area is also slightly affected by the SBO, which is intended to achieve the following:

- *To identify land in urban areas liable to inundation by overland flows from the urban drainage system as determined by, or in consultation with, the floodplain management authority*
- *To ensure that development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and local drainage conditions and will not cause any significant rise in flood level or flow velocity*

- *To protect water quality and waterways as natural resources by managing urban stormwater, protecting water supply catchment areas, and managing saline discharges to minimise the risks to the environmental quality of water and groundwater*

A planning permit is required to carry out buildings and works within the SBO. The SBO affects the Truck Refueling Facility and a small area of the site proposed to be used for the ammonia cracking facility, future expansion of the ammonia cracking facility and the H2 truck loading facility.

ESO2
The ESO2 extends north along the foreshore from Refinery Pier and covers the land proposed for the carpark.

The environmental objectives to be achieved by the ESO2 is:
- *To maintain the ecological character (the sum of the biological, physical and chemical components of the wetland ecosystem, and their interactions which maintain the wetland and its products, functions and attributes) of Ramsar wetlands*
- *To protect natural resources and maintain ecological processes and genetic diversity*
- *To protect and ensure the long-term future of terrestrial and aquatic habitat for native plants and animals, including shorebird feeding areas and roosts and species and communities listed under the Fauna and Flora Guarantee Act 1988*
- *To encourage ecological restoration, regeneration and revegetation with indigenous species within the site and in adjoining areas*
- *To maintain the function of the wetland or habitat area as part of the broader natural system, including maintenance of natural flows and flooding regimes*
- *To prevent further loss of wetland habitat*
- *To manage the site in order to maintain and/or improve its value as a conservation site for native plants and animals*
- *To protect water quality and prevent water pollution in watercourses, water bodies, wetlands and groundwater*
- *To protect cultural (including aboriginal and non-aboriginal heritage) values*
- *To protect visual amenity*

A permit is not required for buildings and works within this overlay if an approval has been issued under the *Coastal Management Act 1995*. This Act has been repealed and replaced with the *Marine and Coastal Act 2018*. A Marine and Coastal Act consent will be sought for the project.

A permit is not required for the removal, destruction or lopping of exotic species of vegetation, unless the vegetation is deemed to be of importance to:

- *Maintain the ecological character of the site*
- *A species listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) or the Bonn Convention*
- *A species listed in Schedule II of the Fauna and Flora Guarantee Act 1988*
- *A species listed as a threatened species in Victoria by the Department of Environment, Land, Water and Planning*

Given the highly modified nature of this land, which currently hosts pipelines from Refinery Pier to the Geelong refinery operations, it is unlikely that any of these species will be present.

2018 Port Development Strategy
The 2018 Port Development Strategy **(PDS)** identifies the infrastructure and land use needs of the port to meet essential trade demands.

The PDS acknowledges that GeelongPort's primary role as a bulk port (dry, liquid and break bulk cargoes) serving national and international markets. This focus is not expected to change dramatically, however existing uses will grow, evolve and be supplemented by new trades.

The project footprint falls within the Refinery Pier Precinct of the PDS. The primary role of this precinct is to continue to be the port's primary location for the movement of bulk liquids. The PDS envisages that under-developed land in this area provides opportunities in dry and liquid bulk. This proposal is consistent with this vision, being a liquid bulk opportunity.

Local government area(s):

City of Greater Geelong

8. Existing environment

Overview of key environmental assets/sensitivities in project area and vicinity
(cf. general description of project site/study area under section 7)**:**

Key environmental assets identified in the project area include:
- geology and soils
- groundwater
- surface water features
- terrestrial and marine biodiversity
- Aboriginal heritage
- conservation areas/reserves

Geology and soils

The geology of the study area comprises a series of Palaeozoic rocks which have been overlain by Mesozoic and Neogene deposits (Tertiary and Quaternary sediments and volcanics), as shown in Figure 3.

Soil material across the project area is generally comprised of top fill material and underlying Quaternary sediments to depths ranging between 1 to 2 m below ground level, with silty clay and sandy clay underlying these sediments at greater depth. Most of the land to the east of Incitec Pivot Fertilisers has been engineered and is subject to historical filling as a landfill. The landfill was operated until 1979 and was capped with about a metre of silty clay and sand.

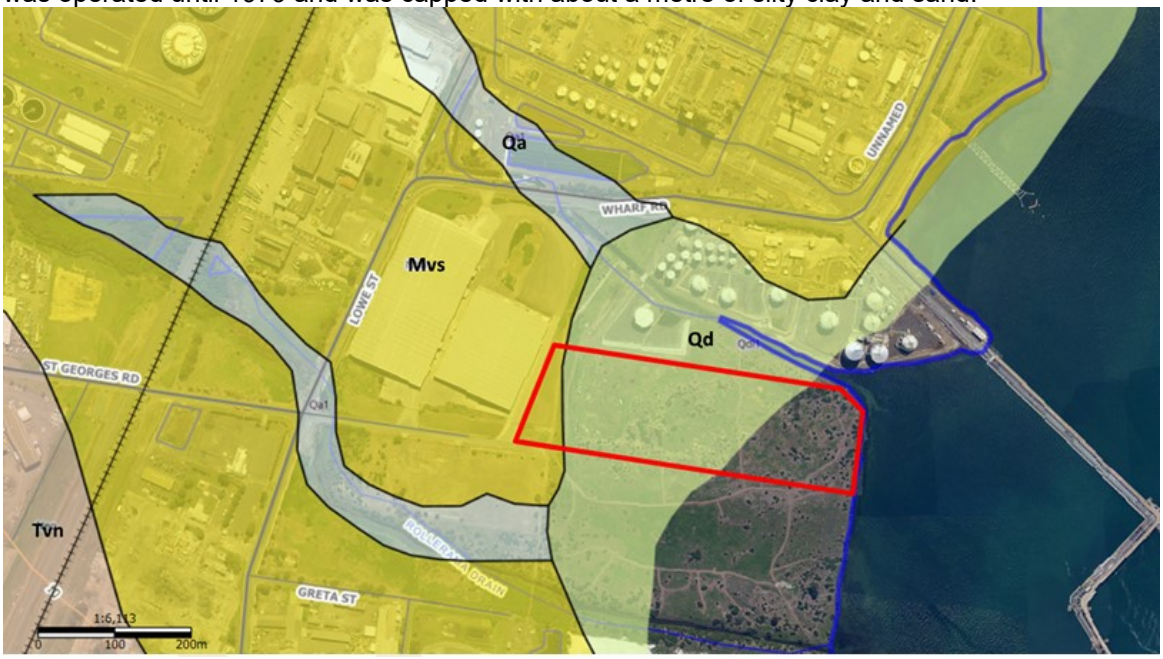


Figure 3: Site geology (Tvn – Newer Volcanics, Mvs – Moorabool Viaduct Sand, Qd – Quaternary coastal deposits, Qa – Quaternary alluvials)

Groundwater
The Moorabool Viaduct Sand is the principal aquifer in the study area and constitutes a regional water table aquifer. It is interpreted to be hydraulically connected with the coastal dunes aquifer systems, and where present, the overlying Newer Volcanic basalt.

The study area does not fall within a defined Groundwater Management Area **(GMA)**, suggesting that there are no known groundwater resource issues that require closer management by DELWP.

A stylised cross-section of the hydrogeological conceptualisation through the study area has been shown in Figure 4. On the site, the water table resides with the Moorabool Viaduct Sands and the undifferentiated Quaternary deposits. Filling has occurred and there will be areas where deeper fill is saturated (below the water table).

The Newer Volcanic basalts are not mapped on site and occur further to the south and west. They too form a water table aquifer where saturated. The Moorabool Viaduct Sands are estimated to be around 20 m thick and overlie mid-Tertiary marine sediments (limestones). The Moorabool Viaduct Sands are a bedded sedimentary sequence and therefore horizontal hydraulic conductivities are potentially an order of magnitude greater than vertical hydraulic conductivities.

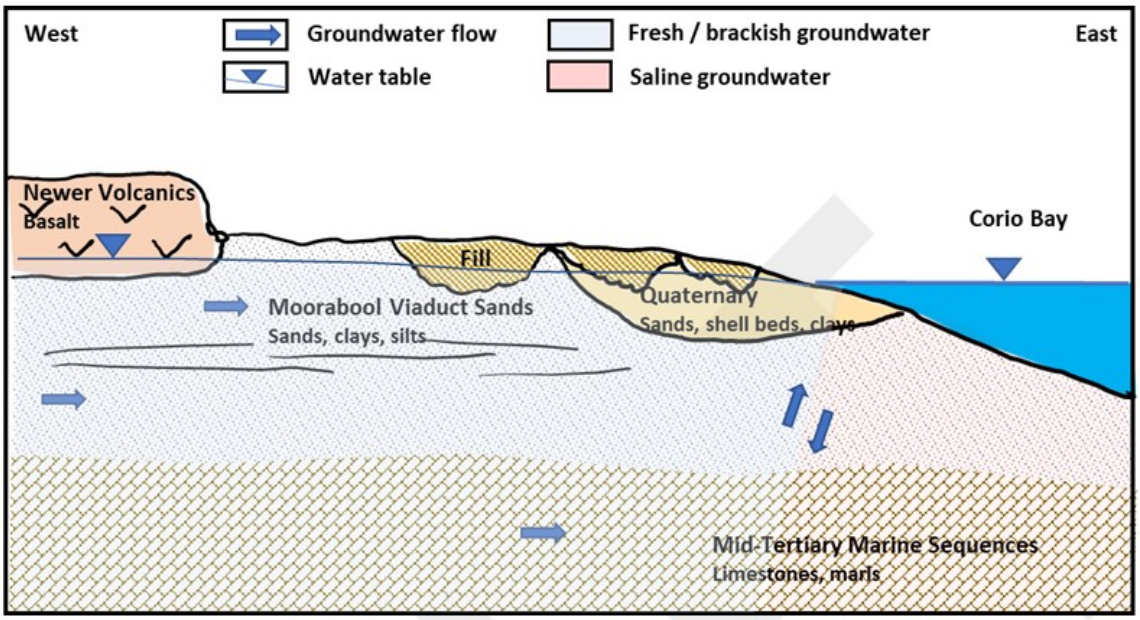


Figure 4: Groundwater conceptualisation

Rainfall infiltration through the shallow fill materials has the potential to leach constituents into the groundwater, effecting the groundwater quality and potentially, down-gradient receptors such as Corio Bay. The shallow nature of groundwater occurrence, and potentially high hydraulic conductivity of coastal sediments, suggests that the groundwater is vulnerable to contamination from land use practices (both current and historical).

Surface water

Oyster Bay Creek / Shell Effluent Channel

Oyster Bay Creek / Shell Effluent Channel is the receiving waterway for cooling water discharged from Geelong refinery's north of the site. Effluent mixing is visible north of Wharf Rd. The waterway appears to be a constructed, trapezoidal channel with minimal riparian vegetation and low ecological value.

Cuthbertson's Creek / Rollerama Drain

Cuthbertson's Creek / Rollerama Drain was identified as Oyster Cove Drain in a 1997 audit report (*Woodard-Clyde 1997, Addendum Report, Areas Port of Geelong Environmental Audit of Sea-Bed, June 1997*). The section of the drain that bisects through the site is generally trapezoidal in shape and has minimal riparian vegetation (surrounding grass and some reeds).

The 1997 audit report indicated that at that time, lime treated industrial effluent and sewerage from the neighbouring Incitec facility passed to sewer and stormwater, which was released to the Rollerama Drain or was used for irrigation of the surrounding grassed area. It is unclear if this effluent is still being released however Incitec remains on the property.

As part of the 1997 audit, a sample of water was collected from the Rollerama Drain near the coast, which was indicated to be brackish, slightly alkaline and, apart from some low levels of nitrogen compounds, was not demonstrated to be otherwise contaminated. The report noted that it seems probable that tidal fluctuations, periodic flooding, and heavy rainfall were generating leachate release to the Rollerama Drain, to the land to the north (the site) and to the Coast. This leachate analysed was noted to be brackish, it would possibly include some phenols and dissolved organic carbon as well as nitrogen compounds in forms such as ammonium ion, organic nitrogen, and nitrate. The alkaline pH and the anoxic environment of the drain was noted as being unlikely to release heavy metals other than iron and some zinc.

Water Quality

Corio Bay is located off the main area of Port Phillip Bay, and due to its position water circulation is more limited than in the rest of the Bay. Exchange of water between Corio Bay and the main body of Port Phillip Bay is restricted by a shallow bar through which a channel has been dredged to allow shipping access to the Port of Geelong. The flushing time (where all the water is replaced by new water) is in the order of 350 days (Harris et al., 1996). This means that water quality may take longer to change in both a positive and negative direction, making Corio Bay particularly sensitive to nutrients and other inputs.

Loss of fresh water by evaporation increases the salinity of Port Phillip Bay as a whole, a phenomenon acutely observed during the millennium drought when the salinity of the Bay increased noticeably. This area is often more saline than the rest of the Bay (and sometimes more saline than Bass Strait).

Throughout most of Port Phillip Bay, the most problematic point sources of pollution have largely been stormwater and sewer flows. Sediments near input sources (stormwater and sewer) within Corio Bay have significantly higher concentrations of cadmium, copper, chromium, iron, nickel, arsenic, mercury, lead and zinc than other locations in the wider Port Phillip Bay with concentrations decreasing with distance from the input source. Corio Bay has had historically higher concentrations of other contaminants including petroleum hydrocarbons, pesticides and herbicides and other organic contaminants.

Corio Bay – Ecological values

Corio Bay supports a diverse range of terrestrial and marine habitats, with areas that are of international significance including the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar sites (City of Greater Geelong, undated). The wetlands and seagrass meadows of the shallow marine waters of Port Phillip Bay and Corio Bay are important fish habitat and nursery areas that support a significant commercial and recreational fishery (City of Greater Geelong, undated).

Recreational fishing is popular in Victoria and is largely centred within Port Phillip Bay and Western Port. In these areas, commercial fishing is being phased out in favour of recreational fishing (VEAC, 2019). Three new rocky fishing reefs have been built in and around Corio Bay to give more fishers access to recreational fish species. The closest reef to the proposed project site is > 4 km away (VFA, 2021).

Significant areas of intertidal seagrass habitat are present along both the southern and northern shores, with a total of 3,280 hectares of seagrass present within Corio Bay (DELWP 2016). Mangroves grow in the intertidal region of sheltered embayments and estuaries, such as Limeburners Bay.

Saltmarsh tends to occupy the area between the mangrove zone and the upper tidal limit and is inundated during the spring tidal cycles. An important habitat for many land and aquatic species, saltmarsh features distinctive vegetation of low growing succulent herbs and shrubs, rushes and sedges which are adapted to the daily tidal inundation (City of Greater Geelong, undated). Coastal saltmarsh communities can be found on and adjoining the marine and estuary areas (City of Greater Geelong, undated). The majority of saltmarsh habitats are present to the north of the bay such as Limeburners Bay at Corio (Figure 5). . .

The proposed project site falls within the Port Phillip Bay biounit, which has been extensively mapped (see Figure 5 and Figure 6).

The project site lies within the biotope complex ‘Corio Bay silty-muds’, which is classified as sublittoral muddy sediments with low species richness, based on infauna and epibiota (VEAC, 2019).

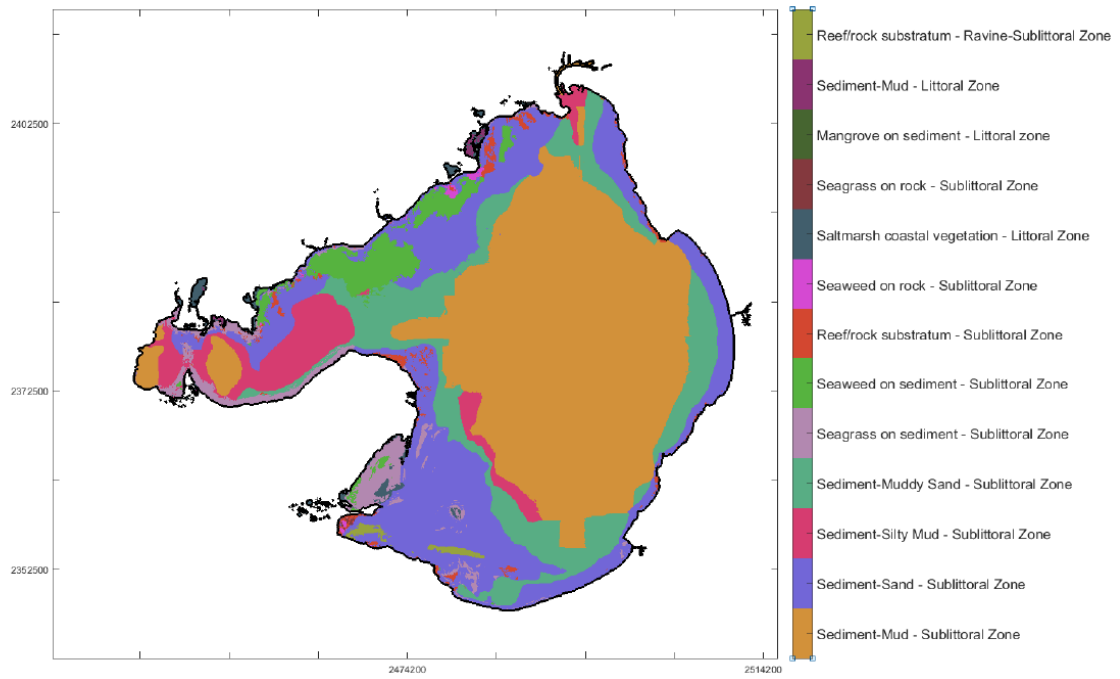


Figure 5: Port Phillip Bay Habitats (DELWP 2016)

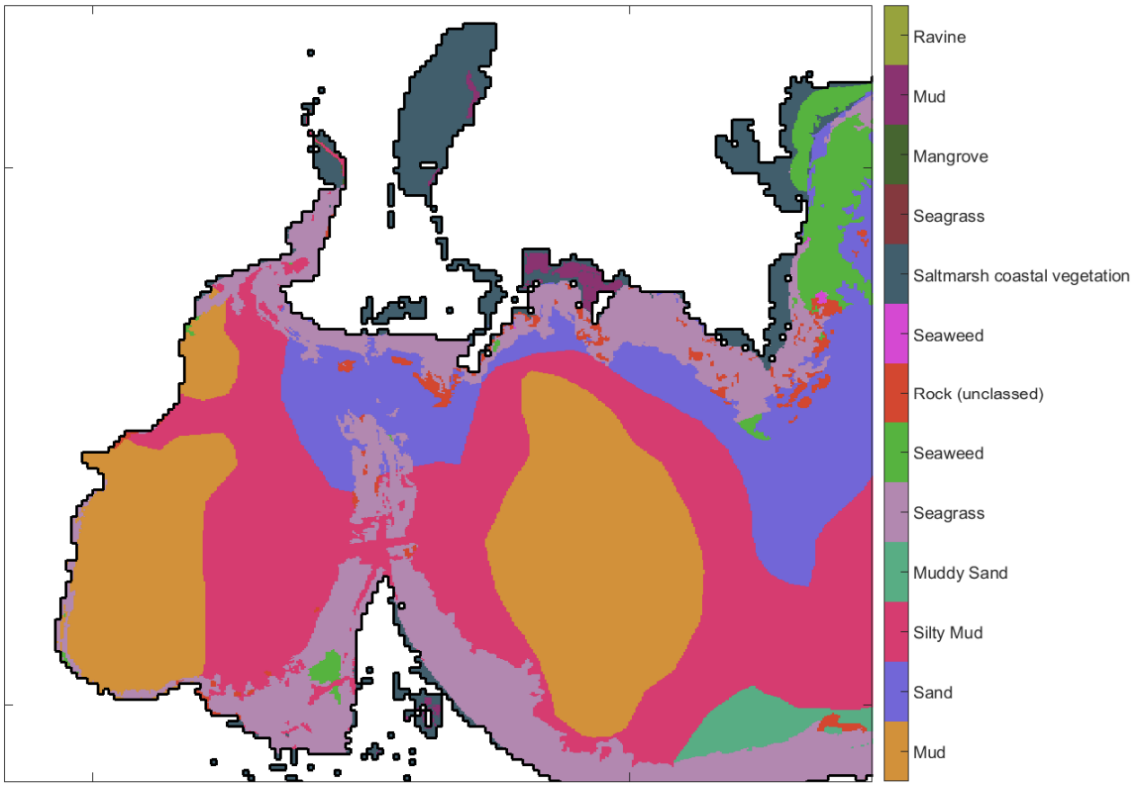


Figure 6: Corio Bay Habitats (DELWP 2016)

Seagrass

Seagrasses are colonisers of mud, silt and sand, using their extensive rhizome systems to anchor them and consequently stabilising the sediments. The coast between Limeburners Point and Corio Quay is characterised by *Zostera/Heterozostera* (generally with filamentous algae) found in the shallower waters from the shore to a depth of approximately 3-5 m, and *H. australis*, which becomes dominant in the deeper water and where sediments were generally finer (Blake and Ball, 2001).

Refer to Attachment B Figure 2: Extent of benthic primary producer habitat relative to the proposed project site for location of mapped and surveyed seagrass beds. The closest mapped seagrass bed to the proposed new berth is ~580 m away. The carpark to the north of Refinery Pier is located approximately 80 m overland from another mapped seagrass bed. A recent seagrass survey commissioned by GeelongPort for a new mooring dolphin at Lascelles Precinct (Aquatica Environmental, 2020) detected *Zostera muelleri* at Refinery Pier (Lascelles Precinct), with an average density of 74% where present. This seagrass is located approximately 470 m from the proposed new berth.

Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site

The project area is located approximately one kilometre south-west of the Ramsar wetland.

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located on the western shoreline of Port Phillip Bay between Melbourne and Geelong and on the Bellarine Peninsula. The Ramsar site covers 22,650 hectares and comprises six distinct areas: Point Cook/Cheetham, Werribee/Avalon, Point Wilson/Limeburners Bay, Swan Bay, Mud Islands, and the Lake Connewarre complex, as shown in Appendix A Figure A-5. The site includes freshwater wetlands, estuaries, intertidal shorelines, sub-tidal beds, inland saline wetlands and a wastewater treatment facility. Extensive areas of coastal saltmarsh and seagrass occur within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

The Ramsar site has 10 Components, Processes and Services **(CPS)** that are considered critical to the ecological character of the site. These are briefly described below as outlined in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (DELWP, 2018).

Geomorphology - Connectivity between freshwater and estuarine areas and estuaries and the marine environment are an important process for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

Hydrology - The hydrology of the Point Wilson/Limeburners Bay area would comprise of tides and river flows as it is a coastal/marine area, with Hovells Creek also forming part of this area of the Ramsar site.

Saltmarsh - Coastal saltmarsh is listed as an ecological community under the EPBC Act.

Seagrass - There are two species of seagrass in Port Phillip Bay which are a feature within the Ramsar site.

Mangroves - The mangrove areas of Port Phillip Bay comprise a single species, *Avicennia marina*, and there are small areas of mangrove in Limeburners Bay (4 hectares).

Freshwater vegetation - Freshwater vegetation in the Western Shoreline and Bellarine Peninsula Ramsar site is limited largely to areas other than Point Wilson/Limeburners Bay.

Fish diversity and abundance - The Western Shoreline and Bellarine Peninsula Ramsar site provides a variety of habitats for fish ranging from freshwater species as well as over 60 species of estuarine and marine species in seagrass and saltmarsh habitats.

Waterbird diversity and abundance - A total of 129 waterbird species have been recorded within the Western Shoreline and Bellarine Peninsula Ramsar site, and the site regularly supports 20 species of waders from the East Asian-Australasian Flyway listed under the international migratory bird agreements JAMBA, CAMBA and ROKAMBA.

Waterbird breeding - The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is important for waterbird breeding for a wide variety of species.

Threatened wetland species - The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site regularly supports FFG and/or EPBC Act listed threatened species, including 10 species of bird, one frog and one fish species:

- Bar-tailed Godwit *(Limosa lapponica bauera)*
- Curlew Sandpiper (*Calidris ferruginea)*
- Eastern Curlew (*Numenius madagascariensis)*
- Great Knot (*Calidris tenuirostris)*
- Lesser Sand Plover *(Charadrius mongolus)*
- Red Knot *(Calidris canutus)*
- Australian Fairy Tern *(Sternula nereis nereis)*
- Australasian Bittern *(Botaurus poiciloptilus)*
- Hooded Plover *(Thinornis rubricollis)*
- Orange-bellied Parrot *(Neophema chrysogaster)*
- Growling Grass Frog *(Litoria raniformis)*
- Australian Grayling *(Prototroctes maraena)*

Terrestrial Vegetation and Habitat
The ecological field assessment (Attachment A) identified approximately 0.023 ha of EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion) dominated by *Typha* sp. within the project area within Cuthbertson's Creek / Rollerama Drain (Appendix A Figure A-6). A patch of EVC 9 Coastal Saltmarsh (Vulnerable) was identified adjacent to the project area, north of the proposed ammonia cracking plants (Appendix A Figure A-6). EVC 9 Coastal Saltmarsh (Vulnerable) and EPBC listed ecological community Subtropical and Temperate Coastal Saltmarsh were also identified as potentially occurring along the Shell Parade natural shoreline outside of the project area based on a visual assessment from the public road (Appendix A Figure A-6). No EPBC Act listed threatened ecological communities were identified within the project area during the field survey.

Scattered native plants were identified within the project area at the east end of St Georges Rd, including *Acacia pycnantha* (Golden Wattle), *Einadia nutans* (Nodding Saltbush) and *Rytidosperma* sp. (Wallaby Grass).

Threatened terrestrial fauna
Two threatened fauna species were recorded within 500 m of the project area, which is the Little Tern (*Sternula albifrons*) and Fairy Tern (*Sternula nereis*) (Appendix A 7). The Fairy Tern is considered vulnerable under the EPBC Act. Both species are considered critically endangered under the *Flora and Fauna Guarantee* Act.

There is potential for both species to forage along the shoreline and further out over the bay, and also loaf along the shoreline, jetty and ship birthing facility. However, both species prefer to roost and nest on sand-spits, sandy beaches, sand bars within sheltered coastal or estuarine environments (DAWE 2021b/c), thus are unlikely to roost or breed within the project area.

Aboriginal heritage
The proposed study area is located within areas of Aboriginal Cultural Heritage Sensitivity (CHS) associated with Coastal Land, Coastal Crown Land, and also three registered Aboriginal places (VAHR 7721-0969, 7721-1347 and 7721-1229), located in proximity to the Truck Fuelling Site, and the carpark.

The areas of CHS within and adjoining the study area are shown in Appendix A Figure A-8. Note that the polygon that runs along the Esplanade, north to Wharf Road and along Shell Pde is also listed as Coastal Land.

There have been significant changes to the landscape within the study area, including large scale alterations within the project footprint. Aerial images from 1947 and 1966 show this section of the study area completely stripped of vegetation and showing a natural shoreline, gradually being modified. By 1970, aerial imagery shows some large-scale changes to this shoreline, which by 1974 has dramatically receded, demonstrating significant inundation occurrences. By 1978 the area of land had been reclaimed and is at the same elevation seen in modern day aerial photographs. The reclaiming of land was associated with the usage of the location as municipal land fill.

Besides this changing shoreline, limited disturbance is noted within the current project area, except for the construction of a modified drain in the south. The location of the proposed H2 Truck Fuelling site is noted within the environmental audit as being ‘an area of flat, fallow land which apart from possibly a residential building since demolished has only ever been used for grazing’ (AGC Woodward-Clyde 1997).

9. Land availability and control

Is the proposal on, or partly on, Crown land? ☐ No ☒ Yes If yes, please provide details. Victoria's entire marine environment is legally defined as Crown land, which is particularly relevant for the extension to Refinery Pier which will require consent under the *Marine and Coastal Act 2018.*
Current land tenure (provide plan, if practicable): The majority of the project (i.e. landside components) is proposed to be located on land owned by Ports Pty Ltd. The remainder of the land is Crown land for which a seabed lease will be required.
Intended land tenure (tenure over or access to project land): It is intended that GeelongPort would obtain a seabed lease for the area adjacent to their existing seabed lease for the site of the proposed new berth.
Other interests in affected land (eg. easements, native title claims): Easements in favour of the City of Greater Geelong lie along portions of Oyster Bay Creek / Shell Effluent Channel and Cuthbertson's Creek / Rollerama Drain downstream of Seabeach Parade.

10. Required approvals

State and Commonwealth approvals required for project components (if known):

The key approvals/ permits/ licences/ consents, and reasons for these are presented in the table below.

Approvals are not required under the *Heritage Act 2017* as no historical structures of State or local significance have been identified in the study area.

Legislation	Agency	Approval / permit / licence	Reason
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	DAWE	Referral and if deemed a controlled action assessment and approval under the EPBC Act	Potential impacts to MNES: – Berth construction occurring approximately 1.5 km from a component of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site – Potential presence of EPBC listed migratory species – Potential presence of EPBC listed threatened species and ecological communities
State			
Planning and Environment Act 1987 City of Greater Geelong Planning Scheme	City of Greater Geelong	Planning permit (use and development) and planning permit (buildings and works) Planning permit to remove, destroy or lop native vegetation (if required) OR Planning Scheme Amendment	– The proposed facilities fall within the definition of 'Industrial gas production' as set out in Clause 53.10 of the Planning Scheme (Uses and Activities with Potential Adverse Impacts) and Clause 73.03 – Zoning triggers permit requirements for use and buildings and works – Overlays trigger permit requirements for buildings and works – If clearing of native vegetation is required
Environment Effects Act 1978	DELWP	Referral, and if decided by the Minister an EES or Environment Report	Potential impacts to require an integrated environmental impact assessment under the provision of the Act, and the preparation of an EES or Environment Report, depending on the scale, character, intensity and duration of potential impacts.
Occupational Health and Safety Act 2004	WorkSafe	Licence to operate a Major Hazard Facility	For onshore hydrogen production/storage and transfer facilities that trigger a notification under the OHS Regulations 2017 Part 5.2
Environment Protection Amendment Act 2018	EPA Victoria	Development licence and operating licence	It is likely that EPA would consider the conversion of ammonia to hydrogen 'Chemical Works' and hence, if the scale is greater than 2000 tonnes per annum of products a development licence from EPA would be required prior to construction commencing and an operating licence would be required prior to operation commencing.
Marine and Coastal Act 2018	DELWP	Consent to 'undertake works on marine and coastal Crown land' Consent for the 'use and development of marine and coastal Crown land' (construction of the new berth)	Consent is required as the project involves development and works on marine and coastal Crown land (i.e., construction of a new berth)

Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2018	First Peoples – State Relations	Cultural Heritage Management Plan (CHMP)	A mandatory CHMP is likely to be required. The proposed study area is located within areas of cultural heritage sensitivity associated with Regulation 25, Regulation 30, and Regulation 31. The works related to the ammonia import pipeline are classified as a high impact activity and under Regulation 46 (1)(b)(xii), Regulation 46 (1)(b)(xxvii)(C) and Regulation 58 (1). Significant ground disturbance does not appear to remove all areas of cultural heritage sensitivity that intersect with the study area. Further on ground assessment would be required to further investigate this matter. Due to the history of ground disturbance within the study area, the risk to Aboriginal cultural heritage is considered to be low. Consultation with Wadawurrung Traditional Owners Aboriginal Council would identify to what stage any CHMP would need to be undertaken to.
Gas Safety Act 1997	Energy Safe Victoria	Gas Safety Case	Project involves the production and distribution of hydrogen gas

Have any applications for approval been lodged?

☒ No ☒ Yes If yes, please provide details.

Approval agency consultation (agencies with whom the proposal has been discussed):

The following agencies have been consulted with regarding the proposal:

- Department of Environment, Land, Water and Planning
- Department of Transport

Other agencies consulted:

PART 2 POTENTIAL ENVIRONMENTAL EFFECTS

11. Potentially significant environmental effects

Overview of potentially significant environmental effects (identify key potential effects and comment on their significance and likelihood, as well as key uncertainties):

Construction of the Project has the potential to result in the following environmental effects:

- Ground disturbance and stockpiling results in:
  - Loss or degradation of native vegetation and fauna habitat
  - Loss or degradation of Aboriginal cultural heritage places, if present
  - Exposure of existing contamination (soil, soil vapour, groundwater) and mobilisation into waterways and/or Corio Bay via runoff
  - Accumulation and concentration of flammable/explosive or toxic gases and vapours from existing soil vapour and landfill gas in confined or non-ventilated spaces posing a health and safety risk
  - Generation of nuisance dust emissions
- Increased vehicle and vessel movements result in traffic and transport impacts (safety, network efficiency, amenity)
- Noise and vibration from onshore construction activities disturb threatened and migratory fauna
- Artificial lighting from construction vessels and onshore infrastructure areas disturbs threatened and migratory fauna
- Construction of the new berth and associated seabed disturbance results in:
  - Removal of benthic habitat and replacement with new benthic habitat in the form of artificial substrate
  - Underwater noise and vibration from piling resulting in harm or disturbance to marine fauna
- Contaminated hulls result in introduction and establishment of invasive marine species that are harmful to benthic habitats
- Spills/leaks of hazardous materials due to vessel collisions, refuelling incidents, tank/equipment failure or grounding
- Increased presence of vessels increases the likelihood of collision with marine mammals

Operation of the Project has potential to result in the following environmental effects:

- Vented (nitrogen) and fugitive (ammonia) air emissions adversely impact local air quality
- Increased vehicle and vessel movements result in traffic and transport impacts (safety, network efficiency, amenity)
- Noise, vibration and artificial lighting of operations disturbs threatened and migratory fauna

Native vegetation and flora (terrestrial)

A site assessment was undertaken to determine the condition and extent of native vegetation and potential flora habitats within the project area (Attachment A).

The project may intersect native vegetation in the form of EVC 821 Tall Marsh (no bioregional conservation status available for the Victorian Volcanic Plain bioregion (VVP)) within Cuthbertson's Creek / Rollerama Drain, resulting in the removal or modification of up to 0.023ha of native vegetation. EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion) in this area is dominated by a high abundance of native *Typha* sp. (Bulrush) and *Bolboschoenus* sp. (Club Sedge), with a number of introduced species present as well. Based on the field assessment, the project area is considered unlikely to support any threatened flora.

Where possible, GeelongPort will avoid and minimise impacts to patches of native vegetation and detailed design will aim to avoid works within Cuthbertson's Creek/ Rollerama Drain. Construction would consider methods to avoid and minimise indirect impacts to adjacent EVC 9 Coastal Saltmarsh (Vulnerable).

Threatened and migratory fauna (terrestrial)

The Project has the potential to impact threatened and migratory fauna directly through removal of habitat, and indirectly through generation of noise and vibration and night-time lighting.
The habitat within the project area consists of low quality habitat and some unknown habitat values. The proposal may remove up to 7.5 ha of fauna habitat. The majority of habitat removal (approximately 6 ha) would be required for the construction of the proposed admin services, load facilities and the ammonia cracking and storage areas. The remaining habitat would be removed/modified for the construction of the hydrogen offtake and delivery routes and roads and powerlines. There is potential for two threatened species, the Little Tern (*Sternula albifrons*) and Fairy Tern (*Sternula nereis*), and several migratory species to forage along the shoreline and further out over the bay, and also along the shoreline, jetty and ship birthing facility. However, these areas are not preferred habitat for roosting or breeding for these species.

No significant environmental effects regarding threatened and migratory fauna are expected as a result of vegetation clearance given the project area is not preferred or suitable habitat for breeding or roosting.

Noise, vibration and lighting impacts to fauna are likely to be minimal given the context of the surrounding environment and existing port and industrial noise environment.

Benthic habitats

Construction of the new berth and associated subsea infrastructure (e.g., piles, concrete) has potential to remove or disturb the existing benthic habitat and replace with new benthic habitat.

Given the extent of habitat loss will be relatively small and the probable low species richness of the proposed project site, it is unlikely that habitat loss will cause major flow-on impacts to benthic communities. Known seagrass communities should not be impacted given their distance from the proposed project site.

Geophysical, geotechnical and benthic surveys will be undertaken to inform berth design and construction. These surveys would identify any sensitive habitats of which the project would aim to avoid.

In addition, increased vessel movements during construction for delivery of materials, and to a lesser extent for ammonia supply during operations, has the potential to introduce invasive marine species that are harmful to benthic habitats via contaminated hulls. National legislation and guidelines are available to assist proponents in managing this risk through implementation of controls (e.g., biofouling risk assessment, record books, hull assessments).

Marine fauna

The project has potential to impact marine fauna through underwater noise and vibration, artificial lighting, spills/leaks and vessel strike. These potential impact pathways are discussed below.

Pile driving generates intense pulses of noise that have the potential to impact marine fauna including threatened and listed migratory marine species. This source of underwater noise and vibration would be temporary and short lived. While the likelihood of occurrence of many noise sensitive species (e.g. marine mammals and turtles) is rare or unlikely, good industry practice mitigation and management measures will be adopted within the Construction Environmental Management Plan **(CEMP)** to reduce the risk (e.g., soft start requirements, shut down procedures). Underwater noise may also be generated during arrival and departure of the ammonia supply tanker. However, operational noise impacts are considered minor given the context of the current activities at Port of Geelong, and the fact only one to four supply tankers a month is required by the Project.

Artificial lighting from construction and operational vessels may attract marine fauna and impact their behaviour and/or movements. However, project impacts from artificial lighting are considered minor given the context of the current activities at the Port of Geelong. Additional lighting from the proposed project is unlikely to substantially increase current light levels experienced by marine fauna. GeelongPort and its contractors will limit lighting to that required for safe operations.

Spills of chemicals or hazardous substances from vessels, transfer pipelines or storage areas has potential to hard marine fauna. The risk of a spill cannot be completely eliminated. While additional vessels in the area may slightly increase the likelihood of a spill, vessel activities are well regulated, and control measures implemented across the industry.

The increased presence of vessels could also result in harm to marine mammals. Given the presence of marine mega-fauna at the proposed project site is unlikely and the proposed activities to be relatively infrequent, the likelihood of serious injury is significantly reduced. Regulated travel speeds will be adhered to, as well as maintaining safe distances from marine mammals if sighted.

Contamination

Historical land use activities have likely created legacy environmental issues including soil, soil vapour (petroleum hydrocarbons and/or landfill gas) and groundwater contamination. Potential issues and impacts regarding contamination and proposed mitigation and management are discussed below.

A preliminary contamination investigation (desktop assessment only) has been undertaken to inform this referral (Attachment E). Intrusive environmental investigations will be required to determine whether the study area soil, soil vapour and groundwater are contaminated and pose an unacceptable risk to human health (both construction workers, and site operators), and down-gradient receiving environments.

Known or potential onsite sources of contamination include:
- Historical filling
- Possible illegal dumping
- Grazing activities prior to 1955
- Former landfill (municipal solid waste)
- Former industrial activities:
  - Fertiliser production and likely subsequent explosives production within a square block to the south of St Georges Rd
  - Geelong Water (now Barwon Water) pipe maintenance depot and subsequently a second material dealer within a triangle block at the corner of Seabeach Parade and Greta St

Known or potential offsite sources of contamination include:
- Geelong Refinery (the Refinery) to the immediate north
- Adjacent upgradient industrial activities including a fertiliser plant (Incitec Pivot Fertilisers) and an express self-assistant diesel service station

Contaminants of Potential Concern **(CoPC)** include:
- Metals (arsenic, barium, boron, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, vanadium & zinc)
- Total recoverable hydrocarbons **(TRH)**, Polycyclic aromatic hydrocarbons (PAH), Benzene, Toluene, Ethyl-Benzene, Xylene **(BTEX)**, Methyl tertiary-butyl ether **(MTBE)**, phenols, cresols
- Ammonia, sulphides
- Organochlorine Pesticides **(OCP)**, Organophosphate Pesticides **(OPP)**
- Asbestos
- Landfill gases including CH4, CO, H2S, SO2
- Landfill leachate and soil (pH, TDS, metals, ammonia, nitrogen, sulphides, TRH, BTEX, Volatile Organic Compounds **(VOC)**, Semi-Volatile-Organic Compounds **(SVOC)**, Per- and Poly-Fluoro Alkyl Substances **(PFAS)**, salinity)
- Odorous gases
- Nitrates, nitrogen, phosphorous, sulphur, ammonia, fluoride, pH
- Explosives
- Solvents
- PFAS
- Light Non-Aqueous Phase Liquids **(LNAPL)** and dissolved phase hydrocarbons in groundwater

Contaminated soils and buried waste
Excavations to construct the onsite infrastructure, and various utility pipelines would have a high likelihood of disturbing fill materials, which could include contaminated soils and buried wastes. Should contaminated soils and buried wastes be exposed then management of these wastes, likely as Industrial or Priority Waste would be required. On-site management of the exposed contaminated soils and buried waste would be required to reduce the migration risk of the contaminants into the surrounding environment, in particular Corio Bay. Most buried waste and contaminated soils would likely be unsuitable to remain on-site and would require off-site disposal to operating licensed landfill. Sedimentation management will be needed for the construction given the high potential for contamination and close proximity to Corio Bay. Spoil management may be needed where soil is likely to be contaminated and wastes may be excavated.

If gross asbestos contamination comprising fibrous or friable asbestos contamination is present, particularly in landfills, then any disturbance of these soils and materials would be done under Class A asbestos removal work conditions. This involves additional controls such as PPE, isolation barriers, air monitoring, dust suppression, encapsulation in a designated asbestos works area by a Class A licensed asbestos removal contractor in accordance with Worksafe Victoria guidance. Once disturbed or excavated these materials and any visibly contaminated soil cannot be re-used on the site and will require offsite disposal to an appropriately licenced landfill. If undisturbed, then these materials can remain at depth on-site under an asbestos management plan.

Coastal acid sulfate soil (CASS) may be present, particularly on the waterfront north of Refinery Pier, therefore if encountered an acid sulphate soil management plan will be required to manage the risk including staged excavation, leachate capture, neutralisation and storage system, addition of lime to neutralise soils, monitoring of surface water and possible offsite disposal of soil. If undisturbed, then these materials can remain on-site under an acid sulphate soil management plan.

Contaminated groundwater
A preliminary groundwater assessment was completed (Attachment D). With shallow groundwater, there is an increased likelihood that excavations to construct foundations or underground services, may intersect groundwater. Construction dewatering may be required to enable safe and stable excavations below the water table, however, such activities are temporary, and recovery of the groundwater table is reasonable at the cessation of dewatering activities. Under these circumstances impact to groundwater from dewatering could be reasonably managed through design, and construction environmental management processes.

The Project is not expected to impact other groundwater users in regards to quantity. However, potential issues regarding groundwater quality that would require management during design and construction include:

- Oxidation of acid sulfate soils. It is noted that the published mapping indicates a low probability of occurrence of CASS across the majority of the project area but a high probability along the waterfront north of Refinery Pier
- Managing volumes of groundwater recovered during dewatering activities, i.e. how is groundwater disposed of, particularly given the groundwater is likely to be contaminated and the close proximity of the Corio Bay aquatic ecosystem
- Increased risk of the generation of soil vapour and/or landfill gas as the water table is lowered and saturated subsurface materials become unsaturated and exposed to air
- Disturbance of groundwater affected by hydrocarbon and other contaminants from the Geelong Refinery

Irrespective of project activities, rainfall infiltration through the shallow fill materials has the potential to leach constituents into the groundwater, effecting the groundwater quality and potentially, down-gradient receptors such as Corio Bay. The shallow nature of groundwater occurrence, and potentially high hydraulic conductivity of coastal sediments, suggests that the groundwater is vulnerable to contamination from land use practices (both current and historical).

Soil vapour/landfill gas
Soil vapour and landfill gas generated from the former landfill may be present subsurface in the area and pose a risk to construction and site workers in confined space with no or minimal ventilations. Landfill gases will likely accumulate in trenches and confined spaces during construction and post construction. Should the former landfill area and the adjacent area (within a buffer of 200 m) be used for proposed construction, ongoing landfill gas monitoring and/or a gas extraction or barrier system may be needed.

Excavation of buried waste in the former landfill would be avoided where possible through adoption of foundations and geotechnical options such as bored piers rather than bulk excavation. If leachate and/or landfill gas is still being generated then a gas or leachate extraction or barrier system may be needed to mitigate the risk if wastes are not removed. Landfill leachate is often also acidic therefore selection of construction materials would also need to consider the corrosion and aggressive characteristic of the soil.

Noise

Based on the high level review of the expected construction activities, and typical noise levels for various equipment (refer Table 9 of Attachment H), the following is noted:

- Construction noise during standard hours is unlikely to result in significant community reaction to noise. A typical construction noise level of 75 dB(A) is considered during standard construction hours.
- Construction works outside standard hours will likely result in noise levels above the preliminary targets (refer Table 5 of Attachment H) indicating that management of construction noise outside of standard hours will be required with implementation of projects specific noise mitigation measures

Based on a high level operational noise assessment (Attachment H), noise associated with the operation of the proposed facility has a potential risk of exceeding relevant environmental noise limits at the nearest noise sensitive receivers. However, it is expected that noise emissions from the operation of the facility can be managed to relevant limits via incorporation of appropriate noise mitigation measures in the design of the facility.

Further noise assessment is proposed as part of the future investigation program (Section 20).

Air quality

Construction activities involving ground disturbance and earthworks may generate dust emissions. These activities will be conducted under a CEMP which will contain good practice control measures for dust emissions in accordance with Civil Construction, building and demolition guide (EPA Victoria Publication 1834, 2020). No potentially significant air quality effects are expected as a result of construction dust.

Air emissions generated during operation of the Project will depend largely on the ammonia cracking technology. Based on first principles, cracking of ammonia to produce a hydrogen product and nitrogen waste stream does not result in potentially significant air quality effects as nitrogen is the primary constituent of the atmosphere. As the key feed and product streams, respectively, ammonia and hydrogen will be contained within material transfer infrastructure (pipe and duct work) and dedicated storage tanks. Only low concentrations of ammonia are expected as fugitive emissions during operation of the facility. Nitrogen will be emitted to atmosphere however nitrogen is not considered a criteria pollutant or subject to air quality assessment criteria in accordance with EPA Victorian Publication 1961. Further information can be found in the Air Quality assessment (Attachment G).

Further assessment regarding potential air quality impacts is proposed as part of the future investigation program (Section 20).

Greenhouse gas emissions

The most significant greenhouse gas emissions that are likely to occur during construction will be those associated with the embodied energy of the materials used (for instance concrete and steel). These are referred to as Scope 3 emissions which are indirect emissions which occur offsite. There will also be minor direct (Scope 1) greenhouse gas emissions from fuel consumption of construction equipment.

During operations, energy (power and heat) is required for the cracking of ammonia to hydrogen and nitrogen. The energy source has not yet been finalised but the preferred source is the hydrogen produced onsite (Scope 1).

A comprehensive assessment of Scope 1, 2 and 3 emissions is proposed as part of the future investigation program (Section 20). Opportunities to reduce emissions will be investigated as part of this assessment.

Aboriginal cultural heritage

Whilst no known Aboriginal cultural heritage places are located within the study area, three are located in the surrounding area and result in areas of cultural heritage sensitivity which overlap with the project area. Construction of the Project is classified as a high impact activity under the Aboriginal Heritage Regulations 2018 and ground disturbance and earthworks have the potential to disturb or destroy Aboriginal heritage sites if present. However, the risk to Aboriginal cultural heritage is low given the extent of previous ground disturbance within the study area.

Further assessment is proposed as part of the future investigation program (Section 20) as well as consultation with Wadawurrung Traditional Owners Aboriginal Corporation to identify to what stage any CHMP would need to be undertaken.

Historic heritage

No historical structures of State or local significance have been identified in the study area. No further historical heritage investigations are proposed to be undertaken.

Visual

No significant visual effects are expected as a result of the Project given the existing visual environment of the project area is highly modified and industrial. Proposed structures are to be of a similar height and scale to those within the existing industrial zone, with the exception of the ammonia storage tank which is preliminary sized as 48 m diameter x 37 m height and would likely be visible from multiple locations. Visual impact receptors include residential areas (located approximately 900 m from the tank and transient boats in Corio Bay).

Further assessment regarding potential landscape and visual impacts is proposed as part of the future investigation program (Section 20).

12. Native vegetation, flora and fauna

Native vegetation

Is any native vegetation likely to be cleared or otherwise affected by the project?

☒ NYD ☐ No ☐ Yes If yes, answer the following questions and attach details.

The project may intersect potential native vegetation in the form of EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion), resulting in the removal or modification of native vegetation.

Based on the size and extent of the project area footprint up to 0.023 ha of native vegetation could be removed or modified, although the actual figure is likely to be less.

What investigation of native vegetation in the project area has been done? (briefly describe)

A desktop assessment of ecological values known or predicted to be present within the broader referral area and actual project area was undertaken in September 2021 to consider likely impacts to terrestrial ecological values (Attachment A, Section 2.1). This included recent information from the following databases and spatial datasets:

- Victorian Biodiversity Atlas **(VBA)** for flora and fauna recorded within a 10 km buffer of the site (VBA curated by DELWP) (DELWP 2021a)
- NatureKit Maps – which provide modelled mapping of extant and pre-1750 Ecological Vegetation Classes (EVCs) (maintained by DELWP) (DELWP 2021b)
- Native Vegetation Information Management **(NVIM)** systems maps – which provide Location mapping, the Current Wetland Layer, the Strategic Biodiversity Score and the Native Vegetation Condition Score for the project area (maintained by DELWP) (DELWP 2021c)
- Aerial imagery of the project area and project area to identify ecological values and land use history

Following this, a botanical assessment was undertaken at the site in October 2021. The botanical assessment ground truthed desktop information in order to clarify the location of remnant patches of native vegetation, non-native vegetation and scattered trees with the project area.

What is the maximum area of native vegetation that may need to be cleared?

☐ NYD Estimated area ……Up to 0.023 ha……..(hectares)

Based on the size and extent of the project area footprint up to 0.023 ha's of native vegetation could be removed or modified, although the actual figure is likely to be less.

How much of this clearing would be authorised under a Forest Management Plan or Fire Protection Plan?

☒ N/A …… approx. percent (if applicable)

Which Ecological Vegetation Classes may be affected? (if not authorised as above)

☐ NYD ☒ Preliminary/detailed assessment completed. If assessed, please list.

The field assessment identified EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion) as occurring within the project area where it intersects Cuthbertson's Creek / Rollerama Drain.

In addition, EVC 9 Coastal Saltmarsh (Vulnerable) was identified adjacent to the project area north of the proposed catalytic cracking plants within the old landfill site, and as having potential to occur along the Shell Parade natural shoreline.

Have potential vegetation offsets been identified as yet?

☒ NYD ☐ Yes If yes, please briefly describe.

Other information/comments? (eg. accuracy of information)

Not applicable.

NYD = not yet determined

Flora and fauna

What investigations of flora and fauna in the project area have been done?
(provide overview here and attach details of method and results of any surveys for the project & describe their accuracy)

Terrestrial Flora and Fauna

A desktop assessment of ecological values known or predicted to be present within the broader referral area and actual project area was undertaken to consider likely impacts to terrestrial ecological values (Attachment A). This included recent information from the following databases and spatial datasets:

- Victorian Biodiversity Atlas (VBA) for flora and fauna recorded within a 10 km buffer of the site (VBA curated by DELWP) (DELWP 2021a)
- NatureKit Maps – which provide modelled mapping of extant and pre-1750 Ecological Vegetation Classes **(EVCs)** (maintained by DELWP) (DELWP 2021b)
- Native Vegetation Information Management (NVIM) systems maps – which provide Location mapping, the Current Wetland Layer, the Strategic Biodiversity Score and the Native Vegetation Condition Score for the project area (maintained by DELWP) (DELWP 2021c)
- Aerial imagery of the project area and project area to identify ecological values and land use history

Following this, a botanical assessment was undertaken at the site in October 2021. The botanical assessment ground truthed desktop information in order to clarify the location of remnant patches of native vegetation, non-native vegetation and scattered trees with the project area.

Terrestrial Flora

Key findings from the terrestrial flora assessment (Appendix B to Attachment A) include:

- 980 species of flora have been recorded (On VBA) within 10 km of the project area, including 519 native species, 429 introduced species and 32 species that are native but non-indigenous to the area
- The field assessment identified 49 species within the project area, including nine native species, 33 introduced species and seven species that are native but non-indigenous to the area or that have been planted in the project area
- No species with VBA records were recorded within, or within 500 m of the project area
- 48 FFG and/or EPBC Act listed rare or threatened plants have been recorded within 10 km of the project area, 11 of which are considered likely to occur, or likely to have suitable habitat occurring in the project area
- A total of 59 species were species identified for the project are listed as threatened under the EPBC Act, the FFG Act, and/or are considered rare or threatened in Victoria.19 species are listed under the EPBC Act, and 54 species are listed under the FFG Act, (see Appendix B to Attachment A for species list)
- Of these 59 rare and threatened flora records:
  - 10 flora species were considered possible to occur within the project area based on an assessment of suitable habitat onsite, and recent records on the VBA within 10 km of the project area
  - 43 species considered unlikely to occur, and
  - 6 species considered highly unlikely to occur
- Suitable habitat in the proposed works area may include inland watercourses; estuarine flats; saline soils; sandy, sandy loam or basalt derived soils; brackish wet or moist soils, and coastal grasslands, woodlands and heathlands
- The field assessment identified two species listed under the FFG Act, but that are not indigenous to the locality, within the project area: *Eucalyptus leucoxylon* subsp. *megalocarpa* (Large-fruit Yellow-gum) and *Melaleuca armillaris* subsp. *armillaris* (Giant Honey-myrtle). There are no legislative requirements for these non-indigenous species.
- The field assessment did not identify any indigenous threatened species within the project area, nor are any threatened flora considered likely to occur due to the limited extent of remnant native vegetation and highly modified nature of the site
- Just outside the project area, one location was identified during the field assessment as potentially providing suitable remnant habitat for threatened flora: the natural shoreline

parallel to the proposed carpark on Shell Parade, which potentially contains EVC 9 Coastal Saltmarsh (Vulnerable)

– The field assessment did not identify any EPBC-Act listed threatened ecological communities within the assessed project area

Terrestrial Fauna
A total of 485 terrestrial fauna species are documented to occur or predicted to occur, within the project area (i.e. within 10 km of the project area) (VBA and Protected Matters Search Tool **(PMST)**). Of the terrestrial fauna species identified within the project area, 89 are considered to be threatened and are listed under the EPBC Act and/or FFG Act:

– Forty-five species listed under the EPBC Act
– Eighty-three species listed under the FFG Act

Appendix D to Attachment A lists the threatened fauna species with previous records within the project area and/or identified as potentially occurring within the project area.

Based on the VBA species geographical mapping, two threatened fauna species were recorded within 500 m of the project area, which is the Little Tern (*Sternula albifrons*) and Fairy Tern (*Sternula nereis*). Both species are considered critically endangered under the FFG Act. There is potential for both species to forage along the shoreline and further out over the bay, and also loaf along the shoreline, jetty and ship birthing facility. However, both species prefer to roost and nest on sand-spits, sandy beaches, sand bars within sheltered coastal or estuarine environments (DAWE 2021b/c), thus are unlikely to roost or breed within the project area.

Forty-five migratory bird species were identified by the VBA and PMST as known or likely to occur within 10 km of the project area (See Table 4, or Appendix D to Attachment A).

– Eighteen species are listed under the EPBC Act
– Twenty-three species are listed under the FFG Act

There is limited habitat for migratory species within the project area. Migratory birds listed under the EPBC Act are generally in Australia during warmer months (August to March) before returning to breeding grounds in the northern hemisphere. There is potential for migratory bird species to forage along the shoreline and over the bay, and also loaf along the shoreline, jetty and ship birthing facility. However, there are limited opportunities for roosting within the project area. The nearest known roosting and foraging areas (those with records on the DELWP database) in order of distance (closets to furthest away) include:

- Limeburners Bay/Lagoon (over one kilometre north of the project area)
- Avalon Coastal Reserve (over five kilometres northeast and east of the project area)
- Point Henry foreshore and reserve (over five kilometres southeast of the project area)
- Stinagree Bay / Moolap Saltworks (over five kilometres southeast of the project area)

Marine environment

In addition to the terrestrial flora and fauna assessment, a desktop assessment of marine ecological values was completed (Attachment B) to provide a description of the existing marine ecological environment, the associated values and sensitivities and their relevance to the proposed project site. Information has been sourced from peer-reviewed journals, and government and industry reports and websites.

Seagrass
The closest mapped seagrass bed to the proposed new berth is ~580 m away. The closest surveyed seagrass bed is approximately 470 m west of the new berth. The carpark to the north of Refinery Pier is located approximately 80 m overland from another mapped seagrass bed (refer Figure 2 of Attachment B).

Migratory and marine species
A number of listed threatened and/or migratory marine species were identified as having the potential to occur within the proposed project site (refer Table 2 of Attachment B). Seven species were identified as possible to occur, with the remainder considered to have an unlikely or rare likelihood of occurrence. The seven Species identified with a likelihood of occurrence include:

- Leatherback Turtle *Dermochelys coriacea* – (Migratory – EPBC status Endangered)
- Shy Albatross *Thalassarche cauta* - (Migratory – EPBC status Endangered)
- Grey-headed Albatross *Thalassarche chrysostoma* – (Migratory – EPBC status Endangered)
- Black-browed Albatross *Thalassarche melanophris* – (Migratory – EPBC status Endangered)
- Southern Giant Petrel *Macronectes giganteus* – (Migratory – EPBC status Endangered)
- Northern Giant Petrel Macronectes halli – (Migratory – EPBC status Vulnerable)
- Common Noddy *Anous stolidus* (Migratory)

The proposed project site does not appear to support significant numbers of threatened and/or migratory marine species. Overall, it is unlikely that the aspects described above would lead to a long-term decrease in the size their populations; however, it is acknowledged that there is some uncertainty on the presence/absence of these species and their use of habitat within and near the proposed project site.

Have any threatened or migratory species or listed communities been recorded from the local area?

☒ NYD ☒ No ☒ Yes If yes, please:

- List species/communities recorded in recent surveys and/or past observations.
- Indicate which of these have been recorded from the project site or nearby.

Desktop studies have been undertaken to identify threatened, migratory or listed communities that may occur within proximity to the project. Six EPBC Act-listed Threatened Ecological Communities (TECs) that are known, likely to occur or may occur within 10 km of the project area:

- *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* (Critically Endangered)
- *Natural Damp Grassland of the Victorian Coastal Plains* (Critically Endangered)
- *Natural Temperate Grassland of the Victorian Volcanic Plain* (Critically Endangered)
- *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* (Critically Endangered)
- *Subtropical and Temperate Coastal Saltmarsh* (Vulnerable)
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Critically Endangered)

These mapped ecological communities were assessed as unlikely to occur within the project area, with the exception of *Subtropical and Temperate Coastal Saltmarsh*. Based on native vegetation types mapped onsite and the associated bioregion, the following EPBC community is the only ecological community likely to occur:

- *Subtropical and Temperate Coastal Saltmarsh* (Vulnerable), due to EPBC listing advice including EVC 9 as an indicator of potential presence (DSEWPC 2011a). This community, if present would be most likely to occur west of fencing adjacent to Shell Parade, along the shoreline where the northern extent of planned hydrogen pipeline is currently placed. There is also potential for this community to occur in areas of Site 1 that are low lying and close to the coast, where ammonia cracking, expansion, storage tanks and boil-off-gas refrigeration system are planned.

Rare or threatened fauna species identified within 10 km of the project area by the VBA and PMST are listed in Table 3, and Migratory species are listed in Table 4.

Table 3: Rare or threatened fauna species identified within 10 km of the project area by the VBA and PMST (CR/cr = Critically endangered, EN/en = Endangered, VU/vu = Vulnerable)

Common name	Scientific Name	EPBC Act	FFG Act	Count	Last Recorded	Source
Mammals						
Platypus	*Ornithorhynchus anatinus*	-	vu	5	2019	VBA
Spot-tailed Quoll	*Dasyurus maculatus*	EN	en	-	-	PMST
Swamp Antechinus	*Antechinus minimus maritimus*	VU	vu	-	-	PMST
Eastern Barred Bandicoot	*Perameles gunnii*	EN	en	36	1980	VBA
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU	vu	12	2018	VBA, PMST
Birds						

Plains-wanderer	*Pedionomus torquatus*	CR	cr	-	-	PMST
Diamond Dove	*Geopelia cuneata*	-	vu	1	1977	VBA
Lewin's Rail	*Lewinia pectoralis*	-	vu	14	2014	VBA
White-faced Storm-Petrel	*Pelagodroma marina*	-	en	2	2016	VBA
Southern Giant-Petrel	*Macronectes giganteus*	EN	en	-	-	PMST
Northern Giant-Petrel	*Macronectes halli*	VU	en	-	-	PMST
Wandering Albatross	*Diomedea exulans*	VU	cr	-	-	PMST
Antipodean Albatross	*Diomedea antipodensis*	VU	-	-	-	PMST
Black-browed Albatross	*Thalassarche melanophris*	VU	-	-	-	PMST
Grey-headed Albatross	*Thalassarche chrysostoma*	EN	en	-	-	PMST
Shy Albatross	*Thalassarche cauta*	EN	en	-	-	PMST
White-capped Albatross	*Thalassarche cauta steadi*	VU	-	-	-	PMST
Salvin's Albatross	*Thalassarche salvini*	VU	-	-	-	PMST
Sooty Albatross	*Phoebetria fusca*	VU	cr	-	-	PMST
Southern Royal Albatross	*Diomedea epomophora*	VU	cr	-	-	PMST
Northern Royal Albatross	*Diomedea sanfordi*	EN	-	-	-	PMST
Campbell Albatross	*Thalassarche impavida*	VU	-	-	-	PMST
Buller's Albatross	*Thalassarche bulleri*	VU	en	-	-	PMST
Indian Yellow-nosed Albatross	*Thalassarche carteri*	-	en	1	1979	VBA
Caspian Tern	*Hydroprogne caspia*	-	vu	104	2019	VBA
Little Tern	*Sternula albifrons*	-	cr	109	2019	VBA, PMST
Fairy Tern	*Sternula nereis*	VU	cr	259	2019	VBA, PMST
Ruddy Turnstone	*Arenaria interpres*	-	en	46	2018	VBA, PMST
Grey Plover	*Pluvialis squatarola*	-	vu	10	2017	VBA, PMST
Pacific Golden Plover	*Pluvialis fulva*	-	vu	65	2018	VBA, PMST
Hooded Plover	*Thinornis cucullatus*	VU	vu	2	2005	VBA, PMST
Lesser Sand Plover	*Charadrius mongolus*	EN	en	7	2008	VBA, PMST
Greater Sand Plover	*Charadrius leschenaultii*	VU	vu	2	1996	VBA
Eastern Curlew	*Numenius madagascariensis*	CR	cr	76	2013	VBA, PMST
Whimbrel	*Numenius phaeopus*	-	en	4	1990	VBA
Black-tailed Godwit	*Limosa limosa*	-	cr	10	2019	VBA, PMST
Bar-tailed Godwit	*Limosa lapponica*	VU	vu	21	2016	VBA, PMST
Wood Sandpiper	*Tringa glareola*	-	en	2	2016	VBA, PMST
Grey-tailed Tattler	*Tringa brevipes*	-	cr	37	2015	VBA, PMST
Common Sandpiper	*Actitis hypoleucos*	-	vu	20	2018	VBA, PMST
Common Greenshank	*Tringa nebularia*	-	en	591	2019	VBA, PMST
Marsh Sandpiper	*Tringa stagnatilis*	-	en	285	2019	VBA, PMST
Terek Sandpiper	*Xenus cinereus*	-	en	16	2017	VBA, PMST

Curlew Sandpiper	*Calidris ferruginea*	CR	cr	415	2019	VBA, PMST
Red Knot	*Calidris canutus*	EN	en	34	2018	VBA, PMST
Great Knot	*Calidris tenuirostris*	CR	cr	6	2010	VBA, PMST
Australian Painted-snipe	*Rostratula australis*	EN	cr	1	1956	VBA, PMST
Brolga	*Antigone rubicunda*	-	en	87	2020	VBA
Little Egret	*Egretta garzetta nigripes*	-	en	493	2019	VBA
Plumed Egret	*Ardea intermedia plumifera*	-	cr	21	2007	VBA
Eastern Great Egret	*Ardea alba modesta*	-	vu	1	2013	VBA
Australian Little Bittern	*Ixobrychus dubius*	-	en	1	1970	VBA
Australasian Bittern	*Botaurus poiciloptilus*	EN	cr	11	2002	VBA, PMST
Magpie Goose	*Anseranas semipalmata*	-	vu	934	2019	VBA
Australasian Shoveler	*Spatula rhynchotis*	-	vu	266	2019	VBA
Freckled Duck	*Stictonetta naevosa*	-	en	94	2019	VBA
Hardhead	*Aythya australis*	-	vu	735	2019	VBA
Blue-billed Duck	*Oxyura australis*	-	vu	107	2019	VBA
Musk Duck	*Biziura lobata*	-	vu	203	2019	VBA
Grey Goshawk	*Accipiter novaehollandiae*	-	en	49	2018	VBA
Little Eagle	*Hieraaetus morphnoides*	-	vu	341	2018	VBA
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	-	en	45	2019	VBA
Square-tailed Kite	*Lophoictinia isura*	-	vu	1	2008	VBA
Grey Falcon	*Falco hypoleucos*	VU	vu	-	-	PMST
Black Falcon	*Falco subniger*	-	cr	71	2019	VBA
Barking Owl	*Ninox connivens*	-	cr	1	1969	VBA
Powerful Owl	*Ninox strenua*	-	vu	1	1969	VBA
Masked Owl	*Tyto novaehollandiae*	-	cr	1	2018	VBA
Major Mitchell's Cockatoo	*Lophocroa leadbeateri*	-	cr	2	1999	VBA
Orange-bellied Parrot	*Neophema chrysogaster*	CR	cr	21	2019	VBA, PMST
Swift Parrot	*Lathamus discolor*	CR	cr	17	2019	VBA, PMST
White-throated Needletail	*Hirundapus caudacutus*	VU	vu	18	2016	VBA, PMST
Hooded Robin	*Melanodryas cucullata*	-	vu	3	2016	VBA
Speckled Warbler	*Pyrrholaemus sagittatus*	-	en	3	2018	VBA
Painted Honeyeater	*Grantiella picta*	VU	vu			PMST
Regent Honeyeater	*Anthochaera phrygia*	CR	cr	2	1993	VBA
Diamond Firetail	*Stagonopleura guttata*	-	vu	4	2013	VBA, PMST
Reptiles						
Striped Legless Lizard	*Delma impar*	VU	en	2	2020	VBA, PMST
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	EN	cr	-	-	PMST
Frog						
Growling Grass Frog	*Litoria raniformis*	VU	vu	8	2020	VBA, PMST
Invertebrates						
Yellow Sedge-skipper Butterfly	*Hesperilla flavescens*	-	en	4	1988	VBA

Golden Sun Moth	*Synemon plana*	CR	vu	1	2009	VBA, PMST
Otway Burrowing Crayfish	*Engaeus fultoni*	-	vu	1	1942	VBA
Sea-cucumber species	*Thyone nigra*	-	en	3	1960	VBA
Fish						
Australian Grayling	*Prototroctes maraena*	VU	en	39	1998	VBA, PMST
Dwarf Galaxias	*Galaxiella pusilla*	VU	en	-	-	PMST
Murray Cod	*Maccullochella peelii peelii*	VU	en	1	1905	VBA
Macquarie Perch	*Macquaria australasica*	EN	en	6	1981	VBA
Yarra Pygmy Perch	*Nannoperca obscura*	VU	vu	3	2009	VBA, PMST

Table 4: Migratory fauna identified by the VBA and PMST within 10 km of the project area

Common name	Scientific Name	EPBC Act	FFG Act
Common Sandpiper	*Actitis hypoleucos*	-	vu
Common Noddy	*Anous stolidus*	-	
Fork-tailed Swift	*Apus pacificus*	-	
Ruddy Turnstone	*Arenaria interpres*	-	en
Sharp-tailed Sandpiper	*Calidris acuminata*	-	
Curlew Sandpiper	*Calidris ferruginea*	CR	cr
Pectoral Sandpiper	*Calidris melanotos*	-	
Red-necked Stint	*Calidris ruficollis*	-	
Long-toed Stint	*Calidris subminuta*	-	
Great Knot	*Calidris tenuirostris*	CR	cr
Double-banded Plover	*Charadrius bicinctus*	-	
Lesser Sand Plover	*Charadrius mongolus*	EN	en
Antipodean Albatross	*Diomedea antipodensis*	VU	
Northern Royal Albatross	*Diomedea sanfordi*	EN	
Latham's Snipe	*Gallinago hardwickii*	-	
Pin-tailed Snipe	*Gallinago stenura*	-	
White-throated Needletail	*Hirundapus caudacutus*	VU	vu
Broad-billed Sandpiper	*Limicola falcinellus*	-	
Bar-tailed Godwit	*Limosa lapponica*	VU	vu
Black-tailed Godwit	*Limosa limosa*	-	cr
Southern Giant-Petrel	*Macronectes giganteus*	EN	en
Northern Giant-petrel	*Macronectes halli*	VU	en
Satin Flycatcher	*Myiagra cyanoleuca*	-	
Eastern Curlew	*Numenius madagascariensis*	CR	cr
Osprey	*Pandion haliaetus*	-	
Red-necked Phalarope	*Phalaropus lobatus*	-	
Ruff	*Philomachus pugnax*	-	
Sooty Albatross	*Phoebetria fusca*	VU	cr
Pacific Golden Plover	*Pluvialis fulva*	-	vu
Grey Plover	*Pluvialis squatarola*	-	vu
Flesh-footed Shearwater	*Puffinus carneipes*	-	
Rufous Fantail	*Rhipidura rufifrons*	-	
Little Tern	*Sternula albifrons*	-	cr
Buller's Albatross	*Thalassarche bulleri*	VU	en
Shy Albatross	*Thalassarche cauta*	EN	en

Grey-headed Albatross	*Thalassarche chrysostoma*	EN	en
Campbell Albatross	*Thalassarche impavida*	VU	
Black-browed Albatross	*Thalassarche melanophris*	VU	
Salvin's Albatross	*Thalassarche salvini*	VU	
White-capped Albatross	*Thalassarche cauta steadi*	VU	
Grey-tailed Tattler	*Tringa brevipes*	-	cr
Wood Sandpiper	*Tringa glareola*	-	en
Common Greenshank	*Tringa nebularia*	-	en
Marsh Sandpiper	*Tringa stagnatilis*	-	en
Terek Sandpiper	*Xenus cinereus*	-	en

If known, what threatening processes affecting these species or communities may be exacerbated by the project? (eg. loss or fragmentation of habitats). Please describe briefly.

The following threatening processes which may be exacerbated by the Project were identified from the Species Profile and Threats Database Listed Key Threatening Processes (DAWE, 2020) and the FFG Act Processes List (DELWP, 2016).

Construction and decommissioning activities
Potential threatening processes that may be exacerbated by construction activities include:
- Input of petroleum and related products into Victorian marine and estuarine environments from accidental spills/vessel collision or grounding
- The discharge of human-generated marine debris into Victorian marine or estuarine waters
- Invasion of native vegetation by “environmental weeds”

These potential impacts are discussed generally in earlier sections of this referral document.

Environmental risks associated with construction (and decommissioning) activities will be assessed in the various studies required to support the approvals process for the project. Impacts and proposed mitigation measures would be incorporated into the Construction Environmental Management Plan(s) which will be required for the project.

Operation activities
Potential threatening processes that may be exacerbated by operation activities include:
- Input of petroleum and related products into Victorian marine and estuarine environments from accidental spills/vessel collision or grounding
- The introduction of exotic organisms into Victorian marine waters
- Novel biota and their impact on biodiversity
- Invasion of native vegetation by “environmental weeds”

These potential impacts are discussed generally in earlier sections of this referral document.

Environmental risks associated with operational activities will be assessed in the various studies required to support the approvals process for the project. Impacts and proposed mitigation measures would be incorporated into the Operational Environmental Management Plan(s) which will be required for the project.

Are any threatened or migratory species, other species of conservation significance or listed communities potentially affected by the project?

☒ NYD ☒ No ☒ Yes If yes, please:

- List these species/communities:
- Indicate which species or communities could be subject to a major or extensive impact (including the loss of a genetically important population of a species listed or nominated for listing) Comment on likelihood of effects and associated uncertainties, if practicable.

Native vegetation
The project may intersect potential native vegetation in the form of EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion), resulting in the removal or modification of up to 0.023 ha of native vegetation.

EPBC ecological communities
The Subtropical and Temperate Coastal Saltmarsh may occur. This community, if present, is mostly likely to occur along the Shell Parade natural shoreline adjacent to the proposed carpark on Shell Parade

Fauna communities
No fauna communities listed under the EPBC Act or FFG Act are likely to occur within the project area.

Flora species of conservation significance
10 flora species were considered possible to occur within the project area based on an assessment of potential habitats.

Fauna habitat
The habitat within the project area consists of low quality habitat and contains some unknown habitat values. The proposal may remove between 5 – 7.5 ha's of fauna habitat.

The majority of habitat removal would occur for the construction of the proposed admin services, load facilities and the ammonia cracking and storage areas.

The remaining habitat would be removed/modified for the construction of the hydrogen offtake and delivery routes and roads and powerlines.

Fauna species of conservation significance
Based on the VBA species geographical mapping, two threatened fauna species were recorded within 500 m of the project area, which is the Little Tern (*Sternula albifrons*) and Fairy Tern (*Sternula nereis*). The Fairy Tern is considered vulnerable under the EPBC Act.

Both species are considered critically endangered under the FFG Act. There is potential for both species to forage along the shoreline and further out over the bay, and also loaf along the shoreline, and on the jetty and ship birthing facility. However, both species prefer to roost and nest on sand-spits, sandy beaches, and sand bars within sheltered coastal or estuarine environments (DAWE 2021b/c), thus are unlikely to roost or breed within the project area.

Migratory species
Forty-five migratory bird species were identified by the VBA and PMST as known or likely to occur within 10 km of the project area (Attachment A).
- Eighteen species are listed under the EPBC Act
- Twenty-three species are listed under the FFG Act

There is limited habitat for migratory species within the project area. There is potential for migratory bird species to forage along the shoreline and over the bay, and also loaf along the shoreline, and on the jetty and ship birthing facility. However there are limited opportunities for breeding or roosting within the project area.

Is mitigation of potential effects on indigenous flora and fauna proposed?
☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

- GeelongPort will adopt an 'avoid and minimise' process to the construction and operation of the facility where viable, particularly with regard to patches of native vegetation (EVC 821 and EVC 9). Detailed design will aim to avoid works within Cuthbertson's Creek / Rollerama Drain which contains EVC 821 Tall Marsh (no bioregional conservation status available for the VVP bioregion). Construction would consider methods to avoid and minimise indirect impacts to adjacent EVC 9 Coastal Saltmarsh.
- A Weed management and hygiene protocol will be incorporated into a project-specific CEMP/ EMP

– If identified, native vegetation offsets will be provided in accordance with legislative requirements – The CEMP will include protocols regarding native fauna, including minimising lighting, noise and vibration where possible
Other information/comments? (eg. accuracy of information) Not applicable

13. Water environments

Will the project require significant volumes of fresh water (eg. > 1 Gl/yr)?

☒ NYD ☒ No ☒ Yes If yes, indicate approximate volume and likely source.

During construction, water may be required for dust suppression and hydrotesting the pipelines. However, volumes would be minor and are not expected to exceed 1 GL/yr.

During operation, water is not required for the ammonia cracking process. Water may be required for cooling and to service workshops and offices, however total demand is expected to be minimal. A sustainable solution will be further defined with ammonia cracking technology vendors.

Will the project discharge wastewater or runoff to water environments?

☒ NYD ☒ No ☒ Yes If yes, specify types of discharges and which environments.

Based on a Surface Water assessment (Attachment C) construction of project infrastructure has potential to increase sediment in runoff and expose historical landfill material and/or leachate to waterways via runoff. Management measures regarding erosion and sedimentation, topsoil management and waste (including contaminated soil) management contained within the CEMP will be implemented to mitigate these potential impacts.

The pre-treatment of all stormwater discharges from new industrial developments in order to meet the best practice guidelines including the Australian Rainfall and Runoff (Geosciences Australia 2019), and the Best Practice Environmental Management Guidelines (CSIRO 1999), is a requirement of the City of Greater Geelong. Stormwater from hardstand areas will be collected and directed to interceptors before draining to Oyster Bay. Stormwater from bunded areas (e.g., hazardous materials and waste storage areas) would either be removed and disposed offsite by an appropriately licenced contractor or pre-treated prior to discharge.

Are any waterways, wetlands, estuaries or marine environments likely to be affected?

☒ NYD ☒ No ☒ Yes If yes, specify which water environments, answer the following questions and attach any relevant details.

The Project involves construction of a new berth and will therefore directly affect the marine environment within Corio Bay with the potential for indirect effects (e.g., increased turbidity and marine noise) to extend beyond the immediate infrastructure footprint. Construction of the new berth introduces the risk of mobilisation of historic contaminants in the sediments, and the potential for accidental spills or leaks of contaminants (fuel/ammonia).

During operation, there is a risk of loss of ammonia or hydrocarbon into Corio Bay during transfer from the ship, or into Rollerama Drain from the potential nearby hydrogen truck fuelling site. These risks will need to be managed, including through the existing controls in GeelongPort's Safety and Environmental Management Plan **(SEMP)**.

Based on DELWP's NVIM tool, there is a mapped current wetland at the western side of the project area (wetland ID 54381). Based on the conceptual site layout (Appendix A Figure A-2) and NVIM tool mapping, the H2 truck fuelling site may slightly overlap with this wetland (Appendix A Figure A-9).

The adverse effects outlined above (e.g., increased turbidity, marine noise, mobilisation of historic contaminants in the sediments, accidental spills or leaks of contaminants (fuel/ammonia)) are not expected to significantly affect the Point Wilson/Limeburners Bay portion of the Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar wetland given:

- The separation distance (over one kilometre)
- Its proximity to existing industry such as the Geelong Oil Refinery which is approximately 600 m west of the wetland
- Risks will be managed, including through the existing controls in GeelongPort's SEMP.

Are any of these water environments likely to support threatened or migratory species?

☒ NYD ☒ No ☒ Yes If yes, specify which water environments.

Based on a preliminary desktop assessment (Attachment B), the proposed project site does not appear to support significant numbers of threatened and/or migratory marine species given the historic and current land use and current port and industry operations. However, it is acknowledged that there is some uncertainty on the presence/absence of these species and their use of habitat within and near the proposed project site.

Refer to Section 8 (pg 26 and 27) and 12 (pg 40 to 46) for further information on which threatened and/or migratory marine species have potential to occur within the project area and its surrounds.

Are any potentially affected wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'?

☒ NYD ☒ No ☒ Yes If yes, please specify.

The project area is approximately one kilometre south-west of the Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar site, which comprises six distinct areas, with the closest being Point Wilson/Limeburners Bay.

Could the project affect streamflows?

☒ NYD ☒ No ☒ Yes If yes, briefly describe implications for streamflows.

As outlined above, only stormwater discharged is proposed from the site.

Could regional groundwater resources be affected by the project?

☐ NYD ☐ No ☒ Yes If yes, describe in what way.

A preliminary groundwater assessment has been prepared by GHD for GeelongPort to provide information on groundwater considerations for the proposed Project (Appendix D). The site setting and available information suggests that the groundwater levels are shallow and likely to be within 1 m to 2 m of the ground surface. With shallow groundwater, there is an increased likelihood that excavations to construct foundations or underground services may intersect groundwater.

Construction dewatering may be required to enable safe and stable excavations below the water table, however such activities are temporary, and recovery of the groundwater table is likely at the cessation of dewatering activities. Under these circumstances impact to groundwater from dewatering could be reasonably managed through design, and management measures to be implemented within a construction environmental management plan.

As the study area is not within a recognised groundwater management area, and there is limited abstractive groundwater use nearby, the project is expected to have minimal effect on the groundwater resource in terms of quantity (volume taken from the aquifer).

Nevertheless, construction dewatering can create a number of issues that will require management during the design and construction of the project:

- Oxidation of acid sulfate soils. It is noted that the published mapping indicates a low probability of occurrence at the study area.
- Managing volumes of groundwater recovered during dewatering activities, i.e. how is groundwater disposed, and the groundwater may be contaminated
- Increased risk of the generation of vapours (and methane release) as the water table is lowered and saturated subsurface materials become unsaturated and exposed to air
- Disturbance of contaminated groundwater

There are a range of options to minimise the disturbance of the groundwater environment and dewatering activities. This could include:

- Design of foundation / structure elevations (to minimise or avoid deep excavations and water table intersection)
- Flow cut-offs / barriers, e.g. sheet piling, secant / contiguous piles, diaphragm walls
- Reinjection of the seepage water recovered from excavations back into the aquifer system

Marine construction works are not expected to influence the groundwater environment as no capital dredging is required.

Could environmental values (beneficial uses) of water environments be affected?

☐ NYD ☐ No ☒ Yes If yes, identify waterways/water bodies and beneficial uses (as recognised by State Environment Protection Policies)

Cuthbertson's Creek / Rollerama Drain is intersected by the proposed project footprint near the corner of St Georges Road and Seabeach Parade. The drain in this area appears well vegetated and may provide habitat value for frogs and aquatic fauna. The Oyster Bay Creek drain at the point intersected by the proposed project footprint near Corio Bay is of low-quality habitat and does not appear to have any or minimal fauna habitat/vegetation. The manmade drainage channel on Greta St has some vegetation and may provide low quality habitat for frogs and aquatic fauna

Environmental values of waterways are likely impacted by the historic and current industrial land use surrounding the waterways.

Potential impacts to the waterways during construction include increased sedimentation, and potential to expose historical landfill material and or leachate to waterways. During operation, there is potential for spills and/or leaks to impact waterways. These risks will be mitigated through implementation of good industry practice controls in relation to erosion and sedimentation, topsoil management and waste management to be dictated in the project CEMP and Operations Environment Management Plan (OEMP).

There is some uncertainty regarding the current condition of the groundwater in the study area, however, historical landfilling and industrial activities are likely to have degraded the groundwater quality. Under these conditions the following is noted:

- Excavations to construct the onsite infrastructure, and various utility pipelines have a high likelihood of disturbing fill materials which could include contaminated soils, and groundwater
- Excavations may remove contaminated material, however contaminated soils and fills may remain and continue to generate leachate and contamination of the groundwater and the down-gradient receiving environment
- Some areas containing fill may not be disturbed by the project, but could continue to act as a source of leachate, groundwater contamination and contaminated discharge to the marine environment
- Construction of the infrastructure has the potential to sterilise access to parts of the landfilled areas and prevent or complicate future clean-up. Therefore, an understanding of the status of groundwater contamination and whether it poses an on-going risk to the groundwater environment is required.
- Operation of the project is not likely to result in further degradation of the environment. The main constituents of the industrial process, ammonia and hydrogen are gases and therefore spills and industrial accidents are not likely to impact on groundwater.
- Some clean-up of soil and groundwater may be required, however, such would be assessed as part of the Contaminated Land specialist report
- Environmental investigations were completed over 20 years ago (Woodward Clyde 1997) and therefore emerging contaminants such as PFAS and their presence in the study area may not have been assessed

Under the new EP Act (2017), and irrespective that the contamination may have been a responsibility of legacy land users and managers, the proponent has a general environmental duty to minimise risk of harm to human health or the environment from pollution or waste so far as reasonably practicable and meet their environmental protection duties. Specifically, whether construction of the project and its ongoing operation would result in greater fluxes of contaminated groundwater discharging from the site and resulting in unacceptable adverse impacts to the aquatic ecosystems of Oyster Bay Creek / Shell Effluent Channel, Cuthbertson's Creek / Rollerama Drain or Corio Bay. Additional detailed site investigations will be undertaken during detailed design.

Could aquatic, estuarine or marine ecosystems be affected by the project?

☐ NYD ☐ No ☒ Yes If yes, describe in what way.

<u>Aquatic and estuarine ecology</u>

There are two minor waterways in proximity to the site, Cuthbertson's Creek / Rollerama Drain and Oyster Bay Creek / Shell Effluent Channel that receives cooling water discharge from the Geelong Refinery. Both waterways comprise low quality habitat and does not appear to have any or only minimal fauna habitat/vegetation. Cuthbertson's Creek / Rollerama Drain is intersected by the proposed project footprint near the corner of St Georges Road and Seabeach Parade. The drain in this area appears well vegetated and may provide habitat value for frogs and aquatic fauna.

There is potential for an increase in sediment runoff and/or exposure of historical landfill material and or leachate to waterways via runoff during construction of the project, which may adversely impact the habitat value of Cuthbertson's Creek/ Rollerama Drain. These potential impacts will be mitigated through good industry practice regarding erosion and sedimentation, spills/leaks and waste management. Management measures in the Construction Environmental Management Plan may include avoiding or minimising clearance of vegetation where reasonably practicable, characterisation of soils prior to construction, stabilisation of exposed soils (e.g., jute matting, rock armour or vegetation), developing and implementing contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits, developing and implementing unexpected finds protocol including procedures if contamination is encountered, and containment of stockpiled materials.

Marine ecology

Potential impacts to marine ecosystems as a result of the Project include:
- Underwater noise harming or disturbing marine fauna
- Presence of subsea infrastructure to impact benthic habitat (beneficial and/or adverse)
- Introduction of invasive marine species
- Vessel lighting impacting behaviour and/or movements of marine fauna
- Spills/leaks of hazardous materials harming marine fauna
- Vessel collision with marine mammals

These potential impacts are discussed below.

Underwater noise and vibration from construction (piling) and operations has the potential to cause death, physical/auditory injury or behavioural disturbance to marine fauna. While the likelihood of occurrence of many noise sensitive species (e.g. marine mammals and turtles) is rare or unlikely, good industry practice mitigation measures (e.g. soft start requirements, shut down procedures) will be adopted to reduce the risk.

The physical presence of subsea infrastructure (e.g., piles, concrete) has the potential to reduce, remove or disturb benthic habitat or to provide artificial substrate that results in creation of new benthic habitat and possible changes to communities. Given the extent of habitat loss will be relatively small and the probable low species richness of the proposed project site, it is unlikely that habitat loss will cause major flow-on impacts to benthic communities. Known seagrass communities should not be impacted given the approximate distance from the proposed project site.

It is also unlikely that habitat loss would result in significant displacement of listed threatened/migratory species. The only threatened invertebrate identified as potentially occurring in the area is the sea cucumber *Thyone nigra*. However, this is a South Australian species, not endemic to Victoria, and last recorded in Port Phillip Bay/Corio Bay in 1958 and 1963 (O'Hara, T.D. 2002; O'Loughlin et al. 2012). Management measures will include completing geophysical, geotechnical and benthic surveys to avoid sensitive habitats if possible.

Contaminated hulls have the potential to result in the introduction and establishment of invasive marine species that are harmful to benthic habitats. Port Phillip Bay has the most marine pests in Victorian waters including northern Pacific seastar, broccoli weed, European fan worm, green shore crab, Japanese kelp (north of Port Phillip Bay and gradually colonising subtidal habitats southwards along east), Asian date mussel, Pacific oyster, red algae (*Grateloupia turuturu*) and toxic dinoflagellate (*Alexandrium minutum*). Legislation and guidance are in place to manage this specific risk (e.g. biofouling risk assessment, record books, hull assessments).

Lighting from construction and operational vessels has the potential to attract marine fauna and impact behaviour and/or movements. Vessels will have external lighting to facilitate navigation and safe operations. Given the major facilities (e.g. piers) already established at the Port of Geelong, additional lighting from the proposed project is unlikely to substantially increase current light levels experienced by marine fauna. Lighting will be limited to that required for safe operations.

Diesel or chemical spills due to vessel collisions, refuelling incidents, tank/equipment failure or grounding have the potential to result in sub-lethal or lethal effects to marine fauna. Fuels, oils, lubricants and other chemicals can have lethal and sub-lethal effects on organisms and can persist in the environment for long periods of time. The risk of a spill cannot be completely eliminated. While additional vessels in the area may slightly increase the likelihood of a spill, vessel activities are well regulated, and control measures implemented across the industry. Examples of control measures that will be implemented include:
- Standard maritime legislation (e.g. The International Convention for the Prevention of Pollution from Ships **(MARPOL)**) including requirements or communication processes and navigation aids
- Simultaneous operations management plans
- Equipment maintenance to manufacturers specifications
- Bunding and containment systems
- Spill response plans

The increased presence of vessels has the potential to result in injury/death of marine mammals. Factors contributing to the frequency and severity of effects from collisions vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth) and the type of animal potentially present and their behaviours. Given the presence of marine mega-fauna at the proposed project site is unlikely, the likelihood of serious injury is significantly reduced. Controls to be implemented include EPBC Act regulations for travel speeds and safe distances for marine mammals.

Is there a potential for extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long-term?

☒ No ☐ Yes If yes, please describe. Comment on likelihood of effects and associated uncertainties, if practicable.

The proposed project site does not appear to support significant numbers of threatened and/or migratory marine species. Overall, it is unlikely that the potential impacts described in the response above would lead to a long-term decrease in the size their populations; however, it is acknowledged that there is some uncertainty on the presence/absence of these species and their use of habitat within and near the proposed project site.

Is mitigation of potential effects on water environments proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Potential mitigation measures (identified in the sections above and duplicated below) are drawn from legislation and standard industry control measures in water environments.

- Development of a sustainable approach to water management in consultation with the technology vendors
- Implementation of management measures for erosion and sedimentation, topsoil and waste (including contaminated soil) management within the CEMP
- Pre-treatment of all stormwater discharges in order to meet the best practice guidelines including the Australian Rainfall and Runoff (Geosciences Australia 2019), and the Best Practice Environmental Management Guidelines (CSIRO 1999)
- Stormwater from hardstand areas to be collected and directed to interceptors before draining to Oyster Bay
- Stormwater from bunded areas (e.g., hazardous materials and waste storage areas) to either be removed and disposed offsite by an appropriately licenced contractor or pre-treated prior to discharge
- Groundwater dewatering procedures to be outlined in the CEMP, including procedures for disposal of dewatered groundwater
- Minimise potential dewatering impacts through measures such as:
    - Design of foundation / structure elevations (to minimise or avoid deep excavations and water table intersection)
    - Flow cut-offs / barriers, e.g. sheet piling, secant / contiguous piles, diaphragm walls
    - Reinjection of the seepage water recovered from excavations back into the aquifer system
- GeelongPort's general environmental duty to minimise risk of harm to human health or the environment from pollution or waste so far as reasonably practicable and meet its environmental protection duties.
- Underwater piling measures to minimise noise and vibration such as soft start requirements and shut down procedures.
- Completing geophysical, geotechnical and benthic surveys to avoid sensitive habitats, if possible.
- Compliance with legislation and guidance regarding marine pests (e.g. biofouling risk assessment, record books, hull assessments)
- Lighting to be limited to that required for safe operations
- Control measures for accidental spills and leaks such as:
    - Standard maritime legislation (e.g. MARPOL) including requirements or communication processes and navigation aids
    - Simultaneous operations management plans

- Equipment maintenance to manufacturers specifications
- Bunding and containment systems
- Spill response plans

- Compliance with EPBC Act regulations for travel speeds and safe distances for marine mammals.

Further assessments will be undertaken to determine potential impacts on water environments to inform the development of project-specific mitigation measures to avoid, minimise, and offset potential impacts, as required.

Other information/comments? (eg. accuracy of information)

Not applicable

14. Landscape and soils

Landscape

Has a preliminary landscape assessment been prepared?

☒ No ☐ Yes If yes, please attach.

Is the project to be located either within or near an area that is:

- **Subject to a Landscape Significance Overlay or Environmental Significance Overlay?**

  ☐ NYD ☐ No ☒ Yes If yes, provide plan showing footprint relative to overlay.

The northern portion of the project area that comprises the proposed carpark is subject to an Environmental Significance Overlay – Schedule 2 (ESO2) which extends north from Refinery Pier along the shoreline (Appendix A Figure A-9).

ESO2 relates to high value wetlands and associated habitat protection.

- **Identified as of regional or State significance in a reputable study of landscape values?**

  ☐ NYD ☒ No ☐ Yes If yes, please specify.

An assessment of the character and significance of landscapes throughout the southwest of Victoria was completed in 2012 by the Department of Planning and Community Development (Planisphere, 2013). The study area included the proposed project area. No areas of State or regional significance were identified within the Greater Geelong area.

- **Within or adjoining land reserved under the *National Parks Act 1975*?**

  ☐ NYD ☒ No ☐ Yes If yes, please specify.

- **Within or adjoining other public land used for conservation or recreational purposes?**

  ☐ NYD ☐ No ☒ Yes If yes, please specify.

The northern portion of the project area that comprises the proposed carpark is located adjacent to a Public Conservation and Resource Zone **(PCRZ)** which extends north from Refinery Pier along the shoreline.

Is any clearing vegetation or alteration of landforms likely to affect landscape values?

☐ NYD ☒ No ☐ Yes If yes, please briefly describe.

Is there a potential for effects on landscape values of regional or State importance?

☐ NYD ☒ No ☐ Yes Please briefly explain response.

Is mitigation of potential landscape effects proposed?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

No significant landscape effects are expected as a result of the Project given the existing port and industrial land use in the project area and surrounds.

As outlined in section 20, further assessment is proposed to:

- Characterise the existing landscape character, significant views and sensitive locations in the vicinity of the project
- Assess potential impacts of the project on landscape and visual amenity values
- Identify mitigation measures to reduce project impacts, if required

Other information/comments? (eg. accuracy of information)

Not applicable

Note: A preliminary landscape assessment is a specific requirement for a referral of a wind energy facility. This should provide a description of:

- The landscape character of the site and surrounding areas including landform, vegetation types and coverage, water features, any other notable features and current land use;
- The location of nearby dwellings, townships, recreation areas, major roads, above-ground utilities, tourist routes and walking tracks;
- Views to the site and to the proposed location of wind turbines from key vantage points (including views showing existing nearby dwellings and views from major roads, walking tracks and tourist routes) sufficient to give a sense of the overall site in its setting

Soils

Is there a potential for effects on land stability, acid sulphate soils or highly erodible soils?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

The soils fronting Corio Bay to the north of Refinery Pier have high probability (very low confidence) of occurrence of CASS. There is a low probability (very low confidence) of occurrence of CASS elsewhere across the project area. If encountered an acid sulphate soil management plan will be required to manage the risk including staged excavation, leachate capture, neutralisation and storage system, addition of lime to neutralise soils, monitoring of surface water and possible offsite disposal of soil. If undisturbed, then these materials can remain on-site under an acid sulphate soil management plan.

Further site investigations (geotechnical and contamination) will be undertaken to inform project design. These investigations will identify potential effects regarding land stability, acid sulphate soils or highly erodible soils that may either affect the project or be affected by it.

Are there geotechnical hazards that may either affect the project or be affected by it?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

There is potential for geotechnical constraints at the site given the presence of the former landfill and previously reported landfill gas generation and land subsidence.

A geotechnical assessment of the site will be undertaken to inform project design. This investigation will identify potential geotechnical hazards that may either affect the project or be affected by it.

Other information/comments? (eg. accuracy of information)

Not applicable

15. Social environments

Is the project likely to generate significant volumes of road traffic, during construction or operation?

☐ NYD ☒ No ☐ Yes If yes, provide estimate of traffic volume(s) if practicable.

A preliminary traffic and transport assessment has been prepared by GHD for GeelongPort to provide information on traffic considerations for the proposed Project (Attachment I). The desktop assessment included review of existing conditions, review of background traffic volumes and transport materials from publicly available data, review of relevant legislation and assessment of changes in vehicle movements and potential impacts from the proposed development on the existing transport network. Key findings are:

- The surrounding road network and key roads identified are Department of Transport declared roads and would likely be sufficient to accommodate the additional traffic generated by construction and operation of the facilities
- The traffic generated by the construction activities would likely be temporary, limited in duration, and highly localised
- Traffic generated by the operational phase would be associated with a small number of staff employed on site as well as small number of truck trips to the truck loading facility and hydrogen refuelling facility
- The roads leading to the site are well connected to major thoroughfares, such as the Princes Highway and the Geelong Ring Road, and thus, trucks and heavy vehicles would have excellent access to the site via roads suitable for heavy vehicles
- The proposed facility is located adjacent to industrial zones and therefore, construction and operation would not impact areas such as residential premises or school zones

Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?

☐ NYD ☐ No ☒ Yes If yes, briefly describe the nature of the changes in amenity conditions and the possible areas affected.

The Project is located in an area where there is existing port infrastructure and maritime and industrial activities. The adjacent land outside of the Port Zone is included within the Industrial 2 Zone (IN2Z), with a small portion of the project area north of Refinery Pier (specifically a potential carpark) being adjacent to a Public Conservation and Resource Zone (PCRZ). The activities proposed by GeelongPort are consistent with the industrial context surrounding Port of Geelong.

The nearest residential areas to the Project are located approximately 500 m west of the hydrogen truck refuelling station and 920 m west of the main project area (i.e., ammonia cracking facility and associate admin and services).

Dust

Construction activities involving ground disturbance and earthworks may generate dust emissions. These activities will be conducted under a Construction Environmental Management Plan which will contain good practice control measures for dust emissions in accordance with Civil Construction, building and demolition guide (EPA Victoria Publication 1834, 2020). The magnitude of impacts to nearby residents as a result of construction generated dust is expected the be low.

No dust generating activities are proposed during operation or decommissioning of the Project.

Further assessment will be undertaken as part of the proposed investigation program (Section 20) to characterise the existing air quality within the project area and surrounds, assess potential impacts of the project on air quality (which may include modelling, if required) and identify appropriate mitigation measures to reduce air quality impacts.

Odour

Ammonia is an odorous compound. Only minor fugitive emissions of ammonia are expected and any flushed, larger amounts during start up and shutdown would likely be flared which destroys the odour.

Separation distances from the general population will be sufficient to minimise odour impacts downwind of the Project.

Visual
The existing visual environment of the Project Area includes a highly modified, industrial environment. Proposed structures are to be of a similar height and scale to those within the existing industrial zone, with the exception of the ammonia storage tank which is the tallest structure (preliminary sizing of 48 m diameter x 37 m height) however no higher than the highest structure at the adjacent refinery. The tank is likely to be visible from multiple locations.

The nearest residential area is approximately 900 m to the west of the proposed Project. Other visual impact receptors include transient boats within Corio Bay.

Visual impacts are not expected to significantly affect the amenity of adjacent residents or transient boats within Corio Bay.

Noise
A preliminary noise assessment has been prepared by GHD for GeelongPort to assess potential noise impacts associated with operation and construction of the facility (Attachment H). The desktop assessment included review of applicable legislation and guidelines, review of the proposed site and operations, establishment of preliminary construction and operations noise limits for the proposed facility and high level desktop assessment of operational and construction noise associated with the facility.

A desktop review of aerial imagery and publicly available information was undertaken to identify the nearest noise sensitive receivers to the site. In accordance with the Environment Protection Regulations 2021 a noise sensitive area is defined as land within a distance of 10 metres from:

- External façade of the building for the following:
    - A dwelling (including a residential care facility but not including a caretaker's house)
    - A residential building
    - A noise sensitive residential use in accordance with Victorian Planning Policy definition which includes a community care accommodation, dependent person's unit, dwelling, residential aged care facility, residential village, retirement village or rooming house
- External façade of any dormitory, ward, bedroom or living room of one or more of the following:
    - A caretaker's house
    - A hospital
    - A hotel
    - A residential hotel
    - A motel
    - A specialist disability accommodation
    - A corrective institution
    - A tourist establishment
    - A retirement village
    - A residential village

– External façade of any classroom or any room in which learning occurs in the following building during their operating hours:
    - A child care centre
    - A kindergarten
    - A primary school
    - A secondary school

The site location identified noise sensitive receiver locations and key features are shown in Appendix A Figure A-3. Separation distances from the main site boundary (i.e., ammonia cracking plant and associated admin and services buildings) range from 920 m to 1,850 m. Separation distances from the hydrogen fuelling station range from 500 m to 1,600 m.

Based on the high level review of the expected construction activities, and typical noise levels for various equipment (refer Table 9 of Attachment H), the following is noted:

- Construction noise during standard hours is unlikely to result in significant community reaction to noise. A typical construction noise level of 75 dB(A) is considered during standard construction hours.
- Construction works outside standard hours will likely result in noise levels above the preliminary targets (Weekends/evening noise target for R1 and R2 is 60 dB(A) and at night is 45 dB(A). Weekends/evening noise target for R3 is 50 dB(A) and at night is 35 dB(A). Refer Table 5 of Attachment H) indicating that management of construction noise outside of standard hours will be required with implementation of projects specific noise mitigation measures

Construction noise would be minimised as far as practicable through the development and implementation of a construction noise management plan (or a noise-specific section within the Construction Environmental Management Plan **(CEMP)**) containing reasonable and feasible noise mitigation measures, in line with the requirements of EPA Publication 1834. Should construction works occur outside of normal working hours, the relevant authority would be contacted, and any necessary approvals sought for low noise and managed impact works. For unavoidable works, the relevant authority would be contacted and any necessary approvals sought and all affected sensitive receivers notified of the intended work, its duration and times of occurrence. A construction noise and vibration management plan would be developed for any works outside of normal construction hours.

Specific equipment required for the ammonia cracking facility as well as sizing and specifications have not yet been selected at this stage of the process and will be subject to further investigations and detailed design development. However, the following main noise sources are expected for the facility, at a minimum:

- Compressors
- Pumps
- Pressure reducing valves
- Air conditioning
- Truck movements
- Hydrogen truck fuelling site consisting of compressors, fuel delivery system and vehicle movements

Additional noise generating equipment may also be required such as flares and exhaust stacks for ammonia cracking.

The hydrogen truck fuelling site noise sources are expected to generally consist of mainly compressors, fuel delivery system and vehicle movements through the site. Based on previous measurements of similar facilities, noise emissions from the hydrogen truck fuelling site are expected to comply with the preliminary project criteria at relevant noise sensitive receivers for each of the proposed locations. Therefore, negligible risk is expected from the hydrogen truck fuelling site in relation to noise emissions. Any noise emissions from the facility are expected to be readily managed through incorporation of good practice design and treatments of the facility, such as maximising shielding taking topography, existing structures and equipment location intro account. Operational noise must be minimised as far as reasonably practicable and be within established limits as set by EPA Publication 1826.4 Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Victoria, 2021).

Based on a high level operational noise assessment (Attachment H), noise associated with the operation of the proposed facility has a risk of exceeding relevant environmental noise limits at the nearest noise sensitive receivers. However, it is expected that noise emissions from the operation of the facility can be managed to relevant limits via incorporation of appropriate noise mitigation measures in the design of the facility.

Further assessment is required regarding potential noise impacts and mitigation during construction and operation, including background noise monitoring to establish the outside normal working hours construction noise targets and review and revision of modelling inputs once further project design information is available.

Traffic

As outlined in the above section, the traffic generated by the construction activities would likely be temporary, limited in duration, and highly localised and traffic generated by the operational phase would be associated with a small number of staff employed on site as well as small number of truck trips to the truck loading facility and hydrogen refuelling facility.

The proposed facility is located adjacent to industrial zones and therefore, construction and operation would not result in amenity impacts to areas such as residential premises or school zones.

Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?

☐ NYD ☐ No ☒ Yes If yes, briefly describe the hazards and possible implications.

A preliminary safety, hazard and risk assessment has been prepared by GHD for GeelongPort to assess potential safety, hazard and risks associated with operation and construction of the facility (Attachment J). The desktop assessment included review of the proposed design/layout of the facility, review of relevant legislation and a summary of findings.

Hazards associated with operation of the facility will include hazardous substances, including:
- Ammonia liquid
- Ammonia gas
- Hydrogen gas
- Nitrogen gas

Other hazards that could lead to environmental impact include shipping activity including docking and ship unloading, and pipelines.

Environmental and safety risks arising from the Project include:

Ammonia

- Loss of containment of liquid ammonia into the sea during the ship unloading operation or from the transfer pipeline along the wharf to the onshore storage facility.
  - Liquid ammonia is cold and contact with the sea would initially cause the sea water to freeze in the local area, and the ammonia would rapidly begin to boil off as ammonia gas. Ammonia has a high volatility and thus is unlikely to cause significant water pollution. However, when in water, ammonia is very toxic to aquatic life and organisms, but is non-persistent and non-cumulative. The gaseous ammonia will become airborne and will travel with the prevailing wind, the impacts of which are discussed below.

- Loss of containment of liquid ammonia on to the land from the transfer pipeline or from the 60 m diameter tank(s).
  - Liquid ammonia is cold and contact with the ground would initially cause local freezing. Ammonia liquid has a high volatility and thus is unlikely to cause ground or ground water pollution. However, ammonia in soil absorbs into particulate matter, or undergoes microbial transformation to nitrate or nitrate ions (which are less toxic than ammonia and nitrite). If the nitrate enters the groundwater system and discharge to the marine environment it may result in nutrification and marine algal/plant blooms that change water chemistry (low dissolved oxygen, acidity etc.) that can impact marine ecosystems and fish.
  - It is also possible that a loss of containment of liquid ammonia on land could result in it going to the stormwater system. It could result in initial freezing of any water in the system, then the release of ammonia gas as the liquid evaporates. It has a high volatility and thus is unlikely to cause significant water pollution. However, when in water, ammonia is very toxic to aquatic life and organisms, but is non-persistent and non-cumulative. The gaseous ammonia will become airborne and will travel with the prevailing wind, the impacts of which are discussed below.

- Loss of containment of ammonia gas from water or from land will result in the gas travelling with the prevailing wind. It is lighter than air when it is at the same temperature, so will tend

to rise over time. It will potentially impact the city or suburbs of Geelong or marine traffic on Port Phillip Bay, depending on the wind direction.

- Ammonia is easily detected by people as an irritant to nose, throat and lungs, and can cause difficulty breathing. At higher concentrations it can be toxic if inhaled, leading to chest pain, bronchial damage, pulmonary oedema or death.
- While not regarded as a highly flammable gas, fires are possible at concentrations between 15.5 and 20% (percentage volume).

Hydrogen
Hydrogen will be generated by the catalytic cracking process that separates the ammonia into hydrogen and nitrogen. Hydrogen related risks include:

– Loss of containment of hydrogen gas. Hydrogen is flammable and has a low ignition energy which means the gas is easily ignited including as a result of the leak itself. As a low density gas, hydrogen disperses rapidly on release if the leak is not confined however is subject to form explosive mixtures if the gas accumulates or the leak is significant. Thus, loss of containment from processing equipment or from the proposed hydrogen vehicle filling station could result in a fire.

Nitrogen
Nitrogen will be generated by the catalytic cracking process that separates the ammonia into hydrogen and nitrogen. Nitrogen related risks include -

– Loss of containment of nitrogen gas. Nitrogen is an asphyxiant gas and has about the same, but slightly higher density compared to air. The air we breathe is comprised of about 78% nitrogen and 20% oxygen. A higher percentage of nitrogen will result in a lower percentage of oxygen. Nitrogen is not toxic to humans but a low oxygen concentration is harmful. If there was a loss of containment of nitrogen and there were no wind currents, the nitrogen would sink in the air if both are at the same temperature. The ammonia cracking facility would include appropriate emission design controls regarding venting nitrogen to atmosphere.

As the facility is expected to have more than 200 tonnes of ammonia on site, it is expected to be subject to the requirements and the legal duties described in the Victorian *Occupational Health and Safety Regulations 2017* Part 5.2 Major hazard facilities. If this is the case, the facility will be designed and managed in accordance with WorkSafe Victoria requirements, in their role as the MHF regulator. Guidelines for operators of MHF sites are provided on the WorkSafe website.

The facility will be designed in accordance with recognised design standards and operated and maintained to comply with applicable safety and environmental requirements. The standards include AS/NZS 2022 Anhydrous ammonia – storage and handling.

Is there a potential for displacement of residences or severance of residential access to community resources due to the proposed development?

☐ NYD ☒ No ☐ Yes If yes, briefly describe potential effects.

Are non-residential land use activities likely to be displaced as a result of the project?

☐ NYD ☒ No ☐ Yes If yes, briefly describe the likely effects.

The project area is on land owned by GeelongPort. No land use activities will be displaced as a result of the Project.

GeelongPort will work in a transparent manner with port users in the vicinity of the project who may be impacted by the project. This process will mirror that was recently used during the design and construction of the terminal for the Spirit of Tasmania.

Do any expected changes in non-residential land use activities have a potential to cause adverse effects on local residents/communities, social groups or industries?

☒ NYD ☐ No ☐ Yes If yes, briefly describe the potential effects.

Construction and decommissioning activities may temporarily impact other users of Refinery Pier. GeelongPort will work in a transparent manner with port users in the vicinity of the project who may be impacted by the project. This process will mirror that was recently used during the design and construction of the terminal for the Spirit of Tasmania.

Is mitigation of potential social effects proposed?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

No significant amenity effects are expected during construction or operation of the Project given the existing port and industrial land use in the project area and surrounds.

There is potential for exposure of a human community to health or safety hazards, due to emissions to air (ammonia, hydrogen, nitrogen) as a result of operation of the Project.

As outlined in section 20, further assessment is proposed to:

- Assess 'best practice' for the conversion of ammonia to hydrogen from a risk to human health and environment perspective and demonstrate that the proposed development meets all best practice aspects that are not financially or technically prohibitive.
- Assess potential risks of the project to people, property and community infrastructure
- Identify avoidance and mitigation measures to control risks resulting from project safety hazards

Other information/comments? (eg. accuracy of information)

Not applicable.

Cultural heritage

Have relevant Indigenous organisations been consulted on the occurrence of Aboriginal cultural heritage within the project area?

☒ No If no, list any organisations that it is proposed to consult.
☐ Yes If yes, list the organisations so far consulted.

Wadawurrung Traditional Owners Aboriginal Corporation is the Registered Aboriginal Party for the project area and are proposed to be consulted with. GeelongPort has worked closely with the Wadawurrung Traditional Owners Aboriginal Corporation during the design of Spirit of Tasmania terminal and more recently, launched our Reconciliation Action Plan **(RAP)**.

What investigations of cultural heritage in the project area have been done?
(attach details of method and results of any surveys for the project & describe their accuracy)

A preliminary cultural heritage assessment has been prepared by GHD for GeelongPort to provide information on heritage considerations for the proposed Project (Attachment F). The desktop assessment included review of applicable legislation, historic aerial imagery, heritage databases and previous reporting in proximity to the study area.

A number of archaeological reports associated with a 2 km radius of the study area were identified. The reports most relevant to the study area include:

- Tardis Enterprises Pty Ltd. 2003. Lascelles Wharf Rail Link, Geelong: Cultural Heritage Assessment. Report to Keelogg Brown & Root Pty Ltd
- Terraculture 2003. Victrack Optic Fibre Cable Project Aboriginal SEMP. Report to Vic Track
- Andrew Long & Associates 2009. Northern Water Plant, Corio Cultural Heritage Management Plan 10985. Report prepared for Barwon Water
- ERM 2012. Cultural Heritage Management Plan for Environmental Remediation Works at Shell Geelong Refinery, Corio Bay Foreshore. CHMP 12322. Report prepared for Shell refining (Australia)
- ERM 2013. Cultural Heritage Management Plan for Environmental Remediation Works at Shell Geelong Refinery, Corio Bay Foreshore. CHMP 12579. Report prepared for Shell refining (Australia)

A summary of these archaeological reports is provided in Section 5.2.2 of Attachment F.

The preliminary cultural heritage assessment concluded that:

- Multiple areas of cultural heritage sensitivity are located within the study area
- No Aboriginal cultural heritage places are located within the study area (study area = project area + one kilometre buffer)
- Three Aboriginal cultural heritage places are located outside of the study area, with their 50 m buffers intersecting with the study area and forming areas of cultural heritage sensitivity
- The proposed works constitute a High Impact Activity under Aboriginal Heritage Regulations 2018, Regulation 46 (1)(b)(xii), Regulation 46 (1)(b)(xxvii)(C) and Regulation 58 (1)
- While parts of the study area have likely been subject to significant ground disturbance, it cannot be stated that significant ground disturbance has occurred through all areas of cultural heritage sensitivity associated with the proposed works
- A Cultural Heritage Management Plan would therefore need to prepared in conjunction with the Wadawurrung Traditional Owners Aboriginal Corporation , who will likely evaluate the document

Is any Aboriginal cultural heritage known from the project area?

☐ NYD ☐ No ☒ Yes If yes, briefly describe:

- Any sites listed on the AAV Site Register
- Sites or areas of sensitivity recorded in recent surveys from the project site or nearby
- Sites or areas of sensitivity identified by representatives of Indigenous organisations

The Aboriginal Cultural Heritage Register and Information System **(ACHRIS)** was accessed on 16 September 2021. There are no known Aboriginal cultural heritage places recorded within the study area. However, eleven Aboriginal places have been recorded within 2.0 km of the study area, consisting of eight shell middens and three artefact scatters. Further detail on these Aboriginal cultural heritage places in provided in Section 5.2.1 of Attachment F.

Tardis (2003) identified that the area of land north of St Georges Road and west of Seabeach Parade (currently proposed as a possible vehicle fuelling station, northern extent) was considered to be highly disturbed and of low potential to contain Aboriginal cultural heritage. Complex assessment at the same location undertaken by Andrew Long & Associates (2009), for CHMP 10985, located Aboriginal cultural heritage in the form of a single artefact registered as VAHR 7721-0969. Harm to VAHR 7721-0969 was avoided as part of the CHMP conditions, and the location of the site remains as an area of cultural heritage sensitivity. The proposed works do not intersect with the site location of VAHR 7721-0969, but do intersect with the 50 m buffer, which forms an area of cultural heritage sensitivity. Aerial imagery does not provide evidence that the 50 m buffer surrounding this locality has been subject to significant ground disturbance, therefore the area of cultural heritage sensitivity associated with this site remains.

A similar case is seen for the areas of cultural heritage sensitivity associated with VAHR 7721-1347 and 7721-1229, which are identified within ERM (2012) and ERM (2013) as not being subject to significant ground disturbance. Further on ground investigations would be required to demonstrate whether there have been deviations from this status.

While the shoreline within the area marked to include most of the current proposed infrastructure (including admin and services, vehicle fuelling station, ammonia cracking area, ammonia storage tanks, boil off gas refrigeration and utilities/ammonia route/hydrogen off take route) has been substantially modified, it has not been subject to significant ground disturbance, therefore this area of cultural heritage sensitivity also remains.

Are there any cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the *Heritage Act 1995* within the project area?

☐ NYD ☒ No ☐ Yes If yes, please list.

A search of the VicPlan website was undertaken on 09 September 2021. No Victorian Heritage Register or Victorian Heritage Inventory places are located within the study area. Kings Wharf, located 200 m to the east of the optional hydrogen delivery routes to offsite customers, and outside of any proposed impact areas, is the closest listing on the Victorian Heritage Inventory (VHI Number H7721-0132).

Is mitigation of potential cultural heritage effects proposed?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

Further on ground investigations are required to confirm whether the identified areas of cultural heritage sensitivity have been subject to significant ground disturbance. If they have not, a mandatory Cultural Heritage Management Plan is likely to be required. Development of the Cultural Heritage Management Plan will require consultation with the RAP (i.e., Wadawurrung Traditional Owners Aboriginal Corporation) and development of mitigation measures for potential cultural heritage effects.

The Construction Environmental Management Plan (and CHMP if required) will contain contingency procedures in the case of unexpected finds during ground disturbing activities, including liaison with the RAP (i.e., Wadawurrung Traditional Owners Aboriginal Corporation) or other agencies as appropriate, and procedures for salvage.

Other information/comments? (eg. accuracy of information)

The preliminary cultural heritage assessment (Attachment F) was a desktop assessment only to identify the potential for heritage values at the proposed site. Further on ground investigations would be needed to determine whether significant ground disturbance has occurred within all areas of cultural heritage sensitivity associated with this project. The results of the on-ground investigations will inform whether a mandatory CHMP is required, as the project is a high impact activity in an area of cultural heritage sensitivity.

16. Energy, wastes & greenhouse gas emissions

What are the main sources of energy that the project facility would consume/generate?

- ☒ Electricity network. If possible, estimate power requirement/output …….
- ☒ Natural gas network. If possible, estimate gas requirement/output ……...
- ☒ Generated on-site. If possible, estimate power capacity/output …….
- ☒ Other. Please describe.

Please add any relevant additional information.

During construction, diesel will be required to fuel construction equipment.

During operations, energy is required for the cracking of ammonia to hydrogen and nitrogen. The technology used to çrack ammonia would be a closed loop system to preserve the integrity of the green hydrogen, and the plant would operate using green ammonia as its energy source. Workshops and offices would source very minor amount of electricity from the electricity network.

It is anticipated that based on its scale, the facility would nominally require between 10-100MW of power to produce up to 15,000 tonnes per annum of hydrogen.

What are the main forms of waste that would be generated by the project facility?

- ☒ Wastewater. Describe briefly.
- ☒ Solid chemical wastes. Describe briefly.
- ☒ Excavated material. Describe briefly.
- ☒ Other. Describe briefly.

Please provide relevant further information, including proposed management of wastes.

Minor waste streams generated during construction may include vegetative material, minor quantities of excavated soil, general construction waste (e.g., concrete).

The primary waste stream from operation of the facility is expected to be gaseous emissions to atmosphere. With the exception of ammonia, all other gases involved (nitrogen and hydrogen) are not considered criteria pollutants or air quality assessment criteria (EPA Victoria Publication 1961).

Ammonia is an odorous compound, however, will be contained within material transfer infrastructure (pipe and duct work) and dedicated storage tanks. Only minor fugitive emissions of ammonia are expected.

Minor volumes of domestic waste would be generated from onsite offices.

GeelongPort's objectives with regard to waste management are:

- Minimise the generation of waste
- Prevent harm to human health or the environment
- Comply with all applicable legal and other requirements
- Promote the use of best available technology

GeelongPort seek to minimise use of materials so that waste generation is avoided wherever possible and no waste is directed to landfill.

Waste will continue to be managed in accordance with *Environment Protection Act 2017* and the Environment Protection Regulations 2021 which outline GeelongPort's waste duties. The existing GeelongPort Waste Management Environmental Standard, Waste Management Plan, Waste Management Procedure and Reportable Priority Waste Disposal Procedure will be reviewed and revised if required to account for any changes to the types and volumes of waste generated by the project that require storage, handling, transport and/or disposal. Waste management control measures included in the current Waste Management Plan include, but are not limited to:

- Implement waste hierarchy into planning and decision-making processes
- Liquid waste to be stored in bunded compounds until disposal
- Spill kits to be near any liquid waste storage area
- Reportable priority wastes to be transported in EPA permitted vehicle under Waste Tracker documentation

- Random audits of reportable priority waste transport and disposal methods to ensure compliance

What level of greenhouse gas emissions is expected to result directly from operation of the project facility?

- ☒ Less than 50,000 tonnes of CO_2 equivalent per annum
- ☒ Between 50,000 and 100,000 tonnes of CO_2 equivalent per annum
- ☒ Between 100,000 and 200,000 tonnes of CO_2 equivalent per annum
- ☒ More than 200,000 tonnes of CO_2 equivalent per annum

Please add any relevant additional information, including any identified mitigation options.

A preliminary greenhouse gas assessment was completed by GHD (Attachment K). Direct (i.e., Scope 1) greenhouse gas emissions from the Project during construction and operation are limited to compressor, vehicle and construction equipment exhausts. There is also potential for the hydrogen product to be reused in the ammonia cracking facility as an energy (heat) source. Based on the high-level preliminary assessment, it is considered unlikely that the project will meet the referral criteria '200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility'.

17. Other environmental issues

Are there any other environmental issues arising from the proposed project?

☒ No ☐ Yes If yes, briefly describe.

18. Environmental management

What measures are currently proposed to avoid, minimise or manage the main potential adverse environmental effects? (if not already described above)

☒ Siting: Please describe briefly

☒ Design: Please describe briefly

As a major hazard facility (MHF), the facility will be designed and managed in accordance with WorkSafe Victoria requirements, in their role as the MHF regulator.

The facility will be designed in accordance with recognised design standards and operated and maintained to comply with applicable safety and environmental requirements. The standards include AS/NZS 2022 Anhydrous ammonia – storage and handling.

☒ Environmental management: Please describe briefly.

GeelongPort would develop, implement and maintain a Construction Environmental Management Plan **(CEMP)** for construction activities whilst the existing GeelongPort SEMP would be reviewed and revised as required for operation activities. These management plans would address the requirements of the statutory approvals and consents and contain processes, procedures and requirements to protect environmental and social values potentially impacted by the Project.

The GeelongPort SEMP sets out the approach to safety and environmental management for port operations for a range of activities including vessel movement, loading and unloading, equipment operation, storage, bulk handing, maintenance and construction.

The GeelongPort SEMP would be reviewed and updated as required to incorporate any new activities proposed as part of the Geelong Hydrogen Hub. The GeelongPort SEMP identifies safety and environmental risks which are recorded in a master risk register and outlines the specific objectives and targets for minimising these risks. Further detail on how risks are to be managed at the port are outlined in Environmental Management Action Plans which cover a range of matters including:

- Air quality, including dust and odour
- Biodiversity
- Cultural heritage
- Energy and greenhouse gas
- Noise
- Soil and groundwater
- Stormwater and wastewater
- Water
- Waste

The effectiveness of the existing risk controls is assessed against internal and external audit programs, hazard reporting, and in the development of actions arising from investigations.

The risk register includes an assessment of operations that may result in potential emergency incidents within the port (e.g., spills, collision, fire, natural disasters), and outlines the processes and procedures in such an event. Ship safety in port waters during approach and at berth is the responsibility of the Harbour Master through statutory responsibilities to Transport Safety Victoria.

☐ Other: Please describe briefly

Add any relevant additional information.

19. Other activities

Are there any other activities in the vicinity of the proposed project that have a potential for cumulative effects?

☐ NYD ☐ No ☒ Yes If yes, briefly describe.

The existing industrial activities surrounding the proposed Project have potential for cumulative effects, particularly regarding amenity impacts (noise, traffic, visual). Upgradient industrial activities, including the Geelong Refinery, Incitec Pivot Fertilisers and an express self-assistant diesel service station, may impact the project area via surface run off and through Rollerama Drain and Oyster Bay Creek/Shell Effluent Channel.

It is noted that noise from neighbouring industrial sites already contribute to the existing noise environment in the area. As the Noise Protocol sets noise limits for which cumulative noise from all commercial/industrial premises applies, it is considered appropriate for the noise emissions from the proposed GeelongPort facility to meet 5 dB below the established noise limits to manage noise creep in the area.

GeelongPort is aware of the Viva Energy Gas Terminal Project which comprises the development of a gas terminal using a ship known as a Floating Storage and Regasification Unit (FSRU), which would be continuously moored at Refinery Pier in Corio Bay, Geelong. The proposal has been referred under the EE Act as the Viva Energy Gas Terminal Project, referral number 2020R-18.

Cumulative effects with the Viva Energy proposal are not anticipated on the basis that the two projects could not both proceed as presently proposed.

20. Investigation program

Study program

Have any environmental studies not referred to above been conducted for the project?

☒ No ☐ Yes If yes, please list here and attach if relevant.

Has a program for future environmental studies been developed?

☐ No ☒ Yes If yes, briefly describe.

A list of specialist studies likely to be required to inform project approvals documentation and detailed design is provided in the table below.

Study	Objective
Safety, hazard and risk	– Assess potential risks of the project to people, property and community infrastructure – Identify avoidance and mitigation measures to control risks resulting from project safety hazards
Noise and vibration	– Characterise the existing noise levels within the project area and surrounds – Conduct noise modelling (onshore and underwater) – Assess potential impacts of the project on sensitive receptors (i.e., local residences and fauna) – Identify mitigation measures to either avoid or reduce noise impacts
Marine and coastal biodiversity	– Assess potential impacts of the project on biodiversity values – Identify avoidance and mitigation measures to avoid or reduce impacts to biodiversity values
Best Practice	– Assess 'best practice' for the conversion of ammonia to hydrogen from a risk to human health and environment perspective and demonstrate that the proposed development meets all best practice aspects that are not financially or technically prohibitive
Landscape and visual	– Characterise the existing landscape character, significant views and sensitive locations in the vicinity of the project – Assess potential impacts of the project on landscape and visual amenity values – Identify mitigation measures to reduce project impacts, if required
Terrestrial and aquatic biodiversity	– Assess potential impacts of the project on biodiversity values – Identify avoidance and mitigation measures to avoid or reduce impacts to biodiversity values
Water (surface water and marine)	– Characterise the existing surface water and marine values of the project area and surrounds, including marine water quality data collection – An investigation of the physical and chemical composition of the sediments in the area where construction is to occur to allow for an assessment of the potential threat of mobilised sediments – Assess potential impacts of the project on identified values – Identify mitigation measures to reduce project impacts
Groundwater	– Assess potential impacts of the project on identified values – Identify mitigation measures to reduce project impacts
Air quality	– Characterise the existing air quality within the project area and surrounds – Assess potential impacts of the project on air quality (may include modelling, if required) – Identify mitigation measures to reduce air quality impacts
Greenhouse gas assessment	– Estimate GHG emissions associated with construction and operation of the project – Identify mitigation measures to reduce greenhouse gas emissions
Land use and planning	– Characterise the existing land use and planning conditions – Assess potential impacts of the project on existing and future planned land uses

Socio-economic	– Characterise the existing social and economic environment – Assess potential impacts of the project on affected communities – Identify mitigation measures for reducing adverse socioeconomic impacts and maximising project benefits
Traffic and transport	– Assess potential impacts of the project on the existing transport network – Identify mitigation measures to reduce traffic impacts
Cultural heritage (Aboriginal)	– Characterise any existing Aboriginal cultural heritage values within the project area (onshore and offshore) and surrounds – On ground assessment of the extent of significant disturbance in the project area – Assess the significance of each value using internationally recognised criteria and insights from consultation with the Traditional Owners (i.e. Wadawurrung Traditional Owners Aboriginal Corporation) Assess the potential impacts of the project on identified Aboriginal cultural heritage values – Identify avoidance and mitigation measures to either avoid or reduce impacts to Aboriginal cultural heritage values

Consultation program

Has a consultation program conducted to date for the project?

☐ No ☒ Yes If yes, outline the consultation activities and the stakeholder groups or organisations consulted.

The following stakeholders have been consulted with regarding the proposal:

– Department of Environment, Land, Water and Planning – several meetings have been held with GeelongPort and DELWP regarding the proposal
– Department of Transport
– End users who are not listed to preserve confidentiality

Has a program for future consultation been developed?

☐ NYD ☐ No ☒ Yes If yes, briefly describe.

A consultation plan will be prepared for the Project as part of future assessment and approvals. This plan will identify the key stakeholders and proposed stakeholder engagement activities and methods for each group.

Key stakeholders that GeelongPort plans to consult with include:

– City of Greater Geelong
– WorkSafe
– EnergySafe
– EPA Victoria
– DAWE
– Wadawurrung Traditional Owners Aboriginal Corporation
– First Peoples – State Relations
– Ports Victoria
– VicRoads
– AusNet, AEMO or Powercor dependent on required connection (to be further defined with technology vendors)
– Barwon Water
– Local community

Engagement methods will include face to face stakeholder engagement using audio and visual aids, preferably in digital format to avoid printing copies where possible.

Authorised person for proponent:

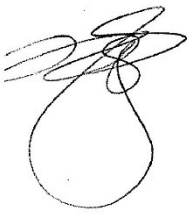
I, Bilal Ali Khan, General Manager | New Markets, confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature 

Date 28 April 2022

Person who prepared this referral:

I, Rhys Armstrong, Technical Director – Planning and Approvals, confirm that the information contained in this form is, to my knowledge, true and not misleading.



Signature

Date 22 April 2022

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Appendix A – Figures

Attachments

Attachment A – Terrestrial ecology
Attachment B – Marine ecology
Attachment C – Surface water
Attachment D – Groundwater
Attachment E – Contamination
Attachment F – Cultural heritage
Attachment G – Air quality
Attachment H – Noise
Attachment I – Traffic and transport
Attachment J – Safety, hazard and risk
Attachment K – Greenhouse gas