

Technical Memorandum

27 April 2022

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| From | Ashley Roberts | Ref. No. | 12559567 |
| Subject | EES referral for the Geelong Hydrogen Hub – Surface water Assessment | | |

1. Introduction

GHD Pty Ltd (GHD) is engaged by GeelongPort Pty Ltd (GeelongPort) to support the preparation of environmental referral documents in relation to the proposed development of the Geelong Hydrogen Hub at the Port of Geelong. GeelongPort is seeking to undertake the following referrals to the relevant agencies:

- Environmental Effects Statement (EES) referral to the Victorian Minister for Planning and the Department of Environment, Land, Water and Planning (DELWP) under the *Environment Effects Act* 1978
- Environment Biodiversity and Conservation Act 1999 (EPBC) self-assessment, and potentially a referral under the same Act to the Commonwealth Department of Agriculture Water and Environment (DAWE)

1.1 Purpose of this memo

This memorandum has been prepared to support and inform the environmental referral documents, and presents the findings of a preliminary surface water assessment (desktop assessment only) for the proposed project and development area. The preliminary surface water assessment considers the potential implications of flooding from the waterway on the proposed infrastructure and site activities, as well as the potential water quality impacts from the proposed facility to the waterway and Corio Bay.

1.2 Project overview

GeelongPort propose to develop a facility at Port of Geelong to import liquid ammonia, produce hydrogen and nitrogen by ammonia decomposition (or cracking over a catalyst), and distribute hydrogen to potential offtake users within the Port of Geelong as well as wider Victoria. Use of hydrogen for these industrial processes will present a strong offset for gas production and consumption needs. The site layout highlights the key process buildings, pipeline routes and structures, and allows for future expansion or alternative applications for the ammonia/hydrogen (Figure 1). The proposed site for the facility comprises approximately 7.5 hectares of land that is wholly owned by GeelongPort. The key project components comprise:

- New ammonia import berth as an extension of Refinery Pier in Corio Bay
- Transfer pipeline to an onshore storage facility
- Onshore storage facility for liquid ammonia (60m diameter storage tank(s))
- Catalytic cracking plant(s) to decompose ammonia into hydrogen and nitrogen

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- Onshore distribution pipelines to potential industrial users either within the Port of Geelong or in adjacent industrial zones
- Vehicle refuelling facility (hydrogen)
- Carpark

An options assessment was undertaken for alternative berth layouts to accommodate future imports of ammonia. The preferred berth layout is located within the existing dredge pocket and therefore no capital dredging is required.



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2. Legislative context

The Environmental Protection Authority (EPA) is an independent statutory authority acting under the *Environmental Protection Act 2017* (EP Act), with a regulatory role to prevent and reduce harm to the environment from pollution and waste. The new EP Act and Environmental Protection Regulations 2021 which came into effect on the 1st of July 2021 introduced significant changes to environmental protection, including a range of new tools called permissions. Permissions include licences, permits and registrations and are issued by the EPA to allow an entity to undertake a particular activity and set performance standards under the general environmental duty (GED).

The GED is applicable to the Project and all contractors carrying out the construction and operation of the Project. The GED (as defined in Section 25 of the new Act) requires a person or entity to:

- Identify risks and hazards that may impact the environment or human health that arise from its operations; and
- Eliminate or minimise those risks as far as reasonably practicable

Environmental management measures will need to be developed as part of a Licence Application to respond to the identified risks to the environment and human health that may arise from the construction and operation of the Project, responding to the first requirement of the GED. The environmental management measures will need to comply with the GED so that identified risks are eliminated or minimised as far as reasonably practicable.

Prior to the commencement of the new Act, the State Environment Protection Policy (Waters) or SEPP (Waters) was the applicable Surface Water standard.

Upon commencement of the new Act, SEPP (Waters) was replaced with the following:

- Part 5 (Water) of the Environment Reference Standard (ERS), gazetted on 26 May 2021;
- Environmental Protection Regulations 2021 (the Regulations), and
- The GED

The requirements of the GED to manage risks to human health and the environment overrides the consideration of superseded clauses in SEPP (Waters), noting that requirements specified in the Environmental Reference Standard have not been substantially changes from SEPP (Waters).

3. Existing conditions assessment

3.1 Waterways and catchment

The site is located within the Corio Catchment Unit within the City of Great Geelong municipality¹. Waterways in and around the site are identified in Figure 2. These include Rollerama Drain (also referred to as Cuthbertson's Creek), which bisects the site, and Oyster Bay Creek (also referred to as Shell Effluent Channel) that is predominantly located north of the site. Both waterways discharge to Port Phillip Bay east of the site's landside area.

¹ 2020 The City of Greater Geelong, Stormwater Services Strategy 2020-30, 30. June 2020



Figure 2 Waterways and water bodies surrounding the site. Waterways and water bodies are indicted in blue. The proposed site footprint is indicated in orange. Note: the area labelled H2 Truck Fuelling Facility north of Refinery Pier is now a proposed carpark and the 'alternate' site to the west is the preferred location for the fuelling facility.

3.2 Flooding

Planning overlays indicative of flood risk in and around the site are presented in Figure 3. A land subject to inundation overlay (LSIO2) and Special Building Overlay (SBO) extend over the area around Rollerama Drain/Cuthbertson's Creek and Oyster Bay Creek/Shell Effluent Channel to the north of the site. LSIO2 extends along the coastline east of the site.



Figure 3 Planning overlays surrounding the site. LSIO2 indicated in blue and SBO indicated by purple dotted pattern. The proposed site footprint is indicated in orange. Note: the area labelled H2 Truck Fuelling Facility north of Refinery Pier is now a proposed carpark and the 'alternate' site to the west is the preferred location for the fuelling facility.

Table 1

Summary of proposed structures within flood risk overlays.

| Structure | LSIO2 | SBO |
|---|-------|-----|
| Ammonia Cracking Plant (60m x 110m) | Х | Х |
| Ammonia Cracking Plant (Expansion) | Х | Х |
| H ₂ Truck Loading Facilities | X | |
| Carpark | Х | |
| H ₂ Truck Fuelling Site | X | Х |
| Utilities Footprint (H_{2} , NH_{3} and power) | X | Х |

3.3 Waterway characteristics

Waterway characteristics of the three waterways in and surrounding the site were inferred from 2020 aerial photo provided as Figure 4 and ground level photos, provided as Figure 5 to Figure 7.



Figure 4 Google Earth view of the site, dated 2020)

3.3.1 Oyster Bay Creek / Shell Effluent Channel

Oyster Bay Creek / Shell Effluent Channel² is the receiving waterway for cooling water discharge from the Geelong Refinery north of the site. Effluent mixing is visible north of Wharf Road in Figure 4, and the channel downstream of this mixing is visible in Figure 5. The waterway appears to be a constructed, trapezoidal channel with minimal riparian vegetation and low ecological value.

² Woodard-Clyde 1997, Addendum Report, Areas Port of Geelong Environmental Audit Of Sea-Bed, June 1997.



Figure 5 Google Earth ground-level view of Oyster Bay Creek / Shell Effluent Chanel from Wharf Road Bridge (38°05′03.47″ S 144°22′43.67″ E facing south east, dated Mar 2015)

3.3.2 Rollerama Drain / Cuthbertson's Creek

Rollerama Drain / Cuthbertson's Creek was identified as Oyster Cove Drain in the 1997 Environmental Audit report³. 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 Environmental Audit Report³ 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 / Cuthbertson's Creek 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 Environmental Audit, a sample of water was collected from the Rollerama Drain / Cuthbertson's Creek 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 Rollerama Drain / Cuthbertson's Creek, to the land to the north (the site) and to the coast. This leachate analysed was noted to be brackish, and 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 zinc³.

³ Woodard-Clyde 1997, Addendum Report, Areas Port of Geelong Environmental Audit of Sea-Bed, June 1997, Page 43



Figure 6 Google Earth ground-level view of Rollerama Drain / Cuthbertson's Creek from St George Road Bridge (38°05'10.07" S 144°22'28.97" E facing south, dated Mar 2015)

3.3.3 Geelong Refinery Coolant Water Intake

Ground level images of the Geelong Refinery Coolant Water Intake are provided in Figure 7 and Figure 8. The intake is a concrete water intake which feeds from Port Phillip into the oil refinery Figure 7.



Figure 7 Photo of Geelong Refinery Coolant Water Intake Training Walls and Culvert facing east⁴ (taken 2004)

⁴ Heritage Victoria 2004, *Maritime Infrastructure Heritage, Project Stage Two*: Geelong, May 2006 version, page 85.



Figure 8 Google Earth ground-level view of Geelong Refinery Coolant Water Intake from Shell Parade (38°04'57.47" S 144°23'01.31" E facing east, dated Mar 2015)

3.4 Existing site conditions

| Table 2 | Summary of existing land use in and around the site |
|---------|---|
|---------|---|

| | | Description | |
|--|-------|--|--|
| Land Use | | The proposed location of the carpark, the northernmost structure of the site, comprises a grassed bank between Shell Parade and Corio Bay. | |
| | | The proposed location for the H_2 Truck Fuelling Facility is situated north of St Georges Road, and south of Rollerama Drain / Cuthbertson's Creek. The location includes a vacant grassed area and the covered the path of Rollerama Drain / Cuthbertson's Creek. | |
| | | The remaining proposed structures are situated on an elevated hummocky grassed area. The area is currently vacant of all structures, however, signs of building rubble littering the surface are visible in the aerial photograph. The area was operated as a landfill until 1979 ⁵ . | |
| Current offsite landuse surrounding the Site | North | The area north of the site is largely zoned as Industrial 2 Zone and made up of the Geelong Refinery, Incitec Pivot Fertilisers and Terminals Pty Ltd (a chemical plant). | |
| | South | South of the site is largely zoned as Industrial 2 Zone and made up by a concrete manufacturer (Geelong Concrete Cutting Service), the former site of the Ford Gelong Casting Plan and a producer of ground calcium carbonate (Omya Australia Pty Limited). The hummocky grassed area underlying much of the proposed site structures also extends south to Rollerama Drain / Cuthbertson's Creek. | |
| | East | Corio Bay borders the site's eastern side. | |
| | West | The area north of the site is largely zoned as Industrial 2 Zone and Public use - Transport zone. A rail line borders the proposed H2 Truck Fuelling Site. The Industrial Zone further west is made up of a fabrication engineer (Brockmans Engineers), and mechanical and electrical repair shops (Joffa's Mechanical Repairs and ABB Australia Bob White Electrix). | |

⁵ Woodard-Clyde 1997, Addendum Report, Areas Port of Geelong Environmental Audit of Sea-Bed, June 1997, Page 51.

4. Potential impacts

A summary of potential impacts on the construction and operation of the proposed Ammonia Import and Hydrogen Storage Facility is provided in Table 3.

| Structure | Flood Impacts on the site (Construction & Operation) | Impacts to waterways | | |
|--|---|---|--|--|
| | | Construction | Operation | |
| Carpark | Structure footprint identified within LSIO2 Potential to increase flooding extent – via structure's displacement of flood waters Flooding during construction impacting downstream | Potential increase in sediment runoff | Potential contaminated (hydrocarbon) runoff into Corio Bay Increased peak runoff and stormwater volumes from hardstand areas | |
| H ₂ Truck Fuelling Site | Structure footprint identified within LSIO2 and SBO Potential to increase flooding extent via structure's displacement of flood waters Flooding during construction impacting downstream. | Potential increase in sediment runoff Reduction in riparian vegetation | Potential loss of fuel into Rollerama Drain / Cuthbertson's Creek and Corio Bay Increased peak runoff and stormwater volumes from roof and hardstand areas | |
| Hydrogen offtake pipeline and ammonia import pipeline | Structure footprint identified withing LSIO2 and SBO Flooding during construction impacting downstream | Potential increase in sediment runoff | - | |
| Admin and Services | - | Potential increase in sediment runoff Potential to expose historical landfill material and or leachate to waterways via runoff | Increased peak runoff and stormwater volumes from roof areas | |
| H ₂ Truck Loading Facilities | Structure footprint identified withing LSIO2 Potential to increase flooding extent – via structure's displacement of flood waters | Potential increase in sediment runoff Potential to expose historical landfill material and or leachate to waterways via runoff | Potential spill from loading and unloading activities | |
| Ammonia Cracking Plants (60 x 110m and Expansion) | Structure footprint identified withing LSIO2 and SBO Potential to increase flooding extent – via structure's displacement of flood waters | Potential increase in sediment runoff Potential to expose historical landfill material and or leachate to waterways via runoff | - Increased peak runoff and stormwater volumes from roof areas | |
| Boil Off Gas Refrigeration | - | Potential increase in sediment runoff Potential to expose historical landfill material and or leachate to waterways via runoff | - | |
| Ammonia Storage Tanks (48 m OD x 37 m Height) | - | Potential increase in sediment runoff Potential to expose historical landfill material and or leachate to waterways via runoff | Potential spill from filling activities | |

 Table 3
 Summary of potential impact of the proposed Ammonia Import and Hydrogen Storage Facility

| Structure | Flood Impacts on the site (Construction & Operation) | Impacts to waterways | | |
|---|--|---|-----------|--|
| | | Construction | Operation | |
| Fence | Structure footprint identified withing LSIO2 and SBO | Potential increase in sediment runoff | - | |
| | Potential to increase flooding extent – via structure's displacement of flood waters | Potential to expose historical landfill material and or leachate to waterways via runoff | | |
| Utilities Footprint (H ₂ , NH ₃ and power) | Structure footprint identified withing LSIO2 and SBO | Potential increase in sediment runoff | - | |
| | | Potential to expose historical landfill material and or leachate to waterways via runoff | | |

The potential construction impacts described in Table 3 can generally be managed with:

- Standard controls and measures that would be included within a contractor's Site Environmental Management Plan (e.g. erosion and sediment controls)
- A Flood Management and Response Plan that may include minimum setback requirements for stockpiles and construction equipment and activities, and well as flood warning protocols

Monitoring of the receiving the waterways may be a requirement as a means of confirming the effectiveness of the management measures.

Some of the potential operational impacts can be addressed in the design develop (e.g. separation of process activities, bunding protecting from spillage). The implementation of standard water sensitive urban design stormwater management practices (e.g. rainwater tanks, swales, bioretention basins etc) will be able to manage stormwater management impacts due to the increase in runoff from impervious surfaces.

5. Recommendations

Based on the information reviewed in this assessment, the following recommendations are noted:

- A site feature survey be prepared to inform the existing conditions assessment including existing flooding characteristics
- A catchment hydrology model be established to confirm peak flow characteristics for the waterways
- A detailed floodplain hydraulic modelling study be undertaken to confirm existing conditions flooding characteristics and enable the assessment of the impacts of the proposed development conditions

Regards

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