Viva Energy Australia

Technical Report E

Surface water impact assessment

Viva Energy Gas Terminal Project

Prepared for
Viva Energy Gas Australia Pty Ltd
ABN: N/A

Technical Report E: Surface Water Impact Assessment

Viva Energy Gas Terminal Project Environment Effects Statement

25-Feb-2022
Viva Energy Gas Terminal Project

Technical Report E: Surface Water Impact Assessment

Viva Energy Gas Terminal Project Environment Effects Statement

Client: Viva Energy Gas Australia Pty Ltd

ABN: N/A

Prepared by

AECOM Australia Pty Ltd
Level 10, Tower Two, 727 Collins Street, Melbourne VIC 3008, Australia
T +61 3 9653 1234 F +61 3 9654 7117 www.aecom.com
ABN 20 093 846 925

25-Feb-2022

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

Table of Contents

Executive summary

This technical report provides a surface water impact assessment conducted to support the Environment Effects Statement (EES) for the Viva Energy Gas Terminal Project (the project).

In December 2020, the Victorian Minister for Planning issued a decision that the project required assessment through an EES under the *Environment Effects Act 1978* (Vic). The reasons for the decision were primarily related to the potential for significant adverse effects on the marine environment of Corio Bay and the potential for contributing to greenhouse gas emissions. Secondarily, the EES was required to assess the effects of the project on air quality, noise, land use, Aboriginal and historic heritage, native vegetation, groundwater, traffic, and transport as well as visual amenity.

In January 2021, the project was also determined to require assessment and approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the potential for the project to have a significant impact on wetlands of international importance, listed threatened species and communities, and listed migratory species. The EES process is the accredited environmental assessment process for the controlled action decision under the EPBC Act in accordance with the bilateral agreement between the Commonwealth and Victorian governments.

This report does not assess potential direct impacts on marine waters in Corio Bay from the floating storage and regasification unit (FSRU). Potential impacts to the marine environment are assessed in the EES Technical Report A: *Marine ecology and water quality impact assessment*.

Overview

Viva Energy Gas Australia Pty Ltd (Viva Energy) is planning to develop 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 key objective of the project is to facilitate supply of a new source of gas for the south-east Australian gas market where there is a projected supply shortfall in coming years.

The FSRU would store liquefied natural gas (LNG) received from visiting LNG carriers (that would moor directly adjacent to the FSRU) and regasify the LNG as required to meet industrial, commercial and residential customer demand. A 7 kilometre gas transmission pipeline would transfer the gas from the FSRU to the Victorian Transmission System (VTS) at Lara.

The gas terminal would be located adjacent to, and on, Viva Energy's Geelong Refinery in a heavily industrialised setting and would benefit from Viva Energy's experience and capability as an existing Major Hazard Facility (MHF) operator and potential synergies between the two facilities such as reuse of the FSRU seawater discharge within the refinery operations.

Methodology

This surface water impact assessment investigated the potential impacts of the proposed construction methods and operation of the project on environmental values and downstream watercourses or receiving waters, in particular Hovells Creek and the Port Phillip (Western Shoreline) and the Bellarine Peninsular Ramsar site. The assessment will inform the development of mitigation measures to be included in the Environmental Management Framework (EMF) and the Construction Environmental Management Plan (CEMP) for the project. The surface water study consisted of:

1. A desktop study of previous assessments and reports.
2. Risk screening and impact assessment.
3. Development of proposed mitigation measures (where appropriate) to avoid, minimise and manage potential impacts on the surface water environment.

Existing conditions

The project is located within the Moorabool River basin of the Corangamite catchment region. The catchment region encompasses a 175-square kilometre coastal fringe and 450-square kilometres of inland coastal waters. Within Corangamite's marine and coastal zone, there is one internationally significant Ramsar wetland, the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, approximately one kilometre to the north-east of the project site.

There are no waterways or streams in good or excellent condition in the highly modified Moorabool basin, and the majority of stream reaches are rated as being in moderate or poor condition.

The project is not located within a floodplain and does not intersect any low-lying or flat areas that are subject to flooding. There is one unnamed minor watercourse located within the project area and the underground pipeline would cross this artificially constructed watercourse within the Hovells Creek Reserve. This is an ephemeral watercourse, meaning it lacks a consistent surface water flow for majority of the year and generally only contains water following a rain event.

Construction impact assessment

Construction activities have the potential to impact local and downstream sensitive receiving waterbodies and watercourses through the mobilisation of sediment, changes in water quality, changes in stream hydrology/stability and pollution incidents (e.g. spills) as well as alteration in downstream flood behaviour if activities are not managed properly.

The impact assessment concluded, that with appropriate management measures in place, it is unlikely that construction of the project would have impacts on nearby sensitive receptors, including Hovells Creek and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

Given the project is not located within a floodplain, and no project component would intersect with any low-lying or flat areas that are subject to flooding, it was concluded that construction of the project would not result in any impacts associated with increased flooding.

Dewatering from excavations after a rain event was identified as a construction activity that has the potential to impact surface water quality. Runoff from disturbed areas was also identified as a potential issue which could result in surface water quality impacts. However, given the short construction timeframe for trenching activities (approximately four months), the short length of the excavated area (less than four kilometres as certain sections of the underground pipeline would be constructed using trenchless construction techniques), progressive trenching and reinstatement, implementation of appropriate management strategies and techniques for excavated water and surface runoff through the CEMP, potential impacts could be adequately managed to avoid and minimise potential impacts.

Potential impacts associated with leaks or spills during construction could effectively be avoided, minimised and managed with the implementation of appropriate fuel and chemical management measures and spill containment and management procedures.

While a single minor waterway crossing is required for the project close to Hovells Creek during construction, the crossing would be trenched and reinstated with minimal short-term impact. It is expected that the proposed trenching associated with the pipeline would be undertaken during dry periods and immediately reinstated to its current condition. With implementation of the recommended mitigation measures, the potential for sedimentation impacts to affect water quality in Hovells Creek or the Ramsar site would be negligible.

Operation impact assessment

The surface water study found that potential adverse impacts on surface water quality would be minimal during the operational phase of the project. No substantial changes to the existing drainage systems are proposed and there are no expected modifications to existing topography or to surface water flow direction. During project operation, existing run-off water management systems in place at the refinery would ensure run-off from a rain event at the treatment facility is captured and managed effectively so as not to impact on nearby sensitive receptors.

The potential impacts of a spill would be minor during operation as the treatment facility is not located within proximity to any watercourses nor would it reach nearby sensitive receptors. The treatment facility and operational practices should be undertaken in accordance with *Liquid storage and handling guidelines. EPA 2018* and *Code of Practice: The storage and handling of dangerous goods* to ensure potential impacts are minimised further.

Decommissioning impact assessment

Potential impacts associated with decommissioning works of the project are likely to be the same or similar to those associated with the construction phase, however, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with

the implementation of the same mitigation measures as those proposed for construction impacts. Therefore, impacts on Hovells Creek and the Ramsar site from decommissioning of the project would be negligible.

Summary of mitigation measures and residual impacts

The mitigation measures outlined in Section 9.0 are recommended to be included in the project Environment Management Framework (EMF) and subsequent Construction Environmental Management Plan (CEMP) to limit/prevent adverse impacts to the surface water environment during construction. The CEMP would include best practice measures to monitor, manage and avoid surface water impacts, in line with relevant Victorian regulations and policies.

The impact assessment found that, with appropriate mitigation measures in place, waterway quality and function would be protected from any adverse consequences caused by the construction, operation or decommissioning of the project and the draft EES evaluation objective can be met.

Abbreviations

Abbreviation	Definition
AAD	Annual Average Damage
AECOM	AECOM Australia Pty Ltd
AEP	Annual Exceedance Probability
ARR2019	Australian Rainfall and Runoff Guidelines 2019
CEMP	Construction Environmental Management Plan
Ch	Rail chainage
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DELWP	Department of Environment, Land, Water and Planning
EES	Environment Effects Statement
EMF	Environmental Management Framework
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation https://www.environment.gov.au/epbc
FO	Floodway Overlay
FSRU	Floating storage and regasification unit
GL	Giga Litres
CCMA	Corangamite Catchment Management Authority
Ha	Hectare
IECA	International Erosion Control Association
ISC	Index of Stream Condition
LNG	Liquified natural gas
LSIO	Land Subject to Inundation Overlay
MHF	Major Hazard Facility
O&M	Operation and Maintenance
ROW	Right of way
SBO	Special Building Overlay
SWMP	Surface Water Management Plan
SWP	South West Pipeline
TAN	Technical Advice Note
VTS	Victorian Transmission System
UFZ	Urban Floodway Zone
UFI	Unique Feature Identifier

Glossary

Term	Definition
1% AEP	1% Annual Exceedance Probability
APGA	Australian Pipelines and Gas Association
Construction Environmental Management Plan (CEMP)	Document that identifies and manages construction activities that may impact the environment
Environmental Management Framework (EMF)	Provides an integrated governance framework to manage environmental aspects as described in the Environmental Effects Statement (EES)
Ephemeral waterway	A waterway which flows only after rain and has no baseflow component
Fluvial Flooding	When the water level in a river, lake or stream rises and overflows onto the surrounding banks and adjacent land
ISO 31000: Risk Management	International Standards Organisation
IPCC	Intergovernmental Panel on Climate Change
STL	Storm-tide level. The combination of astronomical tide and storm surge and thus the sea-level anticipated or measured during a storm event.
PSA	Planning Scheme Amendment
Pluvial Flooding	When an extreme rainfall event excessive to drainage capacity causing inundation
VPPs	Victoria Planning Provisions

1.0 Introduction

This technical report provides a surface water impact assessment conducted to support the Environment Effects Statement (EES) for the Viva Energy Gas Terminal Project (the project).

Viva Energy Gas Australia Pty Ltd (Viva Energy) is planning to develop 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 key objective of the project is to facilitate supply of a new source of gas for the south-east Australian gas market where there is a projected supply shortfall in coming years.

The FSRU would store liquefied natural gas (LNG) received from visiting LNG carriers (that would moor directly adjacent to the FSRU) and would convert LNG back into a gaseous state by heating the LNG using seawater (a process known as regasification) as required to meet industrial, commercial, and residential customer demand. A 7-kilometre (km) gas transmission pipeline would transfer the gas from the FSRU to the Victorian Transmission System (VTS) at Lara.

The project would be situated adjacent to, and on, Viva Energy's Geelong Refinery, within a heavily developed port and industrial area on the western shores of Corio Bay between the Geelong suburbs of Corio and North Shore. Co-locating the project with the existing Geelong Refinery and within the Port of Geelong offers significant opportunity to minimise potential environmental effects and utilise a number of attributes that come with the port and industrial setting.

In December 2020 the Victorian Minister for Planning determined that the project requires assessment through an EES under the *Environment Effects Act 1978* (Vic). The reasons for the decision were primarily related to the potential for significant adverse effects on the marine environment of Corio Bay and the potential for contributing to greenhouse gas emissions. Secondarily, the EES was required to assess the effects of the project on air quality, noise, land use, Aboriginal and historic heritage, native vegetation, groundwater, traffic and transport as well as visual amenity.

In January 2021 the project was also determined to require assessment and approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the potential for the project to have a significant impact on the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (a wetland of international importance), listed threatened species and communities, and listed migratory species. The EES process is the accredited environmental assessment for the controlled action decision under the EPBC Act in accordance with the bilateral agreement between the Commonwealth and Victorian governments.

1.1 Purpose

This surface water impact assessment identifies, assesses and characterises potential environmental impacts on surface water associated with the construction, operation and decommissioning of the project to inform preparation of the EES required for the project.

The report identifies and recommends mitigation measures to avoid, minimise and manage potential impacts which will inform the development of an Environmental Management Framework (EMF) for the project. The mitigation measures listed in the EMF would be implemented in the approvals and management plans for the project.

1.2 Why understanding surface water is important

Temporary and permanent works during the construction, operation and decommissioning phases of the project have the potential to alter existing catchment characteristics and hydrology which could subsequently impact the water quality and quantity of downstream waterbodies and watercourses. If not planned for and managed appropriately, construction, operation and decommissioning works could result in changes to runoff pathways, streamlines and flood storage as well as cause increased volumes of sediment and pollutants load to receiving surface water environments such as the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site which is designated as a wetland of international importance under the Ramsar convention on Wetlands of International Importance.

Understanding the condition of existing waterways and the environmental values that require protection enables construction, operation and decommissioning activities to be carried out with appropriate mitigation measures in place to avoid, minimise and manage impacts to waterways.

1.3 Project area

The project would be located adjacent to, and on, the Geelong Refinery and Refinery Pier in the City of Greater Geelong, 75km south-west of Melbourne. The project area is within a heavily developed port and industrial area on the western shores of Corio Bay between the Geelong suburbs of Corio and North Shore. The Geelong central business district is located approximately 7km south of the project.

Corio Bay is the largest internal bay in the south-west corner of Port Phillip Bay and is a sheltered, shallow basin at the western end of the Geelong Arm with an area of 43 square kilometres (km^2). The Point Wilson/Limeburners Bay section of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located along the northern shoreline of Corio Bay approximately one kilometre to the north-east of the project.

The Port of Geelong has been in operation for over 150 years and is the largest industrial bulk cargo port in Victoria attracting over 600 ship visits and handling more than 14 million tonnes of product annually. Geelong's shipping channels extend 18 nautical miles through Corio Bay from Point Richards through to Refinery Pier. Ports Victoria (formerly Victorian Regional Channels Authority) manages commercial navigation in the port waters in and around Geelong and is responsible for the safe and efficient movement of shipping, and for maintaining shipping channels and navigation aids. The channels are artificially constructed having been deepened and widened through periodic dredging to support port trade development.

Refinery Pier is the primary location within the Port of Geelong for movement of bulk liquids. Vessels up to 265 metres in length currently utilise the four berths at Refinery Pier which service Viva Energy refinery operations. The majority of ship visits to the port are to Refinery Pier, with Viva Energy accounting for over half of the trade through the Port of Geelong.

The Geelong Refinery has been operating since 1954 with both the refinery and the co-located Lyondellbasell plant being licensed Major Hazard Facilities (MHFs). A range of industrial activities are situated in the Port environs including wood fibre processing and chemical, fertiliser and cement manufacture.

To the north of the Geelong Refinery, along the proposed underground pipeline corridor, the area is predominantly rural. There are several other existing Viva Energy-owned underground pipelines running between the refinery and the connection point to the South West Pipeline (SWP) at Lara. The proposed pipeline route follows already disturbed pipeline corridors, where possible, through a mix of land uses.

The project area is shown in Figure 1.

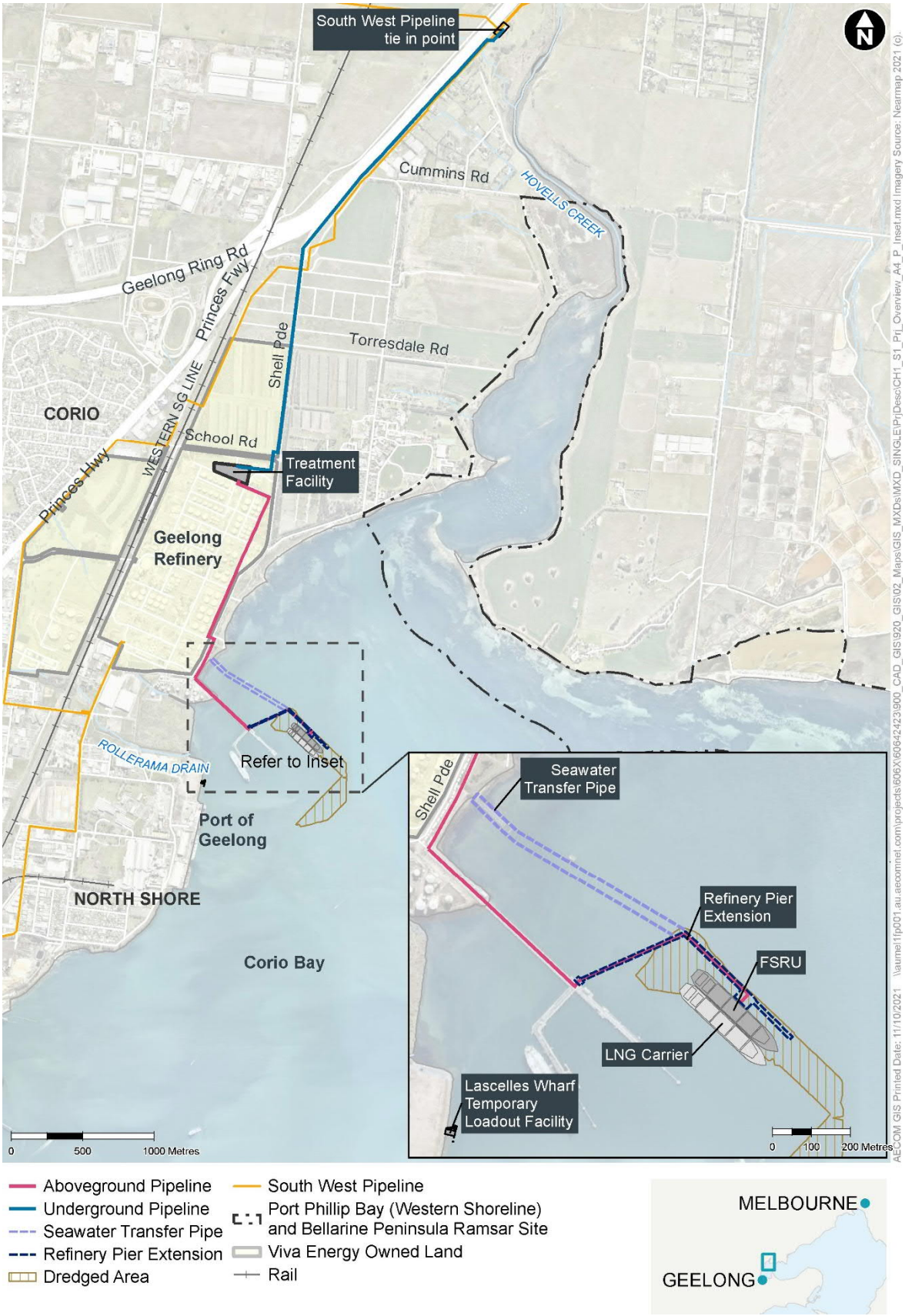

Figure 1: Project overview

1.4 Project description

This section summarises the project as described in Chapter 4: *Project description*. Key components of the project include:

- Extension of the existing Refinery Pier with an approximately 570 metre (m) long angled pier arm, new berth and ancillary pier infrastructure including high pressure gas marine loading arms (MLAs) and a transfer line connecting the seawater discharge points on the FSRU to the refinery seawater intake
- Continuous mooring of an FSRU at the new Refinery Pier berth to store and convert LNG into natural gas. LNG carriers would moor alongside the FSRU and unload the LNG.
- Construction and operation of approximately 3 km of aboveground gas pipeline on the pier and within the refinery site connecting the FSRU to the new treatment facility
- Construction and operation of a treatment facility on refinery premises including injection of nitrogen and odorant (if required)
- Construction and operation of an underground gas transmission pipeline, approximately 4 km in length, connecting to the SWP at Lara.

The Refinery Pier extension would be located to the north-east of Refinery Pier No. 1. The new pier arm would be positioned to allow for sufficient clearance between an LNG carrier berthed alongside the FSRU and a vessel berthed at the existing Refinery Pier berth No. 1. Dredging of approximately 490,000 cubic metres of seabed sediment would be required to allow for the new berth pocket and swing basin.

The FSRU vessel would be up to 300m in length and 50m in breadth with the capacity to store approximately 170 000 cubic metres (m^3) of LNG. The FSRU would receive LNG from visiting LNG carriers and store it on board in cryogenic storage tanks at about -160 °C.

The FSRU would receive up to 160 PJ per annum (approximately 45 LNG carriers) depending on demand. The number of LNG carriers would also depend on their storage capacity, which could vary from 140,000 to 170,000 m^3.

When gas is needed, the FSRU would convert the LNG back into a gaseous state by heating the LNG using seawater (a process known as regasification). The natural gas would then be transferred through the aboveground pipeline from the FSRU to the treatment facility where odorant and nitrogen would be added, where required, to meet Victorian Transmission System (VTS) gas quality specifications. Nitrogen injection would occur when any given gas cargo needs to be adjusted (diluted) to meet local specifications. Odorant is added as a safety requirement so that the normally odourless gas can be smelt when in use. From the treatment facility, the underground section of the pipeline would transfer the natural gas to the tie-in point to the SWP at Lara.

1.4.1 Key construction activities

Construction of the project would occur over a period of up to 18 months. The key construction activities relate to:

- Localised dredging of seabed sediments to enable the FSRU and LNG carriers to berth at Refinery Pier and excavation of a shallow trench for the seawater transfer pipe
- Construction of a temporary loadout facility at Lascelles Wharf
- Construction of the new pier arm and berthing infrastructure, and aboveground pipeline along Refinery Pier and through the refinery
- Construction of the treatment facility on a laydown area at the northern boundary of the refinery site
- Construction of the buried pipeline
- Construction at the tie-in point to the SWP at Lara.

There are no construction activities required for the FSRU component of the project. The vessel would be built, commissioned and all production and safety systems verified prior to being brought to site.

An estimated 490,000 cubic metres (m^3) of dredging would be required, over an area of approximately 12 hectares (ha), adjacent to the existing shipping channel to provide sufficient water depth at the new berth and within the swing basin for visiting LNG carriers to turn. Dredging within the new berth would be undertaken to a depth of 13.1 metres and the swing basin would be dredged to a depth of 12.7 metres. The dredging footprint is shown in Figure 1. It is planned to deposit the dredged material within the Ports Victoria existing dredged material ground (DMG) in Port Phillip to the east of Point Wilson, approximately 26km from Refinery Pier.

The temporary loadout facility at Lascelles Wharf would be the first construction activity to take place in order to facilitate the Refinery Pier extension. This would involve the installation of 10 piles using hydraulic hammers.

Construction of the pier arm would be carried out once dredging was complete, primarily from the water using barge-mounted cranes. Steel piles would be driven into the seabed by cranes mounted on floating barges and pre-cast concrete and pre-fabricated steel components would be transported to site by barge and lifted into position. The installation of pier infrastructure such as the marine loading arms (MLAs), piping from the FSRU to the existing refinery seawater intake (SWI) and aboveground pipeline would also be undertaken from the water using barge-mounted cranes and construction support boats.

Installation of the 3km above ground pipeline along the pier and through the refinery is anticipated to take 3.5 months to complete. The above ground pipeline would run along the pier to the existing pipe track east of Shell Parade within the pier foreshore compound. It would then pass through a road under-crossing to the existing refinery pipe track. The pipeline would then run north along the existing refinery pipe track to an existing laydown area where the treatment facility would be located.

The treatment facility would be located within an existing laydown area in the refinery site and cover an area of approximately 80m x 120m. Construction of the treatment facility would take approximately 18 months and would be undertaken by specialist crews across distinct phases of work. These would include initial earthworks and civil construction, mechanical installation and electrical and instrumentation works.

The 4km underground pipeline would be installed in stages over a 4 month period within a corridor which has been selected to avoid watercourses or other environmental sensitivities, where possible Firstly, a construction right of way (ROW) would be established, clearly identified and fenced off where required. Typically, this would be between 15 and 20m wide, and minimised where possible to reduce disturbance. Once the construction ROW is established, vegetation would be removed, and a trench excavated to a maximum depth of 2m and a maximum width of 1m for the pipeline to be placed. Following the placement of the pipeline, the construction ROW would be rehabilitated to its pre-existing condition as far as practicable for the purposes for which it was used immediately before the construction of that part of the pipeline.

Trenchless construction (including thrust boring or horizontal directional drilling (HDD)) would be used to install the underground pipeline in areas that are not suited to open trenching techniques, such as at intersections with major roads. Trenchless construction would involve boring or drilling a hole beneath the ground surface at a shallow angle and then pushing or pulling a welded length of pipe through the hole without disturbing the surface. It is anticipated that the maximum depth of the trenchless section would be 25m.

The anticipated trenching, HDD and thrust bore locations are presented in Figure 2. It is possible that along the northern section of Macgregor Court the pipeline would also be constructed using HDD, however, this would be confirmed during detailed design.

Construction at the tie-in point to the SWP at Lara would be undertaken by specialist crews across the phases of works, as with the treatment facility.

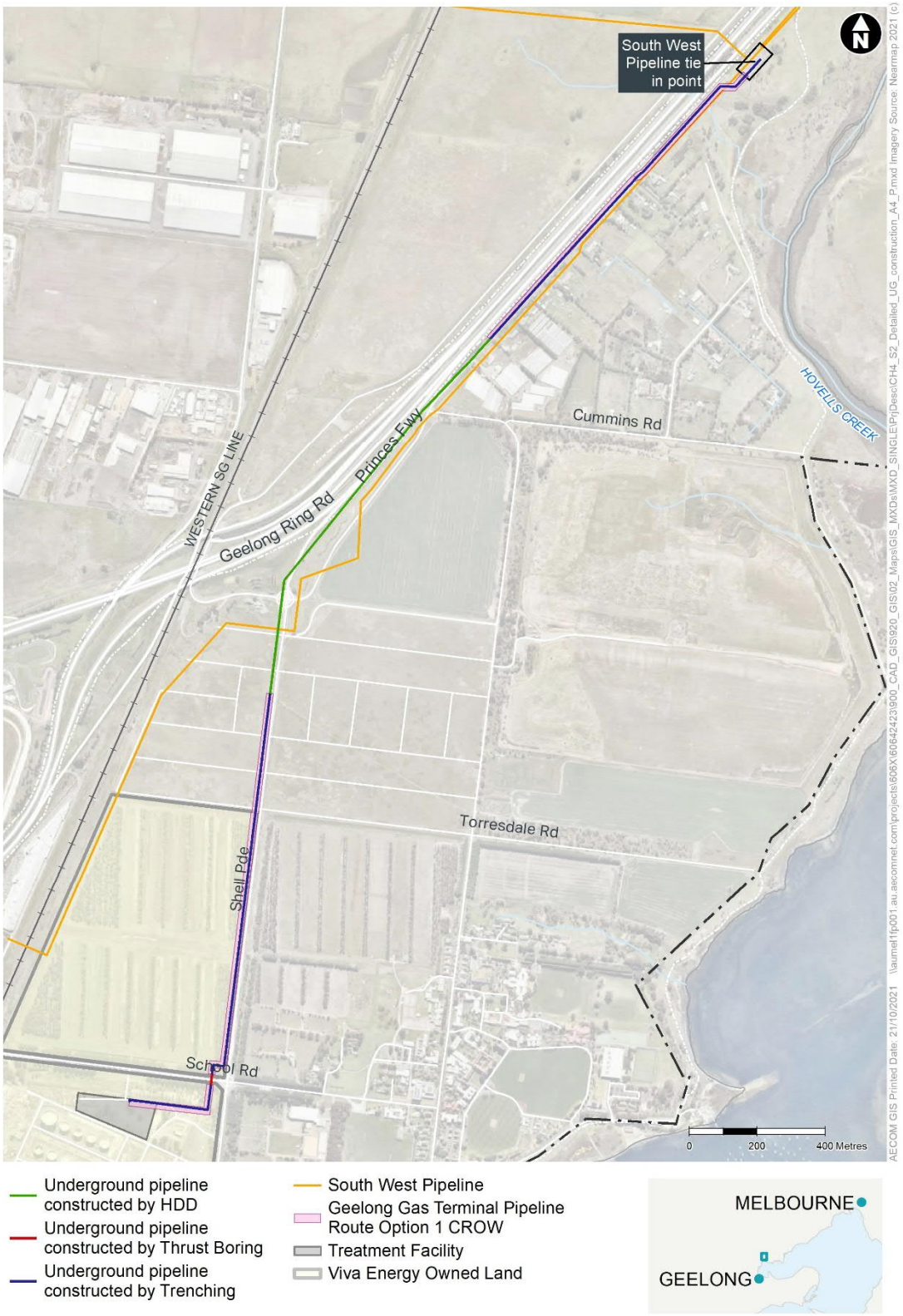

Figure 2: Proposed location of trenching construction techniques for the underground pipeline including open trenching, HDD and thrust boring

1.4.2 Key operation activities

The project is expected to be in operation for approximately 20 years. Key activities relating to project operation include:

- Receipt of up to 45 LNG carriers each year at Refinery Pier – the number and frequency of LNG carriers arriving each year would depend on their storage capacity and gas demand
- Regasification of LNG onboard the FSRU using seawater as a heat source, which would then be reused within the refinery as cooling water
- Injection of nitrogen and odorant into the gas prior to distribution via the VTS
- Monitoring and maintenance of the pipeline easement.

1.4.3 Key decommissioning activities

The FSRU, which continues to be an ocean-going vessel throughout the operation of the project, would leave Corio Bay on completion of the project life to be used elsewhere.

It is anticipated that the Refinery Pier berth and facilities would be retained for other port related uses. The underground pipeline would likely remain in situ subject to landholder agreements and either decommissioned completely or placed into care and maintenance arrangements.

Decommissioning activities may be subject to change, subject to legislative requirements at the time and potential repurposing of the infrastructure at the end of the project.

1.4.4 Project activities relevant to the assessment

Key construction activities relevant to surface water include trenching for placement of the underground pipeline, construction of the treatment facility, and storage and handling of construction material and chemicals. Key operation activities relevant to surface water include an increase in impervious area at the treatment facility and storage and handling of material at the treatment facility.

2.0 Scoping requirements

The scoping requirements for the EES set out the specific environmental matters to be investigated in the EES. The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the Project.

The following evaluation objective is relevant to the surface water impact assessment:

- **Water and catchment values** – To minimise adverse effects on water (in particular wetland, estuarine, intertidal and marine) quality and movement, and to the ecological character of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

The scoping requirements of relevance to this surface water impact assessment and where they are addressed in the report are shown in Table 2-1.

Table 2-1 Scoping requirements relevant to surface water

Aspect	Scoping requirement	Section addressed
Key issues	The potential for adverse effects on the functions and environmental values of surface water environments, such as interception or diversion of flows or changed water quality in downstream water environments due to the project, in the context of climate change projections during construction and operation.	Section 6.0 Construction impacts Section 7.0 Operation impacts
	The potential for adverse effects on the functions, environmental values and the ecological character of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.	Refer to Technical Report A: *Marine ecology and water quality impact assessment*
	The potential for adverse impacts on water quality and environmental values due to dredging and sediment mobilisation, spills or other incidents during construction or operation.	Section 6.0 Construction impacts Section 7.0 Operation impacts
Existing environment	Describe marine, estuarine, intertidal and freshwater waters and their environmental values that could be affected from changed water quality, or water movement, due to the project.	Section 5.0 Existing conditions
	Describe the ecological character of the Ramsar site, and related hydrological and environmental values protected under the EPBC Act, including their acceptable limits for change.	Refer to Technical Report A: *Marine ecology and water quality impact assessment*
	Characterise the interaction between surface water and marine waters within the project and broader area.	Section 5.0 Existing conditions
	Characterise the areas hydrodynamics and coastal processes and modelling techniques utilised to do so.	Refer to Technical Report A: *Marine ecology and water quality impact assessment*
Likely effects	Identify and evaluate effects of the project and alternatives on groundwater, surface water, waterways and wetlands near the project works, including the likely extent, magnitude and duration (short and long term) of	Section 6.0 Construction impacts Section 7.0 Operation impacts

Aspect	Scoping requirement	Section addressed
	changes to water quality, water level, temperature or flow paths during construction and operation, considering appropriate climate change scenarios and possible cumulative effects resulting in combination with other existing or proposed projects of actions.	Refer to Technical Report F: *Groundwater impact assessment*
	Assess the impacts of the construction and operation of the project on the Ramsar site, in particular any potential substantial and/or measurable change to the hydrological regime, in the context of ecological character description and acceptable limits for change.	Section 6.0 Construction impacts Section 7.0 Operation impacts
	Ensure a systems-based assessment is undertaken with marine water quality, hydrodynamics and marine ecology studies undertaken together.	Refer to Technical Report A: *Marine ecology and water quality impact assessment*
Mitigation measures	Identify and evaluate aspects of project works and operations, and proposed design refinement options or measures, that could avoid or minimise significant effects on water, wetlands and marine environments.	Section 6.0 Construction impacts Section 7.0 Operation impacts Section 9.0 Recommended mitigation measures Refer to Technical Report F: *Groundwater impact assessment*
	Describe further potential and proposed design options and measures that could avoid or minimise significant effects on environmental values of surface water, groundwater and downstream water environments during the project's construction and operation, including response measures for environmental incidents.	
Performance objectives	Describe any further methods that are proposed to manage risks of effects on surface water and catchment values, as well as water quality, to form part of the EMF.	Section 9.0 Recommended mitigation measures Refer to Technical Report F: *Groundwater impact assessment*

3.0 Legislation, policy and guidelines

Table 3-1 summarises the key environmental legislation and policy that apply to the project in the context of this surface water impact assessment, as well as the implications for the project and the required approvals (if any).

Additional guidelines and technical criteria relevant to surface water are described in Section 3.1 and 3.2.

Table 3-1: Primary environmental legislation and associated information

Legislation/policy	Description	Implications for the project	Approval required
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).	The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage Matters of National Environmental Significance (MNES) including, but not limited to, World Heritage Properties, National Heritage Places, Ramsar sites, nationally listed threatened species and ecological communities and listed migratory species. The EPBC Act states that 'controlled' actions i.e. actions that are determined as likely to have a significant impact on a MNES are subject to assessment and approval under the EPBC Act.	On 21 January 2021, the delegate for the Commonwealth Minister for the Environment determined the project to be a controlled action due to potential significant impact on the Port Phillip Bay (Western Shoreline) and Bellarine Peninsular Ramsar site, listed threatened species and ecological communities and listed migratory species. The EES process is accredited to assess impacts on MNES under the EPBC Act through the Bilateral Assessment Agreement between the Commonwealth and the State of Victoria. Therefore, the Project will be assessed under the bilateral agreement.	Approval of controlled action required
State			

Legislation/policy	Description	Implications for the project	Approval required
Water Act 1989 (Water Act)	The Water Act provides the legal framework for the integrated management of Victoria's water resources. The main purpose of the Water Act is to promote the efficient and equitable use of water resources and ensure water resources are conserved and appropriately managed for sustainable use. The Water Act provides a formal means of protecting and enhancing waterway flow, water quality and catchment conditions.	Under the Water Act, the Corangamite Catchment Management Authority (CCMA) have been given the power to implement by-laws which apply within the catchment management authority's waterway management district. CCMA would authorise works on designated waterways via an authority permit in accordance with by-law number four - Waterways Protection. Some works including construction of utilities such as sewers and water mains and gas pipelines do not require a works on waterways permit however authorisation for these works is still required.	A works on waterways application will be required to be submitted to the CCMA and approved prior to crossing works commencing on the artificially constructed minor waterway that is located within Hovells Creek Reserve at the northern end of the project area.
Environment Protection Act 2017 (Environment Protection Act)	The Environment Protection Act aims to protect Victoria's air, water and land by adopting a 'general environment duty' (GED) which imposes a broad obligation on entities and individuals to take proactive steps to minimise risks of harm to human health and the environment from pollution or waste. The Environment Protection Authority administers the Environment Protection Act and subordinate legislation.	The Environment Protection Act regulates discharges to land, surface water or groundwater by a system of development and operating licences. Any discharge into a waterway or groundwater during the construction or operation of the project must be in accordance with the requirements of the Environment Protection Act. The GED requires all reasonably practicable steps be taken to minimise impacts from the construction and operation of the project.	The FSRU component of the project would require a development and operating licence.
Pipelines Act 2005 (Pipelines Act)	This is the primary act governing the construction and operation of pipelines in Victoria. The Pipelines Act covers 'high transmission' pipelines for the conveyance of gas, oil and other substances. The	The project requires a pipeline licence(s) under the Pipelines Act for the construction and operation of the pipeline. The Construction Environmental Management Plan (CEMP), required prior to construction of the	Pipeline licence(s) required

Legislation/policy	Description	Implications for the project	Approval required
	Department of Environment, Land, Water and Planning (DELWP) and Energy Safe Victoria (ESV) are responsible for administering the Pipelines Act and the Pipelines Regulations 2017.	pipeline, would include measures to minimise impacts on surface water during construction.	
Planning and Environment Act 1987 (P&E Act)	The P&E Act establishes a framework for planning the use, development and protection of land in Victoria. The P&E Act provides for the preparation of planning schemes in each municipality consistent with the Victoria Planning Provisions and procedures by which planning schemes may be amended and planning permits obtained to govern land use and development. Under the P&E Act, a permit is required to carry out any works in an area intersecting Floodway Overlay (FO), Land Subject to Inundation Overlay (LSIO) or Special Building Overlay (SBO) layers.	For works not covered under *the Pipelines Act 2005* such as the pier extension and ancillary pier infrastructure, FSRU and treatment facility planning approval will be required.	Planning Scheme Amendment to the City of Greater Geelong Planning Scheme
Policy			
Environment Reference Standard	This Environment Reference Standard (ERS) is made under section 93 of the *Environment Protection Act 2017*. It sets out the environmental values of the ambient air, ambient sound, land and water environments that are sought to be achieved or maintained in Victoria and standards to support those values.	The project would seek to minimise the potential for impacts on surface water quality to ensure that existing environmental values are protected, with priority given to maintaining environmental values of areas of high conservation value (Ramsar sites). The project would seek to meet environmental quality objectives and indicators to ensure that	No approvals required

Legislation/policy	Description	Implications for the project	Approval required
	Environmental values are the uses, attributes and functions of the environment that Victorians value. Standards for the environmental values are comprised of objectives for supporting different uses of the environment and indicators that can be measured to determine whether those objectives are being met.	pollutants into receiving waters are at a level that supports the maintenance or improvement of the current condition within the bounds of natural variations.	

3.1 Guidelines

3.1.1 Commonwealth guidelines

National Water Quality Management Strategy – Australia and New Zealand Guidelines for Fresh and Marine Water Quality

The National Water Quality Management Strategy – Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) sets the water quality objectives required to sustain current environmental values for natural or semi-natural water resources in Australia and New Zealand. The document identifies limits to acceptable change in water quality that would continue to protect the associated environmental value. Meeting the guidelines would provide a level of certainty that there would be no impact on waterways or environmental values.

Australian Rainfall and Runoff 2019

Australian Rainfall and Runoff (ARR) 2019 is the national guideline for the estimation of design flood characteristics in Australia. ARR 2019 provides broad guidance on appropriate techniques and methods for determining design flood flows and levels.

3.1.2 State guidelines

Victorian Waterway Management Strategy 2013

This strategy provides the policy direction for managing Victoria's waterways over an eight year period. The project should be undertaken so as not to preclude the condition of rivers, estuaries and wetlands from being improved or maintained to provide environmental, social, cultural and economic value for Victorians.

Victorian Coastal Strategy 2014

The Victorian Coastal Strategy is established under the *Coastal Management Act 1995*. The Strategy gives guidance on the protection of significant environmental and cultural values, integrated planning and direction for the future, sustainable use of coastal resources, and suitable development on the coast. The strategy establishes sea level rise planning benchmarks. The project should consider implications of projected sea level rise on facilities and set design criteria accordingly.

3.2 Technical area criteria

3.2.1 Construction criteria

Australian Pipelines and Gas Association 2017 Code of Environmental Practice. (Onshore Pipelines) Revision 4.

The purpose of the code is:

- To provide industry accepted guidance on environmental management through the planning, construction, operational and decommissioning phases of a pipeline's lifecycle
- To inform the industry and regulators of environmental risks arising from pipeline activities
- To assist the industry, identify and meet its legal obligations around environmental management
- To provide examples of risk management methods applicable to activities within the various lifecycle phases

Land-based pipeline construction (IECA Appendix P)

This appendix provides specific guidelines on the application of best practice erosion and sediment control to the construction of land-based pipelines, and pipeline crossings of waterways. Its purpose is to describe the various temporary drainage, erosion and sediment control measures that are available for use during the construction of land-based pipelines, and where possible, outline the circumstances in which their use is likely to be warranted.

3.2.2 Operational criteria

Liquid storage and handling guidelines. EPA 2018

This guide outlines the principles for preventing harm to the environment and human health when storing and handling liquid substances. This guide refers to bulk storage as well as smaller containers or packaged storage of liquid substances, and to liquids that are considered raw materials, product or waste.

Code of Practice: The storage and handling of dangerous goods
The code of practice provides practical guidance on how to comply with your obligations under Victoria's occupational health and safety legislation for the safe storage and handling of dangerous goods.

4.0 Methodology

This section describes how the surface water assessment was conducted in order to understand the existing environment and potential impacts of the project on surface water. The following sections outline the study methodology.

4.1 Study area

The study area for the surface water impact assessment includes the entire project area described in Section 1.3 and waterbodies and watercourses within the surrounding area. This report has assessed the potential impacts of project activities within this area with a focus on the land-based components of the project, including the aboveground pipeline, the treatment facility and the underground pipeline.

This report does not assess potential impacts on marine waters in Corio Bay from the floating storage and regasification unit (FSRU). Potential impacts to the marine environment are assessed in the EES Technical Report A: *Marine ecology and water quality impact assessment*.

4.2 Existing conditions

A desktop assessment was undertaken to understand the existing conditions of surface water, local hydrology and wetland systems across the project area. The assessment of existing conditions was based on a review of publicly available data and previous investigations. These included:

- DELWP MapShare, LIDAR data and VicPlan portals
- Publicly available surface water information/reports, hydraulic and hydrological studies relevant to the project area
- Publicly available stream flow data and historic flood and erosion information
- Consultation and engagement with Corangamite Catchment Management Authority (CCMA) to confirm the status of waterways and sub-catchments within the project area
- Investigation of water management authorities relevant to the project to understand surface water management obligations and water allocations
- Aerial photographs and mapping to determine existing waterways and their location in relation to the project.

4.3 Risk screening method

A risk-based screening approach has been used for the EES assessment in accordance with the requirements outlined in the 'Ministerial guidelines for assessment of Environmental Effects under the *Environment Effects Act 1978*' (page 14). The risk screening is undertaken to ensure that the level of investigation conducted in each technical study is adequate to inform an assessment of the significance and acceptability of the project's potential environmental impacts.

An environmental, social and economic issues risk screening tool has been used to prioritise and focus the proposed investigations, assessments and approaches to avoiding, minimising or managing potential impacts. The issue screening process involved an evaluation of the potential environmental, social and economic issues associated with the project based on the information collected through a series of initial assessments undertaken into the potential effects of the project.

The purpose of the issues screening tool was to assist in identifying:

- Significant issues, uncertainties and/or potential impacts that require more detailed characterisation and/or assessment within the EES
- Matters or potential impacts considered to be already well understood or less significant.

A high, medium, or low screening value was assigned to potential issues to determine the level of assessment required to identify and investigate impacts.

Each potential issue was given a score (1, 2 or 3) against the categories of:

- Community and stakeholder interest
- Significance of assets, values and uses
- Potential impact (spatial, temporal and severity).

The scores were added together, or the highest score across the three contributing categories was used, to give a 'screening value' of high, medium or low, which gives an indication of the level of impact assessment that is required. Issues that were assigned a screening value of high or medium required detailed assessment in the EES at a level commensurate with them being considered primary level issues.

Issues that were assigned a screening value of low were proposed to be documented and managed with some investigation and assessment in the EES at a level commensurate with them being considered secondary level issues.

4.3.1 Criteria and consequence ratings

Risks, issues, and potential impact pathways were identified for both construction and operation of the project. Table 4-1 defines the criteria and consequence ratings for each of the three categories that have been used to inform the issues screening. The sum of the scores against each of the three categories or the highest rating across any of the three contributing categories gives the 'screening value'.

Table 4-1 Issues screening criteria and consequence ratings

Rating	Community and stakeholder interest	Significance of assets, values and uses	Potential impact (spatial, temporal and severity)
1	Low interest and perceived impact	Locally significant asset, value or use	Potential for localised, temporary impact
2	Some interest and targeted perceived impacts	Regionally significant asset, value or use	Potential for significant temporary, or localised permanent impact
3	Broad community and stakeholder interest or impacts	State or nationally significant asset, value or use	Potential for significant permanent impact

The screening values are then used to determine the level of assessment required as shown in Table 4-2.

Table 4-2 Issue investigation categories

Screening score	Screening value	Potential consequences	Complexity of mitigation	Level of assessment
7, 8 or 9 or the highest rating across any one of the three contributing categories is 3	High	Potential for elevated, longer term impacts, significant assets or values may be affected with enduring changes. Considers both impacts and benefits, or Issue may not be well defined and insufficient information is available for the impact assessment, or High level of community interest.	Stringent management measures may be required	Detailed assessment required

Screening score	Screening value	Potential consequences	Complexity of mitigation	Level of assessment
4, 5 or 6 or the highest rating across any one of the three contributing categories is 2	Medium	Potential for moderate level impacts, significant assets or values may be affected over an extended time frame with some resultant changes. Considers both impacts and benefits, or Issue may be moderately understood, and some information is available, however more is required for the impact assessment, or Medium level of community interest.	Standard management measures are available that can be adopted with some modification	Moderate assessment required
3 or the highest rating across any one of the three contributing categories is 1	Low	Potential for short term and localised impact. Asset or values may be temporarily affected but recovery expected, or Issue is well understood and there is enough information available for the impact assessment, or Low level of community interest.	Standard management measures are available.	Some assessment required

Further information about the risk screening process is detailed in Chapter 7: *Assessment framework.*

Outcomes from the risk screening process are outlined in Section 4.3.2 below.

4.3.2 Risk screening

Table 4-3 provides the key potential issues related to changes in surface water identified as part of the risk screening process for the project and presents the screening value for each issue.

Table 4-3 Issues screening results for surface water

Aspect	Issue	Community & stakeholder perceived	Significance of assets, values &	Potential impact (spatial, temporal & severity)	Screening Score	Screening Value
Construction						
Hydrology	Potential impacts on surface water quality or flows during construction such as from disturbance of waterways, surface run-off, wastewater disposal and dewatering, and temporary works in areas that may impede flows	1	1	1	3	Low
Operation						
Hydrology	Permanent infrastructure changes surface water flows / flood regime	1	1	1	3	Low

4.4 Impact assessment method

A qualitative impact assessment was conducted as part of this study. The impact assessment involved identifying key activities expected during construction and operation of the project that have the potential to impact on the quality of receiving waters and subsequently recommending mitigation measures to avoid, minimise and manage potential impacts.

Consistent with the EES assessment approach, initial recommendations are for the project design to be modified where possible in order to mitigate the impact or reduce it to a level that is within statutory requirements or guidelines and is acceptable to the relevant regulatory authorities. Where changes to the project design or operation are not possible, additional mitigation measures have been recommended to minimise or manage potential impacts to achieve an outcome consistent with the evaluation objectives.

The impact assessment for this study primarily focused on potential impacts associated with water quality from both construction and operation of the project.

4.4.1 Construction

Potential impacts to surface water have been identified by considering the proposed construction methods for the pipeline as well as identifying other construction activities that have the potential to impact environmental values, watercourses or receiving waters including the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site if they are not managed properly. Measures to mitigate potential impacts have been recommended based on existing construction guidelines and practices.

There are a variety of construction techniques and controls that can be implemented to minimise impacts on waterways and receiving waters.

The following factors are generally considered when assessing the suitability of proposed pipeline construction methods for waterway crossings:

- Whether the waterway is natural or significantly modified from its original form (constructed).
- Whether vegetation is intact or cleared including the extent of vegetation and ability to re-establish, based on surrounding land use.
- A combination of upstream catchment area and channel width, which provides an indication of whether the pipeline trench could be excavated and reinstated with certainty before rain is forecast so that sediment accumulating in the downstream waterway can be prevented.
- Whether the waterway is ephemeral or permanent.

Open trenching is commonly used for crossing minor watercourses where disturbed surfaces can be adequately reinstated. Excavators or backhoes are generally used for trenching, enabling trench spoil to be stockpiled away from the watercourse. The prefabricated pipe is placed across the waterway, lowered in and the trench backfilled immediately. This method is often applied in dry or shallow, low flow watercourses

There are numerous strategies and controls that can be applied to manage stormwater during construction. Management of stormwater during the construction phase would be based on the mitigation techniques listed in the Civil construction, building and demolition guide (EPA Publication 1834) and EPA Victoria (1991) Construction Techniques for Sediment Pollution Control (EPA Publication 275). These guidelines have been used to identify potential impacts from the construction method and identify suitable mitigation measures

4.4.2 Operation

As the 3km above ground pipeline would run along the pier and then along the existing refinery pipe track and the remaining 4km pipeline would be underground, once constructed, the pipeline would generally not result in any permanent change to the existing landforms. In addition, there would be no material change to the existing proportion of impervious surfaces associated with the pipeline.

Once constructed, there would be no permanent change to surface topography other than minor changes associated with the treatment facility at the existing refinery site. The treatment facility would however result in a small increase in impervious area.

No modelling to quantify and mitigate potential impacts on flood levels associated with the pipeline or treatment facility has been undertaken as part of this assessment however consideration has been given to how the treatment facility should be developed to avoid adverse impacts to runoff water quality. Furthermore, consideration has been given to how material and chemicals should be handled during operation to avoid adverse impacts.

4.4.3 Decommissioning

Decommissioning of the project would involve the same, or similar, issues as those associated with the construction of the project however the overall level of impact would be lower due to the nature of decommissioning activities.

4.5 Stakeholder and community engagement

Stakeholders and the community were consulted to support the preparation of the project's EES and to inform the development of the project and understanding of its potential impacts.

On 16 March 2021 a meeting with the CCMA was held to engage with the authority at an early stage of the project and to seek information about environmental values that could potentially be impacted by the project.

In accordance with the scoping requirements, a Technical Reference Group (TRG) was convened and chaired by DELWP on behalf of the Minister for Planning. The TRG has provided input throughout the EES process. EES Chapter 6: *Stakeholder and community engagement* provides a summary of the project's key engagement activities.

4.6 Assumptions and limitations

Assumptions and limitations relating to this impact assessment are provided below:

- The assessment focuses on the impact of the project works on all waterways and waterbodies intersecting and/or that could be potentially impacted by the project works.
- The Intergovernmental Panel on Climate Change (IPCC) Assessment Report Number 6 (AR6) will be updated to Number 7 (AR7) in 2022. This study will include changes to predicted climatic conditions which may have a direct impact on the parameters used to assess climate change impact and mitigation for the project.
- A range of consultation activities including Community Information Sessions have been undertaken as part of the broader EES process as per the Project Consultation Plan.
- No hydrologic and hydraulic models were developed for this project.
- Various standards and guidelines may be updated as the project progresses. The design of the proposed works should be undertaken to comply with standards and guidelines that are current when the works are being undertaken.

This study should be read in the context of limitations and assumptions mentioned above and the purpose for which it was intended. The limitations and assumptions referred throughout the report and other relevant issues outside of the report scopes are solely for the purpose of this assessment.

4.7 Linkage to other EES technical reports

The surface water impact assessment should be read in conjunction with other relevant technical reports forming part of the EES. Other potential impacts relating to groundwater, biodiversity and contamination have been considered in detail in other technical reports:

- Technical Report A: *Marine ecology and water quality impact assessment*
- Technical Report D: *Terrestrial ecology impact assessment*

- Technical Report F: *Groundwater impact assessment* - details the interaction between groundwater and surface water, such as groundwater dependent ecosystems
- Technical Report G: *Contamination and acid sulfate soils impact assessment* - Mitigation measures recommended in the surface water impact assessment have been adopted where applicable.

5.0 Existing conditions

This section of the surface water impact assessment describes the existing conditions of the catchment and local waterways of the area in which the project is located. It also describes the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site which is a potential sensitive receptor within the region.

Understanding the existing conditions and characterising the surface water environment is an important step in the assessment approach as it provides the baseline conditions to be used for the impact assessment.

This section does not address existing conditions related to the marine environment. Existing conditions and potential impacts on the marine environment are outlined in EES Technical Report A: *Marine ecology and water quality impact assessment*.

5.1 Regional catchment overview

The project site is located within the Corangamite catchment region. The region compromises approximately 13,340 square kilometres along the Victorian south-western coast from Geelong to Peterborough and includes the cities of Ballarat and Greater Geelong, the Borough of Queenscliff and the shires of Moorabool, Surf Coast, Corangamite, Golden Plains, Colac Otway and Moyne (CCMA, 2019).

The Corangamite catchment compromises four drainage basins: Lake Corangamite, Moorabool River, Barwon River and Otways Coast (refer to Figure 3). The region's marine and coastal environment extends from Peterborough in the west to Point Wilson in the east. The region encompasses a 175-square kilometre coastal fringe and 450-square kilometres of inland coastal waters (CCMA, 2014).

The Corangamite catchment region contains more than 1,500 wetlands covering 65,000 hectares, which equals five percent of the entire region. These wetlands range from saline lakes to shallow ephemeral freshwater meadows (CCMA, 2013).

There are two Ramsar sites within the catchment region; the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site and the Western District Lakes Ramsar site. There are 24 wetlands of national importance and a number of marine protected areas also located within the catchment (CCMA, 2010). The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located approximately 1 km to the north east of the project.

The Corangamite region is divided into 15 landscape zones as the basic management unit for the CCMA regional natural resource management.

5.1.1 Moorabool River basin

Within the Corangamite region, the project is located within the Moorabool River basin and the Hovells Creek sub-catchment (CCMA, 2014) (refer to Figure 4). The Moorabool River basin includes:

- Moorabool River, the major river system within the catchment flowing through the east of the region,
- Hovells Creek, a small creek system that rises in the southern foothills of the You Yangs and flows into Corio Bay.

The Moorabool River is located approximately 6.5 km to the south-east of the project and Hovells Creek is located approximately 300 m to the east of the proposed pipeline tie-in point to the SWP at Lara.

Figure 3: Corangamite regional catchment

5.1.2 Hovells landscape zone

The Hovells landscape zone is located north-east of Geelong extending toward the eastern border of the Corangamite region. Hovells Creek is the main river of the zone bisecting the township of Lara and flowing into Corio Bay via Limeburners Lagoon. The creek is a high value and priority waterway within the landscape zone due to its environmental condition and social amenity value.

The zone includes several wetlands making up three percent of the total zone area, including Limeburners Lagoon State Nature Reserve. These sites are part of the internationally significant Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site. Serendip Sanctuary and the Wurdi Youang (You Yangs) Regional Park are located within the landscape zone and are of significant environmental value, with diverse wildlife and cultural and social importance which attracts many visitors annually. Corangamite Waterway Strategy 2014-2022 (CCMA, 2014) identified the following as threats to the condition of its estuaries and waterways:

- invasive fauna and flora
- reduced vegetation width and riparian connectivity
- reduced estuary extent, bed instability and degradation
- change in the flow regime and barriers to fish passage, particularly reduced freshwater inflows from the creek,
- unpermitted estuary entrance openings,
- high levels of sediment and nutrients,
- pollution events, e.g. oil spills,
- land claim (creating new land from areas that were previously below high tide),
- salinization, acidification and acid sulphate soils.

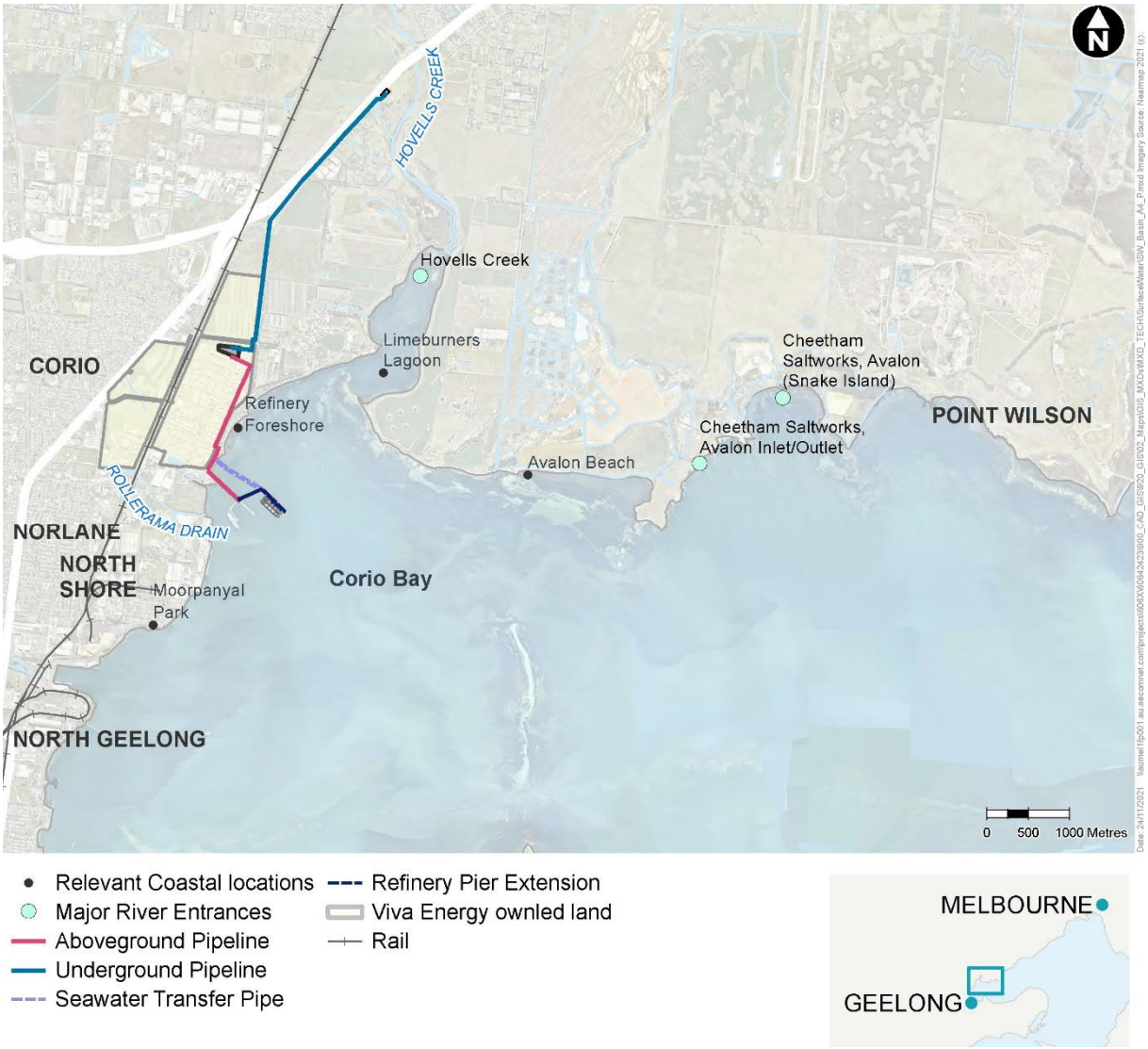

Figure 4: The project area within Moorabool River basin adjacent to Hovells Creek and Limeburners Lagoon

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

Within Corangamite's marine and coastal zone, there is one internationally significant Ramsar wetland, the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site. This site is comprised of six distinct areas, one of which is located in proximity to the project:

- Point Wilson/Limeburners Bay as part of the coastal strip from Point Wilson to Limeburners Lagoon, and

This area of the Ramsar site supports numerous threatened species and provides valuable habitat to many migratory bird species. A number of fauna species listed under the *Flora and Fauna Guarantee Act 1988* have been recorded in this area (DSE, 2003).

Limeburners Lagoon is a natural conservation area located at the Hovells Creek Estuary, within the broader Limeburners Bay. The land tenure of the Lagoon is nature conservation (State Nature Reserve), managed by City of Greater Geelong in partnership with Parks Victoria (CCMA, 2019).

The Point Wilson/Limeburners Bay section of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is located along the northern shoreline of Corio Bay approximately one kilometre to the north-east of the project site (CCMA, 2010).

The project area does not intersect the Ramsar site. However, there is potential for overland flow generated from the broader project area to flow to the site (DELWP, 2020). The boundary of the Ramsar site and the project area are shown in Figure 5.

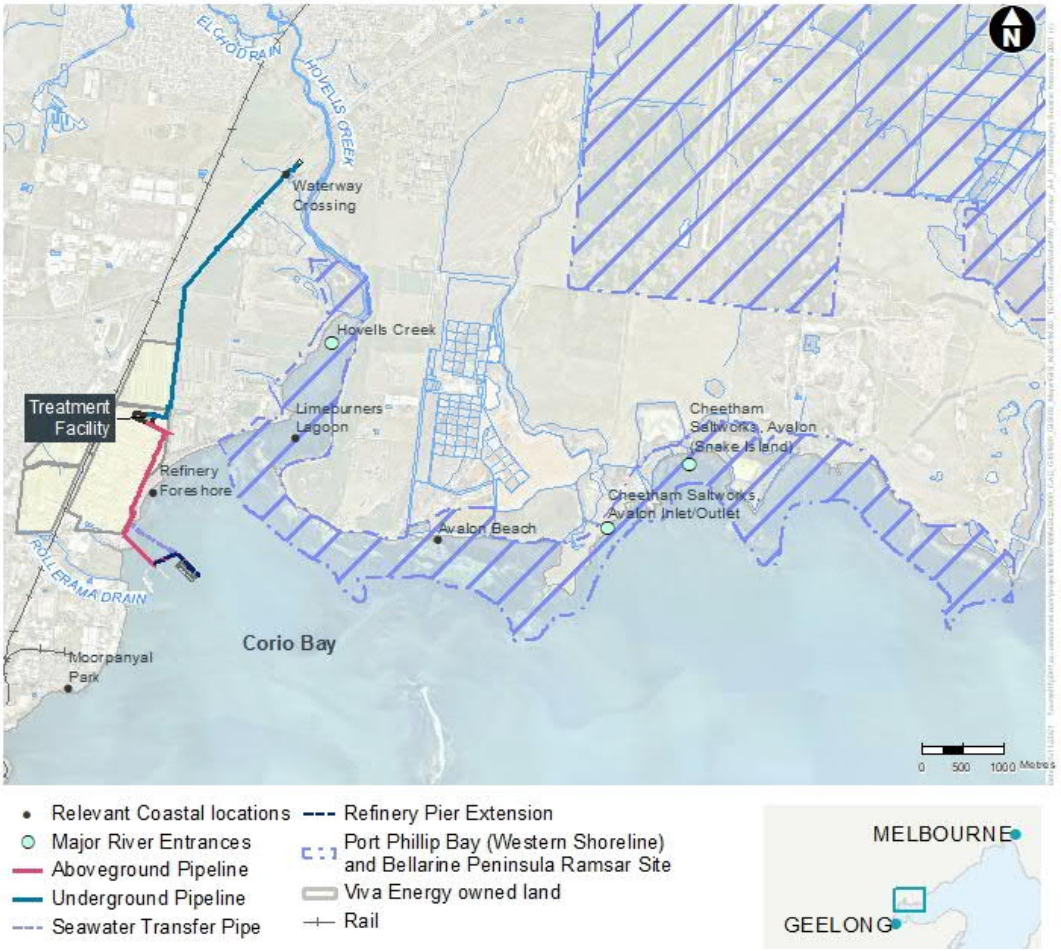

Figure 5: Limeburners Bay Ramsar Wetland Boundary and the project

5.3 Flood characteristics

The project is not located within a floodplain and does not intersect any low-lying or flat areas that are subject to flooding. There are 1% Annual Exceedance Probability (AEP) flood extent and historic flood overlays (DELWP, 2018) present downstream of the southern boundary of the project, however, none of the project components, including the above ground and underground pipelines and treatment facility, intersect with any flood overlays.

Floodwaters from surrounding inundated areas drain to the Hovells Creek floodplain, which flow into the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site and Corio Bay. The extent of 1% AEP flood is shown in Figure 6. There are no flood protection assets (e.g. coastal levees) within or downstream of the project area.

5.4 Geomorphology

Inland from the coast the area is generally quite flat and low-lying ranging between 7 and 15m above sea level. Quaternary basalt flows cover the gently undulating plains and overlie flat-lying marine and

non-marine Tertiary sediments. The refinery is situated on low-lying terrain and southern parts of the site have been reclaimed with fill (URS/CSIRO, 2007).

The Corio Bay area is a broad area of lowland (Moolap and Connewarre Lowland) extending between Stingaree Bay at Geelong to the Bass Strait coast at Breamlea. The shoreline is a combination of cliffs, rocky foreshores with narrow beach widths and low angle fine grained sediment beaches with little to no dune formation. There is minimal sediment transport in this area due a lack of material and low wave action (Cardno, 2016).

5.5 Sea level rise

Sea level rise is the primary climate-change related hazard that will impact coastal environments. predominantly through inundation and erosion. As recommended by CCMA, a coastal hazard assessment done by Cardno (2016) has been considered to identify how potential surface water impacts of the project may increase as a result of climate change induced sea level rise. Figure 7 shows inundation extent for 1% AEP plus 1.4m Australian Height Datum (AHD) storm-tide level (STL) (the highest storm-tide level scenario) projected for the year 2100.

For areas along the refinery foreshore and Limeburners Lagoon, inundation is projected to be the key issue rather than erosion. Along the foreshore, there would be a small projected increase in flooding of the low-lying foreshore and along the drainage channels. The inundation hazard in these areas is mostly to the road and stormwater infrastructure.

Saline inundation at Limeburners Lagoon is considered to be of low significance. The ground elevations are low along the floodplain of Hovells Creek and the lagoon, however, the floodplain is bounded by a steep rise to higher land which would limit the extent of inundation (Cardno, 2016).

As shown in Figure 7, the onshore section of the project is not anticipated to be impacted by sea-level-rise projected for the year 2100 and is therefore not discussed further in this study.

Potential impacts on the project from climate change is described in EES Attachment II: *Risk to the project from climate change*.

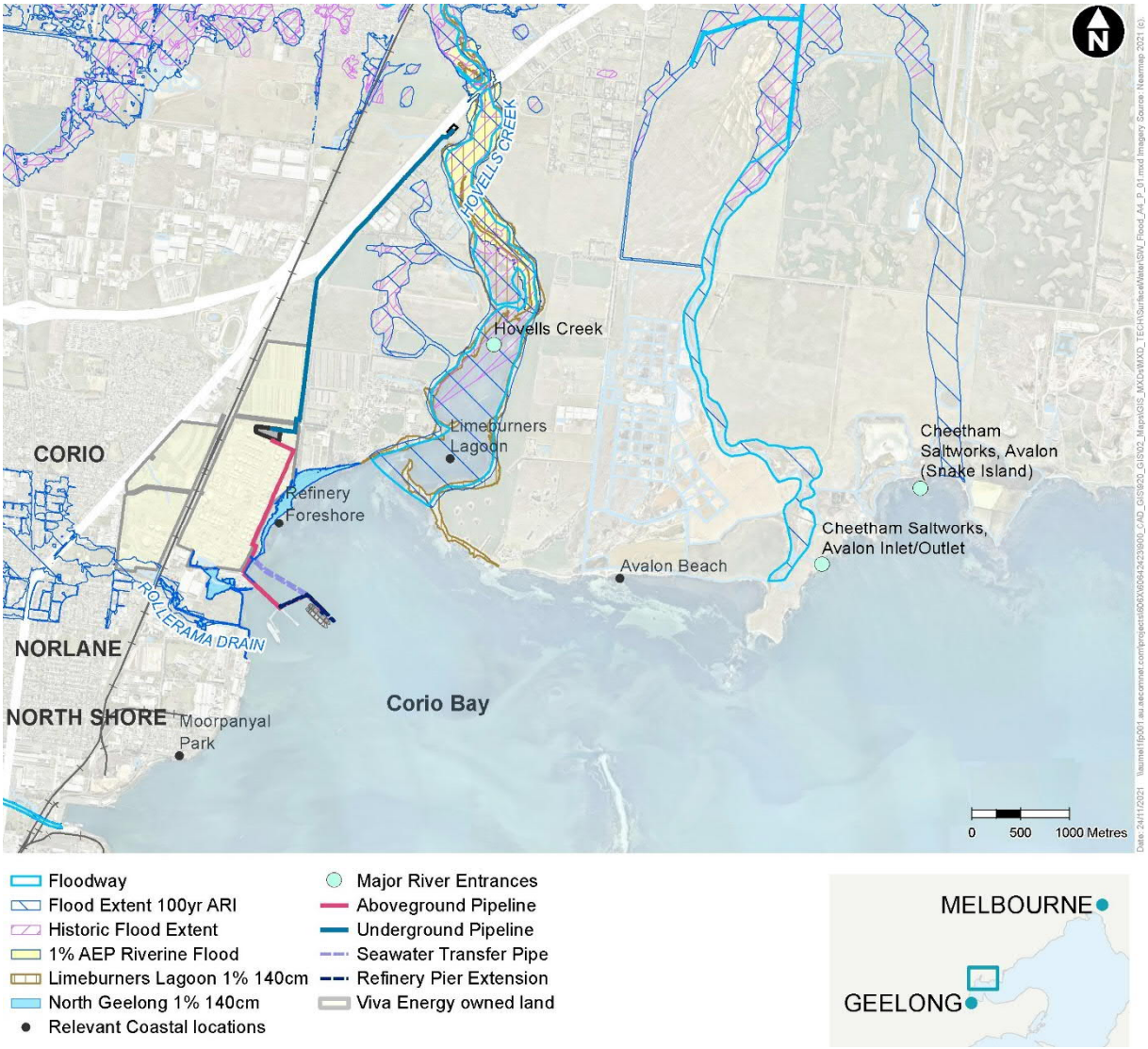

Figure 6: Flood overlays (FO) within the Hovells Creek floodplains bisected by the project area

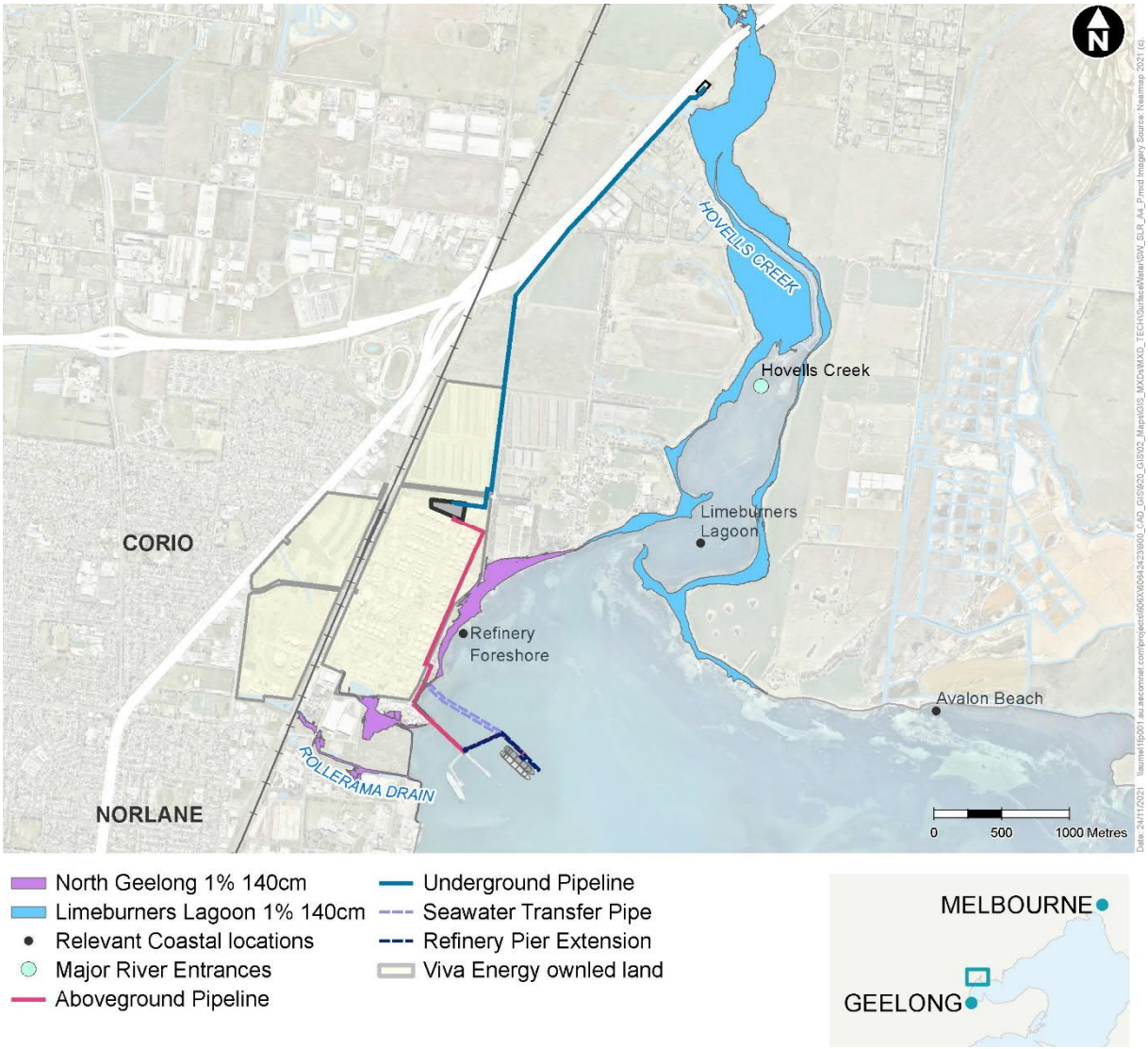

Figure 7: Sea level rise impact projection with 140 cm STL for year 2100 (Cardno, 2016) - Limeburners Lagoon and Refinery Foreshore

5.6 Water quality

In terms of water quality in the region, the Index of Stream Condition (ISC, 2010) indicates that there are no waterways or streams in good or excellent condition in the highly modified Moorabool basin, and that majority of stream reaches are rated as being in moderate or poor condition (Waterwatch Victoria (2020), CCMA, (2014)).

The Index of Wetland Condition (IWC) shows that water quality in Port Phillip Bay, including Limeburners Lagoon, is in overall good condition but can vary, particularly after heavy rain. This is also dependent upon the quality of water from rivers and catchments upstream entering the Bay (CCMA, 2014).

Water quality and the hydrological regime of the Ramsar site supports flora and fauna communities, and therefore, it is important to maintain hydrological characteristics to support the existing habitat and ecological conditions. CCMA (2014) identified the following key risks to the Ramsar site:

- water flow alteration which may change the quantity of water in lagoons and marshes
- pollutant spill and acidic leachate
- erosion resulting in increased sediment and turbidity.

5.7 Waterways

As part of this study, Vicmap Hydro GIS layers were obtained from DELWP Spatial Datamart (DELWP, 2018a, c) to identify any hydrological features within the project area including watercourse networks, farm dams, springs, waterfalls and flood protection features.

There is one unnamed minor watercourse (UFI: 44723391) located within the project area. The underground pipeline would cross this ephemeral artificially constructed watercourse located within the Hovells Creek Reserve, prior to reaching the tie in point to the SWP at the northern end of the pipeline corridor (refer to Figure 8).

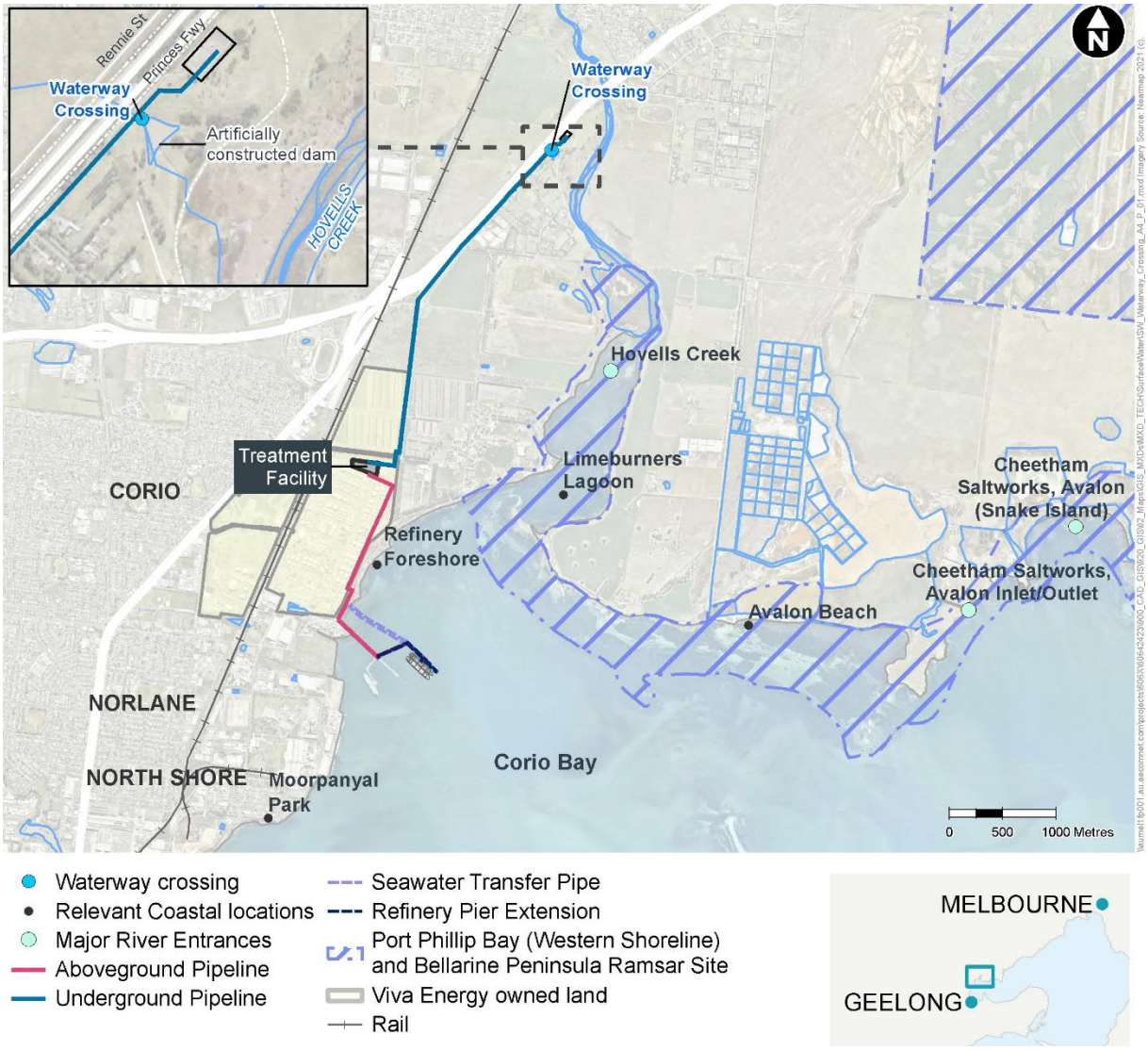

Figure 8: Proposed waterway crossing within the project area

The minor watercourse is an artificially constructed, approximately five metre wide rock lined channel with low hierarchy (contains low or minor importance features). The watercourse flows from the north-west beneath Rennie Street and the Princes Highway before draining into an artificially constructed dam shown in Figure 9. This dam is a low point in the landscape which fills up after heavy rainfall events. At the edge of the dam, the hill then slopes down to Hovells Creek where overflow from the dam flows into the creek. The dam only flows into Hovells Creek when there is a significant rainfall event overfilling the dam.

The Westernport-Altona-Geelong (WAG) crude oil pipeline, the black oil pipeline (BOPL) and the APA Brooklyn – Corio Gas Pipeline all currently run under this minor watercourse.

Figure 9: Dam which the ephemeral watercourse flows into, prior to entering Hovells Creek

Waterway crossings and repairs to existing crossings of designated waterways require approval from CCMA, which is responsible for the control, management and authorisation of works and activities in or over designated waterways in the CCMA's waterway management district. The CCMA authorises works on designated waterways via an authority permit in accordance with the CCMA's by-law No.4, Waterways Protection (CCMA Flood Portal, 2020). A works on waterways application will be required to be submitted to the CCMA and approved prior to crossing works commencing on the artificially constructed waterway located within Hovells Creek Reserve at the northern end of the project area.

5.8 Environmental values

The Environment Reference Standard (ERS) is promulgated under section 93 of the *Environment Protection Act 2017 (Vic)* (Environment Protection Act). It sets out the environmental values of the ambient air, ambient sound, land and water environments that are sought to be achieved or maintained in Victoria and standards to support those values.

Environmental values are the uses, attributes and functions of the environment that Victorians value. Standards for the environmental values are comprised of objectives for supporting different uses of the environment and indicators that can be measured to determine whether those objectives are being met. Accordingly, environmental values of Victoria's waterways that are of relevance to the project are listed below. These values have been selected based on their relevance to waterways in the vicinity of the project area:

- Water dependent ecosystems and species Human consumption of aquatic foods
- Water-based recreation.
- Agriculture and irrigation
- Traditional Owner cultural values

A summary of environmental values associated with waterways in the vicinity of the project area are summarised in Table 5-1.

Table 5-1: Environmental values within or adjacent to the project sites

Waterways in the vicinity of the project area	Environmental values
Hovells Creek and its tributaries	Water dependent ecosystems and species: (Slightly to moderately modified) • Agriculture and irrigation • Traditional Owner cultural values • Water based recreation • Human consumption of aquatic foods
Estuaries and inlets – Limeburners Lagoon	Water dependent ecosystems and species: (Slightly modified) • Water based recreation • Traditional Owner cultural values • Human consumption of aquatic foods

6.0 Construction impacts

This section provides an overview of the potential surface water impacts associated with construction of the project. Construction activities have the potential to impact local and downstream sensitive receiving waterbodies and watercourses through the mobilisation of sediment, changes in water quality, changes in stream hydrology/stability and pollution incidents (e.g., spills) as well as alteration in downstream flood behaviour if not managed properly. To manage potential impacts to surface water during the construction phase, appropriate mitigation measures have been recommended.

6.1 Flooding impacts

Construction activities undertaken in flood prone areas, such as stockpiling of spoil material, has the potential to change floodplain function and increase flood levels. However, given that the project is not located within a floodplain, and no project component would intersect with any low-lying or flat areas that are subject to flooding, construction of the project would not result in any impacts associated with increased flooding and therefore no mitigation measures have been recommended.

6.2 Water quality impacts

6.2.1 Dewatering

Following a rain event during construction of the project, it may be necessary to pump surface water out of open trenches or excavated areas which has accumulated from direct rainfall or from surface water runoff. Water collected from open trenches may contain sediments and other pollutants from surface run off. Dewatering may also be required in the event that groundwater is encountered during construction, however, this is considered unlikely and is discussed further in EES Technical Report F: *Groundwater impact assessment*. If water collected from trenches is not managed appropriately, there is potential for water with high sediment content or pollutants to enter nearby sensitive receptors, such as Hovells Creek and Limeburners Lagoon.

Wherever possible, water collected from excavated areas should be recycled or reused for construction activities such as dust suppression. Where this is not possible, water collected from excavated areas should be treated if turbidity exceeds EPA requirements prior to discharging. Water in trenches which may contain other contaminants should be tested and discharged or disposed of in accordance with surface water management and contamination protocols which should be outlined in a Construction Environmental Management Plan (CEMP). Water from excavated areas should not be discharged directly into or within 20 metres of any watercourse. Discharge of collected water should be to low gradient areas to avoid soil erosion or sedimentation of land or water. Where required, sediment control devices to remove suspended soils and dissipate flow should be used (see mitigation measure MM-SW01).

Pollutants associated with contaminated groundwater and measures to manage groundwater in the event that it is encountered during construction activities are discussed in EES Technical Report F: *Groundwater impact assessment* and EES Technical Report G: *Contamination and acid sulfate soils impact assessment.*

6.2.2 Runoff from disturbed areas

Temporary construction works would involve disturbance activities such as excavation of the underground pipeline trench and the treatment facility site which would involve the stockpiling of spoil material. HDD sites would also result in disturbed surfaces at entry and exit points where trenchless construction is proposed. Runoff from excavated trenches, disturbed surfaces and stockpiled material has the potential to increase sediment loads and turbidity in receiving water bodies. There is also the potential for these sediments to contain pollutants including contaminated sediments, oils and/or chemicals. If increased sediment loads reach nearby waterways and enter the Ramsar site downstream, this may impact on waterway health and aquatic vegetation.

In order to manage runoff from disturbed areas, flow diversion banks should be placed upstream of the spoil material, and an overflow spillway should be constructed to allow runoff from external catchments to pass over the spoil material at a controlled location without causing erosion and potential sedimentation to receiving waterbodies. During the construction works, sediment control devices such

as bunding or silt fences should be set around stockpiled material, earthworks and disturbed areas to minimise loss of sediment to the receiving environment (see MM-SW02).

HDD is proposed along the northern section of Shell Parade and the southern section of Macgregor Court as shown in Figure 2. HDD could also occur along the northern section of MacGregor Court, however, this would be confirmed during detailed design. A thrust bore crossing for the underground pipeline is proposed on School Road, just north of the treatment facility as shown in Figure 2. Installation of the aboveground pipeline through a culvert beneath Shell Parade would also occur via trenching or thrust boring. Drilling muds used for HDDs should be managed to avoid them entering waterbodies. Earth bunds and/or drainage channels should be placed around the upper edges of drill sites and work areas to divert natural runoff around and away from the site and prevent mixing with drilling compound runoff. Sump pits should also be constructed at the bottom of the drill sites. The sump pit should be positioned to capture runoff from the drilling compound (see MM-CO06 in Technical Report G: *Contamination and acid sulfate soils impact assessment*).

6.2.3 Watercourse trenching

Trenching through watercourses to install the pipeline could increase the potential for sediment to be transported downstream during a rain event. Primarily, open trenching is used for waterways that are heavily degraded and/or do not have the potential to convey significant volumes of water during rainfall events, meaning the likelihood of sediment mobilisation from construction works during these events is low.

Only one minor artificially constructed watercourse would be crossed by the underground pipeline which is proposed to be trenched. This watercourse is highly modified and has been trenched for several previous pipelines. This is an ephemeral watercourse, meaning it lacks a consistent surface water flow for majority of the year, and generally only contains water following a rain event. Given this watercourse is within close proximity to Hovells Creek and can potentially drain into the creek during a rainfall event, there is the potential for sediments to be transported downstream into Hovells Creek. However, as the watercourse does not convey significant volumes of water, it is anticipated that trenching could be undertaken with appropriate mitigation measures to avoid potential impacts.

Where practicable, to avoid potential sedimentation impacts, the watercourse crossing should be constructed during no flow conditions and reinstated as soon as possible. Weather forecasts should also be monitored to avoid having the watercourse trench open when high rainfall events are expected. All obstructions to flow, if there is any flow, should be removed as soon as practicable after the pipe is laid and backfilled (see MM-SW03).

6.2.4 Spills

There is potential for spills to occur during construction, including fuels or other liquid pollutants, associated mostly with refuelling and other liquids used during construction activities. The primary concern with this potential impact is the possibility of hazardous materials entering Hovells Creek and the Limeburners Bay component of the Ramsar site.

To avoid potential spills occurring, the storage of fuels and chemicals on site should be minimised and should not be stored close to waterways or areas within proximity to the wetland. If a spill were to occur, to minimise potential impacts, spill kits should be available at locations where machinery/plant equipment is operating, as well as refuelling points and fuel and chemical storage locations. Refuelling of vehicles and machinery should be undertaken in a designated refuelling area with auto shut off valves and should not occur within 20 metres of a receiving watercourse (see MM-CO08 in Technical Report G: *Contamination and acid sulfate soils impact assessment*).

6.3 Summary of residual construction impacts

Residual impacts to surface water associated with the construction of the project are considered to be minor on the basis that industry standard mitigation measures are adopted. It is unlikely that the project would have impacts on nearby sensitive receptors, including Hovells Creek and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

Trenching and laying of the underground pipeline is expected to take approximately four months and would be undertaken progressively along the pipeline route, with completed sections being rehabilitated as construction progresses. Given the short construction timeframe and short length of

the underground pipeline, (less than 4 kilometres as certain sections of the underground pipeline would be constructed using trenchless construction techniques), it is unlikely that temporary construction works would impact on surface water and nearby sensitive receptors. Potential impacts associated with site dewatering, runoff from disturbed areas and potential spills can be effectively avoided and minimised with the implementation of recommended mitigation measures.

As outlined above, while the single waterway crossing required for the project would occur close to Hovells Creek, it could be trenched and reinstated with minimal short-term impact. It is expected that the proposed trenching associated with the pipeline would be undertaken during dry periods and immediately reinstated to its current condition. With the implementation of the recommended mitigation measures, the potential for sedimentation impacts to affect water quality in Hovells Creek or the Ramsar site would be negligible.

Construction activities would be required to comply with regulatory requirements including *Australian Pipelines and Gas Association 2017 Code of Environmental Practice - (Onshore Pipelines) Revision 4* and *Land-based pipeline construction (IECA Appendix P)* as well as guidance documents issued for storage of chemicals and fuels such as *Liquid storage and handling guidelines. EPA 2018*, *Code of Practice: The storage and handling of dangerous goods* and *Pipelines Act 2005*. Potential impacts associated with potential leaks or spills during construction can effectively be avoided, minimised and managed with the implementation of recommended mitigation measures.

7.0 Operation impacts

This section provides an overview of the potential surface water impacts associated with operation of the project. An increase in impervious areas at the treatment facility may pose a risk to runoff water quality. The potential for spills to water during operation of the treatment facility is also assessed in this section. To manage potential impacts to surface water during the operational phase, appropriate mitigation measures have been recommended.

7.1 Flood levels

Once constructed, there would be no permanent change to surface topography other than minor changes associated with the treatment facility at the existing refinery site. The below ground pipeline would be fully covered once constructed and the aboveground pipeline would run along existing pipe tracks and therefore there would be negligible change to the surface topography. No area of the project or the existing refinery is located within a floodplain or low-lying areas that are prone to flooding. Therefore, the project would not result in increased flood levels during the operation of the project and no mitigation measures have been recommended.

7.2 Water quality impacts

The treatment facility located on the existing refinery site would result in a small increase in impervious area associated with structures which may increase local runoff. There is potential for this runoff to reach nearby waterways and impact on sensitive receptors. However, this runoff is not expected to be detrimental to receiving waterways and nearby sensitive receptors due to the small volume generated and the fact that runoff would be managed in accordance with existing practices currently in place for refinery operations.

The proposed site for the treatment facility will be approximately 80 metres by 120 metres, in an area that is currently used as an existing laydown area at the refinery. Stormwater runoff after a rainfall event from the treatment facility should be treated and managed in accordance with the refinery's existing run-off water system. In a wet weather event, controlled discharge facilities (CDF) at the refinery provide storage for the 'first flush' of rainwater, which is considered to be the most contaminated run-off water. Once the CDF basins are full, subsequent run-off water is allowed to discharge directly into Corio Bay in accordance with EPA licence requirements.

This type of CDF 'buffering basin' is capable of capturing and buffering a specific volume of run-off water from an upstream catchment area for a specific design storm event. Run-off that accumulates in the buffering basin will then be pumped out under automatic level control to a downstream treatment facility prior to being discharged into Corio Bay.

Run-off from a rain event at the treatment facility would be unlikely to reach nearby waterways and sensitive receptors prior to being treated and it is therefore unlikely that surface water run-off from the treatment facility would result in any adverse water quality impacts.

There is a potential for spills of fuels or other hazardous substances during the operational phase of the project, particularly associated with the treatment facility. However, due to the absence of watercourses in the area surrounding the treatment facility and the management measures that will be in place, the potential for a spill to enter into waters supporting environmental values such as those in the Ramsar site are limited and should be readily manageable using standard industrial spill control measures (see MM-CO08 in Technical Report G: *Contamination and acid sulfate soils impact assessment*).

7.3 Summary of residual operation impacts

Residual impacts to surface water associated with operation of the project are considered to be minor with the implementation of industry standard mitigation measures and by utilising existing management practices currently in place at the refinery. It is highly unlikely that the project's operation would have surface water impacts on nearby sensitive receptors, including Hovells Creek and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

Run-off water management systems in place at the existing refinery would ensure run-off from a rain event at the treatment facility is captured and managed effectively so as to not impact on nearby sensitive receptors.

The potential impacts of a spill would be minor as the treatment facility is not located within proximity to any watercourses nor would it reach nearby sensitive receptors. The treatment facility and operational practices should be undertaken in accordance with *Liquid storage and handling guidelines. EPA 2018* and *Code of Practice: The storage and handling of dangerous goods*.

8.0 Decommissioning impacts

Potential impacts associated with decommissioning works of the project are likely to be the same or similar to those associated with the construction phase, however, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts. With recommended mitigation measures in place, the potential for impacts on Hovells Creek and the Ramsar site from decommissioning of the project would be negligible.

9.0 Recommended mitigation measures

This section outlines the mitigation measures recommended for surface water management to avoid, minimise and manage the potential impacts to surface water imposed by the project's construction (Section 6.0) and operation (Section 7.0).

The recommended mitigation measures are applicable to the construction, operation and decommissioning phases and, if implemented, would ensure that the project minimises adverse effects on water quality within the project site and downstream waterbodies. Implementation of these measures would ensure that the project works should not have significant or ongoing effects on downstream surface water and environmental values.

Table 9-1 outlines mitigation measures recommended to be applied.

Table 9-1: Recommended water quality mitigation measures

Mitigation measure ID	Mitigation measure	Implementation phase
MM-SW01	**Discharge water** The CEMP should include surface water management strategies including: Depending on rainfall, soil condition and groundwater table, dewatering may be required particularly associated with pipeline trenching. The following mitigation measures are recommended for management of excavated water: a. Water collected from excavated areas should be recycled and reused for construction activities such as dust suppression. b. Where discharge to waterbodies is unavoidable, water should be collected and treated if turbidity exceeds EPA requirements prior to discharging. c. Discharge to land should not occur within 50 metres of watercourses or be discharged directly into stormwater drains. d. Construction activities to conform to the surface water requirements of the *Environment Protection Act 2017* e. Site management mitigation measures should include vehicle wheel wash and rumble bars at worksite egress points, appropriate placement of material stockpiles and chemical storages, covered loads, street sweeping and water quality monitoring, where required. f. Discharge of water to land should avoid soil erosion or sedimentation of land or water. Sediment control devices such as silt fence to remove suspended solids and dissipate flow should be used where required. g. Water should not be discharged to waterways, wetlands or into stormwater drains without approval from relevant authorities. h. Water should be tested for pH and salinity prior to discharge to land. pH and salinity should not exceed acceptable limits in EPA guideline. i. Water that cannot be treated to meet the relevant discharge criteria should be disposed to an EPA Victoria licensed facility.	Construction

Mitigation measure ID	Mitigation measure	Implementation phase
	j. Relevant landholder(s) and water authorities should be consulted, and permission obtained prior to discharge to land. k. Discharge should be to low gradient, stable, grassed areas and be undertaken in accordance with landholder requirements and through “irrigation type” systems to prevent scour or erosion. Visual monitoring during land discharge should be undertaken to ensure water does not enter existing waterways and/or wetlands. Groundwater encountered during construction of the pipeline should be managed in accordance with mitigations outlined in EES Technical Report F: *Groundwater impact assessment*.	
MM-SW02	**Managing runoff** a. Obstructions to flow should be removed. b. Flow diversion banks should be placed upstream of spoil material if required. c. An overflow spillway should be constructed to allow runoff from external catchments to pass over the spoil material at a controlled location without causing erosion. d. During the works, sediment control devices such as bunding or silt fences should be set around stockpiled material, earthworks and disturbed areas to minimise loss of sediment to the receiving environment. e. Temporary diversions should be provided to allow flow around the excavation area.	Construction

Mitigation measure ID	Mitigation measure	Implementation phase
MM-SW03	**Watercourse trenching** Where trenching is undertaken over a watercourse the following mitigation measures should be undertaken: a. Undertake works in accordance with APGA guidelines. b. Where practicable, all trenched watercourse crossings should be constructed during no flow conditions and reinstated as soon as possible. c. Weather forecasts should be monitored to avoid having open trenches at the waterway when high rainfall events are expected. d. Where watercourses are trenched, all obstructions to flow should be removed as soon as practicable after the pipe is laid and backfilled. e. Trenching on both sides of the waterway should be fully excavated and prepared prior to undertaking the final section of trenching over the waterway. f. Waterway reinstatement should be carried out in consultation with the CMA. g. The exposed trench within the watercourse should be reinstated immediately following the installation and commissioning of the pipeline, including providing suitable compaction and revegetation. h. Waterway reinstatement should be designed to avoid future erosion. This may include the use of riprap made of stones and fabric mesh to stabilise the waterway. i. If necessary, a geofabric should be provided to prevent erosion and scour until the vegetation has established. j. Visual monitoring should be undertaken downstream of the trench during flow events if the trench has not been reinstated. k. Sediment control devices such as silt fences should be used to remove suspended solids and dissipate flow where required.	Construction
MM-SW04	**Capture and treat runoff from treatment facility** Runoff from the treatment facility after a rain event should be captured and managed by the controlled discharge facilities (CDF) in place at the refinery.	Operation

9.1 Environmental monitoring

Recommended mitigation measures outlined above in Section 9.0 should be incorporated into the CEMP. The CEMP should include best practice measures to monitor, manage and avoid surface water impacts in line with relevant Victorian legislation and policies.

The project CEMP should be developed in accordance with the Civil construction, building and demolition guide (EPA Publication 1834) and EPA Victoria (1991) Construction Techniques for Sediment Pollution Control (EPA Publication 275. Methods to implement the CEMP can be also

informed by the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Appendix P (2008).

Compliance with the CEMP and mitigation measures will be monitored. Monitoring may include periodic inspections and audits of construction work areas and the operation of project component once constructed to verify and confirm the effectiveness of mitigation measures implemented.

Water quality monitoring for waterway (UFI: 44723391) is not recommended for the project as the waterway within the site is ephemeral and sampling could only be undertaken immediately following a rain event. Visual inspections should be undertaken to monitor the establishment of vegetation and the landform post trenching of the waterway.

10.0 Conclusion

The objective of this assessment was to determine the potential impacts of the project on the receiving surface water environment (including waterways and wetlands) and to identify management and mitigation measures where appropriate to avoid, minimise and manage potential impacts.

It was identified that construction activities have the potential to impact local and downstream sensitive receiving waterbodies and watercourses through the mobilisation of sediment, changes in water quality, changes in stream hydrology/stability and pollution incidents (e.g. spills) as well as alteration in downstream flood behaviour if not managed properly. However, the impact assessment concluded that with appropriate management measures in place, it is unlikely that construction of the project would have impacts on nearby sensitive receptors, including Hovells Creek and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

Given that the project is not located within a floodplain, and no project component would intersect with any low-lying or flat areas that are subject to flooding, it was concluded that construction of the project would not result in any impacts associated with increased flooding.

Dewatering from excavations after a rain event was identified as a construction activity that has the potential to impact surface water quality. However, given the short construction timeframe for trenching activities (approximately four months), the short length of the excavated area (less than four kilometres as certain sections of the underground pipeline would be constructed using trenchless construction techniques), progressive trenching and reinstatement and implementation of appropriate management strategies and techniques for excavation water through the CEMP, this impact could be adequately managed to avoid and minimise potential impacts. Runoff from disturbed areas was also identified as a potential issue which could result in surface water quality impacts, however, with standard runoff management techniques in place potential impacts could be readily managed. Potential impacts associated with potential leaks or spills during construction can effectively be avoided, minimised and managed with the implementation of appropriate fuel and chemical management measures and spill containment and management procedures.

While a single minor waterway crossing is required for the project close to Hovells Creek, the crossing would be trenched and reinstated with minimal short-term impact. It is expected that the proposed trenching associated with the pipeline would be undertaken during dry periods and immediately reinstated to its current condition. With implementation of the recommended mitigation measures contained in this report, the potential for sedimentation impacts to affect water quality in Hovells Creek or the Ramsar site would be negligible.

The study found that adverse impacts on surface water quality are minimal during the operational phase for the project. No substantial changes to the existing drainage systems are proposed and there are no expected modifications to existing topography or to surface water flow direction. During project operation, run-off water management systems in place at the existing refinery would ensure run-off from a rain event at the treatment facility is captured and managed effectively so as to not impact on nearby sensitive receptors. The potential impacts of a spill would be minor during operation as the treatment facility is not located within proximity to any watercourses nor would it reach nearby sensitive receptors. The treatment facility and operational practices should be undertaken in accordance with *Liquid storage and handling guidelines. EPA 2018* and *Code of Practice: The storage and handling of dangerous goods* to ensure potential impacts are minimised further.

Potential impacts associated with decommissioning works of the project are likely to be the same or similar to those associated with the construction phase, however, the overall level of impact would be lower due to the nature of decommissioning activities. These impacts should also be managed with the implementation of the same mitigation measures as those proposed for construction impacts. Therefore, impacts on Hovells Creek and the Ramsar site from decommissioning of the project would be negligible.

The impact assessment found that, with appropriate mitigation measures in place, waterway quality and function would be protected from any adverse consequences caused by the construction, operation or decommissioning of the project and the EES evaluation objective can be met.

11.0 References

Australia, G. (n.d.). *National Surface Water Information*. Retrieved from http://www.ga.gov.au/scientific-topics/national-location-information/national-surface-waterinformation

Cardno (2016). *Bellarine Peninsula - Corio Bay Local Coastal Hazard Assessment*

CCMA Flood Portal (2020). *Corangamite flood portal. Floodplain management*: https://www.ccmaknowledgebase.vic.gov.au/flood/cb_pages/floodplain_management.php

CCMA (2013). *Corangamite Regional Catchment Strategy 2013-2019*

CCMA (2014). *Corangamite Waterway Strategy 2014 – 2022*. http://www.ccma.vic.gov.au/Publications/Corangamite-Waterway-Strategy.aspx

CCMA (2010). *Wetlands in the Corangamite Region*.

CCMA (2019). *Marine and Coastal Biodiversity Fact Sheet,* https://ccma.vic.gov.au/wp-content/uploads/2019/08/Marine-and-Coastal-Biodiversity-Fact-Sheet-1_1301289130419.pdf

CSIRO. (1999). *Urban Stormwater - Best-Practice Environmental Management Guidelines.* CSIRO.

DELWP. (2020). *Flood Database*. Victoria.

DELWP. (2018a). *Surface Water Sites - active telem only*. Retrieved from Department of Environment, Land, Water & Planning: https://data.water.vic.gov.au/

Department of Environment, L. W. (2018b). *Designated Water Supply Catchments* (PWSC100).

Department of Environment, L. W. (2018c). *Statewide watercourse network* (VMLITE_HY_WATERCOURSE).

Department of Environment, L. W. (2018e). Retrieved from https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/wetlands/significant-wetlands

Department of Sustainability and Environment. (2009/10). *Index of Wetland Condition 2009/2010.* State Government Victoria.

DSE (2003). *Port Phillip Bay (Western Shoreline) and Bellarine Peninsular Ramsar Site: Strategic Management Plan*. Department of Sustainability and Environment, Victoria.

URS/CSIRO 2007 Work Plan for the Shell Geelong Refinery Ecological Risk Assessment of Corio Bay. Prepared for Shell Refining. 13 December 2007.

Victoria, E. (1995). *Construction Techniques for Sediment Pollution Control* (EPA Publication 275).

Victoria, E. (1996). *Civil construction, building and demolition guide* (EPA Publication 1834).

Waterwatch Victoria. (2020). *Waterwatch Data Portal*. Retrieved from Waterwatch Victoria: http://www.vic.waterwatch.org.au/water_data_portal.php

PAGE INTENTIONALLY LEFT BLANK