PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

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Queensland Government

ProjexPartners
PROJECT MANAGEMENT | ENGINEERING | PLANNING
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Design Report

REDLAND BAY FERRY TERMINAL

Pensar Structures

November 2021

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Our ref: 497-001

Pensar

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1 INTRODUCTION

Projex Partners have been engaged by Pensar Structures on behalf of SeaLink Travel Group (SeaLink) to undertake the detailed design of the Redland Bay Ferry Terminal upgrade. Currently, the facility consists of a single ramp used for vehicle services plus a service ramp and disused ramp on the northern side of the vehicular loading ramp. To improve services for their customers, SeaLink are proposing to upgrade the existing facility to provide two vehicle access locations to accommodate a new fleet of ferries with associated improvements to queuing, ticketing and access.

The site is located within Redland Bay vehicular ferry terminal is located at the eastern end of Weinam Street, Redland Bay. It is also within the Weinam Creek Priority Development Area (PDA) with development approvals coordinated by Economic Development Queensland (EDQ).

Figure 1-1: Redland Bay Vehicular Ferry Terminal Location

1.1 Purpose of Project

The project has been initiated by SeaLink following ongoing and increasing demand for vehicular ferry services within the southern Moreton Bay islands associated with development of the islands and commercial and recreational activities.

The current SeaLink fleet servicing southern Moreton Bay is aged, with limited capacity and ongoing maintenance needs.

SeaLink has initiated a program to replace their existing vehicular ferry fleet with new, larger vessels capable of providing enhanced vehicular services to the southern Moreton Bay islands.

The existing vehicular ferry terminal at Redland Bay is not capable of accommodating the enhanced fleet due to the increased vessel width, draft and length.

This project is intended to upgrade the existing Redland vehicular ferry terminal to provide:

- Berthing and loading facilities for two vessels
- Increased dredge basin and mooring facilities for the two loading vessels plus storage for an additional vessel within the dredge basin
- Enhanced vehicle storage capability within the site
- Upgraded and relocated fuel storage facilities to replace aged infrastructure
- Enhanced passenger facilities, including improved access and waiting facilities adjacent to the waterfront
- Enhanced site operational safety and facilities
- Compatibility with the Weinam Creek PDA masterplanning, including provision for the proposed Esplanade path
- Associated administration and administration facilities, storage and public utility plant to support the above.

Note that there is an additional project being undertaken by Redland City Council and SeaLink to upgrade the facilities on the islands to accommodate the upgraded vessels.

1.2 Future Operators

The proposed development enhances and supports the operation of a second vehicular ferry operator as nominated in the PDA planning by providing:

- A secondary berth to facilitate parallel operations.
- Additional vehicle storage and queuing for potential additional operator use
- Refueling, watering and waste disposal allowing parallel operations
- Additional ticketing facilities

It is noted that due to the leasehold arrangements, use of the berths by a second operator will be under a commercial arrangement with SeaLink (leaseholder).

Similar arrangements are currently in use elsewhere by SeaLink and others and are an accepted industry practice.

2 SITE DESCRIPTION

2.1 General Description

The site is located on Lots 1 & 2 SP261696 and 186 SL8029 at the end of Weinam Street, Redland Bay as shown in Figure 2.1 below. The property is 7039m^2 with approximately 4540m^2 within tidal zones.

Figure 2-1: Current Site Layout

2.2 Existing Features and Services

Currently, the facility consists of a single ramp used for vehicle services plus a service ramp and disused ramp on the northern side of the vehicular loading ramp. There are four entry lanes and one exit lane along with site carparking, fuel storage, ticketing and maintenance and operations facilities.

Underground, electrical, water, sewer and telecommunications services and an overhead electrical service are also present within the site.

2.3 Geotechnical Investigations

Initial geotechnical investigations have been undertaken to provide an assessment of the existing ground conditions expected under the expansion.

The Geotechnical Investigations Report is included as ***Appendix C*** and has provided input to the development of the design embankment and structures including:

- Specification requirements for the proposed embankment and revetment wall materials (including resistance to salt water)
- Pile depths for the major, load bearing structure at the ramp

- Design parameters for high level footings for lightly loaded structures (including storage shed and the ticket booth)
- Retaining structure parameters used in the sheet pile wall design

2.4 Survey and Bathymetric Survey

Survey of the existing site and underwater surface levels have taken place to inform the design and determine dredging requirements for the work. The survey was undertaken on 09/10/2020 and 13/01/2021.

3 ENVIRONMENTAL AND PLANNING

An environmental and planning constraints investigation has been undertaken on the site with the following key issues identified:

- The land is included in a priority development area (PDA), which exempts the works from assessment under the local Council planning scheme. Instead the works will require assessment against the PDA by the Minister for Economic Development Queensland (EDQ).
- The works extend over land described as Lot 2 on SP261696, Lot 1 on SP261696, Lot 186 SL8029 and Lot 1 on AP1696 and is under lands lease tenure, and include an area of unallocated State land.
- Land owners consent is required for works on land below high water mark. This is obtained from the Department of Resources.
- Land below HAT is located within the Moreton Bay Marine Park and will require a marine parks permit to be obtained prior to commencement of construction.
- The proposed development includes tidal works defined under the *Coastal Protection and Management Act 1995*, including the reconstruction of revetment walls, dredging of the seabed and provision of mooring piles to guide ferries berthing at the terminal. The works are not assessable under the *Planning Act 2016* as the site is confined to the PDA, but will require consideration by EDQ during the material change of use application as following the approval, operational work associated with the material change of use, including tidal works, will be exempt development. Due to the State Assessment and Referral Agency (SARA) typically assessing matters relevant to tidal work, the following codes have been assessed and provided with the supporting documentation: State Code 7 and State Code 8 and *Coastal Protection and Management Regulation 2017, Schedule 3*.
- The western extent of the allotments is mapped as being located within a koala priority area. However, field investigations have confirmed that the site does not harbour non juvenile koala habitat trees.
- Marine plants (mangroves) are present and impacts to these species will require consideration as mangroves are protected under the *Fisheries Act 1994*. However, Schedule 10, Part 6, Division 3 s.1(11)(c) of the *Planning Regulation 2017* precludes operational work that is the removal, destruction or damage of marine plants from being assessable development where the operational work is PDA-related development. Therefore, will require consideration by EDQ during the material change of use application as following the approval, operational work associated with the material change of use, including tidal works, will be exempt development, including the removal, destruction or damage of marine plants, will be exempt development. The will include assessment against State Code 11. Due to the construction/works of the proposed Redland Bay Vehicle Ferry Terminal Upgrade occurring within an urban area, it is arguable that all offset requirements are precluded under the *Environmental Offset Regulation 2014.*
- Where dredging of material in a year ranges between 1,000 to 10,000 tonnes an application for an Environmental Authority is required. Due to the dredging works involving the removal of 4500m^3 material from Moreton Bay, an application for an *ERA 16-(2)(a) dredging, in a year, 1,000t to 10,000t of material* is required. This will include assessment against State Code 22. The application will be lodged directly with SARA for assessment.
- Acid sulfate soils have been identified as present within the dredging site. Results of analysis indicate that the soils exhibit an absence of total actual acidity and high SCR results, however the presence of shell in the sediment significantly buffers the acid generating potential through neutralisation, resulting in only a low to moderate level of lime required to neutralise the acid generating potential of the soil; and
- Elevated levels of tributyltin were identified at one sampling location (S2). Nickel contamination was also identified at three locations. The most significant of these was located at the same point as the sample from which the elevated TBT analysis result was obtained.
- The existing ponded area on the northern side of the site (between the existing wall and the pier) is subject to intermittent tidal inundation only. The proposed works are not intended to change the tidal characteristics of

this area. Plans showing the existing and proposed tidal levels and extent of inundation on the northern side of the site are included in ***Appendix A***.

The environmental report is a standalone document produced by Future Plus Environmental and is not included within this design report.

4 DESIGN DETAILS

4.1 Proposed Layout

The proposed development is to consist of two ferry loading ramps along with 6 entry lanes, 1 holding lane and 1 exit lane. A storage building, ticket booth / administration building and fuel storage area are to be located at the entrance of the site. Footpaths and seating areas are also included in the new development.

A new grassed area is proposed along the southern boundary of the site and includes a swale drain to help improve water quality from the site. The northern boundary also has a swale drain that will manage the stormwater runoff from the northern portion of the site.

The site reclaims approximately 150m^2 resulting in a net area of approximately 2650m^2.

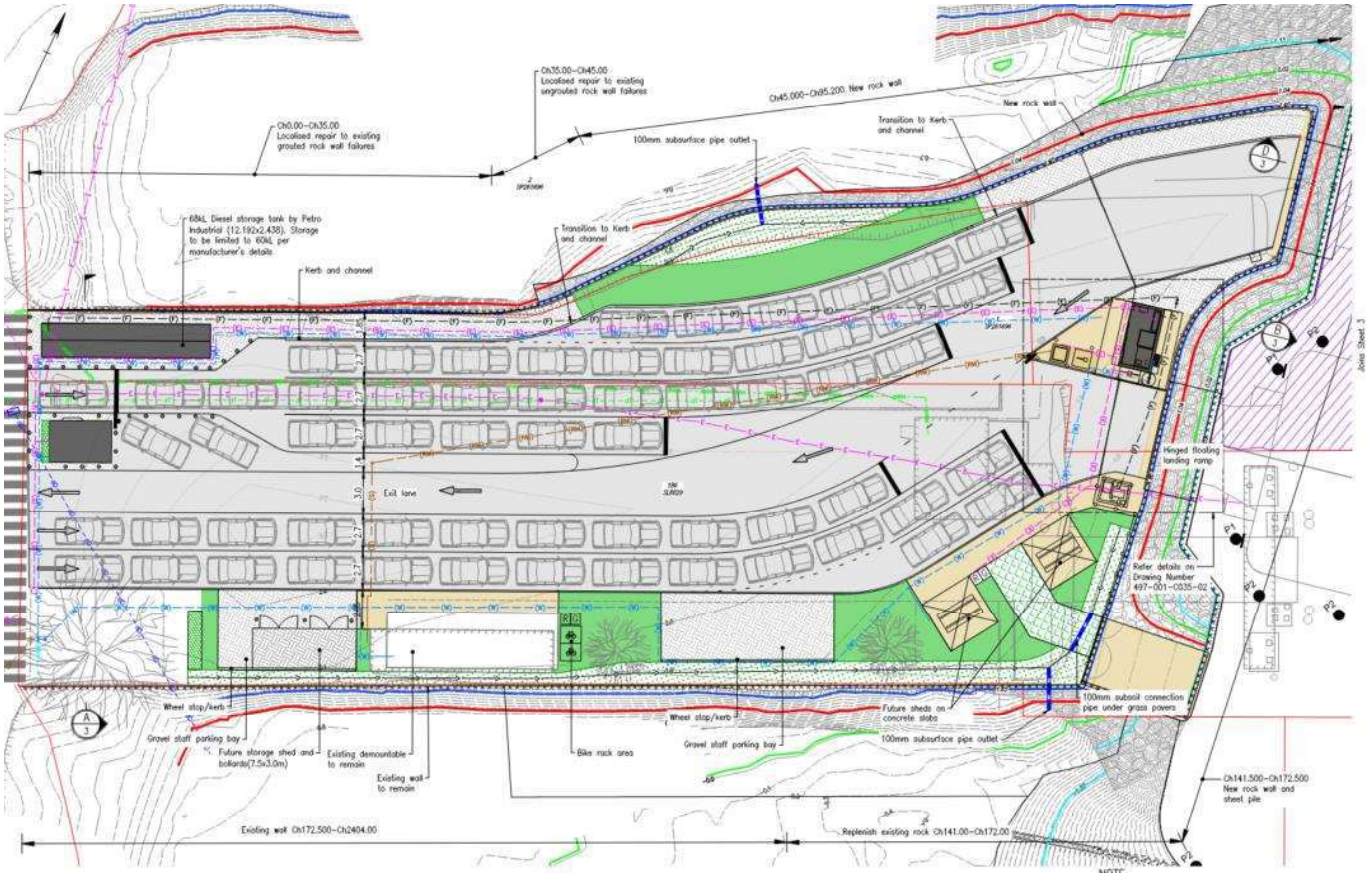

Figure 4-1: Site Plan

4.2 Water Treatment

Water on site requires treatment for quality and quantity as per:

- State Planning Policy (2017)
- Queensland Urban Drainage Manual (2017)
- Redland City Plan – Planning Scheme Policy 2: Infrastructure Works.

The swale drains will help improve water quality before discharging into the bay. Due to an increase in the total site area, stormwater runoff increases slightly. This slight increase has no impact on surrounding properties or infrastructure.

More information on stormwater management can be found in the Stormwater Management Plan in ***Appendix E***.

4.3 Coastal Processes Assessment

A coastal processes assessment was undertaken by JBP. This included the below:

- Tidal assessment
- Extreme wave assessment
- Peak currents
- Rock size estimation.

The findings are summarised below with the full report in ***Appendix D***.

4.3.1 Design Levels and Tidal Planes

Due to the location of the site, tidal levels will drive the design. Table 4-1 outlines the adopted design tidal planes and appropriate water levels used in the design.

Table 4-1: 2021 Tidal Plane Levels

Tidal Plane	Reduced Level (m) [Relative to AHD]	+0.8m (2100)
Highest Astronomical Tide (HAT)	1.65	2.45
Mean High Water Springs (MHWS)	1.04	1.84
Mean Sea Level (MSL)	0.02	0.82
Mean Low Water Springs (MLWS)	-0.93	-0.13
Lowest Astronomical Tide (LAT)	-1.33	-0.53
Seabed level	-3.35	-3.35

These tidal levels were derived from the Maritime Safety Queensland (MSQ) 2021 Semidiurnal and diurnal tidal planes.

4.3.2 Storm Tide Levels

Storm tide levels have been determined based on the 2100 storm tide level within Redland City Council's planning scheme.

Table 4-2: Storm Tide Levels (1% AEP Storm Event)

Year	Reduced Level (m) [Relative to AHD]
2021	2.51
2070	2.96
2100	3.23

4.3.3 Peak Currents

The peak currents were modelled at five locations. These are listed in the table below with the velocity.

Table 4-3: Peak Currents

Location	Pre Development (m/s)	Post Development (m/s)
Mangrove Area	0.02	0.01
End of Ramp	0.08	0.04

Location	Pre Development (m/s)	Post Development (m/s)
Dredging Area	0.06	0.07
100m offshore	0.14	0.13
200m offshore	0.50	0.50

4.3.4 Peak Wave Height

Waves encountered at the site are wind driven. Modelling was undertaken to determine peak wave heights at 5 locations during different storm events for the present day, 2070 and 2100. These are shown in the table below.

Table 4-4: Peak Wave Heights

Location	Depth (mAHD)	Present Day 1% AEP		2070 1% AEP		2100 1% AEP	
		Hs (m)	Tp (s)	Hs (m)	Tp (s)	Hs (m)	Tp (s)
1	-1.16	1.42	3.48	1.52	4.47	1.58	4.47
2	-3.55	1.50	3.48	1.59	3.95	1.64	4.47
3	-2.66	1.51	3.95	1.59	4.47	1.65	4.47
4	-2.35	1.54	4.47	1.62	4.47	1.67	5.07
5	-2.25	1.59	4.47	1.67	5.07	1.72	5.07

Locations are shown in Figure 4.2 below.

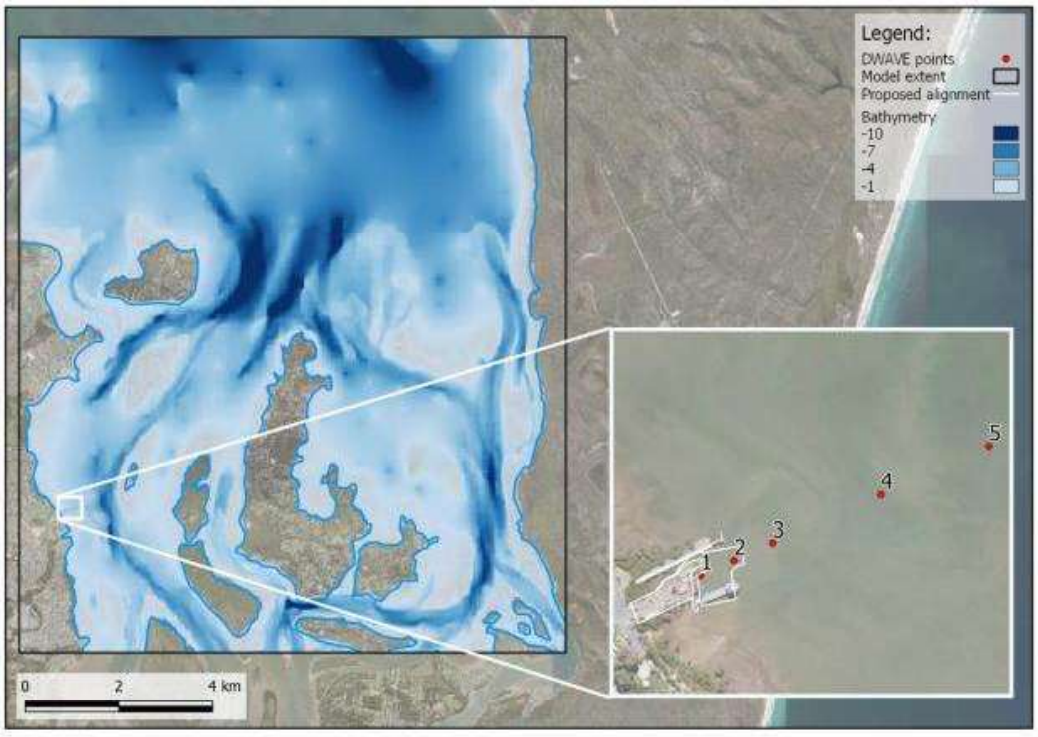

Figure 4-2: Peak Wave Height Locations

4.3.5 Rock Armour Size

Rock armour size was investigated as a possible batter stabilisation for the site. The rock was proposed to be used for the abutments and batters for the site. Two layers of rock, primary and secondary, can be used to protect the site. Rock has been sized for 0.5%, 1 % and 2% storm events with a factor of safety of 1.5 as well as 2 across present day, 2070 and 2100 conditions. The rock sizes range from Dn_{50} = 0.8m to 1.1m.

4.4 Vessel Details

SeaLink have provided plans for the proposed vessel upgrades (44.9m Catamaran Ropax Ferry) proposed for the route using the Redland Bay terminal (refer ***Appendix F***).

It is also noted the vessels in the existing fleet will utilise the terminal.

Table 4-5 outlines the key parameters in developing the design of the terminal infrastructure:

Table 4-5: Vessel Parameters

Vessel Draft (Loaded)	1.55m
Minimum hull clearance to seabed	0.5m approx.
Vessel Mass	145 Tonne

4.5 Loading Bridge

To enable access to the ferries, a floating loading bridge will be used. This bridge is similar to bridges used by SeaLink in other locations around Australia.

Large polyethylene floats are connected to the bridge via legs. With the bridge connected to the abutment, this allows the bridge to rise and fall with the tides to match the deck level of the ferries. The air within the polyethylene floats can be adjusted to allow the bridge to sink or float to match the deck level of empty or fully loaded ferries.

The loading bridge design drawings are attached in ***Appendix A***.

4.6 Abutment Design

The abutment for the site is proposed to be dumped rock, sized in accordance with the JBP report (***Appendix D***). This rock is sized appropriately to withstand the predicted wave actions during storm events.

Thrust generated from the vessels will also impact the abutment. To ensure the thrust does not dislodge the rock armour, the abutment across the front of the site where vessels land will have sheet piles installed to mean sea level with rock placed behind the wall. The sheet piles will protect the abutment and prevent rocks from dislodgement and becoming a hazard for the hull of vessels.

4.7 Fuel Storage

A future fuel storage is proposed on site to fuel vessels. A self-bunded fuel storage system with 68 kilolitre capacity has been incorporated in the design for future installation as part of a staged implementation plan subject to budget constraints. The capacity of this tank is to be limited to 58.8kL to comply with environmental regulation.

The tank will be located at the entrance to the site on the northern side of the ticket booth to facilitate easy access for refuelling operations and increase the distance to the Moreton Bay frontage compared to the existing fuel storage.

The tanks will connect to a pump located at the loading ramps via underground pipe network. The loading pump will be located within a bunded area to capture any spills or leaks that may occur.

The fuel tank systems are self-bunded to capture any leaks or spills.

4.8 Access Road and Carpark

The access road and carpark have been designed to provide maximum vehicle storage.

The design vehicle for developing vehicle turn paths is a Class 9 six axle articulated vehicle (19m semi).

The facility provides storage for 59 standard vehicles (cars).

Additional overflow storage for 6 vehicles exists at the entrance to the facility without impacting on operations of the adjacent carpark.

A layout for the site can be found in General Arrangement Sheet 2 within ***Appendix A*** and further details on the Traffic Impacts included in ***Appendix G***.

4.9 Pedestrian Access

Significantly improved access to the site, foreshore and ferries will be provided for pedestrians by providing improved pedestrian routes through the site.

Footpaths will be compliant to the Disability Discrimination Act (DDA) until the landing ramp. The landing ramp may not be compliant due to fluctuations in tidal levels impacting the angel of the ramp. Staff are present at all times to provide assistance, if required however it is noted that the primary function of this loading facility is for vehicular traffic. Passenger services are provided via the separate southern Moreton Bay islands passenger ferry service at Weinam Creek.

4.10 Structures

The existing administration / ticketing building on site is to be retained as part of the proposal and five new structures are proposed for the facility.

These include a ticket booth, storage shed (part of a future stage), two picnic shelters and a vessel servicing building. All these buildings are prefabricated and are able to be removed from site if required in the future.

4.10.1 Combined Ticket Booth and Administration

This building is intended to be up to 4.5m long x 3m wide and will include a service window to check vehicle tickets and provide tickets to passengers if required.

This building will be located at the entrance to the facility and is positioned to provide a single vehicle entry lane to access the ticket booth.

This building is to be a pre-fabricated structure of a single storey height.

4.10.2 Storage Shed

Provision has been made for a future storage shed as part of a future stage of the project on the western side of the existing administration building.

The storage shed will 7.5m x 3m and will have two doors located on the front for access. This building will be used to store maintenance equipment, vessel spares and other general items.

This building is to be pre-fabricated structure of single storey height with colourbond finish to match the other buildings on site.

4.10.3 Vessel Service Building

The vessel servicing building is located as close as possible to the vessel loading ramps to facilitate crew access for water-side vessel activities. This building replaces the existing facility adjacent to the existing fuel storage at the eastern extent of the site.

The building will store an air compressor, spill kit, waste oil tank, main switchboard and will also have an external shower and hose reel. A service pillar which includes air, power, water and light will also be installed next to this building.

This building is to be pre-fabricated structure of single storey height with colourbond finish to match the other buildings on site.

4.11 Utilities

4.11.1 Power

Power is currently supplied to the site via overhead electrical lines. A power pole is located in the north western corner of the site.

Energex are currently undertaken a reconfiguration of the lighting and electrical service supply on the Weinam Road and carpark frontage of the site. Energex have been requested to provide a point of supply for a new internal underground power supply network.

Concept designs for the electrical design (based on initial Energex advice for Point of Supply Location) are included in ***Appendix H.***

4.11.2 Lighting

The site is currently lit by a non-compliant network of overhead lights co-located with the electrical services.

It is proposed to upgrade this network to a lighting system suitable for the intended carparking use and SeaLink's operational requirements. It is noted that the area will be under traffic control for all hours of use, therefore a level of service appropriate to the use is being considered by the project team to reduce lighting spill and luminance impacts.

Concept designs of the lighting are included in ***Appendix H***.

4.11.3 Water

An existing 25mm water meter is located on the south western corner of the site. To improve water supply, this service is to be upgraded to a 63mm metered supply.

The old 25mm pipe within site is to be removed and replaced with the larger 63mm pipe.

25mm water services will be maintained to the existing administration building and provided to the ticket booth and the storage shed.

Approval for this service connection has been received from City Water (Redland City Council).

4.11.4 Sewer

Sewer for the site will connect to the existing sewer manhole via the existing discharge connection point within the site. Approval for this service connection has been received from City Water (Redland City Council) (refer ***Appendix I.***

The sewer line will service the facilities buildings and will also connect to the sewer pump used to pump waste from vessels.

Vessel sewer discharge is to be undertaken using a combined internal pumped risking main and gravity fed network from the vessel unloading point to the existing sewer discharge point.

4.11.5 Fuel

Fuel lines will be installed underground to connect the fuel discharge points at each berth with the fuel storage tank located at the facility entrance.

These are to be a proprietary system in accordance with the fuel supplier's specifications.

4.12 Miscellaneous Items

Due to the coastal environment, all items proposed for the upgrade of the development are to be suitable for the marine environment.

Equipment to be installed as part of the upgrade include service pedestals, spill kits, waste bins, hose reels, pumps (fuel, sewerage and water), waste oil tank, picnic settings and shade shelters.

Further details on these items can be found in ***Appendix G*** and in the Landscape Schedule in ***Appendix A***.