2. Project Need and Alternatives Considered

2.1 Project Need

Queensland is Australia's fastest growing state, with a strong emphasis on exports, particularly from the natural resources sector. Demand for coal has increased significantly over the past decade and the growth is expected to continue.

The Queensland Government's document entitled "CoalPlan 2030 – Laying the foundations for a future (Department of Infrastructure and Planning, 2010) summarises the projected increasing demand for Queensland Coal over the next 20 years from current production of 190 Mtpa to 340 Mtpa or more. In addition to the ongoing development of mines within the Bowen Basin, exploration and planning for development of mines within the Surat and Galilee Basins is a key industry focus.

The demand for terminal capacity for the export of coal from Queensland continues to push the limits of the available and planned coal export terminals within the state. Although linkages between the central Queensland rail systems have been developed to provide redundancy in the systems and to leverage off latent capacity which existed in some elements of the rail networks, it remains broadly true that the most cost effective and sustainable outcomes are those which rail to the nearest port on the coast. This has defined the catchments for each of the ports to date and will continue to do so in the future.

Building on the existing rail corridors into the Gladstone Region is the most appropriate gateway for the export of coal from the Surat Basin, southern Bowen Basin and potentially the southern Galilee Basin.

The RG Tanna Coal Terminal has reached the limit of its development capability and its capacity has been contracted fully to customers. The Wiggins Island Coal Export Terminal (WICET), with an approved capacity of approximately 80 – 85 Mtpa, has commenced construction of Stage 1 based on the capacity of 27 Mtpa being fully committed. It is also apparent that subsequent stages of WICET have received tonnage nominations from coal producers well in excess of its design capacity.

Recent proposals by coal producers and explorers to take up capacity in other proposed and approved coal terminals throughout the State have also been substantially oversubscribed. To meet demand locally in the Gladstone region, additional port sites are being pursued, such as Port Alma.

The ongoing opportunities to develop coal mines in the Surat Basin, southern Bowen Basin and potentially the southern Galilee Basin rely on having sufficient port capacity to export the coal.

3TL has briefed industry on the Project and has requested proposals to take up capacity in the terminal. Formal proposals from coal customers have resulted in the 50 Mtpa capacity being oversubscribed.

2.2 Alternatives

2.2.1 Port Site

The proposed terminal site is within the current Port of Gladstone limits and the Gladstone State Development Area which has been identified as a suitable area for this type of development. Adjacent coal export developments or terminals (existing and approved) include the R.G. Tanna Coal terminal and WICET. It is considered that co-location of the proposed development with these existing and approved coal export terminals is in line with strategic planning for the Gladstone region. The land that is being acquired for the Project is owned by the Minister for Industrial Development, Queensland and is available for a major project that will provide significant economic development for Queensland.

No other sites are currently available within the Port of Gladstone for a Project of this nature. The Fisherman's Landing port precinct is only suitable for Panamax and Post-panamax class vessels, and Curtis Island is committed to the Liquefied Natural Gas industry. Lot 1 is the only site suitable for the construction of a jetty to the existing deep water channel which is capable of accommodating Cape class vessels. The proposed berths are within the confines of the existing working port and located adjacent to the location of berths for the two other coal terminals. Dredging to provide access from the berths to the existing designated deep water shipping channels is expected to be minimal.

2.2.2 Rail

As an alternative to construction of the new 14 km rail line, consideration was given to accessing the existing QR National network to Gladstone, however, it has been determined through investigation that the existing network is fully committed with no spare capacity for additional coal trains to service the proposed 3TL terminal. As a consequence 3TL proposes to construct a rail line in a new corridor dedicated to the 3TL terminal.

The line would accommodate both Surat Basin trains arriving via the new Moura Link with crossover onto the new 3TL corridor and Blackwater trains from the North Coast Line.

It may also be possible for trains from the Goonyella system to reach the 3TL port via the Gregory Line and Blackwater system. These trains will be limited by the capacity of the Gregory / Blackwater system in terms of train length and available slots. Notwithstanding this, within the life of the terminal it is possible to consider that the upgrades could be undertaken.

A final rail corridor is yet to be determined. The broad study area within which options for the corridor will be considered is shown in Figure 1-2. Identification of a preferred corridor within this study area will present challenges, due to:

- Topography;
- Existing corridors for rail, road, linear infrastructure e.g. pipelines; and
- Multiple landowners.

2.2.3 In-loading

A final corridor for the in-loading conveyors is yet to be determined. The broad study area within which options for the corridor are being considered is shown in Figure 2-1. The study area broadly runs south east from the existing Materials Transportation and Services Corridor.

A more detailed investigation of topography, horizontal and vertical geometry of the conveyors, and landowner discussions will be undertaken to select the preferred corridor.

2.2.4 Out-loading Jetty

Two options are being considered for the alignment of the out-loading jetty (Figure 2-2):

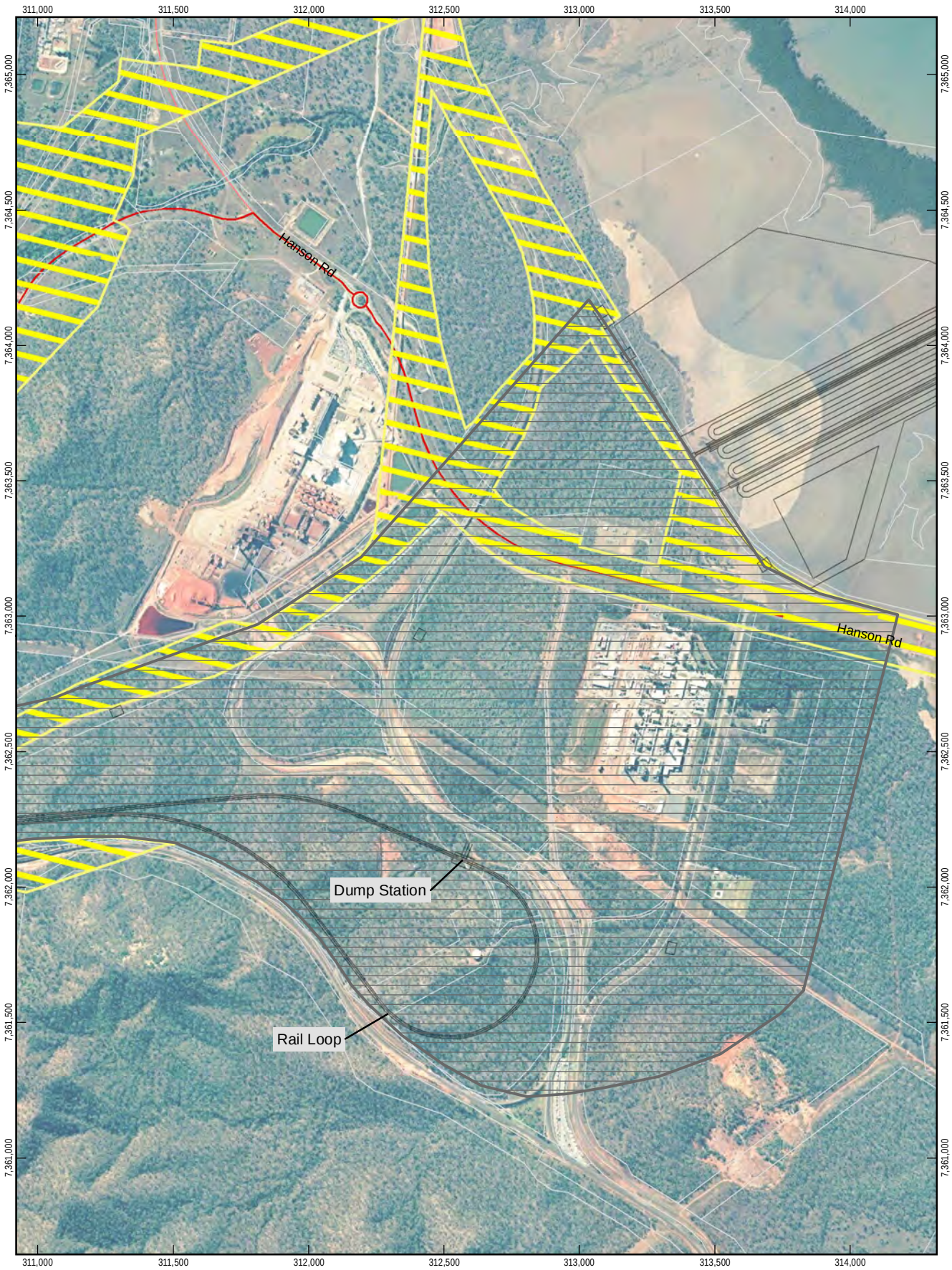
- Option 1 has the out-loading jetty running parallel, and adjacent to (and completely separate from), the existing Gladstone Pacific Nickel (GPN) Project and WICET corridor with an overland conveyor from the stockpile to the corridor. This option seeks to minimise the area of seabed disturbance through location of the jetty adjacent to an already approved structure. This option has a conveyor length of approximately 8,200 m, with 4,600 m being overland and 3,600 m over water; and
- Option 2 has the out-loading jetty running directly out to the wharf from the stockyard. This option reduces the amount of over water infrastructure required to a length of 3,300 m and reduces the number of transfer towers (and accordingly, the associated potential for dust generation at the transfers).

Option 2 is currently the preferred option.

2.2.5 Berth Alignment

The preferred alignment of the jetty and berths (Figure 2-2) considered the following:

- Alignment of the berths with the tidal streams to avoid compromising ship handling or mooring;
- Alignment of the berths to avoid compromising navigation or existing and proposed berths;
- Avoiding the location of a submarine tunnel to Curtis Island, proposed by an LNG project proponent;
- Maintaining existing Quay Line alignments and the potential for this terminal to interface with other planned berths associated with the proposed GPN Project and WICET; and
- Minimising dredging to reduce environmental impacts and associated costs.



LEGEND

- Existing Railway
- Highway
- Main Road
- Secondary Road
- Proposed Infrastructure
- Cadastral Boundary
- In-loading Conveyor Study Area

GSDA - PRECINCT

- Materials Transportation and Services Corridor - Boat Creek Corridor Sub-Precinct

1:20,000 (at A4)

0 100 200 300 400 500

Meters

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Tenement to Terminal Ltd
Yarwun Coal Terminal Project

Job Number	41- 24484
Revision	A
Date	10/04/2012

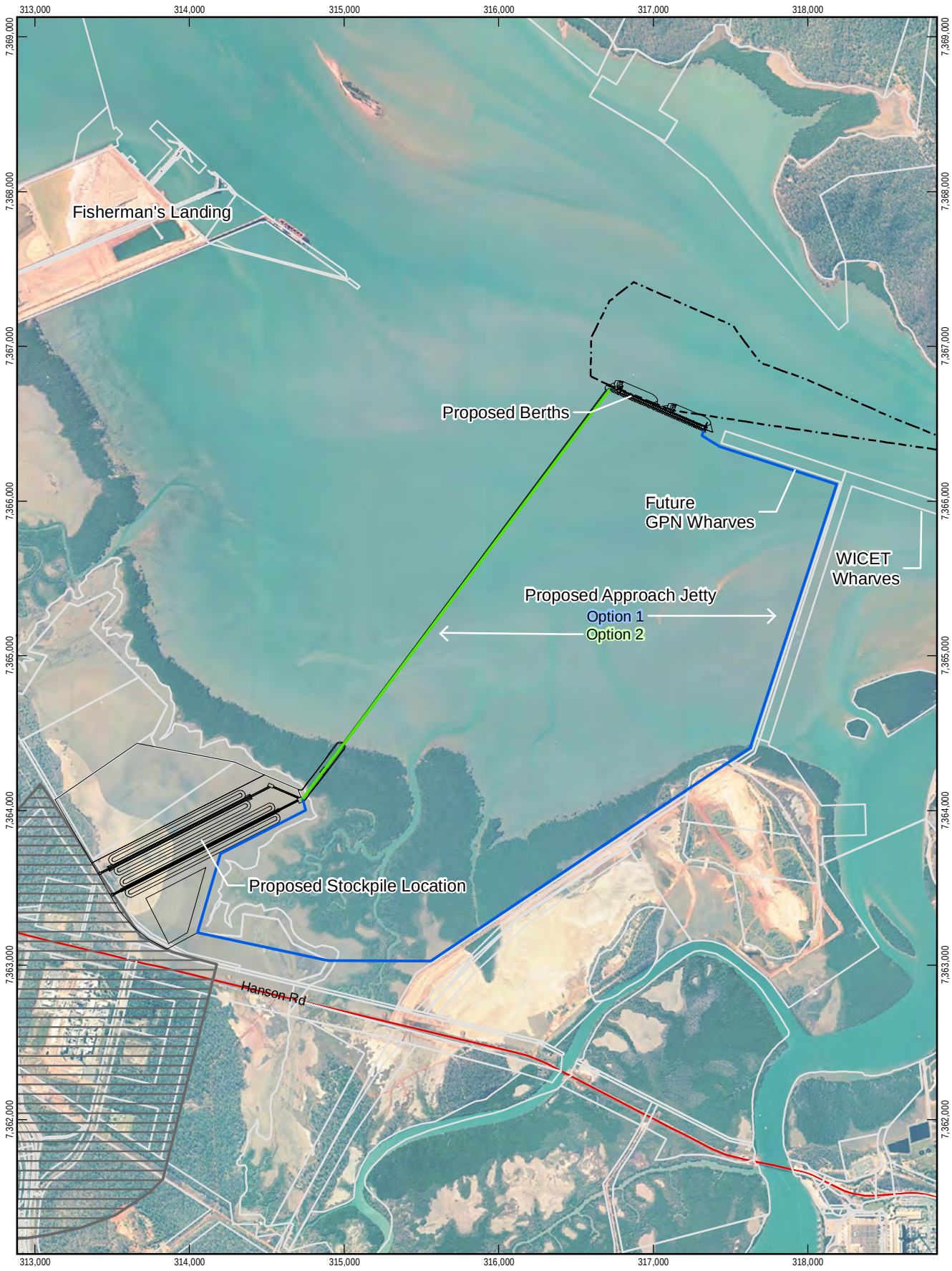
In-loading Conveyor Study Area

Figure 2-1

N:\AU\Brisbane\Projects\41\24484\GIS\Maps\MXD\400_Env_Approvals\41_24484_0411_rev_a.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: © Copyright Commonwealth of Australia - Geoscience Australia: Watercourse, Railway/2007; DERM, Gazetted Placenames/ 2009, Road Physical Network/2010, Watercourse/2011, Cadastre/2012, Protected Areas of Queensland/2010; GHD Proposed Alignment/2011. Created by:rbannister



LEGEND

- Existing Railway
- Highway
- Main Road
- Secondary Road

Proposed Jetty Approach
- Option 1
- Option 2

- Proposed Infrastructure
- In-loading Conveyor Study Area
- Cadastral Boundary

1:35,000 (at A4)

0 0.5 1

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Tenement to Terminal Ltd
Yarwun Coal Terminal Project

Job Number	41- 24484
Revision	A
Date	10/04/2012

Jetty and Berth Locations

Figure 2-2

N:\AU\Brisbane\Projects\41\24484\GIS\Maps\MXD\400_Env_Approvals\41_24484_0406_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: © Copyright Commonwealth of Australia - Geoscience Australia: Watercourse, Railway/2007; DERM, Gazetted Placenames/ 2009, Road Physical Network/2010, Watercourse/2011, Cadastre/2012, Protected Areas of Queensland/2010; GHD Proposed Alignment/2011. Created by:rbannister

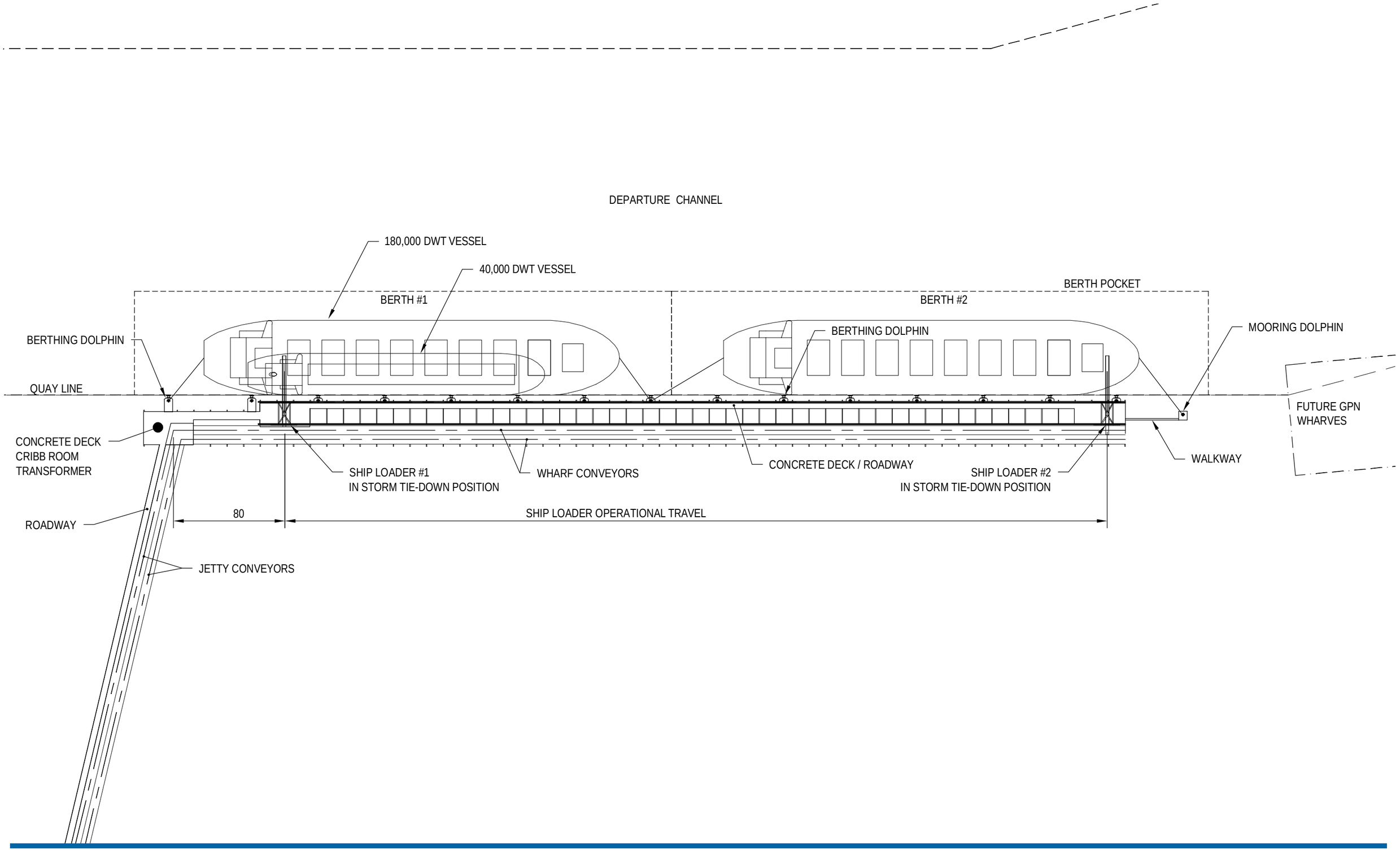
2.2.6 Shiploading

The wharf will service vessels ranging in size from Handymax to Cape class. A high capacity loading operation is proposed and, as such, options which require interruption of loading to warp a vessel along the berth have not been considered. Two shiploading options are being considered:

- Option 1 – A Long Travelling Loader with Luffing Boom (Figure 2-3) that traverses the entire length of the ship with the luffing boom reaching all ship hatches. One loader is required per berth. Key advantages of this type of loader include:
  - The loader can reach the entire vessel without the need for vessel warping; and
  - Staged expansion of the terminal can occur. From initially one berth / one loader, capacity can increase incrementally with provision of a layby berth, extension of the berth with the loader traversing two berths and, finally, installation of a second loader.
  - The disadvantages with this type of loader include:
  - Decreased efficiency from the need to stop loading and move the loader for hatch changes; and
  - The tripper system used to transfer the coal from the conveyor to the ship loader is prone to spills and dust creation. The system requires large surge bins and spill retention structures.
- Option 2 – Dual Quadrant Radial Ship Loader (Figure 2-4) where the loaders slew around a fixed point and the loader's telescopic arm runs along a rail arc. A pair of loaders (dual quadrant) will be required so that the entire vessel can be reached without the need for vessel warping. The advantages of this configuration include:
  - Increased efficiency (5% - 10%) as loading continues uninterrupted during hatch changes;
  - The possibility to substantially downsize or even remove surge bins; and
  - Substantially less "marine structure" is required. Berthing and mooring dolphins run along the quay line with infrastructure similar to the approach jetty running behind the loaders for access.

  The disadvantages with this configuration include:
  - Two ship loaders are required, resulting in higher maintenance costs;
  - Maintenance would be undertaken from floating plant as road access to all elements of the ship loader would not be available; and
  - The reduced opportunities for incremental increases in terminal capacity (i.e. Stage 1 is one berth and any capacity increase beyond Stage 1 is a quantum increment to a second berth).

Further investigation will occur during detailed design to select the preferred option.



0 25 50 75m

SCALE 1:2500 AT ORIGINAL SIZE

TENEMENT TO TERMINAL LTD
YARWUN COAL TERMINAL PROJECT

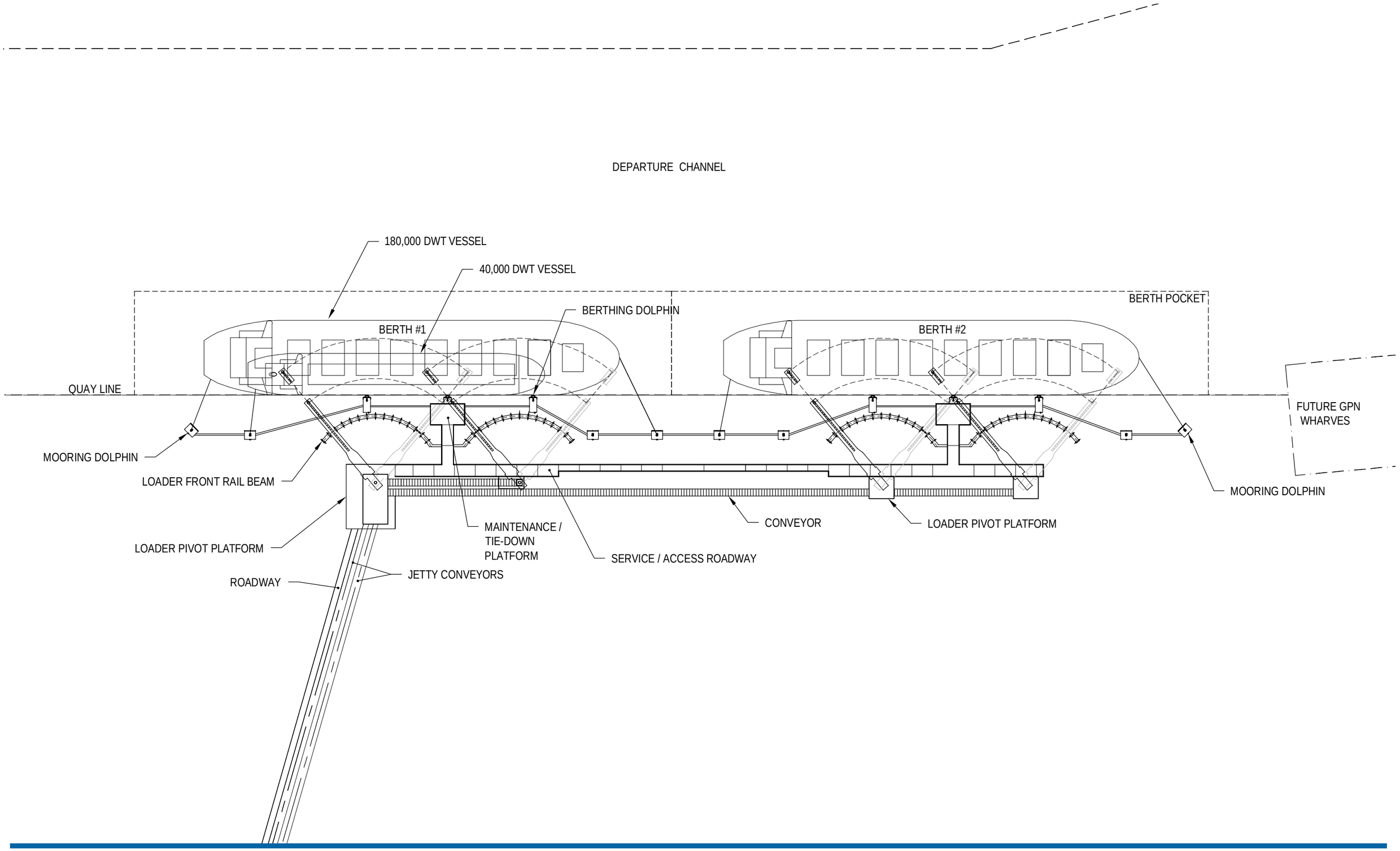
LONG TRAVELLING SHIP LOADER WITH LUFFING BOOM - PLAN

Job Number 41-24484
Revision A
Date Mar 2012

Figure 2-3

Level 4, 201 Charlotte St Brisbane QLD 4000 Australia **T** 61 7 3316 3000 **F** 61 7 3316 3333 **E** bnemail@ghd.com **W** www.ghd.com

Plot Date: 2 March 2012 - 12:00 PM Plotted by: Liam Houghton/Brisbane/GHD/AU Cad File No: G:\41\24484\Document Transfer\Outgoing\2012-03-02 Gis Figures\41-24484-FIG 2-3.dwg



0 25 50 75m

SCALE 1:2500 AT ORIGINAL SIZE

TENEMENT TO TERMINAL LTD
YARWUN COAL TERMINAL PROJECT

DUAL QUADRANT RADIAL SHIPLOADER - PLAN

Job Number 41-24484
Revision A
Date Mar 2012

Figure 2-4

Level 4, 201 Charlotte St Brisbane QLD 4000 Australia **T** 61 7 3316 3000 **F** 61 7 3316 3333 **E** bnemail@ghd.com **W** www.ghd.com

Plot Date: 2 March 2012 - 12:01 PM Plotted by: Liam Houghton/Brisbane/GHD/AU Cad File No: G:\41\24484\Document Transfer\Outgoing\2012-03-02 Gis Figures\41-24484-FIG 2-4.dwg

2.2.7 Port Access

The terminal will rely on access to the entrance channel to the port. Shipping channel capacity studies have been previously undertaken by others.

As is normally the case for new major projects requiring access to the Gladstone shipping channels, 3TL will need to carry out shipping channel simulation studies to determine the adequacy of the channel for its proposed shipping mix.

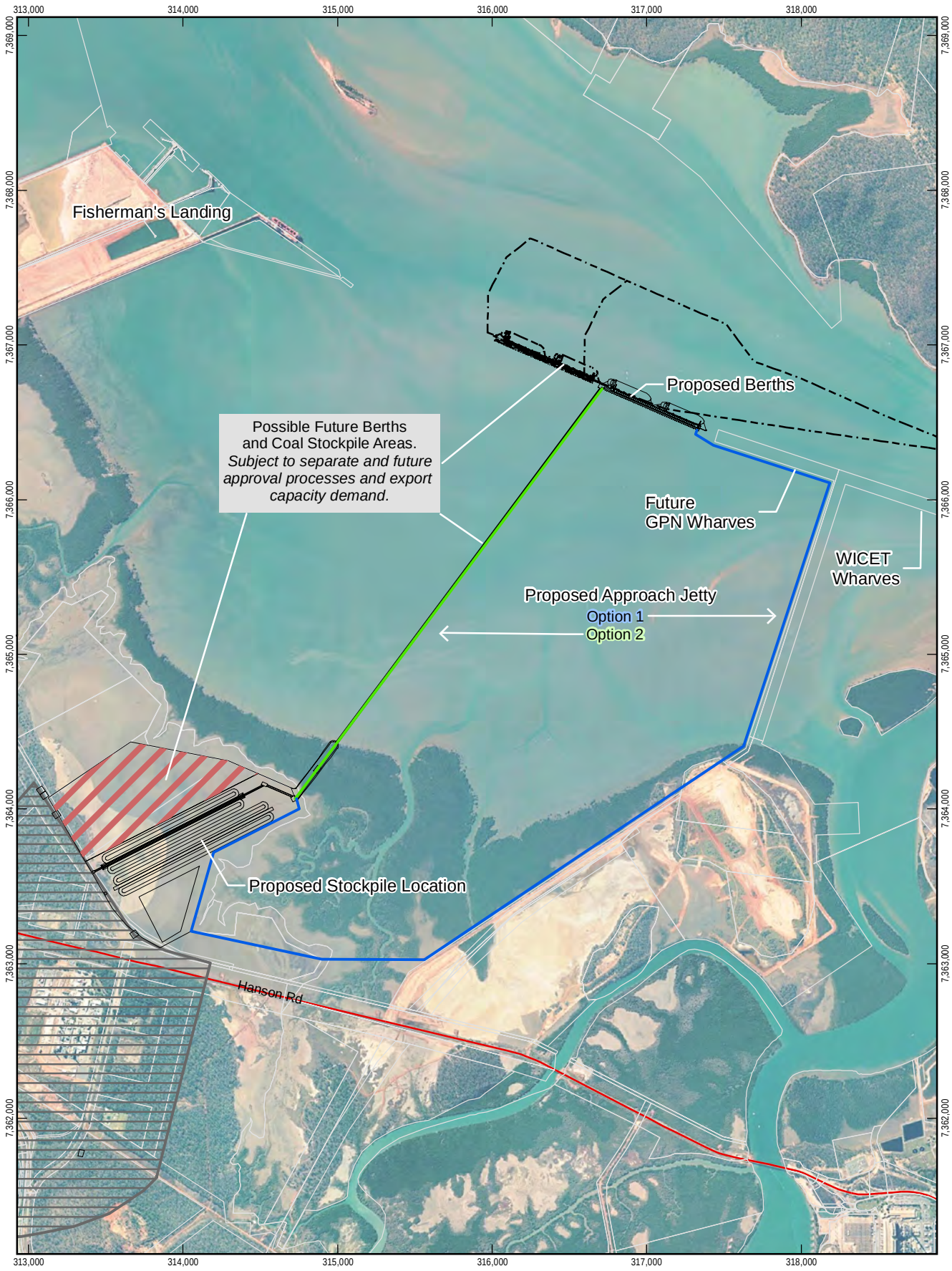
2.2.8 Future Expansion

3TL intends to consider future expansion opportunities at a later date. Expansions of the terminal beyond a capacity of 50 Mtpa will be subject to future and separate approvals processes and subject to a range of factors such as market demand for coal exports, engineering considerations around the form and function of the terminal and cost. Figure 2-5 shows how the terminal might be expanded in the future.

2.2.9 Do Nothing

The consequences of not developing the Project include:

- Continuing limitations on coal export capacity and impacts on the economy;
- Increased waiting times for vessels to access other port facilities;
- Increased demand for the construction of other port facilities elsewhere along the coast to service export demand, as evidenced by the oversubscription of 3TL's 50 Mtpa of capacity; and
- The potential loss of local economic benefits and employment opportunities.



LEGEND

- Existing Railway
- Highway
- Main Road
- Secondary Road
- Proposed Jetty Approach
  - Option 1
  - Option 2
- Proposed Infrastructure
- Cadastral Boundary
- In-loading Conveyor Study Area
- Possible Future Stockpile Area

1:35,000 (at A4)

0 0.5 1

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Tenement to Terminal Ltd
Yarwun Coal Terminal Project

Job Number	41- 24484
Revision	A
Date	10/04/2012

Possible Future Expansion

Figure 2-5

N:\AU\Brisbane\Projects\41\24484\GIS\Maps\MXD\400_Env_Approvals\41_24484_0412_rev_a.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: © Copyright Commonwealth of Australia - Geoscience Australia: Watercourse, Railway/2007; DERM, Gazetted Placenames/ 2009, Road Physical Network/2010, Watercourse/2011, Cadastre/2012, Protected Areas of Queensland/2010; GHD Proposed Infrastructure/2011. Created by:rbannister