



Infrastructure Victoria Second Container Port Advice Environment & Social Advice

May 2017

Executive summary

The Victorian Special Minister of State has asked Infrastructure Victoria (IV) to provide advice on the future capacity of Victoria's ports, focusing on the need for, timing and location of a second container port. The Special Minister of State has also asked IV to assess two possible sites for the second container port, one at Hastings in Western Port and one at Bay West in Port Phillip Bay.

In order to develop this advice, IV has engaged consultants across four work packages: Commercial, Economic & Transport Modelling; Engineering, Dredging & Reclamation; Navigation & Hydrodynamics; and Environment & Social. This report is specific to the Environment and Social package.

The Environment and Social package involved a desktop review of key environment and social factors to identify influences on the development of the Port of Melbourne, and to provide information for a comparison of the relative suitability of the Hastings and Bay West locations as alternate sites for a second container port. The review focussed, in particular, on any differences between these two locations that may potentially benefit or constrain future container port development and that may impact on the ability to obtain approvals for container port development.

Key environment and social factors that were considered included:

- Social and land use considerations
- Amenity, with a particular focus on landscape and visual and noise impacts
- Aboriginal and historic heritage
- Potential for impacts on the marine and terrestrial environments, inclusive of protected Ramsar sites and with a particular focus on ecological receptors
- Offset requirements

Potential port development scenarios were developed by the Engineering, Dredging and Reclamation consultant to form the basis for the assessment. Port of Melbourne capacity was assumed to be able to be increased through minor development of existing infrastructure and operations at Swanson Dock and more significant development of Webb Dock. For each of the Hastings and Bay West sites a container port concept was developed, including location and configuration of the port terminal, channels and transport connections, as well as requirements for dredging, reclamation and possible dredge material disposal options.

For the Port of Melbourne, there are a number of social issues that would need to be considered as part of any expansion. These include compatibility with and potential changes to existing land uses, access and land acquisition requirements, as well as potential for traffic and amenity impacts. IV has carried out initial consultation which further identified that a number of these issues are existing concerns for the community. Impacts on heritage and the terrestrial and marine environment would also need to be assessed and considered. There would generally be less impact associated with expansion within the existing footprint, as it is largely disturbed due to the existing port. Expansion beyond the existing footprint would require more detailed assessment. Any expansion activity would require assessment with respect to the legislative and approvals framework in place at the time of the development.

Each of Hastings and Bay West feature significant but varied environmental values, making a direct comparison between the two sites challenging. The relative size of the land-based development footprint was found to be a key factor for the level of and ability to avoid or manage impacts. Hastings' larger port development footprint and associated transport corridors is likely to result in a greater amount of land acquisition, potential changes to existing land uses and related social impacts, and amenity impacts during construction and operation when compared with Bay West. Similarly, impacts on terrestrial ecology at Hastings would be more extensive and challenging to avoid when compared to Bay West; however, it is also noted that Bay West potentially provides some of the last remaining mainland habitat for the critically endangered Orange-bellied Parrot. From a marine ecology perspective, there is potentially more flexibility to avoid high value areas at Bay West than there is at Hastings, including intertidal areas of high value for shorebirds and the wetland areas within the Western Treatment Plant. A Bay West solution may however require dredging of the Entrance, which would require detailed assessment and rigorous management and monitoring during construction – as was carried out for the previous Channel Deepening Project. Heritage requirements were assessed as broadly similar for both sites.

Based on the current legislative framework in Victoria and Australia, approvals triggered by container port development are likely to be broadly similar for both Hastings and Bay West. One additional approval, a Sea Disposal Permit to dispose of dredged material in Commonwealth waters, may be required for Hastings in order to dispose of dredged material in Bass Strait. This is an additional requirement for Hastings when compared with Bay West; however, as this process could occur in parallel with other approvals and would draw on similar studies, it is not considered to be a key differentiator. In contrast, approval under the *Environment Protection and Biodiversity Conservation Act 1999* due to potential impacts on MNES is considered a differentiator. Whilst both Bay West and Hastings would likely require comprehensive assessment and approval under this Act, this approval has been assessed as potentially more challenging for Hastings, as offsets for potential impacts on the ecological character of the Western Port Ramsar site are not readily identifiable. This could impact on the ability to obtain approval under this Act for a container port development at Hastings.

The outputs from this assessment will be used to inform a Multi Criteria Analysis of the Bay West and Hastings port location options. In considering these conclusions and the Multi Criteria Analysis process, it should be noted that this assessment has been based on currently available desktop information and that there is a significant amount of uncertainty associated with the impacts of a complex development such as a port. Container port development at either location would be subject to detailed design and a full environmental assessment and approvals process, in line with the current legislative framework.

This report is subject to, and must be read in conjunction with, the limitations, assumptions and qualifications contained throughout the report.

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1. Introduction

1. Introduction

1.1 Context

The Victorian Special Minister of State has asked Infrastructure Victoria (IV) to provide advice on the future capacity of Victoria's ports, focusing on the need for, timing and location of a second container port.

Currently all container shipping into Victoria is through the Port of Melbourne, which is Australia's largest container port. The IV study is preparing advice on the ultimate capacity of the Port of Melbourne, when the port will reach capacity and when a second container port will be required.

The Special Minister of State has also asked IV to assess two possible sites for the second container port, one at Hastings in Western Port and one at Bay West in Port Phillip Bay.

To assist with these tasks, IV engaged consultants across the following four work packages (illustrated in Figure 1):

- Commercial, Economic & Transport Modelling
- Engineering, Dredging & Reclamation
- Navigation & Hydrodynamics
- Environment & Social

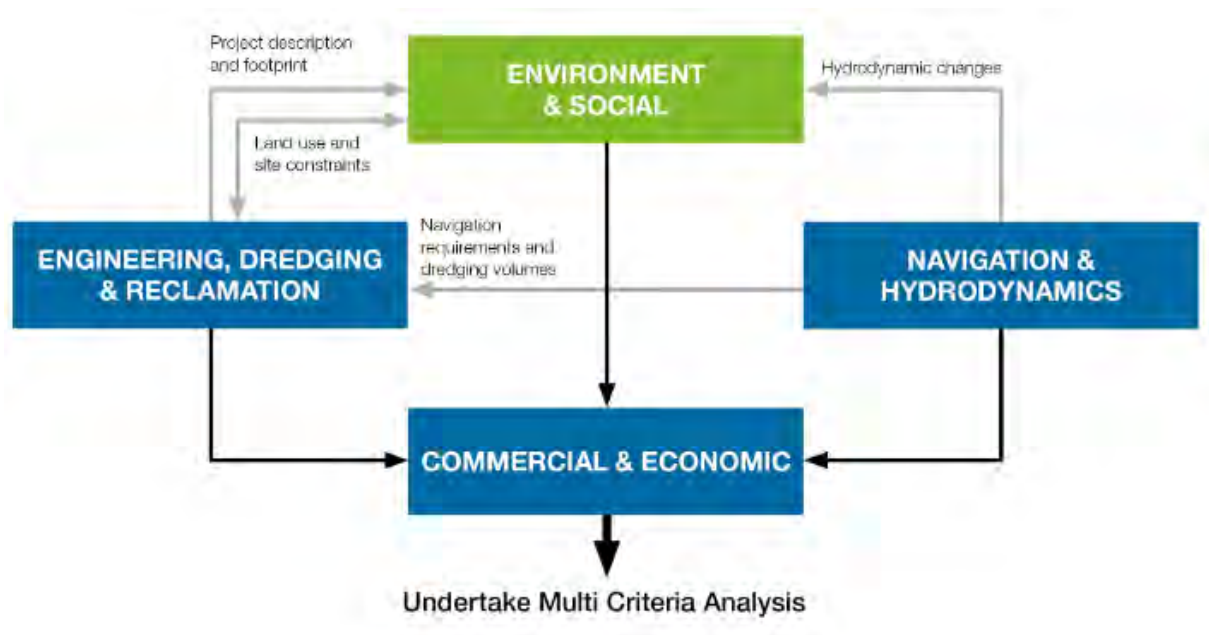


Figure 1 Inputs to IV study

This report is specific to the **Environment and Social** package; assessment of which has been undertaken by GHD Pty Ltd (GHD).

1.2 Overview of the Environment and Social package

The environment and social package involves a desktop review of key environment and social factors to identify influences on the development of the Port of Melbourne, and to provide information for a comparison of the relative suitability of the Hastings and Bay West locations as alternate sites for a second container port. The review has focussed, in particular, on any differences between these two locations that may potentially benefit or constrain future development. Key environment and social factors that were considered included:

- Social and land use considerations
- Amenity, with a particular focus on landscape and visual and noise impacts
- Aboriginal and historic heritage
- Potential for impacts on the marine and terrestrial environments, inclusive of protected Ramsar areas
- Offset requirements

Ultimately, these factors were considered in regard to the potential to obtain project approvals at each potential port location.

The outputs from the Environment and Social package as documented in this report will be used to inform a **Multi Criteria Analysis** (MCA) of the Bay West and Hastings port location options. The MCA is to be led by the Commercial, Economic and Transport Modelling consultant and the outcomes of the MCA will be documented in a separate report.

1.3 Purpose of this report

The purpose of this report is to document the environmental and social inputs into IV's MCA process, including:

- Influences on timing for Victoria's second container port, namely consideration of limits to expansion at the Port of Melbourne. This includes social, heritage and environmental factors, as well as consideration of approvals requirements
- Considerations for the location of Victoria's second container port including a desktop review and mapping of key environmental and social factors, to assess the relative suitability of Bay West and Hastings as port development sites. This focuses on differentiation between the two sites and potential fatal flaws in regard to key factors, rather than an overall assessment of the potential level of impact at either site. Any port development would be subject to detailed design and a full environmental assessment and approvals process.

2. Approach

2. Approach

2.1 What this report is about

This report has been prepared by GHD for Infrastructure Victoria. The report draws upon the information and various existing studies currently available for the Port of Melbourne, Port Phillip Bay and Western Port areas. Information from this knowledge base has been synthesised in this report to enable the Commercial consultant to compare alternative port locations using an MCA methodology.

A comparative task was undertaken that focussed on refining the scope of issues to be considered based on potential impacts and opportunities at Bay West and Hastings as relevant to site selection, and potential to impact on project approvals, as shown in Figure 2.

This report identifies existing assets, values and land uses that are potential differentiators between the Bay West and Hastings sites. A high-level assessment of the potential impacts to these differentiating assets, values and land uses at each site as a result of port development was undertaken. Potential environmental and social risks associated with the likely footprint of port development, physical process impacts and construction and operational impacts were separately identified and assessed at a high level in order to provide a systematic approach to comparing the two sites. The likelihood of obtaining approvals and the potential for offsets to be required at either site was also considered. This provides a logical and transparent basis for comparative consideration of the location for Victoria's second container port.

The high-level impact assessment in this report is intended to support IV in a strategic assessment of the Bay West and Hastings sites. Any port development would be subject to detailed design and a full environmental assessment and approvals process.

2.2 What this report is not about

This report is targeted to the specific issues that may allow differentiation between Bay West and Hastings and identification of constraints on the expansion of the Port of Melbourne. This report is not an exhaustive consideration of all issues or assets, values and land uses present within these areas.

This report has been prepared drawing on knowledge generated through previous studies undertaken by GHD, IV, and others. These previous studies are not reproduced in full within this document. Additional primary research, data collection, site inspections or fieldwork has not been undertaken to inform this report or to validate currency of reporting information used.

GHD's assessment focuses on only those assets, values and land uses at the Bay West and Hastings sites that are considered to be differentiators for site selection. Accordingly, not all potential impacts associated with port development at these sites have been assessed, and the results of the high-level risk assessment are not definitive. It is acknowledged that the potential environmental and social impacts from the construction and operation of a port development are complex and include long term, short term, direct and indirect impacts that would require in-depth assessment.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report, as outlined in section 7 of the report. GHD has not independently verified or checked the above information beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Risks were identified and assessed for representative concepts for the purposes of comparing Bay West and Hastings as described in section 4.2 of this report. Detailed studies and fieldwork would be required to improve understanding of values and potential impacts on and risks to these. More data collection, better understanding of the issues and more design work to mitigate the identified risks could change (increase or decrease) the risks associated with the Bay West and Hastings sites.

The evidence relied upon to support key conclusions, areas of uncertainty and recommendations for further investigations that could be completed are documented within the report.

2.3 How to read this report

This report is structured around the key questions that the environment and social advice would inform, as shown in Figure 2.

WHEN will Victoria need a new container port?	3
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Future development of the Port of Melbourne	3.2
Social and environmental factors	3.3
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Figure 2 Report structure

2.4 Assumptions

The opinions, conclusions and any recommendations in this report are based on the following assumptions made by GHD. GHD disclaims liability arising from any of the assumptions being incorrect.

- This report may only be used and relied on by Infrastructure Victoria for the purpose agreed between GHD and the Infrastructure Victoria as set out in section 1.3 of this report
- GHD otherwise disclaims responsibility to any person other than Infrastructure Victoria arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible
- The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report
- GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared
- This report aims to synthesise existing knowledge to enable a comparison of alternative port locations by identifying key differentiators between the sites to inform an MCA. The report does not reproduce all available data and knowledge for Port Phillip Bay, Western Port or the Port of Melbourne, nor it is intended to present an absolute assessment of impacts or risks at these locations. Further assessment and specialist studies would be required to progress any of the development scenarios considered as part of this report, which may bring new information to light and affect the findings of this report
- Assessment of Bay West and Hastings has focussed on the footprints and surrounding areas identified in section 4.1. Different configurations or alternative locations of a port within each bay have not been considered within this report. Note that impacts on the environment of Bass Strait have not been considered as part of this report as dredging and disposal sites have not yet been identified
- The report focuses on specific issues that may allow for differentiation between Bay West and Hastings and identification of constraints on expansion of Port of Melbourne but does not consider or document all issues or assets, values and land uses.

3. When will Victoria need a new container port?

3. When will Victoria need a new container port?

3.1 Capacity requirements

Infrastructure Victoria notes the Port of Melbourne as the busiest shipping container port in Australia. In 2014-15, the Port of Melbourne handled 2.58 million twenty foot equivalent units (TEU), or around 38% of Australia's container trade (Infrastructure Victoria, 2016).

The Port of Melbourne also handles a diverse range of general bulk cargo. Australia's largest automotive terminal is at the port and typically handles up to 1,000 new motor vehicles per day. Multipurpose terminals handle a variety of non-containerised cargo, including farm equipment and machinery, and bulk commodities like timber, paper, iron and steel (Port of Melbourne Corporation, 2016) (refer to Figure 3).

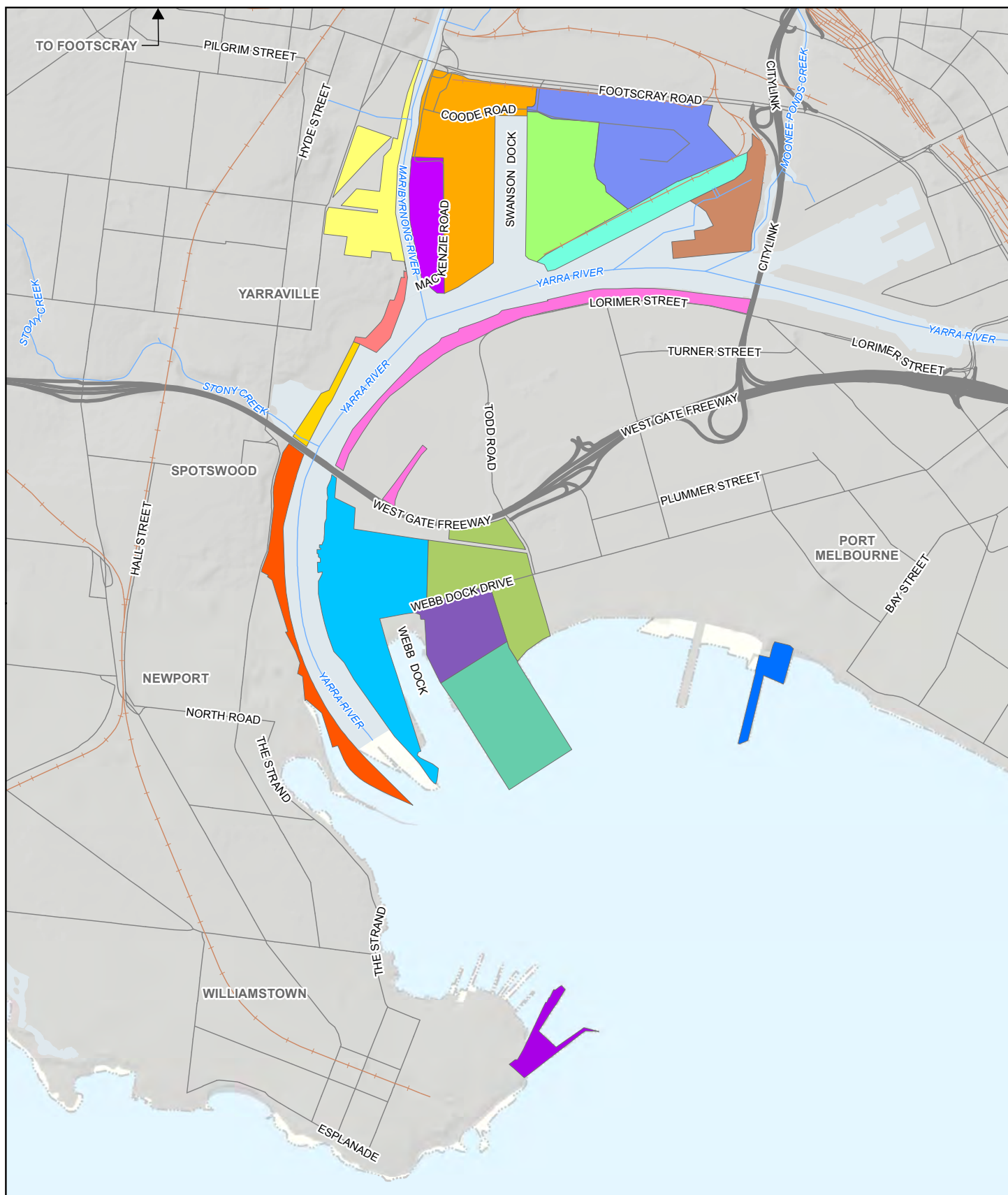
In responding to the request from the Special Minister of State for advice on the preferred sequencing, timing and location of investment in future Victorian commercial port capacity, IV's study seeks to understand the long term demand and capacity of the existing Port of Melbourne, including (Infrastructure Victoria 2016):

- Its capacity for containers, bulk and other non-containerised cargo
- The capability of Victorian channels and existing port infrastructure to handle different scenarios of future changes to the international shipping fleet, cargo handling technologies and changes to the supply chain onshore
- Potential increases in capacity resulting from investment and improved port management under the Port of Melbourne lease arrangement

Section 3.2 of this report summarises planned and potential future development scenarios at the Port of Melbourne (addressed in more detail in GHD, 2017a), and section 3.3 outlines social and environmental factors that may influence this development.

At this stage, it is assumed that Victoria will always provide sufficient capacity to meet demand and that, in the short to medium term, the most efficient way to meet demand is to maximise capacity at the Port of Melbourne until further expansion is unfeasible (Infrastructure Victoria, 2016).

Once capacity at the Port of Melbourne is maximised, it is envisaged that Victoria could require a second container port. IV's study is looking at when capacity requirements could trigger the need for a second container port, and what variables may alter this timeline. The study includes an assessment of Hastings in Western Port and Bay West in Port Phillip Bay as two possible sites for the second container port (Infrastructure Victoria, 2016). Social and environmental factors and corresponding approvals requirements for port development at these two sites are discussed in sections 4 and 0 of this report.



LEGEND

Urban Area
Freeway
Arterial

Port of Melbourne Existing Uses

Appleton Dock Precinct - (Break Bulk & Grain)

Coo de Island / Maribyrnong (Bulk Liquid)
Holden Dock (Bulk Liquid)
Newport Precinct
South Wharf Precinct (Break Bulk Cement Tugs)
Station Pier (Passengers)

Swanson Dock - East (Containers)
Swanson Dock - West (Containers)
Swanson/Appleton/Victoria Dock Precinct

Victoria Dock (General Cargo)
Webb Dock - East (Containers)
Webb Dock - East (Bass Strait)

Webb Dock - West (Automobiles)
Webb Dock Precinct
Breakwater & Gellibrand Piers (Bulk Liquid)
Yarraville Berths (Bulk)
Yarraville Precinct

Paper Size A4
0 125 250 500 750 1,000
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Infrastructure Victoria
Ports Advice

Job Number 31-34508
Revision C
Date 14 Feb 2017

Existing Port of Melbourne Land Uses

Figure 3

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180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

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Data source: DELWP, VicMap, 2016; GHD, 2016 Created by: Irsmith

3.2 Future development of the Port of Melbourne

The Port of Melbourne's current *Port Capacity Project* will assist to absorb demand growth for containerised export by adding at least 1 to 1.5 million units of capacity, to provide an estimated overall container capacity of approximately 5 to 5.5 million TEU in the Port of Melbourne annually (Special Minister of State, 2016). The Port Capacity Project involves extension and upgrades at Webb Dock and ancillary works to enable the re-introduction of an international container terminal at Webb Dock East and expansion of the existing automotive terminal at Webb Dock West. Further capacity is considered feasible, and will be created through the long term lease of the Port of Melbourne.

A separate component of the IV study has investigated long-term capacity requirements for container traffic into Victoria (GHD, 2017a). This study indicates that the port could theoretically be developed to handle an increased annual container trade of up to 8-9 million TEU (an increase in container trade of almost three to four times the existing volumes).

As well as an increase in container traffic, other trade operations at the Port of Melbourne are also set to increase along with the demands of Victoria's growing population. The expansion could be achieved largely through redevelopment or expansion of the existing port footprint for the port at its current location in the estuary of the lower Yarra and Maribyrnong Rivers.

If implemented, the overall increase in capacity at the Port of Melbourne would likely result in an increase of the capacity at Swanson Dock (up to around 5.2 million TEU), and to require the expansion of Webb Dock, potentially up to 9 million TEU depending on the volume split between the two terminals.

The expansion of capacity would include minor development only of existing infrastructure and operations at Swanson Dock and more significant development of Webb Dock.

This potential expansion of Webb Dock could require some or all of the following major works and infrastructure (refer to Figure 4):

- Minor extension (90m) to the north of the current Webb Dock East (WDE) berth to better accommodate two larger container vessels at the Victorian International Container Terminal (VICT)
- Upgrade of the existing road junctions connecting to the Westgate Freeway
- The extension of Webb Dock to the south by a length of around 750m, creating two additional berths. This would require land reclamation and dredging
- Deepening of the existing basin so that it extends around 200m further north to create a 1100m length quay along Webb Dock West and another two berths (750m) on WDE
- A new freight link including road and rail routes across the Yarra River (most likely adjacent to the Bolte Bridge) with connection to the Western Distributor and potential development of a new on-dock rail terminal if network capacity exists

If all expansion options for Webb Dock were undertaken, it is expected that the entire Webb Dock precinct would be used for container trade in the future (as well as using Swanson Dock). This would mean that at least some of the existing general bulk cargo trade and automotive import trade at Webb Dock would be displaced and would need to be re-established at an alternative location.



LEGEND

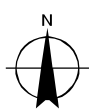
- Indicative Western Distributor Alignment
- Freeway
- Highway
- Swing Basins
- Webb Dock East expansion
- Webb Dock Rail Terminal

Webb Dock

- VICT
- Bass Strait
- Automotive Terminal
- Off Dock Terminal/Empty Container Park

DRAFT

Paper Size A4
0 150 300 450 600
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Infrastructure Victoria

Job Number 31-34508
Revision A
Date 14 Feb 2017

Webb Dock Capacity
Enhancement Options

Figure 4

3.3 Social and environmental factors influencing future development of the Port of Melbourne

As explained in section 3.1, in order to understand when there may be a need for a new container port, it is important to understand the factors that influence existing and future potential capacity at the Port of Melbourne. This includes an appreciation of relevant social and environmental considerations.

Social and environmental factors that may influence future development of the Port of Melbourne are discussed below. This includes consideration of issues raised through community consultation carried out by IV (RPS, 2016).

3.3.1 Social

Social factors influencing future development are likely to include:

- Potential changes in land use and access, and land acquisition (associated with new road/rail connections)
- Traffic, amenity and health – including the social impacts of traffic congestion, changes in air quality, noise and visual impacts

IV has also carried out recent community consultation (RPS, 2016), which has identified key areas of concern for the community.

Land use

The Port of Melbourne includes land in the municipalities of the City of Melbourne, Port Phillip, Hobsons Bay and Maribyrnong. Each of these municipalities has a Municipal Strategic Statement (MSS) and planning provisions within their planning schemes that to varying degrees recognise the significance of the Port of Melbourne. The interface and land use for each of these adjoining municipalities varies, resulting in a diversity of issues and strategic priorities.

The Port of Melbourne's landside area is characterised by large industrial buildings and structures such as gantries, cranes and storage tanks. Many of the sites contain extensive hard stand areas for external storage, access and car parking. Port-related uses also occupy surrounding land, including the industrial precinct located between Swanson and Webb Docks, which is used for a variety of manufacturing and warehousing purposes.

The Port of Melbourne is also adjacent to long-established suburbs that comprise a mix of residential, commercial and light industrial uses, including (as shown in Figure 3):

- (From north to south) – Footscray, Yarraville, Spotswood, Williamstown and Newport to the west of the Port across the Yarra River
- The suburb of Port Melbourne to the east of Webb Dock

To the east of Swanson Dock, the Docklands precinct has evolved from redundant waterfront and port land in the late 1990s into a significant mixed use urban renewal precinct comprising residential, commercial and entertainment uses. Land to the north of Swanson Dock across Footscray Road is occupied by the Dynon intermodal terminals, with land used predominantly by industry and transport logistics providers for the movement of goods (for example, Toll, Linfox, L Arthur, VicTrack, ARTC, and Pacific National) and passengers (MTM and VLine), as well as maintenance sheds (Yarra Trams and MTM).

There are also existing recreational areas in proximity to the Port, including Westgate Park to the north of the Webb Dock Precinct, which contains wetlands and pedestrian and cycling trails, and Perce White Reserve located to the south east of the Webb Dock Precinct. Also located to the south east of this precinct are the Life Saving Victoria headquarters, Sandridge Lifesaving Club, Sandridge Beach, public BBQs, play equipment and car park areas. There are also shared pedestrian and cycling paths along the linear corridors of the Maribyrnong River (north-west of Swanson Dock) and Moonee Ponds Creek (north-east of Swanson Dock).

Plan Melbourne 2014 (the Victorian Government's Metropolitan Planning Strategy) identifies a number of areas immediately adjacent to the Port of Melbourne that are planned for future urban renewal, including:

- **E-Gate:** a 20-hectare development site on the edge of Melbourne's CBD, north of Footscray Road and east of CityLink. It is envisaged that E-Gate will become a mixed use precinct combining residential, retail, commercial, and community uses (DTPLI, 2014).
- **Docklands:** a 190-hectare urban renewal area and extension to the CBD, east of CityLink and north of the Yarra River. Development of Docklands commenced in 1997 and is managed by Places Victoria. The precinct offers a mix of uses including residential, commercial, retail, dining and leisure. It is expected that the site will be fully developed by 2025 (Places Victoria, 2017)
- **Fishermans Bend:** Australia's largest urban renewal project covering approximately 485 hectares to the north and east of Webb Dock. Fishermans Bend will consist of five precincts across both the City of Melbourne and the City of Port Phillip, and is expected to house approximately 80,000 residents and provide employment for up to 60,000 people by 2050. The *Fishermans Bend Vision* was finalised in September 2016 (DELWP, 2017)
- **Former Melbourne Markets:** This site on the northern side of Footscray Road is the location of the former Melbourne Wholesale Fruit and Vegetable Market and the Melbourne Seafood Market. It is currently vacant, and may provide an opportunity for future urban development

Key issues associated with future development of the Port of Melbourne could therefore include:

- The impacts of temporary land occupation and permanent land acquisition on the existing use of land and land use character, particularly relating to potential land acquisition associated with new road and rail connections
- Access or connectivity implications for existing land uses and planned strategic redevelopment precincts, including E-Gate, Docklands and Fishermans Bend.

Traffic and amenity

Expansion of the Port of Melbourne has the potential to impact on the amenity of the surrounding community through congestion, air and noise pollution from port activities and increasing port-related road traffic. Increased traffic congestion and heavy vehicle movements could also impact on the safety of road users, including pedestrians and cyclists, particularly if these occur in residential areas.

In addition, the extension of Webb Dock South as described in section 3.2 could have a visual impact on the following areas:

- Williamstown, especially the coastal edge (The Strand, Bay Trail West, Commonwealth Reserve and Williamstown / Newport Foreshore). Views of the city skyline over the water may be inhibited by the expansion of proposed port infrastructure

- Newport Park and Greenwich Reserve. Views out toward the bay may be inhibited by the expansion of the port facility
- Port Melbourne Beach, Princes Pier and Spirit Station Pier. Expansion of the port could take up more of the view toward Williamstown and Port Phillip Bay

To a lesser extent, the following areas may also be subject to visual impacts:

- Port Melbourne, Albert Park, Middle Park and South Melbourne foreshores. There could be a minor change in the view toward Williamstown
- Open water areas in the vicinity of Williamstown and Port Melbourne

Traffic, noise, air and visual assessments would be required to investigate the potential issues identified above to determine the level of impact. The Victorian Government has proposed major transport projects, such as the planned Western Distributor project, that may assist to alleviate some of these issues.

Other initiatives implemented elsewhere in the world could also assist to alleviate some of the issues with air emissions that have the potential to be associated with an expanded Port of Melbourne in its current location. These include:

- Cold-ironing, where ships turn off their engines and run on power from the shore
- Restrictions on the types of trucks that may use the port
- The use of electric vehicles
- Automation of equipment

Themes from consultation

Recent community consultation held by IV has identified a number of key themes and concerns, including:

- Truck movements through inner west residential suburbs and residential streets, including:
 - Health impacts of diesel pollution. Air emissions associated with truck traffic are perceived to impact on community health, and seen by community members as relating to an increasing occurrence of asthma
 - Noise impacts associated with truck movements
 - Safety concerns, i.e. from heavy vehicles moving on residential streets with sensitive uses such as schools. Port-related truck traffic currently contributes to congestion on local roads, leading to delays and safety issues for local traffic
- Effective use and enforcement of tolls and curfews to reduce truck movements on local streets. The infringement of truck curfews on local roads has caused frustration and decreasing public tolerance for trucks in the area
- Emissions to air from ships in port
- Visual impacts due to construction and operational port activities, including crane operations, stacking of containers, new industrial/warehouse type buildings and night lighting
- Community cohesion. The existing port acts as a barrier for community connectedness between the city and the western suburbs. It is expected that this would continue to be an issue associated with any planned port expansion. Any increases in truck traffic through the inner west relating to port expansion are anticipated to further exacerbate issues related to community cohesion

- Community identity and acceptance of the port. Increasing densification and urban renewal surrounding the port can be seen as competing with port development in terms of demand for land and usage of the area. Participants in IV's community consultation discussed the social licence of a port to operate, in terms of residents' and visitors' co-existence with an expanding port in the city area and the acceptance of port operations. This social licence was discussed in the context of what was seen by participants as an international trend of moving river ports out of cities

Future targeted consultation with stakeholders and the community is recommended, which may identify other issues. Additional consultation activities could include focus groups and one-on-one meetings with key interest groups, and community wide online surveys.

These issues would need to be considered and assessed, as appropriate, as part of any proposal to expand the Port of Melbourne.

3.3.2 Heritage

The extensive, available historical data indicates that the Webb Dock Precinct has been subject to a significant level of disturbance which has all but removed the possibility for Aboriginal cultural heritage to be present within the area. Historical documentation provides evidence for the extent to which the broad outline of the land within the Webb Dock Precinct has been modified with significant land reclamation across the majority of the southern area. Prior to the 1870s or early 1880s the area remained on the fringe of the swamp until the Melbourne Harbor Trust began to reclaim large areas within the swamp and used these areas as a depot (Duncan and Griffin 2007, p. 29). In 1879 Sir John Coode's report on the re-alignment of the Yarra was released, and canal construction commenced in 1881. By 1887 the primary canal construction was complete. The Coode canal was deepened and widened in 1902 (Howell-Meurs and Lever, 2012). In 1894 a large amount of foreshore was reclaimed south of Williamstown Road for port related purposes and in 1896 the main Melbourne Water sewer was constructed 15m below the current ground surface (Duncan and Griffin 2007, p. 29).

The area has subsequently seen a range of land uses ranging from sand quarrying, military activities during the Second World War to a motor racing track, a landfill, a motocross track to its current use as a port with landside operations. In the 1970s Webb Dock opened for shipping and through the 1980s and early-1990s, substantial construction, expansion and land reclamation continued in a southerly direction.

Details regarding the extent of the ground disturbance are provided by the results of numerous heritage, geotechnical and environmental assessments, which have been undertaken in the area previously. The results of these investigations indicate that all sections of the area have been extensively modified and filled, a process which has continued up until the present day.

Overall, the Port of Melbourne environs have been significantly disturbed and are considered to have a low potential for any Aboriginal cultural heritage significance. It is noted however that any development outside of the existing footprint would need a heritage assessment.

3.3.3 Environment

The terrestrial environment of the Port of Melbourne has been heavily modified over the past 150 years, with virtually no areas within the site retaining their natural values. Apart from revegetated areas such as Perce White Reserve, the entire area is used for port related activities.

Key environmental issues that would require assessment as part of any future development include:

- Impacts on the terrestrial and marine environments arising from new or upgraded transport connections, the expansion of Webb Dock and deepening of the existing basin
- Sediment contamination and dredged material disposal

There has been examination of the marine environments as part of the Channel Deepening Project and the Port Capacity Project. Neither of these identified any significant environmental impacts for the upper bay region, including the estuaries of the Maribyrnong and Yarra Rivers and the Webb Dock precinct (CEE, 2012; Ecology Australia 2012; PoMC, 2012; SKM, 2012). It is noted that the Port Capacity Project was able to successfully dredge and dispose of material from Webb Dock at the Port of Melbourne's Dredged Material Ground (DMG).

3.3.4 Approvals

Approvals were considered for two scenarios:

- Redevelopment within the existing port footprint
- Expansion beyond the existing footprint

Redevelopment within the existing port footprint

The *Planning and Environment Act 1987* ('the Act') provides the framework for land use and development in Victoria. Planning schemes prepared under the provisions of the Act apply to each Victorian municipality.

The current requirements of the Port of Melbourne Planning Scheme ('the Planning Scheme') would apply to any redevelopment of the Port of Melbourne within the existing footprint.

The Webb Dock and Swanson Dock precincts are generally included within Special Use Zone 1 (SUZ1), with the relevant planning controls specified in Clause 37.01 of the Planning Scheme. The SUZ1 relates specifically to the Port of Melbourne, and provides the following purposes:

- *To provide for the ongoing operation and development of the Melbourne Port as a key area of the State for the interchange, storage and distribution of goods*
- *To provide for uses which derive direct benefit from co-establishing with a port*

'Shipping container storage' and a 'transport terminal' are listed as Section 1 uses (planning permit is not required) on the condition that they are directly associated with and reliant upon the port. Additionally, these uses must be located at least 30 metres from land in a residential zone. 'Wharf' is also a Section 1 use (with no conditions).

Any future development would need to meet other requirements within the planning scheme, which could include:

- Height limits for stored goods or material as specified in Schedule 2 to Clause 43.02 (Design and Development Overlay)
- Consideration of impacts to native vegetation and planted native vegetation pursuant to Clause 52.17 (Native Vegetation)
- Requirements associated with the creation or alteration of access to roads under Clause 52.29 (Land Adjacent to a Road Zone, Category 1 or Public Acquisition Overlay for a Category 1 Road)

In addition to this, other approvals, consents, licences may be required depending on specific activities proposed.

Expansion beyond the existing footprint

Further marine based development, such as the expansion of Webb Dock and deepening of the existing basin would require assessment to identify the potential need for additional approvals which may include:

- Potential for significant impacts on Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and need for referral/approval. Based on the Channel Deepening Project and Port Capacity Project, it is noted that MNES considerations are likely to be confined to marine species, such as the Australian Grayling
- Consent under the Victorian *Coastal Management Act 1995* for works on coastal Crown land, including the seabed of Victoria
- Potential to trigger the referral criteria under the Victorian *Environment Effects Act 1978* and potential need for an Environment Effects Statement (or similar process)

Further terrestrial based development, such as new or upgraded road and rail corridors may trigger a range of approvals depending on the location, proposed scale and design of these works. Types of approvals that would need to be considered include, but are not limited to:

- Potential for significant impacts on MNES under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and need for referral/approval
- Potential need for an Environment Effects Statement (or similar process) under the Victorian *Environment Effects Act 1978*
- A Cultural Heritage Management Plan under the Victorian *Aboriginal Heritage Act 2006* if significant ground disturbing works are to be carried out within an area of cultural heritage sensitivity
- Planning Scheme Amendment and/or Planning Permits to reserve and enable the use and development of land and for native vegetation removal under the Victorian *Planning and Environment Act 1987* (Victoria) – Port of Melbourne and the surrounding Melbourne and Port Phillip Planning Schemes
- Seeking comment from the Secretary to the Department of Environment, Land and Water and Planning on any plan of works across a waterway pursuant to section 66(1) of the Victorian *Conservation, Forests and Lands Act 1987*
- Licence from Melbourne Water under section 67 of the Victorian *Water Act 1989* to construct, alter, operate or decommission works on a waterway
- Consents and decisions under the *Road Management Act 2004*.

3.3.5 Summary

Whilst the factors outlined above are not hard constraints on development, they are matters that would need to be considered and assessed as part of any future development of the Port of Melbourne and may influence an ultimate decision on when to progress development of a second container port. Commentary around potential approval requirements is based on the current legislative framework and would need to be reviewed and re-considered at the time that development at Port of Melbourne was proposed.

4. Where could Victoria's second container port be located?

4. Where could Victoria's second container port be located?

4.1 Two locations for investigation – Bay West and Hastings

Terms of Reference were issued with the Special Minister of State's request to IV for advice regarding a second container port. These Terms of Reference ask for advice on the suitability of the Port of Hastings and Bay West locations.

These two locations have been considered for a second container port by successive Victorian governments. The Hastings site has been identified in government policy for about 50 years, and was recognised as a preferred location for a second container port in the 2004 *Victorian Ports Strategic Framework* (Department of Infrastructure, 2004). The 2013 *Victorian Freight and Logistics Plan* (DTPLI, 2013) also identified Hastings as a location for second container port, and in that same year the Port of Hastings Development Authority commenced feasibility studies and early planning for an expanded container port at that location.

More recently, governments have also considered the feasibility of a second container port on the north-west shore of Port Phillip Bay, referred to as Bay West. Studies such as the Environment Effect Statements for the Channel Deepening Project and work on the Western Treatment Plant have examined the environmental and social values in the vicinity of Bay West.

The Bay West (Port Phillip Bay) and Hastings (Western Port) environments are highly complex and the potential impacts on these environments as a result of port development and operation are challenging to compare.

4.1.1 Bay West

The Bay West area covers the north-west coastline of Port Phillip Bay between Point Cook and Point Lillias (25–50 km south-west of Melbourne). There were several possible port locations in this area, each with different land and marine access attributes. IV and GHD (as its engineering consultants) selected an indicative port terminal location to study based on: technical factors considered in previous investigations of this area; the results of geophysical survey; surrounding land uses; environmental factors; and sensitivity testing to consider impacts to dredge volumes and reclamation feasibility (GHD, 2017b). The indicative port location and footprint at Bay West is shown in Figure 5.

The indicative location for the container terminal is on an island terminal of reclaimed land. This would be constructed in Port Phillip Bay to the south of the Werribee River mouth, offshore from Melbourne Water's Western Treatment Plant (WTP). The WTP treats around 60% of Melbourne's sewage (approximately 500 megalitres at Average Dry Weather Flow) and produces high quality recycled water for use in the Werribee Irrigation District and for City West Water customers. Treated effluent that is not recycled is discharged to Port Phillip Bay to the south via four main outfalls.

In addition to the main sewage treatment plant, recycled water treatment plant and distribution pipework, the WTP site also has an AGL-operated cogeneration power facility. The WTP site forms part of the Western Port Phillip Bay and Bellarine Peninsula Wetland of International Importance (Ramsar site). The WTP is situated on a total landholding of around 10,700 Ha, with approximately 5,000 Ha of this land dedicated to agribusiness, and the remainder to the sewage treatment facility and associated works and biodiversity conservation areas. The management of the agricultural business, including cropping, cattle and sheep, is outsourced by Melbourne Water with the associated land on a 20-year lease to the agricultural operator.

Within Port Phillip Bay there are four marine reserves, with only Point Cooke Marine Sanctuary located near to the Bay West location. Point Cooke Marine Sanctuary is 290ha in size and encompasses the Point Cooke Marine Reserve. The sanctuary is located to the north-east of the Bay West port development site.

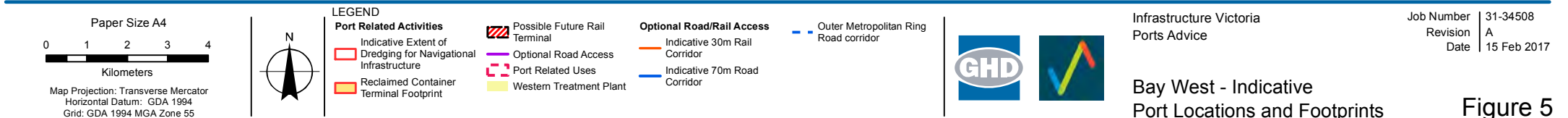
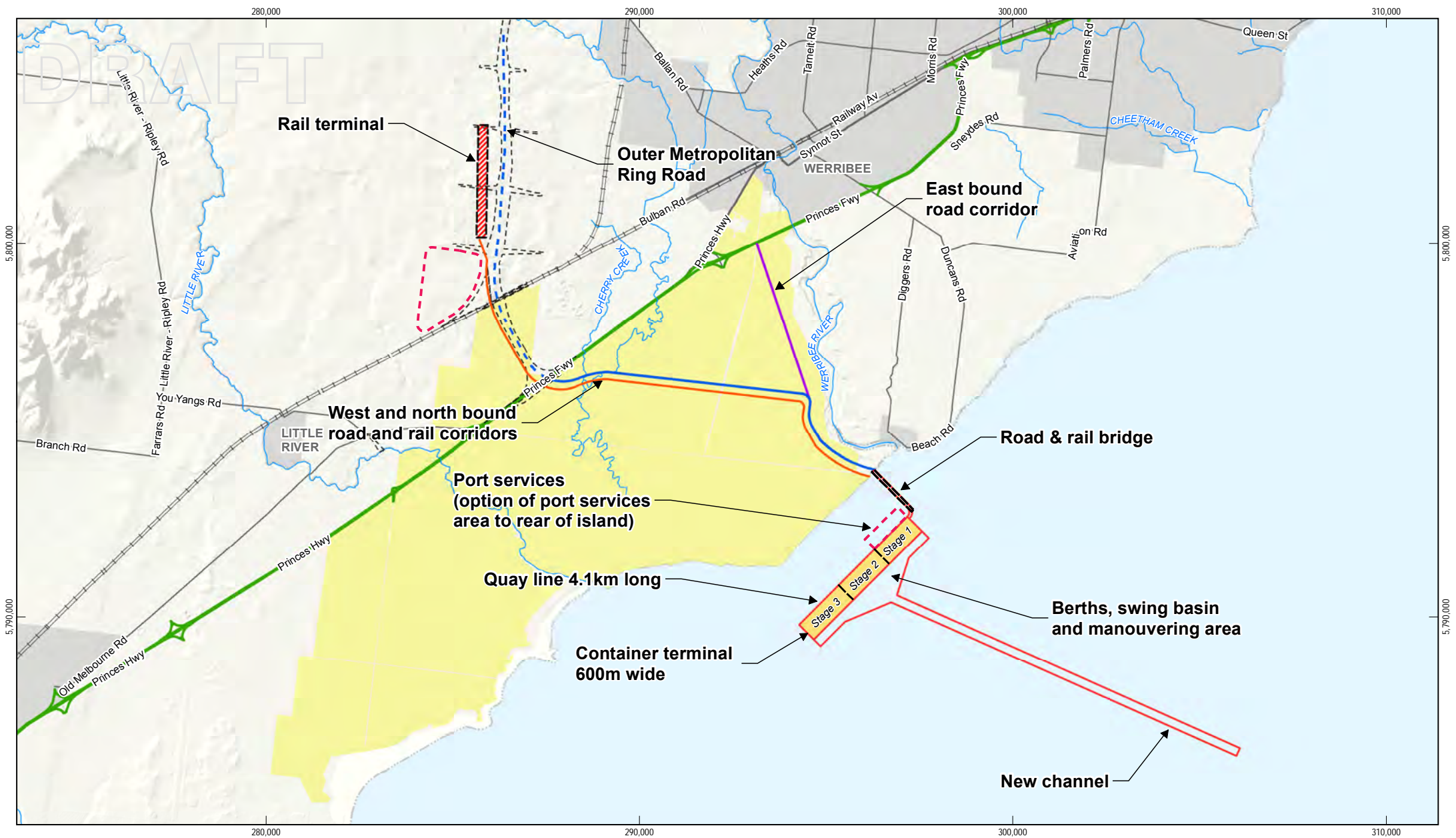


Figure 5

4.1.2 Hastings

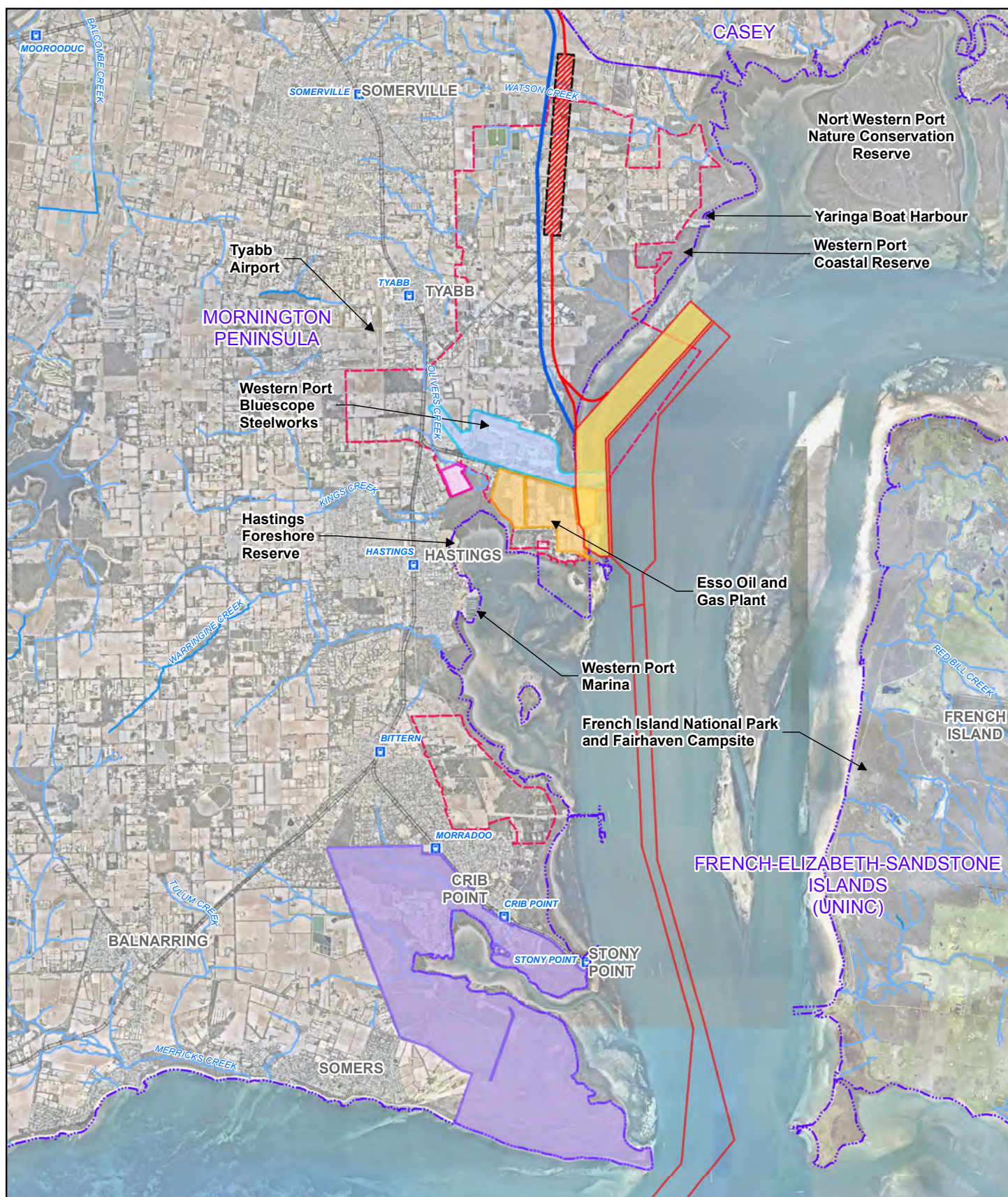
The Hastings site is located 60 km south-east of Melbourne at Western Port, to the north of Long Island Point. Western Port is bounded by the Mornington Peninsula to the west, Koo Wee Rup to the north, Phillip Island to the south and features French Island in the centre. Western Port is connected to Bass Strait by two channels: a wide western channel between Flinders and the western point of Phillip Island, and a narrow eastern channel between San Remo and Phillip Island. The port location at Hastings and indicative footprint is shown in Figure 6.

Despite some early attempts to establish a port in Western Port in the 1820s as a reaction to French interest in the southern coast of Australia, it was not until after World War 2 that any real impetus for a port development in the bay occurred (Shapiro, 1975). The land at Hastings has been reserved for port-related uses since the late 1960s. In the mid-1970s, three additional areas were identified for port purposes and set aside so that the state's options for any future port development at Western Port could be preserved. Land designated for port-related uses is captured within the SUZ1, shown in Figure 6.

The majority of land within the SUZ1 at Hastings is owned and occupied by a small number of landholders with significant vacant land parcels. The largest land owners are BlueScope Steel, Esso/BHP and Crib Point Terminal (Shell – Mobil). There are also small farms and some larger farms with intensive horticulture, poultry and similar activities within the SUZ1. The Port of Hastings is already an operating commercial trading port serving international and domestic shipping with existing sea and landside infrastructure in place. Currently the port facilities do not handle containerised freight.

There are several parks and reserves in the vicinity of the proposed port location including French Island National Park, Devilbend Natural Features Reserve and Crib Point (G229) Bushland Reserve. There is also a Public Conservation and Resource Zone and Public Park and Recreation Zone on the Hastings foreshore reserve, and a small park managed by the Mornington Peninsula Shire Council at the northern end of the SUZ1 area.

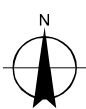
Western Port contains three Marine Protected Areas (MPAs). MPAs, which include Marine National Parks (MNPs), protect the State's significant marine environmental and cultural values. Each MNP also has a Special Protection Area for national values which includes saltmarsh and mangrove habitat used by wading birds (Barton *et al.* 2012). MNPs are intended to conserve the biodiversity of a range of unique marine environments and provide for the future protection of these areas. Special Management Areas (SMAs) are also found in Western Port. They are designated through state legislative mechanisms for protection of special natural values. The areas are usually consistent with International Union for Conservation of Nature (IUCN) categories for marine protected areas. Western Port contains five SMAs. The entire area of Western Port, excluding French and Phillip Islands form part of a Ramsar Wetland of International Importance.



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|---|---|--|
| Indicative Extent of Dredging for Navigational Infrastructure | Indicative 70m Road Corridor | HMAS Cerberus |
| Reclaimed Container Terminal Footprint | Possible Future Rail Terminal | United Hastings Terminal |
| Indicative 30m Rail Corridor | BlueScope Steel | Local Government Boundary |
| | Esso/BHP Billiton | SUZ1 - Zoned for Port Related Uses |

Paper Size A4
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Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Infrastructure Victoria
Ports Advice - Environmental and Social

Job Number 31-34583
Revision B
Date 14 Feb 2017

Hastings - Indicative
Port Location and Footprint

Figure 6

4.2 Project description

Whilst any port development would be subject to detailed design and a full environmental assessment and approvals process, it is important to have a conceptual understanding of potential project elements to inform comparative site impact assessment. The following project descriptions are intended to provide an indication of the types of infrastructure, port configurations and activities that may occur at Bay West and Hastings, if either of these sites were to be developed as a second container port for Victoria.

It is noted that a port at either location may be progressively developed in stages; for the purposes of this report, potential impacts have only been considered for the ultimate development scenario and footprint.

GHD's report for Infrastructure Victoria, *Ports Advice – Engineering Dredging and Reclamation: Concept Designs and Costings – Bay West and Hastings* (GHD 2017b), presents further detail on the process for developing these conceptual project descriptions and information considered in developing these, and forms the basis for this section of the report.

4.2.1 Bay West: location and activities

For the purposes of this report, the Bay West port is assumed to be to the south-west of the Werribee River and to the south and east of the Western Treatment Plant main treatment lagoons (refer to Figure 5).

Bay West would primarily comprise the following areas:

- Dredging, reclamation and possible disposal of dredged material: Port Phillip Bay
- Port terminal: An island terminal offshore from the Western Treatment Plant with a bridge connecting the terminal to the landside operations
- Transport: A transport corridor comprising a four lane highway between the port and the existing road network at the Princes Freeway and future Outer Metropolitan Ring (OMR) Road, and a twin rail track between the port and the existing Principal Rail Freight Network to the north for rail. A future rail terminal servicing the port is proposed to be located to the west of the OMR

In addition, project infrastructure may be located in other areas. For example, aids to navigation may be required in various locations.

Marine components of the port

The marine element encompasses all activities in the sub-tidal to deep water areas within Port Phillip Bay, including:

- A container terminal consisting of a single island pier running parallel to the shoreline where containers would be loaded and unloaded from vessels. The island would be approximately 4,100m in length and 600 m wide, located 1,500 to 2,000m from the shoreline. The exact dimensions and location of the container terminal would be determined through the project design process
- An open piled bridge linking the container terminal to the mainland. If the distance exceeds 1,500m, there may be a section of causeway in lieu of a bridge
- Shipping channels that would provide access for vessels to the Bay West container terminal and swing basin, from the existing Port Phillip Bay shipping channels. In the ultimate development scenario, capital dredging may be required to widen (but not deepen) the existing channel at the entrance to the bay to allow for the passage of larger vessels

- Berth pockets that would provide sufficient area and water depth to allow for safe mooring of vessels at the berths during the tidal cycle while vessels are loading and unloading
- Turning or swing basins that would provide areas of water or enlarged channel used for turning vessels with dimensions sufficient to enable container vessels to be turned around and manoeuvred safely onto and off the quay at the container terminal
- Anchorage areas where vessels are permitted to lie at anchor whilst waiting to berth. It is expected that the container terminal and channel system would have sufficient capacity that vessels requiring access at the anchorage would be minimised.
- Marine-based aids to navigation that would be located along the length of the channel. Land-based aids to navigation may need to be provided on the terminal island and maybe elsewhere

Other ancillary infrastructure that would be incorporated within the development footprint includes:

- New berths for tug boats, service craft, line boats and survey vessels
- New amenity or office facilities for the harbourmaster or pilots
- New berth infrastructure for receiving construction materials and/or special cargo.

Port terminal

The port terminal element includes all activities in the coastal and terrestrial areas associated with the port. These are expected to be limited to:

- An intermodal exchange area containing facilities required for the exchange of import and export containers between trains, trucks and ships
- Services and utility infrastructure including power supply, drainage, water supply and sewage, telecommunications, area lighting, security infrastructure and quarantine, fencing, customs and terminal equipment repair facilities to support container terminal operations

It is anticipated that warehousing, empty container depots, transport operators and support services related to logistics and operations of the Port could be primarily provided by industrial precincts developed close to the facility in existing areas, including Laverton and Truganina, and to the north of the Princes Freeway and at Avalon. Accordingly, development of an extensive new land-based port terminal precinct at Bay West is not expected, although there may be a need for some development to support a few key operations (e.g. customs facilities).

Transport

The transport element would include road and provision for rail corridors with associated rail marshalling areas to efficiently connect the port with the metropolitan, state and national transport networks. This would include:

- Road and dual carriageway in and out of the port across the Melbourne Water Western Treatment Plant site, connecting into the Princes Freeway and future OMR connection
- A minimum twin track freight rail corridor (20 to 30 m width) with provision for dual gauge connectivity from Bay West across the Melbourne Water Western Treatment Plant site, connecting into the Principal Rail Freight Network built within the OMR and existing mainline to north of Princes Highway
- A rail marshalling area of 3km length by 250m width located to the north of the Princes Freeway, west of the proposed OMR corridor

- A truck circulation area directly connected to the intermodal exchange area and the primary transport corridor

Dredged material management

The estimated volume for capital dredging for the new approach channel, swing basins and berth pockets is 28-29 million m³, which would comprise sands and clays. It is anticipated that a significant proportion (close to 100%) of the dredged material for Bay West would be re-used beneficially within the land reclamation, reducing volumes for disposal to a minimum. The site location and configuration allows for this share to be optimised to suit the material type. The proportion of material deemed unsuitable for land reclamation would be disposed to existing DMGs in Port Phillip.

Due to the low current speeds and water depth, all dredging can be undertaken entirely within a silt curtain thus controlling the spread of turbidity from the site of dredging operations (GHD, 2017b).

Dredged material management options would be assessed in accordance with the Victorian EPA's Best Practice Guidelines for Dredging assessment framework (EPA, 2001) and/or the National Assessment Guidelines for Dredging (DEWHA, 2009) as applicable.

4.2.2 Hastings: location and activities

A port at Hastings would be situated within Western Port, to the north of the township of Hastings and approximately 60 kilometres southeast of Melbourne. The port would be primarily developed in the following areas:

- Marine: Western Port, largely within the existing declared Port of Hastings Port Waters
- Port landside: Long Island Point, generally within the area covered by the SUZ1 (including coastal and intertidal areas)
- Transport: A rail corridor between the port and the existing Principal Rail Freight Network at Lyndhurst, and upgrades to the existing road network from the port to Cranbourne-Frankston Road
- Dredging, reclamation and material management: to be confirmed, but may include:
 - Dredging of sand from Bass Strait for use in reclamation areas
 - Dredging of local sand/clay/silts from channels and disposal offshore (Bass Strait) (site not identified)

In addition, project infrastructure may be located in other areas. For example, aids to navigation may be required in various locations, and land and marine areas may be required for the disposal of dredged material.

Note that impacts on the environment of Bass Strait have not been considered as part of this report as dredging and disposal sites have not yet been identified.

Marine components of the port

The marine element encompasses all activities in the sub-tidal to deep water areas within Western Port, including:

- Shipping channels that would provide access for vessels from the deep waters of Bass Strait to the Port of Hastings container terminal and swing basin, generally following the alignment of the existing Port of Hastings approach channels
- Berth pockets that would provide sufficient area and water depth to allow for safe mooring of vessels at the berths during the tidal cycle while vessels are loading and unloading

- Turning or swing basins that would provide areas of water or enlarged channel used for turning vessels with dimensions sufficient to enable container vessels to be turned around and manoeuvred safely onto and off the quay at the container terminal
- Anchorage areas where vessels are permitted to lie at anchor whilst waiting to berth. Western Port currently has two designated anchorage areas that could be modified as part of the development. It is expected that the container terminal and channel system would have sufficient capacity that vessels requiring access at the anchorage would be minimised
- Marine-based aids to navigation that would be located along the length of the expanded channel, and potentially around the swing basin at Long Island Point.

Ancillary infrastructure which may be required at Crib Point and Stony Point includes:

- New berths for tug boats, service craft, line boats and survey vessels
- New amenity or office facilities for the harbourmaster or pilots
- New berth infrastructure for receiving construction materials and/or special cargo
- New berth infrastructure to replace existing port infrastructure if displaced by the port development.

Port landside

The port landside element would include all activities in the intertidal, coastal and terrestrial areas associated with the port. The container terminal is the key component of the port landside element and is where containers would be loaded and unloaded from vessels. The container terminal would include:

- 4.25 km of land reclamation and a quay line in front of the existing shoreline at Long Island Port, where the berths would provide safe terminal operations under predicted tides, and most weather conditions. The exact dimensions and location of the container terminal would be determined through the project design process
- A container yard where containers are stacked and moved, directly behind the quay on the reclaimed land
- An intermodal exchange area containing facilities required for the exchange of import and export containers between trains and trucks, and the container stacks
- A truck circulation area directly connected to the intermodal exchange area and the primary transport corridor
- Services and utility infrastructure including power supply, drainage, water supply, telecommunications, area lighting, security infrastructure and quarantine, customs and terminal equipment repair facilities to support container terminal operations.

The area behind the terminal would consist of the port precinct and port environs. The port precinct would consist of warehouses and distribution centres, together with an associated development area within the wider port environs for port and logistics related business. The port precinct would also include support and administration buildings, terminal gate (for vehicle access), empty container depots, and service and utility corridors. Land-based aids to navigation may need to be provided.

The area outside the port precinct but generally within the SUZ1 boundary is defined as the port environs. It would extend around the port precinct and contain further warehousing, transport operators and support services related to logistics and operations of the Port.

The size and arrangement of the port precinct would be defined during the project design process.

Transport

The transport element would include road and provision for rail corridors with associated rail marshalling areas to efficiently connect the port with the metropolitan, state and national transport networks (refer to Figure 7).

Ultimately this would connect to the South Gippsland Highway and include:

- A freeway from the Port of Hastings to Cranbourne–Frankston Road, Langwarrin. This would involve duplication of the existing Western Port Highway
- Construction and operation of a dual gauge freight rail line from the Port of Hastings connecting into the Principal Rail Freight Network (Cranbourne railway line) at Lyndhurst, located within the freeway median.

The freeway would join with the northern section of the Western Port Highway which is currently planned to be upgraded to freeway standard between the South Gippsland Highway and Cranbourne–Frankston Road. The planned upgrade of the northern section is required irrespective of the port development and is being undertaken by VicRoads as part of the Western Port Highway (North) Upgrade Project. It includes an area in the median to accommodate a rail line (GHD, 2017b).

Local upgrades to other roads may be required for interim stages of the port development to accommodate transport demand and would be determined through transport modelling.

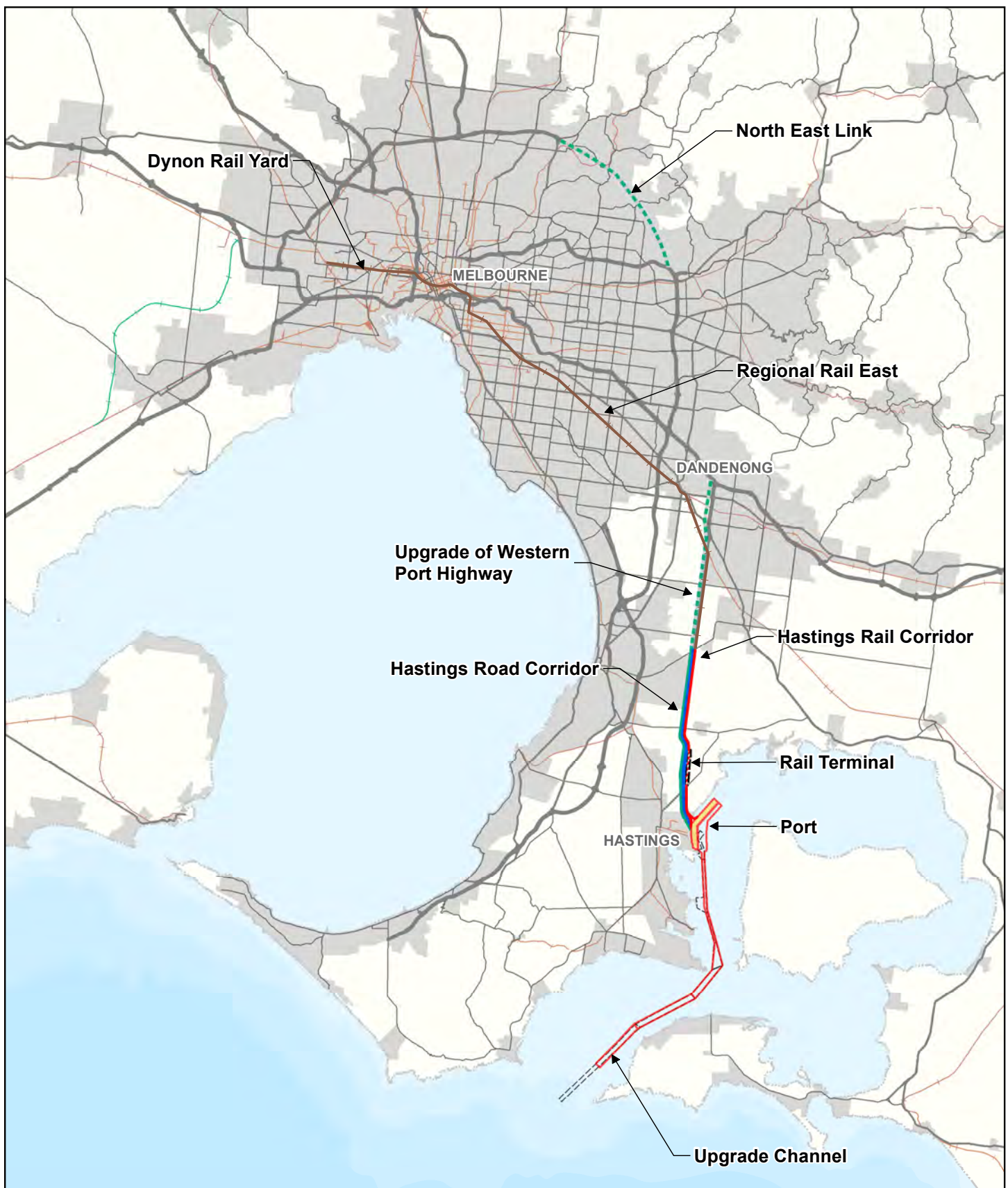
Dredged material management

Dredging would be required to deepen and potentially widen shipping channels and enable access of larger vessels to the port. The estimated volume of capital dredging around 47 million m³ (GHD, 2017b).

To accommodate this process, areas would be required for the management of dredged material. Dredged material management may involve:

- Use of dredged material for beneficial uses, such as land reclamation, environmental rehabilitation, stockpiles or other future construction related uses (if possible)
- Disposal of dredged material that is considered unsuitable for any alternative use. This would include disposal at offshore sites, including sites potentially outside of Western Port waters and in Bass Strait.

Dredged material management options would be assessed in accordance with the Victorian EPA's Best Practice Guidelines for Dredging assessment framework (EPA, 2001) and/or the National Assessment Guidelines for Dredging (DEWHA, 2009) as applicable.



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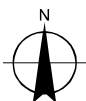
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| Regional_Rail_Link | Indicative 30m Rail Corridor | Urban Areas |
| Railways | Indicative 70m Road Corridor | |
| Indicative Extent of Dredging for Navigational Infrastructure | Possible Future Rail Terminal | |
| Reclaimed Container Terminal Footprint | Existing Shipping Channel | |

Paper Size A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Infrastructure Victoria
Ports Advice - Environmental and Social

Job Number	31-34583
Revision	B
Date	14 Feb 2017

Hastings Transport Corridor

Figure 7

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180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

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Data source: DELWP, VicMap, 2016; GHD, 2016 Created by: Irsmith

4.2.3 Construction

The ports may be constructed in stages as demand grows and available container handling capacity in Victoria is exceeded. Construction of each stage may comprise numerous months of dredging works, terminal and land based construction. The duration of construction would be better defined as the preliminary design is developed. Dredging and container terminal construction works could be undertaken in parallel.

It is anticipated that staging may include:

- Hastings to be constructed in three dredge/reclaim phases
- Bay West to be constructed as a single capital dredge/reclamation phase with phased development of quay line and top side areas

Construction activities and structural works for both Hastings and Bay West would be likely to include:

- Marine
 - Dredging
 - Dredged material management (beneficial reuse and/or disposal)
 - Reclamation and revetment systems
 - Piling
- Port landside
 - Concrete works
 - Excavation and earthworks
 - Capping and stabilising
 - Materials storage and fabrication
 - Structural rehabilitation works
- Transport
 - Concrete works
 - Excavation and earthworks
 - Bridges and underpasses
 - Pavement, highway and rail construction
 - Building construction, infrastructure and landscaping

4.2.4 Operation

The operational activities for both Hastings and Bay West are expected to include:

- Marine
 - A fleet of tugs to guide ships to and from the berth at the container terminal
 - Other vessels associated with the mooring of vessels such as line boats as well as maintenance vessels
 - Bunkering operations, although these are not expected to be any different from those currently undertaken
 - Aids to navigation in the channel and anchorage area to guide vessel movements
 - Vessels may be, on occasion, waiting in the anchorage area until they can access the port if directed by the Harbour Master
 - Maintenance dredging, when required, to maintain the channel depth for safe navigation

- Port terminal and landside
 - Ships berthing and unberthing from the berth structure, and ship to shore container cranes unloading and loading container vessels. Aids to navigation to guide vessels to the berth structure
 - Containers being transferred from the berth to a stack in the container yard or intermodal area – the approach to moving containers would be defined by the future operator of the port and could be manual or automated
 - Warehouses and distribution centres within the port precinct receiving containers for storage, filling, emptying or transporting by the road or rail transport infrastructure
 - Operations occurring 24 hours per day, seven days per week
- Transport
 - Road and rail transport of containers occurring 24 hours per day, seven days per week

4.3 Review of key assets, values and land uses

The current assets, values and land uses within the Bay West and Hastings areas are known as the 'existing conditions'.

A review of existing information was undertaken to identify significant assets, values and uses within both the Bay West and Hastings areas. The aim of this review was to identify potential differentiators for site selection, as a baseline against which the two sites could be assessed with regard to the potential impacts of the development of a container port. The information that was reviewed is listed in section 7 of this report.

This review has focussed on identifying environmental and social values from the perspective of obtaining environmental approvals and potential to impact on the community. Design and constructability issues such as flooding, groundwater and cost of contamination management, including unexploded ordinance which may be present around Defence sites, and geotechnical conditions are not discussed as part of this report.

The review considered the following questions:

- What are the current assets, values and land uses within these areas?
- What is the significance of these assets, values and land uses?
- How well do we understand these assets, values and land uses – what level of data/information is available?
- What are the significant assets, values and land uses that may be site constraints, differentiators between sites or provide opportunities for port development?

The key assets, values and land uses within the Bay West and Hastings areas are shown in Figure 8 to Figure 13 and summarised in sections 4.3.1 and 4.3.2. Key considerations for site selection are listed in section 4.4. Detailed results of the review, including the criteria for assessing significance and reference sources are presented in Appendix A.

Both Hastings and Bay West are adjacent to and within Ramsar wetland sites. These wetlands are recognised by the Convention on Wetlands of International Importance, also known as the Ramsar Convention. The convention aims to halt the worldwide loss of wetlands and to conserve those that remain. Ramsar wetlands are recognised as a Matter of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). At the wetlands at both locations have Ramsar listings this is a key consideration for development at either location.

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

The Port Phillip Bay Ramsar site is comprised of six separate areas. The Bay West investigation area is adjacent to and partly within Melbourne Water's Western Treatment Plant, which lies in the Werribee/Avalon area of the Ramsar site. Werribee/Avalon is the largest area in the Ramsar site, covering approximately 14,616 hectares, including coastal areas and adjacent marine waters to the 2m depth contour. Eight of the wetland types recognised under the Ramsar classification system are located in the Werribee/Avalon area of the Port Phillip Bay Ramsar site: sandy marine shores; intertidal mudflats; intertidal saltmarsh; estuarine waters; permanent rivers; seasonal/intermittent freshwater marshes; irrigated land and wastewater treatment areas.

The Port Phillip Bay Ramsar site meets seven of the nine Ramsar criteria:

- **Criterion 1:** The majority of the wetland types within the Port Phillip Bay Ramsar site cannot be considered as unique within the bioregion. However, it is considered that the site does contain wetlands that are representative of natural or near-natural wetlands types, and that these are internationally important.
- **Criterion 2:** The wetlands within the Ramsar site support six threatened fauna species that are listed under the EPBC Act. This includes: Fairy Tern (*Sternula nereis*) which is a bird of global conservation significance; the Australasian Bittern (*Botaurus poiciloptilus*), listed as endangered under the EPBC Act; and the Australian Painted Snipe (*Rostratula australis*). Additionally, the Growling Grass Frog (*Litoria raniformis*) is listed as vulnerable under the EPBC Act. The Orange-bellied Parrot (*Neophema chrysogaster*) which is listed as critically endangered under the EPBC Act, has been recorded in all saltmarsh areas within the Ramsar site. Australian Grayling (*Prototroctes maraena*) which is listed as vulnerable under the EPBC Act also utilises the coastal areas during their early life stages.
- **Criterion 3:** Whilst there is an absence of any species unique to the Ramsar site and it is not necessarily more species rich or diverse than other comparable areas, it is still considered that the Ramsar site supports plants and animals that are important for maintaining the biological diversity of this particular biogeographic region.
- **Criterion 4:** All areas within the Ramsar site support migratory shorebirds, including a large number of international migratory species. The permanent freshwaters of the WTP lagoons provide valuable habitat for waterfowl and other native species when other temporary freshwater inland wetlands are dry. The WTP also supports breeding habitat for waterbirds and for the Growling Grass Frog.
- **Criterion 5:** The site regularly supports great than 20,000 shorebirds over summer. The WTP supports over 60,000 waterfowl within the summer months.
- **Criterion 6:** The Ramsar site regularly supports more than one per cent of the estimated populations of 14 species of birds; four internationally migrant species, one tern, a gull and eight species of waterfowl.
- **Criterion 8:** There are a number of locations within the Ramsar site that are important sources of food, nursery and migration paths for fish.

Fairy Tern (*Sternula nereis*)

Australasian Bittern is listed as Vulnerable under the EPBC Act, Threatened under the FFG Act and Endangered under the Advisory List of Threatened Vertebrate in Victoria.

Although the population appears to be relatively stable, in Victoria, there is estimated to be only a few pairs. Their preferred habitat is coasts and estuaries with nesting occurring on sandy banks and sheltered beaches and roosting occurring on the beach during the night.



Property of Len Robinson/Viridans Images

Australasian Bittern (*Botaurus poiciloptilus*)

Australasian Bittern is listed as Endangered under the EPBC Act, Threatened under the FFG Act and Endangered under the Advisory List of Threatened Vertebrate in Victoria. It is also one of 20 birds that the Australian Government has prioritised resource allocation to support the species recovery effort.

It can be found in shallow terrestrial freshwater wetlands, primarily in reedbeds, swamps, estuaries and streams.



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Australian Painted Snipe (*Rostratula australis*)

Australian Painted Snipe is currently listed as Endangered under the EPBC Act, Threatened under the FFG Act and Critically Endangered under the Advisory List of Threatened Vertebrate in Victoria.

Its preferred habitat is marsh with moderate cover.



Aviceda (Creative Commons)
http://en.wikipedia.org/wiki/File:Australian_Painted-Snipe_female_Nov02.JPG#globalusage

Growling Grass Frog (*Litoria raniformis*)

Growling Grass Frog is listed as Vulnerable under the EPBC Act, Threatened under the FFG Act and Endangered under the Advisory List of Threatened Vertebrate in Victoria.

Previously found across Victoria, it now persists in isolated populations in the greater Melbourne area. Its preferred habitat includes the edges of swamps, lakes or ponds where the water is slow flowing or still. They can also be found in emergent vegetation.



Property of Alex Holmes

Orange-bellied Parrot (*Neophema chrysogaster*)

Orange-bellied Parrot is listed as Critically Endangered under the EPBC Act, Threatened under the FFG Act and Critically Endangered under the Advisory List of Threatened Vertebrate in Victoria.

They breed in south-west Tasmania in the warmer months before migrating to the southeast mainland where their preferred habitat is saltmarshes, heathlands and low scrublands. They are occasionally seen on grassy areas.



Property of Dan Eyles

Australian Grayling (*Prototroctes maraena*)

Australian Grayling is listed as Vulnerable under the EPBC Act, Threatened under the FFG Act and Vulnerable under the Advisory List of Threatened Vertebrate in Victoria.

Australian Grayling migrate between freshwater streams and the ocean. Time spent in the ocean and coastal areas is during the larval and at least part of the juvenile stages.



Property of Simon Harrow

Western Port Ramsar Wetland

The Western Port Ramsar site extends across approximately 60,000 hectares of the bay with its southernmost extent crossing between Point Leo in the east and Observation Hill on Phillip Island and across to a point just west of San Remo (as shown in Kellogg Brown and Root, 2010). The shoreline of French Island is part of the Ramsar site (Kellogg Brown and Root, 2010).

Four of the marine and coastal wetland types recognised under the Ramsar classification system are located in the Western Port Ramsar site: marine sub-tidal aquatic beds; intertidal mud and sand flats; intertidal marshes including saltmarsh; and intertidal forested wetlands including mangroves.

The Western Port Ramsar site meets seven of the nine Ramsar criteria:

- **Criterion 1:** Western Port is a particularly good example of a natural wetland marine embayment with extensive intertidal flats, mangroves, saltmarsh, and seagrass beds within the South East Coastal Plain. It is also a very good example of a saltmarsh-mangrove-seagrass wetland system.
- **Criterion 2:** The site supports the Fairy Tern (*Sternula nereis*) which is a bird of global conservation significance. Saltmarsh vegetation within the site provides important habitat for the Orange-bellied Parrot (*Neophema chrysogaster*), listed as critically endangered under the EPBC Act.
- **Criterion 3:** Western Port is one of the most important areas for migratory waders in south-east Australia with wader surveys indicating that the Ramsar site supports up to 39 species, and includes 10,000 to 15,000 summer migrants (approximately 12 to 16 per cent of the Victorian population). It supports seagrass and mangrove communities that are characteristic of the marine embayments of Southern Victoria.
- **Criterion 4:** The site is one of the three most important areas in southeast Australia for migratory waders in total numbers and density. It also provides overwintering habitat for the Orange-bellied Parrot and a number of important high tide roosts and breeding habitat.
- **Criterion 5:** The site regularly supports about 10,000 to 15,000 migratory waders, and periodically supports 1,000 to 3,000 ducks and 5,000 to 10,000 Black Swans (*Cygnus atratus*).
- **Criterion 6:** The site regularly supports more than one per cent of the estimated flyway population of five wader species and supports internationally significant numbers of several non-wader species.
- **Criterion 8:** Seagrass beds within the site are known to provide nursery habitat for a number of fish species, including commercially significant species.

4.3.1 Bay West

The Bay West area of investigation includes land to the north of the Princes Freeway, where indicative locations for the road and rail corridors (including one option for a possible future rail terminal) are proposed; land occupied by Melbourne Water's Western Treatment Plant to the south; and an offshore area proposed for the port container terminal.

Land uses, community and recreational facilities

The predominant land use within the development footprint is for activities associated with sewage treatment and agriculture at the WTP. Residential areas are concentrated between the Princes Freeway and Geelong-Melbourne railway line to the north-east adjoining established residential areas in Werribee.

To the south-west adjoining the Princes Freeway is Avalon Airport, which provides both passenger and freight aviation services. Much of the area of the WTP including the coastal areas are managed for conservation purposes.

To the east of the Werribee River is the Werribee Irrigation District, an area of land largely occupied by market gardens which are major producers of lettuce, broccoli and cauliflower. The Werribee Open Range Zoo spans both sides of the river adjacent to the Princes Freeway, with the National Equestrian Centre, Werribee Park complex (including the Mansion and State Rose Garden) and Werribee Park Golf Club occupying land further to the south. These facilities are major tourism attractions within the area, and collectively this is known as the Werribee Tourist Precinct.

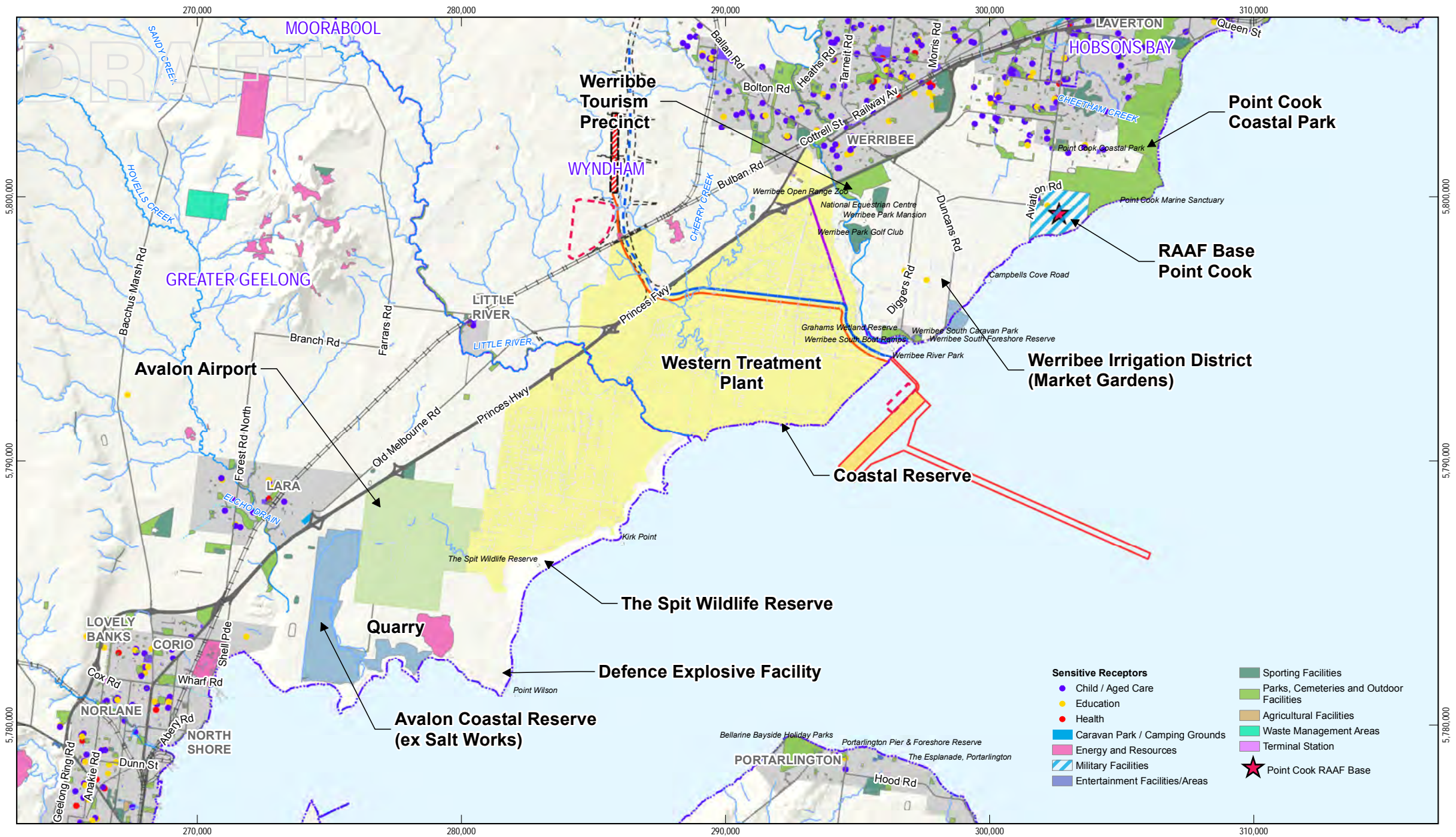
Land to the north-east of the Werribee Tourist Precinct is being developed as the East Werribee Employment Precinct; a mixed-used city development with a town centre surrounded by major health, learning and commercial land uses (Growth Areas Authority 2013).

There are a number of parks and recreational areas near and to the east of the Werribee River. This includes the Werribee River Park (which runs along the western bank of the river); Grahams Wetland Reserve (on the eastern bank of the river, near where it meets the sea); and the Werribee South Boat Ramp and Werribee South Caravan Park along the coast. The publicly accessible offshore area between the Werribee River mouth and the (RAAF) Williams Point Cook Base is valued for recreation (RPS, 2016). Further to the east of RAAF Williams, the Point Cook Coastal Park is open to the public and is popular with birdwatchers and family groups (Parks Victoria, 2016a).

Within Port Phillip Bay it is likely that the recreational catch of fish exceeds that of the commercial fisheries. The western part of Port Phillip Bay is highly valued for recreational fishing. There are a range of access points for recreational anglers, including public boat ramps located within the Western Treatment Plant at Kirk Point, at the Werribee River, at Point Richards and Clifton Springs on the Bellarine Peninsula. The Wyndham Harbour Marina is located in Werribee South (east of the mouth of the Werribee River), which, once all stages are complete, is proposed to contain up to 1000 wet berths, dry boat storage for up to 390 boats, a refuelling dock and ancillary services for recreational boating (Wyndham Harbour, 2017). Target species for recreational fishers include 62 species with the main species targeted being sand flathead, King George Whiting, Southern Sea Garfish, Australian Salmon, Snapper, Southern Calamari and Yellow Eye Mullet.

Western Port Phillip Bay also supports commercial fisheries and aquaculture with over 60 species recorded from commercial catches. The Kirk Point-Werribee Aquaculture Fisheries Reserve (KWAFFR) is close to Bay West, and is largely based around mussel farming offshore and land-based culture of abalone. Australian Salmon, King George Whiting, Flathead (all species), Yellow Eye Mullet, Flounder, Gummy Shark, Southern Sea Garfish, Black Bream and Southern Calamari are all commercially harvested in the west of Port Phillip Bay. There is a growing sea urchin fishery in Port Phillip Bay, within the Bay West investigation area (RPS, 2016).

Land uses, community and recreational facilities within and close to the proposed Bay West port development footprint are shown on Figure 8.



Aboriginal and historic cultural heritage

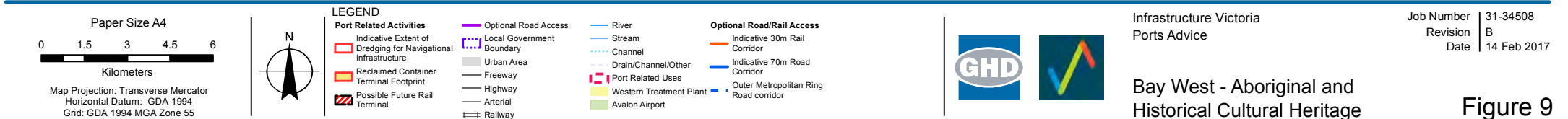
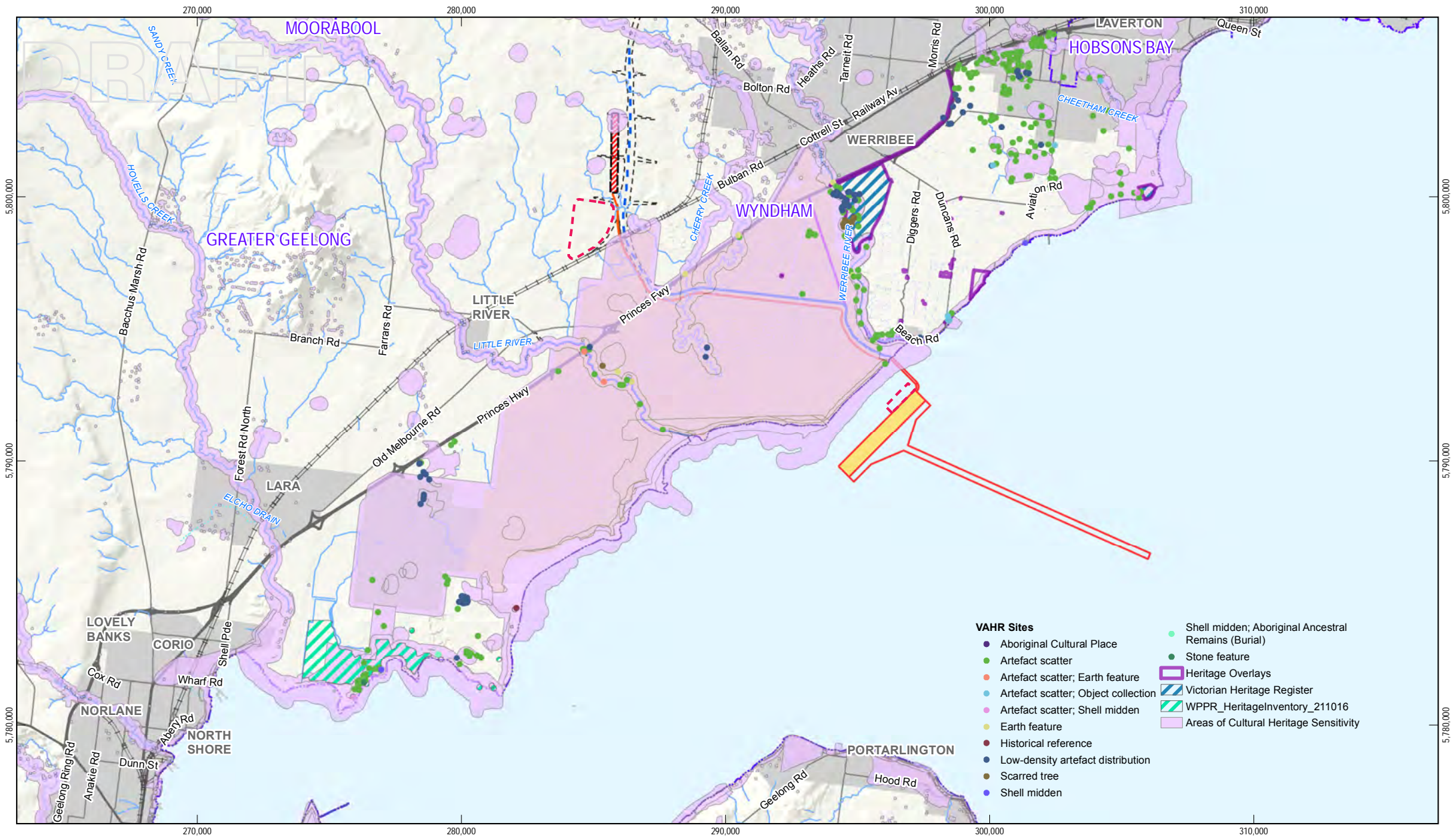
A large area between the Werribee River and extending south-west to Avalon, from just north of the Princes Freeway to the coast, is considered to be an area of Aboriginal cultural heritage sensitivity as defined by the *Aboriginal Heritage Regulations 2007*. Within the Bay West area, numerous stone artefact scatters, earth features, scarred trees and other objects considered to be Aboriginal cultural heritage material are recorded as being present. These are largely located along waterways (Werribee River and Little River), although some are located on land currently occupied by the Western Treatment Plant that could be intersected by the proposed port-related precinct and/or road and rail terminals. There is one intangible, non-archaeological place potentially of high Aboriginal cultural heritage significance within the vicinity, comprising two intertwined trees.

Further to the west, to the south of Avalon Airport, the coastal area is recorded as containing shell middens (accumulations of shell resulting from the collection, cooking and eating of shellfish) and a burial containing Aboriginal ancestral remains. Approximately 3 km north of Point Wilson, outside of the area proposed for port development, areas are identified as being of importance or significance in association with Aboriginal people as the site of Gellibrand's Harbour meeting in 1835. Stone artefact scatters have also been recorded further to the east, near Point Cook.

The tourism precinct south of the Princes Freeway and adjacent to the Werribee River is considered to be of State and local historic heritage significance (and is listed on the Victorian Heritage Database and protected by a Heritage Overlay). Within the area proposed for port-related development, there is a water tank originally constructed in 1854 that is listed on the Victorian Heritage Register as being of historical and architectural importance to the State (VHR 1416, Wyndham Planning Scheme Heritage Overlay Schedule 19). The site is located at the western end of Old Boundary Road, associated with the original Cocoroc Village.

However, the majority of places that have been identified as being of local historic heritage significance in this area are within the suburb of Werribee further north of the Princes Freeway, further east at Point Cook or to the west and south-west at Point Wilson and Point Lillias – well outside of the area proposed for port development.

Aboriginal and historic cultural heritage values within and close to the proposed Bay West port development footprint are shown on Figure 9.



Environmental values

The WTP is a key feature of this location and the entire site is part of Werribee/Avalon section of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (refer box for a description of the listing). This Ramsar site is internationally recognised as an area of significant habitat for migratory birds and is listed under the Ramsar Convention (Convention on Wetlands of International Importance especially as Waterfowl Habitat) and a number of international bilateral agreements for the protection of migratory birds (CAMBA¹, JAMBA², ROKAMBA³ and the CMS⁴ or Bonn Convention). Migratory birds listed under these agreements are considered MNES under the EPBC Act.

The critical ecosystem components and processes defined in the draft Ramsar Management Plan include:

- **Geomorphic:** Extensive intertidal mudflats and the significant geomorphic feature of the Spit and tidal lagoon
- **Hydrology:** Semi-diurnal tides in the coastal areas, hydrological connectivity between the tidal lagoon and the Bay through The Spit, artificially maintained water levels in WTP wetlands, with permanent lagoons, winter flooded grass paddocks and summer saturated land paddocks
- **Primary Production:** High biomass of the treatment lagoons and nearshore areas
- **Vegetation:** Subtidal areas characterised by macroalgae, variable distribution of seagrass, large areas of saltmarsh, emergent fringing vegetation at edges of treatment lagoons
- **Invertebrates:** Intertidal invertebrates at a high abundance, dominated by polychaete worms and bivalve and gastropod molluscs. Freshwater invertebrates with large biomass in polishing ponds
- **Fish:** 15 freshwater species in Lake Borrie and Little River. Five estuarine species in Little River and migratory route for a number of species that require freshwater and estuarine marine water for their life cycle
- **Waterbirds:** 105 species recorded, 17 breeding. Regularly supports > 20 000 waterbirds and > 1% of the population of seven species of waterfowl; important breeding site for Pied Cormorant; significant site for moulting waterfowl. Saltmarshes and other intertidal areas are significant for migratory shorebirds; regularly supports > 1% of the populations of Curlew Sandpipers, Red-necked Stints and Sharp-tailed Sandpipers, important for threatened species: Orange-bellied Parrot, Fairy Tern, Australian Bittern and Australian Painted Snipe

Whilst the majority of the land within the WTP area has been disturbed by development and operation of the WTP or significantly modified by agriculture and other land uses as described above, there are remnants of State-listed Western Basalt Plains Grassland community to the east and south of Little River, mainly to the west of the future Outer Metropolitan Ring Road alignment. These grasslands support two natural ephemeral wetlands, and provide habitat for threatened fauna species including the Commonwealth-listed Striped Legless Lizard and State-listed Fat-tailed Dunnart. The Department of Environment, Land, Water and Planning plans to acquire land to create the Western Grassland Reserve at this location (DELWP 2016a).

¹ China Australia Migratory Bird Agreement

² Japan Australia Migratory Bird Agreement

³ Republic of Korea Migratory Bird Agreement

⁴ Convention on Migratory Species

The indicative container terminal location and road and rail corridors are adjacent to and within areas that are largely used for wastewater treatment and resource recovery. The western sewage treatment lagoons support Commonwealth-listed coastal saltmarsh, and there are small isolated patches of seagrass and green algae along the coast though mainly to the south west of the proposed development location. Extensive areas of macroalgae along the western shore of Port Phillip Bay provide habitat and food for invertebrates and fish.

Over winter, the coastal saltmarsh and adjoining vegetation is occupied by the Orange-bellied parrot a Commonwealth-listed species that is critically endangered. The WTP remains one of the few areas on the mainland where the Orange-bellied parrot has been regularly sighted.

The lagoons and associated channels and drains of the WTP also provide habitat for large numbers of waterfowl, threatened fauna species, including the Growling Grass Frog, and are an important refuge area for waterfowl, particularly under drought conditions.

Between Little River and Werribee River, the proposed road/rail corridor would cross Lollypop Creek – one of the last remaining intact examples of the formally extensive distributary channel system of the Werribee Delta – and Cherry Creek, which provides habitat for the Commonwealth-listed Growling Grass Frog. South-west of Little River, the Spit Wildlife Reserve runs along the shoreline. This reserve is protected from public access and contains remnants of native vegetation and provides an important feeding ground for waterbirds and shorebirds. East of Little River lies Ryans Swamp, a 27-hectare freshwater wetland supporting waterfowl and remnant native vegetation.

The extensive intertidal mudflats, treatment lagoons, areas of saltmarsh and grasslands also provide habitat for a wide range of waterbirds including migratory shorebirds, dabbling ducks, diving ducks, grebes, filter-feeding ducks, grazing waterfowl, fish eating birds and wading birds. The intertidal areas of the WTP are of international importance for shorebirds for both feeding and roosting. The importance of the mudflats as foraging areas for shorebirds is a function of the area exposed at low tide. The small extent of intertidal mudflat within the proposed container terminal footprint and road and rail corridors means that these areas are not as important for shorebirds as areas elsewhere along the coastline of the WTP.

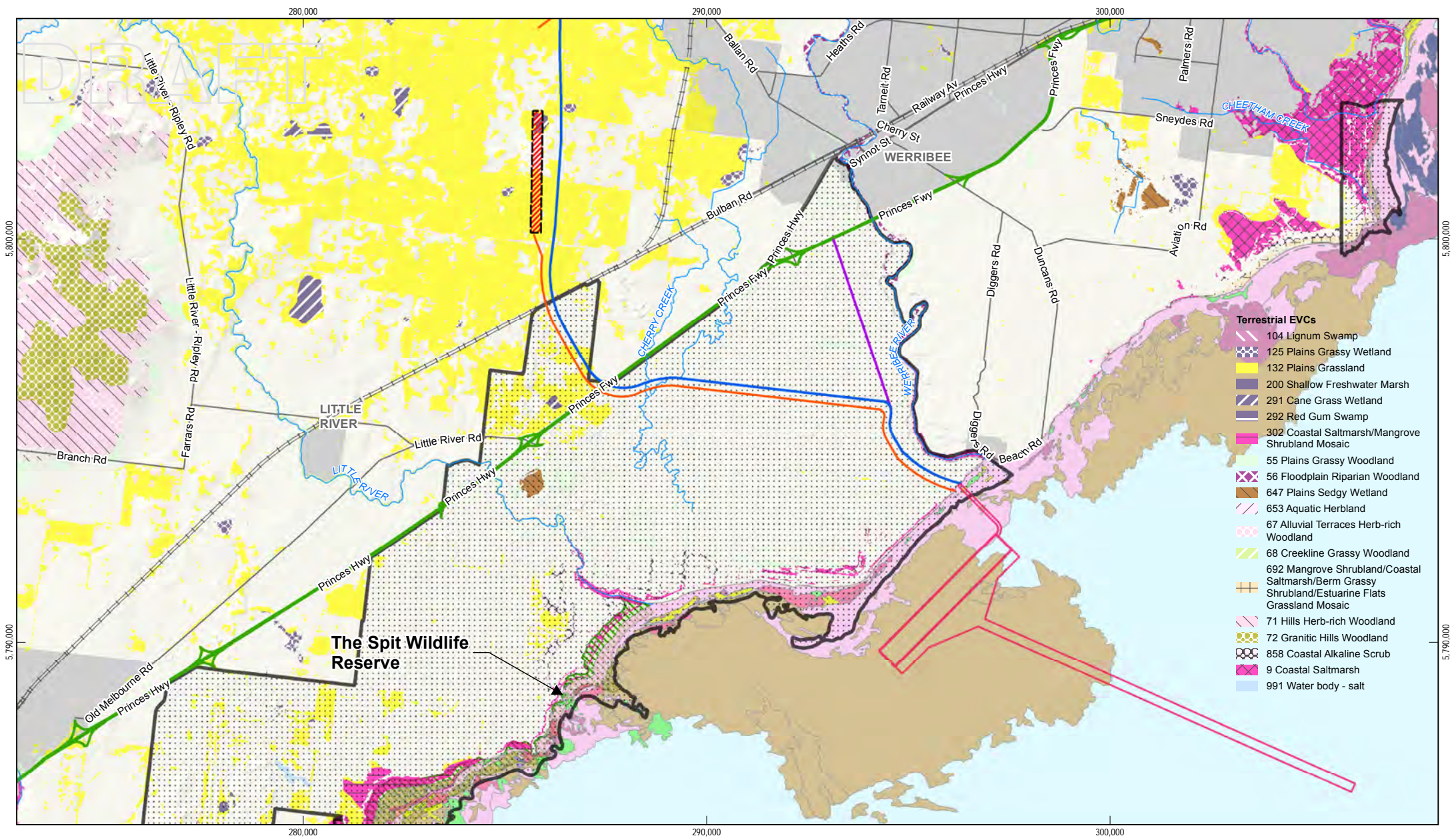
The intertidal benthic invertebrate communities around the WTP are influenced by the discharges of treated sewage effluent and generally have a different community structure and higher levels of productivity than other intertidal areas within Port Phillip Bay. The higher productivity of the nearshore marine environments is particularly important for shorebirds.

There are fish species within Port Phillip Bay that are not fished commercially or recreationally but are important components of the Bay's ecosystem. These fishes include anchovies and pilchards, and others that are protected. Protected fishes within Port Phillip Bay include taxa in the family *Syngnathidae* (seahorses and pipefishes) and fishes (including snapper) that aggregate during particular life history stages when they may be particularly prone to impacts of port construction or operation.

The area is occasionally visited by cetaceans including dolphins, although the Bay West location is not considered to provide important habitat for these species (Mustoe and Waugh, 2006).

The subtidal soft sediments of Port Phillip Bay are key to supporting removal of nitrogen from bay water and sediments through nitrification and denitrification processes (primarily performed by bacteria). Benthic denitrification was considered critical to the maintenance of the status of the Bay by the CSIRO Port Phillip Bay Study (Harris *et al.* 1996). The process involves a complex series of interactions between nitrogen cycling in the water column and sediments with its eventual loss from the bay as nitrogen gas.

Environmental values within and close to the proposed Bay West port development footprint are shown on Figure 10.

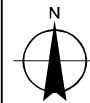


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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



LEGEND

Port Related Activities

- Indicative Extent of Dredging for Navigational Infrastructure
- Reclaimed Container Terminal Footprint
- Optional Road/Rail Access
- Indicative 30m Rail Corridor

Marine Habitat

- Bare Reef
- Bare Sediment
- Drift Algae
- Land
- Macroalgae
- Macroalgae on Reef
- No Visible Bottom
- Pyura & Macroalgae
- Seagrass
- Seagrass & Filamentous Algae
- Seagrass & Macroalgae
- Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Wetlands



Infrastructure Victoria
Ports Advice

Job Number 31-34508
Revision B
Date 15 Feb 2017

Bay West Environmental Values

Figure 10

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4.3.2 Hastings

The Hastings area of investigation encompasses:

- The coastal area on the western side of Western Port, where port development is proposed (including a container terminal and an area designated for port-related uses that corresponds with the Port of Hastings SUZ1)
- Road and rail corridors from the Port to Cranbourne-Frankston Road
- The channel down to the western entrance that would require dredging
- The adjoining inland area interface near the townships of Hastings, Tyabb and Somerville

Outside of the land proposed for port development is the Crib Point SUZ1 and Stony Point jetty further to the south.

As previously noted, while dredging of sand and dredge material disposal may occur within Bass Strait, this has not been considered as part of this report as the disposal location is currently unknown. Potential assets, values and land uses and Impacts on assets, values and land uses as a result of dredge material disposal would need to be assessed and considered if a port development at Hastings were likely to proceed.

Land uses, community and recreational facilities

The existing Port of Hastings area, as well as the area proposed for port-related uses as part of future port development, is currently zoned SUZ1 pursuant to the Mornington Peninsula Planning Scheme. The primary purpose of the SUZ1 is to provide a location for selected port and industrial uses and enable the effective implementation of the Hastings Port Industrial Area Land Use Structure Plan, while providing for the interim rural use of land to the extent consistent with maintaining land resources for future port and port related development.

The SUZ1 includes the Esso Long Island Point Plant and Western Port Blue Scope Steelworks at Long Island Point in the south, a number of smaller industries, and rural land uses, some with residential properties. Residential areas and smaller areas zoned for commercial and industrial uses are concentrated within the townships of Hastings, Tyabb, Somerville, Crib Point and Pearcedale (further to the north-east). Outside of these townships, much of the surrounding land is within the Mornington Peninsula Green Wedge. Mornington Peninsula Shire Council's objectives for the Green Wedge area include retaining its green and rural character by minimising further subdivision and development; promoting and supporting farming and agricultural productivity; and maintaining its long term recreational value.

Coastal reserves and parks within the area include Watson Creek at the northern boundary of the SUZ1, the North Western Port Nature Conservation Reserve, Western Port Coastal Reserve, Hastings Foreshore Reserve and the Fairhaven campsite within French Island National Park (French Island). These recreational areas are popular with walkers, and the area is also valued for bird watching. There are no known or documented coastal Crown land infrastructure (stairs and boardwalks, boat ramps or piers) that support access to and recreation to the foreshore and water within the primary port development precinct (SUZ1) or areas adjacent to the SUZ1 precinct boundary.

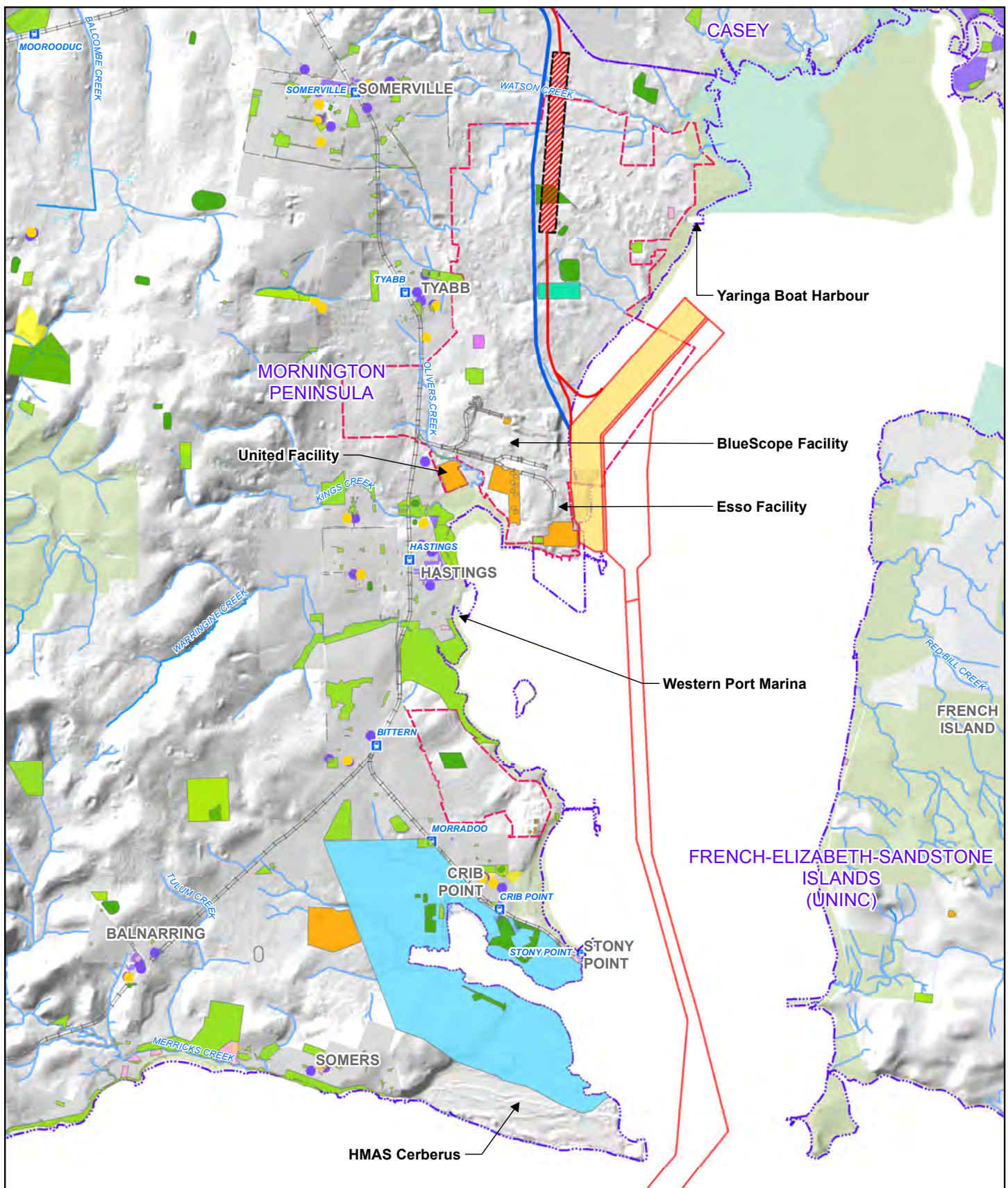
Further to the south is Phillip Island, a popular tourist destination which attracts day trippers from Melbourne, as well as interstate and overseas visitors. One of the main attractions at Phillip Island is the Penguin Parade at Summerland Beach, when Little Penguins come ashore in groups at sunset. One and a half kilometres offshore from 'The Nobbies' outcrop at the south-western edge of the island are Seal Rocks, home to Australia's largest Australian Fur Seal colony. The Phillip Island Circuit is also a well-known track for motorcycle and car racing (Destination Phillip Island, 2016).

Boat based fishing is popular in Western Port and fishing is permitted throughout, excluding Marine National Parks and Sanctuaries and Port exclusion zones. Much of the direct participation and therefore expenditure in recreational fishing is associated with boat based activities. The main target species for recreational anglers in Western Port include Australian Salmon, Elephant Fish, Flathead, Gummy Shark, King George Whiting, Leatherjacket, Silver Trevally, Snapper, Squid and Yellow-eye mullet. Many of these species have preferred breeding and feeding habitats and locations within Western Port including the mangroves, tidal mudflats, seagrass beds, tidal channels and open water.

There are a number of boating facilities in the port area and surroundings. Boating facilities nearest to the port are the Western Port Marina and Yaringa Boat Harbour. The Yaringa Boat Harbour hosts a handful of related commercial uses including Superior Masts & Rigging, JNC Marine, The Yacht Doctor, Condor Trailers, Clow Marine Electronics, Supreme Marine, Steve's Marine Windows and Windscreens, and Yaringa Boat Hire. Expansion of Yaringa Boat Harbour, and rezoning the land it occupies from SUZ1 to Special Use Zone Schedule 9 (Yaringa Boat Harbour), was recently approved by the Minister for Planning (Mornington Peninsula Shire, 2016). This expansion provides for a new inland harbour basin containing 180 wet berths and 18 holding berths, tourist accommodation and conference facilities, and the expansion of the existing marine service industry.

Several other tourism operators and businesses in Hastings, and Western Port more broadly, promote and offer for hire non-powered vessels such as sail craft, kite boards, kayaks and canoes as well as powered water craft for hire.

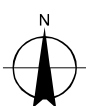
Land uses, community and recreational facilities within and close to the proposed Hastings port development footprint are shown on Figure 11.



LEGEND

Indicative Extent of Dredging for Navigational Infrastructure	Indicative 70m Road Corridor	Commercial/Mixed Use/Township	Health	Sporting Facilities
Reclaimed Container Terminal Footprint	Possible Future Rail Terminal	Residential	SUZ1 - Zoned for Port Related Uses	Parks, Cemeteries and Outdoor Facilities
Indicative 30m Rail Corridor	Local Government Boundary	Schools, Halls, Churches, Community Facilities	Energy and Resources	Waste Management Areas
		Child / Aged Care	Military Facilities	Parking Area
		Education	Entertainment Facilities/Areas	Terminal Station

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Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



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Ports Advice - Environmental and Social

Job Number 31-34583
Revision B
Date 14 Feb 2017

Hastings - Land Uses, Community and

Recreational Facilities (incl. Sensitive Receptors)

Figure 11

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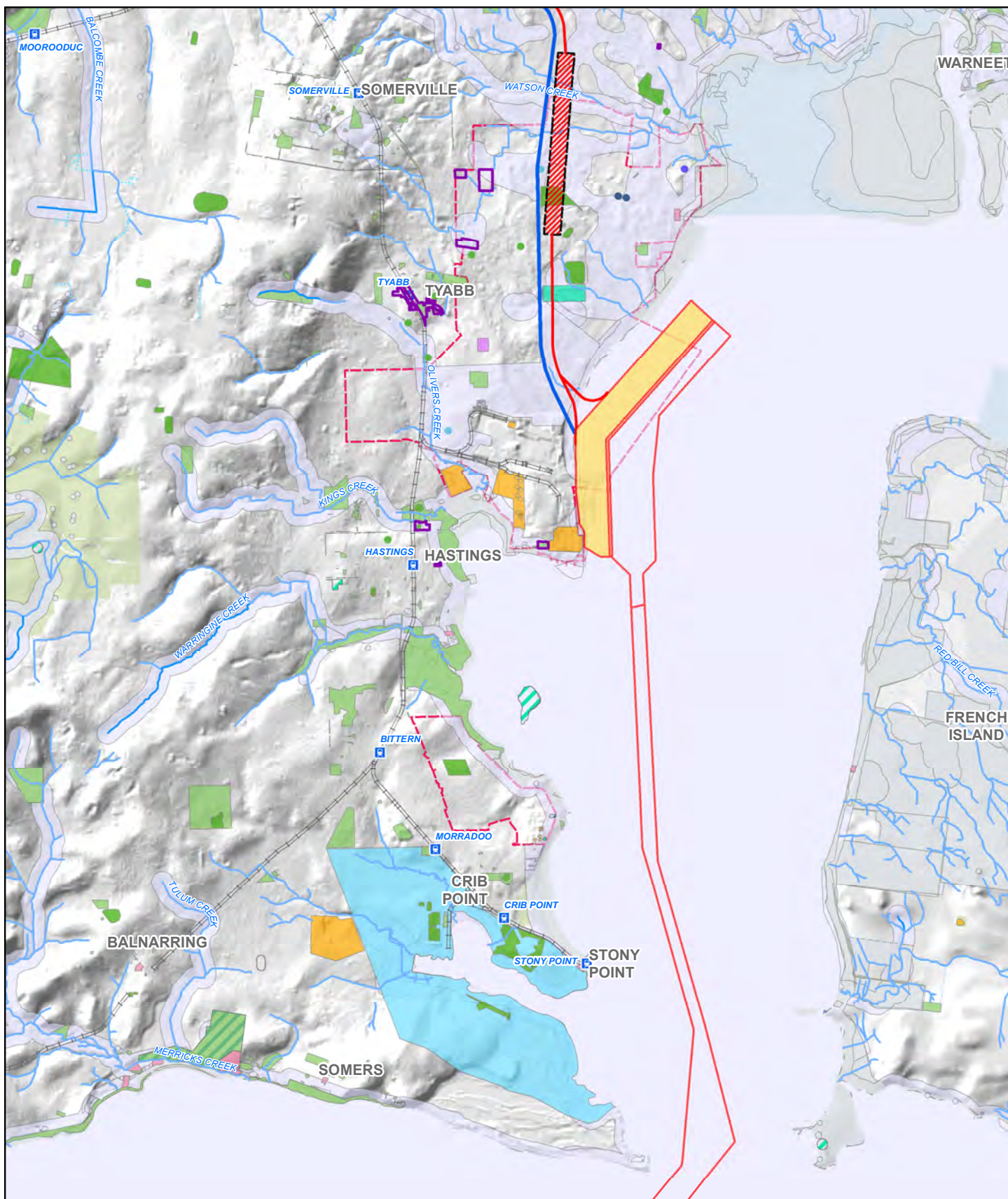
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Aboriginal and historic cultural heritage

Western Port, its coastline, localised dunes, Cranbourne Sands, watercourses and a large Aboriginal place registration north of Bayview Road are considered to be areas of Aboriginal cultural heritage sensitivity as defined by the *Aboriginal Heritage Regulations 2007*. Within the northern portion of the Port of Hastings SUZ1, several stone artefact scatters of relatively low density, shell middens and object collections are present. These are located largely within rural landholdings that could be intersected by the proposed port-related precinct and/or road corridor and rail terminal.

There are places that have been identified as being of local historic heritage significance (identified and protected by Heritage Overlays) within the western edge of the SUZ1, including existing historic homes, farmland, and associated trees and outbuildings (HO268 – *Brunning's Farm House and Trees*; HO269 – *Thomas Brunning's Farm*; HO311 – *John Brunning & Sons Complex, Trees*).

Aboriginal and historic heritage values within and close to the proposed Hastings port development footprint are shown on Figure 12.



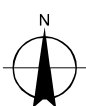
LEGEND

Indicative Extent of Dredging for Navigational Infrastructure	Possible Future Rail Terminal	Parks, Cemeteries and Outdoor Facilities	Low-density artefact distribution
Reclaimed Container Terminal Footprint	SUZ1 - Zoned for Port Related Uses	Waste Management Areas	Shell midden
Indicative 30m Rail Corridor	Energy and Resources	Parking Area	Heritage Overlay
Indicative 70m Road Corridor	Military Facilities	Terminal Station	Heritage Register
	VAHR Sites	Heritage Inventory	Areas of Cultural Heritage Sensitivity
	Entertainment Facilities/Areas	Artefact scatter	
	Sporting Facilities	Artefact scatter, Object collection	

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
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Hastings - Aboriginal and
Historic Cultural Heritage

Figure 12

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Environmental values

Western Port is internationally recognised as an area of significant habitat for migratory birds and is listed under the Ramsar Convention (Convention on Wetlands of International Importance especially as Waterfowl Habitat) and a number of international bilateral agreements for the protection of migratory birds (CAMBA⁵, JAMBA⁶, ROKAMBA⁷ and the CMS⁸ or Bonn Convention). Western Port is also registered as an Important Bird Area (IBA) of global significance (Dutson *et al.*, 2009). Migratory birds listed under these agreements are considered MNES under the EPBC Act.

The Western Port Ramsar Site boundary in most part is aligned with the boundaries of the Crown land and Crown land reserves situated around Western Port (refer to Figure 13). The proportion of French Island that is above high water and Phillip Island are both excluded from the Ramsar listing. Included within the Ramsar site are:

- French Island Marine National Park
- Yaringa Marine National Park
- Churchill Island Marine National Park
- Sandstone Island (privately owned)
- Elizabeth Island (privately owned)

The Western Port Ramsar Wetland Ecological Character Description (ECD) (Kellogg, Brown and Root 2010) describes the ecological character of the Ramsar site at the time of listing (1982) and an assessment of changes to the site since its listing. The ECD identifies critical ecosystem components and processes of the wetland as:

- **Wetland bathymetry:** The bathymetry is driven by Western Port's hydrodynamics and contributes to the presence of eight distinct marine habitats and in particular intertidal mudflats
- **Geomorphology and sedimentation:** Includes natural turbidity and sedimentation processes and their links to other components
- **Flora—seagrass:** Four species of seagrass occur across intertidal and subtidal environments
- **Flora—saltmarsh:** Supports a diversity of saltmarsh communities including the EPBC listed Subtropical and Temperate Coastal Saltmarsh community
- **Flora—mangrove:** Supports significant areas of the White Mangrove *Avicennia marina* subsp. *australasica* mangrove communities
- **Flora—significant species:** EPBC listed species may occur within the Ramsar site but are limited to woodland areas
- **Fauna—waterbirds:** High numbers of waterfowl and shorebirds inhabit the site including migratory and listed species
- **Fauna—marine invertebrates:** The prevalent intertidal and subtidal soft sediment habitats support a high diversity of marine invertebrates and are critical to supporting waterbirds and fish species

⁵ China Australia Migratory Bird Agreement

⁶ Japan Australia Migratory Bird Agreement

⁷ Republic of Korea Migratory Bird Agreement

⁸ Convention on Migratory Species

- **Fauna—fish:** The diversity and extent of habitats support a wide range of fish species, which are critical to supporting the ecological character of the wetland particularly as a food source for some waterbirds and marine mammals

The driving hydrodynamic forces in Western Port – which experiences strong tidal currents and a three metre tidal range – have shaped a diverse array of physical features across the intertidal and sub-tidal environments, including intertidal mudflats, sub-tidal channel slopes, sub-tidal channels, sediment banks, deeper basins, isolated reefs and tide-flushed water columns (EPA 2011). These physical features support a diversity of important ecological habitats including seagrasses, mangroves, saltmarshes, rocky reefs, intertidal mudflats and pelagic environments (Melbourne Water 2011). These habitats in turn support a large diversity of flora and fauna species, including threatened species and communities.

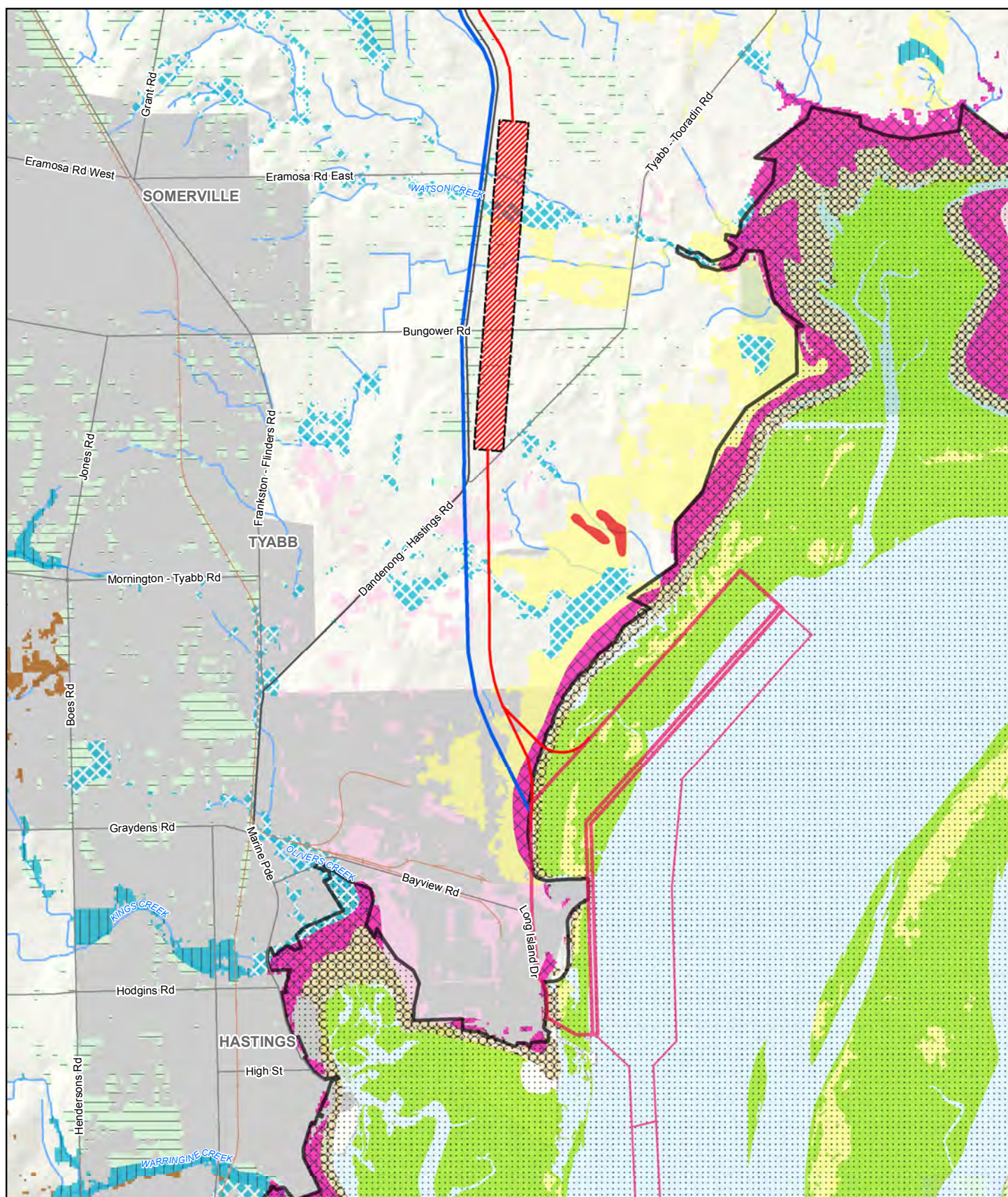
Western Port contains three Marine Protected Areas (MPAs) including the Churchill Island and French Island Marine National Parks (MNPs). Each MNP also has a Special Protection Area for national values which includes saltmarsh and mangrove habitat used by wading birds (Barton *et al.* 2012).

Five Special Management Areas (SMAs) are also found in Western Port, designated through state legislative mechanisms for protection of special natural values. These areas are usually consistent with International Union for Conservation of Nature (IUCN) categories for marine protected areas.

Within the vicinity of Long Island Point there are diverse coastal and marine habitats consisting of fringing woodland vegetation, saltmarsh and mangrove communities, intertidal mudflats and intertidal and subtidal seagrass communities. The coastal fringing vegetation includes grassy woodland and grassy plains vegetation that may provide habitat for a number of threatened flora and fauna species, and there is a largely intact area of vegetation on BlueScope Steel land. Adjacent to these communities in the upper intertidal zone is the EPBC-listed temperate coastal saltmarsh community and mangrove communities. Intertidal mudflat areas consist of extensive beds of seagrass extending from Long Island Point to Yaringa National Park. Recent surveys indicate the average seabed depth of dense subtidal seagrass beds is five metres but may extend as deep as seven metres (CEE 2014). The seagrass beds support a diversity of fish and invertebrate species (Melbourne Water 2011).

Foraging and roosting habitats for waterbirds are also present in Western Port. The area north of BlueScope Steel includes extensive areas of intertidal mudflat providing foraging areas for shorebirds (waders) including resident and migratory species. The intertidal area immediately south of Yaringa National Park is also a primary foraging area for shorebirds. The area closer to (within one kilometre of) BlueScope Steel is less utilised by shorebirds. The Little Penguin, Short-tailed Shearwater, Fluttering Shearwater and Crested Tern are amongst a range of bird species that use the western arm of Western Port for foraging and for which this area is important habitat (Dann *et al.*, 2003).

Environmental values within and close to the proposed Hastings port development footprint are shown on Figure 13.



LEGEND

Preferred Option

- Indicative Extent of Dredging for Navigational Infrastructure
- Reclaimed Container Terminal Footprint

Possible Future Road / Rail Links

- Indicative 30m Rail Corridor
- Indicative 70m Road Corridor

- Possible Future Rail Terminal
- River
- Stream
- Drain/Channel/Other
- Railways

Western Port Ramsar Wetland

- Bare Intertidal Sediment
- Seagrass; Seagrass & Macroalgae
- Urban Areas

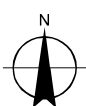
Marine Habitat

Terrestrial EVCs

- 140 Mangrove Shrubland
- 16 Lowland Forest
- 175 Grassy Woodland
- 3 Damp Sands Herb-rich Woodland
- 48 Heathy Woodland

- 53 Swamp Scrub
- 710 Damp Heathland
- 83 Swampy Riparian Woodland
- 9 Coastal Saltmarsh

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Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
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Hastings Environmental Values

Figure 13

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4.4 Opportunities, constraints and differentiators

The key assets, values and land uses that are considered to present potential opportunities, constraints and differentiators between the Bay West and Hastings sites are listed below. These are identified in Table 1 as ways in which the Bay West and Hastings sites could be compared.

In some cases, these assets, values and land uses may be an important consideration for one site and may not be important or even present at the other site, providing a differentiator between the two location options. In addition, this table includes consideration of critical ecosystem components and processes for each of the Western Port and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar sites and associated assets, values and land uses are listed that may not necessarily be assessed significant when considered in isolation of the Ramsar listing (for example, fish or intertidal mudflats).

Table 1 Key assets, values and land uses

Asset, value, use	Comment
Land use, community and recreational facilities	
Planning, land use and private property	<p>Sites can be compared with respect to:</p> <ul style="list-style-type: none"> • potential land acquisition required • compatibility with existing land uses • future development plans.
Amenity, community values, identity and lifestyle	<p>Sites can be compared with respect to potential changes in amenity including:</p> <ul style="list-style-type: none"> • Landscape and visual impact of the development • Noise during construction (temporary) and operation • Changes in access, connectivity, traffic conditions and congestion during construction (temporary) and operation (permanent). <p>Other amenity considerations such as air quality are considered likely to be applicable to both locations and hence have not been included as a key area for comparison.</p>
Business, industries, commercial	Sites can be compared with respect to impacts (positive or negative) on business, industries and commercial operations.
Recreational fishing	Sites can be compared with respect to their relative potential for impacts on recreational fishing.
Social infrastructure facilities and services	Sites can be compared with respect to impacts on social infrastructure, recreational and natural assets such as parks and reserves.
Aboriginal and historic heritage	
Aboriginal heritage values	Sites can be compared with respect to presence/absence of registered Aboriginal heritage places, relative potential for previously unregistered Aboriginal heritage places and values to occur, and relative level of disturbance.
Historic heritage values	Sites can be compared with respect to presence/absence of historic heritage values.
Environment	
Ramsar wetlands	Sites can be compared with respect to the relative potential level of impact on the overall ecological character through the assessment of individual components of Ramsar listed wetlands and the ability to mitigate or offset these impacts.
Saltmarsh	Sites can be compared with respect to the relative area and quality of saltmarsh impacted.
Mangroves	Sites can be compared with respect to the relative area and quality of mangrove impacted.
Seagrass	Sites can be compared with respect to the relative area and quality of seagrass potentially impacted and the relative importance of this seagrass in the context of Port Phillip Bay / Western Port.
Fish (non-commercial)	Sites can be compared with respect to their relative potential to impact on fish protected by legislation as well as recreational fishing through area of habitat impacted.

Asset, value, use	Comment
Shorebirds and migratory birds	Sites can be compared with respect to their relative potential to impact on shorebirds and their habitat, including intertidal mudflats.
Little Penguin	Sites can be compared with respect to their relative potential to impact on the Little Penguin and associated tourism industries.
Orange-bellied Parrot	Sites can be compared with respect to their relative potential to impact on the Orange-bellied Parrot and its habitat.
Blue Carbon (carbon stored in marine vegetation including seagrass, saltmarsh and mangrove)	Sites can be compared due to their relative potential area of impact on seagrass, saltmarsh and mangroves and corresponding capture and storage of carbon from the atmosphere.
Offsets	Sites can be compared with respect to extent of offsets potentially required under State and Commonwealth legislation and availability of potential options to secure required offsets.

4.5 Assessment of key risks

To enable a systematic comparison of the two locations, a broad assessment potential social and environmental risks associated with the development of a port at Bay West and Hastings was undertaken. This assessment focussed on the differentiating assets, values and land uses as described above, and considered the following:

- How will the project interact with assets, values and land uses identified as potential differentiating factors – what are the possible impact pathways?
- Are there standard measures available to readily manage or mitigate impacts to an acceptable level?
- What is the consequence and likelihood associated with each impact pathway assuming that standard management measures are implemented, and the corresponding risk?
- What level of certainty is associated with potential impacts based on current data and its availability?
- What are the potential implications of each impact pathway for obtaining approvals and are there any requirements to obtain offsets? This is discussed further in section 5.

Social and environmental risks have been identified and classified as relating to one of four main hazard categories:

- **Development footprint:** this refers to the permanent footprint impacts that could occur due to the development impacting on the existing land use and values
- **Changes to hydrodynamics and coastal processes:** refers to impacts of the development outside the immediate footprint that could be caused by changes to physical processes such as hydrodynamic changes. Impacts are less certain and assessment is dependent on modelling
- **Construction:** refers to impacts associated with port construction, including dredging. These impacts will generally be temporary, however still need to be considered with respect to the ability of an asset, value or land use to recover from the impact

- **Port operations:** refers to the impacts associated with the operation of the proposed container port and predominantly relates to impacts arising from emissions to air, light, noise, water; traffic (marine and terrestrial) and accidental discharges to the environment such as spills

The broad assessment of social and environmental risks is presented in Appendix B. Impact pathways with a high risk rating and/or those that are most likely to influence site selection are discussed further below.

4.5.1 Land use and social

Development footprint

Container terminal and port-related uses

The size of the overall development footprint and associated social impacts related to land acquisition, land access and land use is likely to be a key differentiator between the two proposed sites. A relatively smaller project footprint on land and offshore at Bay West has been developed to avoid interruption to Melbourne Water's existing and planned future operations at the WTP site, where possible. In addition, the Western Plains South and Werribee South Green Wedge areas to some extent limit the potential for residential development encroaching into land vested in Melbourne Water that is used for the WTP (DELWP 2014; Wyndham City Council 2010), close to where the landside elements of the port development concept are proposed to be located. The Bay West investigation area also provides opportunities for port development to leverage against key existing and proposed infrastructure (airport, rail, road) for compatible and complementary land uses.

A relatively larger project footprint on land and offshore at Hastings is likely to affect a number of social infrastructure facilities, including active and passive recreational areas/reserves, equestrian riding/training/breeding centres, schools/child care facilities and places of worship. A comparatively larger rural residential area at Hastings would be occupied by port-related uses, and the function and use of some of the existing industries in the area (such as farming and equestrian industry) would change.

Although these current agricultural and recreational uses and activities within the SUZ1 may become incompatible with future port-related activities, the primary purpose of the land included within the SUZ1 is for port related activities. Notwithstanding this, the protection of the environmental values of the waters, coastline and intertidal areas of Westernport and adjoining land and protection from adverse effects on the amenity are also defined purposes of the SUZ1.

Outside of the SUZ1, the Green Wedges (Westernport Green Wedge and Mornington Peninsula Green Wedge) to some extent limit the potential for residential development further encroaching into the SUZ1 (AECOM 2014). However, the potential expansion of the townships of Tyabb and Hastings has the potential to limit available land for port-related uses. It is acknowledged that there must be provision for buffers between sensitive uses (such as residential development) and port-related uses. One means of accommodating this may be to locate lower impact land uses on the periphery of the area designated for core port-related uses.

The Tyabb airport runway ends at the northern boundary of the SUZ1, west of Frankston Flinders Road. Accordingly, there are restrictions on the height of buildings and nature of land uses that can be developed in this part of the SUZ1.

Transport corridors

As described in section 4.2.2, road and rail connections to the Port of Hastings would be required. These connections are partially provided for with VicRoads' planned upgrades as part of the Western Port Highway (North) Upgrade Project. However, the Western Port Highway comprises a single lane in each direction between North Road (south of Cranbourne-Frankston Road) and the proposed port location. This section of the highway would also need to be upgraded to freeway standard and to accommodate a dual gauge freight rail link, which would connect to land to the north reserved by VicRoads for this same purpose.

Land acquisition would be necessary to facilitate the required upgrade of the road network from the Port of Hastings to the Western Port Highway at North Road, including connection from the Port to the highway where it intersects with Tyabb-Tooradin Road, and provision for a freight rail link within this corridor. Further development of the road network, widening of the existing Western Port Highway corridor to the east and/or west and construction of an adjacent rail terminal would also impact upon private rural residential and commercial landholdings, creating potential access and severance issues.

Furthermore, it is anticipated that additional rail capacity would be required from the Dynon Precinct in the west of Melbourne, through the city (from Southern Cross to Flinders Street) and along the Caulfield to Dandenong corridor to cater for existing export traffic as well as to facilitate additional freight capacity from the Port of Hastings (GHD, 2017b). The scope of such development would include works to over 40km of metropolitan rail network. It is expected that these works would require land acquisition along parts of the corridor, with the potential for significant impacts to existing land uses, access and amenity during construction and operation.

Road and rail connections would also be required for a port located at Bay West. New road connections from the shoreline to the Princes Freeway would be required within Melbourne Water-owned land. Two corridors may be needed: an east-west connection to the Princes Freeway and OMR, utilising the existing 160 South Road; and a north-south connection to the Princes Freeway utilising the existing Farm Road. Both connections would require major interchanges with the Princes Freeway, which would also be constructed within land that is currently owned by Melbourne Water.

The port rail corridor would follow the same alignment as the east-west road connection. Grade separation would be required at the Princes Highway to allow for the rail corridor, which would continue north to connect to the Melbourne-Geelong railway in both directions. The location of the proposed rail terminal is within land that is subject to a Public Acquisition Overlay and that is planned to be acquired by the Department of Environment, Land, Water and Planning (DELWP) to create the Western Grassland Reserve (DELWP 2016a).

Outside of land occupied by the Western Treatment Plant, the proposed port road and rail corridors do intersect with a number of Precinct Structure Plans (PSPs) administered by the Victorian Planning Authority (VPA) and Councils (Victorian Planning Authority, 2016). PSPs are required to inform urban development on land included in the Urban Growth Zone (UGZ). However, it is envisaged that both the road and rail links from the port at Bay West would connect to road and rail that would already exist within the OMR alignment at the time of port construction. The OMR alignment has been considered when developing PSPs in this area.

As such, it is likely that land acquisition to facilitate the transport corridors would largely be limited to government landowners (Melbourne Water and DELWP), and the footprint of the transport corridor associated with a port at Bay West is expected to have fewer land use impacts than at Hastings.

Construction

It is anticipated that construction associated with port development at either location is likely to result in temporary changes to amenity and could potentially require temporary occupation of land.

Temporary occupation of land

Due to the larger area development footprint at Hastings, it is anticipated that temporary impacts on community values, amenity, community cohesion and other existing industries in the area would be more pronounced than at Bay West. A review of the existing social assets and values in and adjacent to the development footprint at Hastings identified that due to the larger development footprint, land requirement may lead to relocation of some rural residences, social infrastructure facilities and services, and businesses (including equestrian and tourism businesses) that are currently located within the SUZ1, potentially impacting on their viability.

Changes to amenity

The existing social assets and values in and around the development footprint at Bay West show that the main transport corridor would be located within Melbourne Water's Western Treatment Plant and adjacent to planned future residential areas north of the Princes Freeway. Given it is assumed that the northern section of the road and rail corridor would already be established as part of the Outer Metropolitan Ring Road development, and due to a comparatively smaller development footprint for port-related uses, it is expected there would be less impacts when compared with those associated with container port development and construction of road and rail transport corridors at Hastings. In addition, it is possible that construction activities may temporarily lead to congestion and temporarily impede access to and within the Western Treatment Plant.

Noise as a result of construction activities undertaken in the Bay West investigation area during the night-time period (if any) may have the potential to exceed prescribed criteria based on the use of heavy excavation equipment, piling (impact) and whilst undertaking dredging activities. The highest exceedances are predicted to occur for sensitive receivers along Beach Road due to the impact of sheet piling activities (if these are required to be conducted at night) (refer to Appendix D).

Construction activities and construction traffic in the Hastings area would temporarily exacerbate the heavy vehicle and other traffic issues in this area, further contributing to the change in amenity and transformation of rural character to a more urbanised feel. Increased construction activities and traffic may impede access to certain areas and it is possible that reduced amenity would reduce the uptake of recreational and tourism activities in the area.

Within the Hastings investigation area, noise as a result of construction activities during both the daytime and night-time periods may have the potential to exceed the prescribed criteria. Those sensitive receivers that are located within the immediate vicinity of the proposed road and rail corridors, may be heavily impacted by construction activities for this infrastructure. This includes a considerable number of individual sensitive receivers located along McKirdys Road and Dandenong-Hastings Road (refer to Appendix D).

Potential impacts on the tourism industry

Phillip Island, which is relatively close to the Hastings site, hosts a number of colonies of the Little Penguin and the colony at the Penguin Parade is the island's main tourist attraction. The proximity of the Hastings site to Phillip Island means that there are more Little Penguins in the immediate area than at Bay West. As outlined in section 4.5.3, it is possible that changes to water turbidity as a result of dredging activities may influence the ecology of the Little Penguin. As the penguins from the Penguin Parade spend most of their time in Bass Strait with only

some usage of the western arm of Western Port (Dann, 2011), impacts on the Little Penguin in Western Port – and potential resulting impacts on tourism – are unlikely to be significant. There is a greater potential for impacts on penguin feeding and behaviour from dredging and disposal activities in Bass Strait.

Port operation

It is anticipated that port development at either location is likely to change the community values, amenity and community cohesion due to the introduction of (at Bay West) or increase in (at Hastings) port related activities in the area.

Changes to community values, amenity and community cohesion

Due to the larger area expected to be occupied by port-related uses at Hastings, it is anticipated that impacts on community values, amenity, community cohesion and other existing industries in the region would be more pronounced than at Bay West.

The installation of a port facility at Hastings may also have a more marked effect on visual amenity, particularly with reference to open water areas and coastal edges as well as French Island and to a certain extent, Phillip Island. Locating a port at Bay West on the other hand is less likely to be detrimental to visual amenity but it would be more visually exposed, particularly from onshore areas. Mitigation of visual impact would also pose more of a challenge at Bay West (refer to Appendix C).

The operation of a port terminal at Bay West may generate marginal exceedances of noise levels at the nearby receivers at Beach Road by up to 2-3 dB(A) during the night-time period. The operation of a port terminal at Hastings may also generate exceedances of noise levels (at receivers along Cemetery Road) by a greater amount, of up to 9 dB(A) during the night-time period. Depending upon the equipment that is required, the operation of the future rail terminal may have the potential to exceed the night-time noise criteria at nearby sensitive receivers in both locations (refer to Appendix D).

Potential impacts on recreational fishing

During port operation, opportunities for recreational fishing may potentially be restricted in areas that currently may be accessed for fishing-related activities at both Bay West and Hastings. There are existing controls on access and anchoring in the Port of Melbourne (Victorian Ports Melbourne, 2017) and it is assumed that controls similar to these would apply to any new container port development. With these assumptions, it is likely that the changes in access for recreational fishing would amount to an area of Port Phillip Bay no longer being available for fishing, equivalent to a reduction of around 0.5% of the area that is currently available for recreational fishing. There are existing access restrictions in Western Port (Parks Victoria, 2016b), around the existing commercial wharves, but no restriction on activities in the shipping channels. It may be expected that, with the increase in shipping activity in the channels resulting from port development, the Western Port channels would also see increased restrictions on small craft including those used for recreational fishing. In Western Port a larger section of the western arm of the bay would no longer be available for recreational fishing (equivalent to a reduction of around 5% of the area that is currently available for recreational fishing); however, this is still small in the context of the total area available in Western Port.

Potential exclusion zones for boating and fishing are shown in Figure 14 (Bay West) and Figure 15 (Hastings).

Summary

Overall, the development footprint for the port, road and rail transport corridors and port-related uses at Hastings would likely result in a greater amount of land acquisition, and corresponding potential changes to existing land uses and related social impacts, when compared with Bay West.

Whilst construction associated with port development at either location is likely to result in temporary changes to amenity and could potentially require temporary occupation of land, the impact is expected to be greater at Hastings when compared to Bay West. This is due to the larger development footprint at Hastings, and also because there are more sensitive receivers located within the immediate vicinity of the proposed road and rail corridors who could experience noise impacts as a result of construction activities.

During port operation, there is the potential for a more marked effect on visual amenity at Hastings, and for this site to generate exceedances of noise levels by a greater amount than at Bay West. With an increase in shipping activity resulting from container port development at the Hastings site, there is the potential for the existing area that is available for recreational fishing to be reduced to a greater extent than may occur at Bay West.

For a better understanding and possible comparison of the two sites in relation to community values, further consultation with stakeholders and communities would be required.



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

LEGEND

Port Related Activities

- Indicative Extent of Dredging for Navigational Infrastructure
- Reclaimed Container Terminal Footprint

- Local Government Boundary
- Arterial
- River
- Drain/Channel/Other
- Western Treatment Plant

Fishing Boating Exclusion Zones

- No Anchoring or Drifting
- No Boating or Fishing Access

Optional Road/Rail Access

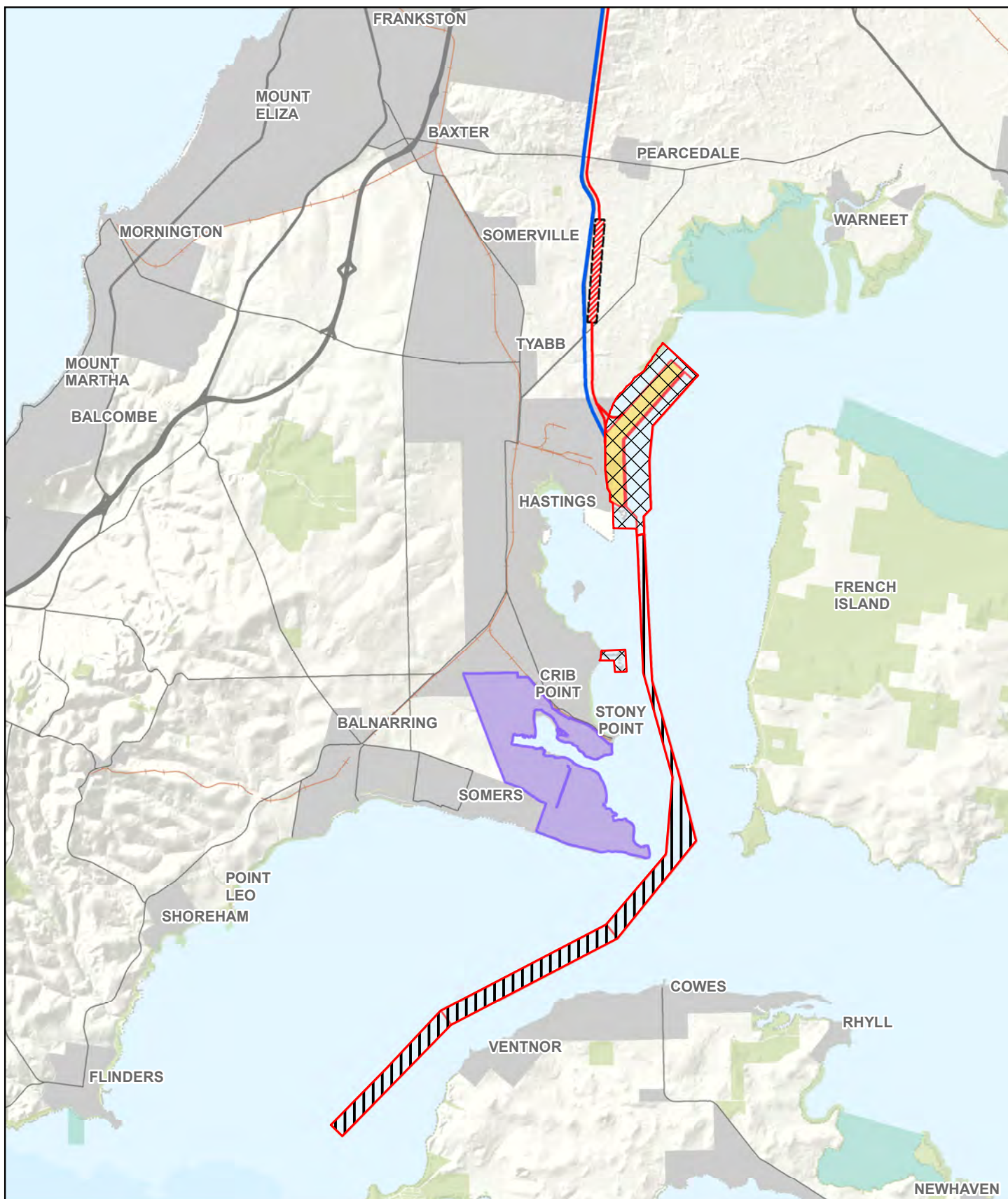
- Indicative 30m Rail Corridor
- Indicative 70m Road Corridor

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Bay West -
Boating & Fishing Exclusion Zones

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Revision | B
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Figure 14



LEGEND

- HMAS Cerberus
- Railways
- Indicative Extent of Dredging for Navigational Infrastructure
- Reclaimed Container Terminal Footprint
- Urban Areas
- Indicative 30m Rail Corridor
- Indicative 70m Road Corridor
- Possible Future Rail Terminal

Paper Size A4

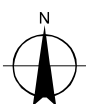
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Map Projection: Transverse Mercator

Horizontal Datum: GDA 1994

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Boating & Fishing Exclusion Zones

Figure 15

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4.5.2 Aboriginal and historic heritage

Aboriginal and historic cultural heritage values are present both for Bay West and Hastings. A summary of potential impacts is provided below:

Development footprint

Any issues that may arise with respect to Aboriginal heritage would need to be addressed and managed through the assessment process that would be required to support project approvals, such as an Environment Effects Statement (or similar) and preparation of a Cultural Heritage Management Plan (CHMP).

Changes to hydrodynamics and coastal processes

No specific information in relation to the impacts on heritage values as a result of hydrodynamic changes was identified. However, there remains some potential for impacts on Aboriginal and historical heritage, either submerged or fringing Port Phillip or Western Port Bays. Note that submerged sites would predate the inundation of the Bay (approx. 8,000 years ago).

Construction

Construction impacts would be identified and assessed as part of the assessment of preparation of the CHMP and approvals for the development footprint and hence additional construction phase impacts are not anticipated. This process would include development of contingency measures to be implemented should previously unidentified places be uncovered during construction.

Port operation

Any issues that may arise with respect to Aboriginal heritage would need to be addressed and managed through the assessment process that would be required to support project approvals, such as an Environment Effects Statement (or similar) and preparation of a Cultural Heritage Management Plan (CHMP).

Summary

Overall, it is anticipated that impacts on high value Aboriginal and historic heritage sites may be able to be avoided through design and hence heritage is not considered to be a differentiator for site selection. While the Bay West site has more identified values, it is noted that it is also likely that more of the Bay West area has been subject to higher levels of significant ground disturbance, thus affecting the preservation of Aboriginal cultural heritage. It is also noted that there may be previously unidentified values at both sites, which may affect these conclusions and level of effort required to obtain approval.

4.5.3 Environment

Terrestrial environment

The potential implications for the project with regard to the terrestrial environment for Bay West and Hastings are discussed and compared in this section. A summary table is provided to compare the two locations (refer to Table 2).

Development footprint

The majority of the land-based port-related infrastructure proposed at the Bay West site would be located to the north of the high quality ecological values of the WTP. As a result, it is anticipated that there would be minimal impact on terrestrial ecological values due to the proposed development footprint, as it avoids the majority of the Ramsar wetland, the habitat for

waterbirds and migratory birds and the saltmarsh habitat. It is possible that the development footprint could impact upon potential habitat for the Orange-bellied Parrot. The Orange-bellied Parrot has been regularly reported within the WTP and adjacent wetlands, with some sightings close to the Bay West area⁹. The site proposed for the development footprint may provide habitat for the species near locations which are possibly the last remaining mainland site still used by the species.

By contrast, the breadth of ecological values along the coast at the Hastings site and relatively larger land-based development footprint increases the risk of impacts from the proposed development footprint. The Hastings site supports a large amount of native vegetation that contains threatened saltmarsh and mangrove vegetation along the length of the coastline. Therefore, it is unlikely that impacts to these values could be avoided. As with Bay West, the proposed development footprint for the Hastings site may impact on habitat for the Orange-bellied Parrot and some waterbirds and migratory birds. There are no recent records of the Orange-bellied Parrot from the Hastings site, however saltmarsh vegetation is present and the species preferred habitat.

Changes to hydrodynamics and coastal processes

Any changes to hydrodynamics and coastal processes as a result of port development at either site would predominantly impact the marine and coastal environments. It is not expected that there would be significant impacts for these processes on terrestrial environments.

Construction

The potential impacts associated with port construction are similar to those for the development footprint. As such, it is anticipated that there would be minimal impacts to terrestrial values at the Bay West site. However, there is also the potential for indirect impacts such as disturbance from noise, light and dust from construction activities. These can disturb fauna and can disrupt activities such as feeding and breeding. The construction footprint would need to be minimised in areas that may affect such activities and other measures such as the timing of construction in relation to migratory movements and/or breeding cycles) would also need to be considered. Construction works undertaken by Melbourne Water at the Western Treatment Plant have in the past been subject to seasonal restrictions; for example, construction near the foreshore has not been permitted during the periods when migratory shorebirds are present on the site.

Construction activities within the Hastings site would require relatively greater management to minimise impacts on existing ecological values. This is because the location of important ecological values such as saltmarsh and mangroves would make it difficult to avoid impacts, both direct (e.g. removal of vegetation/habitat) and indirect (e.g. noise disturbance to migratory movements or breeding cycles).

Port operation

Impacts to ecological values during port operation could include noise and light emissions disturbing roosting or foraging habitat for birds, or any accidental discharges impacting upon wetlands, vegetation or fauna habitat. As discussed, there are more opportunities at Bay West to avoid the terrestrial environmental values through design of the development footprint. This also allows for more opportunities to avoid impacts during operation of the port. Due to the breadth of ecological values along the coast at the Hastings site and relatively larger land-based development footprint, it is also considered more likely that port operations would potentially have a greater impact on terrestrial values.

⁹ Due to the conservation status of the Orange-bellied parrot the locations of sightings are not reported publicly.

Summary

Table 2 Summary of the potential impacts to terrestrial environment

Hazard category	Bay West	Hastings
Development footprint	Relatively smaller development footprint that largely avoids areas of important habitat and is based in locations that have been used for agriculture for many years. Potential habitat for the Orange-bellied Parrot may however be impacted. Overall, there is opportunity to avoid impacts to terrestrial environmental values through location of proposed development footprint.	Relatively larger development footprint that includes identified habitat and areas of conservation significance within the development footprint, including listed vegetation communities, mangroves and saltmarsh. Limited scope for avoiding impacts due to spread of terrestrial environmental values along the coastline
Changes to hydrodynamics and coastal processes	Unlikely to impact the terrestrial environmental values at this site	Unlikely to impact the terrestrial environmental values at this site
Construction	Opportunity to avoid impacts on terrestrial environmental values throughout construction by design and implementing appropriate mitigation measures such as timing of construction.	Construction activities in this area will likely impact on terrestrial environmental values
Port operation	With the implementation of appropriate mitigation measures, it is considered unlikely that port operation would result in major impacts upon terrestrial environmental values	Significant effort would be required to minimise the impacts from port operations on terrestrial environmental values

Overall, the potential for impacts to terrestrial ecological values appears to be relatively greater at the Hastings site where there are less opportunities to minimise these impacts through design or by implementing management measures due to breadth of values along the coastline and the proposed location of infrastructure.

For both Bay West one of the highest risks with regard to terrestrial values relates to potential impacts to the EPBC-listed Orange-bellied Parrot and its associated habitat (i.e. saltmarsh and other coastal vegetation).

Marine environment

The potential implications for the project with regard to the marine environments for Bay West and Hastings are discussed and compared in this section. A summary table is provided to compare the two locations (refer to Table 3).

Development footprint

The footprint of the proposed Bay West option would impact both subtidal and intertidal areas adjacent to the Western Treatment Plant. Subtidal impacts would involve the permanent removal of subtidal habitat that may include some macroalgae beds and potentially some seagrass. The seagrasses where they occur in this area are sparse and are not considered to be important areas of this habitat within Port Phillip Bay. The areas of macroalgae constitute habitat for a range of fish and invertebrates. However, as for the seagrass, they are not considered to be important in the context of Port Phillip bay as a whole. The proposed shoreline crossing to gain access to the offshore island terminal would intersect the intertidal area where shorebird habitat is considered to be least important along the WTP foreshore.

The potential for disturbance of the marine environment at Hastings is potentially greater, given the presence of more identified areas of significant habitat including saltmarsh, seagrasses and mangroves in both the subtidal and intertidal areas under the development footprint. The areas of these habitats that would be impacted is much greater than at Bay West where there is likely to be only limited impact to sparse seagrass beds, only a small impact to the intertidal area and no mangroves expected to be disturbed. Impacts to the greater presence of saltmarsh, seagrasses and mangroves at Hastings would correspond with a greater reduction in 'blue carbon' that is captured from the atmosphere and stored in this vegetation, when compared with Bay West.

Changes to hydrodynamics and coastal processes

The Bay West port may require some widening, not deepening, of the shipping channel through the entrance to Port Phillip. Modelling of the impacts of this widening on physical processes in Port Phillip predicts that the increased capacity for water exchange at the entrance would result in the level defining the lowest 2% of sea levels, will decrease by 3.7mm with the level defining the highest 2% of sea levels increasing by 6.3 mm (Cardno, 2016). There may be some changes to the coastal geomorphology of western Port Phillip as a result of a proposed port development at Bay West, but these are not expected to be significant (Cardno 2016; Environmental GeoSurveys, 2017).

It is anticipated that there would be little change to sea levels at Hastings, with very small changes in currents resulting from the port development. Changes in sediment transport are also expected to be small and mainly in the vicinity of the port itself. There may be some changes to coastal geomorphology as a result of a proposed port development at Hastings, but these are not expected to be significant (Cardno 2016; Environmental GeoSurveys, 2017).

Nitrification is an important process for the health of Port Phillip Bay and is less important to the health of Western Port. Evidence presented as part of the assessment of the Channel Deepening Project assessed the potential impact of that project on nitrogen cycling in the Bay as within the observed natural variation. It is expected that a port development at Bay West would be unlikely to result in a different outcome. The nitrogen cycle is not an issue for the Hastings site, as Western Port is more exposed to the open ocean with greater water exchange during each tidal cycle.

Construction

Potential construction impacts to the marine environment include changes to turbidity from dredging activities, noise (both terrestrial and underwater), and a projected increase in marine traffic.

Changes to turbidity as a result of dredging have the potential to impact fish species, including those that are protected under Victorian and Commonwealth legislation. Dredging activities at Bay West are proposed to be managed using mechanisms to control turbidity such as the use of silt curtains. Silt curtains would allow turbidity to be restricted to the immediate vicinity of the dredging works, which is not considered to be important habitat for protected fish species that are found within Port Phillip Bay, and thus would not have a wider impact on the bay. Such control measures may not be available at Hastings as the currents are stronger than at Bay West and this is likely to preclude the use of such turbidity control measures. As a consequence, it is likely that turbidity from the dredging operations would spread much more widely than will occur at Bay West. The extent of the spread of the turbid plume is yet to be modelled, and therefore potential impacts are not certain. However, it is known that fish are a critical ecosystem component of the Western Port Ramsar site, as are the habitats they live in and depend upon (such as saltmarshes, seagrasses and algal meadows). Important fish species include Australian Grayling, Syngnathidae (pipefish and seahorses), Pale Mangrove

Goby, Southern Bluefin Tuna and protected sharks. Western Port is also a key breeding area for the Elephant Fish, Australian Anchovies and School Sharks, and a nursery area for other species such as King George Whiting. As such, there is the potential for turbidity from dredging operations at Hastings to impact upon fish breeding and nursing areas within Western Port.

The impacts of construction on the Little Penguin are potentially greater at Hastings, with the potential for a larger plume from dredging activities as a result of the limited ability to contain any dredge plume compared to Bay West. This increase in turbidity may interfere with feeding habits of the Little Penguin, as well as the feeding habits of other visual predators such as seals and fish, through a reduction in their ability to see their prey. The Little Penguin spends time feeding in the open waters of the western arm of Western Port (Dann *et al.*, 2003) where higher turbidity may occur as a result of dredging and construction activity. The Little Penguins from Phillip Island spend much of their time foraging in the waters of Bass Strait largely around the western entrance to Western Port (Collins *et al.* 1999). There is potential for any offshore dredging and disposal activities in Bass Strait to impact upon the feeding habits of penguins in this area should a large turbid plume be generated.

Bay West is less important for marine mammals than the Hastings area. The large seal colony at the Nobbies on Phillip Island is located at the western entrance to Western Port, however the seals generally spend their time in Bass Strait with few venturing into Western Port itself (Dann 1996). There is potential for any offshore dredging and disposal activities in Bass Strait to impact upon the feeding habits of seals in this area should a large turbid plume be generated.

Underwater noise from piling has also been shown to have both physical impacts on marine fauna in the immediate vicinity of piling activity, as well as behavioural impacts (e.g. changes in mating and foraging behaviour) further from the site of the piling. Piling at both Bay West and Hastings may extend over several years. There are potentially options available to reduce the requirement for piling through the use of alternative engineering solutions such as caisson construction. An increase in traffic resulting from construction vessels may also pose a risk to marine fauna.

A potential impact of dredging in Port Phillip Bay, should any widening of the entrance to the Bay be required, is that rock rubble may be dislodged from the reef that is being dredged and move across the reef and fall down the deep canyons which occur in the area. These deep canyons are home to a range of sponge communities that have the potential to be disturbed by the rockfall. During the Channel Deepening Project, concern about the impact of the rockfall on the sponge communities was addressed through a detailed monitoring program during and for a number of years following the dredging at the entrance. This monitoring concluded that:

- Short term impacts with progressive recovery of the communities were observed in the six-year period following the dredging
- Evidence of recovery of communities at the impact locations was observed to occur soon after dredging was completed and was well advanced six years after the dredging operations ceased
- Full habitat recovery would take occur over a period of at least five years following cessation of dredging.

The monitoring report also concluded that controls implemented during the dredging operations had minimised the impacts of the dredging (Zavals *et al.*, 2015).

Port operation

The potential for environmental impacts from port operations is likely to be similar for both locations. There are potential issues with disturbance of wading birds, in particular from light

and noise from port operations. Mitigation measures to ameliorate these impacts are available, such as screening, noise walls and directional lighting.

The impacts of any spills of hydrocarbons or other chemicals would be similar at both locations where the coastal environments are identified as sensitive to hydrocarbons spills. Large scale chemical spills at Australian ports are extremely rare and as such the risk of this occurring is likely to be low.

Summary

Overall, the potential for environmental impacts appears greater at the Hastings site than at Bay West. Although both are to be constructed partially within Ramsar areas, the Bay West location is likely to avoid most of the values for which the site is Ramsar-listed. The Bay West site avoids the intertidal areas that are important for shorebirds as well as avoiding the important wetland areas within the Western Treatment Plant. Similarly, the proposed design avoids areas of saltmarsh and mangrove. The low energy conditions of Port Phillip Bay allow for construction methods to be used such that turbidity from the dredging can be contained to within the immediate vicinity of the dredging. The actual footprint of the wharf and associated structures in the marine environment will result in loss of benthic habitat. The areas that would be lost do not include areas of important seagrass nor important other habitat.

The proposed development at Hastings would impact to a much greater extent the values for which the Ramsar listing of the wetland areas was made. Areas of both intertidal and subtidal seagrass would be lost as would areas of mangrove and saltmarsh. There is much less flexibility at Hastings to avoid adverse impacts on the environment. There is also likely to be greater impacts on water quality from dredging activities as the opportunities to control turbidity are much more limited in the higher current environment of Western Port.

Table 3 Summary of the potential impacts to marine environment

Hazard category	Bay West	Hastings
Development footprint	Removal of areas of sparse seagrass and macroalgae that is unlikely to be significant in a bay-wide context Crossing of the intertidal zone at an area that is least significant along the WTP foreshore	Removal of areas of seagrass (intertidal and subtidal), saltmarsh and mangrove as well as unvegetated intertidal habitat
Hydrodynamics	Small changes in tidal sea level in Port Phillip Bay. Some changes to the coastal geomorphology of western Port Phillip but not expected to be significant.	Only very small changes in sea level in Westernport Some changes expected to coastal geomorphology but these are not expected to be significant.
Construction	Turbidity from dredging activities likely to be able to be controlled through use of mitigation measures such as silt curtains. Noise from piling likely to be less of an impact as marine mammals are not commonly found in the Bay West area.	Controls on turbidity from dredging likely to be limited with potential for spread of sediment laden waters as a result of dredging activities. If dredging and disposal activities were to be undertaken in Bass Strait, then there may be potential for impacts to Little Penguin and, to a lesser extent, seal feeding habits. Noise from piling has a potential to impact upon marine mammals including seals from the Seal Rocks colony.
Port operation	Noise and light have potential to disturb fauna, including shorebirds Uncontrolled major spills have potential to damage habitat which is particularly sensitive to spills. No particular differentiator from Hastings	Noise and light have potential to disturb fauna including shorebirds Uncontrolled major spills have potential to damage habitat which is particularly sensitive to spills. No particular differentiator from Bay West

5. What approvals would a new container port need?

5. What approvals could a new container port need?

5.1 Approval requirements

Development of a container port at either Bay West or Hastings would require a number of approvals under Victorian and Commonwealth legislation. The need for these approvals is influenced by the project location, land tenure, footprint and activities, as well as by environmental values. A summary of potential approval requirements is presented below. These have been identified based on legislation that is in effect as of the date of preparation of this report. It is noted that legislation and approval requirements may change in the future, potentially affecting obligations for and likelihood of obtaining approvals at either port location.

5.1.1 Key approvals

Both Bay West and Hastings are expected to require approval under the following legislation:

- Approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* due to potential for significant impacts on MNES
- A Cultural Heritage Management Plan under the Victorian *Aboriginal Heritage Act 2006* (Victoria) if required by the Victorian *Aboriginal Heritage Regulations 2007*
- Coastal Management Act Consent under the Victorian *Coastal Management Act 1995* for works on coastal Crown land
- Assessment/approval through an Environment Effects Statement under the Victorian *Environment Effects Act 1978* or Comprehensive Impact Statement under the Victorian *Major Transport Project Facilitation Act 2009*. Note that for the purposes of this report we have assumed the Environment Effects Statement pathway would be used, for consistency with recent major Victorian transport projects such as the Western Distributor Project and Melbourne Metro Project
- Planning Scheme Amendment to reserve and enable the use and development of land for development of the port, transport corridors and to develop associated infrastructure and port precincts, and for native vegetation removal under the Victorian *Planning and Environment Act 1987*.

In addition, if disposal of dredged material is required in Commonwealth Waters (dumping of dredged material waters outside either Westernport or Port Phillip Bay) approval may also be required under the Commonwealth *Environment Protection (Sea Dumping) Act 1981*. This is likely to be required for Hastings as dredged material is proposed to be disposed to Bass Strait (location not yet identified). Dredged material for Bay West is proposed to be disposed to existing dredge material grounds within Port Phillip Bay. Placement of dredged material within either of the bays may still be undertaken using the Sea Dumping Act but with the Victorian government as the determining authority. Alternatively, the dredging and disposal of dredged material may be undertaken using the Victorian EPA's "*Best Practice Environmental Guidelines for Dredging*".

5.1.2 Other approvals

In addition to these key approvals, other approvals may be required for both ports for specific impacts or activities, including, but not limited to:

- Consent under the Victorian *Conservation, Forest and Lands Act 1987*
- Leases and licenses under the Victorian *Crown Land (Reserves) Act 1978* and/or Victorian *Land Act 1958*
- Works Approval and/or discharge licenses under the Victorian *Environment Protection Act 1970* depending on proposed activities within the port precinct and discharges
- Permit to take protected aquatic biota under the Victorian *Fisheries Act 1995*
- Permit to remove protected flora species under the Victorian *Flora and Fauna Guarantee Act 1988*
- Heritage permits and/or consents under the Victorian *Heritage Act 1995* to impact on sites listed on the Victorian Heritage Register or Inventory
- A works permit to carry out works in declared port waters under the Victorian *Port Management Act 1995*
- Consents and decisions under the Victorian *Road Management Act 2004*
- Licences under the Victorian *Water Act 1989* for works on waterways or to take or use water from a waterway or groundwater
- Consideration of tenure requirements if works are to occur in reclamation areas identified under the Victorian *Westernport Development Act 1967* and Victorian *Western Port (Steel Works) Act 1970*
- Management Authorisation to translocate fauna under the Victorian *Wildlife Act 1975*.

Requirements under the *Native Title Act 1993* may also be applicable.

In addition, the provisions of the Victorian *Land Acquisition and Compensation Act 1986* (LACA) would be relevant. Land required for a public purpose can be acquired by government departments and agencies either compulsorily or by negotiation. LACA sets out the process to be followed and how compensation is to be determined.

5.1.3 Offsets

Offsets are prescribed in policy under the EPBC Act to mitigate impacts to MNES and also, under Victorian legislation, to compensate for loss or degradation of native vegetation and fauna habitat.

An offset to compensate for environmental impact can be one, or a combination of actions resulting in the improvement in the condition of existing environmental assets with ongoing management and protection with appropriate security arrangements in place. An example might be the revegetation of a site with ongoing management and protection.

The potential impacts on MNES that may result from the proposed port development will likely result in some requirement for offsets. Both the State and Commonwealth governments have calculators to be used to determine offset requirements. There is a need however for some degree of precision around the data to be used in these calculators and as yet the information available to be used is not sufficient to be able to generate meaningful assessments of offset requirements. To inform this assessment consideration has been given to the availability and type of offsets that may inform suitability of each development location.

Offsets can be implemented prior to an action being undertaken. These offsets are known as “Advanced Offsets” (DoEE, 2017).

If suitable direct offsets are not available, such as may be the case at Hastings (see below), then alternative offsets may need to be investigated. Alternative offsets are generally

considered by approval agencies on a case by case basis and generally require that equivalent outcomes to direct offsets are demonstrated.

Bay West

The potential for the loss of native vegetation that may require offsets at Bay West is limited as the project would largely impact areas that have been cleared of native vegetation and the areas of native vegetation that would be expected to be impacted are generally of poor quality. Vegetation offsets are still likely to be required, however their overall impact on the project is likely to be minor.

The offsets for Bay West are likely to be able to be managed along the western shoreline for Port Phillip Bay. There are a number of opportunities for offsets consistent with the policy.

The Ramsar site may offer the opportunity for offsets such as:

- Pest and weed management, including the provision of predator-proof fencing
- Increased connectivity of habitat
- Increased protection for waterfowl and shorebird areas
- Reduction in access to areas considered ecologically important
- Rehabilitation of coastal vegetation, including the saltmarsh vegetation utilised by the Orange-bellied Parrot
- Remodelling of shoreline areas to create greater habitat for shorebirds to support population growth and resilience. The density of shorebirds has been shown to be proportional to the width of the intertidal mudflat

Hastings

Offsets within Western Port are less readily identifiable. The port development at Hastings requires the removal of areas of mangrove, saltmarsh and seagrass all of which are difficult to re-establish elsewhere even if suitable locations were to be found. Saltmarsh in particular is difficult to rehabilitate or recreate. Offsets would likely be required under both State level for vegetation clearing under Victoria's native vegetation permitted clearing regulations (currently under review – DELWP 2016c) and at the Commonwealth level to offset impacts against potential significant impacts to MNES.

It is only possible to secure offsets where they are available and one of the challenges identified for Hastings is the availability of suitable offsets. The requirement for offsets is likely to be much greater than Bay West and involve offsetting the removal of vegetation such as seagrasses and saltmarsh. It is difficult to find offsets for vegetation communities or communities of high significance that are uncommon (usually one of the contributing factors to their significance). In such cases, obtaining permission to remove such values may be challenging. There may also be the requirement to offset impacts to the ecological character of the Ramsar site. If the extent of offsets were identified, then it may be possible to provide the offset prior to the project being commenced (as mentioned previously).

5.2 Approvals assessment

Each of the key approvals identified have been assessed with respect to:

- Whether they are common to both locations, and whether there are approvals that are unique or have potential to be more challenging for one location
- Potential approval pathways, including opportunities for integration of key approvals and studies

- Likely timeframes for obtaining approvals, including flagging considerations such as time that may be required for baseline data collection to inform existing conditions studies or to carry out seasonal surveys for threatened species, and the risk that approval may not be obtained

Based on this assessment, Table 4 presents approvals that have potential to differentiate between sites.

This assessment has been informed by the outcomes of the baseline review and social and environmental risk assessment tasks, as well as approval processes for similar Commonwealth and Victorian approvals processes in Victoria and early scoping work completed in 2014 for the Port of Hastings.

One approval requirement has been identified as a potential differentiator: approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* due to potential impacts on MNES. Whilst both Bay West and Hastings would likely require comprehensive assessment and approval under this Act, this approval has been assessed as potentially more challenging for Hastings, as offsets for potential impacts on the ecological character of the Western Port Ramsar site are not readily identifiable, which could impact on ability to obtain approval. This is discussed in more detail in Table 4.

Table 4 Approvals analysis

Legislation	Requirement	Timing	Analysis	Differentiator?
Commonwealth				
<i>Environment Protection and Biodiversity Conservation Act 1999</i> EPBC Referral and Approval	Actions that have or are likely to have a significant impact on MNES must be referred to the Australian Government Minister for Environment (the Minister).	The EPBC Act sets out statutory timelines for making decisions on referrals and approvals. Victoria's <i>Environment Effects Act 1978</i> assessment process is accredited as an assessment process under a bilateral agreement. Should this process be utilised to assess the project, a decision must be made within 30 business days of receiving the assessment report under the <i>Environment Effects Act 1978</i> .	<p>Both Bay West and Hastings would likely require referral due to their potential to impact on MNES, and in particular Ramsar listed wetlands, threatened species and communities and listed migratory species. Hastings would also likely require referral due to potential to impact on the environment as a result of dredging and disposal activities in Commonwealth marine waters (Bass Strait).</p> <p>Major actions undertaken by Melbourne Water at the Western Treatment Plant have generally referred under the EPBC Act with activities such as the Environment Improvement Program, a major alteration to sewage treatment at the site, being considered a controlled action under the Act. The triggers of the Ramsar site, the large number of listed species and size of the project would suggest that the proposed development would likely require detailed consideration under the EPBC Act for Bay West.</p> <p>Previous work for Hastings indicates that this would likely be determined to "be a controlled action" under the EPBC Act. This is due to the port's location within the Western Port Ramsar wetland and the potential for the project footprint and other project activities to affect some functional components of the Ramsar wetland, including bathymetry and hydrodynamics, water quality and flora and fauna populations. Whilst there are existing operating port facilities within Western Port, Hastings would require the alteration of an area that provides habitat for threatened species and communities, and is used by listed migratory species.</p> <p>Hastings' interactions with Western Port Ramsar wetland and the marine environment would be complex and result in both direct impacts, such as habitat loss, and indirect impacts, such as trophic impacts. In addition, other, non-port related, activities and processes are occurring in and around Western Port that also have potential to impact on Western Port. A key challenge is to understand these interactions and develop a robust and systematic process for identifying and assessing potential impacts, including cumulative impacts on Western Port and the marine environment. As port development and dredging also has potential to impact on Western Port more broadly than just within the project area, a comprehensive and well-designed</p>	Yes

Legislation	Requirement	Timing	Analysis	Differentiator?
			study program and ecological risk assessment process would need to be developed, which may require significant effort prior to commencing studies. In addition, a program of studies would be required to assess potential impacts on the Bass Strait environment.	
			<p>By comparison, the Port Phillip Bay environment and potential study requirements are better understood due to the recent Channel Deepening Project. Regardless, Bay West would likely also still require an extensive level of assessment, but may not be as complex as Hastings.</p> <p>Offsets would be required, potentially for both sites, in accordance with the EPBC Act to mitigate impacts to MNES. As discussed in section 5.1.3, there are a number of opportunities for offsets for Bay West, whereas offsets for Hastings are not readily identifiable. This presents a challenge for obtaining approvals at Hastings and could be a key differentiator for site selection if unable to be addressed.</p> <p>Both sites would require a comprehensive assessment of environmental impacts either under the EPBC Act or via an Environment Effects Statement (if the bilateral agreement is utilised). At this stage it is difficult to distinguish between the two sites with respect to timelines and required studies to support approvals. However, it is expected that these could require in the order of 3-5 years to obtain, allowing for characterisation of existing conditions.</p> <p>The Western Port environment is complex and has a lot of uncertainty associated with it, however previous dredging campaigns within Port Phillip Bay have also required extensive assessment and monitoring and have highlighted areas where uncertainty remains.</p>	

Legislation	Requirement	Timing	Analysis	Differentiator?
<i>Environment Protection (Sea Dumping) Act 1981</i> Sea Disposal Permit	A Sea Disposal Permit is required to dispose of dredge material in Commonwealth waters. The application needs to address the requirements of the National Assessment Guidelines for Dredging.	<p>The Sea Dumping Act is related to the EPBC Act. Where approval is required under both acts, applications can be assessed concurrently under both Acts.</p> <p>If the project is referred under the EPBC Act, a decision on the sea disposal permit application cannot be made until the project has either been determined to be “not a controlled action” or approved by the Minister.</p>	<p>A Sea Disposal Permit is unlikely to be required for Bay West as dredge spoil is proposed to either be reused for reclamation fill for the project or to be disposed within existing dredge material grounds in Port Phillip Bay, which is considered inland waters entirely within Victorian State waters.</p> <p>A Sea Disposal Permit is likely to be required for Hastings as dredge material is proposed to be disposed to Bass Strait.</p> <p>As the approvals process would occur in parallel with approval under the EPBC Act and as the information required to support this approval would also be required to support decisions around dredge material management and approval under the EPBC Act and <i>Environment Effects Act 1978</i>, the need for this approval is not considered to be a differentiator for the purposes of site selection.</p>	No

Legislation	Requirement	Timing	Analysis	Differentiator?
Victorian				
<i>Aboriginal Heritage Act 2006</i> Cultural Heritage Management Plan	The <i>Aboriginal Heritage Act 2006</i> and Regulations require preparation of a CHMP for activities which are defined as a High Impact Activity (i.e. activities specified in Division 5 of Part 2 of the <i>Aboriginal Heritage Regulations 2007</i>) and are within an Area of Cultural Heritage Sensitivity. A CHMP is also mandatory for any project for which an Environment Effects Statement is required.	The CHMP would be prepared in parallel with an Environment Effects Statement. The duration for preparation of the CHMP would be dependent on the complexity of cultural heritage issues identified through this process. The Environment Effects Advisory Note on Aboriginal cultural heritage and the environment effects process (DPCD, 2007) notes that there is flexibility with the timing of preparation of a CHMP within the broader EES process. The CHMP can be finalised either before or after the EES process is finalised, depending on the complexity of the cultural heritage issues.	A CHMP would be required for development at both the Bay West and Hastings sites. This process is expected to be broadly similar for both sites. While the Bay West site has more identified high values, it is noted that it is also likely that more of the Bay West area has been subject to higher levels of significant ground disturbance, thus affecting the preservation of Aboriginal cultural heritage.	No
<i>Coastal Management Act 1995</i> Coastal Management Act Consent	Section 37 of the Act requires that a person may not use or develop coastal Crown land unless the written consent of the Minister for the Environment has first been obtained. Coastal Crown land includes (in summary) any Crown land within 200 metres of high water mark of the coastal waters of Victoria and the sea-bed of the coastal waters of Victoria.	The Coastal Management Act Consent application could be prepared in parallel with the Environment Effects Act process. Once the application has been submitted, the Minister or DSE delegate has 28 days to consent to the development (with or without conditions) or to refuse to consent the use or development (DSE, 2004).	Both Bay West and Hastings would require consent under the Coastal Management Act 1995. It is anticipated that the assessments required to address requirements under the EPBC Act and <i>Environment Effects Act 1978</i> would be sufficient to also support a consent application. Accordingly, this approval is not anticipated to be a differentiator between sites.	No

Legislation	Requirement	Timing	Analysis	Differentiator?
<p><i>Environment Effects Act 1978</i></p> <p>Environment Effects Statement (and EES Referral)</p>	<p>The <i>Environment Effects Act 1978</i> provides for the assessment of projects that are capable of having a significant effect on the environment. The 'Ministerial guidelines for assessment of environmental effects under the Environmental Effects Act 1978' contain criteria for effects that automatically trigger a referral under the Act (DSE, 2006).</p>	<p>The Ministerial guidelines for assessment of environmental effects under the Environmental Effects Act 1978 provide statutory timelines for specific elements and decisions as part of the EES process. The overall timeline for this approvals process is dependent on the scope and extent of studies required a could take a number of years to complete.</p>	<p>Both Bay West and Hastings would trigger referral under the <i>Environment Effects Act 1978</i> and are expected to require an Environment Effects Statement (or similar) due to their potential to meet one or more of the EES referral criteria, including, but not limited to:</p> <ul style="list-style-type: none"> • Clearing of 10 ha or more of native vegetation • Potential to impact on the ecological character of a Ramsar listed wetland • Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long term • Potential to have extensive or major effects on the health, safety or well-being of a human community due to emissions to air or water or chemical hazards or displacement of residences • Potential significant effects on the amenity of a substantial number of residents due to extensive or major, long-term changes in visual, noise and traffic conditions. <p>Preparation of an Environment Effects Statement for either site would require an existing conditions assessment, including baseline monitoring to establish the current condition of ecological values, as well as a robust risk and impact assessment process.</p>	No

Legislation	Requirement	Timing	Analysis	Differentiator?
<p><i>Planning & Environment Act 1987</i></p> <p>Planning Scheme Amendment</p>	<p>A Planning Scheme Amendment would be required to reserve and enable the use and development of land for development of the port, transport corridors and to develop associated infrastructure and port precincts, and for native vegetation removal under the <i>Planning and Environment Act 1987</i> (Victoria).</p>	<p>The Planning Scheme amendment would be prepared and exhibited concurrently with the EES process.</p>	<p><u>Bay West:</u> The following planning scheme mechanisms might be considered in order to protect and / or reserve land for future port related use and development and land based transport connections:</p> <ul style="list-style-type: none"> Planning Scheme Amendment: <ul style="list-style-type: none"> Rezone required land to a more appropriate zone (consider use of existing VPP Port Zone, or the Special Use Zone with a tailored schedule to Bay West Port operations Apply a Public Acquisition Overlay for transport purposes to reserve land for road and rail connections (i.e. PAO5 – Port Services and access corridor). <p><u>Hastings:</u> The following planning scheme mechanisms might be considered to facilitate additional port related use and development (noting no additional land is required for port function) and land based transport connections:</p> <ul style="list-style-type: none"> Planning Scheme Amendment: <ul style="list-style-type: none"> Investigate any need to amend the existing SUZ1 (Port Related Uses) as currently applying to the Port of Hastings environs to ensure it does not prohibit any potential future industrial / transport logistics related activity. Apply a Public Acquisition Overlay for transport purposes to reserve land for road and rail connections (i.e. PAO1 – Road construction and widening and PAO5 – Port Services and access corridor). 	<p>No</p>

6. Next steps

This report presents the outcomes of a high level review of environment and social values at each of Bay West and Hastings. The purpose of this work was to inform the Multi Criteria Assessment to be completed by the Commercial and Economics Consultant in early 2017. This report may require update following that process to reflect any improved understanding or additional information that may arise during that process.

Ultimately this report presents a high level summary of key environmental and social issues and potential approval requirements for each of Bay West and Hastings, and potential environmental and social constraints on the development of Port of Melbourne as of the date of preparation of this report. This report is based on the reports viewed in the Reference list (section 7) and the current legislative framework. Knowledge of, and studies on, Western Port and Port Phillip Bay continues to evolve and hence new information may become available that would affect the findings in this report.

Next steps for development of a port at either Bay West or Hastings or expansion of Port of Melbourne should therefore include revisiting the potential constraints, opportunities and fatal flaws at the point in time that development is proposed, in order to provide the most relevant advice. This further investigation should be based on:

- Proposed scope of works and development activities
- Knowledge of environmental and social conditions current at the time of the proposed works
- Current technology and mitigation techniques
- The legislative framework that is in place at the point in time and associated approval requirements

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Appendices

Appendix A – Baseline information review: Environmental, heritage and social considerations

Significance and data availability criteria

Each identified asset, value and use was assigned a significance based on the rating scale shown in Table 1.

Table 1 Assets, values and land uses significance rating scale

Existing assets, values, land uses	High	Medium	Low
Marine and terrestrial environments	National conservation significance Of importance to national / state project stakeholders	State conservation significance Of importance to regional project stakeholders	Local conservation significance Of importance to local project stakeholders or no likely impact
Aboriginal cultural heritage	A place of rare occurrence of exceptional value or a place with obvious spatial patterning	Commonly occurring place in good condition	Commonly occurring place in an already disturbed context
Historic heritage	National heritage significance	State heritage significance	Local heritage significance
Social and community	Unique, only facility of its type, irreplaceable assets/values. Used regularly by many people. Of local as well as wider importance.	Only facility of its type in the local area. Used regularly by locals only. Can be replaced/relocated elsewhere in the nearby area.	Other similar assets/values exist in the area. Will not be missed in the community as people can access other similar assets or values can be managed with minor interventions.
It should be noted that significance of social assets, values and land uses is subjective and should be identified in consultation with key stakeholders who use the assets or hold the values. Hence, we strongly recommend that significance rating provided in this table should be validated through appropriate stakeholder consultation.			

Similarly, each identified asset, value and use was assigned a level of understanding (or uncertainty) based upon the availability of data or information to support the assessment, according to the criteria in Table 2.

Table 2 Assets, values and land uses – level of understanding/certainty

High	Medium	Low
Data and information is specific to the region, conditions and industry and has sufficient historical records/statistics to support risk rating	Data and information has some aspects specific to project region and conditions but not all. Historical records/statistical data are limited in some areas	Data and information is not specific to the region, conditions and industry and has very limited historical records or statistical support

The assessment in Tables 3 and 4 considers assets, values and land uses both within and nearby to the proposed port development footprints at Bay West and Hastings.

Bay West

Table 3 Baseline review of existing environmental, heritage and social assets, values and land uses – Bay West

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Marine environment							
Hydrology	It is noted that hydrology may influence the degree of protection of the shoreline from wave action, and therefore the area and stability of the intertidal habitat around the WTP. Hydrology is also a factor in the pattern of spread of the effluent plumes from the WTP.						
Seagrass	<ul style="list-style-type: none"> Small isolated patches of <i>Zostera/Heterozostera</i> present from The Spit to Werribee South. a mixture of seagrass and undefined species of the green algae <i>Caulerpa</i>. Most of the seagrass along the western foreshore of Port Phillip Bay is located to the southwest of Beacon Point. The main areas of seagrass in Port Phillip Bay are located in the southern areas of the Bay. Impacts through direct removal, smothering or turbidity from dredge plume. 	Blake and Ball, 2001 Ball <i>et al.</i> 2014	Medium	High	Unlikely. The seagrasses in the Bay West area are not likely to be important in the wider ecology of Port Phillip Bay. Port development may enhance the ability for seagrass to grow in the area.	Yes. It is possible to locate the port with minimal impact on the overall seagrass	Yes because of the high importance of seagrasses in Western Port and the lack of importance in the Bay West area of Port Phillip Bay.
Macroalgae	<ul style="list-style-type: none"> The areas along the western shore of PPB are the main areas for macroalgae in the Bay Benthic macroalgae are important primary producers providing food for invertebrates and fish Macroalgae provides habitat for fish Drift algae (algae that grows in the water column) occur in waters off the northwest coastline of the bay Impacts potentially through the change in hydrodynamic conditions 	Jenkins and McKinnon (2006) Chidgey and Edmunds, 1997	Medium	Medium	Unlikely. Macroalgae does provide habitat for fish and invertebrates but has not been identified as important in the wider context of Port Phillip Bay.	Unlikely	Unlikely
Fish (non-commercial species)	<ul style="list-style-type: none"> 11 protected species / groups are present within PPB Potential impacts on fish relate to dredging and the impacts of any turbid plume Creation of new hard substrata 	Jenkins and McKinnon (2006)	Low	Medium	Unlikely. Bay West area not important habitat for listed fish species in Port Phillip Bay.	Unlikely	Unlikely
Commercial fishing and aquaculture	<ul style="list-style-type: none"> Aquaculture based around mussel farming offshore and potential for land-based culture of abalone The Kirk Point – Werribee Aquaculture Zone is closest to Bay West 60 species of finfish recorded in commercial catches in PPB Bay West area used for commercial harvesting of King George Whiting the most valuable commercial catch in Port Phillip Bay Bay West is most fished location for commercial Black Bream fishery in Port Phillip Bay Other fisheries though of lesser importance in the Bay West area are Australian Salmon, Flathead (all species), Yellow Eye Mullet Flounder, Gummy Shark, Southern Sea Garfish and southern calamari though main areas around Corio Bay and Bellarine Peninsula 	Jenkins and McKinnon (2006) DPI, 2005a, b, c	Medium	High	Unlikely. Even though the port may impact upon access to areas where fishing occurs the additional of additional channel and hard substrata in the Bay may offset some of these issues. Aquaculture zones are unlikely to be significantly affected.	Unlikely	Unlikely, commercial fishing is small in Western Port and not likely to be significantly affected in Port Phillip Bay.
Shorebirds	<ul style="list-style-type: none"> Intertidal areas of international importance for shore birds for both feeding and roosting. WTP is one of the most important shorebird areas in Australia. There is a demonstrated linkage between the discharge of treated effluent from the WTP and the numbers and distribution of shorebirds 	Steele 1996, Dann 2007, Rogers <i>et al.</i> 2007, Rogers <i>et al.</i> 2013	High	High	Any impacts upon the shorebird populations along the western side of Port Phillip Bay would need to be avoided. As such any development to the southwest of the proposed location would be constrained.	No	Shorebirds needs to be a factor considered in the site selection due to their high profile and conservation significance at both Bay West and Hastings.

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
	<ul style="list-style-type: none"> The WTP supports more shorebirds than any other wetland in Port Phillip Bay. Most important areas in WTP for shorebirds are Conservation Ponds, intertidal areas, and the Spit Nature reserve. Not recorded in or near area of proposed terminal or road/rail corridors as the extent of intertidal mudflat is small in these areas. Also shorebirds do not appear to roost in the areas near the proposed development footprint. 						
Other marine birds (excluding Little Penguin)	<ul style="list-style-type: none"> Several species of birds breed in Port Phillip Bay including the White-faced Storm petrel, Australasian gannet, Pied Cormorant and Crested Tern. These are unlikely to be significantly impacted by the proposed Bay West Development Marine birds utilise the areas offshore from the Bay West Site Potential impacts likely to be indirect though effects on food supply rather than direct. 	Brett Lane and Associates, 2006	Medium	High	Unlikely	Unlikely	Unlikely
Little Penguin	<ul style="list-style-type: none"> Penguins from both the colony at St Kilda and Phillip Island are present in Port Phillip Bay Other smaller colonies of Little Penguins occur around PPB Offshore areas in the north western area of the Bay does support higher number of Little Penguins in both the summer and winter Potential impacts include increased turbidity resulting from dredging activities influencing feeding activity and entrainment into the dredge (though this can be easily managed). 	Mustoe and Waugh, 2006	Medium	High	Unlikely	Unlikely	Potentially due to larger occurrence of Little Penguin in Western Port as a result of the proximity of the large colony on Phillip Island.
Blue carbon	<ul style="list-style-type: none"> Coastal and shallow marine vegetation including saltmarshes, seagrasses, and mangroves are some of the most efficient carbon sinks in the natural world. The carbon captured in this coastal vegetation is known as “blue carbon”. The carbon stocks across the two bays were distributed: seagrass (54%), saltmarsh (31%) mangrove (15%). Saltmarsh has the highest carbon stock per unit area followed by mangrove and seagrass. Impacts on blue carbon should be proportional to impacts on seagrass, saltmarsh and mangroves 	Carnell <i>et al.</i> , 2015	Low	Medium	Unlikely as the Bay West area contains limited seagrass, saltmarsh and mangrove areas.	Unlikely	Yes. Bay West is likely to see much lower potential impact on all three sinks of blue carbon.
Microphytobenthos	<ul style="list-style-type: none"> An important component of the processes for carbon fixation, nutrient cycling and the transfer of energy and nutrients in Port Phillip Bay Biomass of microphytobenthos around the Bay West area is relatively low compared to other areas in Port Phillip Bay 	Beardall and Light, 1997	Low	Low	Unlikely	Unlikely	Unlikely
Marine protected areas	<ul style="list-style-type: none"> Point Cooke Marine Sanctuary is to the northwest of the Bay West location Port Phillip Heads Marine National Park is located in and around the entrance to the Bay Main concern for protection of marine natural values is the threat from introduced marine pests 	Parks Victoria, 2016c	Medium	High	Unlikely	No	Unlikely

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Marine mammals	<ul style="list-style-type: none"> Seven species of cetaceans have regularly been recorded in and around Port Phillip Bay Impacts are potentially confined to collision with shipping and noise impacts from piling Habitats to the northwest of Port Phillip Bay are not considered important for marine megafauna 	Mustoe and Waugh, 2006	High	High	Unlikely	No	Unlikely
Terrestrial environment							
Conservation areas	<ul style="list-style-type: none"> Land use at WTP categorised into conservation, agriculture, northern grasslands, and sewage treatment area Conservation area predominantly associated with waterways Little River, Lollipop Creek, Cherry Creek, western areas of the site including aerobic ponds, Lake Borrie and shoreline 	Ecology Australia, 2010	High	High	Yes as expansion to the southwest would impact upon conservation areas	Yes. It will be possible to locate the port with minimal impacts to the conservation areas and offsets may enhance the management of these areas.	Unlikely
Geomorphology	<ul style="list-style-type: none"> A remnant stem of Werribee Delta is evident at a section of Lollypop Creek as one of the last remaining intact examples of the formally extensive distributary channel system of Werribee River All other channels are covered by the WTP lagoons or have been significantly modified by agriculture 	Ecology Australia, 2010	Low	High	Possible - Lollypop Creek at western edge of proposed rail terminal	Unlikely	Unlikely
Wetlands	<ul style="list-style-type: none"> International significance of WTP recognised through Ramsar listing. Abundance of waterbirds including migratory shorebirds is of international significance Threatened species Migratory shorebirds feed and roost in the WTP wetlands and ponds 	Ecology Australia, 2010 Dann, 2007	High	High	Unlikely as proposed development located away from Ramsar values. However, the project will need to consider ecological character of Ramsar Wetland	Yes. It will be possible to locate the port with minimal impacts to the wetland areas and provides conservation opportunities.	Possibly – it is an internationally recognised wetland area.
Waterbirds	<ul style="list-style-type: none"> WTP is one of the most important sites for waterbirds in SE Australia. Wetlands support 24 waterbird species considered to be of international significance. In particular, the sewage treatment lagoons important for waterfowl. Some species may use freshwater habitats found in creeks/rivers. 	Ecology Australia, 2010 Dann, 2007 Loyn <i>et al.</i> , 2014	High	High	Yes as expansion to the southwest would impact upon conservation areas	Unlikely	Unlikely
Orange-bellied parrot	<ul style="list-style-type: none"> Over winter occupies coastal saltmarsh and adjoining vegetation. Have been recorded in numerous locations in WTP which is one of the few remaining locations on the mainland where OBP are regularly recorded Not recorded in or near area of proposed terminal or road/rail corridors 	Ecology Australia, 2010	High	High – annual targeted surveys and high intensity of survey effort at the WTP	Possible - OBP may fly from saltmarsh areas to roost near Werribee River though this is unclear.	Yes. It will be possible to locate the port with minimal impacts to the saltmarsh area. Opportunity to conserve salt marsh and other OBP habitat at WTP.	Possibly – the OBP is a high profile species. Any potential impacts to the species and its habitat may be of particular importance to the public/other stakeholders.
Striped Legless Lizard	<ul style="list-style-type: none"> Was recorded in 1987 in northern grasslands but has not been recorded since however can be difficult to detect 	Ecology Australia, 2010	High	Low	Unlikely - may not be present within proposed impact area. However would need to be considered for the project.	Unlikely	Unlikely
Growling grass frog	<ul style="list-style-type: none"> The WTP has one of the largest populations around Melbourne. Treatment lagoons, conservation ponds and drains provide main habitats. Cherry Tree Creek is highlighted as GGF habitat – rail and road corridors cross this creek. 	Ecology Australia, 2010	Medium	High. Regular ongoing surveys at WTP with annual reporting.	Possible - impacts to Cherry Tree Creek may impact the GGF. As it is an EPBC listed species, may require additional surveys and EPBC Act referral.	Unlikely	Unlikely

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Other threatened fauna species	<ul style="list-style-type: none"> Population of Fat-tailed Dunnart (classified as Near Threatened in Victoria) Found in northern grasslands which is the habitat intercepted by proposed road and rail corridors 	Ecology Australia, 2010	Medium	Low	Possibly - it will be impacting an area that was once one of the most important populations in Victoria.	This may provide an opportunity to minimise impacts and highlight areas for additional potential conservation.	Unlikely
Saltmarsh	<ul style="list-style-type: none"> Saltmarsh is present in the western lagoons. Not present within the area proposed for rail terminal or road/rail corridors 	Ecology Australia, 2010	High	High	No. Not in location of terminal or road/rail corridors.	Opportunity to conserve salt marsh at WTP.	Unlikely
Native vegetation	<ul style="list-style-type: none"> Remnants of Western Basalt Plains Grassland EVC occurs throughout Northern Grasslands (community listed under FFG Act) Northern Grassland area also supports two natural ephemeral wetlands Large suite of EVCs at WTP spanning a wide range of wetland and dryland environments 	Ecology Australia, 2010	Medium	High	Possible –the project will need to obtain necessary approvals for native vegetation impacts.	Unlikely	Unlikely
Mangroves	Mangroves present along Little River and Werribee River estuaries	Ecology Australia, 2010		Medium		Unlikely	Unlikely
Other threatened flora species	Lake Borrie Spit Grassland supports an important population of EPBC-listed Plains Spiny Rice-flower.	Ecology Australia, 2010	Medium	Medium	No. Not in location of terminal or road/rail corridors.	Unlikely	Unlikely
Aboriginal cultural heritage							
Aboriginal Cultural Place	Intangible, non-archaeological place (n=1). Comprising two intertwined trees with expressed non-archaeological value.	Aboriginal Victoria, 2016	Potentially high	Low – needs further investigation	Unlikely, given it is a discrete location	No	Unlikely
Artefact Scatter	Place represented by stone artefacts of any density (n=250)	Aboriginal Victoria, 2016	Low to Medium	Medium	These places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	Dependent on the proposed design and construction
Earth Feature	Exposure of cultural material in a bank (n=8)	Aboriginal Victoria, 2016	Low to Medium	Medium	These places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	Dependent on the proposed design and construction
Object Collection	Cultural material housed in a secondary location (n=6)	Aboriginal Victoria, 2016	Low	Medium	No	No	Unlikely
Shell Midden	Accumulations of shell resulting from the collection, cooking and eating of shellfish (n=6)	Aboriginal Victoria, 2016	Low to Medium	Medium	These places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	Dependent on the proposed design and construction
Historical Reference	Location of importance, significance or association with Aboriginal people (n=1). Gellibrand's Harbour Meeting.	Aboriginal Victoria, 2016	Medium	Low – needs further investigation	Unlikely, given it is a discrete location	No	No
Low Density Artefact Distribution (LDAD)	An artefact scatter registered after 2012 that contains less than 10 artefact per 10 square metres (n=17)	Aboriginal Victoria, 2016	Low	Medium	No, these places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	No
Scarred Tree	Scar on a tree caused by people intentionally removing bark (n=10)	Aboriginal Victoria, 2016	Medium	Low to Medium	Unlikely, given it is a discrete location	No	Dependent on the proposed design and construction
Aboriginal Ancestral Remains	Burial (n=1)	Aboriginal Victoria, 2016	High	Medium	Possibly	No	Unlikely, given its location away from the proposed port development area
Stone Feature	An intentional or constructed arrangement of stone (n=1)	Aboriginal Victoria, 2016	Medium to High	Low	Possibly	No	Potentially, given the significance of the site type

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Historic heritage							
Heritage Overlays	Local council planning schemes - include places of local significance as well as places included in the Victorian Heritage Register (n=19)	Heritage Council of Victoria, 2016	Low	Medium	No	No	No
Victorian Heritage Inventory (various sites as shown on the mapping)	Listing of all known historical (non-Indigenous) archaeological sites in Victoria (n=16)	Heritage Council of Victoria, 2016	Low to Medium	Medium	No	No	No
Victorian Heritage Register (various places as shown on the mapping)	A heritage place or object of State significance (n=4)	Heritage Council of Victoria, 2016	Medium	Medium	Possibly	No	Potentially, given the significance of the site type
Social and community							
Residential land uses:	Residential areas within the vicinity of the port development are concentrated between the Princes Freeway and Geelong-Melbourne railway line to the north-east adjoining established residential areas in Werribee, as well as around the Wyndham Harbour development in Werribee South (to the east of the Werribee River). There are isolated rural residential uses to the west of the investigation area toward the township of Little River.	Google Earth, 2016	Medium to high	Low	Yes – there is a need to minimise potential impacts on residential land uses	No	Potentially, given the significance of the land use and proximity to the port development
Businesses/ industrial/ commercial land uses:	The Werribee Tourist Precinct to the east includes major tourism attractions – Werribee Park Mansion, Werribee Open Range Zoo, Werribee Park Golf Club, State Rose Garden, National Equestrian Centre, Sofitel Mansion and Spa, and Shadowfax winery complex. Land to the north-east of the Werribee Tourist Precinct is being developed as the East Werribee Employment Precinct. The Werribee South Caravan Park is located near the coast, on the eastern bank of the Werribee River. The Werribee South Market Gardens, also to the east of the Werribee River, are major producers of lettuce, broccoli and cauliflower.	Google Earth, 2016	Medium to high	Low	Yes – there is a need to minimise potential impacts on the Werribee Tourist Precinct (Werribee South Market Gardens are outside of the area considered for port development)	Yes	Potentially, given the significance of the land use and proximity to the port development
Other land uses:	The landside area designated for port-related uses and the proposed rail terminal are largely located within land zoned for Rural Conservation that is proposed to be acquired by DELWP. This land is predominantly used for agricultural and farming uses. South of the Princes Highway, the transport corridor is within land currently occupied by the Western Treatment Plant (WTP), located to the west of the Werribee River. It is assumed that the northern section of the transport corridor would already be established as part of the Outer Metropolitan Ring Road development at the time of port development. The closest centre is Werribee to the east. A small township, Little River, is to the west. Avalon Airport is located south west of Melbourne along the Princes Highway.	Google Earth, 2016	High	High	Yes – there is a need to minimise potential impacts on WTP operations	Yes – there is a significant area of non-residential and government-owned land within the area of investigation	Yes
Social infrastructure / natural assets:							
Werribee River Park	Caters for recreational activities such as fishing and kayaking. Access from Geelong Road onto New Farm Road.	Parks Victoria, 2016d	High	Medium	Yes – there is a need to minimise potential impacts on recreational areas	No	Potentially, given the significance of the land use and proximity to the port development
Grahams Wetland Reserve	Wetland area adjacent to Beach Road, Werribee South	Google Earth, 2016	High	Low	Yes – there is a need to minimise potential impacts on recreational areas	Unlikely	Potentially, given the significance of the land use and proximity to the port development

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Point Cook Coastal Park and coastal land east of the Werribee River	The publicly accessible offshore area between the Werribee River mouth and the (RAAF) Williams Point Cook Base is valued for recreation. Further to the east of RAAF Williams, the Point Cook Coastal Park is open to the public and is popular with birdwatchers and family groups.	RPS, 2016	High	Medium	Yes – there is a need to minimise potential impacts on recreational areas	Unlikely	Potentially, given the significance of the land use and proximity to the port development
The Spit Wildlife Reserve	Wildlife reserve along the coast, south of and adjacent to the WTP. There is no general public access to the reserve, although visitors with birdwatching permits can observe birdlife from the boundary.	Melbourne Water, 2016	High	High	Unlikely	No	Unlikely, given this reserve is publicly inaccessible and is outside of the port development footprint
Recreational fishing	<ul style="list-style-type: none"> Recreational fishing is a very important recreational activity across Port Phillip Bay including areas around Bay West A number of recreational fishing/boating facilities are located nearby with a large boat ramp at Werribee South and a small one at Kirk Point 62 species of fish are targeted for recreational fishing in PPB Main species fished include sand flathead, King George whiting, Southern sea garfish, Australian Salmon, snapper, southern calamari and yellow-eye mullet	CDP EES Chapter 13 and Technical Appendix 57	High	High	Unlikely to be major constraint as fishing likely to be able to continue over most the Bay West area, excluding the port area itself the channels where restrictions on fishing are likely to apply. Constraints on recreational fishing will be as currently applicable, with a restriction on anchoring and drifting in the channels.	Unlikely	Potentially
Community values attached to the area – recreational values, lifestyle:	The community likely values the rural setting, natural assets and recreational opportunities such as boating and fishing in the area. Recreational and tourism opportunities are reliant on the quality of these natural assets. Potential change in the identity and local values of rural/peri-urban character of the area.	Google Earth, 2016	Medium to high	Low	Unlikely	No	Potentially
Amenity of the area:	The existing peri-urban/rural residential areas, with quiet surroundings and a rural landscape.	Google Earth, 2016	Medium to high	Low	Unlikely	No	Potentially
Access and connectivity:	Current traffic in the area has less heavy vehicles and generally less traffic on local roads and streets.	Google Earth, 2016	Medium to high	Low	Unlikely	Yes - the existing Princes Freeway and future Outer Metropolitan Ring Road provide opportunity for connection to the proposed port transport corridor	Potentially

Hastings

Table 4 Baseline review of existing environmental, heritage and social assets, values and land uses – Hastings

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Marine environment							
Hydrology	<ul style="list-style-type: none"> Supports maintenance of areas that provide habitat for seagrass, foraging area for waterbirds and support diverse soft sediment invertebrate fauna Wetland bathymetry is a critical ecosystem component of the ecological character description 	Cardno, 2016 KBR, 2010	High	Medium	Yes – changes to hydrological regime may mean changes to habitat structure, bathymetry and geomorphology	Unlikely	Potentially
Seagrass	<ul style="list-style-type: none"> Four species of seagrass are present in Western Port: <i>Zostera nigricaulis</i>, (most abundant) <i>Z. muelleri</i>, <i>Halophila australis</i> and <i>Amphibolis antarctica</i>. Intertidal and subtidal seagrass covers 25% of Western Port Ecological character description nominates seagrasses as a critical ecosystem component of the Ramsar site. 	CEE, 2014	High	Medium. Much of the information is old (>15 years) and those studies reported considerable variability.	Yes. Potential impacts on seagrasses can have implications for the wider ecosystem of Westernport.	Unlikely	Yes because of the high importance of seagrasses in Western Port and the lack of importance in the Bay West area of Port Phillip Bay.
Macroalgae	The green alga <i>Caulerpa cactoides</i> is present in large beds mainly in eastern areas of Westernport with similar habitat functionality to seagrasses.	CEE, 2014	Low	Medium.	No as the beds of <i>Caulerpa</i> occur on the eastern side of Western Port.	Unlikely	Unlikely
Reef habitats	Reefs comprise only a very small component of benthic habitat in Western Port and are mainly outside the area.	CEE 2014, Melbourne Water 2011	Low	Medium	Unlikely	Unlikely	Unlikely
Fish (non-commercial species)	<ul style="list-style-type: none"> Important species include Australian Grayling, Syngnathidae (pipefish and seahorses), Pale Mangrove Goby, Southern Bluefin Tuna and listed sharks Western Port is a key breeding area for the Elephant Fish, Australian Anchovy and School Shark and a nursery area for other species such as King George Whiting Ecological character description nominates fish as a critical ecosystem component of the Ramsar site. 	Jenkins, 2014	High.	Medium	Potential impacts on fish breeding / nursery areas may be a consideration.	Unlikely	Potentially as impacts on fish may be higher in Western Port than Bay West.
Aquaculture and commercial fishing	<ul style="list-style-type: none"> Commercial fishing in Western Port has declined since commercial net fishing was removed in 2007 and the remainder of the commercial licences are being phased out through a management process There is one aquaculture area, the Flinders Aquaculture Fisheries Reserve in Western Port 	DPI 2005d, CEE 2014	Low	Medium	Commercial fishing is being phased out by 2022 so not likely any impact	Unlikely	Unlikely. As both Western Port and Bay West have commercial fisheries that are unlikely to be impacted by the proposed port developments
Shorebirds	<ul style="list-style-type: none"> Western Port provides important foraging, high roosting and breeding areas for a number of shorebird species including migratory waders. Western Port is one of the three most important areas for migratory waders in Victoria. Surveys indicate that Western Port supports about 10 000 waders (approximately 12.3% of the Victorian population). 37 species of waders have been recorded in the Western Port, of which 10 occur in their highest numbers in Victoria due to important feeding and roosting areas. Migratory bird habitat is present along the extent of the proposed project footprint. A significant feeding area and multiple roosting sites are found in the Hastings bay and along the western half of French Island's coast. Other 	Biosis 2014, DSE 2003	High	High	Yes	Unlikely	Yes. Both Bay West and Hastings have extensive areas of intertidal mudflat that are important habitat for shorebirds, however the potential impacts on Hastings are greater and the ability to offset or mitigate any impacts are greater at Bay West.

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
	feeding areas and roosting sites are located north and south of the Hastings Bay.						
Little Penguin	<ul style="list-style-type: none"> Little Penguin breeds in Western Port with Phillip Island having the highest profile rookeries Little Penguins are found mainly in the western and northern arms of the bay Western Port is relatively unimportant as a feeding area for Phillip Island birds <p>Potential impacts likely to be indirect though effects on food supply rather than direct.</p>	Dann <i>et al.</i> 2001	High – not a listed species but of high profile	High	Unlikely	Unlikely	Potentially due to larger occurrence of Little Penguin in Western Port as a result of the proximity of the large colony on Phillip Island.
Marine mammals	<ul style="list-style-type: none"> The largest Australian Fur Seal colony in the world is located at the western Entrance to Western Port at Seal Rocks however only small numbers venture into the Bay mainly via the northern and western arms. Western Port is used by Bottlenose Dolphins as well as smaller numbers of Short-beaked Common Dolphins though neither are characterised as commonly inhabiting the waters of Western Port Other marine mammals only make rare visits to Western Port 	Dann 1996, Kirkwood <i>et al.</i> 2010	Medium	Low	Noise from piling activities may impact upon the Australian Fur Seals. Direct physical impacts are unlikely but there is potential for behavioural impacts.	Unlikely	Only if the noise from piling and other construction activity were to be found to impact the Australian Fur Seal.
Blue carbon	<ul style="list-style-type: none"> Coastal and shallow marine vegetation including saltmarshes, seagrasses, and mangroves are some of the most efficient carbon sinks in the natural world. The carbon captured in this coastal vegetation is known as “blue carbon”. The carbon stocks across the two bays were distributed: seagrass (54%), saltmarsh (31%) mangrove (15%). Saltmarsh has the highest carbon stock per unit area followed by mangrove and seagrass. Impacts on blue carbon should be proportional to impacts on seagrass, saltmarsh and mangroves 	Carnell <i>et al.</i> , 2015	Low	Low	Potentially as the proposed development would remove areas of seagrass, saltmarsh and mangrove.		Yes. Bay West is likely to see much lower potential impact on all three sinks of blue carbon.
Terrestrial environment							
Saltmarsh	<p>The study area contains 43.4 ha of the EPBC Act listed ecological community <i>Subtropical and Temperate Coastal Saltmarsh</i> which is comprised of two EVCs (9: Coastal Saltmarsh aggregate; and 10: Estuarine Wetland). The Western Port saltmarsh is one of the most significant stands of saltmarsh in south-eastern Australia.</p> <ul style="list-style-type: none"> It occupies a large portion of the coast of Western Port and extends over a kilometre from the shore in some places. The Western Port saltmarsh is floristically richer than most other saltmarshes on the southern coast. The saltmarsh is relatively undisturbed as it does not appear to have suffered from grazing, heavy industry, or weed infestation. The saltmarshes are important habitat for a number of bird species, including the critically endangered Orange-bellied Parrot (<i>Neophema chrysogaster</i>) which has been observed in the saltmarshes opposite Reef Island. The saltmarshes also support a rich and diverse amount of invertebrate species with 1381 species recorded from 23 major groups – three to four times the total number found in Port Phillip Bay. 	Biosis 2015, DSE 2003, DELWP 2016b	High	High	Yes – impacts to the saltmarsh will have implications for multiple aspects of the ecosystem	Unlikely	Yes, as the saltmarsh is floristically richer than most other saltmarshes on the southern coast.

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
	<ul style="list-style-type: none"> According to the BIM Mapping tool, Saltmarsh is present at Crib Point, along the coast of the Hastings bay, and along the remainder of the proposed project site north of Long Island point. It is also found along the northern and western coasts of French Island. 						
Mangroves	<ul style="list-style-type: none"> White Mangroves (<i>Avicennia marina</i>) line 40% of the coastline of the Ramsar area (near Hastings, the inlet near Crib Point and in Yaringa Marine National Park. There is also a small distribution on the north-western coast of French Island). On a global level, they are considered important as they are the only large mangrove community situated so far from the equator with the exception of Corner Inlet. The mangroves provide several environmental services including: <ul style="list-style-type: none"> Filtering pollutants Stabilise sediments Trap and process nutrients Protects the shoreline from erosion Provides nursery area and habitat for a number of species. 	Melbourne Water 2011	High	High	Yes – as the mangroves are significant on a global level and have an effect of the sediment quality of the bay	Unlikely	Yes, as the mangroves play an important role in the maintenance of the Bay's ecosystem.
Seasonal Herbaceous Wetland	<ul style="list-style-type: none"> The study area contains 3 ha of the ecological community Seasonal Herbaceous Wetland (freshwater) of the Temperate Lowland Plains which is listed under the EPBC Act. The areas of Seasonal Herbaceous Wetlands would also meet the definition of the FFG listed community Herb-rich Plains Grassy Wetland (West Gippsland). The community has a rich association of grasses, sedges and aquatic herbs and provides habitat for threatened and/or migratory wetland birds and plant species such as River Swamp Wallaby-grass (<i>Amphibromus fluitans</i>) and Swamp Everlasting (<i>Xerochrysum palustre</i>). 	Biosis, 2015	Medium	High	Possible	Unlikely	It is unknown whether the proposed footprint will impact a significant amount of the ecological community. Regardless, it is anticipated that an EPBC referral would be required for the project regardless. Impacts to this community would need to be considered if the Hastings site is selected.
Threatened species – flora	<p>According to the terrestrial flora desktop assessment conducted by Biosis, combined VBA & PMST searches found that 15 EPBC Act listed species, 14 FFG Act listed species and 56 State listed species have been found, or are predicted to occur within 5 km of the study site. 13 EVCs were mapped during the Biosis assessment, many of which were found to have the potential to support several threatened species of flora, including:</p> <ul style="list-style-type: none"> Swamp Fireweed (<i>Senecio psilocarpus</i>) River Swamp Wallaby-grass (<i>Amphibromus fluitans</i>) Purple Diuris (<i>Diuris punctata</i> var. <i>punctata</i>) Threatened flora have the potential to occur particularly in the Western Port Coastal Reserve. 	Biosis, 2015	Medium	Medium	Possible – the project will need to obtain necessary approvals for native vegetation impacts.	No	Unlikely
Threatened species – fauna	<p>12 EPBC Act listed species, 41 FFG Act listed species and 58 State listed species have been found, or are predicted to occur within 5 km of the study site. 13 EVCs were mapped during the Biosis assessment, many of which were found to have the potential to support several threatened species of fauna, including:</p> <ul style="list-style-type: none"> Orange-bellied Parrot (<i>Neophema chrysogaster</i>) Southern Brown Bandicoot (<i>Isodon obesulus obesulus</i>) 	Biosis, 2015	Medium	Medium	Possible – field assessments would have to be undertaken to determine the presence of listed threatened species	No	Unlikely

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
	<ul style="list-style-type: none"> Growling Grass Frog (<i>Litoria reniformis</i>) Swamp Skink (<i>Lissolepis coventryi</i>) <p>Additionally, Western Port periodically supports in excess of 10 000 ducks and Black Swans (<i>Cygnus atratus</i>). Threatened terrestrial fauna have the potential to occur along the full extent of the proposed site, particularly in the area surrounding Yaringa Marine National Park and Western Port Coastal Reserve.</p>						
Migratory birds	The Bay provides habitat for numerous species listed in the Japan-Australia Migratory Birds Agreement (JAMBA) and the China-Australia Migratory Birds Agreement (CAMBA).	Biosis 2015	High	High	Yes – as the area is significant to species on a global level	Unlikely	Yes - Hastings has extensive areas of intertidal mudflat that are important habitat for shorebirds, and the potential impacts on Hastings are greater and the ability to offset or mitigate any impacts are greater at Bay West.
Aboriginal cultural heritage							
Artefact Scatter	Place represented by stone artefacts of any density (n=38)	Aboriginal Victoria, 2016	Low to Medium	Medium	These places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	Dependent on the proposed design and construction
Object Collection	Cultural material housed in a secondary location (n=7)	Aboriginal Victoria, 2016	Low	Medium	No	No	No
Shell Midden	Accumulations of shell resulting from the collection, cooking and eating of shellfish (n=1)	Aboriginal Victoria, 2016	Low to Medium	Medium	These places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	Dependent on the proposed design and construction
Low Density Artefact Distribution	An artefact scatter registered after 2012 that contains less than 10 artefact per 10 square metres (n=7)	Aboriginal Victoria, 2016	Low	Medium	No, these places can be managed through the preparation of a Cultural Heritage Management Plan (CHMP)	No	No
Historic heritage							
Heritage Overlays	Local council planning schemes - include places of local significance as well as places included in the Victorian Heritage Register (n=19)	Heritage Council of Victoria, 2016	Low	Medium	No	No	No
Social and community							
Residential land uses:	Generally isolated settlements of rural residential uses within the SUZ1 and residential areas in main townships of Tyabb, Pearcedale, Hastings and Somerville. There are also residential properties on either side of the Western Port Highway (future ports transport corridor to be upgraded).	Google Earth 2016, GHD and AECOM 2013	Medium to high	Medium	Yes – there is a need to minimise potential impacts on residential land uses	No	Yes, given the significance of the land use and proximity to the port transport corridor
Businesses/ industrial/ commercial land uses:	<p>Businesses located within or adjacent to the SUZ1 include:</p> <ul style="list-style-type: none"> Plant nurseries and farm gate sales Gazzola Farms, which produces green vegetables for local, interstate and export markets (Gazzola Farms, 2014) Christmas tree farms, including the Somerville Christmas Tree Farm Western Port Harbour Caravan Park Equestrian services including the Treehaven Equestrian Centre, Equine Magic and Jeremiah Park Pony Stud Western Port Blue Scope Steelworks 	Google Earth 2016, GHD and AECOM 2013 Gazzola Farms, 2014	Low to high	Medium	Yes – there is a need to minimise potential impacts on these land uses	No	Potentially, given the proximity to the port development

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Social infrastructure / natural assets:							
Western Port Coastal Reserve	Reserve on Yaringa Rd, Somerville adjacent to the SUZ1.	Google Earth 2016, GHD and AECOM 2013	High	Medium	Possible	No	Potentially, given the significance of the land use and proximity to the port development
Yaringa Marine National Park	Located between the mainland and Quail Island Nature Conservation Reserve in Western Port, this park is part of the Western Port Ramsar site and is an area of international significance due to its importance for wader birds. The area encompasses a variety of ecologically important habitats including saltmarsh, mangroves, sheltered intertidal mudflats, subtidal soft sediments and tidal channels.	Parks Victoria, 2016e	High	Medium	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the significance of the land use and proximity to the port development
Gordon Rolfe Bushland Reserve	Passive recreation reserve adjacent to the SUZ1.	Google Earth, 2016	High	Low	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the proximity to the port development
Tyabb Foreshore Reserve	Passive recreation reserve adjacent to the SUZ1.	Google Earth, 2016	High	Low	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the proximity to the port development
Watson Creek	Creek running parallel to the northern boundary of the SUZ1, used for recreational purposes.	GHD and AECOM 2013	High	Low	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the significance of the land use and proximity to the area designated for port-related uses
Hastings Foreshore Reserve	Reserve to the south of the SUZ1 used for recreational purposes.	GHD and AECOM 2013	High	Low	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the significance of the land use and proximity to the port development
Phillip Island	Popular tourist destination attracts day trips from Melbourne, to watch the Penguin Parade at Summerland Beach, when Little penguins come ashore in groups. The Nobbies outcrop is the viewing site for Seal Rocks, home to a large colony of Australian fur seals. The Phillip Island Circuit is a well-known track for motorcycle and car racing.	Destination Phillip Island, 2016	High	High	Yes – there is a need to minimise potential impacts on recreational areas and natural assets	No	Potentially, given the significance of the land use and proximity to the port development
Bembridge Golf Course	Golf course on 125 Tyabb-Tooradin Rd, Somerville north of the SUZ1.	Google Earth, 2016	Low - high	Low	Yes – there is a need to minimise potential impacts on recreational areas	No	Unlikely given the proximity from port development
Bunguyan Reserve	Primary sport and recreation facility for Tyabb located on 1475 Frankston-Flinders Road, adjacent to the SUZ1. Facilities include a sporting field and two sports courts.	Google Earth 2016, Capire 2014	Low - high	Low	Yes – there is a need to minimise potential impacts on recreational areas	No	Potentially, given the proximity to the area designated for port-related uses
Tyabb Central Reserve	Primary sport and recreation facility for Tyabb on Mornington-Tyabb Road. Facilities include a cricket oval.	Google Earth 2016, Capire 2014	Low - high	Low	Unlikely given the proximity from port development	No	Unlikely given the proximity from port development
Blue Scope Steel Recreation Centre	Recreation centre on Denham Road, Hastings within the SUZ1.	Google Earth, 2016	Low - high	Low	Yes – there is a need to minimise potential impacts	No	Potentially, given the proximity to the area designated for port-related uses
Child care centres and schools	These include: <ul style="list-style-type: none"> Child care centre on 249 Marine Parade, Hastings close to SUZ1. Tyabb Railway Station Primary School – public primary school at 88 The Crescent, Tyabb close to the SUZ1. Padua College – Catholic secondary college at 1585 Frankston – Flinders Rd, Tyabb, close to the SUZ1. 	Google Earth, 2016	Low - medium	Low	Yes – there is a need to minimise potential impacts on sensitive land uses	No	Potentially, given the sensitivity of the land use and proximity to the area designated for port-related uses

Existing assets, values, land uses	Description	References	Significance – high, medium, low	Level of understanding/ certainty	Is this a constraint to Port development?	Is this an opportunity for Port development?	Is this likely to be a differentiator for site selection?
Equestrian services	These include: <ul style="list-style-type: none"> Jeremiah Park Pony Stud - Horse breeder on 1447 Frankston - Flinders Rd, Tyabb. Equine Magic – Horse riding school on 33 Dandenong-Hastings Rd, Tyabb within the SUZ1. Treehaven Equestrian Centre – Equestrian centre on 53 Western Port Hwy, Somerville within the SUZ1. 	Google Earth 2016, Capire 2014	Low	Low	Yes – there is a need to minimise potential impacts	No	Potentially, given the proximity to the area designated for port-related uses
Dinosaur World	Tourist attraction on Frankston - Flinders Rd & O'Neills Rd, Somerville adjacent to the SUZ1	Google Earth, 2016	Medium to high	Low	Yes – there is a need to minimise potential impacts	No	Potentially, given the proximity to the area designated for port-related uses
Yaringa Boat Harbour	Marina on 1 Lumeah Road, Somerville adjacent to the project area providing water access to the public. The Yaringa Boat Harbour also hosts a handful of related commercial uses, including but not limited to Superior Masts & Rigging, JNC Marine, The Yacht Doctor, Condor Trailers, Clow Marine Electronics, Supreme Marine, Steve's Marine Windows and Windscreens, and Yaringa Boat Hire (Yaringa Boat Harbour, 2014).	Google Earth 2016, GHD and AECOM 2013	High	Medium	Yes – there is a need to minimise potential impacts	No	Potentially, given the significance of the land uses and proximity to the port development
Kingdom Hall of Jehovah's Witnesses	Place of worship on 192 Marine Parade, Hastings close to the SUZ1.	Google Earth, 2016	Low	Low	Yes – there is a need to minimise potential impacts	No	Potentially, given the proximity to the area designated for port-related uses
Tyabb (Western Port) Airport	Tyabb Airport is operated by the Peninsula Aero Club, a flying training school and aero club, west of the SUZ1.	Peninsula Aero Club, 2016	Medium to high	Low	Potentially - obstacle limitation surfaces radiate out from the runway and this would affect the height and nature of land uses that can be developed in this part of the SUZ1	No	Unlikely
Recreational fishing	Western Port has an important recreational fishery The main recreational species are King George whiting, snapper, gummy shark, flathead, southern calamari and elephant fish.	Fisheries Victoria, 2017	High	Medium	Potential impact on recreational fisheries may be an important consideration.	Unlikely	Potentially
Community values attached to the area – recreational values, lifestyle:	The community values the rural setting, natural assets and recreational opportunities such as boating and fishing in the area. Recreational and tourism opportunities are reliant on the quality of these natural assets.	GHD and AECOM 2013	High	Medium	Possible	No	Potentially
Amenity of the area:	Quiet rural residential areas, open space and landscape and views.	GHD and AECOM 2013	High	Medium	Unlikely	No	Potentially
Access and connectivity:	Heavy vehicle traffic is already an area of community concern.	GHD and AECOM 2013	Medium	Low	Yes - upgrades to the road network would be required for port traffic to utilise the existing Western Port Highway	No	Potentially

Appendix B – Social and environmental risk factors

Risk assessment framework

A high level assessment of risks posed by development footprint, construction and operation of the ports at each location was carried out in order to provide a systematic approach to comparing the two sites. The assessment considers assets, values and land uses both within and nearby to the proposed port development footprints at Bay West and Hastings, that were identified as potential differentiators for site selection.

This high level assessment is not definitive and was based on available data and understanding of issues at the time of preparing this report. Detailed studies and fieldwork would be required to improve understanding of values and potential impacts on and risks to these. The risks were assessed for the representative concepts for the purposes of comparing Bay West and Hastings as described in this report, rather than providing an absolute assessment of risks or impacts. More data collection, better understanding of the issues and more design work to mitigate the identified risks could change the risk profiles (increase or decrease) of the Bay West and Hastings proposals.

The likelihood and scale of the risk of harm for each identified potential impact pathway was assessed. This involved rating the likelihood of the impact occurring (using the scale in Table 1) and an assessment of the consequence of this harm.

From the consequence and likelihood levels assigned to the cause-and-effect pathway, the risk matrix shown in Table 2 was used to determine the overall risk rating for each potential impact pathway identified.

Consequence criteria range on a scale of magnitude from 'insignificant' to 'severe'. Magnitude is a function of the size of the impact, the spatial area affected and the ability to recover from impact.

Consequence criteria descriptions indicating a minimal impact over a local area and with a recovery time within the range of normal variability were considered to be at the insignificant end of the scale. Conversely, severe consequence criteria describe scenarios involving a very high magnitude event.

Consequence criteria are set out in Table 3.

Table 1 Likelihood rating scale

Rating	Description
Almost Certain	The event is expected to occur in most circumstances and there is a history of regular occurrence
Likely	The event will probably occur in most circumstances and there is a history of frequent occurrence
Unlikely	The event and its impact could occur but is not expected. There is some history of occurrence
Very Unlikely	Not expected but there is a slight possibility that it may occur at some time
Rare	The event is highly unlikely, but it may occur in exceptional circumstances and may not cause an impact

Table 2 Risk matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Low	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Unlikely	Negligible	Low	Medium	High	High
Very Unlikely	Negligible	Low	Medium	Medium	High
Rare	Negligible	Negligible	Low	Medium	Medium

Table 3 Consequence criteria

Consequence level		Insignificant	Minor	Moderate	Major	Severe
Environment						
Ecological values	Ecosystem function (need to consider resilience and resistance)	Within natural variability. Interactions may have changed but unlikely to be detectable.	Changes to ecosystem components without major change in function. < 1 year recovery	Changes to ecosystem components with a minor change in function. 1-3 years recovery	Changes to ecosystem components with a major change in function. 4-10 years recovery	Long term and possibly irreversible damage to one or more ecosystem functions. Recovery, if at all, greater than 10 years
Wetland significance, intertidal seagrass, subtidal seagrass. intertidal benthic infauna, subtidal benthic infauna, subtidal epifauna, saltmarsh, mangroves	Habitat, communities and / or assemblages	Alteration or disturbance to habitat within natural variability. Less than 5% of the area of habitat affected or removed	5-10% of the area of habitat affected in a major way or removed. Recovery in less than 1 year (relative to component seasonality) following completion of Project construction	10 to 30% of the area of habitat affected in a major way or removed. Recovery in 1 to 3 years following completion of Project construction	30 to 70% of the area of habitat affected in a major way or removed. Recovery in 4 to 10 years following completion of Project construction	Greater than 70% of the area of habitat affected in a major way or removed. Recovery if at all, greater than 10 years following completion of Project construction
Waterbirds, migratory birds, shorebirds, terrestrial flora, terrestrial fauna	Species and / or groups of species (including protected species)	Alteration or disturbance to habitat, species or population within natural variability. No measurable impacts to population	Habitat damaged to the extent that will species/population is likely to decline in the short-term. Recovery in less than 1 year (relative to component seasonality) following completion of Project construction	Habitat damaged to the extent that will species/population is likely to decline in the medium-term. Recovery in 1 to 3 years following completion of Project construction	Habitat damaged to the extent that the species/population is likely to decline. Recovery in 4 to 10 years following completion of Project construction	Habitat damaged to the extent that the species/population will decline. Recovery if at all, greater than 10 years following completion of Project construction
Social						
Community assets	Impact on residential attractiveness	No impact in area that alters perception as a high amenity place to live. Region still seen as attractive place to live	Short term (<1 year) localised damage to the area that reduce perception as a high amenity place to live. Region not locally seen as attractive place to live. Recovery <1 year	Regional damage to area that reduces perception as a high amenity place to live. Region not widely seen as attractive place to live. Recovery 1-3 years	Community perception that the area is significantly damaged. Wider area loses appeal as residential area. Recovery 4-10 years	Community perception that the area has experienced major damage as a residential location and is a place to be avoided. Recovery, if at all, >10 years
Recreation - general	Impact on recreational users (land, coastal and marine)	No measurable impacts on recreation (compatibility, suitability and accessibility) -no lasting effects	Suitability of local areas for recreational activities temporarily affected (e.g. restricted access) Recovery in <1 year	Reduction in the environmental quality of the local area in which recreation occurs. Recovery in 1 to 3 years	Access to areas recreational activities permanently reduced. Recovery in 4-10 years, if at all	Areas of recreational activities permanently incompatible with Port related activities and land use. Recovery, if at all, >10 years
Recreation - fishing	Impact on recreational fishing	No measurable interruptions in recreational use	Restriction on whole or parts of communities to pursue fishing when visiting the area during construction period. Recovery in <1 year	Short term modifications to the area available for fishing and/or the environment that affects the recreational fishery - catch rate; types of species; condition of individuals - during and post construction period. Recovery in 1 to 3 years	Long term modifications to the area available for fishing and/or the environment that affects the recreational fishery - catch rate; types of species; condition of individuals - Recovery in 4-10 years, if at all	Permanent restrictions in access to preferred fishing areas - coastal and marine. Recovery, if at all, >10 years
Amenity - sensory/perception	Impacts related to amenity	No community perception of measurable impacts in area that alter perception as a high amenity place to live. Region still seen as attractive place to live	Community perception of localised damage to the area that reduce perception as a high amenity place to live. Region not locally seen as attractive place to live. Recovery in <1 year	Community perception of regional damage to area that reduce perception as a high amenity place to live. Region not widely seen as attractive place to live. Recovery in 1 to 3 years	Community perception that the area is significantly damaged. Wider area loses appeal as residential area. Recovery in 4-10 years, if at all	Community perception that the area has experienced major damage as a residential location and is a place to be avoided. Recovery, if at all, >10 years
Tourism	Impacts related to tourism at Phillip Island	No measurable decrease in tourist/visitor numbers and their activities on Phillip Island	Short term (<1 year) impacts to penguin habitat and therefore reduced tourism numbers for a short term	Short term impacts to penguin habitat and amenity impacts of construction activities resulting in reduced tourists/visitors. Recovery in 1 to 3 years	Long term modifications to the environment that affect the penguin habitat and long term amenity impacts resulting in reduced visitor numbers	No visitors/tourists to Phillip Island and complete loss of tourism industry on the island

Consequence level		Insignificant	Minor	Moderate	Major	Severe
Heritage						
Aboriginal Cultural Heritage	Impacts on registered and unregistered Aboriginal cultural heritage places during port construction and operation	No impact to registered and unregistered Aboriginal cultural heritage places during port construction and operation	Destruction of common occurrence place containing a small number (e.g. 0-10 artefacts) or limited range of cultural materials with no evident stratification. Place destroyed or in a deteriorated condition with a high degree of disturbance; some cultural materials remaining	Destruction of occasional occurrence place containing: (a) a larger number, but limited range of cultural materials: and/or (b) some intact stratified deposit remains. Site in a fair to good condition, but with some disturbance. Occasional occurrence	Destruction of rare occurrence place (e.g. burned mounds) containing: (a) a large number and diverse range of cultural materials; and/or (b) largely intact stratified deposit; and/or (c) surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were laid down. Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down	Destruction of place containing human remains
Historic Cultural Heritage	Impacts on registered and unregistered historic cultural heritage places during port construction and operation	No impact to registered and unregistered historic cultural heritage places during port construction and operation	Disturbance to a locally significant heritage feature or site (HO or DSE local listing). Complete removal of heritage site of local significance (HO)	Disturbance of a historical heritage inventory site (HI)	Disturbance/complete removal of multiple VHI or HO sites	Disturbance or complete removal of a heritage site of State (VHR) or National significance

Appendix C – Desktop Review of Landscape and Visual Amenity

This document provides a high level analysis of the key issues which relate to landscape and visual amenity surrounding the Bay West and Hastings proposed port development sites. Its purpose is to inform the site selection process by comparing the relative level of risk to landscape and visual amenity between Bay West and Hastings.

The basis for comparison is by way of identifying potential visually sensitive receivers (VSRs) in the vicinity of each site and assessing (at desktop level) the relative level of risk to each. VSRs are locations which may be visually affected by the project. The results do not by any means represent a detailed assessment of landscape and visual impact at specific locations. A site visit and other investigations that are normally part of such an assessment have not been undertaken. It is a basis for comparison only.

This review is organised under the following headings:

- Methodology statement
- Limitations of the study
- Desktop analysis and literature review results
- Summary of findings

Methodology statement

The methodology adopted for this study utilises a desktop analysis of each proposed port site using Google Maps and Google Street View, followed by a literature review of available information relating to landscape and visual amenity associated with that site.

The available literature was found to be of varying levels of detail, with a wide range in focus and purpose and not necessarily specific to landscape and visual. They were also produced by different authors with different professional backgrounds and approaches. In the majority of cases, relevant information relating to landscape and visual was not found.

Analysis using Google Maps and Google Street View serves the purpose of providing a common basis for analysis between the two site locations, with the results of the literature review serving as verification. This brings benefits of filling gaps in literary information as well as a checking mechanism that is independent from the varying authorship and consistency and reliability of literary information.

Desktop analysis

The desktop analysis steps through a series of potential VSRs identified from Google Maps with a description and location of each. GIS was used for location and distance information as well as to query underlying land use and other relevant geographic data. A summary also provided in turn. Each VSR is rated for risk to landscape and visual amenity under the following criteria:

- **Proximity.** The distance of a VSR from the project has a substantial influence on the apparent size and visual influence of the project. The following categories have been indicatively applied:
 - **High.** Where the project would be a highly dominant element in the view. (0 to 2 km for the port development and 0 to 1 km for the road and rail development)
 - **Medium.** Where the project would be a moderately dominant element in the view. (2.1 to 5 km for the port development and 1.1 to 2 km for the road and rail development)

- **Low.** Where the project would be more difficult to discern as it is the far distance. (5.1 to indicatively 10 km for the port development and 2.1 to indicatively 5 km for the road and rail development)
- **Landscape Sensitivity.** This criterion refers to the degree of visual modification of a landscape and its sensitivity to further visual modifications. The following categories have been indicatively applied:
 - High. Relatively unmodified, naturalistic landscapes of high visual amenity
 - Medium. Moderately disturbed landscapes of a semi-naturalistic quality
 - Low. Highly modified, disturbed and or degraded landscapes with low visual amenity
- **Visual Exposure.** The likely visibility of the project, both as a function of the relative number of people who are expected to visit the location as well as the clarity of views toward the project. The following categories have been indicatively applied:
 - **High.** Public areas which have a high degree of visitation and clear views toward the project that are not constrained by intervening vegetation, terrain and buildings
 - **Medium.** Moderately frequented areas with views toward the project that are partially inhibited by vegetation, terrain and buildings
 - **Low.** Infrequently visited locations or locations that do not permit clear views toward the project due to intervening vegetation, terrain and buildings

An overall rating is provided which approximates the representation of risk to visual impact given the individual ratings and any other location specific characteristics. Supporting comments are also provided.

Literature review

The results of the literature review for each site, where literature exists, have been tabulated and a summary is provided at the end of the review. The literature review follows the same focus as the desktop analysis with an emphasis on identifying and assessing VSRs. Only documents with relevant content have been listed. The results are generally based on studying the contents page, a brief overview of the document and a search for the key words: 'landscape', 'visual' and 'amenity', with more careful examination where relevant information is found.

Limitations of the study

The following limitations apply to this study:

- The desktop analyses rely primarily on Google Maps and Google Street View images which may be a number of years old. Site conditions may have changed since then
- VSRs are defined as general areas or linear features (such as roads) on the landscape. It is beyond the scope of this study to analyse specific point locations via site visit and photography. Conditions may vary depending on a particular location within each VSR
- The distance zones provided under the 'proximity' criterion are indicative only and serve as a means of drawing comparisons between the two proposed project sites. It is beyond the scope of this study to undertake a detailed analysis of the likely visual prominence of the project from specific distances. Distances given relate to the port development unless stated otherwise
- Impacts to open water locations and those aboard recreational water craft has not been considered in a detailed manner owing to limits in available information. General information only is provided

- This comparative study is primarily based on the port and rail terminal components of the project as the major visually significant elements. Specific consideration has not been given to precise shipping movements, dredging and construction as visual impacts from these would generally be common to both sites

Desktop analysis and literature review results

Bay West

The desktop analysis for Bay West is presented in the following table and summarised below.

Risk to visual impact is likely to be highest along the coastline in the vicinity of Werribee South Foreshore Reserve and any locations directly adjacent to the port development or nearby vicinity such as Wyndham Harbour and publicly accessible areas of the Western Treatment Plant. Management of visual impact would pose a challenge in these areas as the project would be visible within close range and directly within line of sight of the ocean, thereby significantly diminishing the level of visual amenity. Any mitigation measures designed to filter views of the proposed port would also filter views of Port Phillip Bay.

In areas further north and further south along the coast, mitigation through vegetative screening may pose less of a challenge depending on the specific site conditions. It may be possible to control views of the port development whilst maintaining views of the water.

In areas inland, mitigation of visual impact of the rail terminal(s) may pose less of a challenge given that linear bands of vegetation are a common feature of the rural landscape and views from roads are often constrained by vegetation. Views of the port from inland locations are less likely owing to intervening vegetation, terrain, buildings and structures.

Risk to visual impact from locations further away such as Portarlington, Werribee, Point Cook and You Yangs is relatively low owing to the mitigating effects of distance.

Hastings

The desktop analysis for Hastings is presented in the following table and summarised below.

The areas which are most likely to be visually impacted are along coastal and elevated locations within French Island National Park and presumably the open water areas immediately adjacent to the project. The level of visual impact is likely to be moderate from French Island however, as a result of the mitigating effect of distance (this would need to be confirmed via a site visit or more detailed analysis).

Locations in the vicinity of Hastings and associated coastal parks and reserves may offer views toward the project, however the project may be partially concealed by the intervening headland and its associated vegetation. Bulk storage tanks associated with the industrial area along Bayview Road can be seen from certain locations along the coast in the vicinity of Hastings and they are partially concealed from view. The addition of the port to the north of the bulk storage tanks may not represent a substantial visual modification to the view which has already been modified to an extent.

Mitigation of visual impact from these locations may be achieved by vegetation and or earth mounding to further conceal the project. As the project would be co-located amongst other prominent structures associated with the industrial area, the change in the visual baseline is less as compared with locating a new industrial facility in a location where no structures exist of a comparable form and scale.

Views of the project from areas to the north and west of the site are constrained by limited physical access and existing roadside vegetation. Visual impact is likely to be low from the major arterial roads and town centres owing to intervening vegetation, terrain, buildings and structures.

A literature review was carried out. The report by GHD and AECOM (2013) provided a strong correlation to the desktop analysis in the VSRs that have been identified. There is also a strong correlation in the feasibility of mitigation of impacts, for example the provision of landscape buffers to the western edge of the proposed port facility to filter views from the vicinity of Hastings.

VSRs that were generally not identified in the desktop analysis but were identified from the literature review include Bembridge Golf Course, Bunguyan Reserve, Tyabb Central Reserve, Gordon Rolfe Reserve, Western Port Harbour Caravan and the numerous jetties that are located along the coastline as listed below. The impact from these specific locations are not likely to be different from the VSRs identified in the desktop analysis as they occur within close range of the VSRs that have been assessed. The likely level of impact on these and many of the locations mentioned in the literature however is either not clear or the basis for determination of impacts is unclear.

Other VSRs mentioned in the literature include higher elevation areas on Mornington Peninsula such as Mount Martha and Arthurs Seat. These are virtually beyond visual range however and need not be considered.

Desktop analysis – Bay West

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from proposed port	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
BW01	Portarlington Seaside Resort / Bellarine Bayside Holiday Park	Caravan park	Coastal campground and caravan park.	SW	10 km	Low	Recreation reserve with relatively clear ocean views.	High	Potentially high visitation during peak periods. Uninhibited views to project.	High	Low	Project potentially viewable on the horizon line but would be difficult to discern owing to distance away.	Google Earth, 2016
BW02	Portarlington Pier and foreshore reserve	Recreation reserve	Flat open grassed area adjacent to working pier.	SW	10 km	Low	Recreation reserve with relatively clear ocean views.	High	Potentially high visitation during peak periods. Uninhibited views to project.	High	Low	Project potentially viewable on the horizon line but would be difficult to discern owing to distance away.	Google Earth, 2016
BW03	Portarlington Township	Township	Coastal township with ocean views as a strong feature.	SW	10 km	Low	Views toward the ocean are partially inhibited by trees, buildings and infrastructure.	Medium	Potentially high visitation during peak periods. Limited views to project.	High	Low	Project potentially viewable on the horizon line but would be difficult to discern owing to distance away.	Google Earth, 2016
BW04	The Esplanade, Portarlington	Public Road	Scenic coastal drive to the east of Portarlington township.	SW	10 km	Low	Scenic coastal drive with unimpeded views of the ocean along most of its length.	High	Potentially high visitation during peak periods. Uninhibited views to project.	High	Low	Project potentially viewable on the horizon line but would be difficult to discern owing to distance away.	Google Earth, 2016
BW05	Beach Road, Werribee South	Public Road	Scenic coastal drive to the south east of Werribee.	N	1.3 km	High	Scenic coastal drive with mostly unimpeded views of the ocean except where constrained by roadside vegetation	High	Potentially high visitation during peak periods. Uninhibited views to project.	High	High	The project would be viewed within close proximity against the backdrop of the ocean. Management of impacts would be challenging.	Google Earth, 2016
BW06	Werribee South Foreshore Reserve	Recreation reserve	Flat open grassed area adjacent to Beach Road, Werribee South	N	1.3 km	High	Recreation reserve with relatively clear ocean views.	High	Potentially high visitation during peak periods. Uninhibited views to project.	High	High	The project would be viewed within close proximity against the backdrop of the ocean. Management of impacts would be challenging.	Google Earth, 2016
BW07	Werribee South Caravan Park	Caravan park	Coastal campground and caravan park.	N	1.3 km	High	Caravan park is located to the landward side of Beach Road and does not have direct access to the beach.	Low	Potentially high visitation during peak periods. Views are partially obscured by vegetation.	Medium	Medium	The caravan park is not directly adjacent to the beach front and views of the ocean from within the park are partially obscured.	Google Earth, 2016
BW08	Grahams Wetland Reserve	Recreation reserve	Flat open wetland area adjacent to Beach Road, Werribee South	N	1.3 km	High	Moderate quality flat area with clear views toward the project and prominent geological formations such as the You Yangs in the far distance.	Medium	It is not known whether there are walking trails which allow public access.	Medium	Medium	The presence of walking trails is not known so it is uncertain whether visual changes to the landscape would have a significant impact.	Google Earth, 2016
BW09	Werribee South Boat Ramp	Feature of Interest	Boat ramp adjacent to Beach Road, Werribee South	N	1.3 km	High	Appears to be primarily utilitarian, for launching of boats with little evidence of land based recreational activities.	Medium	Potentially high visitation during peak periods however brief in duration.	Medium	Medium	Views available toward the project however visual receiver is primarily utilitarian.	Google Earth, 2016
BW10	Wyndham Harbour	Residential	Seaside residential area with clear views toward the project.	NE	2.5 km	Medium	Currently medium sensitivity but potentially high as more residential development is implemented.	High	Potentially high as more residential development is implemented. Uninhibited views to project.	High	High	The project would be viewed within close proximity against the backdrop of the ocean. Management of impacts may be possible if carefully planned.	Google Earth, 2016

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from proposed port	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
BW11	Campbells Cove Road, Werribee South	Public Road	Scenic coastal drive to the east of Werribee township.	NE	4.6 km	Medium	There are a number of residential 'shacks' located along this road which have water frontages and clear views toward the ocean.	High	Moderate level of visual exposure as compared to the more populated areas. Views to project partially constrained.	Medium	Medium	Medium owing to distance away and the project would be visible adjacent to the coastline as opposed to directly out on the ocean.	Google Earth, 2016
BW12	Point Cook Coastal Park	Recreation reserve	Coastal recreation reserve to the east of Werribee.	NE	10 km	Low	Coastal recreation reserve with ocean views as a strong feature.	High	Potentially high visitation during peak periods, relatively uninhibited views toward the project.	High	Low	Although the landscape has a high sensitivity and a high degree of visual exposure, the project would be in the far distance and would be difficult to discern against the coastline.	Google Earth, 2016
BW13	Point Cook Marine Sanctuary	Recreation reserve	Coastal recreation reserve to the east of Werribee.	NE	11 km	Low	Coastal recreation reserve with ocean views as a strong feature.	High	Potentially high visitation during peak periods, relatively uninhibited views toward the project.	High	Low	Although the landscape has a high sensitivity and a high degree of visual exposure, the project would be in the far distance and would be difficult to discern against the coastline.	Google Earth, 2016
BW14	Point Wilson and The Spit Wildlife Reserve	Recreation reserve	Coastal recreation reserve to the east of Avalon airport.	SW	8 km	Low	Coastal recreation reserve with ocean views as a strong feature.	High	Moderate level of visual exposure as compared to the more frequented areas.	Medium	Low	Although the landscape has a high sensitivity and a high degree of visual exposure, the project would be in the moderately far distance.	Google Earth, 2016
BW15	Werribee Park Golf Club	Recreation reserve	Golf Course to the south of Werribee.	N	5.5 km (from port)	Low	Generally sensitive to visual changes however views and activities tend to be focussed inward rather than out across the landscape.	Medium	Potentially high visitation during peak periods, however appears to be surrounded by vegetation which would inhibit views out across the landscape.	Medium	Medium	Mitigation of visual impacts is possible through the use of screening vegetation to inhibit views toward the project.	Google Earth, 2016
BW16	Werribee Open Range Zoo and Werribee River Park	Recreation reserve	Zoological park and recreation reserve to the south of Werribee.	N	6.5 km (from port)	Low	Generally sensitive to visual changes however views and activities tend to be focussed inward rather than out across the landscape.	Medium	Potentially high visitation during peak periods, however is surrounded by vegetation which would inhibit views out across the landscape.	Medium	Low	Distance away is likely to result in minimal visibility of the project. Mitigation of visual impacts is possible through the use of screening vegetation to inhibit views toward the project.	Google Earth, 2016
BW17	Princes Freeway	Public Road	Major arterial road connecting Melbourne to Geelong.	NW	1 km (from rail terminal) 9 km (from port)	High	The landscape within view is primarily comprised of highly modified flat agricultural land.	Low	This road contains high volumes of traffic but the presence of roadside vegetation constrains views across the landscape.	Medium	Medium	The rail terminal may be visible within close range but the presence of roadside vegetation would constrain views toward it. Mitigation planting would assist considerably to filter views of the rail terminal.	Google Earth, 2016

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from proposed port	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
BW18	You Yangs Regional Park	Recreation reserve	Prominent geological formation to the south west of Werribee.	W	12 km (from rail terminal) 22 km (from port)	Low	Views toward the rail terminals are out across a highly modified landscape with many artificial linear elements within the view.	Low	Potentially high visitation during peak periods. Uninhibited views toward the project from the peak.	High	Low	Although there is a high degree of visual exposure at this location, the project would be in the far distance and would be difficult to discern.	Google Earth, 2016
BW19	Werribee Township	Township	Major town centre between Melbourne and Geelong	N	6 km (from rail terminal) 8 km (from port)	Low	Views from townships are generally sensitive to visual changes.	High	Roads within the township generally have high traffic volumes however views out across the landscape are typically constrained by intervening vegetation, buildings and infrastructure.	Medium	Low	Views of the rail terminal from Werribee township are not likely owing to intervening vegetation, buildings and infrastructure.	Google Earth, 2016
Total VSRS = 19		Overall assessment			High	3	Medium	6	Low	10			

Desktop analysis – Hastings

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from project	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
HA01	French Island and French Island National Park	Recreation reserve	Relatively isolated and undeveloped coastal island located in Western Port.	SE	5.2 km	Low	Recreation reserve with relatively clear ocean views. Attractions include camping and nature based activities.	High	Location has a moderate level of visitation as compared with more populated areas. May have views toward the project.	Medium	Medium	Project potentially viewable but would not be a dominant visual element in the view.	Google Earth, 2016
HA02	Tyabb Township	Township	Minor town centre to the north west of project site.	NW	2.4 km (from rail terminal) 3.0 km (from port)	Medium	Views from townships are generally sensitive to visual changes.	High	Although it is a populated town centre there is limited visibility toward the proposed rail terminal and port	Low	Low	Visibility toward the project is limited by intervening vegetation, buildings and structures.	Google Earth, 2016
HA03	Hastings Township	Township	Major coastal town centre to the south west of project site.	SW	2.8 km	Medium	Views from townships are generally sensitive to visual changes. View of coastline is an important feature.	High	Although it is a populated town centre, visibility toward the project is partially constrained by intervening terrain and vegetation.	Medium	Medium	It is a sensitive landscape with however visibility toward the project is partially constrained by intervening terrain and vegetation..	Google Earth, 2016
HA04	Bittern Township	Township	Minor town centre to the south west of project site.	SW	5.6 km	Low	Views from townships are generally sensitive to visual changes.	High	Although it is a populated town centre there is limited visibility toward the proposed rail terminal and port	Low	Low	Visibility toward the project is limited by intervening vegetation, buildings and structures.	Google Earth, 2016

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from project	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
HA05	The Esplanade and Woolleys Road, Crib Point.	Public Road	Coastal drive at the eastern periphery of Crib Point.	SW	4.4 km	Medium	Coastal roads typically have a high sensitivity to visual modifications.	Medium	This road would experience moderate traffic volumes however views toward the ocean are constrained by roadside vegetation.	Low	Low	Visibility toward the project is constrained by intervening vegetation, buildings and structures.	Google Earth, 2016
HA06	Stony Point	Feature of Interest	Site of Stony Point Ferry Terminal and Boat Ramp.	S	7.6 km	Low	The site is modified and has port facilities and supporting infrastructure.	Medium	Views toward the ocean are primarily to the east and south east. Views toward the project are constrained by buildings and vegetation.	Low	Low	The project is unlikely to be a dominant visual element against the backdrop of existing port infrastructure.	Google Earth, 2016
HA07	Western Port Marina and associated amenities	Feature of Interest	Artificial cove for docking of recreational watercraft.	SW	2.2 km	Medium	The marina and associated amenities are primarily for recreational users with ocean views as a key feature.	High	Potentially high visitation during peak periods. View toward project is partially constrained by terrain and vegetation.	Medium	Medium	Management of visual impact is achievable as there is a headland within line of sight to the project on which visual screening may be undertaken.	Google Earth, 2016
HA08	Warringine Park	Recreation reserve	Coastal recreation reserve to the south of Hastings.	SW	3.0 km	Medium	Conservation park containing a number of different viewing experiences with walking tracks and ecotourism as the primary attraction.	High	Moderately high visitation however views toward the project would be partially constrained by terrain and vegetation.	Medium	Medium	Management of visual impact is achievable as there is a headland within line of sight to the project on which visual screening may be undertaken.	Google Earth, 2016
HA09	Fred Smith Reserve	Recreation reserve	Coastal recreation reserve to the east of Hastings.	SW	2.4 km	Medium	Coastal parkland with views east over Western Port as a strong feature. Bulk storage units from the Long Island Point Fractioning Plant can be seen in the far distance.	High	High visitation however views toward the project would be partially constrained by terrain, vegetation and infrastructure.	Medium	Medium	Management of visual impact is achievable as there is a headland within line of sight to the project on which visual screening may be undertaken.	Google Earth, 2016
HA10	Hastings Foreshore Reserve	Recreation reserve	Coastal recreation reserve to the east of Hastings.	SW	2.5 km	Medium	Coastal parkland with views east over Western Port as a strong feature. Bulk storage units from the Long Island Point Fractioning Plant can be seen in the far distance.	High	High visitation however views toward the project would be partially constrained by terrain, vegetation and infrastructure.	Medium	Medium	Management of visual impact is achievable as there is a headland within line of sight to the project on which visual screening may be undertaken.	Google Earth, 2016

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from project	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
HA11	Dandenong-Hastings Road	Public Road	Major arterial road connecting Dandenong to Hastings.	NW	< 500 m (from rail terminal) 2.5 km (from port)	High	The road passes through a highly modified, flat farmland with linear wind breaks and farm buildings and infrastructure as key features.	Low	The road carries relatively high volumes of traffic however the presence of roadside vegetation constrains views across the landscape for significant portions.	Medium	Low	Views toward the port facility are unlikely and mitigation planting would be possible to conceal views of the proposed rail terminal.	Google Earth, 2016
HA12	Tyabb-Tooradin Road	Public Road	Minor arterial road connecting Tyabb and Baxter–Tooradin Road	NE	< 500 m (from rail terminal) 2.5 km (from port)	High	The road passes through a highly modified, flat farmland with linear wind breaks and farm buildings and infrastructure as key features.	Low	The road carries relatively high volumes of traffic however the presence of roadside vegetation constrains views across the landscape for significant portions.	Medium	Low	Views toward the port facility are unlikely and mitigation planting would be possible to conceal views of the proposed rail terminal.	Google Earth, 2016
HA13	Warneet	Township	Minor township to the north of French Island.	NE	6.0 km	Low	Access and views to water and intertidal zone are a strong feature. Boating, fishing and other water based recreational activities are a key feature.	High	Views toward the project are limited by the presence of Quail Island being located within direct line of sight.	Low	Low	Views of the project are unlikely.	Google Earth, 2016
HA14	Western Port Coastal Reserve	Recreation reserve	Recreation reserve located on a section of shoreline directly opposite the proposed port.	NW	500 m	High	The reserve appears to be in a naturalistic state with nature based activities as a primary value.	High	Appears to be mainly comprised of an intertidal saltmarsh with limited access.	Low	Medium	Although the project is within close proximity to a high value landscape, it appears that visitation is limited.	Google Earth 2016, Parks Victoria 2016f
HA15	Yaringa Boat Harbour	Feature of Interest	Harbour for docking of recreational watercraft. Recently approved expansion will provide for a new inland harbour basin, tourist accommodation and conference facilities, and the expansion of the existing marine service industry.	NW	1.5 km	High	Appears to be within a naturalistic setting. Little evidence of landscape modifications beyond the immediate foreground. The Foreground has masts and other infrastructure as a dominant visual element.	Medium	Appears to be primarily used as an access point to the harbour as opposed to a destination in its own right.	Medium	Medium	Mitigation may be possible through establishment of vegetation along the southern flank of the harbour.	Google Earth, 2016
HA16	North Western Port Nature Conservation Reserve and Yaringa Marine National Park	Recreation reserve	Recreation reserve located to the north east of the project	NE	3.0 km	Medium	The reserves appear to be in a naturalistic state with nature based activities as a primary value.	High	Appears to have an intertidal saltmarsh as a dominant feature with limited access.	Low	Medium	The project is within medium proximity to a high value landscape, however it appears that visitation is limited.	Google Earth, 2016

VSR	Potential Visually Sensitive Receiver	Category	Description	Direction from project	Proximity to project (approx.)	Rating	Landscape sensitivity	Rating	Visual exposure	Rating	Overall Rating	Additional supporting comments / management	Information sources
HA17	Bayview Road	Public Road	Minor road servicing a number of industrial facilities and terminating at the coastline.	W	< 500 m	High	Where there are views across the landscape, a number of modifications to the landscape can be seen associated with the industrial facilities as well as farmland.	Low	This minor road carries relatively low numbers of vehicles. The presence of roadside vegetation constrains views across the landscape for significant portions.	Low	Low	Minor service road with limited views toward the coastline.	Google Earth, 2016
HA18	Somerville	Township	Major town centre to the north west of project site.	NW	3.5 km (from rail terminal) 7 km (from port)	Low	Views from townships are generally sensitive to visual changes.	High	Although it is a populated town centre there is limited visibility toward the proposed rail terminal and port	Low	Low	Visibility toward the project is limited by intervening vegetation, buildings and structures.	Google Earth, 2016
HA19	Pearcedale	Township	Minor town centre to the north of project site.	N	1.5 km (from rail terminal) 6 km (from port)	Medium	Views from townships are generally sensitive to visual changes.	High	Although it is a populated town centre there is limited visibility toward the proposed rail terminal and port	Low	Low	Visibility toward the project is limited by intervening vegetation, buildings and structures.	Google Earth, 2016
HA20	Cowes (incorporating foreshore reserve and jetty)	Township and recreation reserve	Coastal township with ocean views and coastal character as a strong feature.	S	15 km	Low	Coastal township with ocean views as a strong feature, incorporating foreshore reserve and jetty which is an important destination for tourism	High	Views from The Esplanade toward the project are partially obscured by roadside vegetation; Views from jetty and foreshore reserve are relatively unimpeded.	Medium	Medium	It is not likely that the project would be a dominant visual element given the mitigating effect of distance. This would however need to be confirmed through a more detailed assessment.	Google Earth, 2016
Total VSRS = 20		Overall assessment			High		Medium	10	Low	10			

Overall summary of findings

Based on the results of this study, the primary points of difference between the Bay West and Hastings sites with respect to landscape and visual amenity are as follows:

Urban development and land use

Bay West

There is evidence to suggest that there would be urban development in the vicinity of Werribee South and Wyndham Harbour that would place residential areas directly along the coastline and within very close proximity to the Bay West port site. This is in addition to the ones that already exist along that stretch of coastline. Werribee has also been identified as a future employment centre which may increase pressure for such development. Perceived incompatibility between existing farmland, existing and proposed residential areas and a large industrial facility may need to be carefully managed.

Hastings

Residential and town centres are generally set back from the coast with intervening terrain and vegetation partially concealing the industrial facilities that are already there. The ecologically sensitive mangrove environment is less suitable for urban development. Risk to visual impact from towns and centres of population is lower for the Hastings site and this is reflected in the desktop analysis.

The port development at Hastings would represent an expansion of an existing industrial area as opposed to a new industrial area set within farmland and residential land uses, as the case would be for the Bay West site. Impacts on surrounding land use and amenity associated with this increase in industrial activities would however still need to be assessed and carefully managed.

Vegetation growth and opportunities for mitigation

Bay West

The coastline adjacent to the Bay West site appears to be more sparsely vegetated than the Hastings site and views across the water are less constrained by vegetation. Trees and shrubs along the coastal edge generally appear windswept and lacking in height, presumably as a result of being located in a more exposed position as compared to Hastings. In addition, given the configuration of the coastline, the flatness of the terrain and the proximity of the proposed site to a number of VSRs, there appears to be less opportunity for effective mitigation strategies.

Hastings

The benefit of the site at Hastings is that it is located adjacent to a headland that may potentially assist to partially conceal it from view from most identified VSRs, in particular the areas around Hastings township. This effect is already observable with respect to the existing industrial facilities along Bayview Road. Existing vegetation appears to be taller and denser as compared to the Bay West site, suggesting that the establishment of mitigation planting may have a similar level of success. In addition, existing roadside vegetation may already filter views toward the project from a number of inland locations.

Landscape quality and recreation

Bay West

The quality of the landscape surrounding the Bay West site appears to be of a lesser value as compared to the Hastings site. For a coastal landscape, it is relatively flat, visually unremarkable and has very little topographic relief. It is also highly modified in some parts, particularly with respect to the Western Treatment Plant, although it is noted that the area is an important resource for bird watching. Notwithstanding the recreation and nature reserves, its attraction as a scenic coastline appears to be less than that of Hastings. This is also reflected in the density of jetties, recreational boat harbours and other associated recreational and social infrastructure found at Hastings.

Hastings

The coastal edge from Hastings to Tooradin is a high quality coastline in terms of coastal vegetation and landforms. It is of high visual integrity and is relatively unaffected by modifications for the majority of its length, apart from a couple of port and industrial facilities. It is an important recreational landscape and seascape which is highly utilised by boaters, fisherman, bird watchers and other eco tourists. French Island is relatively naturalistic and undeveloped and is also an integral part of the receiving landscape within the visual footprint of the project.

The increase in passage of large commercial vessels at the Hastings site may potentially change the character of the area more so than at Bay West, due to the existing commercial and container ship traffic through Port Philip Bay associated with the Port of Melbourne. Hence, the change over existing conditions at Bay West would not be as great. By contrast, Western Port Bay currently has less commercial vessel traffic and is an important location for recreational vessels and tourism. A large-scale increase in commercial vessel activity is therefore likely to have a greater effect on its character. This impact may extend to popular tourism destinations such as Phillip Island, including Cowes and Nobbies.

The visual impact of a bulk vessel may also be greater within a narrower waterway such as Western Port Bay as opposed to a more open waterbody such as Port Phillip Bay.

Conclusion

The following table lists the preferable siting option in terms of the key differentiators outlined (the differentiators are not necessarily equally weighted):

Differentiator	Bay West	Hastings
Risk to VSRs	Less preferable	More preferable
Urban development and land use	Less preferable	More preferable
Opportunities for mitigation	Less preferable	More preferable
Landscape quality	More preferable	Less preferable

Overall, the installation of a port facility at Hastings may have a more marked effect on visual amenity, particularly with reference to open water areas and coastal edges as well as French Island and to a certain extent, Phillip Island. Locating the site at Bay West on the other hand is less likely to be detrimental to visual amenity but it would be more visually exposed, particularly from onshore areas. Mitigation of visual impact would also pose more of a challenge at Bay West.

Appendix D – Noise Review



Memorandum

1 Introduction

GHD has been commissioned to provide high level noise advice regarding the siting of Victoria's second container port facility. The purpose of the study is to review two potential sites, one in Hastings and the other in western Port Phillip (referred to as Bay West), and look at the possible constraints and benefits for each site, with regards to noise impact from the facility on nearby noise sensitive receivers. This advice looks at each sites relative suitability based on potential noise impacts only.

This advice is subject to, and must be read in conjunction with, the limitations and the exclusions, assumptions and qualifications contained throughout this section and in section 2.4 of the main report entitled '*PRELIMINARY DRAFT Infrastructure Victoria Second Container Port Advice: Environment & Social Advice (January 2017)*'.

1. Project description

This section provides a brief description of the two options 1.) Western Port Phillip (referred to as Bay West) and 2.) Hastings, an existing port facility to the north of the township of Hastings.

1.1 Bay West location

Bay West would be generally located on the north-west coastline of Port Phillip Bay between Point Lillias and Point Cook, approximately 25–50 km south-west of Melbourne. For the purposes of this study, it has been assumed that Bay West would be located to the south-west of the Werribee River and to the south-east and adjacent to the Western Treatment Plant operations.

Bay West would be primarily developed in the following areas:

- Marine and dredge material management: Port Phillip as part of the permanent works for Bay West.
- Port landside: South-east of the Western Treatment Plant (including coastal and intertidal areas)
- Transport: A transport corridor comprising a four lane highway between the port and the existing road network at the Princes Freeway and future Outer Metropolitan Ring (OMR) Road, and a twin rail track between the port and the existing Principal Rail Freight Network to the north for rail. A future rail terminal servicing the port is proposed to be located to the west of the OMR.

In addition, project infrastructure may be located in other areas. For example, aids to navigation may be required in various locations, and land and marine areas may be required for the disposal of dredged material.



Memorandum

1.2 Hastings (Western Port) location

Hastings would be generally located at the existing Western Port, to the north and north east of the township of Hastings and approximately 60 km south-east of Melbourne. The port would be primarily developed in the following areas:

- Marine: Western Port, largely within the existing declared Port of Hastings Port Waters
- Port landside: Long Island Point, generally within the area covered by the Special Use Zone Schedule 1 (including coastal and intertidal areas)
- Transport: A transport corridor between the port and the existing Principal Rail Freight Network at Lyndhurst for rail and the existing road network at Cranbourne-Frankston Road
- Dredge material management: to be confirmed, but may include:
 - Dredge sand disposal offshore (Bass Strait)
 - Dredge local clay / silts and dispose of offshore in an unconfined dredged material ground (DMG)
 - Place dredged sand to create land

In addition, project infrastructure may be located in other areas. For example, aids to navigation may be required in various locations and land and marine areas may be required for the disposal of dredged material.



Memorandum

1.3 Assumptions and exclusions

The following assumptions and exclusions have been considered in writing this report:

- Vibration related impacts from the proposed port facility construction and subsequent operation has not been included in this report.
- Blasting (if any) related impact from the proposed port facility construction has not been included in this report.
- Preliminary project locations and study areas, as well as the nearby noise sensitive receivers are assumed to be accurate.
- Related aerial photography from online-based literature are accurate.
- In the absence of detailed project information, at this stage it is assumed that:
 - For the Bay West option: the proposed road and rail corridors would be constructed as new arterial road and rail infrastructure.
 - For the Hastings Port option: the proposed road corridor would utilise the existing Mckirdys Road and Dandenong-Hastings Road/Western Port Highway and the proposed rail corridor would be constructed as new rail infrastructure
- Connection between the project rail infrastructure and any existing rail network has not been confirmed at the time of writing this report and hence assessment of existing rail noise or any potential cumulative rail noise impact on existing rail infrastructure has been excluded from this study.
- The study does not take into consideration potential cumulative noise impacts from nearby industries as well as from the project site, as this would depend on project specific construction and operational schedules.
- In the absence of detailed project footprint, the proposed road and rail corridors in this study have been considered up to the extent of the available project figures or maps shown in this report.
- In the absence of detailed construction and operational schedules, it is assumed that all construction and operational equipment and activities will be used 24/7.
- Underwater noise impact from the port construction and operational activities have not been included in this report. Underwater noise and vibration impacts may potentially occur during construction activities such as underwater piling and dredging and operational activities such as ship movements. However, such matters would require a separate acoustic assessment and investigation and is not the focus of this assessment.



Memorandum

2. Legislation, policy and guidelines

2.1 Legislation

2.1.1 *Environment Protection Act 1970*

The *Environment Protection Act 1970* (EP Act) defines the environment as:

“...the physical factors of the surroundings of human beings including the land, water, atmosphere, climate, sound, odours, tastes, the biological factors of animals and plants and the social factor of aesthetics.”

The *EP Act 1970* sets out a structure for the protection of the Victorian environment. Part 3, Section 16, of the *EP Act 1970* gives authority to the Governor in Council to create State Environment Protection Policies (SEPP's) to be *“observed with respect to the environment generally or in any portion or portions of Victoria or with respect to any element or elements or segment or segments of the environment”*. Part 8, section 46, of the Act requires *‘the emission of noise shall at all times be in accordance with State Environment Protection Policy specifying acceptable conditions for emitting noise...’*

2.1.2 *Public Health and Wellbeing Act 2008*

The Public Health and Wellbeing Act 2008 seeks to promote and protect the public health in Victoria with the object of *‘promoting conditions in which persons can be healthy’*. The Act makes it an offence for a person to:

- a) *‘Cause a nuisance; or*
- b) *Knowingly allow or suffer a nuisance to exist on, or emanate from, any land owned or occupied by that person’*

Where person is defined as including *‘a body or association (corporate or unincorporate) and a partnership and, in Division 2 of Part 7, also includes a firm’*;

2.1.3 *Transport Integration Act (2010)*

The *Transport Integration Act 2010* sets out a vision, objectives and principles for transport in Victoria. It makes clear that the transport system needs to be integrated and sustainable - in economic terms, in environmental terms and in social terms. It requires all Victorian transport agencies to work together towards the common goal of an integrated and sustainable transport system.

Part 2 of the Act includes a vision statement, objectives, principles and a statement of policy and principles. Part 2, Division 2, Section 10 of the Act outlines the transport objectives with regard to environmental sustainability, these are:

“The transport system should actively contribute to environmental sustainability by:

- (a) *protecting, conserving and improving the natural environment;*
- (b) *avoiding, minimising and offsetting harm to the local and global environment, including through transport-related emissions and pollutants and the loss of biodiversity;*



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- (c) *promoting forms of transport and the use of forms of energy and transport technologies which have the least impact on the natural environment;*
- (d) *improving the environmental performance of all forms of transport and the forms of energy used in transport.”*

2.2 Construction noise

In Victoria the construction noise criteria stipulated under the Victorian EPA Publication 1254 - *Noise Control Guidelines* (EPA Victoria, 2008) are

applicable to the Project. A summary of the EPA Publication 1254 guidelines are provided in the following sub headings and Table 1.

Normal working hours

EPA Publication 1254 guideline places no restriction on construction noise during *normal working hours*. However, it requires that noise management and mitigation measures be implemented to minimise construction noise impact.

The period for *normal working hours* is defined as the following:

- 7.00 am to 6.00 pm, Monday to Friday
- 7.00 am to 1.00 pm, Saturday

Weekend/evening working hours

Noise levels at any residential premises should not exceed background noise by:

- 10 dB(A) or more for **up to** 18 months after project commencement and 5 dB(A) or more **after** 18 months.

during the hours of:

- 6.00 pm to 10.00 pm, Monday to Friday
- 1.00 pm – 10.00 pm, Saturday
- 7.00 am – 10.00 pm, Sunday and public holidays

Night period

Noise should be inaudible within a habitable room of any residential premises during the hours of:

- 10.00 pm to 7.00 am, Monday to Sunday

In addition to EPA Publication 1254, further guidance regarding general mitigation measures is provided in EPA *Environmental Guidelines for Major Construction Sites* (Publication 480) (EPA Publication 480, 1996).



Memorandum

Table 1 Construction work hours

Time Period	Work Hours	Noise Limit
Normal Working Hours	7 am to 6 pm Monday to Friday 7 am to 1 pm Saturdays	There are no limiting noise criteria for the daytime period, however there is still a duty to minimise noise impacts on the surrounding environment.
Weekend Period and Evening Period	6 pm to 10 pm Monday to Friday 1 pm to 10 pm Saturdays 7 am to 10 pm Sundays and Public Holidays	Noise level at any residential premises not to exceed background noise by: 10 dB(A) or more for up to 18 months after Project construction commencement; and 5 dB(A) or more after 18 months.
Night Period	10 pm to 7 am Monday to Sunday	Noise inaudible within a habitable room of any residential premises

2.3 Operational noise

2.3.1 Industrial noise

The Victorian Government provides guidance on operational noise levels and limits for industry in Victoria. There is one policy and one guideline which apply to metropolitan and regional Victoria respectively, namely:

- *State Environment Protection Policy – Control of Noise from Commerce, Industry and Trade No. N-1 (SEPP N-1)* (Victorian Government, 1989)
- *Noise from Industry in Regional Victoria (NIRV): Recommended maximum noise levels from commerce, industry and trade premises in regional Victoria* (EPA publication 1411) (EPA Victoria, 2011)

The SEPP N-1 policy is a mandatory industrial noise policy applicable where sensitive receivers are located within a major urban area. A major urban area (MUA) is defined as:

- The part of Melbourne that is within the SEPP N-1 boundary (refer to Figure 1), or
- The part of Melbourne that extends beyond the SEPP N-1 boundary, but is within the Melbourne Urban Growth Boundary (UGB) (refer to Figure 2), or
- Land within the Urban Centre Boundary of an urban centre with a population greater than 7,000 people.


The NIRV guideline is applicable for sensitive receivers located in a *Rural Area*, with potential impact from industrial noise. A rural area is defined as:

- Land that is not within a major urban area, including land in cities or towns with a population below 7000 and rural locations outside a major urban area.

SEPP N-1 Area

The SEPP N-1 boundary does not follow the council boundary line in some cases.
For a more detailed map please see the EPA website.

Legend

 SEPP N1 Boundary

 Planning UGB

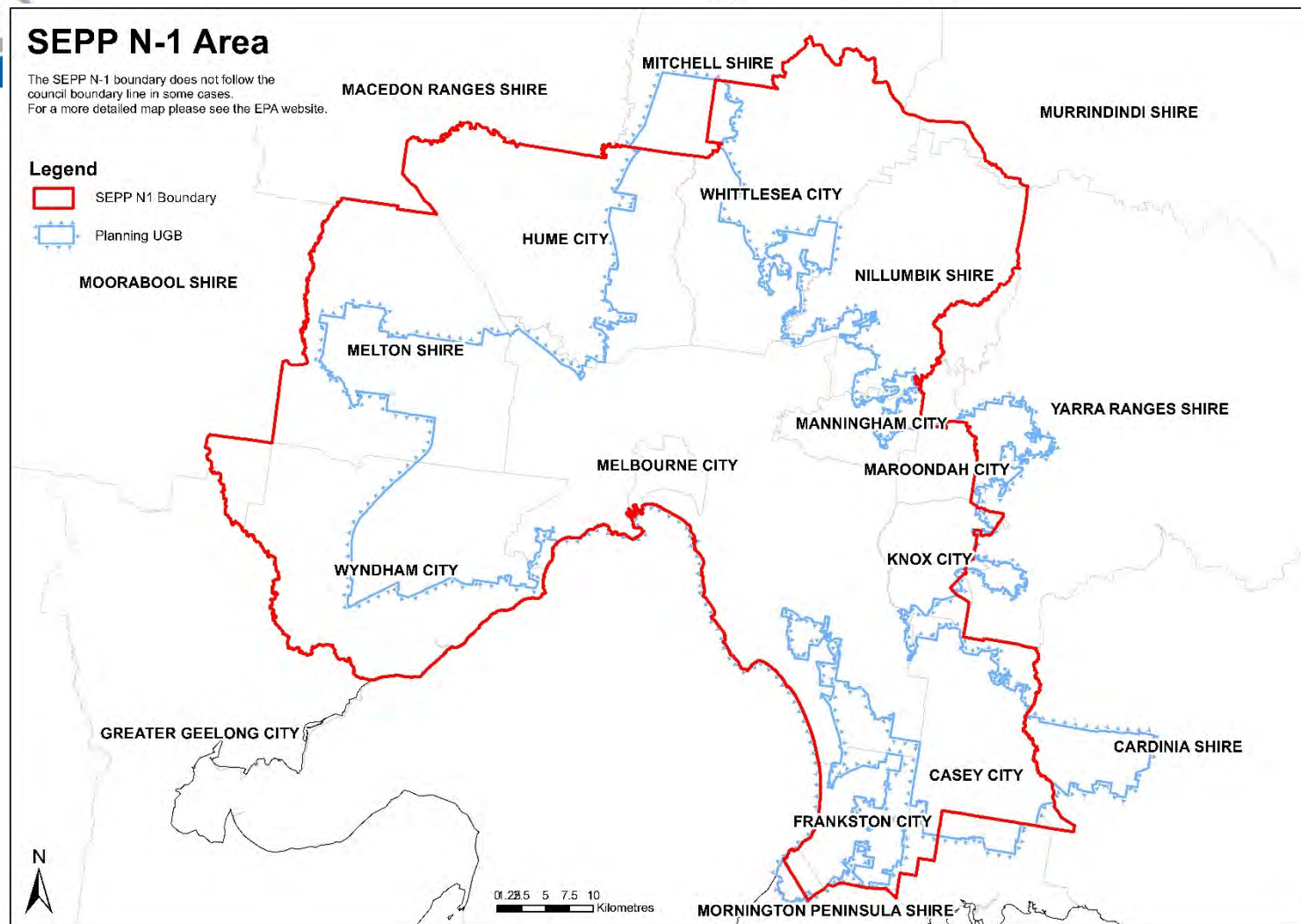


Figure 1 Areas covered by SEPP N-1 and planning Urban Growth Boundary (EPA Victoria, 2011)



Memorandum

State Environment Protection Policy No. N-1 (SEPP N-1)

Noise from industry in metropolitan Melbourne is managed under the SEPP N-1 which manages noise impacts on residential and other noise sensitive uses from industry and should be applied when siting or designing new or expanded industry or plant and when government authorities assess applications for industry.

SEPP N-1 sets the maximum noise level allowed in a noise sensitive area from commercial and industrial premises depending on the time of day (day, evening, night period), land use zone, and existing background noise levels.

The first step in determining the noise limit is to calculate the prescribed upper noise limit (zoning level or zoning limit) for the particular land use as opposed to noise sensitive areas (i.e. residential zoned land around the site). Once the zoning level has been assessed, the background level is assessed to identify whether the background levels are neutral (i.e. not significantly higher than the zoning level) or otherwise.

If the background level is neutral, the noise limit adopted is the zoning level. If, on the other hand, the background level is found to be significantly lower or higher than the zoning level then the noise limit is reduced or increased respectively.

Noise from Industry in Regional Victoria (NIRV)

Noise from industry in regional Victoria^[1] is managed using the NIRV guideline. The NIRV manages noise impacts on residential and other noise sensitive uses and should be applied when siting or designing new or expanded industry or plant and when government authorities assess applications for industry in regional Victoria.

The NIRV sets maximum noise levels allowed in a noise sensitive area from commercial and industrial premises depending on the time of day (day, evening, night period) and land use zoning. The first step is to assess the land use zoning of the receiving zone^[2] and the noise generating zone^[3]. Once the receiving and generating zones are known, then using Table 1 in the NIRV guideline, the zone noise levels are developed for each time period. The noise levels are then adjusted depending on the receiver to source distance to obtain the maximum allowable noise levels.

In a situation where background noise levels may be higher than usual (noise affected area) for a rural area due to traffic noise or coastal noise, background noise monitoring may be undertaken and an adjustment of the zone noise levels made accordingly to develop the maximum allowable noise levels.

2.3.2 Road noise

The proposed project's road corridor may have a potential traffic noise impact to the surrounding sensitive receivers. There is currently no State Environment Protection Policy (SEPP) for road traffic

¹ Part of Victoria that extends beyond the SEPP N-1 area and Planning Urban Growth Boundary and is not classified as Major Urban Area (EPA Victoria, 2011).

² 'Receiving zone' is the land-use zone in which the noise-sensitive area is located.

³ 'Generating zone' is the land-use zone in which the noise emitter is located.



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noise along State-controlled roads within Victoria. Instead, traffic noise along these roads is controlled using the VicRoads – Traffic Noise Reduction Policy 2005 (TNRP). The policy seeks to regulate noise levels on existing roads and also where a new alignment is built.

SEPP N-1 applies to commercial vehicles on commercial or industrial premises, such as deliveries and waste collection. However, it does not apply to noise from vehicles on public roads (EPA Victoria, 2014).

The TNRP seeks to regulate noise levels on existing roads and also where a new alignment is built and seeks to limit noise at the following sites:

- Category A – For residential dwellings, aged person homes, hospitals, motels, caravan parks and other buildings of a residential nature; and
- Category B – For schools, kindergartens, libraries and other noise sensitive community buildings.

Application of the VicRoads policy occurs under the following circumstances:

- A new road alignment project, where a new freeway or arterial road is constructed in a new or an existing reservation (i.e. a greenfield site where no road has previously existed).
- A road upgrade project involving widening or duplication of an existing freeway or arterial road, a duplication that would trigger the policy is defined as two or more lanes are added to a freeway or arterial road. A road widening/upgrade that would trigger the policy would occur when buildings previously protected from traffic noise are exposed to increased road traffic noise by the removal of buildings or other significant structures required for the road upgrade works.

The Project Objective Noise Level (PONL) is the noise level objective for a specific road project that is required to be achieved for at least ten years after completion of the project. The PONL for Category A and B buildings is governed by the following conditions:

- If the existing traffic noise level is less than 50 dB(A), consideration would be given to limit the noise level increase to 12 dB(A);
- If the existing noise level is between 50 and 63 dB(A) the objective is to limit the noise level to:
 - Category A: noise level objective of 63 dB(A) L_{A10} (18 hour)
 - Category B: noise level objective of 63 dB(A) L_{A10} (12 hour)or
 - The level that would have prevailed if the road upgrades had not occurred, whichever is the greater.
- If the existing noise level is above 63 dB(A) the objective is to:
 - Limit the increase in noise level by no more than 2 dB(A) above the existing measured noise levelor
 - Limit the increase to the predicted level that would have prevailed if the road upgrades had not occurred, whichever is the greater.



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Further guidance can be found in the NSW *Road Noise Policy* (March 2011) for cases where additional traffic noise is generated on an existing unaltered road network as a result of the project. The NSW Road Noise Policy states:

“For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.

2.3.3 Rail noise

Currently, there are no statutory requirements in Victoria that prescribe specific numerical noise criteria for freight rail traffic. However, in April 2013, the Victorian Government – Department of Economic Development, Jobs, Transport and Resources (DEDJTR) released a *Passenger Rail Infrastructure Noise Policy* (PRINP) (Victorian Government, 2013). New freight rail or tram infrastructure are not included as part of the policy, however the policy states that:

“when assessing whether the investigation thresholds are exceeded, transport bodies and planning authorities should consider noise from current rail activity and forecast future trends in rail activity. Noise from both passenger rail and freight rail activity should be considered where the corridor is or is likely to also be used for freight rail operations.”

The policy provides rail noise impact guidance via investigation thresholds. The investigation thresholds are not the limit on allowable noise emissions, but rather a guide for transport bodies and planning authorities when assessing rail noise impacts at nearby communities. Under this policy, if noise is expected to exceed investigation thresholds, transport and planning authorities are required to apply a set of principles to determine the appropriate mix of actions to manage noise.

The investigation thresholds apply under the following three circumstances:

1. New passenger rail infrastructure or changing land use near a planned passenger rail corridor
2. Change in land use near an existing rail corridor
3. Redevelopment of existing passenger rail infrastructure

In considering the proposed rail infrastructure at both port locations, based on the current preliminary project information, it is understood that the rail infrastructure would be regarded as new rail infrastructure. The relevant investigation thresholds are shown in Table 2.



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Table 2 Investigation thresholds for new passenger rail infrastructure or a change in land use near a planned rail corridor

Time	Type of receiver	Investigation threshold(s) - dB(A) external
Day (6.00 am – 10.00 pm)	Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks Noise sensitive community buildings including schools, kindergartens, libraries	60 L_{Aeq} or 80 L_{Amax}
Night (10.00 pm – 6.00 am)	Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks	55 L_{Aeq} or 80 L_{Amax}

2.3.4 Summary application of noise policy and guidelines on project operation

This section provides a summary of the applicable policies and guidelines for project operations. Table 3 summarises the list of potential project operational noise sources and the adopted relevant policy and guidelines.

Table 3 Preliminary application of project noise policy and guidelines

Operational noise sources	Applicable or suggested policy and guideline
Port operational noise located within Project site boundary	SEPP N-1 or NIRV guideline
Commercial vehicle noise on Project site boundary or premises	SEPP N-1 or NIRV guideline
Traffic noise from new road or road upgrades (freeway or arterial road) outside of the Project site boundary as a result of the Project	VicRoads Traffic Noise Reduction Policy 2005
Additional traffic noise on existing road as a result of the Project	NSW Road Noise Policy 2011 (adopted as guideline)
Rail noise associated with the rail corridor located outside the Project site boundary	PRNIP 2013 (adopted as guideline)
Rail terminal located outside the Project site boundary	SEPP N-1 or NIRV guideline



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3. Typical noise sources

3.1 Port construction noise sources

The ports may be constructed in stages as demand grows and available container handling capacity in Victoria is taken up. Construction of each stage may comprise numerous months of dredging works, terminal and land based construction. The duration of construction will be better defined as the preliminary design is developed. Dredging and container terminal construction works could also be undertaken in parallel.

It is anticipated that staging may include:

- Hastings to be constructed in three dredge/reclaim phases
- Bay West to be constructed as one substantial capital dredge phase and phased development of quay line and top side areas

Construction activities and structural works for both port location options would be likely to include:

- Marine
 - Dredging
 - Dredged material management
 - Reclamation and revetment systems (erosion control)
- Port landside
 - Piling
 - Concrete works
 - Excavation and earthworks
 - Capping and stabilising
 - Materials storage and fabrication
 - Structural rehabilitation works
- Transport
 - Concrete works
 - Excavation and earthworks
 - Bridges and underpasses
 - Pavement, highway and rail construction
 - Building construction, infrastructure and landscaping

Project specific construction equipment are not known at this stage of the Project. However, typical construction equipment used for port facilities that have the potential to be major noise sources, are listed (but not limited to) in Table 4, along with the calculated sound propagation at incremental distances from the noise sources.



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In the absence of equipment specific sound level data, representative equipment noise data was sourced from Australian Standard AS 2436:2010 – *Guide to noise and vibration control on construction, demolition and maintenance sites* and GHD's internal database.

Table 4 Predicted construction plant item noise levels, dB(A)

Plant item	Sound power level dB(A) L _w	Distance of source to receptor (m)						
		50	100	250	500	750	1000	1500
Excavator	107	65	59	51	45	41	39	35
Front end loader	113	71	65	57	51	47	45	41
Crane	104	62	56	48	42	38	36	32
Compactor	113	71	65	57	51	47	45	41
Dump truck	117	75	69	61	55	51	49	45
Grader	110	68	62	54	48	44	42	38
Dozer	108	66	60	52	46	42	40	36
Rock breaker	118	76	70	62	56	52	50	46
Piling (impact sheet)*	137 L _{max}	95	89	81	75	71	69	65
Piling (vibratory sheet)	116	74	68	60	54	50	48	44
Piling (resonator sheet)								
Piling (vibratory)	125	83	77	69	63	59	57	53
Piling (rotary bored)	111	69	63	55	49	45	43	39
Crane (mobile)	104	62	56	48	42	38	36	32
Concrete pump truck	108	66	60	52	46	42	40	36
Generator (diesel)	99	57	51	43	37	33	31	27
Drill rig	86	44	38	30	24	20	18	14
Barge	104	62	56	48	42	38	36	32
Tug for barge	110	68	62	54	48	44	42	38
Dredging vessel (equivalent to sea freight vessel)	113	71	65	57	51	47	45	41
Diesel water pump (in the case of tailing suction dredging)	117	75	69	61	55	51	49	45
Hydraulic excavator (in the case of backhoe dredging)	109	67	61	53	47	43	41	37

* Note The Sound Power for impact sheet piling is provided as a L_{max} value due to the impulsive nature of the noise source.



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3.2 Port operational noise sources

The operational activities for both location options are expected to include:

- Marine
 - A fleet of tugs to guide ships to and from the berth at the container terminal
 - Aids to navigation in the channel and anchorage area to guide vessel movements
 - Vessels may be, on occasion, waiting in the anchorage area until they can access the port if directed by the Harbour Master
 - Maintenance dredging, when required, to maintain the channel depth for safe navigation
- Port landside
 - Ships berthing and unberthing from the berth structure and ship to shore container cranes unloading and loading container vessels. Aids to navigation to guide vessels to the berth structure.
 - Containers being transferred from the berth to a stack in the container yard or intermodal area – the approach to moving containers would be defined by the future operator of the port and could be manual or automated.
 - Warehouses and distribution centres within the port precinct receiving containers for storage, filling, emptying or transporting by the road or rail transport infrastructure.
 - Operations occurring 24 hours per day, seven days per week.
- Transport
 - Road and rail transport of containers occurring 24 hours per day, seven days per week.

Project specific operational equipment are not known at this stage. However, typical operational equipment used for port facilities that have the potential to be major noise sources, are listed (but not limited to) in Table 5, along with calculated sound propagation at incremental distances from the noise sources. The noise data in Table 5 has been sourced from the GHD database, Australian Standards, and past project experience.

Table 5 Predicted operational plant item noise levels, dB(A)

Plant item	Sound Power Level dB(A) L _w	Distance of source to receptor (m)							
		50	100	250	500	750	1000	1500	2000
Rail mounted container handling	110	68	62	54	48	44	42	38	36
Container forklift/ reach stacker	111	69	63	55	49	45	43	39	37



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Plant item	Sound Power Level dB(A) L _w	Distance of source to receptor (m)							
		50	100	250	500	750	1000	1500	2000
Ship loading/unloading (ship loader)	109	67	61	53	47	43	41	37	35
Portainer cranes	115	73	67	59	53	49	47	43	41
Straddle carriers/RTG cranes	110	68	62	54	48	44	42	38	36
Train (passby)	110	68	62	54	48	44	42	38	36
Train (idle)	97	55	49	41	35	31	29	25	23
Ship generator	115	73	67	59	53	49	47	43	41
Truck B-double	111	69	63	55	49	45	43	39	37
Maintenance dredging	110	68	62	54	48	44	42	38	36
Tug (navigation vessel)	110	68	62	54	48	44	42	38	36



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4. Bay West location option

4.1 Existing environment

Existing noise sources within the vicinity of Bay West were determined based on aerial photography and may include the following:

- Melbourne Water – Western Treatment Plant
- Princess Freeway
- Local traffic noise
- Local neighbourhood activities
- Natural noise from wind through trees, in particular due to the coastal location, surf noise from the bay and night time insect noise

Note that the above existing noise sources are indicative only and should be confirmed via on-site inspection and measurements.

4.1.1 Identified nearby sensitive receivers

The Bay West site is largely located in Public Use Zone – Service and Utility (PUZ1). The proximity of the nearest existing noise sensitive receivers' surrounding the site were identified based on a desktop aerial photography assessment. The following sensitive receivers have been preliminarily identified:

- A group of residential dwellings located within the vicinity of Beach Road, located approximately 1 km to the east of the proposed Bay West rail and road corridors and approximately 2 km to the north of the proposed reclaimed container terminal.
- Several individual sensitive receivers along the road and rail corridors, such as those along Morrisons Lane, Station Street and Manor Road, which are located approximately 1 to 1.5 km from the corridors.

It is acknowledged that there are likely to be more sensitive receivers located nearby the port site and the associated road and rail corridors, however for guidance purposes of this preliminary study, only those potentially situated closest to the Bay West footprint were identified. Note that the identified sensitive receivers in this report were based on aerial photography and have not been verified by on-site site inspection. The actual nearby sensitive receivers would require confirmation via on-site inspection if this site were to be proposed for development.

Nearby sensitive receivers are shown in Figure 8 of GHD's report for Infrastructure Victoria, Second Container Port Advice - Environment & Social Advice (February 2017).



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4.1.2 Adopted indicative local background noise levels

Acoustic environments are often characterised by the background ($L_{A_{bg,T}}$) sound pressure level, defined to be equivalent to the A-weighted sound pressure level exceeded for more than 90% of a stated measurement period, T. ($L_{A90,T}$).

In the absence of on-site background noise monitoring due to the preliminary nature of this assessment, the estimated average background noise levels stipulated in Appendix A of Australian Standard AS 1055.2:1997 *Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 1997) have been used in this assessment.

Due to the suburban nature of nearby sensitive receivers, Category R2 of the 'Noise Area Categories' in 'Appendix A' of AS 1055.2:1997, has been deemed appropriate for this assessment to provide preliminary guidance on the likely background noise environment. Category R2 is defined as 'areas with low density transportation'.

Adopting this approach, the background noise levels from 'Appendix A' of AS 1055.2 are shown in Table 6.

Table 6 AS 1055.2:1997 Background Noise Levels (dB(A) L_{90})

Time period	Background noise levels dB(A) L_{90}
Daytime	45
Evening time	40
Night time	35

Note that the above background noise levels are indicative only. It is recommended that noise monitoring be undertaken at a later stage to verify the background noise levels for the purpose of establishing the construction and operational noise criteria.

4.2 SEPP N-1 and UGB boundaries

Both the port facility and the nearby sensitive receivers are located within the SEPP N-1 boundary (refer to Figure 2). Therefore, noise criteria for nearby sensitive receivers to the Project are developed following the procedures in SEPP N-1.





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4.3 Preliminary project noise criteria

This section details the preliminary construction and operational noise assessment criteria for Bay West.

4.3.1 Construction noise

Based on the adopted background noise levels shown in Table 6, the following construction noise criteria have been determined for residential sensitive receivers potentially affected by Bay West.

Table 7 Construction Noise Criteria for Bay West

Receiver	Days	Time period	Adopted background noise levels dB(A) L ₉₀	Construction noise criteria dB(A) L _{eq}
Nearby noise sensitive receivers	Monday to Friday	<i>Normal working hours: Daytime</i> (7.00 am – 6.00 pm)	45	No applicable noise criteria
		Evening time (6.00 pm – 10.00 pm)	40	50 (up to the first 18 months) 45 (after 18 months)
	Saturday	<i>Normal working hours Daytime</i> (7.00 am – 1.00 pm)	45	No applicable noise criteria
		Evening time (1.00 pm – 10.00 pm)	40	50 (up to the first 18 months) 45 (after 18 months)
	Sunday and public holidays	Evening time (7.00 am – 10.00 pm)	40	50 (up to the first 18 months) 45 (after 18 months)
	All days	Night time (10.00 pm – 7.00 am)	35	Inaudible inside a habitable room of any residential premises

The following should be noted:

- EPA Victoria (via Publication 1254) places no restriction on construction noise during normal working hours, however management mitigation measures, if required, should be considered to minimise the noise impact to prevent a nuisance under the *Environment Protection Act 1970* and *Public Health and Wellbeing Act 2008*.
- EPA Victoria (via Publications 480 and 1996) suggests noise should not be above background levels inside any adjacent residence between 10.00 pm and 7.00 am.



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4.3.2 Operational noise

Industrial noise

As previously discussed, the Bay West site and the identified sensitive receivers are both located within the *SEPP N-1 boundary* (refer to Section 4.1.1). Hence, industrial (operational) noise emanating from the Bay West site boundary as well as the proposed future rail terminal (excluding rail line) should be assessed in accordance with the SEPP N-1 policy.

As per Schedules B1 to B3 of the SEPP N-1, the project noise limits for the day, evening, and night periods must be determined in accordance with Schedule B2 of the SEPP N-1.

Based on the calculated total zoning areas, the calculated influencing factor (IF), the calculated zoning levels, the adopted background noise levels in Section 4.1.2, and the applicable noise limits are presented in Table 8.

Table 8 Derived indicative SEPP N-1 industrial noise criteria for Bay West

Nearby sensitive receivers location	Period	Influencing factor	Zoning levels dB(A)	Adopted background noise levels dB(A) L ₉₀	Background classification	SEPP N-1 noise limits dB(A)L _{eq(30mins)}
Residential premises situated along Beach Road	Day	0.002	50	45	High Background	51
	Evening		44	40	Neutral	44
	Night		39	35	Neutral	39
Morrisons Lane, Little River receiver	Day	0.21	54	45	Neutral	54
	Evening		48	40	Neutral	48
	Night		43	35	Neutral	43
Station Street, Little River receiver	Day	0.14	52	45	Neutral	52
	Evening		46	40	Neutral	46
	Night		41	35	Neutral	41
Manor Road, Little River receiver	Day	0	50	45	Neutral	50
	Evening		44	40	Neutral	44
	Night		39	35	Neutral	39

As the facility operates continuously, 24 hours per day, the night-time limits are the most stringent criteria and would need to be met at the identified sensitive receivers. Once the night time criteria



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have been met and if operational logistics remain similar throughout the day, it generally follows that the day and evening time levels will also be met.

Road noise

As previously discussed in Section 2.3.2, any commercial vehicle noise within the Bay West site boundary would need to comply with the SEPP N-1 noise criteria. For traffic noise associated with the operation of a new road portion or road upgrade (freeway or arterial road) as a result of the Project, but outside of the Project site boundary would need to be assessed against the VicRoads noise reduction policy (TNRP). Any additional traffic noise within existing road corridors, due to Bay West traffic movements should be limited to not more than 2 dB above the existing traffic noise levels as recommended in the NSW *Road Noise Policy* (March 2011).

Rail noise

As previously discussed in Section 2.3.3, rail noise along a new rail corridor is recommended to satisfy the following:

- Daytime: External rail noise level of not more than 60 dB(A) L_{Aeq} or 80 dB(A) L_{max}
- Night-time: External rail noise level of not more than 55 dB(A) L_{Aeq} or 80 dB(A) L_{max}

4.4 Discussion of potential construction noise impact

Based on the predicted construction equipment noise levels at incremental distances provided in Table 4, the identified nearby sensitive receiver locations, and the preliminary construction noise criteria, the following preliminary findings are summarised:

- EPA Publication 1254 does not impose noise goals for construction works during the day period however contractors should aim to minimise the noise impact to prevent a nuisance under the *Environment Protection Act 1970* and Public Health and Wellbeing Act 2008. The predicted construction noise levels at the nearby receivers situated along Beach Road may have the potential to exceed the existing daytime background noise levels. However, in general, daytime construction noise impact is not uncommon with construction activities and is addressed by the implementation of construction noise management measures to be incorporated into an Environmental Management Plan (EMP), including the selection of low noise equipment and maintenance of all noise suppression devices such as silencers, enclosures, etc. Preliminary noise mitigation and management measures have been provided in Section 6.
- Construction activities undertaken during the evening period (if any) may have the potential to exceed the prescribed criteria, in particular during the post 18-month construction period. Equipment that has been predicted to have the potential for exceedances includes; dump truck, rock breaker, piling (impact) and dredging activity, with the highest exceedances of up to 24 dB(A) at the Beach Road receivers, due to impact sheet piling activity.
- Based on the adopted night background noise levels, it is anticipated that night construction works (if applicable) from some equipment would be audible^[4] at the nearby sensitive receivers. This

⁴ This is assuming that external construction noise level is equal to background noise level.



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construction equipment is anticipated to be loader, compactor, truck, grader, rock breaker, piling and dredging. The highest night construction noise impact is anticipated to be from piling activity (if conducted during night).

- Based on the proposed Project Bay West location, there are no other known noise sensitive receivers located within the immediate vicinity of the Project Bay West site or footprint, other than those located along Beach Road being the closest at 1 km away.

4.5 Discussion of potential operational noise impact

Assuming that the port operation will run 24/7, hence the most stringent operational noise criteria would be during the night period of 39 dB(A) L_{Aeq} at the Beach Road and Manor Road sensitive receivers.

Port terminal operation may include equipment such as cranes, ship generator, and train pass-bys that are predicted to exceed the night time noise criteria at Beach Road receivers (at about 2 km away) by up to 2-3 dB(A).

The operation of the future rail terminal may have the potential to exceed the night noise criteria at nearby receivers along Manor Road. However, the exact operating equipment within the facility has yet to be confirmed.

The rail and road noise impacts at nearby receivers will be subject to traffic schedules which would be developed as part of design and hence are not available at this stage of the project.

As previously mentioned, there are no other known noise sensitive receivers located within the immediate vicinity of the Project Bay West site, other than those located along Beach Road being the closest at 1 km away. All identified individual receivers are located at least 1 km away from the project footprint.



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5. Hastings port location option

5.1 Existing environment

Existing noise sources within the vicinity of the surrounding the Hastings Project site were determined based on aerial photography. Potential existing noise sources may include the following:

- Surrounding heavy industrial premises, such as Western Port Bluescope Steel Corporation and Long Island Fractionation Plant
- Arterial roads such as Dandenong-Hastings Road, Western Port Highway and Tyabb-Tooradin Road
- Local traffic noise.
- Local industrial noise
- Local neighbourhood activities
- Natural noise from wind through trees and night-time insects noise

5.1.1 Identified nearby receivers

The Hastings site is largely located in land designated Special Use Zone – Schedule 1 (SUZ1). The proximity of the nearest existing noise sensitive receivers surrounding the proposed Hastings site were identified based on a desktop aerial photography assessment. The following nearby sensitive receivers have been identified:

- Several individual sensitive receivers near the port area, such as those along Beach Drive and Cemetery Road, located about 0.8 to 1.3 km to the west of the Project site.
- Several individual sensitive receivers located immediately adjacent to the proposed road and rail corridors:
 - Approximately 12 individual residential dwellings along McKirdys Road
 - Approximately 25 individual residential dwellings along Dandenong-Hastings Road

It is acknowledged that there may be further sensitive receivers nearby the project site and the associated road and rail corridors, however only those potentially situated closest to the Project footprint were identified at this stage of the Project. Note that sensitive receivers identified in this report were based on aerial photography and have not been verified by on-site inspections. Sensitive receiver locations and numbers should be confirmed using site inspections at a later stage once the Project has been further refined.

Nearby sensitive receivers are shown in Figure 11 of GHD's report for Infrastructure Victoria, Second Container Port Advice - Environment & Social Advice (February 2017).



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5.1.2 Adopted indicative local background noise levels

Acoustic environments are often characterised by the background ($L_{A_{bg,T}}$) sound pressure level, defined to be equivalent to the A-weighted sound pressure level exceeded for more than 90% of a stated measurement period, T. ($L_{A90,T}$).

In the absence of on-site background noise monitoring due to the preliminary nature of this assessment, the estimated average background noise levels stipulated in 'Appendix A' of Australian Standard AS 1055.2:1997 *Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 1997) have been utilised in this assessment.

Due to the suburban nature of nearby sensitive receivers, Category R2 of the 'Noise Area Categories' in 'Appendix A' of AS 1055.2:1997, has been deemed appropriate for this assessment to provide preliminary guidance on the likely background noise environment for the inland sensitive receiver locations. Category R2 is defined as 'areas with low density transportation'.

Due to the close proximity of the existing port industry to the Project, Category R3 of the 'Noise Area Categories' in 'Appendix A' of AS 1055.2:1997, has been deemed appropriate for this assessment to provide preliminary guidance on the likely background noise environment for the surrounding sensitive receivers located closer to the shore. Category R3 is defined as 'areas with medium density transportation or some commerce or industry'.

Adopting this approach, the background noise levels from 'Appendix A' of AS 1055.2 are estimated to be as shown in Table 9.

Table 9 AS 1055.2:1997 Background Noise Levels (dB(A)L₉₀)

Nearby sensitive receiver areas	Time period	Background noise levels dB(A)L ₉₀
Receivers within the vicinity of the existing port industrial premises	Daytime	50
	Evening time	45
	Night time	40
Receivers located inland, close to the proposed project road and rail corridors	Daytime	45
	Evening time	40
	Night time	35

Note that the above background noise levels are indicative only. It is recommended that noise monitoring be undertaken at a later stage to verify the background noise levels for the purpose of establishing the construction noise criteria.

5.2 SEPP N-1 and UGB boundaries

Both the port facility and the nearby sensitive receivers are mainly located under the SUZ1, which are outside the SEPP N-1 boundary, but are still within the Melbourne Urban Growth Boundary (UGB). Some portions of the proposed project's future rail terminal, the



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associated road and rail corridors, and the nearby sensitive receivers are located under land designated Green Wedge Zone – Schedule 2 (GWZ2), and are outside the UGB.

Therefore, noise criteria for nearby sensitive receivers to the Project that are within the UGB are developed following the procedures in SEPP N-1, and therefore project operations that occur outside the UGB would also be assessed against the SEPP N-1 due to the project footprint being located partially within the UGB as follows:

EPA Publication 1411 (2008), Part 3, states:

"Where either the noise emitter or the noise receiver are within a major urban area, the major urban area approach applies."



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The following should be noted:

- EPA Victoria (via Publication 1254) places no restriction on construction noise during normal working hours, however management mitigation measures, if required, should be considered to minimise the noise impact to prevent a nuisance under the *Environment Protection Act 1970* and *Public Health and Wellbeing Act 2008*.
- EPA Victoria (via Publications 480 and 1996) suggests noise should not be above background levels inside any adjacent residence between 10.00 pm and 7.00 am.

5.3.2 Operational noise

Industrial noise

As previously discussed in Section 5.2, the Hastings site and associated sensitive receivers are largely located within the UGB. Therefore, industrial (operational) noise emanating from within the site boundary as well as the proposed future rail terminal (excluding rail line) should be assessed in accordance with the SEPP N-1 policy.

As per Schedules B1 to B3 of the SEPP N-1, the project noise limits for the day, evening, and night periods must be determined in accordance with Schedule B2 of the SEPP N-1.

Based on the calculated total zoning areas, the calculated influencing factor (IF), the calculated zoning levels and the adopted background noise levels in Section 5.1.2, the applicable noise limits at the potential nearest receivers are presented in Table 11.

Table 11 Derived indicative SEPP N-1 industrial noise criteria for the Hastings

Nearby sensitive receivers location	Period	Influencing factor	Zoning levels dB(A)	Adopted background noise levels dB(A) L ₉₀	Background classification	SEPP N-1 noise limits dB(A)L _{eq(30mins)}
Beach Drive, Hastings receiver	Day	0.75	63	50	Low background	61
	Evening		57	45	Low background	54
	Night		52	40	Low background	49
Cemetery Road, Hastings receiver	Day	0.97	68	50	Low background	64
	Evening		61	45	Low background	56



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Nearby sensitive receivers location	Period	Influencing factor	Zoning levels dB(A)	Adopted background noise levels dB(A) L_{90}	Background classification	SEPP N-1 noise limits dB(A) $L_{eq(30mins)}$
	Night		56	40	Low background	51
Eramosa Road E, Somerville receiver	Day	0.05	51	45	Neutral	51
	Evening		45	40	Neutral	45
	Night		40	35	Neutral	40

As the facility operates continuously, 24 hours per day, the night-time limits are the most stringent criteria and would need to be met at the identified sensitive receivers. Once the night time criteria have been met and if operational logistics remain similar throughout the day, it generally follows that the day and evening time levels will also be met.

Road noise

As previously discussed in Section 2.3.2, any commercial vehicle noise within the Hastings Project site boundary would need to comply with the SEPP N-1 noise criteria. For traffic noise associated with the operation of a new road portion or road upgrade (freeway or arterial road) as a result of the Project, but outside of the Project site boundary would need to be assessed against the VicRoads noise reduction policy (TNRP). Any additional traffic noise within existing road corridors, due to Bay West traffic movements should be limited to not more than 2 dB above the existing traffic noise levels as recommended in the NSW *Road Noise Policy* (March 2011).

Rail noise

As previously discussed in Section 2.3.3, rail noise along a new rail corridor is recommended to satisfy the following:

- Daytime: External rail noise level of not more than 60 dB(A) L_{Aeq} or 80 dB(A) L_{Amax}
- Night-time: External rail noise level of not more than 55 dB(A) L_{Aeq} or 80 dB(A) L_{Amax}

5.4 Discussion of potential construction noise impact

Based on the predicted individual construction equipment noise impact levels at incremental distances, the identified nearby sensitive receiver locations and the preliminary construction noise criteria, the following preliminary findings are summarised:

- The EPA Publication 1254 does not impose noise goals for construction works during the daytime period however contractors should aim to minimise the noise impact to prevent a nuisance under the *Environment Protection Act 1970* and *Public Health and Wellbeing Act 2008*. The predicted construction noise levels may impact the nearby receivers situated within the vicinity of Cemetery



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Road as well as those immediately adjacent to McKirdys Road and Dandenong-Hastings Road. However, in general, daytime construction noise impact is not uncommon with construction activities and is addressed by the implementation of construction noise management measures to be incorporated into an Environmental Management Plan (EMP), including the selection of low noise equipment and maintenance of all noise suppression devices such as silencers, enclosures, etc. Preliminary noise mitigation and management measures have been provided in Section 6.

- Construction activities undertaken during the evening and night time period (if any) may have the potential to exceed the prescribed criteria. Those sensitive receivers that are located within the immediate vicinity of the proposed road and rail corridors, may be heavily impacted by construction activities for completion of this infrastructure.
- Based on the proposed Hastings Project location, it is identified that there are a considerable number of individual sensitive receivers located within the immediate vicinity of the Project footprint, along McKirdys Road and Dandenong-Hastings Road.

5.5 Discussion of potential operational noise impact

Assuming that the port operation will run 24/7, the most stringent operational noise criteria would be 40 dB(A) L_{Aeq} during the night-time period within the locality of the Eramosa Rd E sensitive receiver, located nearby the proposed road and rail corridors and the future rail terminal.

Sensitive receivers nearby the port container terminal are identified to be located along Cemetery Road, 800 m away from the Project site. Port terminal operation may include equipment such as cranes, ship generator, trucks, reach stackers, etc. that are predicted to exceed the night time noise criteria at Cemetery Road receivers by up to 9 dB(A).

The operation of the future rail terminal may have the potential to exceed the night noise criteria at the nearby receivers. However, the exact operating equipment within the facility have yet to be confirmed.

The rail and road noise impacts at nearby receivers will be subject to the traffic schedules which would be developed as part of design and hence are not available at this stage of the project.

As previously mentioned, it is identified that there are a considerable number of individual sensitive receivers located within the immediate vicinity of the Project footprint, along McKirdys Road and Dandenong-Hastings Road.



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6. Noise mitigation and management measures

6.1 Noise

Generic good practice noise mitigation measures applicable to the Project should be considered in the detailed design phase. The following noise mitigation measures have been provided for consideration and information purposes only.

- The site configuration should be designed to minimise noise impacts to the surrounding community. The following should be considered in the design:
 - Where possible, the site configuration should be laid-out in such a way that the primary noise sources are at a maximum distance from residences, with solid structures (sheds, containers, etc.) placed between residences and noise sources (and as close to the noise sources as is practical).
 - Any fixed mechanical plant and equipment with the potential to be a major noise source, should be located as far away from sensitive receivers as possible and behind any site structures.
- Where possible and practical, significant construction noise generating activities should be limited to operate during the *normal working hours*.
- Where appropriate, selection of quiet equipment/systems early in the design phase should be considered as part of the Project's construction and operational noise management measures to minimise noise emissions. This would assist in minimising the off-site impact, as well as help in preserving the hearing quality and reducing the health and safety risk for on-site employees.
- Machines found to produce excessive noise compared to normal industry expectations are recommended to be removed from the site or stood down until repairs or modifications can be made.
- Engines and exhaust are typically the dominant noise sources on mobile plant such as excavators, trucks, etc. Residential grade mufflers fitted on this mobile plant would minimise noise emissions from these sources (refer to Table 12 for typical noise reduction estimation for engine silencing).
- Where practical, machines should be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods.
- Where practical to reduce the annoyance commonly associated with reversing alarms, it is recommended on-site mobile equipment is equipped with broadband reversing alarms (audible movement alarms). Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised.
- All equipment should be maintained in good repair (kept properly serviced) in order to reduce noise emission.
- Truck drivers should be kept informed of designated vehicle routes, parking locations, operating hours and on-site speed limits.



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- Optimise the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours.

Table 12 presents noise control methods, practical examples and expected noise reductions according to Australian Standard AS 2436 – 2010 *Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites* (Standards Australia, 2010).

Table 12 Relative effectiveness of various forms of noise control dB(A)

Noise control method	Practical examples	Typical noise reduction dB(A)	Maximum noise reduction dB(A)
Screening	Acoustic barriers such as earth mounds, temporary or permanent noise barriers	7 to 10	15
Acoustic enclosures	Engine casing lagged with acoustic insulation and plywood	15 to 30	50
Engine silencing	Residential class mufflers	5 to 10	20
Substitution by alternative process	Use of electric motors in preference to diesel or petrol	15 to 25	60

6.1.1 Work ethics

All site workers should be sensitised to the potential for noise impacts on local residents and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities. This would generally include:

- Avoiding the use of loud radios
- Avoid shouting and slamming doors
- Where practical, machines should be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods
- Keep truck drivers informed of designated vehicle routes, parking locations and delivery hours
- Minimise reversing
- Avoid dropping materials from height
- All engine covers should be kept closed while equipment is operating

6.1.2 Community consultation and monitoring

Consultation and cooperation between the site and nearby sensitive receptors to the site would assist in minimising uncertainty, misconceptions and adverse reactions to noise and vibration. EPA Publication 1254 (2008) provides guidance on the community consultation processes.

Upon receipt of a noise complaint, monitoring should be undertaken and reported on as soon as possible. If exceedances are detected, the situation should be reviewed in order to identify means to attempt to reduce the impact to acceptable levels.



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7. Conclusion

This report has been prepared to undertake high level noise advice regarding the siting of the Victoria's second container port facility. The two potential sites are located in Hastings and Bay West Victoria.

The following conclusions have been made based on the results and findings of this noise study and the assumptions presented throughout this report.

Noise criteria

Noise criteria applicable at the nearby sensitive receptors were derived based on the relevant policies and guidelines and a summary of noise criteria applicable to the Project are summarised in Section 2.3.4.

Construction noise is assessed against the Victorian EPA Publication 1254 - *Noise Control Guidelines* 2008.

Industrial noise is assessed against the *State Environment Protection Policy – Control of Noise from Commerce, Industry and Trade No. N-1* (SEPP N-1) and *Noise from Industry in Regional Victoria* (NIRV).

The Project's road and rail infrastructure noise are assessed against the VicRoads Traffic Noise Reduction Policy 2005, with the aid of NSW *Road Noise Policy* (March 2011), and Victorian Government *Passenger Rail Infrastructure Noise Policy* (PRINP) (2013) respectively.

Preliminary identification of Sensitive receptors

In relation to the Bay West option, a group of residential dwellings has been identified, which are located within the vicinity of Beach Road, approximately 1 km to the east of the Project's rail and road corridors and approximately 2 km to the north of the Project's reclaimed container terminal. Several individual sensitive receivers are located along the road and rail corridors.

In relation to the Hastings option, an isolated number of individual sensitive receivers have been identified, located within the vicinity of Cemetery Road, approximately 0.8 km to the west of the proposed container terminal. A considerable number of individual sensitive receivers are located within the immediate vicinity of the proposed road and rail corridors as well as the future rail terminal.

Typical noise sources

Project specific construction equipment was not known at the time of writing this report. However, typical construction equipment used for port facilities that have the potential to be major noise sources, would include; excavators, loaders, cranes, compactors, trucks, graders, dozers, rock breakers, piling equipment, concrete trucks, generators, drill rigs, barges, tugs and dredgers. The highest noise emission sources are anticipated to be from piling and rock breaking activities.

Similarly, project specific operational equipment is not known at the time of this report. However, typical operational equipment used for port facilities that have the potential to be major noise sources, would include; container handlers, reach stackers, ship loaders, portainer cranes, train, truck, tug and maintenance dredging. The highest noise emission source is anticipated to be sourced from ship generators, cranes and trucks.



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Construction noise impact study

The EPA Publication 1254 does not impose noise goals for construction works during the daytime period. The predicted construction noise levels may have the potential to impact nearby identified sensitive receivers. However, in general, daytime construction noise impacts are not uncommon with construction activities and are best addressed by the implementation of construction noise management measures to be incorporated in an Environmental Management Plan (EMP). These could include selection of low noise equipment and maintenance of all noise suppression devices such as silencers, enclosures, etc. Preliminary noise mitigation and management measures have been provided in Section 6.

In relation to the Bay West option, construction activities undertaken during the evening period (if any) may have the potential to exceed the prescribed criteria, in particular during the post 18-month construction period. Equipment that has been predicted to have the potential for exceedances includes; dump trucks, rock breakers, piling (impact) and dredging activities, with the highest exceedances predicted at the Beach Road receivers (of up to 24 dB(A)) due to impact sheet piling activities.

Based on the adopted night background noise levels, it is anticipated that night construction works (if applicable) from some equipment would be audible^[5] at the nearby sensitive receivers. This construction equipment is anticipated to be loader, compactor, truck, grader, rock breaker, piling and dredging. The highest night construction noise impact is anticipated to be from piling activities (if conducted during night).

In relation to the Hastings option, construction activities undertaken during the evening and night time period (if any) may have the potential to exceed the prescribed criteria. Those sensitive receivers that are located within the immediate vicinity of the proposed road and rail corridors, may be heavily impacted by construction activities for this infrastructure. Based on the proposed Project location, it is identified that there are a considerable number of individual sensitive receivers located within the immediate vicinity of the Project footprint, along McKirdys Road and Dandenong-Hastings Road.

Operational noise impact study

The preliminary industrial noise criteria for the Project indicate the most stringent night-time noise criteria would be approximately 39 to 40 dB(A) for both port options.

Bay West terminal operational noise may generate marginal exceedances at the nearby receivers at Beach Road by up to 2-3 dB(A) during the night-time period. The operation of the future rail terminal may have the potential to exceed the night time noise criteria at the nearby receivers along Manor Road. However, the exact operating equipment within the facility have yet to be confirmed. The rail and road noise impact to the nearby receivers will be subject to the traffic schedules which would be developed at a later stage.

Hastings terminal operational noise may generate exceedances receivers along Cemetery Road by up to 9 dB(A) during the night-time period. The operation of the future rail terminal may have the potential to exceed the night time noise criteria at the nearby receivers. However, the exact operating

⁵ This is assuming that external construction noise level is equal to background noise level.



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equipment within the facility have yet to be confirmed. The rail and road noise impact at nearby receivers will be subject to traffic schedules which would be developed at a later stage.

Noise mitigation measures

General noise mitigation measures for both construction as well as operational activities have been provided in Section 6 of this report, for guidance purposes, to assist in minimising potential impact.

GHD

Level 8

180 Lonsdale Street

T: 61 3 8687 8000 F: 61 3 8687 8111 E: melmail@ghd.com

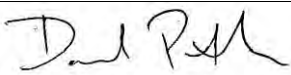
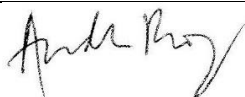

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		Name	Signature	Name	Signature	Date
	Elise Downing Vanessa McKenzie David May Pallavi Mandke Durwin Dharmaraj Stanley Gunawan	David Petch		Andrew Roy		05.05.17
		Megan Shaw				

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