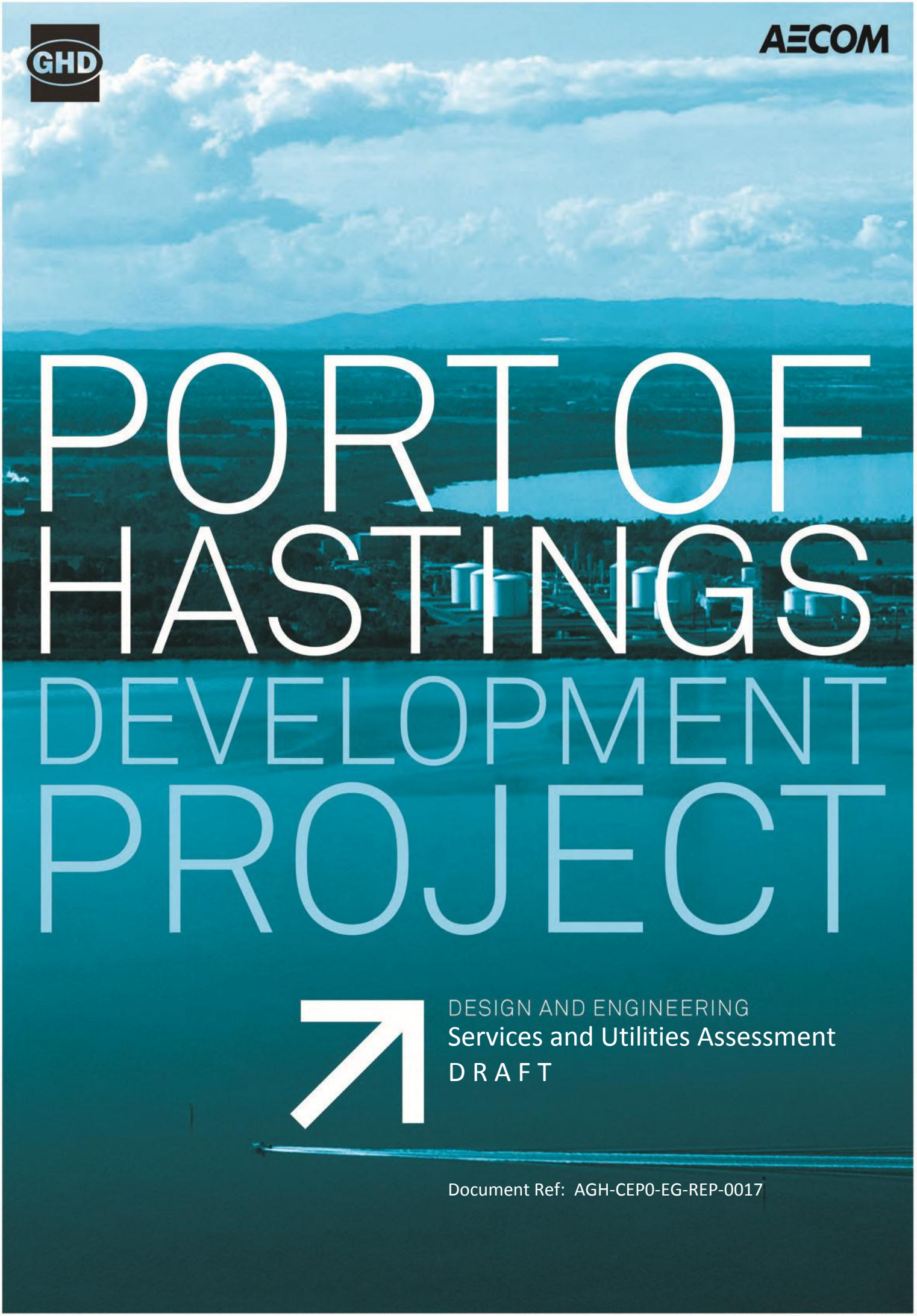
GHD
AECOM
PORT OF HASTINGS
DEVELOPMENT
PROJECT
DESIGN AND ENGINEERING
Services and Utilities Assessment
D R A F T
Document Ref: AGH-CEP0-EG-REP-0017

In May 2016 the Special Minister of State asked Infrastructure Victoria to provide advice on the future capacity of Victoria's commercial ports. Specifically, the Minister has asked for advice on when the need for a second container port is likely to arise and which variables may alter this timeline. The Minister has also asked for advice on where a second container port would ideally be located and under what conditions, including the suitability of, and barriers to investing in, sites at the Port of Hastings and the Bay West location.

In undertaking this task, Infrastructure Victoria reviewed work that was completed as part of the Port of Hastings development project before it was cancelled in 2014. This document forms part of the initial work undertaken for the proposed port development at Hastings. Infrastructure Victoria considers that much of the previous Hastings work, although preliminary in nature, is relevant and suitable for informing a strategic assessment. Therefore, Infrastructure Victoria has made the reports previously commissioned for the development project part of the evidence base on which Infrastructure Victoria will use in providing the Minister with advice.

The opinions, conclusions and any recommendations in this document are based on conditions encountered and information reviewed at the date of preparation of the document and for the purposes of the Port of Hastings Development Project.

Infrastructure Victoria and its consultants have used the information contained in these reports as an input but have not wholly relied on all the information presented in these reports.

DRAFT

Port of Hastings Development Project – Design and Engineering

Services and Utilities Assessment D R A F T

Client: Port of Hastings Development Authority

ABN: 33 737 350 749

Prepared by the AECOM + GHD Joint Venture

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The AECOM + GHD Joint Venture in Australia and New Zealand are certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

This Report has been prepared by the AECOM + GHD Joint Venture for the Port of Hastings Development Authority and may only be used and relied on by the Port of Hastings Development Authority for the purpose agreed between the AECOM + GHD Joint Venture and the Port of Hastings Development Authority as set out in this Report.

The AECOM + GHD Joint Venture otherwise disclaims responsibility to any person other than the Port of Hastings Development Authority arising in connection with this Report. The AECOM + GHD Joint Venture also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by the AECOM + GHD Joint Venture 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.

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. The AECOM + GHD Joint Venture 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.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by the AECOM + GHD Joint Venture described in this Report. The AECOM + GHD Joint Venture disclaims liability arising from any of the assumptions being incorrect.

Quality Information

Project	Port of Hastings Development Project – Design and Engineering
Document	Services and Utilities Assessment D R A F T
Ref	AGH-CEP0-EG-REP-0017
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Prepared by	Andre Vanderputt & Blake Henderson
Reviewed by	Richard Clarke

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	16-Feb-15	Draft for Discussion	Peter Fountain Technical Director	
B	6-Mar-15	Final Draft	Peter Fountain Technical Director	
0	18-Mar-15	Final Working Draft	Peter Fountain Technical Director	

Executive Summary

The Victorian Government has identified the Port of Hastings as the preferred site for the State's next major container port. This port is essential for the long –term economic growth of Victoria as container trades increase and the Port of Melbourne reaches capacity.

The purpose of this report was to undertake a high level assessment of services and utilities in relation to the Port of Hastings Development Project. The assessment included establishing the capacity, forecasting the demand and assessing the difference between supply and demand for each service and utility. The main focus of the investigation was within Special Use Zone 1 (SUZ1), however the study area was increased to include the potential transport corridors as well as Crib Point and Stony Point.

The services and utilities assessed included power, water, gas, telecommunications, stormwater, sewerage and privately owned assets within the study area such as oil and gas pipelines. All key stakeholders were consulted during the course of the project.

Power

The transmission network within the study area is owned and operated by AusNet and the distribution networks is owned and operated by United Energy. The transition between the two networks occurs at the terminal station in Tyabb.

The transmission network to the Mornington Peninsula has a total capacity of 800 MVA, however current demand is only 200 MVA, which equates to a surplus capacity of 600 MVA. The current power demand estimate for the entire port development is approximately 500 MVA, so there appears to be sufficient capacity within the transmission network. However to service the port development the power will need to be converted to a lower voltage for distribution.

United Energy's distribution network currently has a capacity of 300 MV, which equates to a surplus supply of only 100 MVA. To increase distribution capacity augmentation works will be required at the terminal station in Tyabb and along the distribution network.

Based on the anticipated power demand an alternative approach is for PoHDA to operate as a wholesale customer, and effectively become the energy distributor and retailer for the port development. A detailed commercial assessment would be required to confirm if this approach is viable.

Potable Water

The potable water transfer mains with the study area are owned and operated by Melbourne Water and the distribution network is owned and operated by South East Water.

Based on discussions with the water authorities there appears to be adequate potable water capacity for the proposed port development via the existing infrastructure. The main potable water supply is from Cardinia Reservoir, which can be supplemented by the desalination plant located in Wonthaggi. Melbourne Water also has another transfer water main from Tarago Reservoir to the Tyabb storage facility. This pipeline also crosses the desalination pipeline; however they are not currently connected. If additional capacity is required, it may be possible to explore a future connection with Melbourne Water.

Recycled Water

South East Water currently supplies Class A recycled water from the Somers Treatment plant to the BlueScope site. Whilst South East Water own and maintain the pipeline, BlueScope own the rights to the recycled water, as they contributed to the upgrade of the Somers treatment facility. The closure of BlueScope's Hot Strip Mill has resulted in a significant reduction in demand for recycled water, so there is the potential to utilise this surplus capacity, however PoHDA would need to reach an agreement between both South East Water and BlueScope.

Sewerage

South East Water is responsible for the reticulated sewerage collection system within the study area. They also own and operate the sewerage treatment facilities at Somers and Mount Martha.

The majority of SUZ1 is rural land and is not connected to the sewerage network. Hastings and Tyabb are connected to sewerage, however the existing network and treatment facility at Somers has very limited capacity. It is anticipated that upgrades to both sewerage pipeline and the Somers treatment plant will be required to cater for the proposed development. There may also be the potential to divert sewage to the Mount Martha treatment plant, however upgrades to the plant will be required in addition to a new sewerage pipeline. Further discussions with South East Water will be required to confirm an appropriate strategy.

It may be possible to explore an off-peak discharge arrangement; however this is only likely to be a short term solution for the terminal precinct, at best. Other short term sewerage options may consist of on-site storage tanks, which are emptied via suction truck for disposal offsite, or septic tanks.

Long term solutions may consist of a new centralised onsite sewerage treatment plant for the development, which is owned and operated by PoHDA. The feasibility of this this approach would need to be explored further, however the upfront costs are likely to be very high. It is also unlikely to negate the need to upgrade the capacity within South East Water's network as treated waste will still have to be discharged to the main sewerage outfall at Boag Rocks. It is highly unlikely that a new sewerage outfall into Western Port Bay will be supported given its environmental significance.

Stormwater

There are four main catchments within SUZ1 which discharge into Western Port Bay, Watson's Creek, McKirdy's Drain, Oliver's Creek and King's Creek. All creeks have been highly modified with much of the riparian vegetation cleared and extensive works carried out to realign the waterway and increase hydraulic capacity. Melbourne Water and Mornington Peninsula Shire are currently undertaking hydraulic modelling of these catchments, however results were not available at the time of writing this report.

The proposed port development will result in a significant increase in peak flows, runoff volumes and frequency of runoff due to the increase in impervious area associated with roofs, roads and hardstand. There will also be a significant increase in stormwater pollutants (i.e. suspended solids, phosphorous, nitrogen and hydrocarbons) generated from the site. Appropriate mitigation strategies will need to be incorporated into the development to minimise these impacts such as, retarding basins, wetlands, swale drains, bio retention basins, stormwater harvesting and rainwater collection tanks, gross pollutant traps, waterway rehabilitation and bank stabilisation.

Gas

APA own and maintain the distribution network within the study area. They have recently duplicated the existing gas pipeline from Dandenong to Robinsons Road due to increased demand along the eastern side of the peninsula form Frankston to Portsea.

APA indicated that the total capacity in their network is approximately 60,000 TJ, however they were not able to confirm capacity in the vicinity of the study area. The total gas demand for the full port development is only estimated to be 400 TJ, which is less than 1% of APA's total capacity. Therefore, it can reasonably be assumed that gas supply for the future port development is unlikely to be an issue.

Further work will be required to quantify expected gas loads associated with specific industrial and manufacturing businesses, which may have a very high gas demand.

Telecommunications

Telstra is the main telecommunication service provider within the study area. Their fibre network is located underground, whilst the older copper network is located both above and below ground. The main trunk infrastructure (inter-exchange line) is located along Frankston Flinders Road between Hastings and Tyabb.

At present NBN do not provide coverage within the study area. However, moving forward it is anticipated that NBN will utilise Telstra's assets to roll out the new high speed fibre network. No timeframe has been confirmed for the rollout in the Hastings region, however construction has already commenced in Frankston

and Mt Eliza. PoHDA should look to provide early advice to NBN on the expected timing of the port development, as this may assist will accelerating the rollout plans for the Hastings region.

NBN advised that current policy is for any new development to have fibre installed to the boundary of the development. The developer is responsible for the provision of fibre within the development.

Private Assets

There are a number of other private assets located within the study area. Whilst these private assets will not be required to directly service the port development, their location and associated constraints will need to be considered for port development and master planning. The following private asset owners were contacted during the investigation: WAG Pipeline/Viva, Esso/BP, BlueScope, Elgas, United Petroleum and BOC.

Whilst each of these parties have a number of assets within their site they also own a number of private pipelines within the study area, many of these are located in shared easements. The main easement, often referred to as 'pipeline alley', which is just north of Hastings contains pipelines from BP, Esso, WAG, Elgas and APA. As part of the master planning of the development it is advisable to try and design around these easements and avoid moving the pipelines or modifying the easements. It is also worth noting that some of the high pressure gas mains have buffer distances ('measurement length') that can extend up to 900m either side of the pipeline. These buffer distances are dependent on the adjacent land use zoning. Energy Safe Victoria will need to be involved early in the process, if there is to be any change to land use with these buffer zones.

Conclusion

In summary the future port development project appears to be well placed from a services and utilities perspective. Existing infrastructure appears to have capacity to support the future port development. Discussions with the relevant services authorities have confirmed that in relation to power, water, recycled water and gas there is surplus capacity in the existing networks for all stages of the development. Whilst a high speed fibre optic network is not currently available, it is expected that with the rollout of NBN over the next few years, one will be available by the commencement the development. The only service that is constrained is sewerage. The current reticulation network and treatment plants are close to capacity, so upgrades will be required if the port development is to be connected. Alternatively, an onsite sewerage treatment plant may be considered.

The staging of the port development will have a significant impact on how the future service and utilities are rolled out. The majority of SUZ1 is rural land, so is not currently highly serviced, however the potential to provide services to the future port development is very good. There is adequate trunk infrastructure between Tyabb and Hastings which can be utilised. There is also the benefit of having existing industry in the area, which has resulted in very good services coverage in the vicinity of Bayview Road. This could potentially allow a fast track Stage 1 terminal facility with minimal upfront capital expenditure on service related infrastructure, by utilising these existing services.

Table of Contents

1.0 Introduction

1.1 Background Information

The Victorian Government has identified the Port of Hastings as the preferred site for the State's next major container port. This port is essential for the long –term economic growth of Victoria as container trades increase and the Port of Melbourne reaches capacity.

The Port of Hastings Development Authority (the Authority) is progressing staged planning of the Port of Hastings Development Project from 2013 to 2018, culminating in the development of a preliminary business case and a full environmental and social impact assessment.

The Authority has selected a team of specialists to undertake detailed environmental, social and economic studies that will form part of a strict approval process. Specialists will also plan the conceptual design of new port infrastructure including wharf facilities and a logistics precinct, with road and rail access to the Port. Involvement of community and industry will be a critical to the success of this project.

1.2 Purpose of this Report

The purpose of this report was to undertake a high level assessment of services and utilities in relation to the Port of Hastings Development Project. The assessment included establishing the capacity, forecasting the demand and assessing the difference between supply and demand for each service and utility.

It is envisaged that this report may be used by the Port of Hastings Development Authority to scope further investigations in relation to a specific service or utility.

1.3 Scope and Limitations

The services and utilities assessed included power, water, gas, telecommunications, stormwater, sewerage and privately owned assets within the study area such as oil and gas pipelines.

The assessment for Stage 1 included:

- Engagement with service and utility providers. The scope of the engagement was to establish the capacity of their infrastructure and identify future development plans.
- Establishing a high level service and utility demand. The demand was to be developed based on a combination of data from Australian Standards, International Standards, publications or recent relevant experience at other Ports tailored to the Port of Hastings Development Project.
- Assessing the difference between supply and demand.
- Identifying potential constraints, documenting key findings and conclusions and recommending further investigations.

The main focus of the investigation was within Special Use Zone 1 (SUZ1), however the study area was increased to include the potential transport corridors as well as Crib Point and Stony Point. Refer to the study area in the Figure 1 in Appendix A:

2.0 Key Stakeholders

2.1 Service Providers

The stakeholders that were identified as relevant to the Port of Hastings Development Project and the service or utility they provide are listed in Table 1.

Table 1 Service Providers

Service / Utility Provider	Relevant Service or Utility	Engagement	Date of Meeting
AusNet	Power	✓	13/11/2014
United Energy	Power	✓	10/11/2014
Melbourne Water	Potable water, regional overland flow	✓	13/11/2014
Mornington Peninsula Shire Council	Local overland flow and drainage	✓	11/12/2014
NBN Co.	Telecommunications	✓	28/11/2014
South Eastern Water	Potable water, recycled water and sewage	✓	7/11/2014
Telstra	Telecommunications	✓	28/11/2014
APA Group	Gas pipeline	✓	16/12/2014

2.2 Private Assets

The private asset owners that were identified as relevant to the Port of Hastings Development Project and the service or utility are listed in Table 2.

Table 2 Private Asset Owners

Private Asset Owner	Private Asset	Engagement	Date of Meeting
BlueScope Steel	Power, local overland flow, sewer, potable water, recycled water	✓	11/12/2014
Elgas	Gas	✓	17/12/2014
ESSO	Storage and transfer of LPG and crude oil	✓	17/12/2014
Viva/Shell	WAG pipeline	✓	15/12/2014
United Petroleum	Storage tanks and pipeline	✓	17/12/2014
BOC	Hydrogen, nitrogen and compressed air	✓*	27/02/2015

*Denotes phone conversation only

3.0 Existing Services and Planned Upgrades

3.1 Power

The electricity industry in Victoria comprises a number of components including generation, transmission, distribution and retailing. This report excludes generation and retailing, and focuses on transmission and distribution within the study area.

The Victorian transmission network is predominantly owned maintained and operated by AusNet. However, planning for the transmission network is undertaken by the Australian Energy Market Operator (AEMO). The transmission network connects to the distribution network at terminal stations. Planning for the terminal station is the responsibility of AusNet and each distribution business plans for its own network in accordance with the requirements of its Distribution Licence and the Electricity Distribution Code.

The Port of Hastings Development Authority met with AusNet on 13 November 2014 and United Energy on 10 November 2014 to discuss the project.

3.1.1 Transmission Network

The transmission network within the study area is owned, maintained and operated by AusNet, refer to Figure 2 in Appendix A. Their assets include the following:

- 220 kV transmission lines, including 30m wide easement either side of the transmission line.
- 220 kV transmission line to BlueScope
- Transmission towers
- Terminal station in Tyabb

3.1.2 Distribution Network

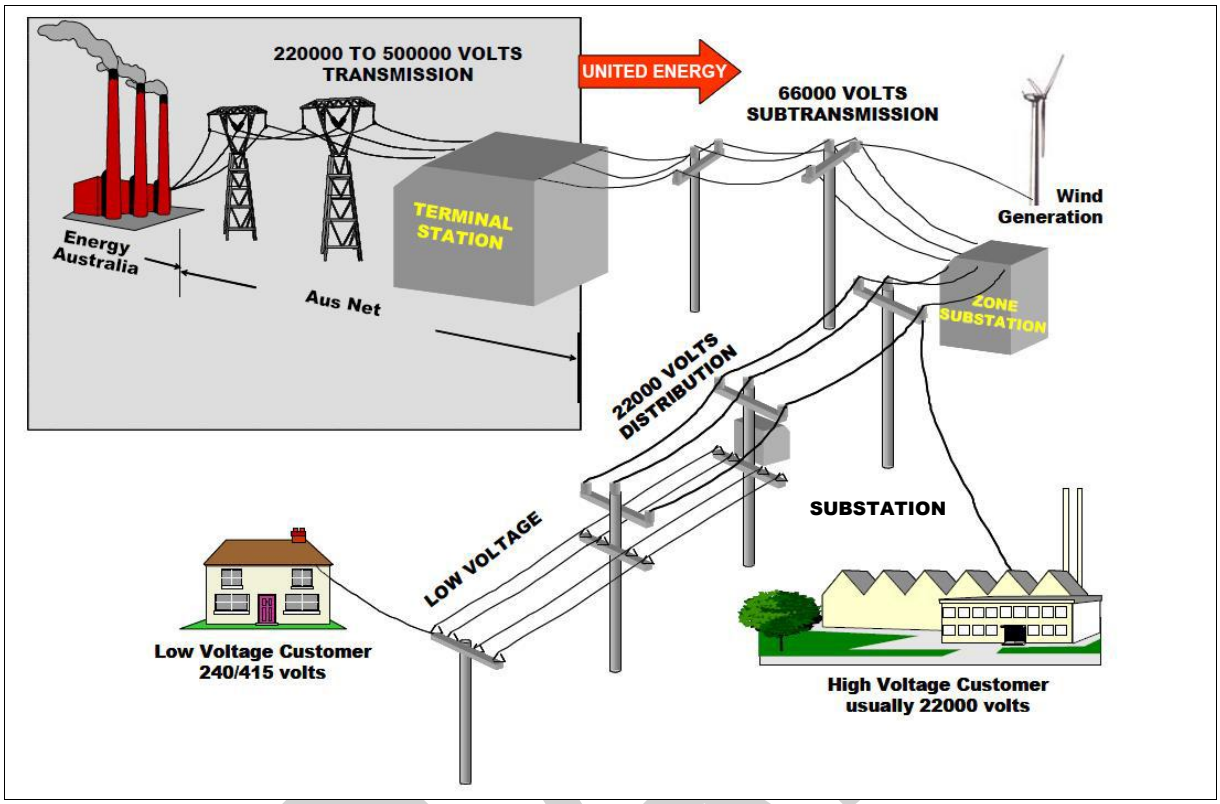
The distribution network connects to the terminal stations and extends to the individual properties. Within the study area United Energy own, operate and maintain the distribution network south of the terminal station in Tyabb, refer to Figure 2 in Appendix A.

The United Energy distribution network is comprised of the following components:

- 66 kV sub-transmission lines that connect terminal stations to zone substations
- Zone substations
- 22 kV distribution feeders that connect zone substations to substations
- Substations
- Low voltage power lines – either overheard or underground lines connecting the substations to the customers

The components of the distribution network are described in the figure below.

Diagram 1 Typical Electricity Transmission and Distribution Network



Source: Citipower 2011 'Distribution System Planning Report' p10

3.1.3 High Voltage Customers

BlueScope is a high Voltage customer and has a direct 220 kV feed from the AusNet terminal station in Tyabb. The 220 kV transmission line and towers from Tyabb to BlueScope are owned by AusNet, however BlueScope own the final tower and the substation within their site. The circuit breaker for BlueScope's supply is located in Tyabb, so AusNet's transmission line is exclusive to BlueScope's network. No other customers are able to connect to this transmission line.

Viva/Shell and Esso are also high voltage customers, but are supplied by United Energy via the distribution network at 22 KV. Both are supplied via Bayview Road, however Esso has a secondary supply from Long Island Drive.

3.1.4 Network Capacity

The power companies have reported a general decline in power consumption in Victoria over recent years. This is due in part to more energy efficient practises at a residential level (i.e. solar power, led lighting, etc..), however the closure of a number of significant industrial and manufacturing industries has been the main factor. In Hastings, BlueScope is one of the largest energy consumers, however with the closure of the Hot Strip Mill demand has reduced by approximately 30 MVA.

AusNet indicated that the transmission network has a total capacity of 800 MVA at the Terminal Station in Tyabb. The current demand for the entire Mornington Peninsula is approximately 200 MVA, which equates to surplus capacity of 600 MVA in the transmission network.

The total capacity within the United Energy distribution network is 300 MV. As indicated above, current demand for the Mornington Peninsula is 200 MVA, which equates to a surplus supply of 100 MVA in the distribution network.

3.1.5 Planned Network Upgrades

United Energy indicated that the capacity of the distribution network around Somerville is likely to be upgraded to cater for forecast residential growth. A new substation is expected to be constructed in Somerville in the medium term (i.e. within 10 years). United Energy has no other plans to upgrade the distribution network within the study area.

Based on the GIS data provided by AusNet there appears to be future provision to upgrade the transmission network to Tyabb. However, these future upgrade plans were not discussed during the meeting and given the surplus capacity in the network, are unlikely in the foreseeable future.

3.2 Water

Melbourne's water supply system is made up of one wholesaler and three metropolitan retail distribution companies. Melbourne Water is wholesaler responsible for bulk supply and head works. South East Water is the retailer within the study area.

The Port of Hastings Development Authority met with South East Water on 10 November 2014 and with Melbourne Water on 13 November 2014 to discuss their assets within the study area. This section describes the key information provided by both in relation to the proposed port development.

3.2.1 Potable Water

Both Melbourne Water and South East Water have potable water assets within the study area, refer Figure 3 in Appendix A.

The main water supply is from Cardinia Reservoir via Melbourne Water's transfer mains. Cardinia Reservoir's water supply can be supplemented via a pipeline which runs between the reservoir and the desalination plant located in Wonthaggi.

Melbourne Water also has a 1050 mm diameter transfer water main from Tarago Reservoir to the Tyabb storage facility, which crosses the study area. This pipeline is located underground in a reserve owned by Melbourne Water. There appears to be no direct connections to this transfer water main within study area.

The potable water distribution network is owned and operated by South East Water. The main potable water feed for SUZ1 is via a pipeline from the Tyabb storage facility along Graydens / Bayview Road. There are also a number of other connections to Melbourne Water's transfer main within the study area.

3.2.2 Recycled Water

South East Water has a 300 mm diameter recycled water main located along Graydens Road and Bayview Road to supply BlueScope, refer Figure 3 in Appendix A. The pipeline which was completed in 2010 is approximately 13km long and runs from the Somers treatment plant to the BlueScope's site. Whilst South East Water own and maintain the pipeline, BlueScope own the rights to the recycled water, as they contributed to the upgrade of the Somers treatment facility.

There are different grades of recycled water from Class A to Class D. Class A is the highest quality and is used exclusively in residential areas and is safe for a range of non-drinking purposes; refer to Dual Pipe Water Recycling Schemes – Health & Environmental Risk Management, EPA 2005. The quality of the recycled water supplied to BlueScope is considered a higher standard than Class A, however there is currently no classification to describe this higher standard.

The main driver for the installation of recycled water was the high demand associated with BlueScope's Hot Strip Mill. The closure of the Hot Strip Mill has resulted in a significant reduction in demand for recycled water. South East Water indicated that there is the potential to utilise the surplus capacity, however PoHDA would need to reach an agreement with both South East Water and BlueScope.

3.3 Sewage

Melbourne Water is responsible for the two main sewerage treatment facilities in Melbourne, the Eastern Treatment Plant at Bangholm and the Western Treatment Plant at Werribee. The three water retail companies are generally responsible for the reticulated collection system that transfers sewage from households, commercial and industrial premises to these treatment plants.

South East Water is responsible for the reticulated sewerage collection system within the study area. They also own and operate a number of smaller sewerage treatment facilities located along the Mornington Peninsula at Somers and Mount Martha.

The Port of Hastings Development Authority met with South East Water on 10 November 2014 and with Melbourne Water on 13 November 2014 to discuss the Port of Hastings Development Project. This section describes the key information provided by both authorities.

3.3.1 Sewerage Infrastructure

South East Water noted that the majority of SUZ1 is rural land and is not currently serviced by sewerage. South East Water has a 900 mm sewer main that runs along Frankston Flinders Road between Hastings and Tyabb. Both towns are serviced by South East Water's sewerage reticulation network. Refer to Figure 4 in Appendix A.

BlueScope has a branch sewer which runs from their site under Bayview Road and along Barclay Street to connect into the reticulation network in Hastings.

3.3.2 Outfalls

The main sewer outfall for the Mornington Peninsula is located at Boag Rocks. Treated sewage from Melbourne Water's Eastern Treatment Plant and South East Water's treatment plants are all directed to this outfall.

There are no sewer outfalls within the study area into Western Port Bay.

3.3.3 Capacity

South East Water indicated that the existing sewerage network and treatment facilities in the vicinity of the study area have limited capacity. It is anticipated that upgrades to both sewerage pipelines and treatment plants will be required to cater for the proposed development.

Due to the limited network capacity, BlueScope have an off-peak discharge agreement, where they store waste water in tanks and discharge to South East Water's reticulation network when sewer loads are low.

The other major industries in Hastings are not serviced by sewerage. They generally have a system of on-site storage tanks, which are emptied via suction truck for disposal offsite, or they utilise septic tanks.

3.4 Stormwater

The regional drainage network in Metropolitan Melbourne is managed by Melbourne Water. This generally consists of catchments greater than 60ha.

Local councils are responsible for local drainage infrastructure within their municipalities. Within the study area Mornington Peninsula Shire is responsible authority for urban catchments.

The Port of Hastings Development Authority met with Melbourne Water on 13 November 2014 and the Mornington Peninsula Shire on 11 December 2014 to discuss the Port of Hastings Development Project. This section describes the key information provided by both parties.

3.4.1 Overland Flow

There are four main catchments within SUZ1, refer to Figure 5 in Appendix A. Below is a summary of the catchment information provided by Melbourne Water:

- **Watson's Creek** (Catchment Area 6,900ha), is a permanent stream that forms in Frankston south and flows in a south easterly direction to Western Port (WBM Oceanic, 2002). The stream has been highly modified

with much of the riparian vegetation cleared and extensive works carried out to realign the stream and increase hydraulic capacity.

- **McKirdy's Drain** (Catchment Area 890ha) is an ephemeral stream that forms north of Hastings and flows to Western Port. The stream has been highly modified with much of the riparian vegetation cleared and extensive works carried out to realign the stream and increase hydraulic capacity.

- **Oliver's Creek** (Catchment Area 2,300ha) is a major waterway forming upstream of Tyabb and discharging into Western Port at Hastings. Agricultural activities and drainage works have resulted in modifications to the waterway including the realignment of the watercourse and the removal of riparian vegetation.

- **King's Creek** (Catchment Area N/A) is a stream that forms to the west of Hastings and flows through the township and discharges into Western Port at Hastings.

The BlueScope site which is approximately 800ha can also be considered a catchment in its own right. Whilst Mckirdy's Drain discharges through the northern section of BlueScope's site, runoff from the rest of the site is managed by BlueScope. The majority of the BlueScope runoff is directed to a lake on the site. Overflow from the lake passes under Bayview Rd and discharges into Hastings Bite via Olivers Creek. There is also a discharge point through the existing wetlands into Western Port Bay and another at the BlueScope Jetty.

Esso also have an EPA discharge license for stormwater from their plant, which is treated and discharged into Western Port Bay at Long Island Jetty. Stormwater from the rest of the site is discharged directly into the Bay.

3.4.2 Catchment Modelling

Below is a summary of the status of flood studies being undertaken by Melbourne Water and Mornington Peninsula Shire Council:

- Watson's Creek – Currently being modelled by Melbourne Water.
- McKirdy's Drain – Has not been modelled. Council will need to confirm who is responsible for modelling this catchment.
- Oliver's Creek – Currently being modelled by Council.
- Kings Creek – Modelling completed by Council in 2014.

Council indicated that flood models, GIS data and drainage asset information will be provided to PoHDA upon completion of the flood studies. It is anticipated that this information will be provided in early 2015.

The latest flood studies will produce a new set of flood inundation overlays, which will need to be considered during the master planning of the development.

3.4.3 Water Quality Runoff

The State Environment Protection Policy (Waters of Victoria) sets the framework for government agencies, businesses and the community to work together, to protect and rehabilitate Victoria's surface water environments. The Waters of Victoria policy was updated in June 2003 and reflects current scientific approaches and Victoria's catchment management arrangements. Special measures are still needed for sensitive areas such as Western Port, the Gippsland Lakes and Port Phillip Bay. These are covered by Schedules to the Waters of Victoria policy, which outline specific beneficial uses and objectives to protect these areas. The following schedule relates to nutrient and suspended solid concentrations in stormwater runoff.

The relevant schedule (F8) indicates allowable maximum discharge concentrations at base flow, as shown in Table 3 below.

Table 3 Maximum allowable concentrations

Indicator	Maximum Concentration
Total Suspended Solids (mg/L)	20

Indicator	Maximum Concentration
Total Phosphorus (mg/L)	0.05
Total Nitrogen (mg/L)	0.6

Given that stormwater runoff from each precinct will not enter a waterway where concentrations can be measured, it is likely that environmental requirements for stormwater runoff will be governed by the EPA's *Best Practice for Environmental Management Guidelines.* These guidelines set pollutant reduction targets for stormwater that ultimately enters Port Philip or Westernport Bay. The target reductions in pollutants are indicated in Table 4 below.

Table 4 Pollutant reduction targets

Indicator	Percentage Reduction (kg/year)
Total Suspended Solids	80
Total Phosphorus	45
Total Nitrogen	45

In addition to nutrients and suspended solids, other pollutants such as hydrocarbons and gross pollutants will also need to be contained or treated.

3.5 Gas

The gas industry in Victoria has four specific sectors to take gas from the point of extraction to consumption. These sectors are exploration and production, transmission, distribution and retailing. This report only focuses on transmission and distribution within the study area.

The Port of Hastings Development Authority met with APA Group on 16 December 2014 to discuss the Port of Hastings Development Project. This section describes the key information provided by APA regarding the proposed port development.

3.5.1 Transmission Network

The Victorian Transmission System (VTS) is operated by the Australian Energy Market Operator (AEMO). The regulator of the market is the Australian Energy Regulator (AER). Whilst APA Group owns and maintains the VTS, AMEO is responsible for the shipment of gas through the VTS. APA's main gas supply is via the transmission main from Longford to Dandenong. They also own and maintain transmission mains which run along Frankston-Flinders Road and Bayview Road, refer to Figure 6 in Appendix A.

BlueScope also has a dedicated industrial transmission line from Frankston Flinders Road to their site, which is owned and maintained by APA. *License No 115*

3.5.2 Distribution Network

APA has field regulators located along the transmission line at Tyabb and Hastings, which reduce the gas pressure for the distribution network. APA own and maintain the distribution network within the study area up to the customer's meter. *License No 61 and License No 62*

3.5.3 Network Capacity

APA has duplicated the existing 300mm dia gas pipeline from Dandenong to Robinsons Road with a 450mm dia pipeline due to increased demand along the eastern side of the peninsula (Frankston to Portsea). *License No 11*

APA noted that their current network has a capacity of approximately 60,000 TJ. The capacity of the network in the vicinity of SUZ1 was unable to be confirmed.

3.5.4 Planned Network Upgrades

APA has not identified any proposals to extend their existing supply network to other townships along the Mornington Peninsula. APA's demand forecast considers future residential development and does not forecast future commercial and industrial developments, such as for the proposed port development. APA has advised that they will review demand forecasts for the Mornington Peninsula when information about the port development is provided.

3.5.5 Easement and Buffer Zones

APA shares a 15 m wide easement with Elgas. Access must be maintained along the entire length of the pipeline. APA also indicated the 'measurement length' for the transmission line is approximately 200m, however this can increase depending on the adjacent land use zoning.

APA indicated that a buffer zone ('Measurement Length') of 200m either side of the pipe is required for safety, based on a complete rupture of the pipeline, (refer to AS 2885). The preference is to keep this buffer zone as rural land use to minimise risk to population. Any change in land use zoning adjacent to the pipeline will increase the buffer zone/measurement length and require approval from Energy Safe Victoria.

3.6 Telecommunications

Traditionally, telecommunications services were delivered by a progression of Government owned organisations, from the Postmaster-General's Department (PMG) through Telecom to Telstra, which we have today. With the advent of mobile telecommunications, plus the introduction of Optus and other companies to the fixed line market, there is now a highly competitive Telecommunications industry.

Telstra remains the dominant telecommunications provider, particularly in the fixed line market; however, the introduction of the National Broadband Network (NBN) in 2009 will change that. The Government created the National Broadband Network Co Limited (NBN Co.), which is wholly Government owned, with the role to design, build and operate the network. NBN Co. will now become the wholesale provider of fixed line telecommunications through a network of fibre optic cables to be rolled out over the next 10 or so years.

The Port of Hastings Development Authority met with Telstra on 27 November and with NBN Co. on 27 November 2014 to discuss their infrastructure within the vicinity of the project. This section describes the key information provided by Telstra and NBN regarding the proposed port development.

3.6.1 Trunk Network

Telstra is the main telecommunication service provider within the study area. Their fibre network is located underground, whilst the older copper network is located both above and below ground. The main trunk infrastructure (inter-exchange line) is located along Frankston Flinders Road between Hastings and Tyabb. The closest Telstra exchange is located at the corner of Coolstore Road and Penshurst Avenue in Hastings, refer to Figure 7 in Appendix A.

3.6.2 Mobile Phone Towers

Telstra noted that it is current policy to provide mobile towers to meet the demand of an area.

3.6.3 Network Upgrades

At present NBN do not provide coverage within the study area. However, moving forward it is anticipated that NBN will utilise Telstra's assets to roll out the new high speed fibre network. No timeframe has been confirmed for the rollout in the Hastings region, however construction has already commenced in Frankston and Mt Eliza.

NBN advised that current policy is for any new development to have fibre installed to the boundary of the development. The provision of fibre to the boundary is the responsibility of NBN. The developer is responsible for the provision of fibre within the development.

Telstra indicated that current demand in the Hastings region is not high. Future demand forecasts, (excluding the impact of the port expansion), are expected to be modest so Telstra have no plans for any major capacity

upgrades to their network. However, they did acknowledge that within 15 years, assuming the current trends remain, the copper network will be entirely replaced by fibre.

3.7 Private Assets

There are a number of other private assets located within the study area. Whilst these private assets will not be required to directly service the port development, their location and associated constraints will need to be considered for port development and master planning, refer to Figure 8 in Appendix A.

For a full list of all pipeline licences in the area, including details of operators, pipe content, length, diameter and pressure, refer to Appendix B.

The Port of Hastings Development Authority met with the following parties to discuss their assets within the Study Area:

- WAG Pipeline/Viva on 9 December 2014
- Esso on 17 December 2014
- BlueScope on 11 December 2014
- Elgas on 17 December 2014
- United Petroleum on 17 December 2014

This section describes the key information provided by these parties regarding the proposed port development.

3.7.1 WAG Pipeline

WAG Pipeline Pty Ltd is an incorporated company consisting of Viva Energy and Esso that owns and operates the Westernport – Altona – Geelong (WAG) pipeline. The WAG pipeline transfers light crude oil from Hasting to refineries in Altona and Geelong. Their infrastructure consists of the following:

- Three 1,440 horse power diesel engine pumps located at Outlook Drive in Hastings, which have a maximum capacity of 24ML/d. However they are only pumping at a quarter of their capacity (6 ML/d) due to current demand.
- 600mm diameter pipe from Hasting to Altona, which is generally underground for the entire length, however the depth of pipeline will need to be confirmed onsite. *License No 65*
- 200mm diameter pipeline from Crib Point to Dandenong, which is not being used, however it is being maintained by Viva. It is classified as a suspended pipe, but can be used in the future, if required. *License No 3*

Various easements are in place, ranging from 12m to 24m either side of the WAG pipeline depending on licence agreements. A minimum clearance of 3m is required either side of the pipeline for maintenance purposes. A buffer zone ('Measurement Length') of 120m either side of the pipe is required for safety reasons, based on a complete rupture of the pipeline, (refer to AS 2885). The preference is to keep this buffer zone as rural land use to minimise risk to population. Buffer zones may increase up to 500m depending on future land use and will need to be referred to Energy Safe Victoria for approval.

3.7.2 Esso

Esso has a 158 Ha plant at Long Island Point, which carries out the final stage of processing gas liquids from Bass Straight. The processed gas liquids include ethane, propane and butane. The facilities consist of the following assets:

- 3 No. gas liquids fractionation trains
- 19 No. pressurised storage vessels
- 7 No. liquid petroleum gas (LPG) storage tanks

- 8 No. crude oil storage tanks
- LPG truck loading terminal
- Jetty for loading LPG and crude oil to ships (Jetty is owned by PoHDA and leased to Esso)
- Laboratory, workshop and admin building

Esso also has a number of pipelines within the study area:

- 700mm diameter crude oil pipeline from Longford to Hastings, which has a capacity of 500,000 barrels per day. The pipeline is 45 years old and scheduled for replacement in 2015. The pipeline, which sits within a 27m wide easement, is located 900mm below the surface and will most likely remain in-ground and be made redundant. Construction of a new below ground 350mm diameter pipe is expected to commence in October 2015 and will take approximately 2 years to complete. The new pipeline, which will share the same 27m wide easement, will have a reduced capacity of 50,000 barrels per day. *License No 35*
- 250mm diameter LPG pipeline from Longford to Hastings. The pipeline sits within the same 27m wide easement as the crude oil pipeline mentioned above, however any development or change in land use within 900m of the LPG pipeline will need to be referred to Energy Safe Victoria for approval. This is referred to as the 'measurement length' and relates to potential blast zone in the case of a complete rupture of the pipeline. *License No 27*
- 1050mm diameter crude oil pipe from Long Island Point to Crib Point that is not being used. The pipeline is in its own easement and is still under licence. *License No 46*
- 250mm diameter ethane pipe line from Hastings to Altona. The ethane pipe shares the same easement as the WAG pipeline. *License No 53*

3.7.3 BlueScope Steel

John Lysaght (Australia) Pty Ltd purchased 600 hectares of land at Long Island Point in the 1960s to build a steel mill. The Western Port facilities were commissioned progressively throughout the 1970s. In 1979, the company was fully acquired by BHP Steel and subsequently spun off into BlueScope Steel Limited. In 2003 the company changed its name to BlueScope Lysaght. It remains a division of Australia's BlueScope Steel.

The primary facilities consist of the following:

- Hot strip mill (not in operation)
- Pickle line
- Cold rolled mill
- Batch annealing circuit and temper mill
- Three continuous metallic coating lines
- Two paint lines[1]

BlueScope has the following dedicated services to their site:

- High voltage overhead transmission power line from the Tyabb Terminal Station to their site, which is owned and operated by AusNet, refer to Section 3.1.3.
- 250mm diameter gas transmission pipeline from Frankston Flinders Road to their site, which is owned and operated by APA, refer to Section 3.5.1. *License* No 115

3.7.4 Elgas

Elgas is wholly owned by BOC Ltd since Oct 2008, and is the largest marketer of LPG in Australia. They transport LPG from Hastings to their Bulk Storage Terminal Facility in Dandenong.

Elgas has the following pipelines within the study area:

- 100mm diameter pipeline from Crib Point to the valve station near Graydens Road. Elgas has indicated that they are looking to decommission this branch in the future. *License No 172*

[1] http://www.epa.vic.gov.au/~/media/Publications/1132.pdf

- 100mm diameter pipeline from Long Island Point to Valve Station near Graydens Road to Bulk Storage Terminal Facility in Dandenong. This is currently the primary supply for LPG to Dandenong. Elgas and APA pipelines share the same easement and are located in a common trench with a separation distance of approximately 0.6m to 1.0m. *License No 172*

The Elgas pipeline is approximately 45 years old, however it is said to be in very good condition, as it has never had air in it. Inspection reports indicate that there is currently no evidence of corrosion within the pipeline.

3.7.5 United Petroleum

United Petroleum Pty Ltd purchased their Western Port fuel terminal assets from Trafigura Services Australia in December 2007. They are a privately owned business with over 500 retail petrol stations across Australia.

United Petroleum imports petroleum products (diesel, ethanol, and biodiesel) from overseas and domestic refineries and unload at Crib Point. Product is then pumped to United Petroleum's storage facility in Hastings for distribution.

The United Petroleum facilities consist of the following assets:

- 3 No. 18ML large storage tanks.
- 4 No. smaller storage tanks
- Ethanol storage tanks
- 2 No. pumps at Crib Point
- 2 No. 25ML new storage tanks are proposed to be built
- 300mm diameter pipeline from Crib Point to United Petroleum Storage Facility. There are no plans to upgrade this pipeline at present. *License No 153*

3.7.6 BOC

BOC Ltd is a Member of the Linde Group which supplies compressed and bulk gases, chemicals and equipment in Australian and international markets. They have a facility located on Bayview Road in Hastings. Whilst PoHDA did not meet directly with BOC, the Elgas representative that PoHDA did meet with was also an employee of BOC.

BOC own and maintain three pipelines, which run along Bayview Road from their site to service BlueScope. All three of the following pipelines are approximately 1km in length:

- 200mm and 250mm diameter compressed air pipeline. *License No 87 and License No 157*
- 50mm diameter hydrogen pipeline. *License No 88*
- 150mm diameter nitrogen pipeline. *License No 89*

4.0 Demand Assessment

A demand assessment was undertaken to establish a high level estimate of the demand for services and utilities. The scope of the assessment included the following:

- Develop a model to forecast the demand for power, water, sewerage, domestic gas, surface water and telecommunication.
- Develop a model for up to four stages of port construction – stage 1, stage 2, stage 3 and stage 4. Staging considerations are only indicative and are subject to change as design is refined.
- Develop a model that can be updated as the Project progresses in its planning and design lifecycle.
- Use relevant port benchmarks or standards to determine the forecast demand.

It is proposed that the demand model will be used to inform an assessment comparing the capacity of the existing services and utilities infrastructure with the forecast demand for services and utilities infrastructure.

The following sections contain a summary of the results from the high level demand assessment. These results were used as the basis for discussions with the relevant service authorities. Appendix C contains the technical note which describes the scope, assumptions and unit rates used to calculate the expected demand.

4.1 Power

Table 5 contains a summary of the expected power demand for each precinct for each stage of the development.

Table 5: Summary of Power Demand

Precinct	Stage 1 Power (MVA)	Stage 2 Power (MVA)	Stage 3 Power (MVA)	Stage 4 Power (MVA)
Terminal	45	67	89	111
Port Precinct	40	60	80	100
Port Environs	111	165	220	274
Stony Point & Crib Point	8	12	16	20
TOTAL	**204**	**304**	**405**	**505**

Refer to Appendix C Section 6.2 for key assumptions and Appendix C Section 8.1 for unit rates used to estimate the peak power demand.

4.2 Water

Table 6 contains a summary of the expected water demand for each precinct for each stage of the development.

Table 6: Summary of Water Demand

Precinct	Stage 1 Water (l/s)	Stage 2 Water (l/s)	Stage 3 Water (l/s)	Stage 4 Water (l/s)
Terminal	<1	<1	1	1
Port Precinct	71	106	141	176
Port Environs	191	285	380	474
Stony Point & Crib Point	5	8	10	12
TOTAL	**270**	**400**	**540**	**670**

Refer to Appendix C Section 6.3 for key assumptions and Appendix C Section 8.2 for unit rates used to estimate the potable water demand.

4.3 Sewage

Table 7 contains a summary of the expected sewage demand for each precinct for each stage of the development.

Table 7: Summary of Sewer Demand

Precinct	Stage 1 Water (l/s)	Stage 2 Water (l/s)	Stage 3 Water (l/s)	Stage 4 Water (l/s)
Terminal	3	3	5	5
Port Precinct	34	51	70	89
Port Environs	348	547	768	1,000
Stony Point & Crib Point	6	9	11	13
TOTAL	**391**	**610**	**854**	**1,107**

Refer to Appendix C Section 6.4 for key assumptions and Appendix C Section 8.3 for unit rates used to estimate the sewer peak demand.

4.4 Gas

Table 8 contains a summary of the expected gas demand for each precinct for each stage of the development.

Table 8: Summary of Gas Demand

Precinct	Stage 1 Gas (GJ/yr)	Stage 2 Gas (GJ/yr)	Stage 3 Gas (GJ/yr)	Stage 4 Gas (GJ/yr)
Terminal	486	486	729	729
Port Precinct	63,450	94,500	125,550	156,600
Port Environs	78,840	111,940	152,010	187,110
Stony Point & Crib Point	21,600	32,400	43,200	54,000
TOTAL	**165,000**	**242,000**	**322,000**	**399,000**

Refer to Appendix C Section 6.5 for key assumptions and Appendix C Section 8.4 for unit rates used to estimate the annual gas demand.

4.5 Stormwater

Table 9 contains a summary of estimated flows for 10 year ARI storm for both existing and developed conditions. Generally the capacity of the underground stormwater drainage network is designed for a 10 year ARI flow, however some parts of the development may require a higher design standard, such as the terminal.

Table 9: Summary of 10 year ARI Peak Flow

Precinct	Stage 1		Stage 2		Stage 3		Stage 4	
	Existing 10yr ARI (m^3/s)	Developed 10yr ARI (m^3/s)	Existing 10yr ARI (m^3/s)	Developed 10yr ARI (m^3/s)	Existing 10yr ARI (m^3/s)	Developed 10yr ARI (m^3/s)	Existing 10yr ARI (m^3/s)	Developed 10yr ARI (m^3/s)
Terminal	4	18	6	25	8	32	9	38
Port Precinct	12	40	16	57	21	74	26	90
Port Environs	9	23	12	32	16	42	19	51
Stony Point & Crib Point	1	1	1	2	1	2	1	3
TOTAL	**26**	**82**	**40**	**116**	**46**	**150**	**55**	**182**

Note: Peak flow estimates are the sum of individual flows for each land use classification within a precinct. No routing / attenuation has been applied, so peak flows are likely to be overestimated. Refer to Appendix C Section 6.6 for limitations associated with the stormwater assessment.

Table 10 contains a summary of estimated flows for 100 year ARI storm for both existing and developed conditions. Generally the capacity of the overland flow network is designed for a 100 year ARI event.

Table 10: Summary of 100 year ARI Peak Flow

Precinct	Stage 1		Stage 2		Stage 3		Stage 4	
	Existing 100yr ARI (m^3/s)	Developed 100yr ARI (m^3/s)	Existing 100yr ARI (m^3/s)	Developed 100yr ARI (m^3/s)	Existing 100yr ARI (m^3/s)	Developed 100yr ARI (m^3/s)	Existing 100yr ARI (m^3/s)	Developed 100yr ARI (m^3/s)
Terminal	8	36	12	50	15	64	18	77
Port Precinct	23	82	33	118	43	152	52	184
Port Environs	18	47	25	67	32	86	39	104
Stony Point & Crib Point	1	2	2	3	2	4	2	5
TOTAL	**50**	**167**	**72**	**238**	**92**	**306**	**111**	**370**

Note: Peak flow estimates are the sum of individual flows for each land use classification within a precinct. No routing / attenuation has been applied, so peak flows are likely to be overestimated. Refer to Appendix C Section 6.6 for limitations associated with the stormwater assessment.

Refer to Appendix C Section 6.6 for key assumptions and Appendix C Section 8.5 for unit rates used to estimate the peak stormwater flows.

4.6 Telecommunications

Below is an estimate of the number of conduits that are likely to be required for telecommunication trunk infrastructure.

- Terminal: 2 no. 100mm conduits
- Port Precinct: 2 no. 100mm conduits
- Port Environs: 2 no. 100mm conduits
- Stony Point: 1 no. 100mm conduit
- Crib Point: 1 no. 100mm conduit

Refer to Appendix C Section 6.7 for key assumptions and Appendix C Section 8.6 for unit rates used to estimate the telecommunication demand.

5.0 Key Findings

5.1 Power

There are a number of options available in terms of power supply for the project. Based on estimated power demand the Port of Hasting can elect to become a High Voltage customer with either AusNet or United Energy.

AusNet has indicated that they can provide a direct 220 kV feed from the terminal station at Tyabb. This would consist of a new dedicated transmission line to the site. PoHDA would be responsible for the construction and ownership of the new substation and assets within the site. This approach is likely to provide surety for all four stages of the project, as AusNet has a surplus power supply of 600 MVA.

AusNet also indicated that PoHDA may be large enough to operate as a wholesale customer, whereby electricity is purchased through the wholesale market in which changes in supply and demand determine prices. Currently the main wholesale customers in Victoria are energy retailers, which bundle electricity with network services for sale to residential, commercial and industrial energy users. If PoHDA elected to become a wholesale costumer they would effectively become the energy retailer for the port development. A detailed commercial assessment would be required to confirm if this approach is viable.

United Energy has indicated that they can provide a feed between 22 kV to 66 kV to the site. This may require augmentation of the United Energy zone substation in Bayview Road. United Energy will provide power to the site boundary and PoHDA would be responsible for the construction and ownership of the new substation and assets within the site. United Energy is able to provide multiple points of supply to the site as long as they are the same voltage. At this stage United Energy has indicated that they only have 100 MVA of surplus capacity in the existing distribution network. To increase capacity augmentation works would be required at the terminal station in Tyabb and along the distribution network.

The decision on which option to pursue is highly dependent on progressing the functional design and more detailed demand modelling, project staging and commercial negotiations with power suppliers. AustNet are also keen to explore a Build, Own and Operate (BOO) approach, whereby they fund the infrastructure cost to the property boundary and PoHDA would pay and ongoing fee to lease the asset.

5.2 Water

South East Water indicated that there appears to be adequate potable water capacity for the proposed port development via the existing 600 mm diameter high pressure water main which runs along Graydens Road and Bayview Road. The main water supply is from Cardinia Reservoir, which can be supplemented by the desalination plant located in Wonthaggi.

Melbourne Water also has a 1050 mm diameter transfer water main from Tarago Reservoir to the Tyabb storage facility, which crosses though the study area. This pipeline also crosses the desalination pipeline; however they are not currently connected. If additional capacity is required, it may be possible to explore opportunities with Melbourne Water.

South East Water has also indicated that there is a surplus of recycled water in the vicinity of the project via the 300 mm diameter recycled water main located along Graydens Road and Bayview Road. The main driver for the installation of recycled water was the high demand associated with BlueScope's Hot Strip Mill. The closure of the Hot Strip Mill has resulted in a significant reduction in demand for recycled water. South East Water indicated that there is the potential to utilise this surplus capacity, however PoHDA would need to reach an agreement between both South East Water and BlueScope, as BlueScope own the rights to the recycled water.

5.3 Sewage

The majority of SUZ1 is rural land and is not connected to the South East Water's sewerage network. Hastings and Tyabb are connected to sewerage, however the existing network and treatment facility at Somers has very limited capacity and is unlikely to service the future port development. It is anticipated that upgrades to both sewerage pipeline and the Somers treatment plant will be required to cater for the proposed development.

There may also be the potential to divert sewage to the Mount Martha treatment plant, however upgrades to the plant will be required in addition to a new sewerage pipeline. Further discussions with South East Water will be required to confirm an appropriate strategy.

It may be possible to explore an off-peak discharge arrangement similar to BlueScope, however this is only likely to be a short term solution for the terminal precinct at best. Other short term sewerage options may consist of on-site storage tanks, which are emptied via suction truck for disposal offsite, or septic tanks.

Long term solutions may consist of a new centralised onsite sewerage treatment plant for the development, which is owned and operated by PoHDA. The feasibility of this this approach would need to be explored further, however the upfront costs are likely to be very high. It is also unlikely to negate the need to upgrade the capacity within South East Water's network as treated waste will still have to be discharged to the main sewerage outfall at Boag Rocks. It is highly unlikely that a new sewerage outfall into Western Port Bay will be supported given its environmental significance.

5.4 Gas

APA indicated that the total capacity in their network is approximately 60,000 TJ. The total gas demand for the full development of Stage 4 is only estimated to be 400 TJ, which is less than 1% of APA's total capacity. It can reasonably be assumed that gas supply for the port development is unlikely to be an issue.

Further work will be required to quantify expected gas loads associated with specific industrial and manufacturing businesses, which may have a very high gas demand. The current demand assessment does not consider these specific requirements.

APA has already completed a number of upgrades to their network to cater for increased residential demand along the eastern side of the peninsula; however their forecast demand projections do not consider the port development.

5.5 Stormwater

The proposed port development will result in a significant increase in peak flows, runoff volumes and frequency of runoff due to the increase in impervious area associated with roofs, roads and hardstand. The demand assessment indicates that peak flows are likely to triple compared to existing conditions. There will also be a significant increase in stormwater pollutants (i.e. suspended solids, phosphorous, nitrogen and hydrocarbons) generated from the site.

Melbourne Water has indicated that appropriate mitigation strategies will need to be incorporated into development to minimise the impacts identified above. An Integrated Stormwater Management Plan will need to be prepared, which considers the following:

- Retarding basins
- Wetlands
- Swale drains
- Bio retention basins
- Stormwater harvesting and rainwater collection tanks
- Gross Pollutant Traps
- Waterway rehabilitation and bank stabilisation

5.6 Telecommunications

Telstra is the main telecommunication service provider within the study area, however moving forward NBN will be responsible for the rollout of the high speed fibre optic network. At present NBN do not provide

coverage within the study area and no timeframe has been confirmed for the rollout in the Hastings region. However, NBN did advise that construction has already commenced in Frankston and Mt Eliza.

PoHDA should look to provide early advice to NBN on the expected timing of the port development, as this may assist will accelerating the rollout plans for the Hastings region.

NBN is expected to provide fibre to the property boundary and PoHDA will be responsible for the provision of fibre within the development.

5.7 Private Assets

There are a number of private pipelines within the study area, many of these are located in shared easements. The main easement, often referred to as 'pipeline alley', which is just north of Hastings contains pipelines from BP, Esso, WAG, Elgas and APA. There are very complex legal agreements in place between parties, which in some cases have taken up to 24 months to negotiate.

As part of the master planning of the development it is advisable to try and design around these easements and avoid moving the pipelines or modifying the easements. It is also worth noting that some of the high pressure gas mains have buffer distances ('measurement length') that can extend up to 900m either side of the pipeline. These buffer distances are dependent on the adjacent land use zoning. Energy Safe Victoria will need to be involved early in the process, if there is to be any change to land use with these buffer zones.

6.0 Conclusion

In summary the future port development project appears to be well placed from a services and utilities perspective. Existing infrastructure appears to have capacity to support the future port development. Discussions with the relevant services authorities have confirmed that in relation to power, water, recycled water and gas there is surplus capacity in the existing networks for all stages of the development. Whilst a high speed fibre optic network is not currently available, it is expected that with the rollout of NBN over the next few years, one will be available by the commencement of Stage 1.

The only service that has serious constraints is sewerage. The current reticulation network and treatment plants are very close to capacity, so upgrades will be required to both if the port development is to be connected.

6.1 Staging Considerations

The staging of the port development will have a significant impact on how the future service and utilities are rolled out. The majority of SUZ1 is rural land, so is not currently highly serviced, however the potential to provide services to the future port development is very good. There is adequate trunk infrastructure between Tyabb and Hastings which can be utilised. There is also the benefit of having existing industry in the area, which has resulted in very good services coverage in the vicinity of Bayview Road.

There is the potential to fast track the Stage 1 terminal facility, with minimal upfront capital expenditure on service related infrastructure, by utilising existing services along Bayview Road. A possible scenario is described below:

Power

- Estimated demand = 45 MVA.
- Connect to United Energy 22KV network, which runs along Bayview Road.
- Install new transformer/substation and internal reticulation within site.

Water

- Estimated demand = 0.3 l/s.
- Connect to South East Water main which runs along Bayview Road.
- Install new meter and internal reticulation.
- Install ring main around terminal for firefighting.

Recycle Water

- If required connect to South East Water main at the corner of Bayview Road and Barclay Crescent.
- Install new meter on site and internal reticulation.

Gas

- Estimated demand = 486 GJ/yr.
- Connect to APA gas main at the corner of Bayview Road / Cemetery Road.
- Install new meter on site and internal reticulation.

Sewage

- Estimated demand = 3 l/s, which is very low.
- Connect to existing South East Water network at the corner of Bayview Road and Barclay Crescent. Install holding tank, rising main and pump to facilitate an off-peak discharge arrangement.

- Alternatively install septic tank and collect sewage with suction truck.

Telecommunication

- Install new fibre optic cable from Telstra' network at the corner of Bayview Road and Frankston-Flinders Road. Look to utilise existing pit and pipe infrastructure where possible.

Stormwater

- Construct 1.75ha wetland (2% of the catchment) to treat water from the site. Incorporate retarding basin within wetland footprint to attenuate flood flow.
- Construct drainage outlet including gross pollutant traps and triple interceptors, as required.

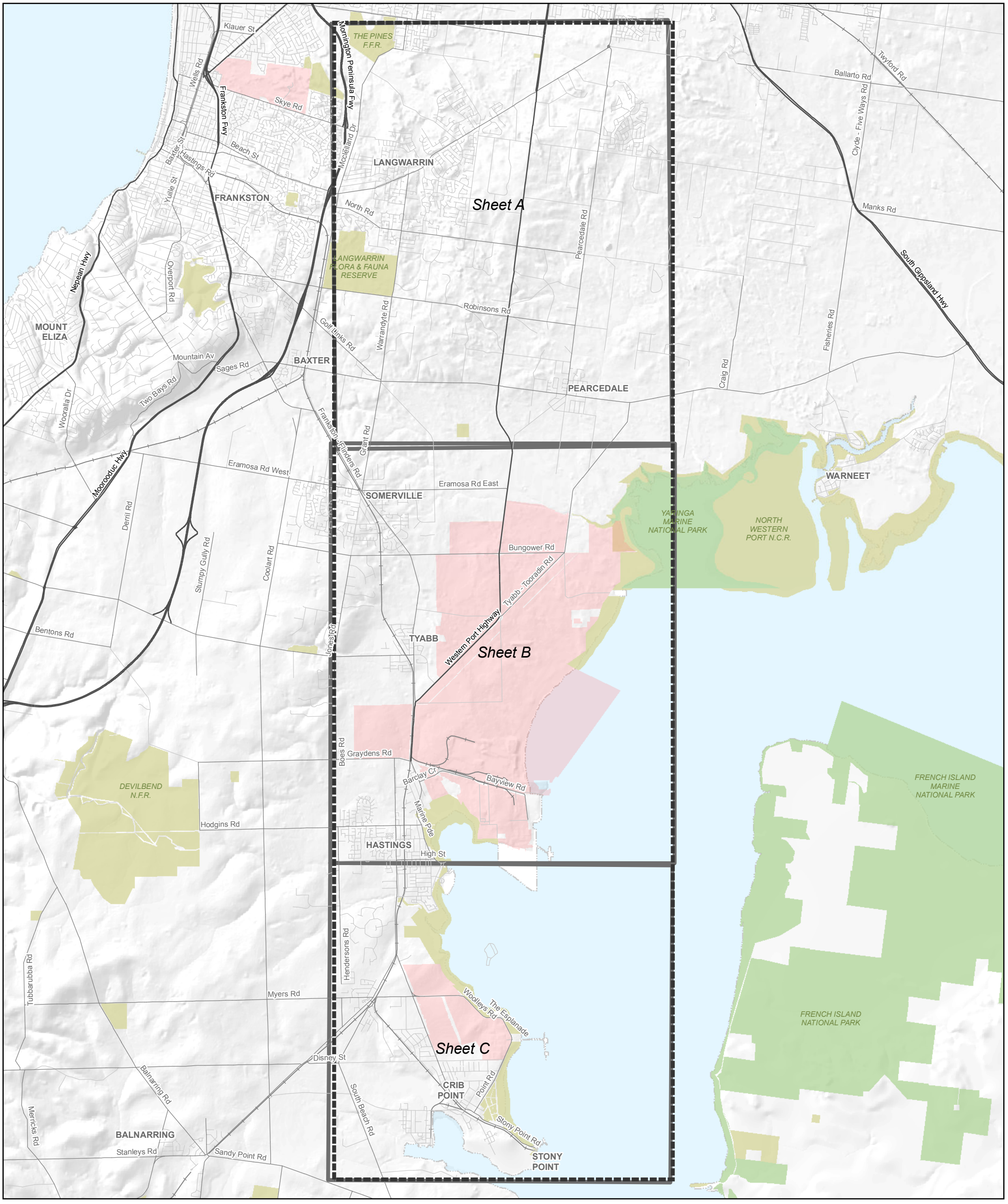
6.2 Future Investigations

It is anticipated that a number of additional investigations will be required to inform the port development project:

- Conceptual design of service and utilities based on the proposed masterplan for the port development.
- Develop an Integrated Stormwater Management Plan for the port development
- Follow up with Melbourne Water and Mornington Peninsula Shire on the status of the flood modelling. Update the flood models based on the proposed masterplan for the port development.
- Investigate alternative power supply options, including wind, solar, battery, regenerative energy and bidirectional flow.
- Investigate commercial arrangements for power supply, including PoHDA becoming a wholesale customer or a BOO approach, whereby AusNet fund the power related infrastructure to the property boundary and PoHDA pay an ongoing fee to lease the asset.
- Capacity assessment of existing sewerage network and treatment plants in conjunction with South East Water to estimate potential upgrade costs.
- Development of options for onsite sewerage treatment to allow a cost comparison between South East Water network upgrades.

Appendix A Existing Services

List of Figures



LEGEND

- StudyArea
- VicMap Data
- Highway
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve
- National Park

1:90,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Study Area Overview and Key Plan

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 1

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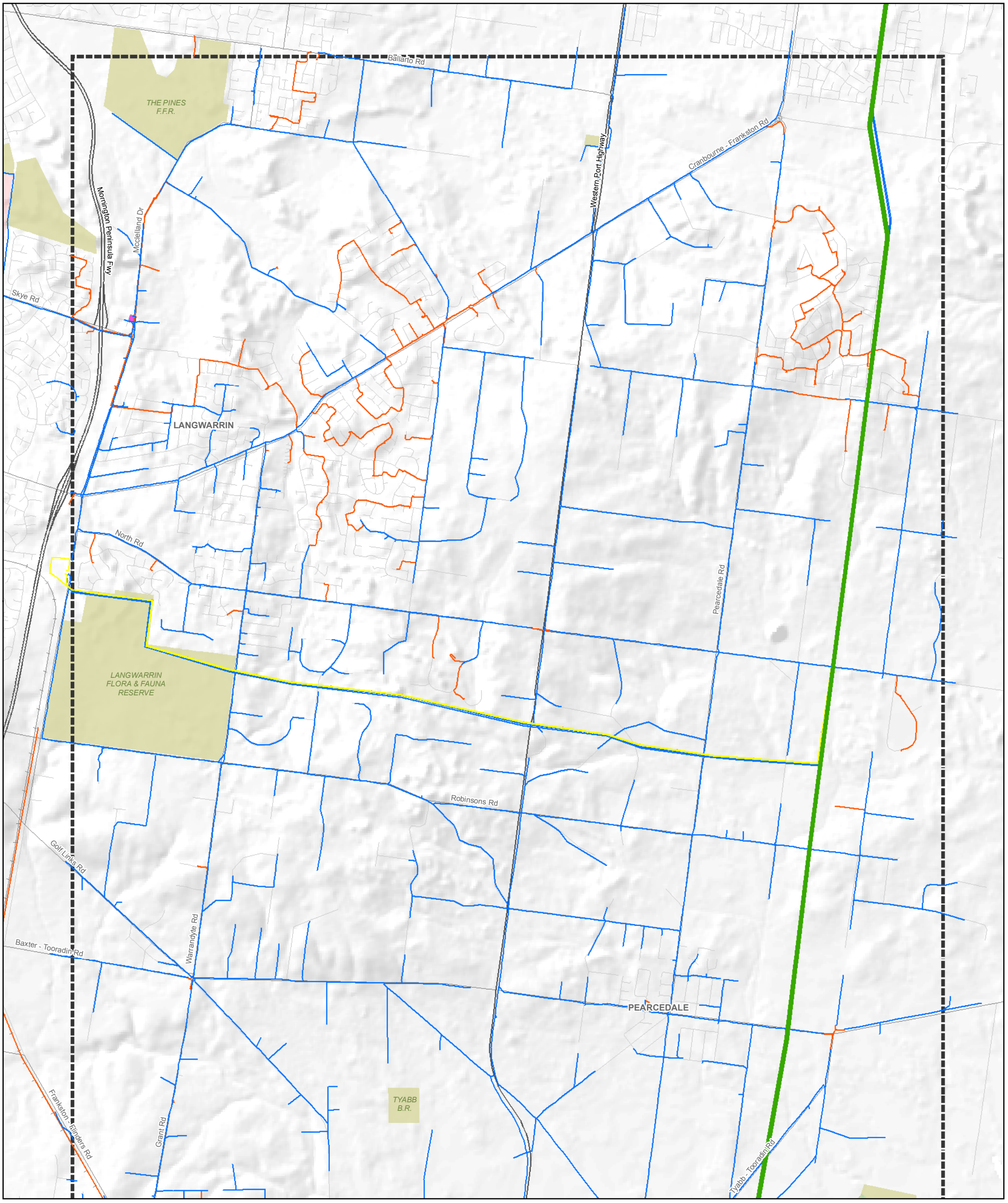
Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: AusNet
- Trans Cond 220kV
- Trans Cond 66kV

Source: United Energy
Lines (Above Ground)
- High Voltage Line (22kV to 66kV)

Cables (Underground)
- High Voltage Cable (22kV to 66kV)

Power Stations
- Zone Substation
- Towers
- StudyArea

VicMap Data
- Highway
- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Power

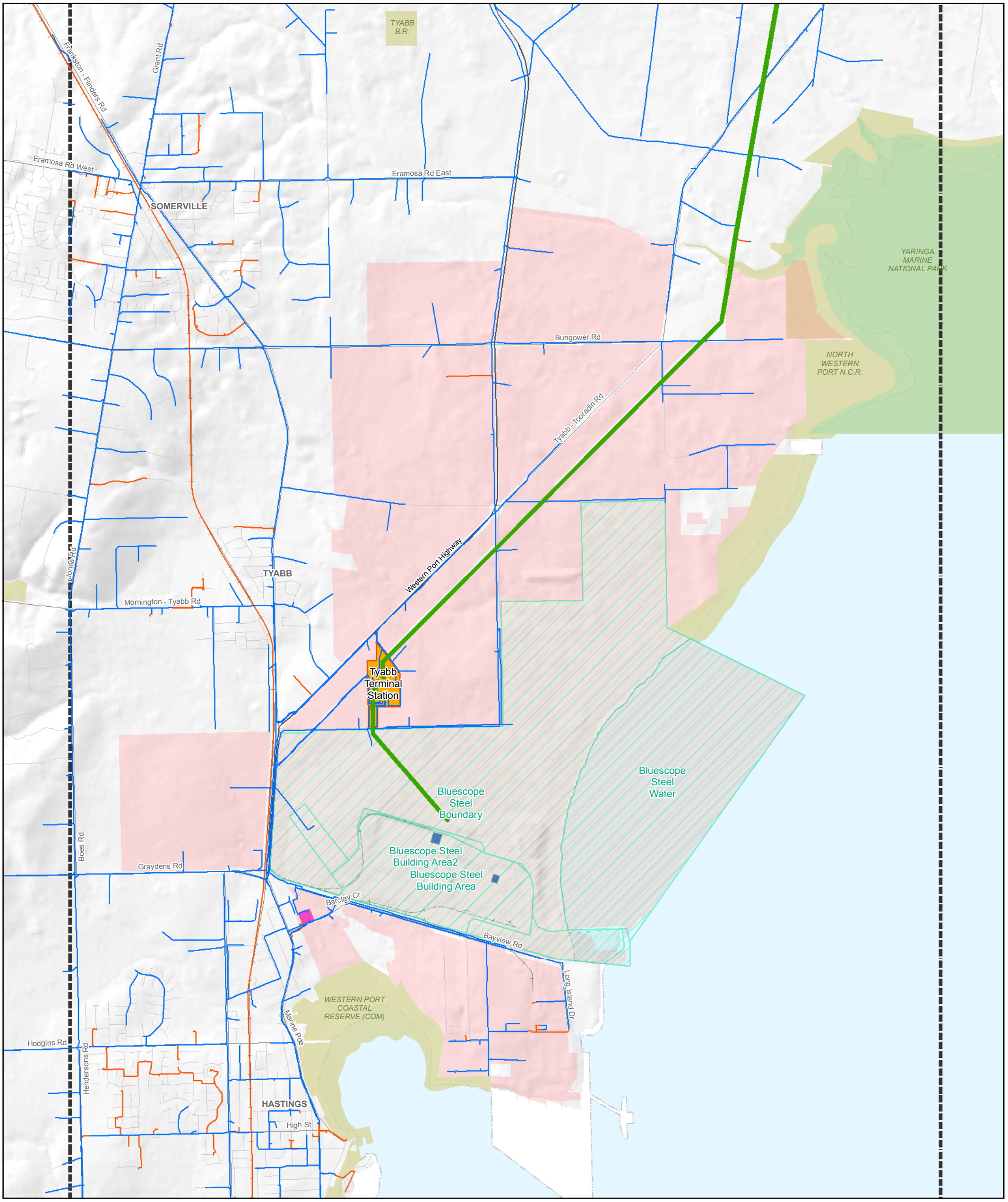
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 2

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 4]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: AusNet
- Trans Cond 220kV

Source: United Energy

Lines (Above Ground)
- High Voltage Line (22kV to 66kV)

Cables (Underground)
- High Voltage Cable (22kV to 66kV)

Power Stations
- Zone Substation
- Bluescope Steel Sub Station

- Tyabb Terminal Station
- Towers
- Bluescope Steel Boundaries (Source: GHD)
- StudyArea

VicMap Data
- Highway
- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Power

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 2

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 4]

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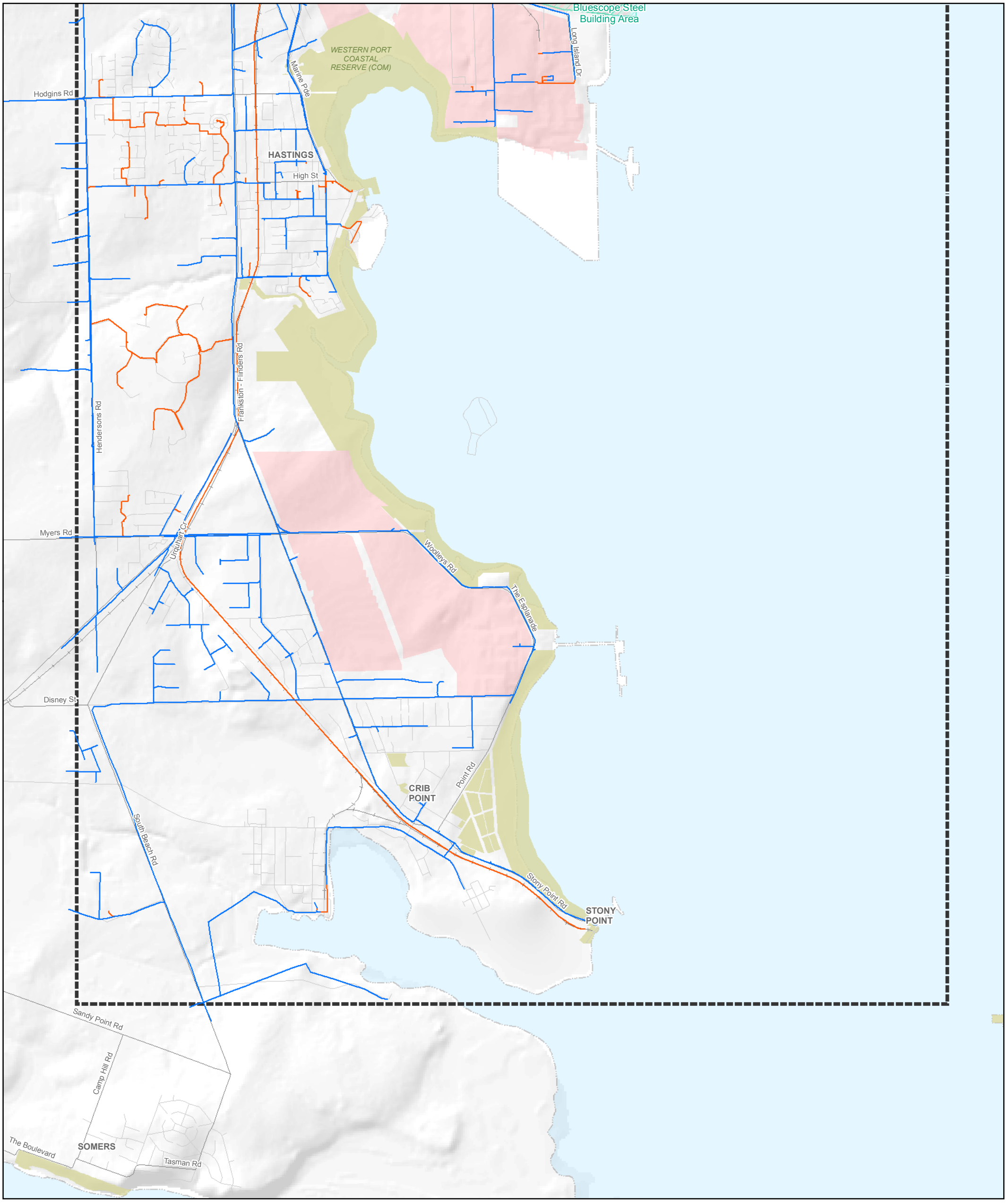

LEGEND

Source: United Energy

Lines (Above Ground)

- High Voltage Line (22kV to 66kV)

Cables (Underground)

- High Voltage Cable (22kV to 66kV)

- Bluescope Steel Boundaries (Source: GHD)
- StudyArea

VicMap Data

- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Power

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 2

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 4]

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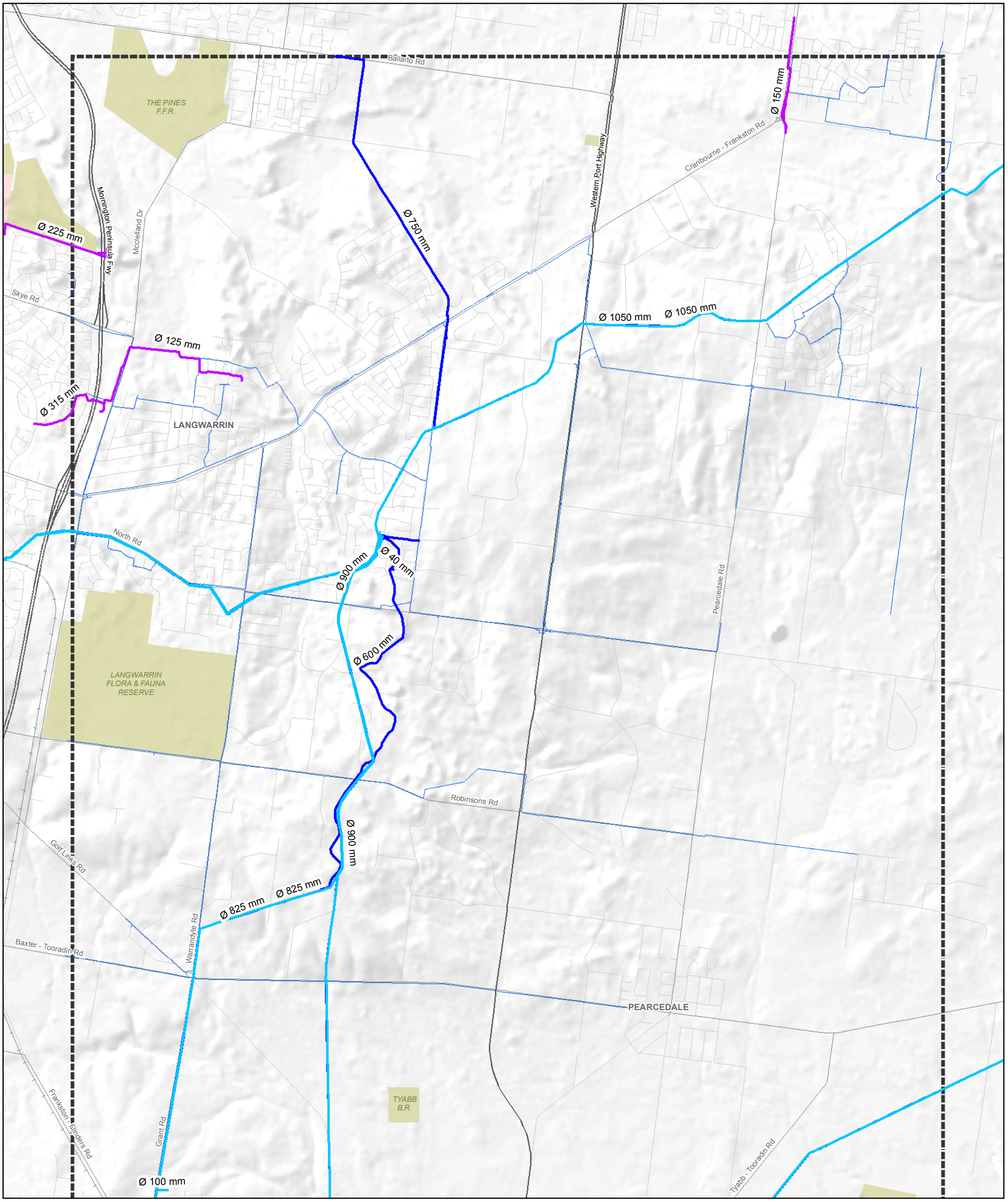

LEGEND

Source: South Easter Water	Source: Melbourne Water	Source: South East Water	VicMap Data	
Recycled Water	Potable Water	Potable Water	Highway	Special Use Zone 1
Recycled Main	Transfer Main	Transfer Main	Arterial	Reserve
		Reticulation Main	Local	National Park
		StudyArea	Rail	

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Potable Water

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 3

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 5]

Level 8, 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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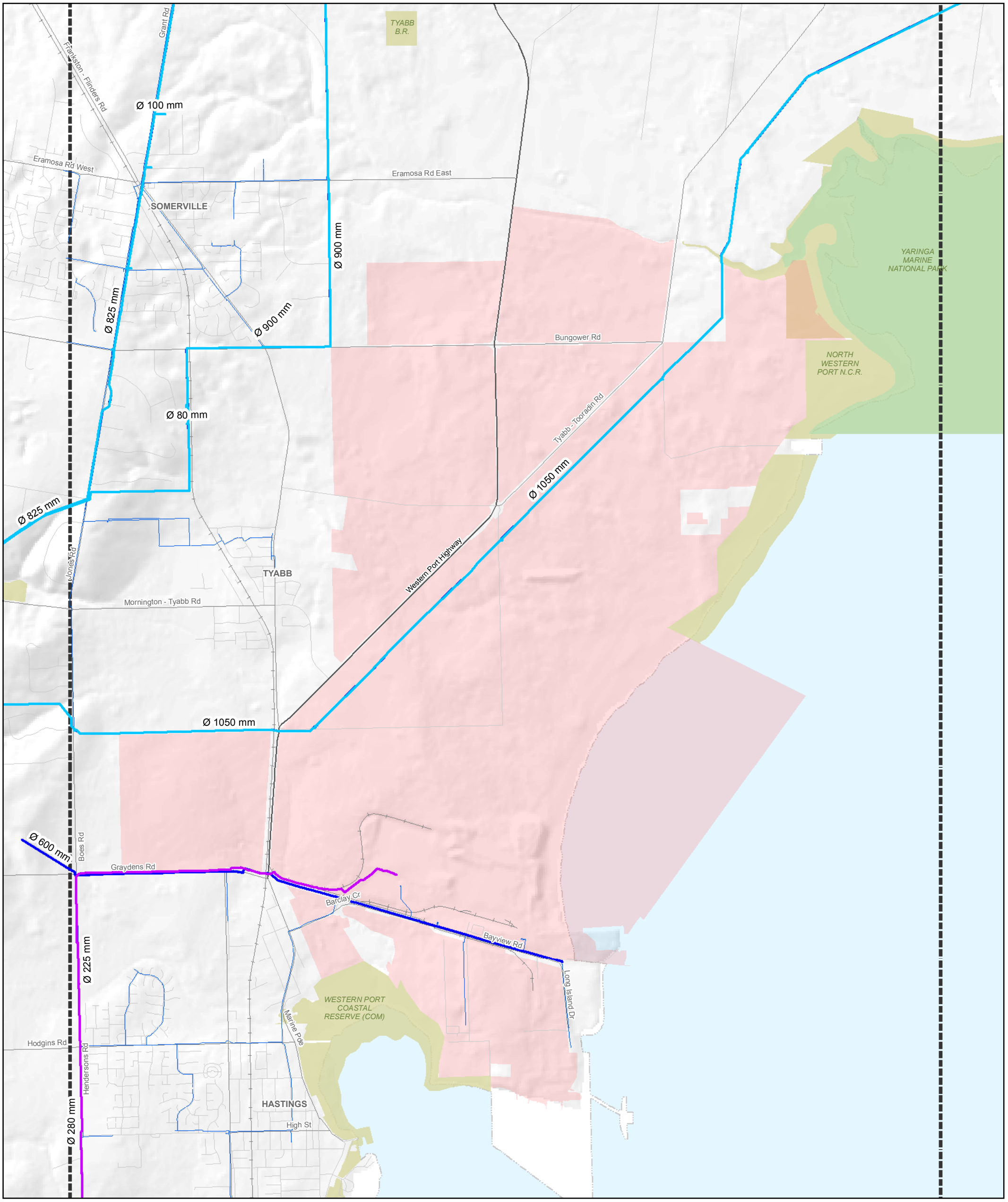

LEGEND

Source: South Easter Water	Source: Melbourne Water	Source: South East Water	VicMap Data	
Recycled Water	Potable Water	Potable Water	Highway	Special Use Zone 1
Recycled Main	Transfer Main	Transfer Main	Arterial	Reserve
		Reticulation Main	Local	National Park
		StudyArea	Rail	

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Potable Water

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 3

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 5]

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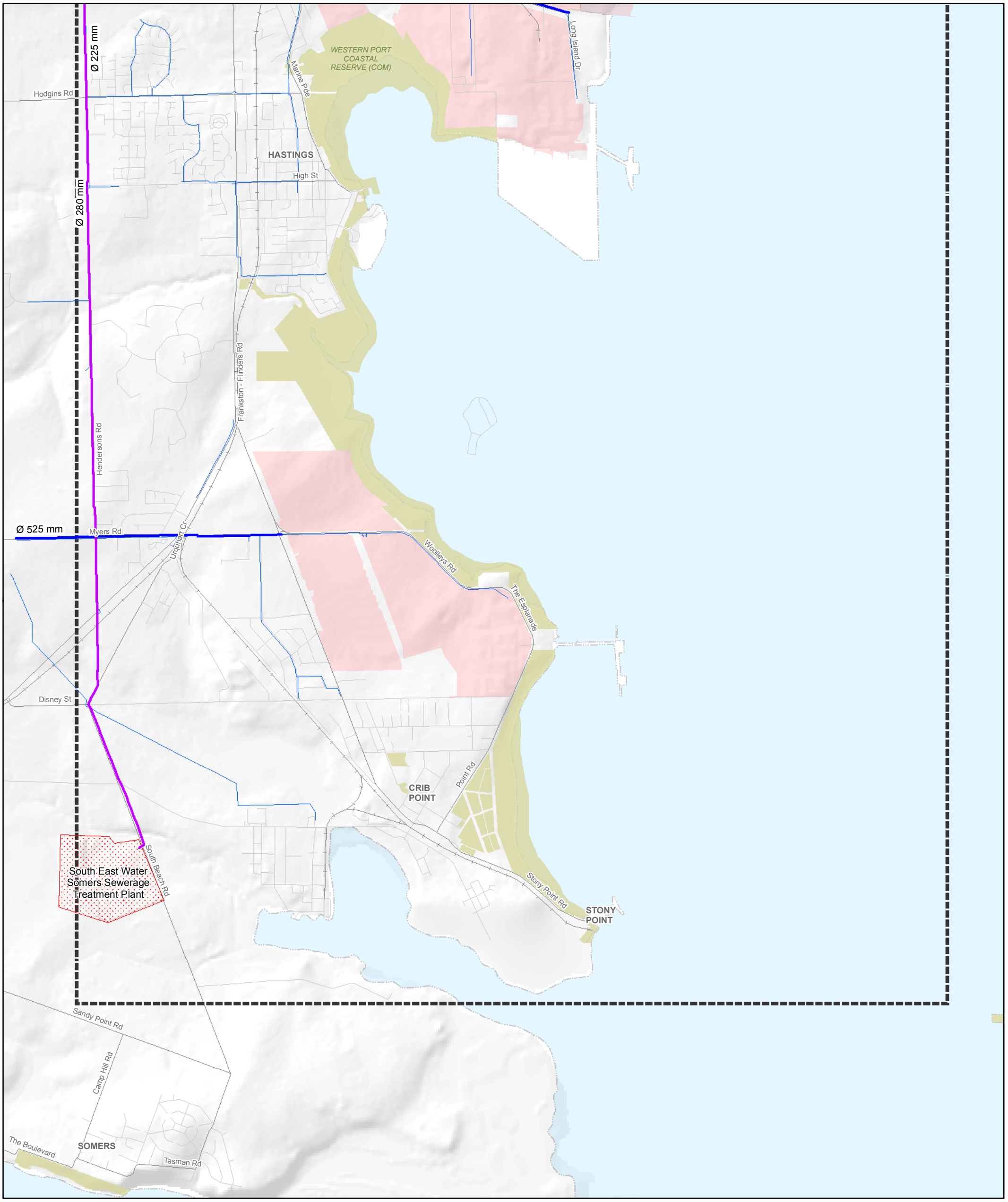
Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: South Easter Water	Source: South East Water	Source: GHD (digitised)	VicMap Data	
Recycled Water	Potable Water	Sewerage Treatment Plant	Arterial	Reserve
Recycled Main	Transfer Main	South East Water Somers Sewerage Treatment Plant	Local	
	Reticulation Main	StudyArea	Rail	
			Special Use Zone 1	

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Potable Water

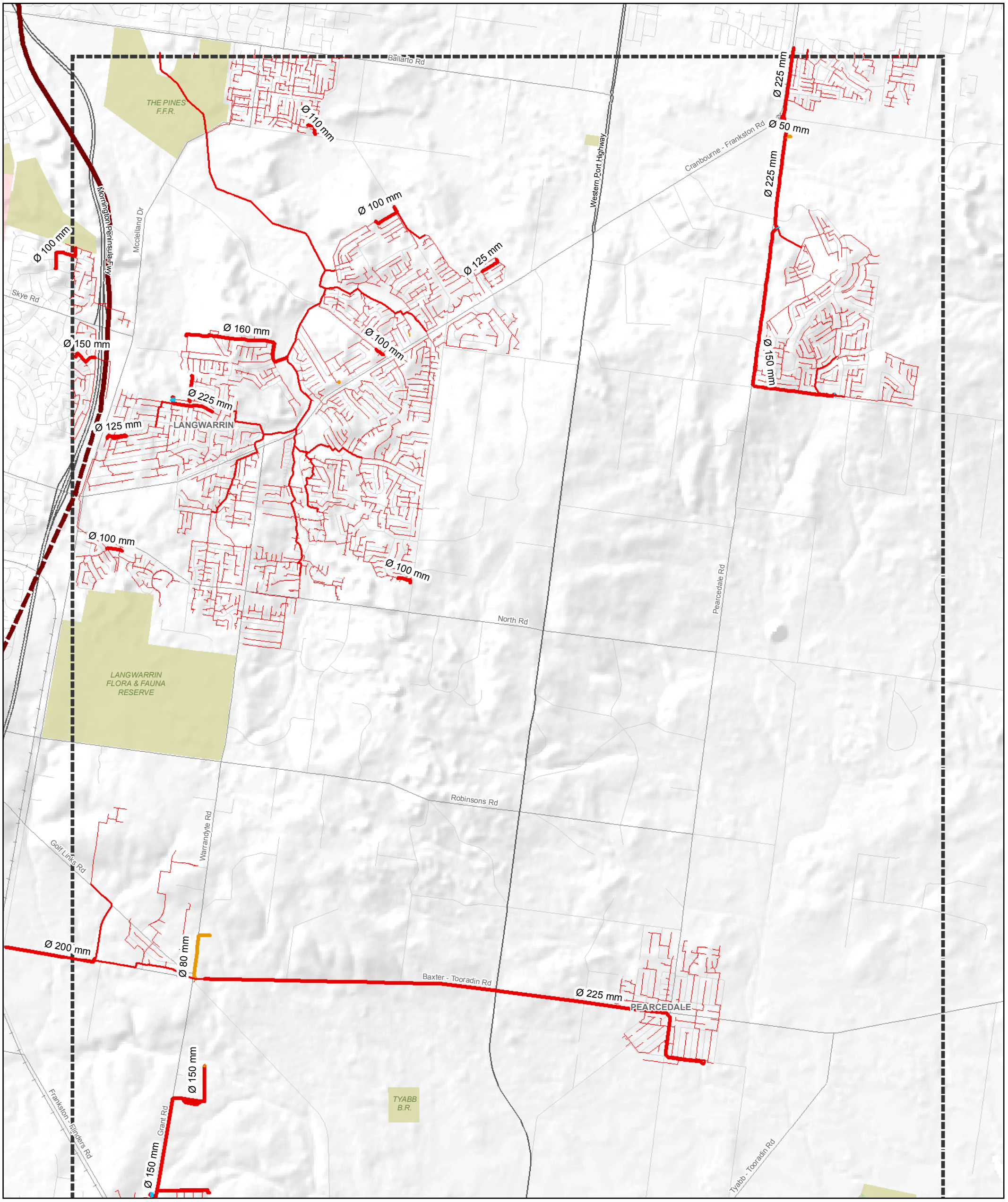
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 3

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 5]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: South East Water

- Melbourne Water Rising Main
- Melbourne Water Trunk Effluent Outfall
- Private Rising Main
- Private Reticulation
- South East Water Main/Rising Main
- South East Water Branch
- South East Water Reticulation
- South East Water Trunk Effluent Outfall
- StudyArea

VicMap Data

- Highway
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Sewer

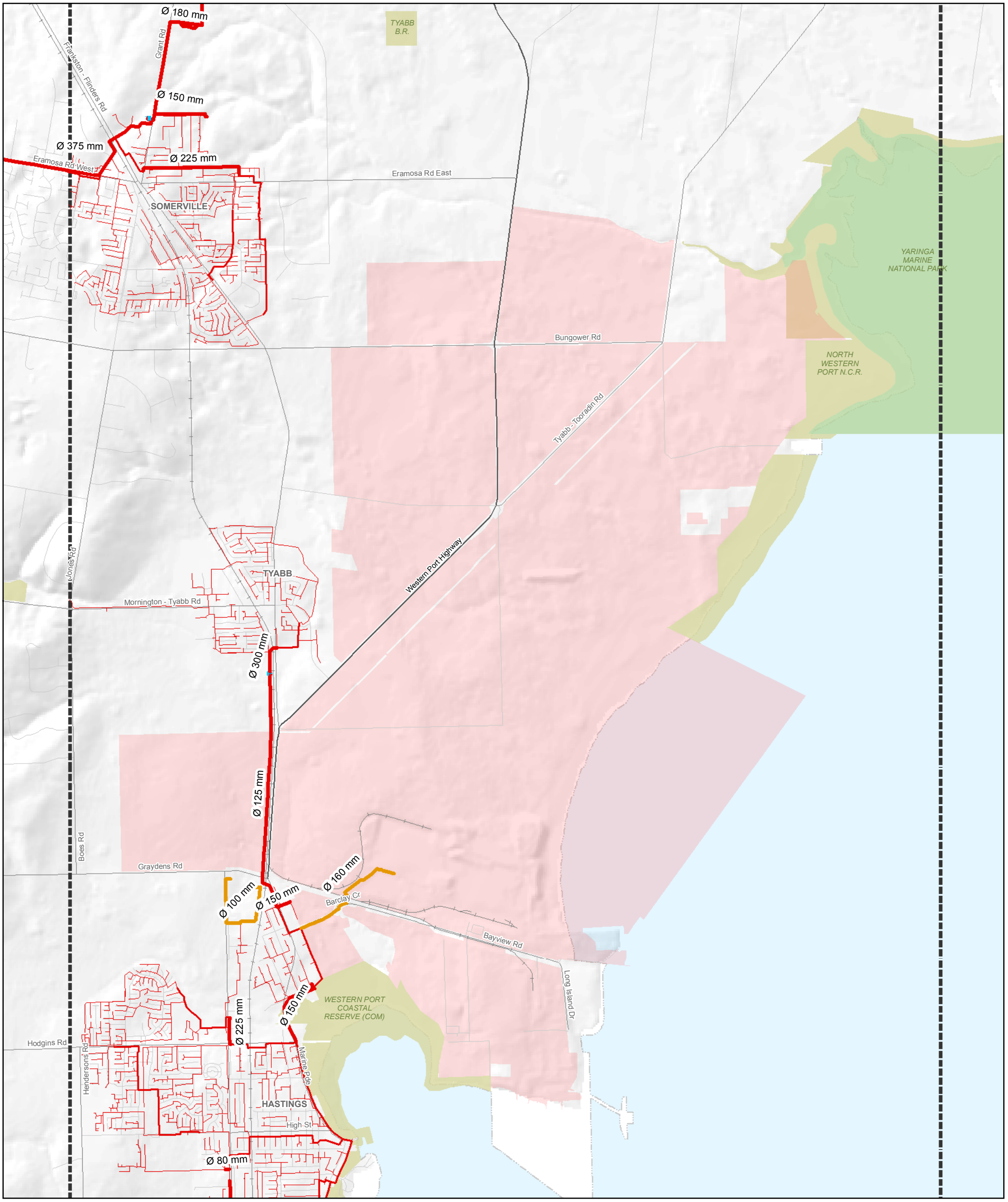
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 4

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 6]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: South East Water

- Private Rising Main
- South East Water Main/Rising Main
- South East Water Branch
- South East Water Reticulation
- South East Water Trunk Effluent Outfall
- StudyArea

VicMap Data

- Highway
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Sewer

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 4

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 6]

Level 8, 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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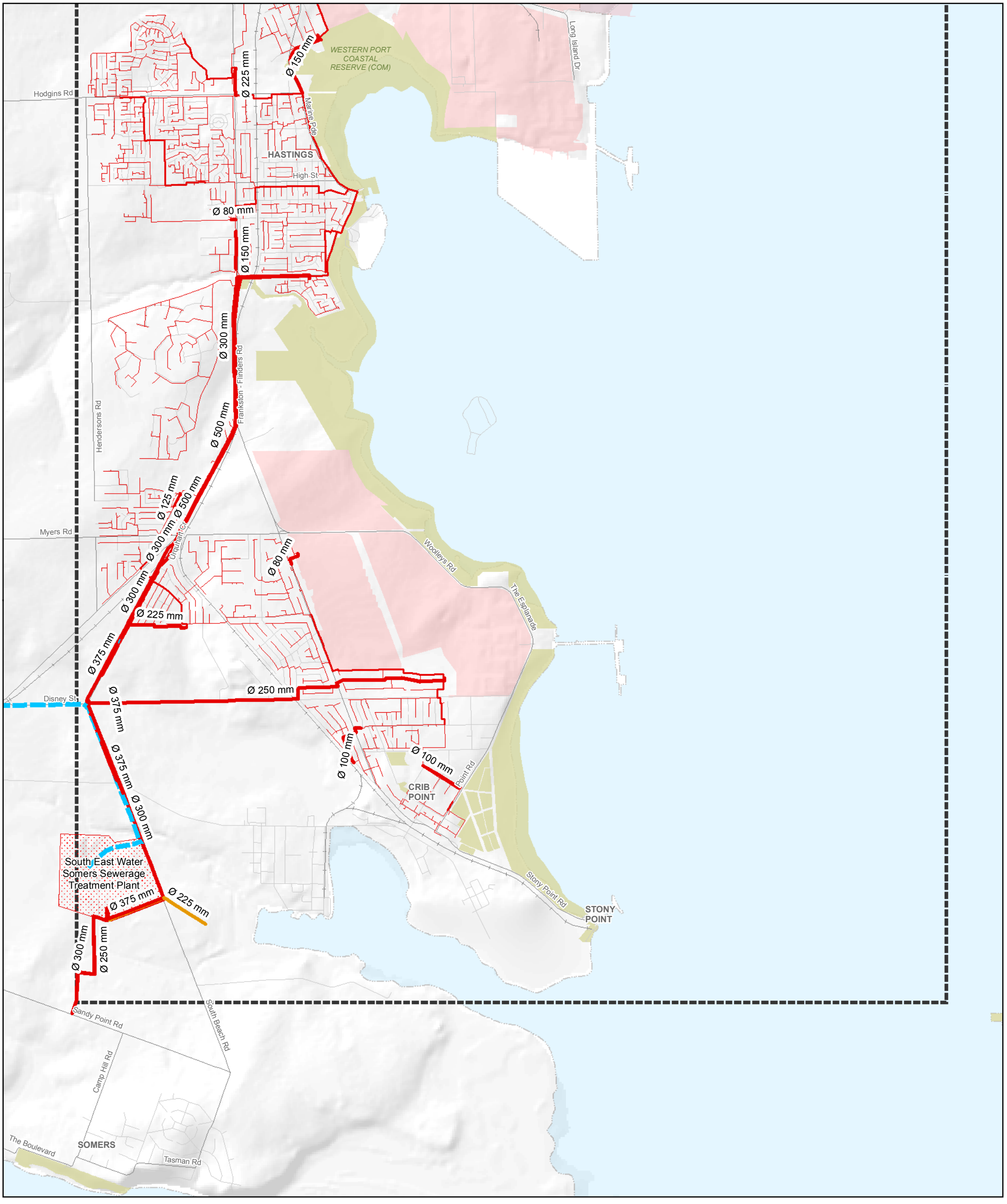

LEGEND

Source: South East Water
- Private Rising Main
- South East Water Main/Rising Main
- South East Water Branch
- South East Water Reticulation

- South East Water Trunk Effluent Outfall

Source: GHD (digitised)
- Sewerage Treatment Plant
- South East Water Somers Sewerage Treatment Plant
- StudyArea

VicMap Data
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Sewer

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 4

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 6]

Level 8, 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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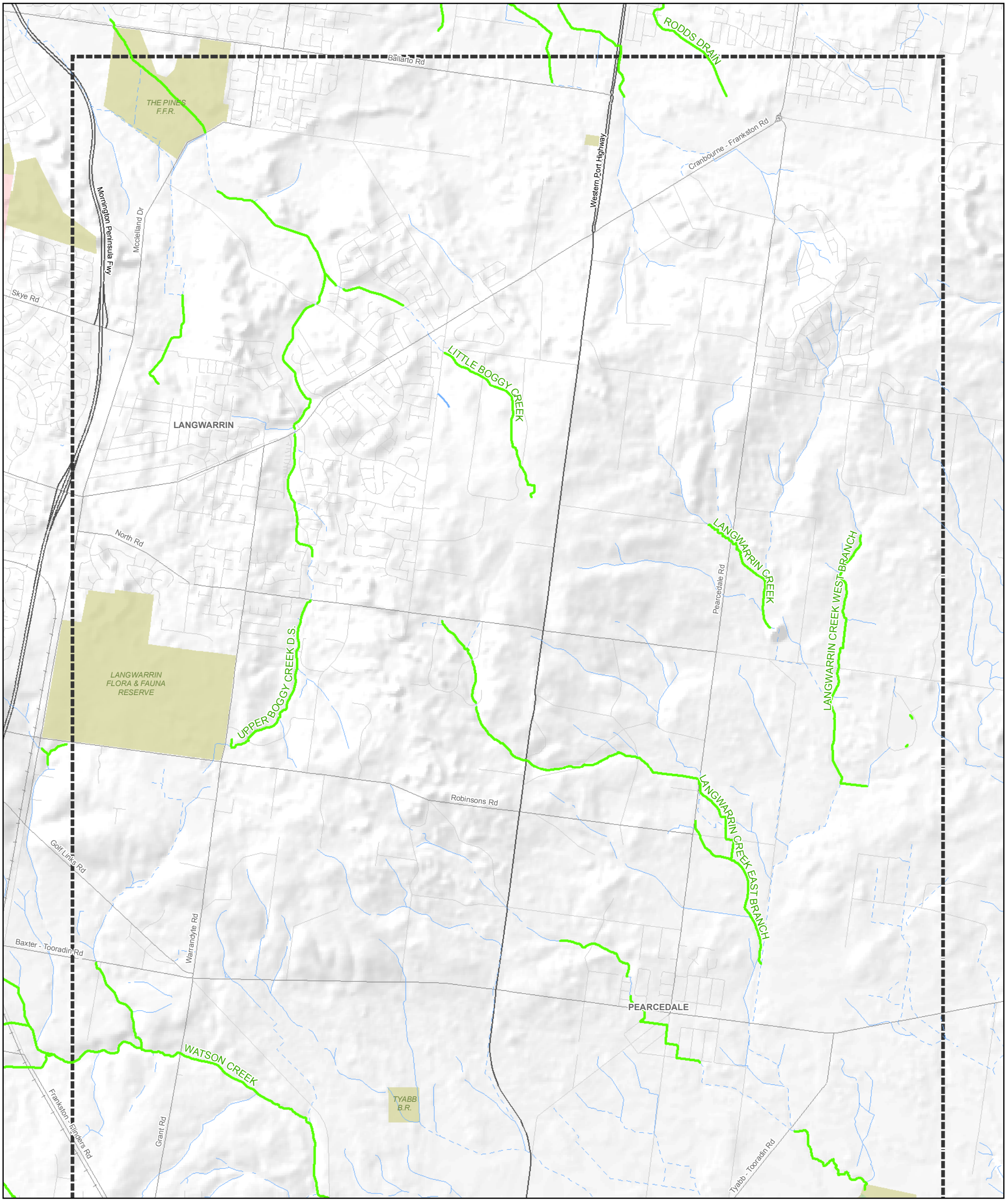


LEGEND

Source: Melbourne Water	Channel / drain	Arterial	National Park
Drains and Natural Waterways	Connector	Local	
Source: VicMap Hydro	StudyArea	Rail	
River	VicMap Data	Special Use Zone 1	
Stream	Highway	Reserve	

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Stormwater

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 5

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 7]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby

WATSON CREEK
TYABB B.R.
LANGWARRIN CREEK
Frankston - Flinders Rd
Grant Rd
Eramosa Rd West
Eramosa Rd East
SOMERVILLE
PEARCEDALE SOUTH
YARINGA MARINE NATIONAL PARK
Bungower Rd
NORTH WESTERN PORT N.C.R.
Tyabb - Tooradin Rd
Western Port Highway
TYABB
Jones Rd
Mornington - Tyabb Rd
McKIRDY ROAD DRAIN
Bluescope Steel Water
Bluescope Steel Boundary
Boes Rd
Graydens Rd
OLIVERS CREEK
Bluescope Steel Building Area
Stormwater Discharge from Bluescope Site
Barclay Ct
Stormwater Discharge United Petrolium EPA Licence No. 3205
Bayview Rd
Stormwater Distcharge from Bluescope Site
Long Island Dr
KINGS CREEK
WESTERN PORT COASTAL RESERVE (COM)
Marine Pde
Hodgins Rd
Hendersons Rd
HASTINGS
High St
ESSO Stormwater Discharge from EPA Licence No. 2613
WARRINGINE CREEK

LEGEND

Source: Melbourne Water
- Drains and Natural Waterways

Source: VicMap Hydro
- River
- Stream
- Channel / drain
- Connector
- StudyArea

VicMap Data
- Highway
- Arterial
- Local
- Rail

- National Park
- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Stormwater

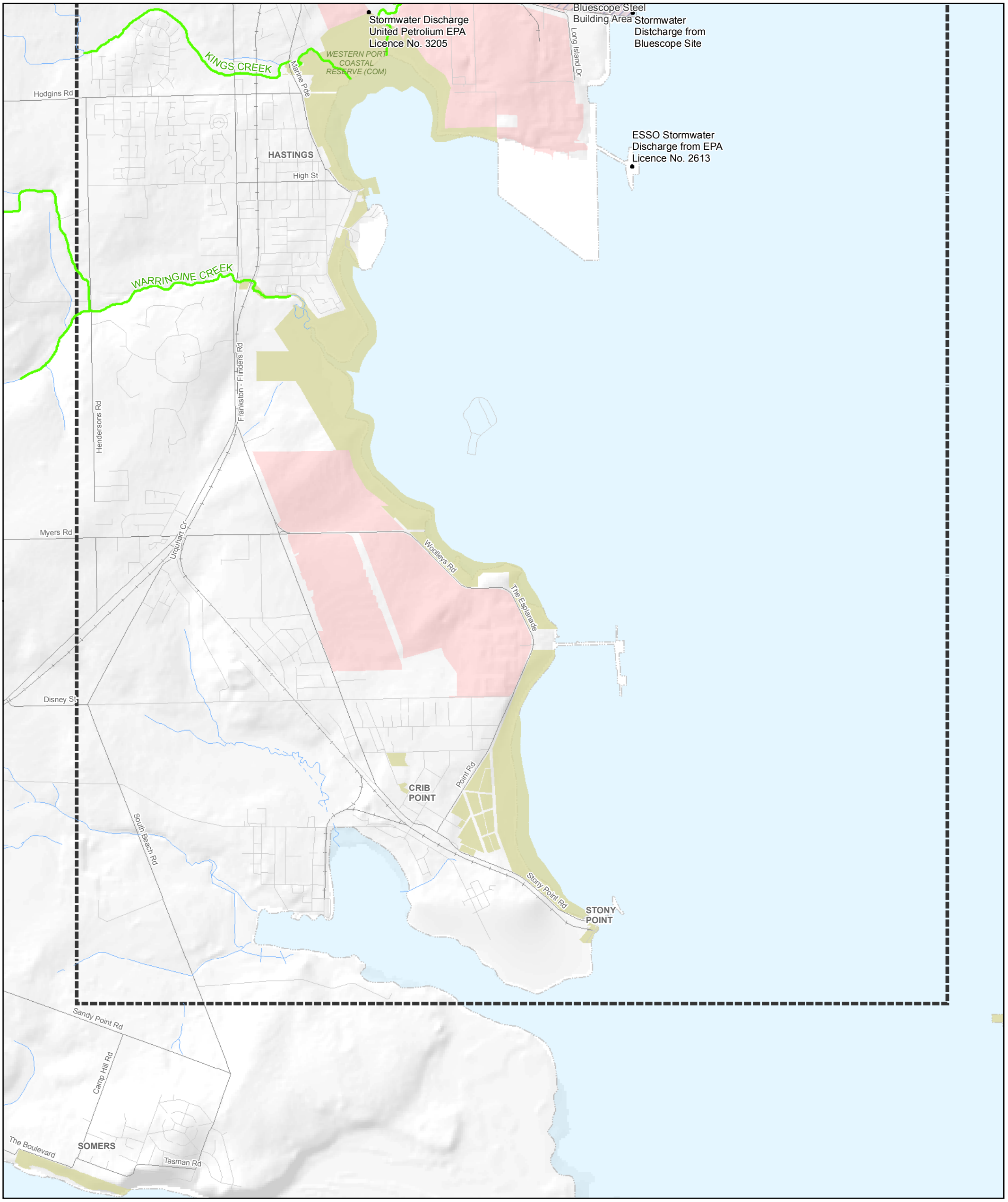
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 5

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 7]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: Melbourne Water
- Drains and Natural Waterways

Source: VicMap Hydro
- Stream
- Channel / drain

StudyArea

VicMap Data
- Arterial
- Local
- Rail

Special Use Zone 1

Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Stormwater

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 5

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 7]

Level 8, 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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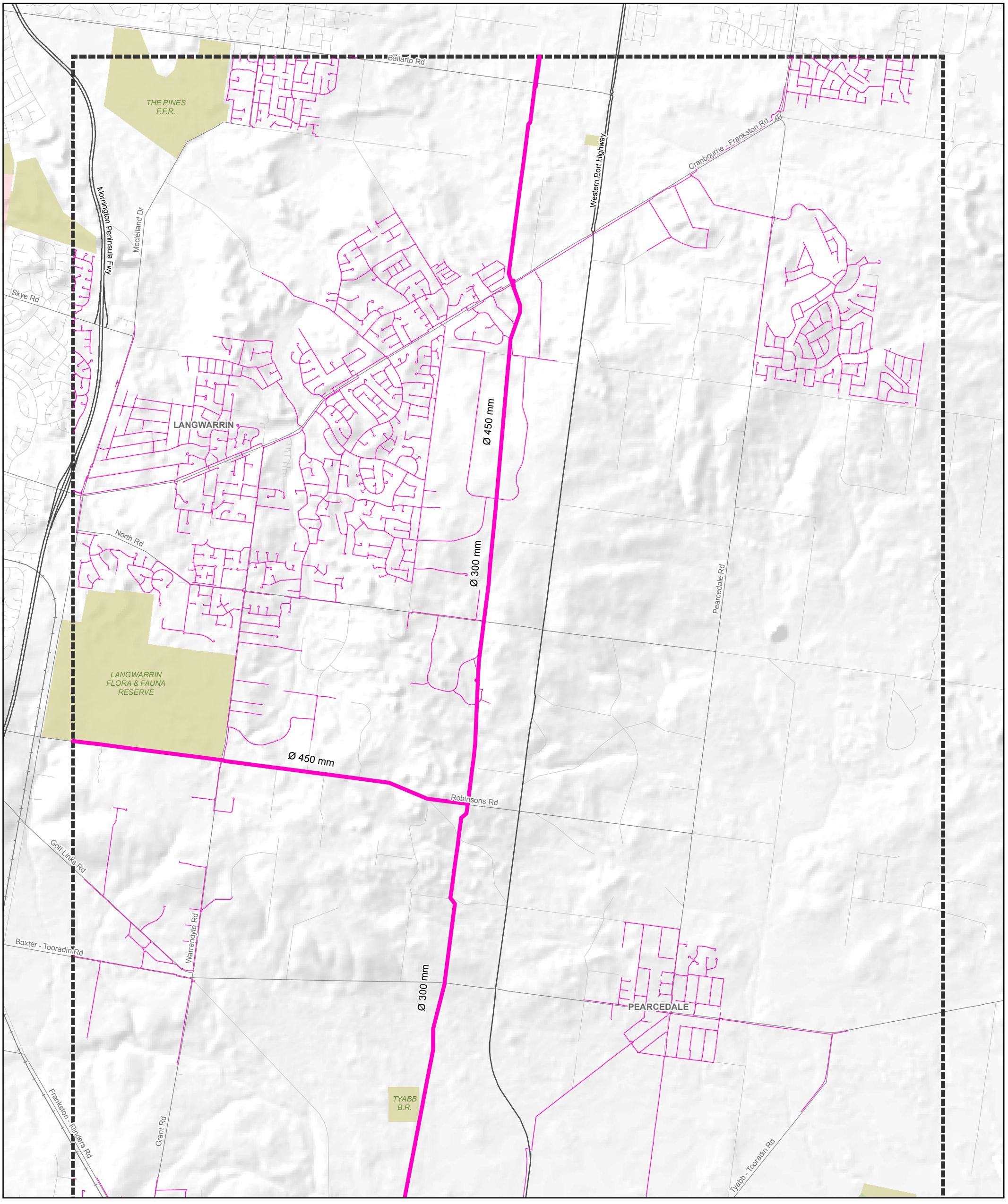


LEGEND

Source: APA

- Transmission Main
- Distribution Pipe
- StudyArea

VicMap Data

- Highway
- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Gas

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 6

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 8]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby

TYABB B.R.
Frankston - Flinders Rd
Grant Rd
Eramosa Rd West
Eramosa Rd East
SOMERVILLE
Ø 300 mm
Bungower Rd
YARINGA MARINE NATIONAL PARK
NORTH WESTERN PORT N.C.R.
Tyabb - Tooradin Rd
Western Port Highway
Jones Rd
TYABB
Ø 150 mm
Mornington - Tyabb Rd
Ø 300 mm
Ø 250 mm
Boes Rd
Graydens Rd
Barclay Cr
Ø 250 mm
Bayview Rd
Ø 80 mm
Long Island Dr
WESTERN PORT COASTAL RESERVE (COM)
Marine Pde
Hodgins Rd
Hendersons Rd
HASTINGS
High St
300 mm

LEGEND

Source: APA
- Transmission Main
- Distribution Pipe
- StudyArea

VicMap Data
- Highway
- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Gas

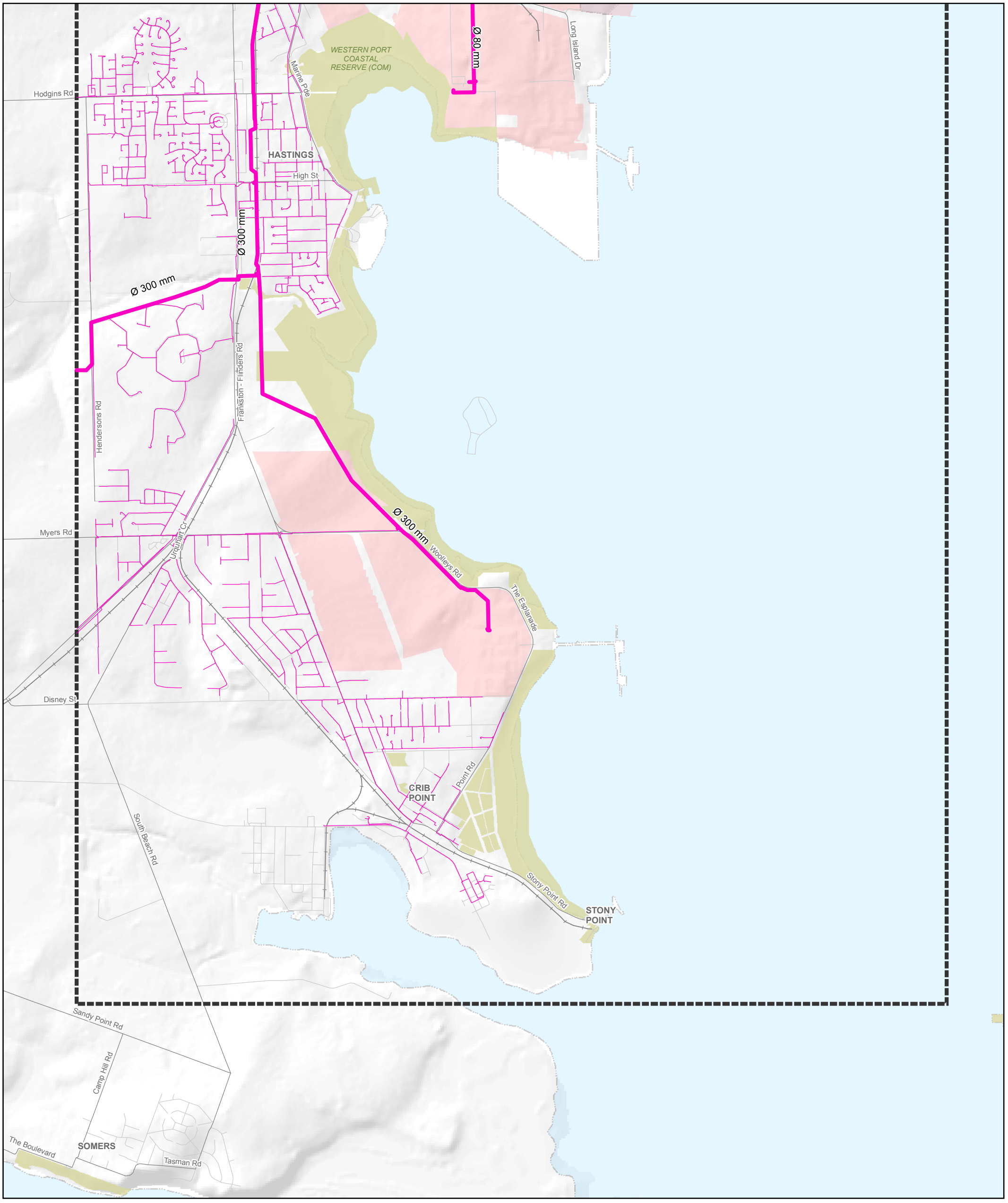
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 6

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 8]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: APA

- Transmission Main
- Distribution Pipe
- StudyArea

VicMap Data

- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Gas

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 6

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 8]

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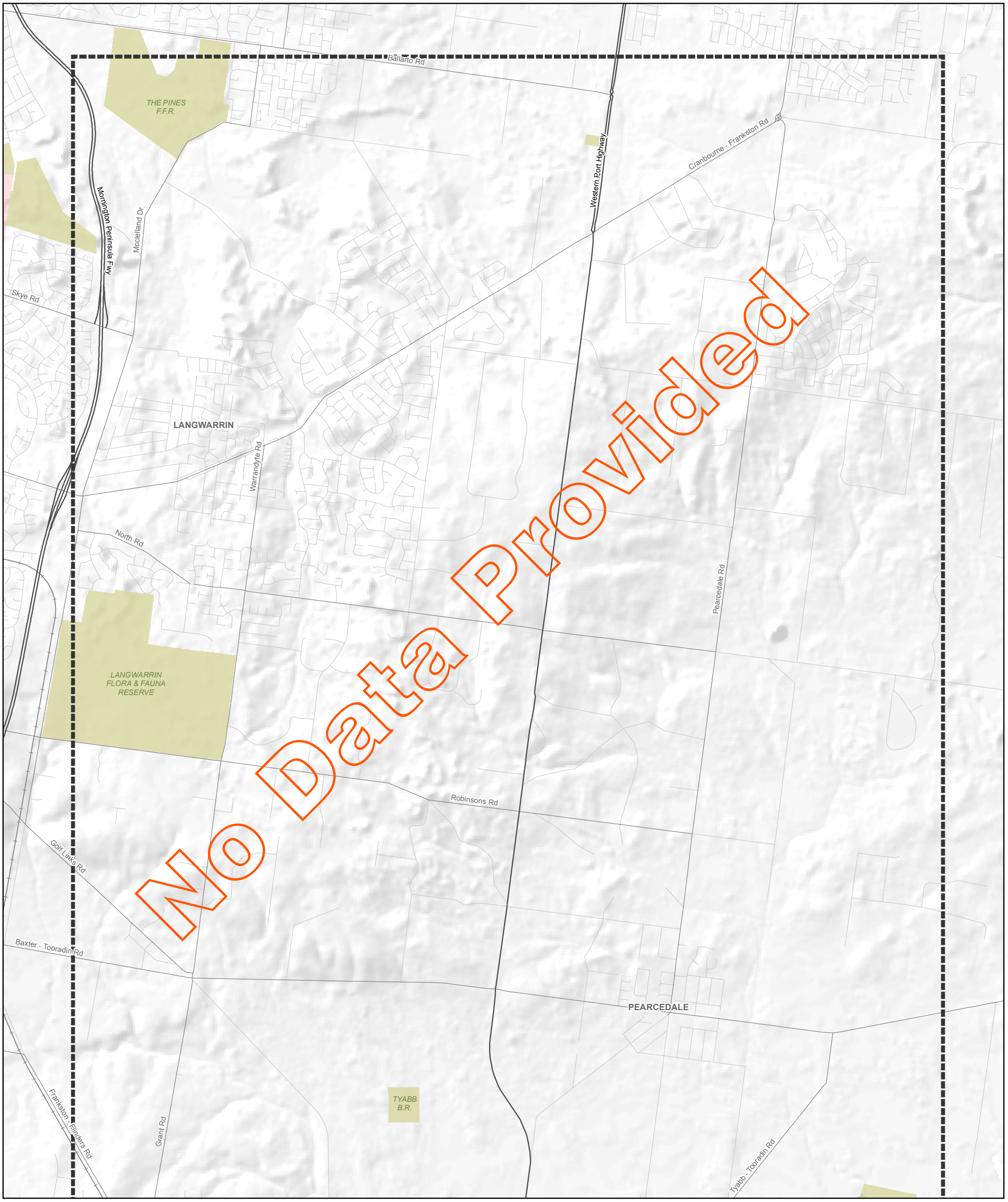

LEGEND

StudyArea
VicMap Data
Highway
Arterial
Local
Rail
Special Use Zone 1
Reserve
National Park

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A

Telecommunications

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 7

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 9]

Level 8, 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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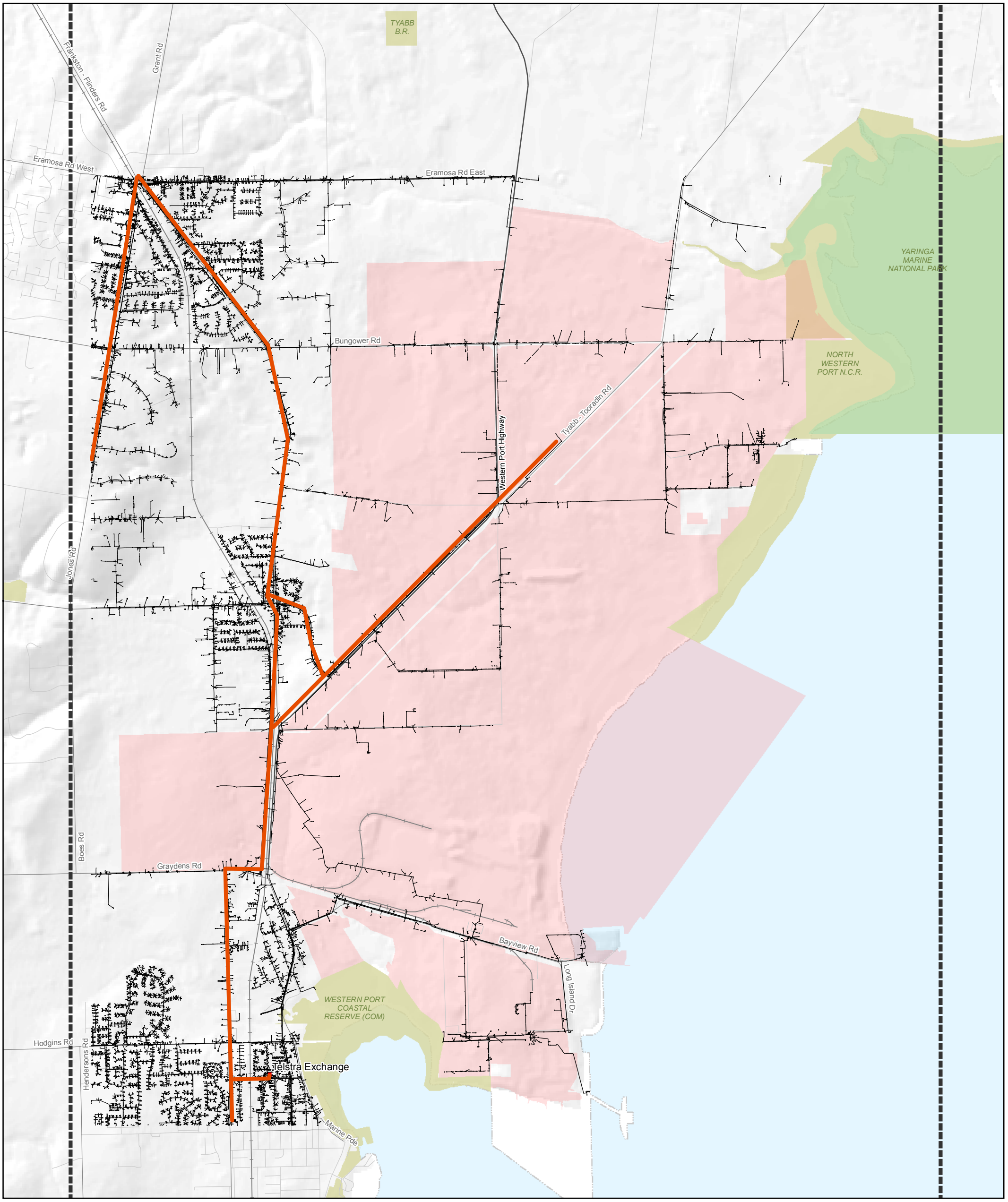


LEGEND

Source: GHD (digitised)	StudyArea	Rail
Telstra Main	VicMap Data	Special Use Zone 1
Telstra Exchange	Highway	Reserve
Source: Telstra (georeferenced)	Arterial	National Park
Telstra (other lines)	Local	

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B

Telecommunications

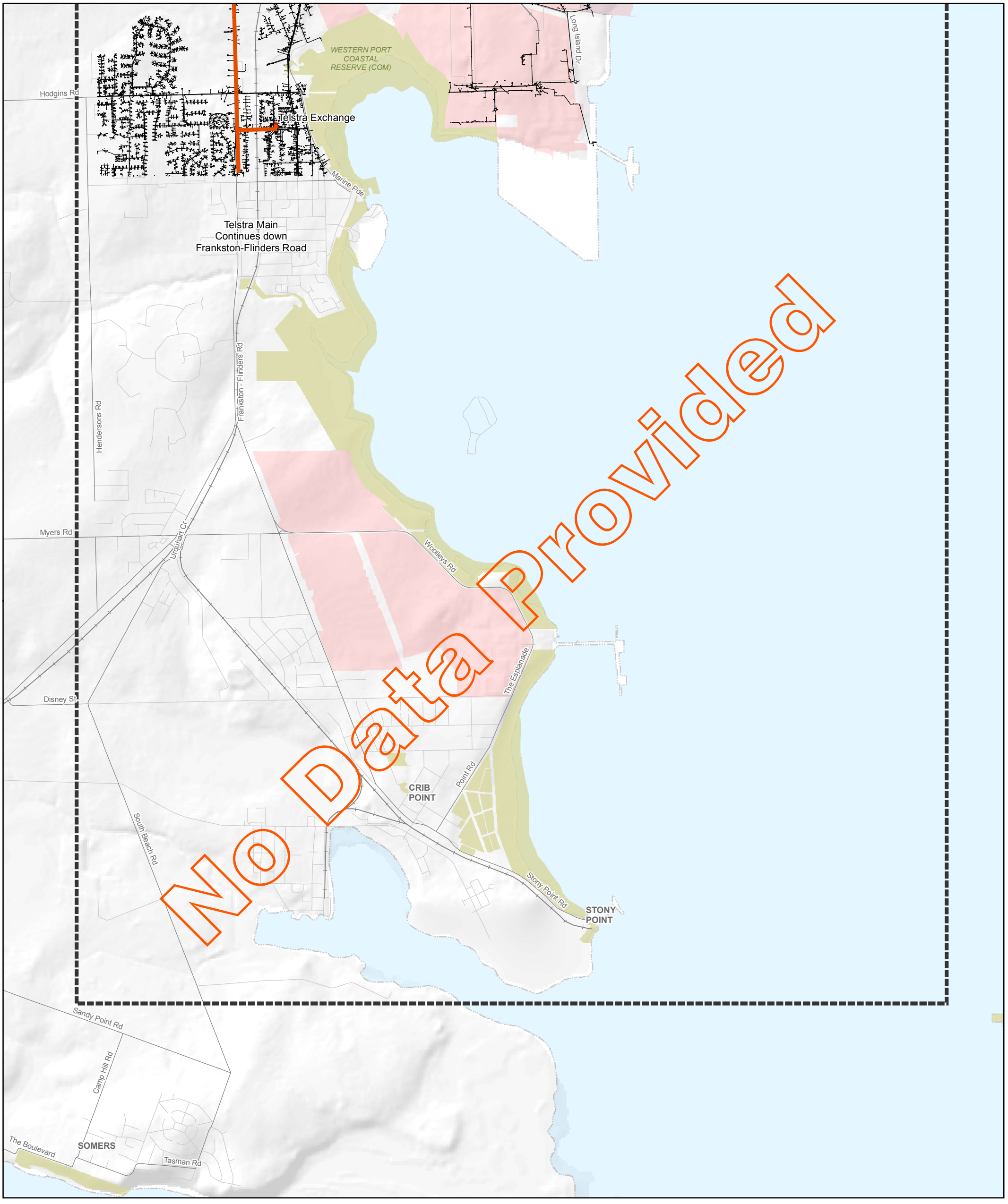
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 7

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 9]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

Source: GHD (digitised)
- Telstra Main
- Telstra Exchange

Source: Telstra (georeferenced)
- Telstra (other lines)

- StudyArea

VicMap Data
- Arterial
- Local
- Rail

- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 5 10 20 30 40 50

Kilometers

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

N

PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C

Telecommunications

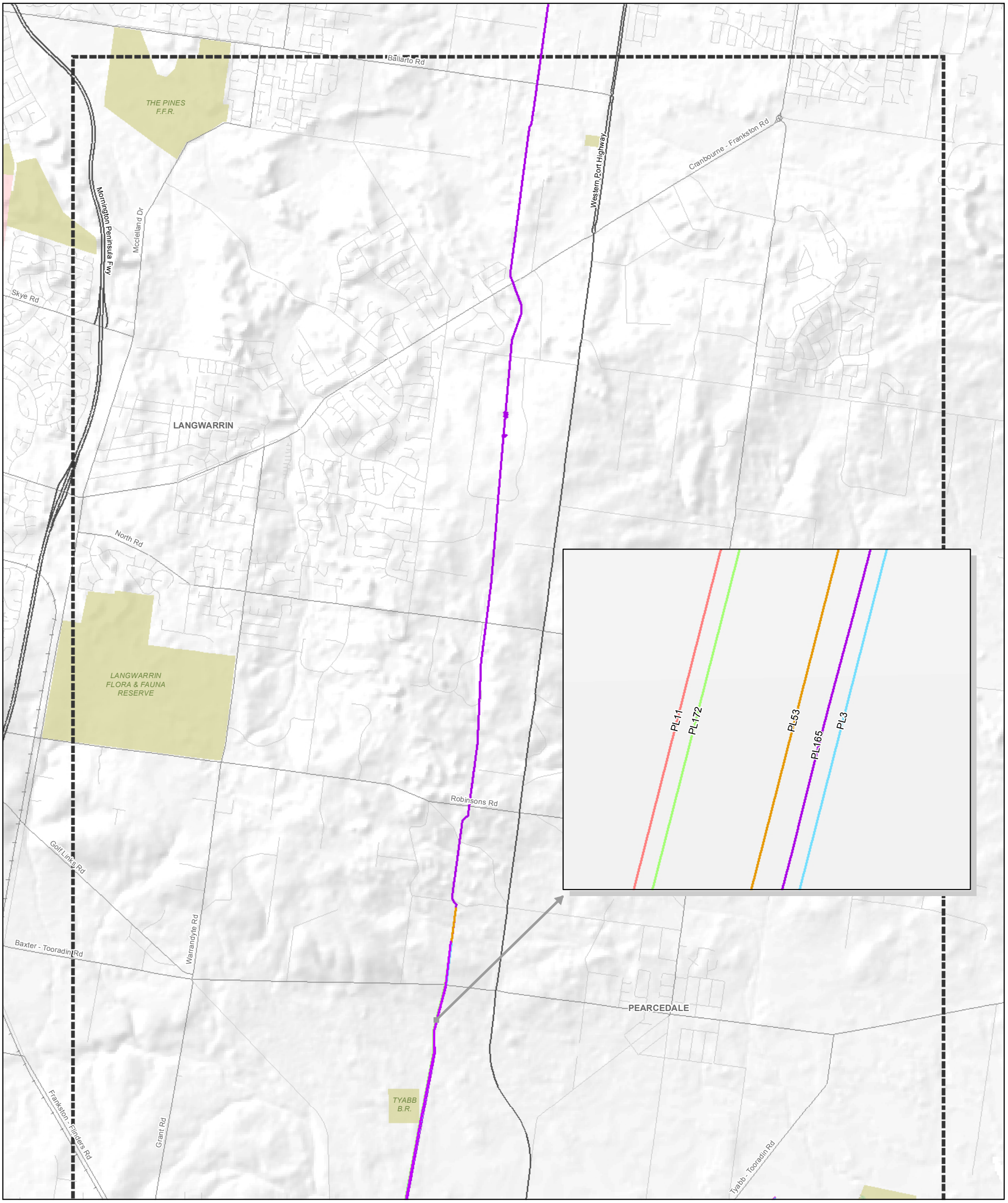
Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 7

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_UtilitiesKBM_A3P.mxd [KBM: 9]

Level 8, 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

Data source: DEPI, VicMap, 2014; GHD, 2014 Created by: nkostraby



LEGEND

- PL11- Vic Gas Distribution (300-450mm)
- PL172 - Elgas Reticulation (100mm)
- PL3 - Crib Point Terminal (200mm)
- PL34 - Esso Australia (250mm)
- PL35 - Esso Australia (700mm)
- PL53 - Esso Australia (250mm)
- PL65 - WAG Pipeline (450-600mm)
- StudyArea
- VicMap Data
- Highway
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

0 0.0225 0.045 0.09 0.135 0.18 0.225

Kilometers

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

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PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet A
Private Assets

Job Number	XX-12345
Revision	0
Date	18 Mar 2015

Figure 8

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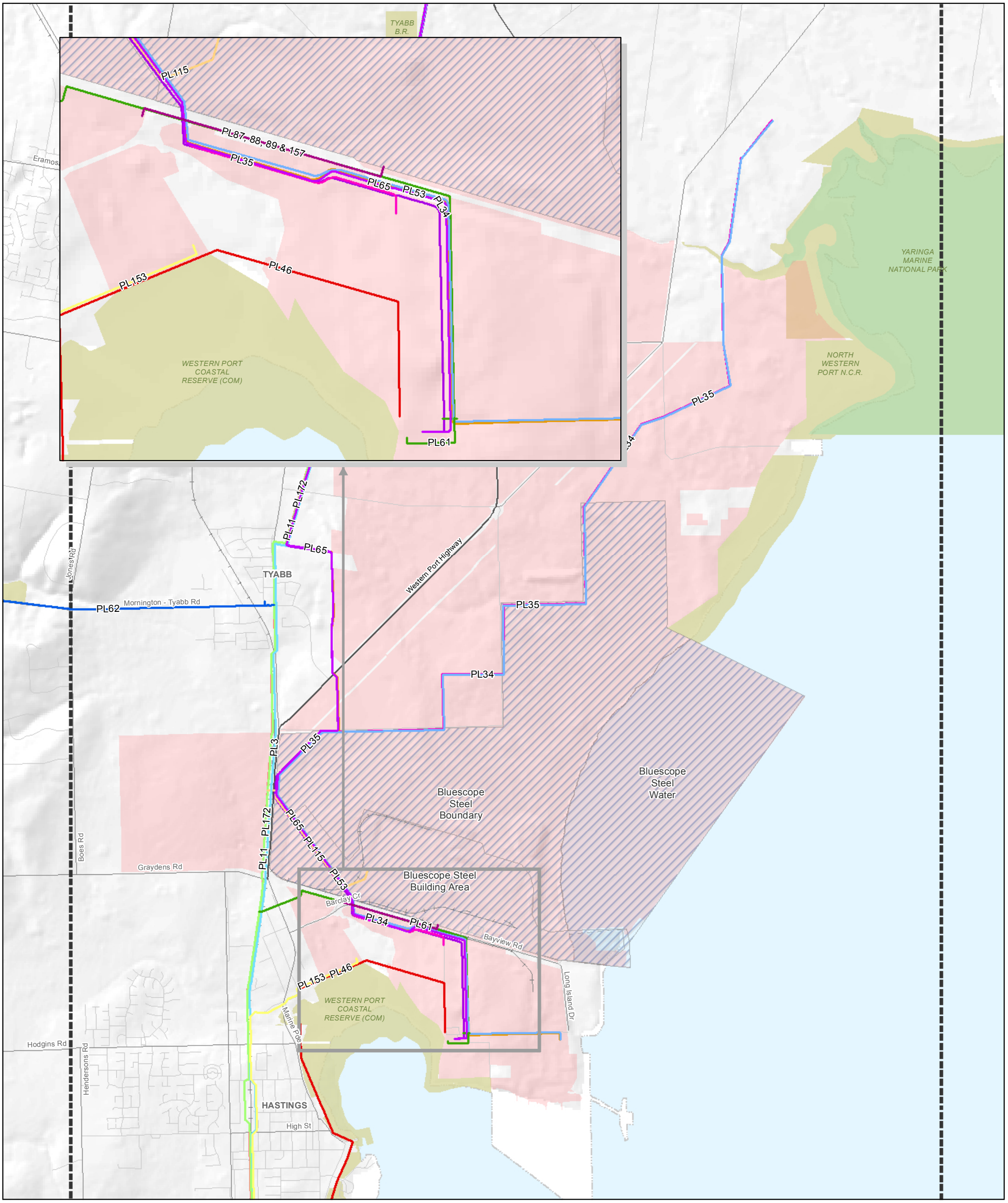
Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com

Data source: DEPI (2014), Port of Hastings Development Authority (2014) Created by:nkostraby



LEGEND

- PL11- Vic Gas Distribution (300-450mm)
- PL115 - Vic Gas Distribution (250mm)
- PL153 - United Terminals (300mm)
- PL172 - Elgas Reticulation (100mm)
- PL3 - Crib Point Terminal (200mm)
- PL34 - Esso Australia (250mm)
- PL35 - Esso Australia (700mm)
- PL46 - Esso Australia (1050mm)
- PL53 - Esso Australia (250mm)
- PL61 - Vic Gas Distribution (80-250mm)
- PL62 - Vic Gas Distribution (150mm)
- PL65 - WAG Pipeline (450-600mm)
- PL87, 88, 89 & 157 - BOC Gasses Australia (200mm, 50mm, 150mm & 250mm)
- Bluescope Steel Boundaries (Source: GHD)
- StudyArea

VicMap Data

- Highway
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve
- National Park

1:35,000 Paper Size A3

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Kilometers

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

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PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet B
Private Assets

Job Number	31-31439
Revision	0
Date	18 Mar 2015

Figure 8

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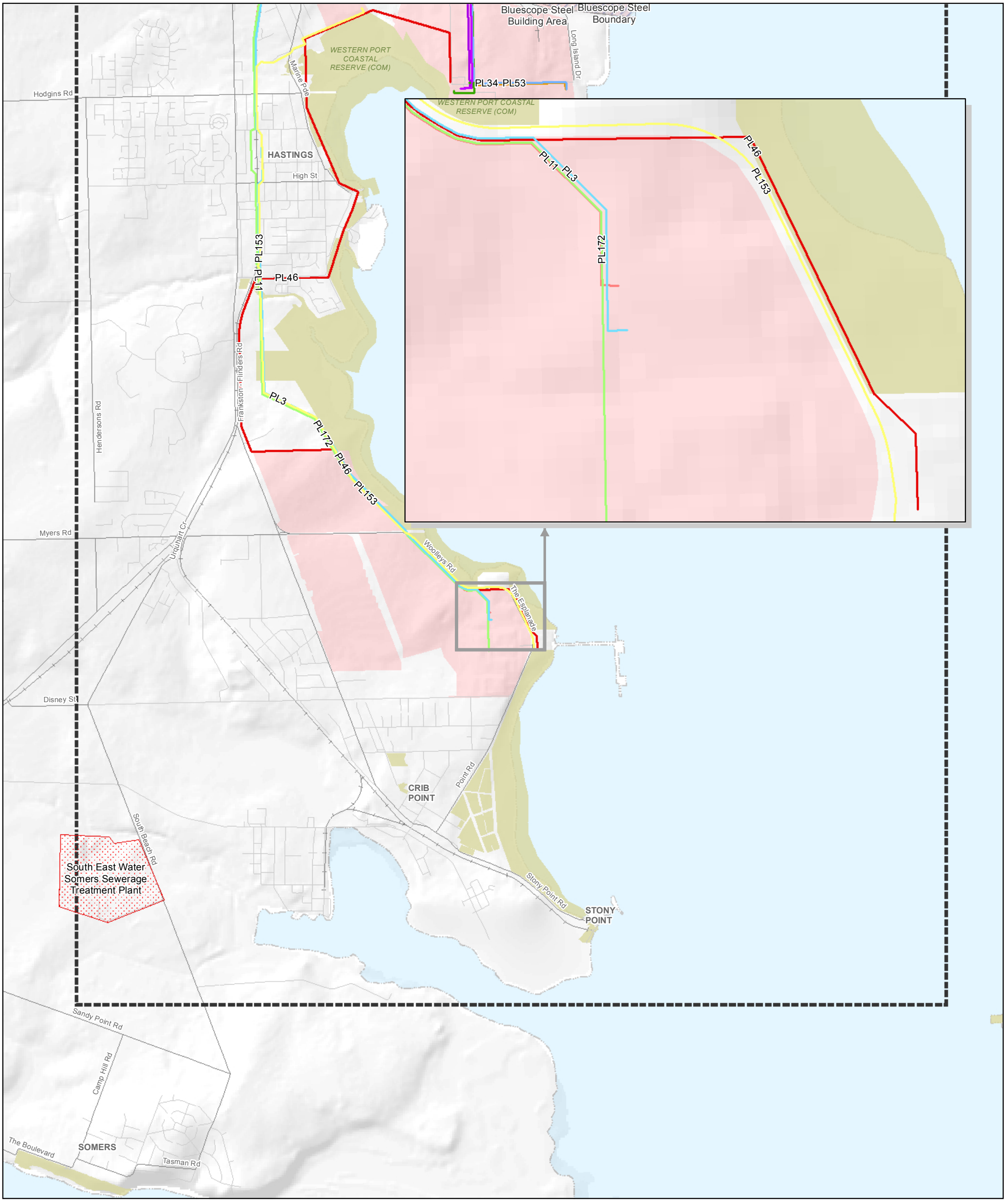
Level 8, 180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com

Data source: DEPI (2014), Port of Hastings Development Authority (2014) Created by:nkostraby



LEGEND

- PL11- Vic Gas Distribution (300-450mm)
- PL153 - United Terminals (300mm)
- PL172 - Elgas Reticulation (100mm)
- PL3 - Crib Point Terminal (200mm)
- PL34 - Esso Australia (250mm)
- PL46 - Esso Australia (1050mm)
- PL53 - Esso Australia (250mm)
- PL61 - Vic Gas Distribution (80-250mm)
- PL65 - WAG Pipeline (450-600mm)
- Bluescope Steel Boundaries (Source: GHD)
- South East Water Somers Sewerage Treatment Plant
- StudyArea
- VicMap Data
- Arterial
- Local
- Rail
- Special Use Zone 1
- Reserve

1:35,000 Paper Size A3

0 0.0225 0.045 0.09 0.135 0.18 0.225

Kilometers

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

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PORT OF HASTINGS DEVELOPMENT AUTHORITY

Port of Hastings Development Authority
Utilities and Services

Sheet C
Private Assets

Job Number 31-31439
Revision 0
Date 18 Mar 2015

Figure 8

G:\31\31439\GIS\Maps\Working\POH\Utilities\31_31439_001_Utilities_PRIVATEASSETS_sheetC_A3P.mxd

Level 8, 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

Data source: DEPI (2014), Port of Hastings Development Authority (2014) Created by:nkostraby

Appendix B Pipeline Register

Title Type	Number	Status	Operator	Tenement Holders	Content	Length (km)	Diameter (mm)	Pressure (kPa)	Application Date	First Granted	Termination Date	Locality
Pipeline Licence	PL3	Current	Crib Point Terminal Pty Ltd	Crib Point Terminal Pty Ltd	Liquid Hydrocarbons	36.59	200	9336	1-Jan-68	1-Jan-68		Crib Point to Dandenong
Pipeline Licence	PL11	Current	Vic Gas Distribution Pty Ltd	Vic Gas Distribution Pty Ltd / APA	Gaseous Hydrocarbons	42.9	300 450	2760	20-Mar-68	30-Apr-68		BP Western Port to Dandenong
Pipeline Licence	PL27	Current	Esso Australia Resources Pty Ltd	BHP Billiton Petroleum (Bass Strait) Pty Ltd Esso Australia Resources Pty Ltd	Liquid Hydrocarbons	173.08	250	8274	15-Aug-68	15-Aug-68		Gippsland Gas Processing Plant to Cranbourne / Hastings
Pipeline Licence	PL34	Current	Esso Australia Resources Pty Ltd	BHP Billiton Petroleum (Bass Strait) Pty Ltd Esso Australia Resources Pty Ltd	Liquid Hydrocarbons	12.4	250	8274	10-Dec-68	10-Dec-68		Cranbourne / Hastings to Long Island Point
Pipeline Licence	PL35	Current	Esso Australia Resources Pty Ltd	BHP Billiton Petroleum (Bass Strait) Pty Ltd Esso Australia Resources Pty Ltd	Liquid Hydrocarbons	185.15	700	6895	10-Dec-68	10-Dec-68		Dutson (Longford) to Hastings
Pipeline Licence	PL46	Current	Esso Australia Resources Pty Ltd	BHP Billiton Petroleum (Bass Strait) Pty Ltd Esso Australia	Liquid Hydrocarbons	10.8	1050	4500	15-Sep-69	15-Sep-69		Long Island Point to Crib Point

Title Type	Number	Status	Operator	Tenement Holders	Content	Length (km)	Diameter (mm)	Pressure (kPa)	Application Date	First Granted	Termination Date	Locality
				Resources Pty Ltd								
Pipeline Licence	PL53	Current	Esso Australia Resources Pty Ltd	BHP Billiton Petroleum (Bass Strait) Pty Ltd Esso Australia Resources Pty Ltd	Ethane	78.3	250		6-Apr-70	6-Apr-70		Hastings to Altona
Pipeline Licence	PL61	Current	Vic Gas Distribution Pty Ltd	Vic Gas Distribution Pty Ltd / APA	Gaseous Hydrocarbons	3.44	250 80	2760	23-Jun-70	7-Oct-70		Hastings to Tyabb
Pipeline Licence	PL62	Current	Vic Gas Distribution Pty Ltd	Vic Gas Distribution Pty Ltd / APA	Gaseous Hydrocarbons	12.66	150	2760	18-Sep-70	11-Jan-71		Tyabb to Mornington
Pipeline Licence	PL65	Current	WAG Pipeline Pty Ltd	WAG Pipeline Pty Ltd	Liquid Hydrocarbons	135.88	450 600	6030	27-Apr-71	27-Apr-71		Tyabb to Corio
Pipeline Licence	PL87	Current	BOC Gases Australia Ltd	BOC Gases Australia Ltd	Compressed Air	1.1	200		27-Dec-73	27-Dec-73		Along Bayview Rd; Hastings
Pipeline Licence	PL88	Current	BOC Gases Australia Ltd	BOC Gases Australia Ltd	Hydrogen	1.2	50	690	27-Dec-73	27-Dec-73		Along Bayview Rd; Hastings
Pipeline Licence	PL89	Current	BOC Gases Australia Ltd	BOC Gases Australia Ltd	Nitrogen	1.1	150		27-Dec-73	27-Dec-73		Along Bayview Rd; Hastings
Pipeline Licence	PL115	Current	Vic Gas Distribution Pty Ltd	Vic Gas Distribution Pty Ltd / APA	Gaseous Hydrocarbons	1.58	250	2760	26-Feb-74	17-Jan-77		John Lysaght (BlueScope); Hastings to John Lysaght (BlueScope); Hastings

Title Type	Number	Status	Operator	Tenement Holders	Content	Length (km)	Diameter (mm)	Pressure (kPa)	Application Date	First Granted	Termination Date	Locality
Pipeline Licence	PL153	Current	United Terminals Pty Ltd	United Terminals Pty Ltd	Liquid Hydrocarbons	10.4	300	3780		23-Nov-90		Crib Point to Long Island Point
Pipeline Licence	PL157	Current	BOC Gases Australia LTD	BOC Gases Australia Ltd	Compressed Air	1.2	250			31-Oct-91		Along Bayview Rd; Hastings
Pipeline Licence	PL172	Current	Elgas Reticulation Pty Ltd	Elgas Reticulation Pty Ltd	LPG	43	100			30-Sep-94		Crib Pont to Long Island Point and Dandenong

Appendix C Demand Model Technical Note

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Memorandum

To	Sam Williams (Port of Hastings Development Authority)		
CC	Udhaya Arambawela (Port of Hastings Development Authority) Lal Edirisinghe (Port of Hastings Development Authority) Richard Hill (GHD)		
Subject	Technical Note: Services and Utilities Demand Model		
From	Andre Vanderputt / Blake Henderson		
File/Ref No.	AGH-CEP0-RG-MEM-0022	Date	18-Mar-15

Final Working Draft

1.0 Audience for the Technical Note and Demand Model

The audience for this Technical Note and the Services and Utilities Demand Model is the project team within the Port of Hastings Development Authority as part of the Port of Hastings Development Project, previously the Port of Hastings Container Expansion Project Stage 0 (CEP0 Prove Phase). It is assumed that the reader will have prior knowledge of the Port of Hastings Development Project Stage 0.

2.0 Port of Hastings Development Project (the Project)

The Port of Hastings Development Authority (the Authority) is progressing staged planning of the Port of Hastings Development Project. The location of the port is in the vicinity of an existing special use zone 1 (SUZ1) area nominated in the planning scheme (describe) for a port development.

By the mid 2020's it is envisaged that a world-class sustainable container port facility will begin operations at Hastings, handling up to 3 million twenty foot equivalent units (TEUs) each year, increasing to a minimum of 9 million TEUs to support the demand.

3.0 Stage 1 Services and Utilities Work Package

The Stage 1 Services and Utilities Work Package 006 is the first stage in assessing the provision of services and utilities to the Port of Hastings Development (the Project). One component of the Stage 1 Services and Utilities Work Package is the establishment of a high level demand model for services and utilities. This document is a technical note regarding the high level demand model created as part of the Stage 1 Services and Utilities Work Package.

4.0 Purpose of the Technical Note and the Demand Model

The purpose of this technical note is to provide a supporting document to the services and utilities demand model. The demand model is titled AGH-CEP0-EG-CAL-0001 Services and Utilities Demand Forecast Model.xlsm. The purpose of the services and utilities demand model is to establish a high level estimate of the Port's demand for services and utilities.

It is proposed that the demand model will be used to inform an assessment comparing the capacity of the existing services and utilities infrastructure with the forecast demand for services and utilities infrastructure. This assessment will be used to inform the Services and Utilities Stage 2 scope of works, which includes concept design and the preparation of a cost estimate to construct the additional infrastructure required to provide services and utilities to the port development.

5.0 Scope of the Demand Model and Technical Note

The scope of the demand model created as part of the Services and Utilities Stage 1 includes:

- Develop a model to forecast the demand for power, water, sewerage, domestic gas, surface water runoff and telecommunication.
- Develop a model for the four stages of port construction – stage 1, stage 2, stage 3 and stage 4.
- Develop a model that can be updated as the Project progresses in its planning and design lifecycle.
- Use relevant port benchmarks or standards to determine the forecast demand.
- Prepare a technical note supporting the demand model (this document).

6.0 Assumptions

6.1 Project Assumptions

To forecast a services and utilities demand model for the Project a number of assumptions were made regarding the scope of the port development. It is anticipated that as the project progresses, these assumptions will be refined, and the service demand model will be updated.

The modelling assumptions made regarding the scope of the port development included:

- Consistent with the Project requirements, the land use of the port development was divided into the Terminal, the port Precinct, the port Environs and an area for Crib Point and Stony Point.
- The port development would be undertaken in or directly adjacent to the special use zone 1 (SUZ1) area zoned for port land use. This area is in the vicinity north of the township of Hastings.
- The service and utility demand was forecast in four stages. The key assumptions on the port development for the stages are described in Table 1: Key Project Assumptions

Table 1: Key Project Assumptions

Stage	TEU / year	Berth Length (m)	Comment
1	3,600,000	2000	Interpolated from the Stage 4 throughput and the berth length
2	5,400,000	3000	Interpolated from the Stage 4 throughput and the berth length
3	7,200,000	4000	Interpolated from the Stage 4 throughput and the berth length
4	9,000,000	5000	End of project scope. Berth Length derived from 9,000,000 / 1,800 TEU / m of berth

- The unit rates for service or utility demand are based on 2014 references. No forecast has been made on how the demand may vary in the future.

- The areas of associated land use were adopted from AGH-CEP0-REP-0011-B entitled Port Precinct and Port Environs Preliminary Planning Concepts prepared by AECOM + GHD in 2014 as part of the Project. This report listed a forecast land use for a 9,000,000 TEU / year port.

Table 2: Land Use Planning assumptions

Precinct	Land Use Classification	Stage 1 Area (Ha)	Stage 2 Area (Ha)	Stage 3 Area (Ha)	Stage 4 Area (Ha)
Terminal	Terminal	120	180	240	300
Port Precinct	Customs and Agriculture Quarantine IS (AQIS)	10.4	15.6	20.8	26
	Warehousing	60	90	120	150
	Bonded warehousing	20	30	40	50
	Distribution centres	30	45	60	75
	Trucking depots	30	45	60	75
	Empty container parks	108	162	216	270
	Road corridor	40	60	80	100
	Rail corridor	12	18	24	30
	Retail and service areas	2	3	4	5
	Port administration	2	3	4	5
	Storm water treatment, utilities corridor and open space etc	43.6	65.4	87.2	109
Port Environs	Warehousing	60	90	120	150
	Distribution centres	30	45	60	75
	Trucking depots (inc. driver rest and trailer exchange facility)	3.2	4.8	6.4	8
	Road corridor	17.6	26.4	35.2	44
	Rail corridor	0	0	0	0
	Retail and service areas	2	3	4	5
	Manufacturing	60	90	120	150
	Office facilities / port support	2.4	3.6	4.8	6
	Accommodation	3.2	4.8	6.4	8
	Highway fuel and food	8	12	16	20
	Industrial land	40	60	80	100
	Storm water treatment, utilities corridor and open space etc.	22.8	34.2	45.6	57
Stony Point & Cribb Point	Stony Point	4	6	8	10
	Cribb Point	4	6	8	10

- No assessment or provision has been made for the growth of areas adjacent to the proposed port development and the associated increase in demand for services and utilities.

- The total area of SUZ1 is approximately 3,500ha, however based on the current land use planning assumptions only 1,800ha has been allocated for port related development. Hence the 1,800ha has been the primary focus of the demand assessment. The remaining 1,700ha has been assumed to be undeveloped, so has been excluded from the assessment at this stage. The 1,700ha of unallocated land will need to be considered further as design is progressed.

6.2 Power Assumptions

The following assumptions were made in regards to the forecast for power demand:

- Provision has been included for power supply to all ships (cold ironing).
- The demand for cold ironing was based upon a 14,000 TEU Maersk E class ship.
- Navigation aids will be solar powered.
- The terminal will operate 365 days per year.
- The terminal will operate at an average berth occupancy of 70%.
- Ship to shore gantry cranes have 60% utilisation.
- Rail mounted yard gantry cranes have 80% utilisation.
- Refrigerated containers (reefer) will comprise 8.7% of the total TEU and have 100% utilisation.
- Terminal lighting required for 14 hours per day.
- Office and workshops will operate 18 hours per day.
- Trains will be diesel powered.
- Customs and Quarantine area assumed to consist of 50% office space and 50% warehousing.
- Trucking depots area assumed to consist of 20% office space and 80% carpark.
- No allowance has been made for specific requirements associated with manufacturing and industrial related industries. At this stage a general provision has been made based on light industrial use.
- No allowance for diversity factors when calculating power demand. Diversity factors will need to be considered in the next stage.

6.3 Potable Water Assumptions

The following assumptions were made in regards to the forecast for potable water demand:

- Ships will produce their own potable water. No allowance for topping up ships from the potable water supply network.
- No allowance for potable water for fire protection systems. However, it is anticipated that adequate pressure and capacity is available in the existing network.
- No allowance has been made for specific requirements associated with manufacturing and industrial related industries as the demand is highly variable. A detailed assessment will be required once the industry type can be better defined.

6.4 Sewage Assumptions

The following assumptions were made in regards to the forecast for sewerage demand:

- Ships will manage their own sewage. No allowance for the transfer of waste from ships to the sewerage network.
- No allowance for disposal of trade waste associated with manufacturing, industrial and trucking depots.

- The impact of groundwater infiltration on the sewer network has not been estimated at this stage. Infiltration factors should be discussed and agreed with South Water in the next stage.

6.5 Gas Assumptions

The following assumptions were made in regards to the forecast for domestic gas demand:

- No allowance has been made for specific requirements associated with manufacturing and industrial related industries as the demand is highly variable. A detailed assessment will be required once the industry type can be better defined.
- 50% of the total Customs and Quarantine area is supplied with gas.
- 20% of the total Warehousing area is supplied with gas.
- 20% of the total Bonded Warehousing area is supplied with gas.
- 20% of the total Trucking Depot area is supplied with gas.
- 20% of the total Distribution area is supplied with gas.
- 20% of the total Manufacturing area is supplied with gas.
- 20% of the total Highway Fuel and Food area is supplied with gas.
- 20% of the total Industrial area is supplied with gas.

6.6 Stormwater Assumptions

The following assumptions were made in regards to the stormwater:

- The rational method was used to undertake a high level estimate of the expected increase in runoff within SUZ1 due to the proposed port development. This is due to the forecast increase in impermeable surfaces (i.e. roofs, roads and hardstand) compared to the existing condition, which is rural farm land with a high permeability. Runoff for the 10 ARI storm has been assessed as this typically corresponds to the capacity of the underground drainage network. Runoff for the 100 ARI storm has been assessed as typically corresponding to the capacity of overland flow in roads / flood channels and retarding basins.
- The assessment undertaken is only a comparative assessment of existing and proposed conditions for each land use type. A more detailed catchment based assessment will need to be undertaken once a masterplan for the entire site is developed.
- External catchments have not been included in this preliminary assessment. Detailed hydraulic modelling will required to quantify the existing flow conditions and the likely impact due the proposed development. Melbourne Water and Mornington Peninsula Shire have already commenced hydraulic modelling of existing catchments, however they have not included the likely impacts associated with proposed port development. Results from these models will be useful in establishing existing conditions.

6.7 Telecommunications Assumptions

The following assumptions were made in regards to the forecast for telecommunications demand:

- The assessment is limited to the supply of external telecommunications into the port development from adjacent trunk infrastructure. It is noted that there will be a high volume of internal telecommunications within the port; however this infrastructure will be installed separately and is unlikely to impact the external network.

7.0 Features of the Demand Model

The demand model has been set up using a spreadsheet in Microsoft Excel. A cover sheet has been installed to simplify interrogation of the data within the model.

The demand model generally applies unit rates for each service and utility to the area of land forecast for each stage. Refer to Table 1: Key Project Assumptions for a list of the assumed staged port development including the forecast throughput in TEU / year for each stage and the forecast berth length in metres for each stage. The area of land use for the stage 4 port was extracted from the Port Precinct and Port Environs Preliminary Planning Concepts report (doc # AGH-CEP0-REP-0011-B).

7.1 Forecast Demand Interrogation

On the cover page, the model user selects the port development stage and the service or utility. The formulae embedded in the spreadsheet draw on the forecast land use areas and the forecast demand unit rates located within the spreadsheet. The spreadsheet then multiplies the land use areas by the forecast demand unit. The result is a service or utility forecast demand as per the model user selection on the cover page.

The model user can change the port development stage and the service or utility cells to interrogate the forecast demand for the proposed port development.

8.0 Unit Rates of Service and Utility Demand

This section lists the unit rate of each service or utility demand used in the forecast demand model. This section lists the source or reference for each adopted unit rate.

8.1 Power Unit Rates

The following table describes the unit rates for each component and a reference for the unit rate:

Table 3: Power Unit Rates

Item	Unit	Reference
Ship to shore gantry crane	140 kWh / hr	Past project experience (confidential)
Rail mounted yard gantry crane	110 kWh / hr	Past project experience (confidential)
Refrigerated containers	2.5 kWh / hr	Past project experience (confidential)
Lighting	3.5 kWh / m^2 / year	Past project experience (confidential)
Offices and workshops (Terminal)	0.1 kWh / m2 / hr	Past project experience (confidential)
Power supply to ships (cold ironing)	2000 kWh h / ship / hr	Past project experience (confidential)
Offices and workshops (General)	100 VA/m^2	Table C3 AS/NSZ 3000:2007
Retail (light, power and air-conditioning)	100 VA/m^2	Table C3 AS/NSZ 3000:2007
Warehousing & bonded warehousing (light, power and ventilation)	15 VA/m^2	Table C3 AS/NSZ 3000:2007

Item	Unit	Reference
Light Industrial (light, power, air-conditioning and equipment)	80 VA/m^2	Table C3 AS/NSZ 3000:2007
Manufacturing	80 VA/m^2	Table C3 AS/NSZ 3000:2007
Accommodation	80 VA/m^2	Table C3 AS/NSZ 3000:2007
Carparks	5 VA/m^2	Table C3 AS/NSZ 3000:2007
Road Lighting	2 VA/m^2	Past project experience

8.2 Potable Water Unit Rates

The following table describes the unit rates used as a guide for the unit rates adopted for potable water demand in the model. The unit rates listed in Table 4: Potable Water Demand Unit Rates are in accordance with the Water Supply Code of Australia, Melbourne Retail Water Agencies Edition, Version 2.0 (WSA 03-2011-3.1):

Table 4: Potable Water Demand Unit Rates

Use	Demand Type	Peak Hour Demand	Unit
Office, workshops, trucking depots, retail and accommodation	Commercial	0.6	l / s / Ha
Warehousing, distribution centres and container park	Commercial	0.2	l / s / Ha
Industrial	General heavy > 200 Ha	0.8	l / s / Ha
Manufacturing	Industrial General heavy > 40 Ha	1.0	l / s / Ha
Industrial	Light	0.4	l / s / Ha
Industrial	Designated high usage	2.5	l / s / Ha

8.3 Sewage Rates

Table 5: Sewage Demand Unit Rates describes the unit rates used as a guide for the unit rates adopted in the model to forecast the capacity of a sewer system to support the port development. The unit rates are in accordance with the Sewerage Code of Australia, Melbourne Retail Water Agencies Edition, Version 1.0 (WSA 02-2011).

Table 5: Sewage Demand Unit Rates

Use	Classification	Rate	Unit
Offices and workshops (Terminal)	Commercial	500	Equivalent Population / Ha
Warehousing, bonded warehousing	Commercial	50	Equivalent Population / Ha
Customs, distribution centres and trucking depots	Commercial	75	Equivalent Population / Ha
Container Park	Commercial	10	Equivalent

Use	Classification	Rate	Unit
			Population / Ha
Industrial	Industrial	150	Equivalent Population / Ha
Retail	Commercial	300	Equivalent Population / Ha
Manufacturing	Industrial	600	Equivalent Population / Ha
Accommodation	Hotel, motels	600	Equivalent Population / Ha

8.4 Gas Unit Rates

Table 6: Gas Demand Unit Rates describes the unit rates used as a guide for the unit rates adopted in the model to forecast the demand for domestic gas to support the port development. The unit rates are based on previous experience.

Table 6: Gas Demand Unit Rates

Use	Classification	Rate	Unit
Offices and workshops	Commercial	270	MJ / m^2 / year
Warehousing, bonded warehousing	Commercial	135	MJ / m^2 / year
Future Industrial	Industrial	135	MJ / m^2 / year
Retail	Commercial	270	MJ / m^2 / year
Manufacturing	Industrial	135	MJ / m^2 / year
Accommodation	Commercial	270	MJ / m^2 / year

8.5 Stormwater

The following impermeable percentages have been adopted in the model to forecast peak flow for each land use. The unit rates are based on previous experience and Australian Rainfall and Runoff (ARR), 1987.

- Terminal: 90%
- Port Precinct: 70%
- Port Environs: 50%
- Stony Point: 50%
- Cribb Point: 50%
- Existing: : 10%

The Time of Concentration was estimated based on the following:

- Travel length: Estimated by taking the square root of the catchment area
- Pipe diameter: 1000mm
- Gutter time: 7 mins
- Slope: 1 in 100

8.6 Telecommunications

At this early stage it is very difficult to estimate the expected demand for telecommunications. A detailed masterplan and functional layout will need to be developed prior to progressing further demand estimates.

Based on previous experience the number of anticipated trunk conduits for each precinct has been estimated. It is anticipated that all conduits will be laid during stage 1 and fibre optic cables will be installed to satisfy demand for each subsequent stage.

- Terminal: 2 no. 100mm conduits
- Port Precinct: 2 no. 100mm conduits
- Port Environs: 2 no. 100mm conduits
- Stony Point: 1 no. 100mm conduit
- Crib Point: 1 no. 100mm conduit

9.0 Limitations

This Technical Note and the Demand Model have been prepared by the AECOM + GHD Joint Venture for the Port of Hastings Development Authority and may only be relied upon by the Port of Hastings Development Authority for the purpose agreed between the AECOM + GHD Joint Venture and the Port of Hastings Development Authority as set out in Section 4.0.

The AECOM + GHD Joint Venture otherwise disclaims responsibility to any person other than the Port of Hastings Development Authority arising in connection with this Technical Note and the Demand Model. The AECOM + GHD Joint Venture also exclude implied warranties and conditions, to the extent legally permissible.

The services undertaken by the AECOM + GHD Joint Venture in connection with preparing this Report were limited to those specifically detailed in the Technical Note and are subject to the scope limitations set out in the Technical Note.

The opinions, conclusions and any recommendations in this Technical Note and in the Demand Model are based on conditions encountered and information reviewed at the date of preparation of the Report. The AECOM + GHD Joint Venture has no responsibility or obligation to update this Technical Note or the Demand Model to account for events or changes occurring subsequent to the date that the Technical Note or the Demand Model was prepared.

The opinions, conclusions and any recommendations in this Technical Note and the information contained in the Demand Model are based on assumptions made by the AECOM + GHD Joint Venture described in this Technical Note (refer to section 6.0).The AECOM + GHD Joint Venture disclaims liability arising from any of the assumptions being incorrect.

9.1 Uncontrolled Demand Model

The Port of Hastings Development Authority has been provided with a softcopy of the Demand Model spreadsheet. The softcopy Demand Model is an uncontrolled document.

It is recommended that The Port of Hastings Development Authority engage the model developers for future adjustments to the Demand Model.

Prior to adjusting the uncontrolled Demand Model, it is recommended that the Port of Hastings Development Authority consider the risk that any changes to the uncontrolled Demand Model may impact on the functionality or outputs. Due to the uncontrolled nature of the Demand Model, the AECOM + GHD Joint Venture takes no responsibility for the uncontrolled Demand Model subsequent to submission to the Port of Hastings Development Authority.