PORT KEMBLA STRATEGIC PLANNING INFRASTRUCTURE ASSESSMENT

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EXECUTIVE SUMMARY

In 2022, the Department of Planning and Environment (DPE) released the Port Kembla Regionally Significant Employment Precinct Profile, which provides a snapshot of the employment area within Port Kembla and identifies opportunities to support activation of the Port of Port Kembla. The DPE engaged Maker ENG Pty Ltd (Maker) to expand on this analysis through a two-stage investigation focusing on the current capacity and anticipated demand for infrastructure to support strategic planning in Port Kembla. Where additional land take is anticipated to be required for this future infrastructure, this land should be set aside to ensure the Port's development potential can be realised. Stage 2 investigates future demands and identifies gaps in the servicing for the proposed theoretical land use scenarios in the next 5, 10 and 20 years.

Stage 1 documents the desktop review analysis, conducted by Maker, of the current infrastructure. Infrastructure and services investigations were carried out for:

- Roads and associated Intersections
- Freight Rail
- Potable Water
- Sewer
- Gas
- Electricity
- NBN
- Flooding

The Stage 1 assessment confirms:

- Existing road networks are generally providing acceptable levels of service when considering current demands.
- Freight rail is expected to near capacity and there are options available to meet further required capacity.
- Information on potable water and sewer capacity is limited, however, mapping of the network and high-level discussions with Sydney Water suggests that there is capacity in both the potable water and sewer networks to supply additional developments.
- Information on gas location is limited given that much of the infrastructure is private although Jemena have indicated that the existing network has capacity to supply current loads and are able to extend coverage depending on the loads and location within the Port. The introduction of the gas terminal and addition of the lateral looping pipeline will assist in servicing additional development.
- The existing electrical infrastructure has capacity to support future development.
- The study area is flood affected with detailed flood studies identifying areas of concern.

Stage 2 documents investigations undertaken via stakeholder engagement into the possible future infrastructure demands for Port Kembla, specifically addressing the projected service demands (water, sewer gas and electricity) and increased vehicle volumes on road infrastructure.

The baseline projects (i.e. those projects which either have approval or have commenced a planning approval process) investigated as part of the future infrastructure demands include:

- Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility)
- Squadron Energy Port Kembla Power Station
- Manildra Group Bulk Liquids Terminal
- BlueScope HyKembla Project
- BlueScope No. 6 Blast Furnace Reline
- Jemena Lateral Looping Pipeline
- NSW Ports Outer Harbour Expansion

In addition to the known future infrastructure demands, this report investigates three likely future development scenarios at Port Kembla.

These scenarios include:

- BlueScope Masterplan Non-Core Area Land Uses
- Port Kembla Hydrogen Hub
- Offshore Wind Farm Operations

This report did not considered a Defence Base given the significant implications this will have for servicing and infrastructure. Should a Defence Base be identified this report would require an update.

The key findings include:

- Baseline projects: These projects are expected to impose small additional demands and is considered unlikely to require any upgrades to the existing infrastructure network.
- BlueScope Masterplan: Upgrading the current services and road network to accommodate the anticipated requirements associated with the BlueScope Masterplan require further investigation and planning.
- Hydrogen Hub: Further consideration is needed to assess the impact on the road network and ensure a reliable power and water supply for the required inputs.
- Gigawatt Scale Hydrogen Production: Further investigation is necessary to address water and power demands associated with gigawatt-scale hydrogen production.
- Offshore Wind farms: The primary constraint for offshore wind farms is the requirement for high-value industrial land with berthing access to facilitate assembly and installation requirements for a relatively short period.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 2
1 BACKGROUND 8
STAGE 1: INVESTIGATION OF CURRENT INFRASTRUCTURE AND SERVICING 9
2 KEY AREAS 9
2.1 BlueScope Core and Non-Core Areas 10
2.1.1 Current Land Usage 10
2.1.2 Future Development 10
2.2 Northern Area 11
2.2.1 Current Land Usage 11
2.2.2 Future Development 11
2.3 Southern Area 12
2.3.1 Current Land Usage 12
2.3.2 Future Development 12
3 ROAD NETWORK 13
3.1 Roadways 14
3.1.1 Traffic Assessment Reports: Roads Assessment 15
3.2 Intersections 16
3.2.1 Traffic Assessment Reports: Intersection Assessment 17
3.3 Amber Review/Investigation 20
3.4 Summary and Recommendations 20
4 FREIGHT RAIL 23
4.1.1 Maldon-Dombarton Line 23
4.1.2 South West Illawarra Rail Link (SWIRL) 24
4.1.3 Conclusion 24
5 BERTHS AND FACILITIES 25
6 SERVICING 28
6.1 Potable and Recycled Water 28
6.1.1 BlueScope Core and Non-Core Areas Assessment 28
6.1.2 Northern Area Assessment 29
6.1.3 Southern Area Assessment 30
6.1.4 Recommendations 30
6.2 Sewer 31
6.2.1 Assessment 31
6.2.2 Recommendations 31
6.3 Electricity 32
6.3.1 Endeavour Energy Data 33
6.3.2 Assessment 35

6.3.3 Recommendations 35
6.4 Gas 36
6.4.1 Assessment 36
Port Kembla Gas Terminal 37
6.4.2 Recommendations 37
6.5 National Broadband Network (NBN) 38
6.5.1 Assessment 38
6.5.2 Recommendations 38
7 FLOODING 39
7.1.1 Assessment 46
7.1.2 Recommendations 47
8 CONCLUSION AND RECOMMENDATIONS 48
STAGE 2: INVESTIGATION OF FUTURE INFRASTRUCTURE DEMANDS 50
9 BASELINE DEMANDS 52
9.1 Baseline Project Description 52
9.1.1 HyKembla Project - Hydrogen Electrolyser (10MW) & Hydrogen Refuelling Station 52
9.1.2 Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility) 52
9.1.3 Squadron Energy Port Kembla Power Station 52
9.1.4 Manildra Bulk Liquids Terminal 52
9.1.5 BlueScope No. 6 Blast Furnace Reline (6BF) 52
9.1.6 Jemena Lateral Looping Pipeline 52
9.1.7 NSW Ports Outer Harbour Expansion 53
9.2 Baseline Projects Infrastructure demands 53
10 FUTURE SCENARIO DEMANDS 56
10.1 Future Scenario Description 56
10.1.1 BlueScope Master Plan for Non-Core Area 56
10.1.1.1 Services Data and Estimation Methodology 57
10.1.2 BlueScope Master Plan Infrastructure Demands 57
10.1.3 Transport Data and Estimation Methodology 58
10.2 Port Kembla Hydrogen Hub 60
10.2.1 Hydrogen Electrolysers 60
10.2.2 Hydrogen Refuelling Station (HRS) Developments 61
10.2.3 Hydrogen Hub Infrastructure Demands 61
10.3 Offshore Windfarms 62
10.3.1 Infrastructure Data 63
10.3.2 Servicing Methodology 63
10.3.3 Transport Methodology 64
10.3.4 Offshore Windfarm Infrastructure Demands 64

10.3.5 Outer Harbour Expansion and Offshore Windfarm Electricity Generation 65
11 SUMMARY 67

APPENDIX A: AMBER MEMO - REVIEW OF BACKGROUND DOCUMENTATION AND INITIAL TRAFFIC ENGINEERING ADVICE 71
APPENDIX B: DETAILED ASSUMPTIONS 72

TABLE OF FIGURES

Figure 1: Transport and Infrastructure SEPP - Chapter 5 Three Ports - Port Kembla Boundary (Project Area) 8
Figure 2: Identified Key Areas 9
Figure 3: BlueScope Core and Non-Core Areas 10
Figure 4: Northern Area 11
Figure 5: Southern Area 12
Figure 6: Restricted Heavy Vehicle Routes (TfNSW) 13
Figure 7: Intersection Assessment 19
Figure 8: Springhill Road / Five Islands Road intersection 21
Figure 9: Springhill / Masters Road Intersection 22
Figure 10: Rail Lines 23
Figure 11: NSW Ports Map of Port Kembla Berths 27
Figure 12: BlueScope Core and Non-Core Sydney Water Network 28
Figure 13: Northern Area Sydney Water Network 29
Figure 14: Southern Area Sydney Water Network 30
Figure 15: Sydney Water Sewer Network 31
Figure 16: Endeavour Energy DAPR Mapping 32
Figure 17: Gas Network Map 36
Figure 18: Jemena Lateral Looping Project 37
Figure 19: NBN Network Map 38
Figure 20: 5% AEP Event Peak Flood Depths and Levels Design Blockage Factors, Figure 5-3 40
Figure 21: 1% AEP Event Peak Flood Depths and Levels Design Blockage Factors, Figure 9-3 41
Figure 22: 1% AEP Event Provisional Flood Hazard Design Blockage Factors, Figure 42-3 42
Figure 23: Scenario ID2 'Design' blockage factor peak flood depth - 5% AEP Event, Figure 17 43
Figure 24: Scenario ID2 'Design' blockage factor peak flood depth - 1% AEP Event, Figure 13 44
Figure 25: Scenario ID2 'Design' factor provisional flood hazard - 1% AEP Event, Figure 37 45
Figure 26: Combined Flood Hazard Curves 46
Figure 27: Baseline Project Locations 51
Figure 28: BlueScope Surplus Land 56

Figure 29: AM Peak Affected Road Network 59
Figure 30: AM Peak Affected Road Network 69

TABLE OF TABLES

Table 1: Road Assessment Guide 14
Table 2: Road Assessment 15
Table 3: Intersection Assessment table 16
Table 4: Intersection Assessment (Signal Intersections) 17
Table 5: Intersection Assessment (Priority Intersection) 18
Table 6: Inner Harbor Zone Substation 33
Table 7: Port Central Zone Substation 33
Table 8: Port Kembla Zone Substation 34
Table 9: Outer Harbour Transmission Substation 34
Table 10: Springhill Transmission Substation 35
Table 11: Baseline Project Infrastructure Demands 53
Table 12: Baseline Projects Road Network Demands 54
Table 13: Service Intensities – Future Demand Scenario 57
Table 14: BlueScope Master Plan Potential Service Demands 57
Table 15: BlueScope Surplus Land Potential Transport Demands 58
Table 16: Hydrogen Electrolyser 60
Table 17: 40MW Hydrogen Electrolyser Services Demands 62
Table 18: Hydrogen Refueling Development Traffic Demands 62
Table 19: Oceanex 2000MW Offshore Windfarm Specifications 63
Table 20: 2000MW Offshore Windfarm Service Intensities 64
Table 21: 2000MW Offshore Windfarm Operation Potential Infrastructure Demands 64
Table 22: Port Kembla Potential Future Daily Service Demands 67
Table 23: Network Augmentation Likelihood Assessment 67

1 BACKGROUND

Maker Eng Pty Ltd (Maker) has been engaged by the Department of Planning and Environment (DPE) to undertake the Port Kembla Strategic Planning Infrastructure Assessment (Report). The purpose of this Report is to build upon the analysis undertaken in the Port Kembla Regionally Significant Employment Precinct Profile with a focus on current capacity and demands on infrastructure to support additional development in the Project Area as defined by Figure 1. This will assist with strategic planning being undertaken in the form of a Structure Plan for Port Kembla, ensuring the Port retains its status as an international gateway for freight and logistics.

Port Kembla is subject to the State Environmental Planning Policy (Transport and Infrastructure), Chapter 5, Three Ports – Port Botany, Port Kembla and Port of Newcastle (Three Ports SEPP). This policy aims to provide consistent planning controls within the Project Area and allows for efficient planning and development. This simultaneously protects Port Kembla from land uses not conducive of heavy industry and shipping while allowing for efficient development within the SEPP area.

The Port Kembla extents of the Three Ports SEPP area has been adopted as the boundary of this assessment and can be seen in Figure 1 below.

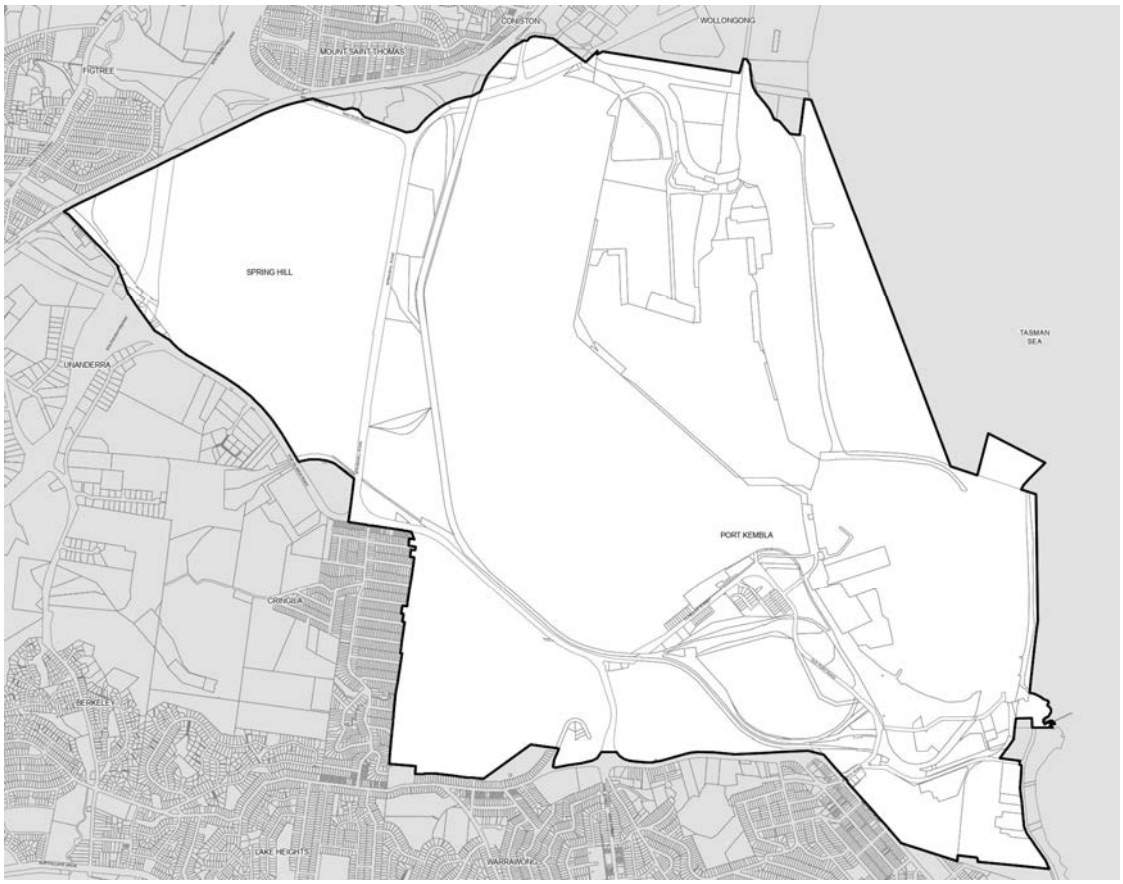


Figure 1: Transport and Infrastructure SEPP - Chapter 5 Three Ports - Port Kembla Boundary (Project Area)

STAGE 1: INVESTIGATION OF CURRENT INFRASTRUCTURE AND SERVICING

Stage 1 of this Report includes a desktop review of current infrastructure and servicing. The objective is to identify existing or projected shortcomings and information gaps. We have reviewed all available information in the Project Area and has identified servicing and infrastructure requiring further assessment.

2 KEY AREAS

The Project Area is broken into four key areas as shown in Figure 2.

The boundaries are based on the prevalent industries and their relative positioning. The four areas include BlueScope Steel's (BlueScope) Main Operations (Core) and Supportive Operations (Non-Core) areas and the remaining Northern and Southern extents of Port Kembla.

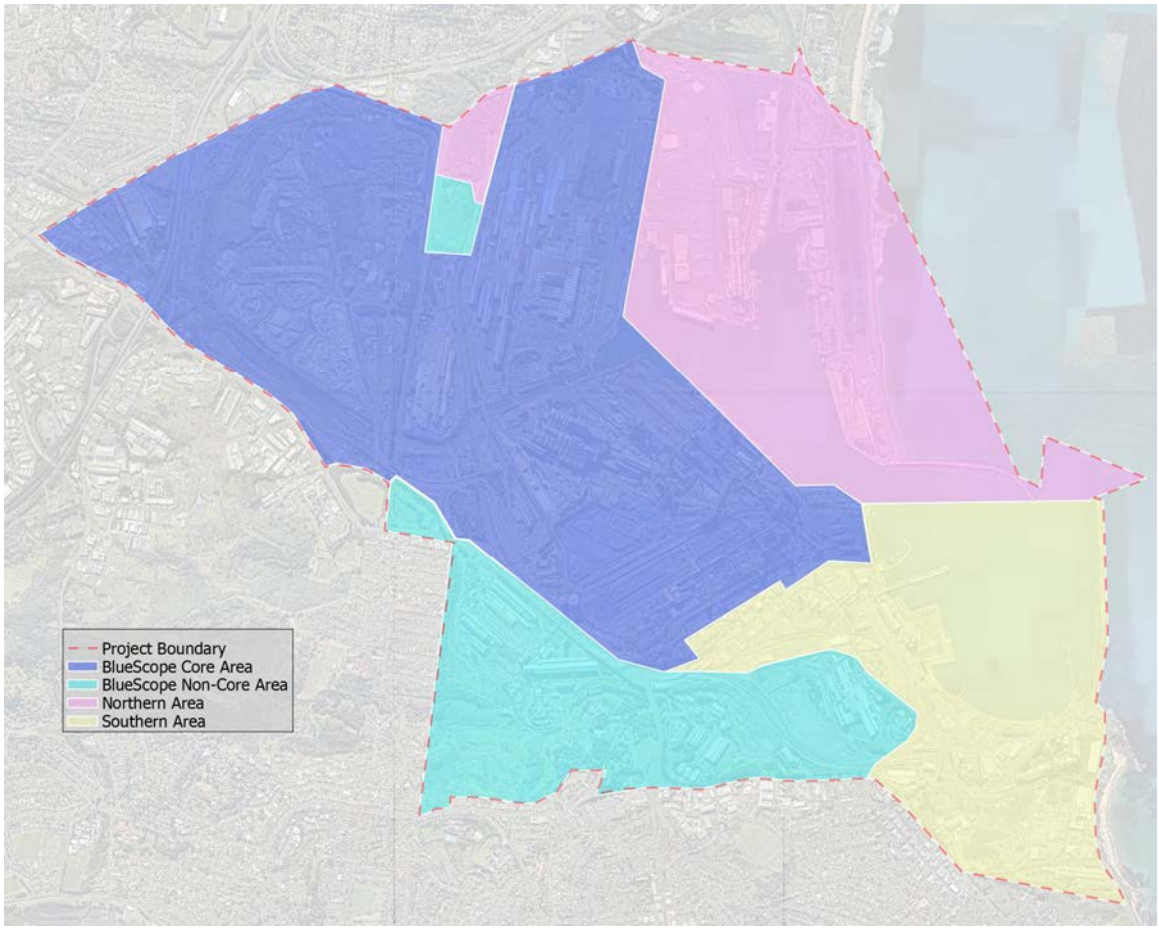


Figure 2: Identified Key Areas

2.1 BlueScope Core and Non-Core Areas

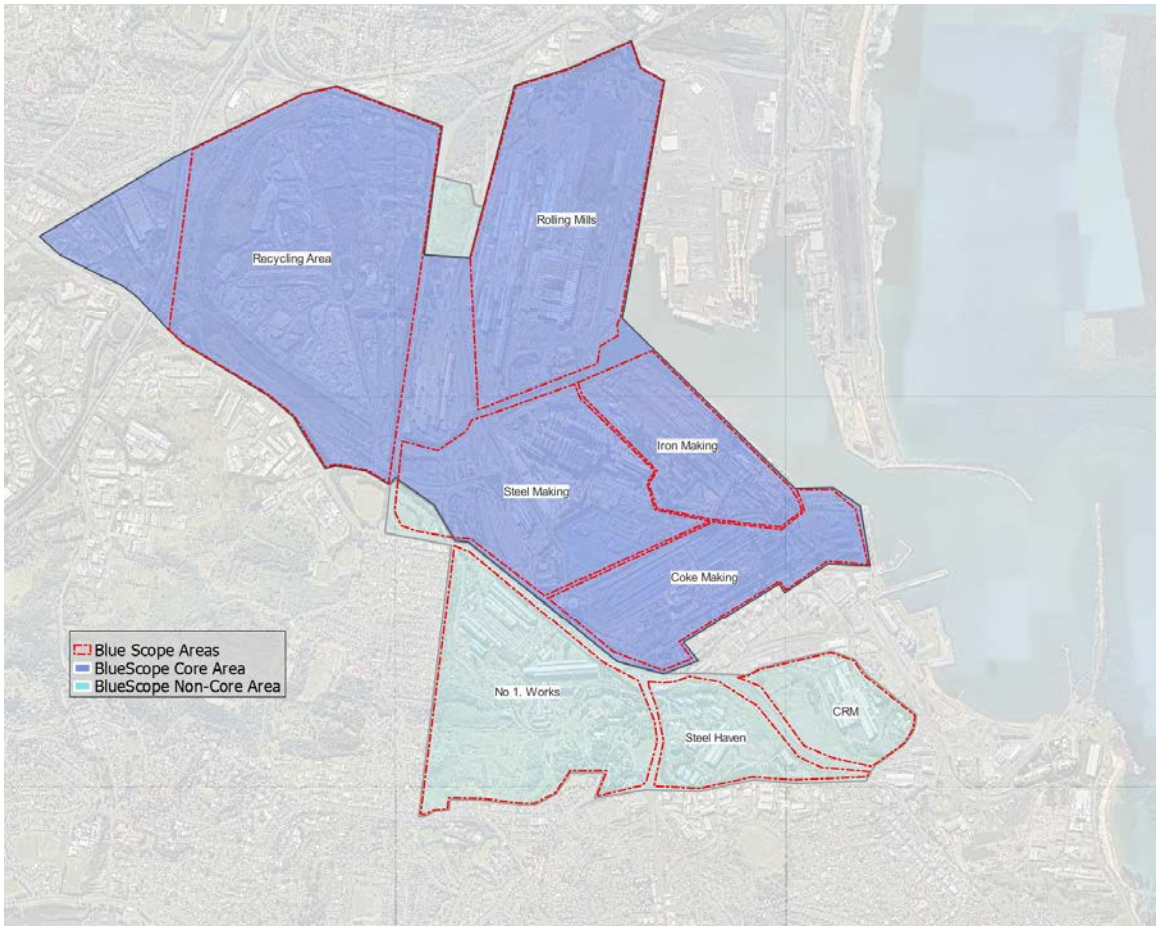


Figure 3: BlueScope Core and Non-Core Areas

2.1.1 Current Land Usage

The area occupied by BlueScope is zoned as IN3 – Heavy Industrial. Figure 3 depicts the locations of the current activities taking place within the BlueScope facility. Servicing facilities within BlueScope are mostly privately owned and operated. BlueScope is currently producing 2.6 million tonnes of raw steel per year and are world leaders in metallic coating and painting technology, supplying a range of building products.

2.1.2 Future Development

BlueScope is in the process of developing a Master Plan for their Non-Core Lands, and ColonySix has been engaged to help manage this process. ColonySix has advised that this process will include key project feasibility studies and overarching site plans of existing infrastructure. The Master Plan assumes that Supportive Operations located in Non-Core Areas, which are critical to Core Operations, will be relocated. The Master Plan will further provide guidance on the future of the Non-Core Sites.

2.2 Northern Area

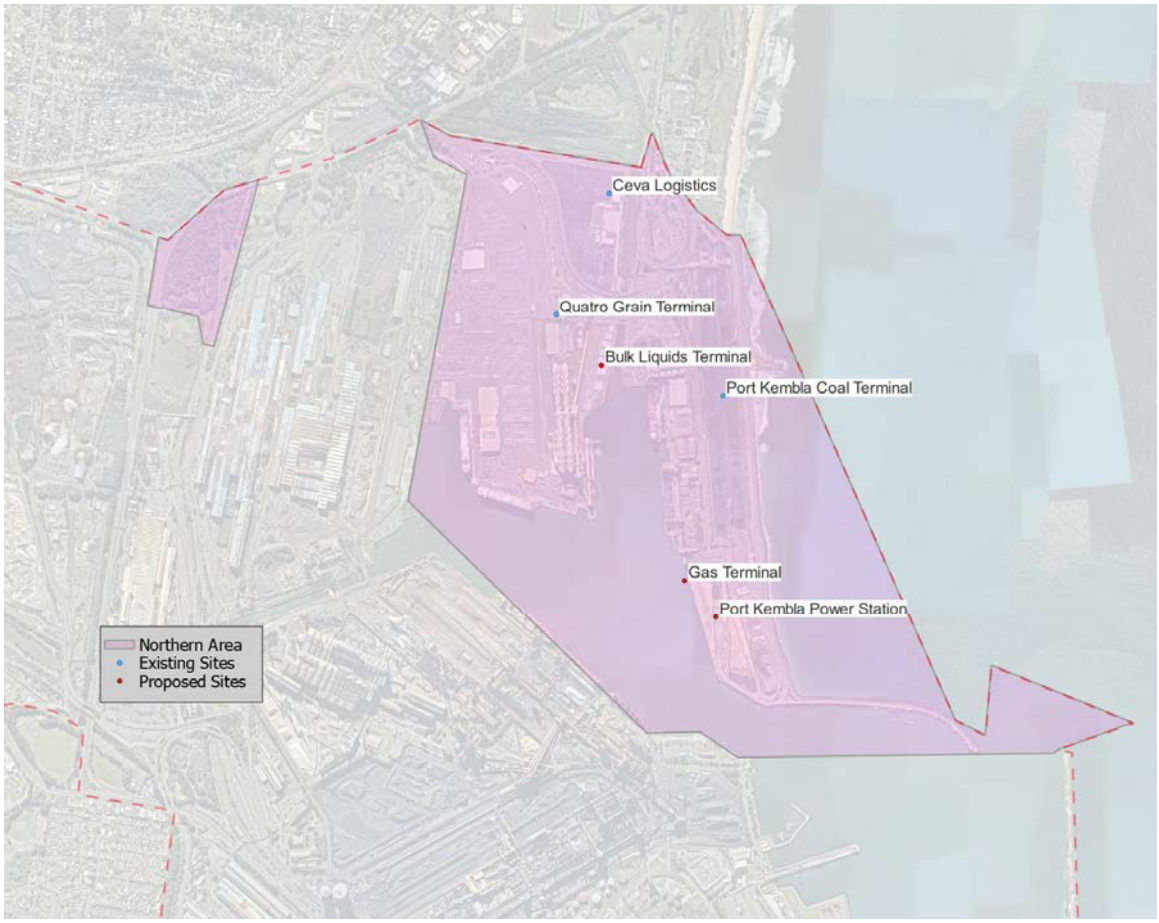


Figure 4: Northern Area

2.2.1 Current Land Usage

The Northern Area is made up of two sites as shown in Figure 4.

The small western section consists of two vacant Crown Land lots separated by a rail corridor zoned as IN3 – Heavy Industrial. This land is vegetated.

The larger, eastern portion is the Inner Harbour and zoned as SP1- Special Activities. The Inner Harbour is owned by the NSW Government and operated by NSW Ports under a 99-year lease signed in 2013. This lease allows NSW Ports to lease portions of the land to other operators.

Current activities in the Inner Harbour include car import, grain export, a bulk liquid berth and coal export.

2.2.2 Future Development

Crown Land is proposing the removal of all built structures and to conduct bush regeneration works in the small western section of land.

According to the NSW Governments Major Projects, there are two state significant infrastructure projects being planned for the Inner Harbour, these include:

- Port Kembla Gas Terminal (approved and currently under construction)

- Port Kembla Power Station – (in the process of preparing an Environmental Impact Statement).

2.3 Southern Area

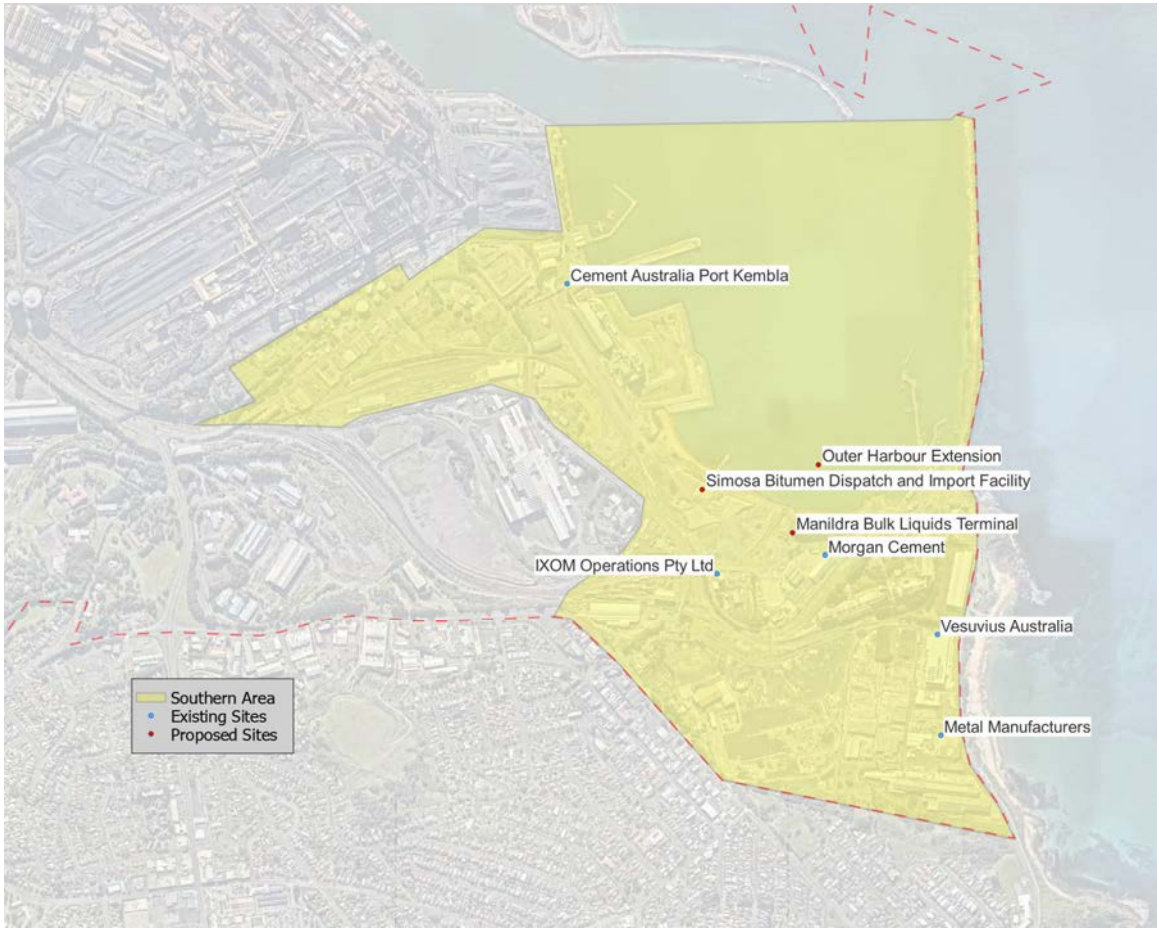


Figure 5: Southern Area

2.3.1 Current Land Usage

The Southern Area is defined by the Outer Harbour zoned as SP1-Special Activities and the IN3 – Heavy Industrial zoned land to the south as shown in Figure 5. A large portion of this area, particularly the Port Kembla Copper site, is currently underutilised.

Current activities include cement production and various manufacturing facilities.

2.3.2 Future Development

Due to its proximity to the Port's berths and BlueScope's facilities, the Southern Area is of high strategic value with various concepts and substantial developments proposed. Developments submitted/recently approved include :

- Port Kembla Outer Harbour Development (approved) - Future Container Terminal
- Manildra Liquids Terminal (awaiting response to submission)
- Simosa Bitumen Dispatch and Import Facility (In the process of preparing an Environmental Impact Statement).

3 ROAD NETWORK

Port Kembla relies on designated heavy vehicle access routes identified by Transport for New South Wales (TfNSW) as shown below in Figure 6.

The roads and intersections that make up the heavy vehicle routes have been assessed using existing traffic assessment reports and traffic data provided by TfNSW.

In addition to Maker's review of the existing traffic studies, Amber Organisation (Amber) were engaged to provided additional traffic recommendations. Amber's investigation is included in Appendix A.

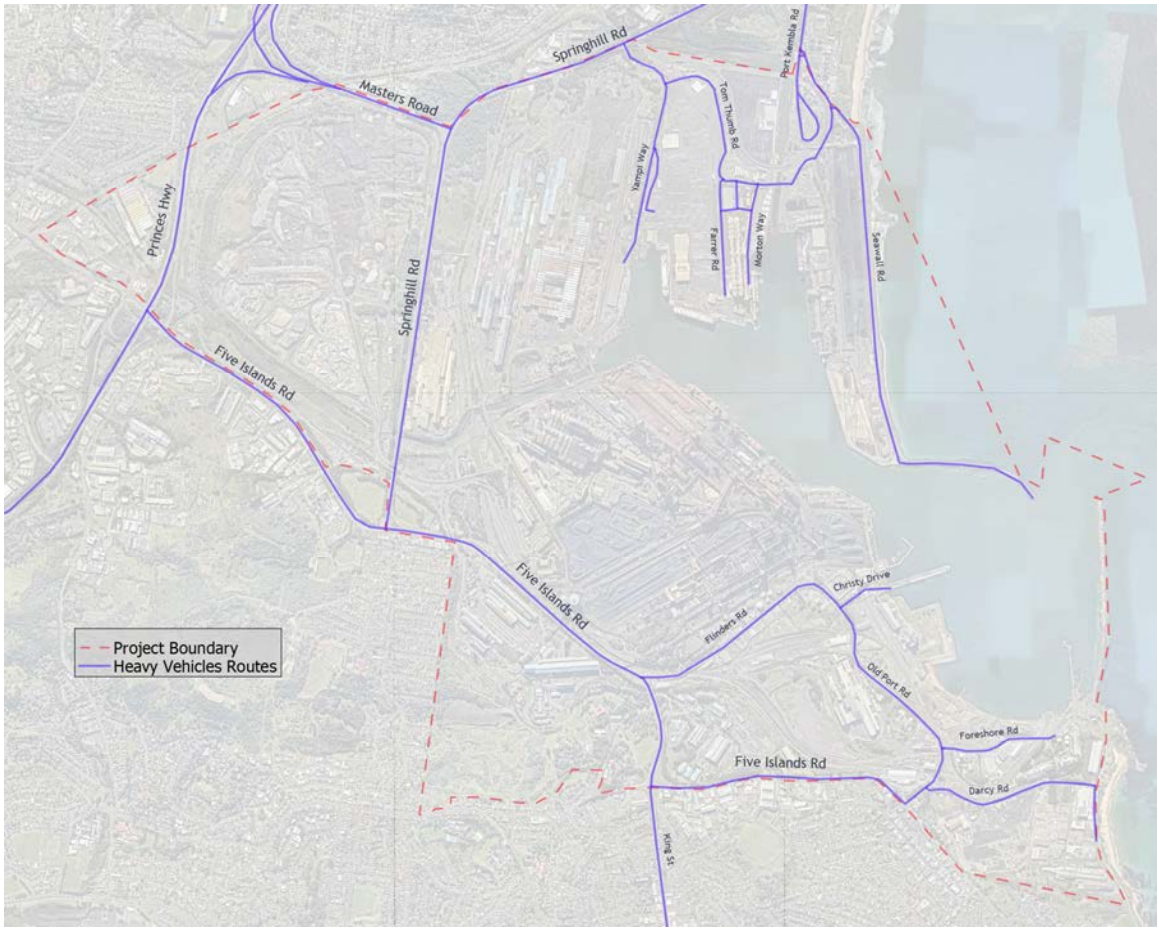


Figure 6: Restricted Heavy Vehicle Routes (TfNSW)

3.1 Roadways

Austroads Guide to Traffic Management, Part 3: Traffic Study and Analysis was used to evaluate the existing road network Level of Service (LoS). The LoS and associated volume/capacity (v/c) ratios are presented in Table 1 below. No traffic studies or investigations were undertaken as part of Stage 1 and information is summarised from the most relevant traffic reports including:

- Port Kembla Gas Terminal Traffic Impact Assessment 2018, GHD
- Proposed Port Kembla Bulk Liquids Terminal Traffic Impact Assessment 2015, Cardno
- Blast Furnace No. 6 Reline Project Traffic Impact Assessment 2022, GHD
- Port Kembla Grinding Mill Traffic Impact Assessment 2011, Bitzios Consulting
- Site B Foreshore Road, Port Kembla Transport Impact Assessment 2022, The Transport Planning Partnership.
- Data provided by TfNSW from their Strategic Forecasting Model (STFM)

Table 1: Road Assessment Guide

Level of Service (LoS)	Details	Allowable v/c
A	Good operation	0.28
B	Good operation, acceptable delays and spare capacity	0.44
C	Satisfactory	0.64
D	Operating near capacity	0.85
E	At capacity, incidents will cause excessive delays	1

3.1.1 Traffic Assessment Reports: Roads Assessment

Table 2 summarises data collected from the traffic impact assessment reports specified in Section 3.1. While all reports were reviewed the most recent data for the road assessment was taken from the Port Kembla Gas Terminal Traffic Impact Assessment 2018, GHD.

Table 2: Road Assessment

Name	Type	No. Lanes Each way	Vehicle Speed	Estimated Carriageway Width (m)	Capacity (veh/hr/lane)	Location	AM V/C[1]	PM V/C[1]	LoS
Arterial and Sub-Arterial Roads									
Springhill Road	Sub-Arterial	4-6	80	9	1200	North of Masters Road	0.89	0.61	D D
						South of Masters Road	0.94	0.63	D D
Five Islands Road	Arterial	2	80	13			0.65	0.78	D
Masters Road	Sub-Arterial	2	80	13	1200		0.36	0.63	C
Northen Area[2]									
Tom Thumb Road	Collector	2	50	5	900		0.13	0.16	A
Port Kembla Road	Collector	2	50	6	900		0.04	0.08	A
Southern Area									
Flinders Road	Collector	2	60	7.2	900		0.26	0.38	A
Old Port Road/Darcy Road	Collector	2	60	7	900		0.1	0.14	A
Darcy Road	Collector	2	60	12	900		0.19	0.25	A
Foreshore Road	Collector	2	50	9.5	900		0.06	0.08	A
Christy Drive[3]	Local	2	40-50	7					

References and Assumptions

[1] Both directions of traffic flow considered with the maximum V/C ratio presented.

[2] Seawall Road, Farrer Road, Morton Way and Yampi Way are considered internal roads managed by major landowners.

[3] No Information provided in Traffic Impact Assessment Reports.

Key points from the road assessment include:

- Springhill Road is operating at capacity
- Five Islands Road is operating near capacity
- Limited data is available for the Northern Area, however the data indicates that the roads are operating at an acceptable LoS
- The Southern Area roads are showing an acceptable LoS
- No consideration has been made for cumulative increase of future demands

3.2 Intersections

Intersections have been split into two categories: signalised intersections and priority-controlled intersections.

Intersections were assessed on 'average vehicle delay', a measure of the average time spent by a vehicle queuing at a given intersection. Table 3 was developed using TfNSW guidelines. No new traffic studies or investigations have been undertaken in Stage 1, with information summarised from available traffic reports, including:

- Port Kembla Gas Terminal Traffic Impact Assessment 2018, GHD
- Proposed Port Kembla Bulk Liquids Terminal Traffic Impact Assessment 2015, Cardno
- Blast Furnace No. 6 Reline Project Traffic Impact Assessment 2022, GHD
- Port Kembla Grinding Mill Traffic Impact Assessment 2011, Bitzios Consulting
- Site B Foreshore Road, Port Kembla Transport Impact Assessment 2022, The Transport Planning Partnership.

Table 3: Intersection Assessment table

Level of Service (LoS)	Signalised Intersections	Priority Controlled Intersections	Average Vehicle Delay (Seconds)
A	Good operation	Good operation	<14
B	Good operation, acceptable delays and spare capacity	Acceptable delays and spare capacity	15 to 28
C	Satisfactory	Satisfactory, but crash study required	29 to 42
D	Operating near capacity	Near capacity, and crash study required	43 to 56
E	At capacity, incidents will cause excessive delays	At capacity, requires other control mode	57 to 70
F	Unsatisfactory and requires additional capacity	Unsatisfactory and requires additional capacity/control mode	>70

3.2.1 Traffic Assessment Reports: Intersection Assessment

Table 4 below summarises data collected from the traffic impact assessment reports specified in Section 3.2.

Table 4: Intersection Assessment (Signal Intersections)

No.	Name	Current				Future (if available)				LOS
		Average Vehicle Delay (s)	Am LoS	Average Vehicle Delay (s)	PM LoS	Average Vehicle Delay (s)	Am LoS	Average Vehicle Delay (s)	PM LoS	
1	Springhill Rd/Port Kembla Rd[1]	8		5.5						A
2	Springhill Rd/Keira St[2]									
3	Springhill Rd/Bridge St[2]									
4	Springhill Rd/Tom Thumb Rd[3]	18		19		25	B	21	B	B
5	Springhill Rd/Steelworks Entrance Rd[2]									
6	Springhill Rd/ Masters Rd[3]	37	C	37	C	63	E	44	D	E
7	Five Islands Rd/Princes Motorway Exit and Entrance[2]									
8	Springhill Rd/ Entry Rd[4]	24		22						A
9	Five Islands Rd/Springhill Rd[5]	20		16						B
10	Five Islands Rd/ Flinders Rd4	10.6		10.1						A
11	Five Island Rd/Wattle St/King St[2]									

References and Assumptions

[1] Port Kembla Gas Terminal Traffic Impact Assessment 2018, GHD

[2] No Information provided in Traffic Impact Assessment Reports.

[3] Proposed Port Kembla Bulk Liquids Terminal Traffic Impact Assessment 2015, Cardno

[4] Blast Furnace No. 6 Reline Project Traffic Impact Assessment 2022, GHD

[5] Port Kembla Grinding Mill Traffic Impact Assessment 2011, Bitzios Consulting

Table 5: Intersection Assessment (Priority Intersection)

No.	Name	Current				Future (if available)				LOS
		Average Vehicle Delay (s)	Am LoS	Average Vehicle Delay (s)	PM LoS	Average Vehicle Delay (s)	Am LoS	Average Vehicle Delay (s)	PM LoS	
Northen Area										
12	Port Kembla Rd Intersection[1]									
13	Tom Thumb Rd/ Yampi Way[2]	2	A	1	A	3	A	2	A	A
Southern Area										
14	Old Port Rd/Christy Dr[1]									
15	Old Port Rd/Foreshore Rd[1]									
16	Old Port Road/ Darcy Rd[1]									
17	Five Islands/ Darcy Rd[3]	28	B	25	B					B

References and Assumptions

[1] No Information provided in Traffic Impact Assessment Reports.

[2] Proposed Port Kembla Bulk Liquids Terminal Traffic Impact Assessment 2015, Cardno

[3] Site B Foreshore Road, Port Kembla Transport Impact Assessment 2022, TTPP

Key points from the road assessment include:

- Springhill Road and Masters Road are at capacity
- Over half of the intersections have no data reported in the available traffic assessments
- Intersections in the southern area are showing acceptable LoS
- No consideration has been made for cumulative increase of future demands

Assessed intersections are illustrated in Figure 7.

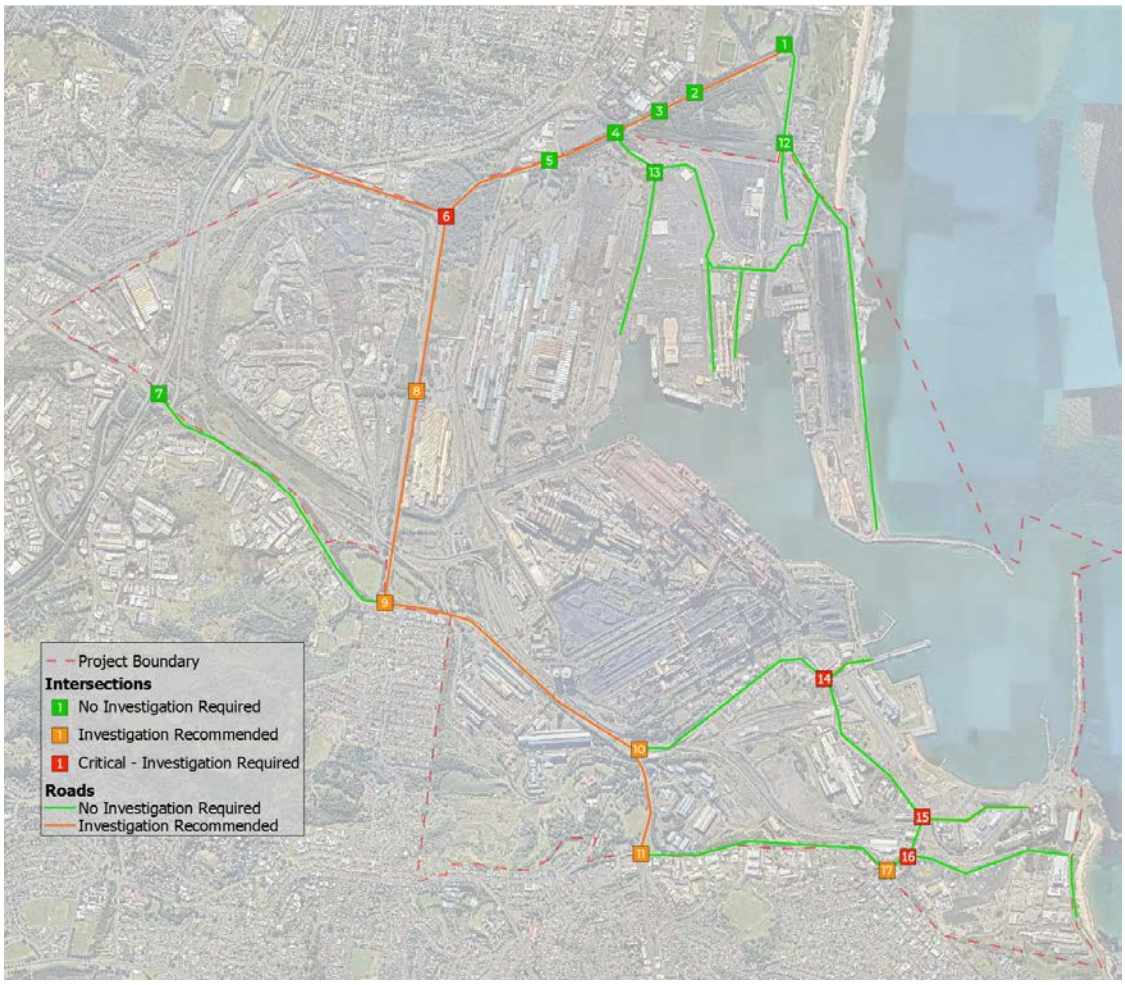


Figure 7: Intersection Assessment

3.3 Amber Review/Investigation

Amber's review confirms the following:

- Most of the surrounding road network is operating with acceptable conditions with the exception of:
  - Midblock along Springhill Road;
  - Springhill Road / Masters Road intersection; and
  - Springhill Road / Five Islands Road intersection.
- The remaining connections with the State road network are expected to be operating with acceptable conditions, given that several of the above intersections have been identified as having a good level of service within the Traffic Impact Assessments.
- Consideration should be given to the interchange intersections of Five Islands Road and Princes Motorway given no assessment has been provided for these intersections and any assessment should be based on traffic survey data and modelling at the intersections.
- There are height restrictions on the surrounding State road network, which prevents higher loads from departing Port Kembla. Height limitations should be identified and addressed as part of future relevant projects.

3.4 Summary and Recommendations

Overall, the desktop review shows that the majority of the surrounding road network is operating with acceptable conditions with the exception of Springhill Road / Masters Road intersection; and Springhill Road / Five Islands Road intersection.

Both the Springhill Road / Five Islands Road intersection and Springhill / Masters Road Intersections are relatively unconstrained with additional area available for upgrades as illustrated in Figures 8 & 9 below.

Figure 8: Springhill Road / Five Islands Road intersection

Figure 9: Springhill / Masters Road Intersection

Considering the anticipated growth in Port Kembla, all upgrades should consider geometric requirements for Oversize and Overmass (OSOM) vehicles (e.g. for transporting wind turbine components).

Based on our experience with other projects in the surrounding area there are height restrictions on the surrounding State Road network, which prevents higher loads from departing Port Kembla. Upgrades should be identified as part of future relevant projects.

Based on the preliminary road network assessment undertaken by both Maker and Amber we recommend the following:

- Engage stakeholders within Port Kembla to collect information regarding the traffic demands of services for both current and future use cases.
- Using collected information, calculate baseload project and future demand scenario project traffic infrastructure demands and provide high level analysis of likely required port infrastructure needs/upgrades.
- Continue to work with TfNSW regarding any future proofing strategies that are relevant.
- Continue to update infrastructure demands analysis as new information becomes available in response to major change in the Port.

4 FREIGHT RAIL

According to 'Illawarra-Shoalhaven Regional Transport Plan by TfNSW' freight rail is responsible for the movement of more than 14 million tonnes of goods in the Illawarra with coal and steel manufacturing accounting for 70% of inbound freight and 74% of outbound freight.

Further, the plan predicts freight decreasing to 12 million tonnes in 2041 and then increasing to 23 million tonnes by 2056. This fluctuation in demand is due to a predicted reduction in coal reserves followed by the introduction of a container terminal (concept Outer Harbour development) resulting in a substantial increase in movements.

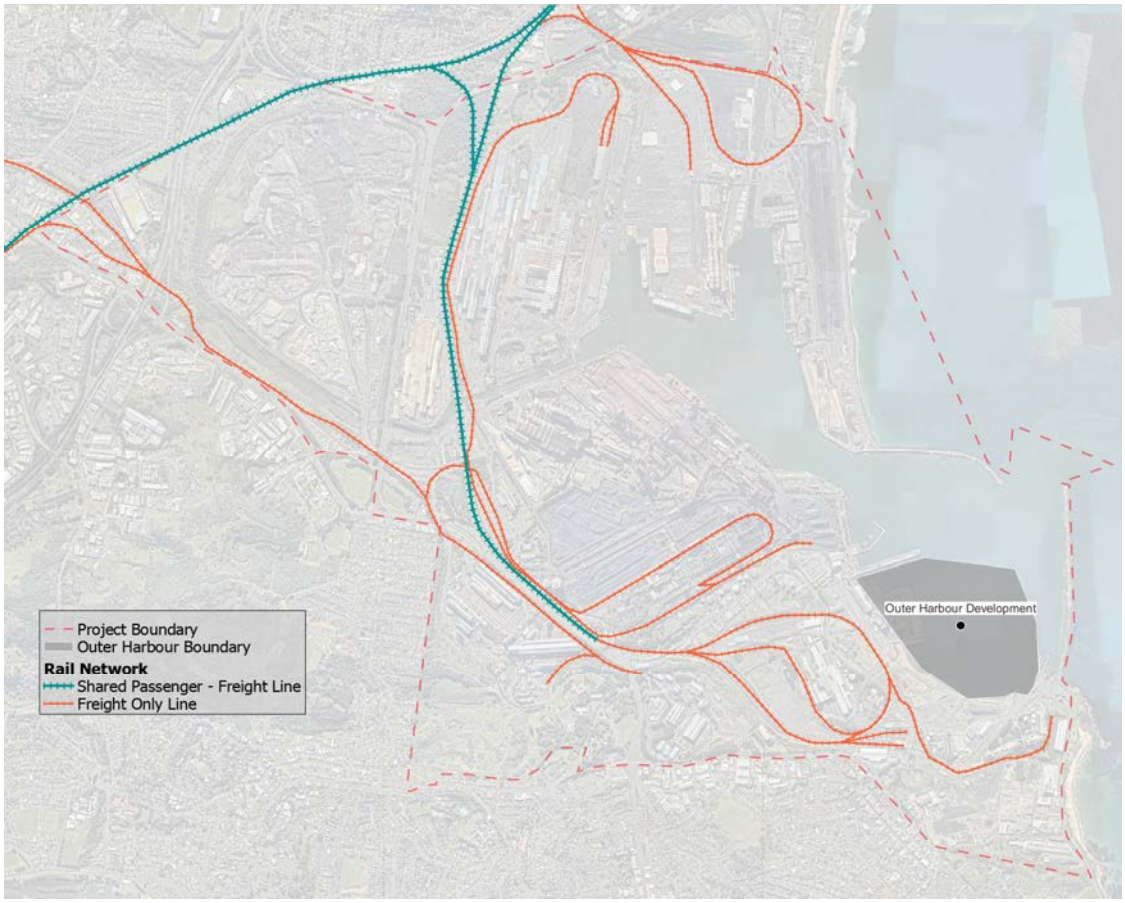


Figure 10: Rail Lines

4.1.1 Maldon-Dombarton Line

The Maldon-Dombarton Railway was planned in the early 1980s to act as a freight link between the Illawarra and Western Sydney with the intent being to divert the increased freight movements required for the growth areas of Western Sydney away from the already capacity constrained South Coast Line. A rail line between Port Kembla and Western Sydney is still considered an essential freight link whether using the Maldon-Dombarton corridor or via an alternate route.

4.1.2 South West Illawarra Rail Link (SWIRL)

The SWIRL is the conceptual infrastructure link that builds on the Maldon-Dombarton Line with freight and passenger rail capacity. Studies undertaken by University of Wollongong's SMART Infrastructure Facility found:

- The SWIRL could see 18,500 daily commuters by 2041 that would experience a 20-minute reduction in travel time between Wollongong and Western Sydney.
- The SWIRL would remove a future rail and road bottle neck expected by 2056.
- Similar to the Maldon Dombarton rail link, the SWIRL "is a necessary upgrade between Wollongong and Western Sydney for both freight and passenger rail."

4.1.3 Conclusion

Freight is critical in maximising the potential of Port Kembla. Freight infrastructure links currently being tabled, such as the Maldon-Dombarton Line and SWIRL, will depend on extensive collaboration and planning between all levels of government. While this is not a key focus of this assessment, the structure plan should:

- Assume additional freight capacity will be provided between Port Kembla and Western Sydney over the long term (20+ years).
- Seek to protect existing freight/transport corridors from encroachment of incompatible development and prioritise freight movement.

5 BERTHS AND FACILITIES

Port Kembla is divided into two sections as shown in Figure 11; the Inner Harbour and the Outer Harbour. The berths and facilities are operated by Australian Amalgamated Terminals (ATT), GrainCorp, BlueScope, NSW Ports, Port Kembla Gateway and Port Kembla Coal Terminal (PKCT).

Berth and facility information has been provided, however, the adequacy and amount of infrastructure for future developments has not been considered in this assessment. Should additional berthing capacity be required by the scenarios considered within this Report, further assessment would be required.

The following information for the Inner Harbour was provided by Ports Authority of NSW.

ATT Berths (103, 105, 106 & 107) – Inner Harbour

- Four berths with a total length of 910 m and an adjacent depth of 12.1 m
- Undercover storage capacity of 18,000 m^2, initial lay down area for 7,000 vehicles plus a further 3 ha for bulk and container storage
- Road transport access for b-double vehicles
- On site rail access for train lengths up to 1000 m

Grain Corp Berth (104) Inner Harbour

- Berth provides all storage and handling requirements relating to the in-loading or out-loading of bulk products and specialist oil-based lubricants by ship, rail and road for domestic and international purposes
- There is one berth available with a total length of 300 m and an adjacent depth of 15.65 m
- Storage consists of 30 gas-tight self-emptying steel bins with a total capacity of 260,000 tonnes
- Two ship loading gantries operate at combined capacity of 10,000 tonnes per hour.
- Road and rail receival/ discharge facilities

Port Kembla Coal Terminal Berths (101 &102) – Inner Harbour

- Berth lengths of 200m and 300m with a depth alongside of 11.5m and 16.2m respectively
- Two ship loaders capable of loading at 6,600 tonnes per hour (ship loaders are rail-mounted)
- Road and rail receival/discharge facilities

BlueScope Berths (109, 110, 111, 112 & 113)– Inner Harbour

- Five berths are owned and operated by BlueScope
- Berth lengths of 260m, 145m, 285m, 300m, 190m with a depth alongside of 12.1m, 8.0m, 15.6m, 30.0m, 11.5m respectively

The Port Kembla Gateway Berths (202, 203, 204 & 205) – Outer Harbour

- Primarily used for bulk and break-bulk cargoes
- Berth length of 360 m with a varying adjacent minimum depth of 10.05 m

- Undercover storage totalling 4000 m2
- Bulk ship loader capable of loading at 1000 tonnes per hour

Bulk Liquids Facility Berths (201 & 206) - Outer Harbour

- Primarily used for fuel discharge and loading as well as bulk liquid products
- Combined berth lengths of 200m and 220m with a depth alongside of 11.5m and 16.2m respectively
- Berths 201 has available berth length of 200 m and primarily used for handling.
- Refined fuels and chemicals including ethanol
- Both have direct pipeline access to nearby storage facilities

Figure 11: NSW Ports Map of Port Kembla Berths

6 SERVICING

6.1 Potable and Recycled Water

The following sources were used as the basis of information for this assessment;

- Information supplied by Sydney Water through consultation
- Information supplied by NSW Ports through consultation
- Information supplied by BlueScope through consultation
- Dial Before You Dig (DBYD) plans

Trunk mains are described as pipes 300 mm and greater in size; this is in line with Sydney Water's procurement guidelines for developer works. Potable water pipes in the range of 200-300 mm are mapped to provide greater context and understanding of the network.

6.1.1 BlueScope Core and Non-Core Areas Assessment

BlueScope land is serviced by a private water network with servicing drawings of the internal network not readily available. BlueScope is understood to be working on compiling an overarching servicing plan as part of its Master Plan.

Key known water mains and recycled water networks are illustrated in Figure 12 below.

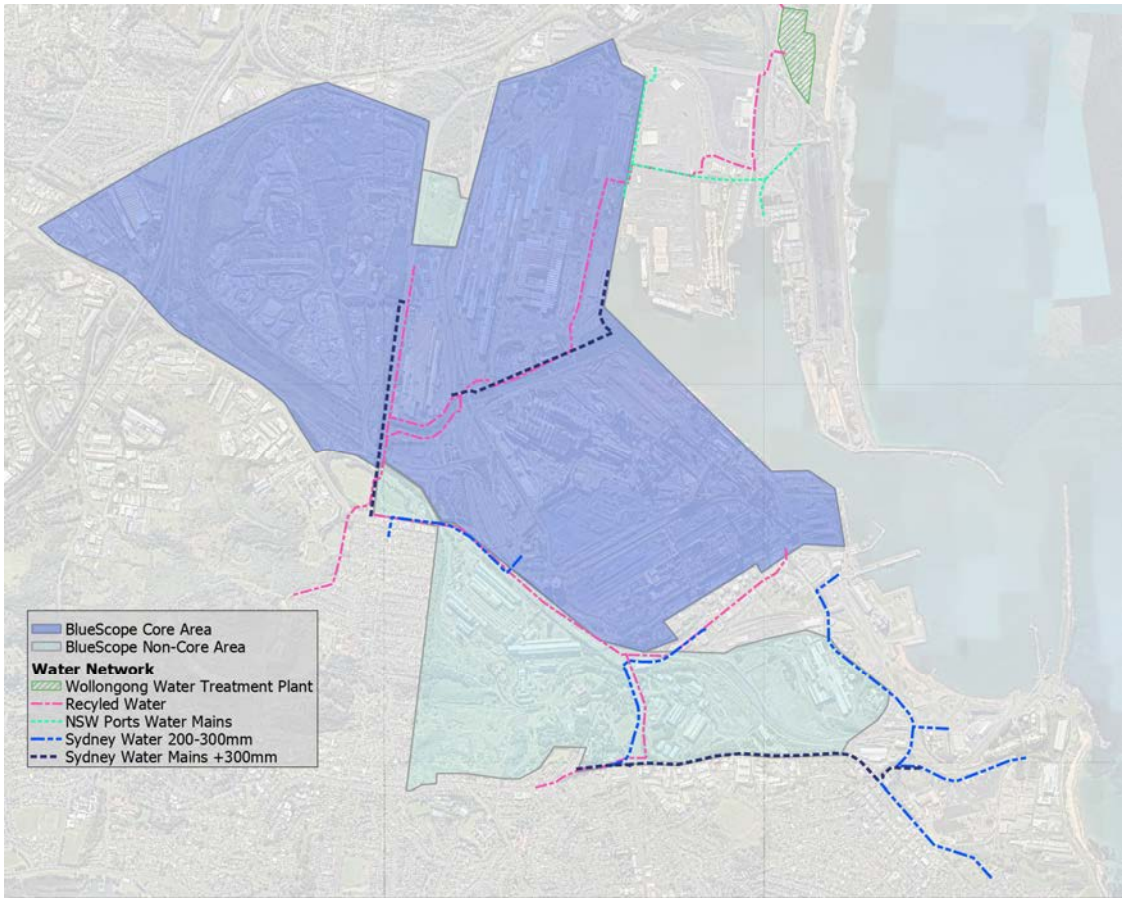


Figure 12: BlueScope Core and Non-Core Sydney Water Network

Sydney Water has advised that they have adequate network capacity to service the entire Port, excluding BlueScope's land. Servicing this land is currently limited by the Wollongong Water Treatment Plant's capacity to produce sufficient recycled water.

Despite this, Sydney Water is supplying the required volume of water through a combination of recycled water and raw water supplemented from the Berkeley reservoir.

Sydney Water plans to upgrade the Wollongong Water Treatment Plant by 2036.

6.1.2 Northern Area Assessment

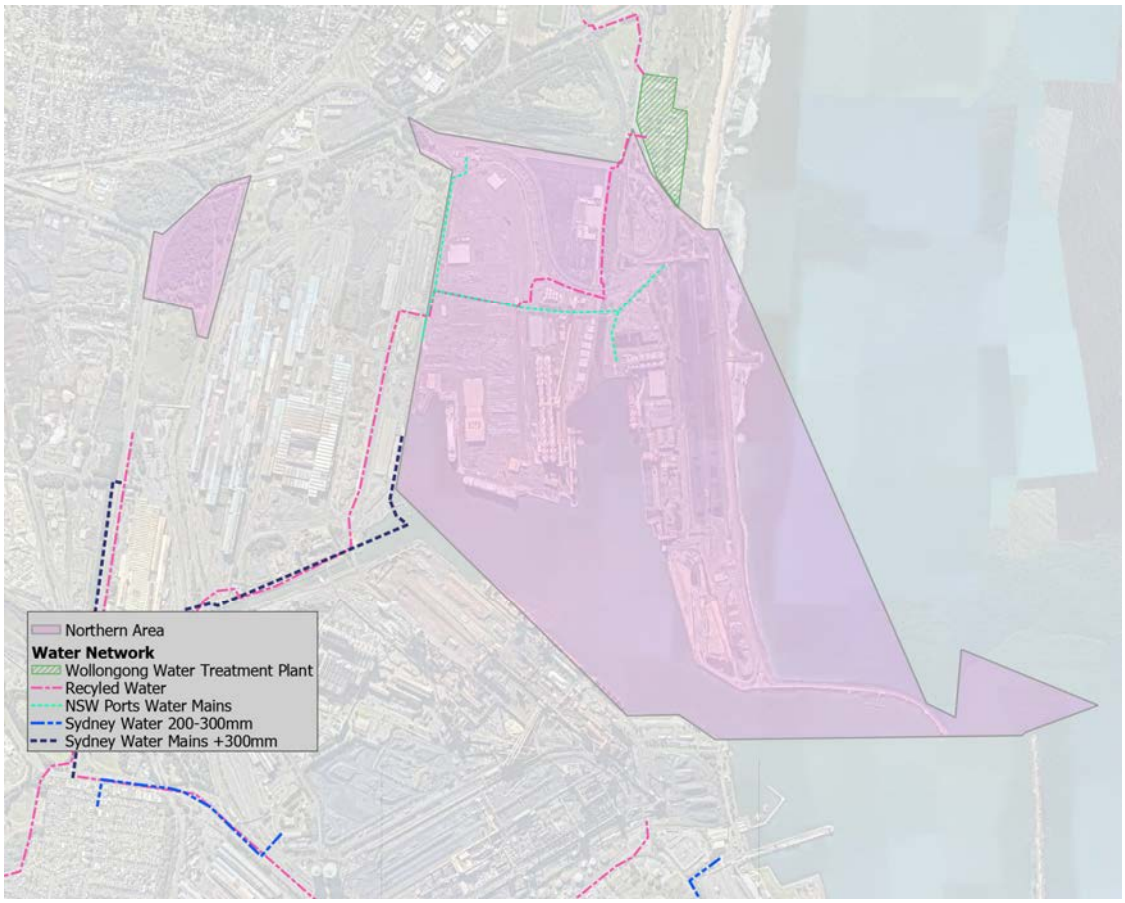


Figure 13: Northern Area Sydney Water Network

The water network within the Northern Area is owned and operated by NSW Ports. NSW Ports provided the location of the water main shown in Figure 13. NSW Ports gave no indication that the network was insufficient. As above, Sydney Water have also advised they have adequate capacity to service the Port.

6.1.3 Southern Area Assessment

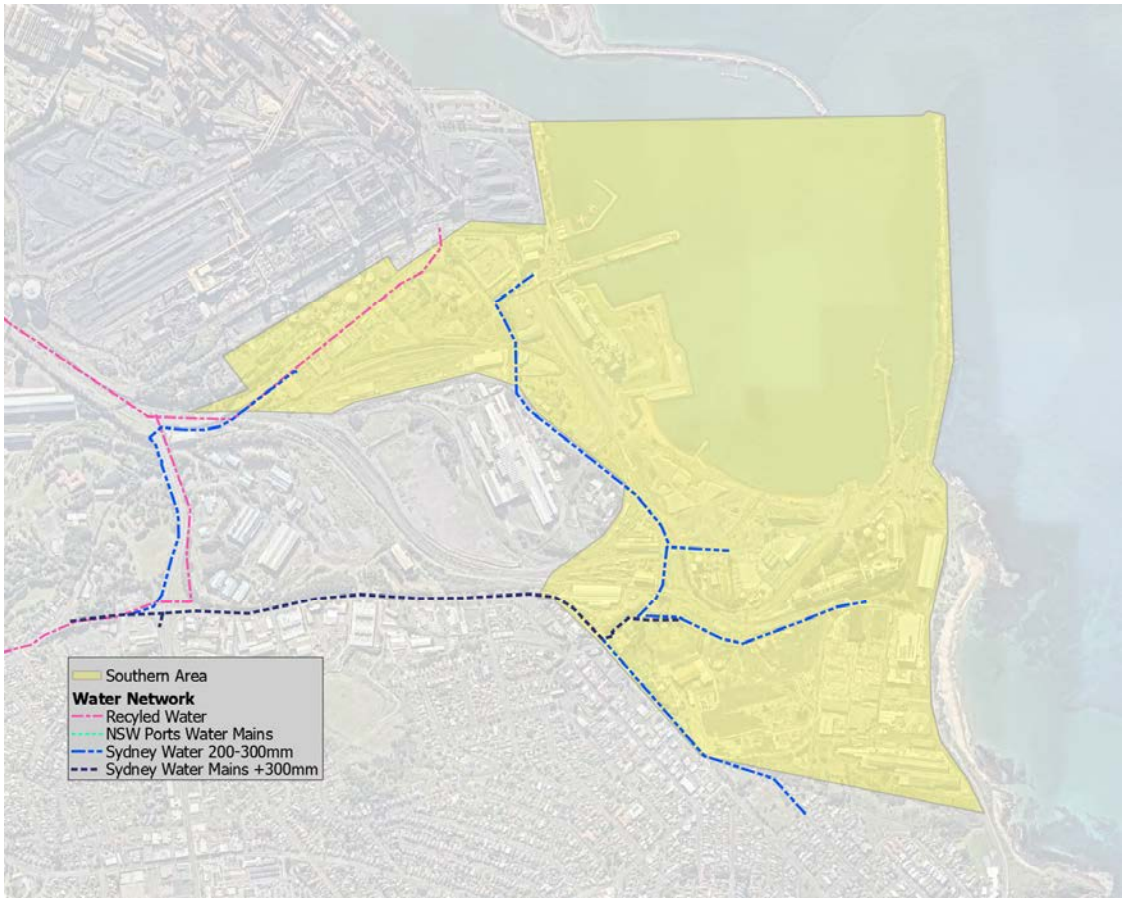


Figure 14: Southern Area Sydney Water Network

The Southern Area water network shown in Figure 14 covers the majority of the Southern Area with a trunk main that branches into respective smaller networks. Sydney Water have advised they have adequate capacity to service the Port.

6.1.4 Recommendations

Based on the preliminary potable water assessment we recommend the following:

- Engage stakeholders within Port Kembla to collect information regarding the potable and recycled water demands for both current and future use cases.
- Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.
- Continue to engage with Sydney Water and update infrastructure demands analysis as new information becomes available in response to major changes in the Port.

6.2 Sewer

The following sources were used as the basis of information for this assessment:

- Information supplied by Sydney Water through consultation
- Information supplied by BlueScope through consultation
- Information supplied by NSW Ports through consultation
- Dial Before You Dig (DBYD) plans.

The sewer main network within the project boundary is shown in Figure 15.

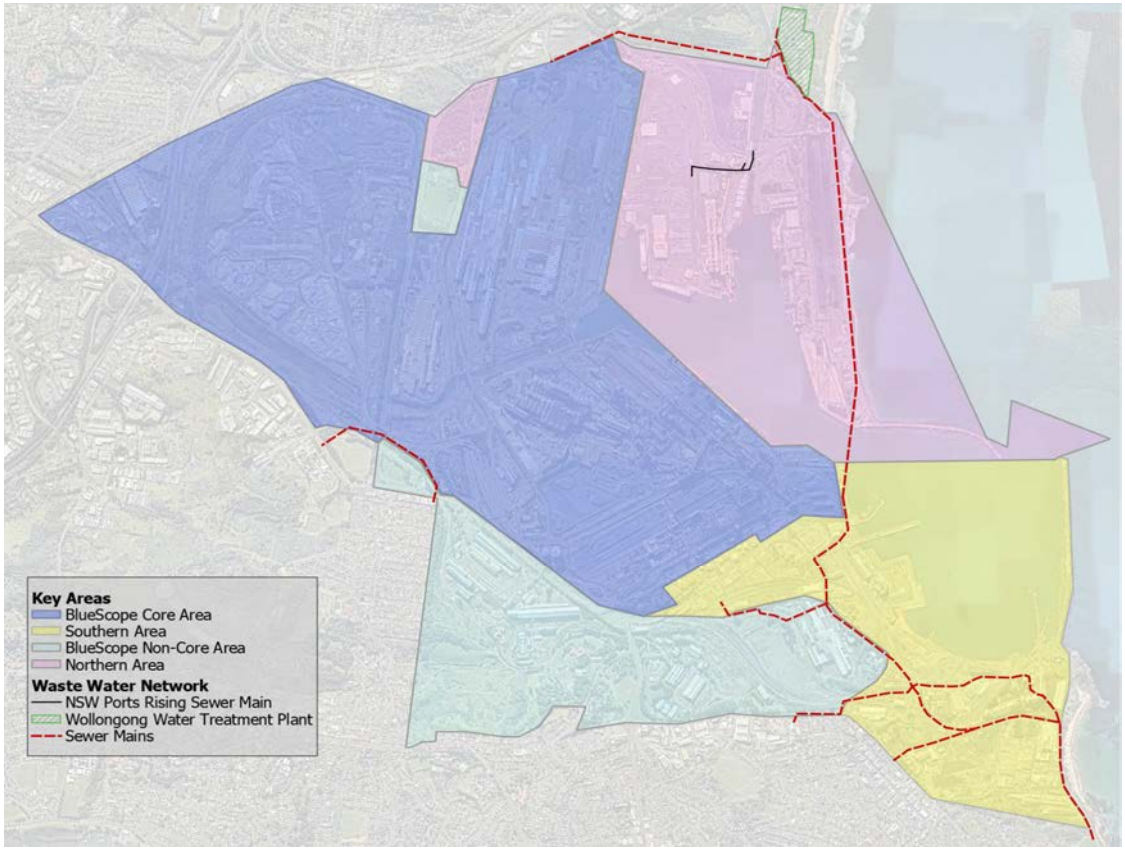


Figure 15: Sydney Water Sewer Network

6.2.1 Assessment

The Sydney Water sewer network has sufficient coverage over the Southern Area. NSW Ports provided information regarding the Northern Area and while limited, gave no indication the network was insufficient. For BlueScope areas, similarly to potable and recycled water, servicing drawings of the internal network are not readily available, and BlueScope is understood to be working on compiling an overarching servicing plan as part of its Master Plan.

In any case, all internal networks will run into a Sydney Water asset, and Sydney Water have advised they have adequate capacity to service Port Kembla.

6.2.2 Recommendations

Similar to the potable water assessment we recommend the following:

- Engage stakeholders within the Port to collect information regarding the sewer demands for both current and future use cases.
- Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.
- Continue to engage with Sydney Water and update infrastructure demands analysis as new information becomes available in response to major changes in the Port.

6.3 Electricity

Electricity supply within the Project Area is delivered by Endeavour Energy. Endeavour Energy's interactive opportunity map is publicly available and provides information pertaining to the capacity and usage of key elements in its network. Maker identified the relevant information for the assessment to be:

- 132 kV Sub-Transmission Lines.
- 33 kV Sub-transmission Lines
- 11 kV Distribution Lines
- Zone Substations
- Transmission Substations

Consultation with Endeavour Energy confirmed the data and mapping shown in Figure 16 is currently accurate.

Endeavour Energy's forecast is based on the current network usage and does not consider future developments.

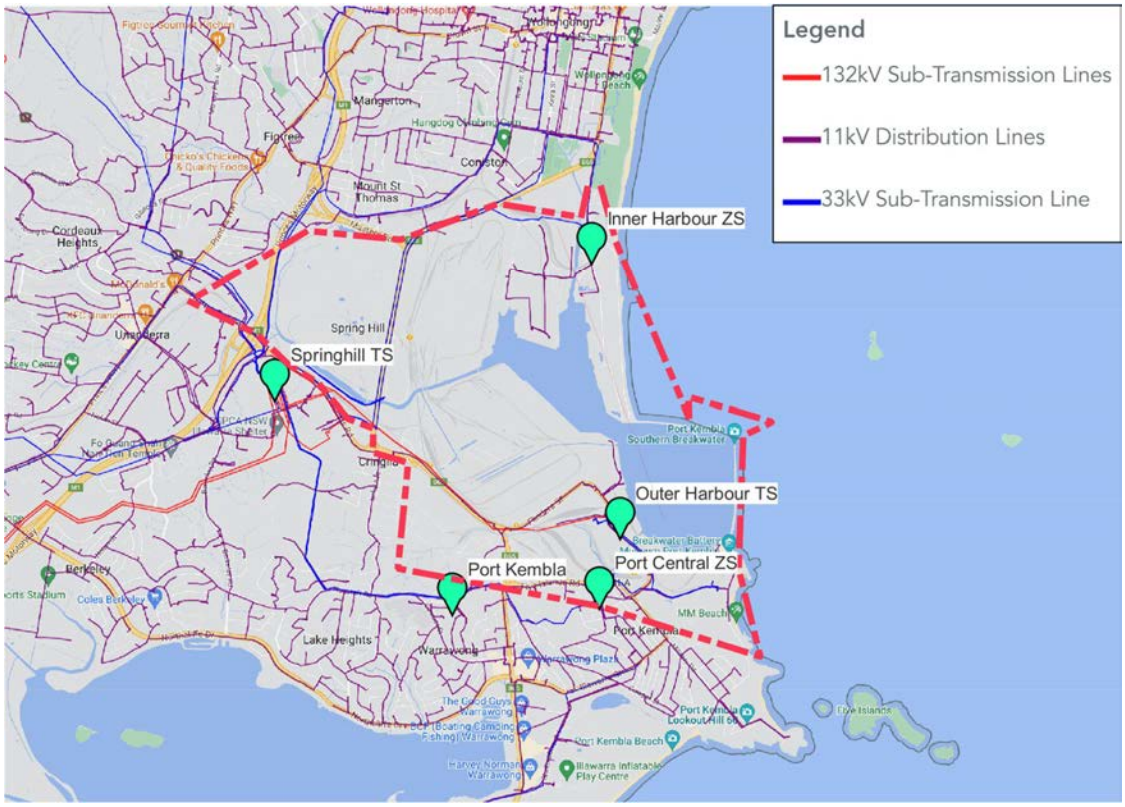


Figure 16: Endeavour Energy DAPR Mapping

6.3.1 Endeavour Energy Data

Tables 5 to 9 summarise the information provided by Endeavour Energy. The tables consider spare transformer bays and their capacities. The information represents the available capacity of each zone or transmission substation.

Table 6: Inner Harbor Zone Substation

Inner Harbour ZS	Voltage level	Total Firm Capacity* (MVA)					
Location Serviced: Northen Area	33/11kV	12.5					
Forecast Data Summer	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	8.9	9.1	9.2	9.3	9.3	9.3	9.3
Usage %	71%	73%	74%	74%	74%	74%	74%
Remaining Capacity %	**29%**	**27%**	**26%**	**26%**	**26%**	**26%**	**26%**
Forecast Data Winter	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	8.9	9.1	9.2	9.3	9.3	9.3	9.3
Usage %	71%	73%	74%	74%	74%	74%	74%
Remaining Capacity %	**29%**	**27%**	**26%**	**26%**	**26%**	**26%**	**26%**

*Includes Spare Transformer Bays

Table 7: Port Central Zone Substation

Port Central ZS	Voltage level	Total Firm Capacity* (MVA)					
Location Serviced: Southern Area & Blue Scope Non-Core Area	33/11kV	19					
Forecast Data Summer	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	8.9	9.1	9.2	9.3	9.3	9.3	9.3
Usage %	47%	48%	48%	49%	49%	49%	49%
Remaining Capacity %	**53%**	**52%**	**52%**	**51%**	**51%**	**51%**	**51%**
Forecast Data Winter	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	11.9	9	9.2	9.4	9.4	9.4	9.4
Usage %	63%	47%	48%	49%	49%	49%	49%
Remaining Capacity %	**37%**	**53%**	**52%**	**51%**	**51%**	**51%**	**51%**

*Includes Spare Transformer Bays

Table 8: Port Kembla Zone Substation

Port Kembla ZS BlueScope Non-Core Area	Voltage level 33/11kV	Total Firm Capacity* (MVA) 25					
Forecast Data Summer	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	13	12.4	10.6	10.6	10.6	10.6	10.6
Usage %	52%	50%	42%	42%	42%	42%	42%
Remaining Capacity %	**48%**	**50%**	**58%**	**58%**	**58%**	**58%**	**58%**
Forecast Data Winter	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	13.9	14.6	15	14.9	14.9	14.8	14.8
Usage %	56%	58%	60%	60%	60%	59%	59%
Remaining Capacity %	**44%**	**42%**	**40%**	**40%**	**40%**	**41%**	**41%**

*Includes Spare Transformer Bays

Table 9: Outer Harbour Transmission Substation

Outer Harbour TS Location Serviced: Southern Area	Voltage level 132/33kV	Total Firm Capacity* (MVA) 120					
Forecast Data Summer	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	34.2	30.4	30.1	30	30	29.9	29.9
Usage %	29%	25%	25%	25%	25%	25%	25%
Remaining Capacity %	**72%**	**75%**	**75%**	**75%**	**75%**	**75%**	**75%**
Forecast Data Winter	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	35.2	28.6	29.6	29.8	29.7	29.7	29.7
Usage %	29%	24%	25%	25%	25%	25%	25%
Remaining Capacity %	**71%**	**76%**	**75%**	**75%**	**75%**	**75%**	**75%**

*Includes Spare Transformer Bays

Table 10: Springhill Transmission Substation

Springhill TS Location Serviced: BlueScope Core Area	Voltage level 132/33kV		Total Firm Capacity* (MVA) 360				
Forecast Data Summer	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	164	161	166	169	157	156	157
Usage %	45%	45%	46%	47%	44%	43%	43%
Remaining Capacity %	**55%**	**55%**	**54%**	**53%**	**57%**	**57%**	**57%**
Forecast Data Winter	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Usage (MVA)	154	169	176	177	179	179	179
Usage %	43%	47%	49%	49%	50%	50%	50%
Remaining Capacity %	**57%**	**53%**	**51%**	**51%**	**50%**	**50%**	**50%**

*Includes Spare Transformer Bays

6.3.2 Assessment

The data presented in Tables 5 to 9, illustrates the additional capacity of all zone substations is more than 25%, and all transmission substations is more than 50%.

Further information regarding the demands and network requirements of future projects, in particular the proposed hydrogen plants and wind farms is discussed in Stage 2 of this report.

6.3.3 Recommendations

Endeavour Energy identified current demands and available capacity present within the network, however, we recommend the below be undertaken while further refining the development of Port Kembla.

- Engage stakeholders within Port Kembla to collect information regarding the energy demands for future use cases.
- Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.
- Continue to engage with Endeavour and update infrastructure demands analysis as new information becomes available in response to major changes in the Port
- Develop strategies that will align with Endeavour Energy's 'Just in Time' strategy for brownfield sites like Port Kembla.

6.4 Gas

The gas network within the Project Area is owned and operated by Jemena. Through engagement with Jemena, mapping of its local gas network was provided.

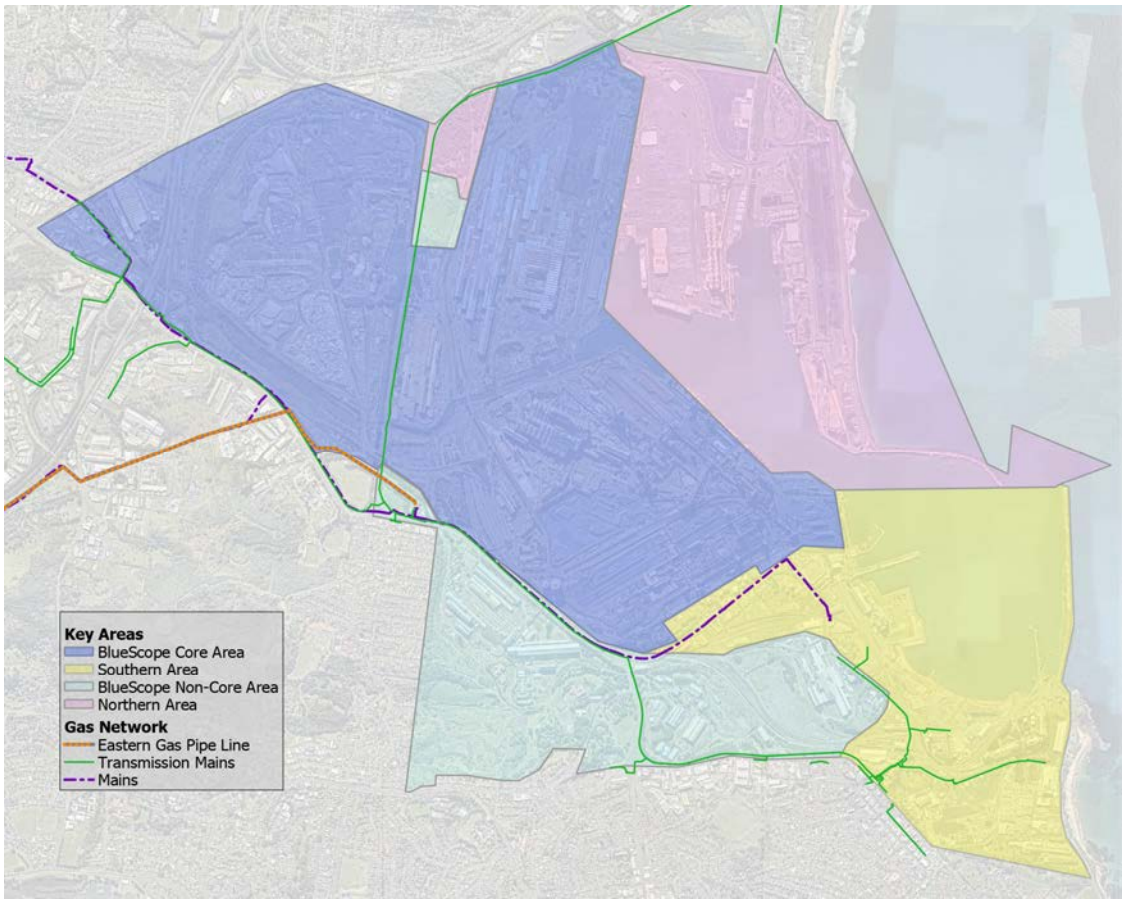


Figure 17: Gas Network Map

6.4.1 Assessment

Figure 17 shows the limited gas network within Port Kembla. NSW Ports has advised that there is currently no gas network in the Northern Area. For BlueScope areas, servicing drawings of the internal gas network are not readily available. The progression of its Master Plan and an overarching servicing plan should increase the availability of gas network information.

Jemena has advised that the network has capacity to supply current loads and is able to extend coverage. The extension of the coverage is dependent on the additional loads and associated locations within the Port. All future capacity requirements are required to be to be checked by Jemena on a case-by-case basis.

Port Kembla Gas Terminal

The Port Kembla Gas Terminal is approved and currently under construction and will increase the gas supply to the NSW gas network. Future works will connect the new terminal to the Eastern Gas Pipeline (EGP) using the lateral loop shown below in Figure 18. While the upgrades will increase the supply to major gas lines, the local network serviced by the EGP will also benefit from the proposed loop.

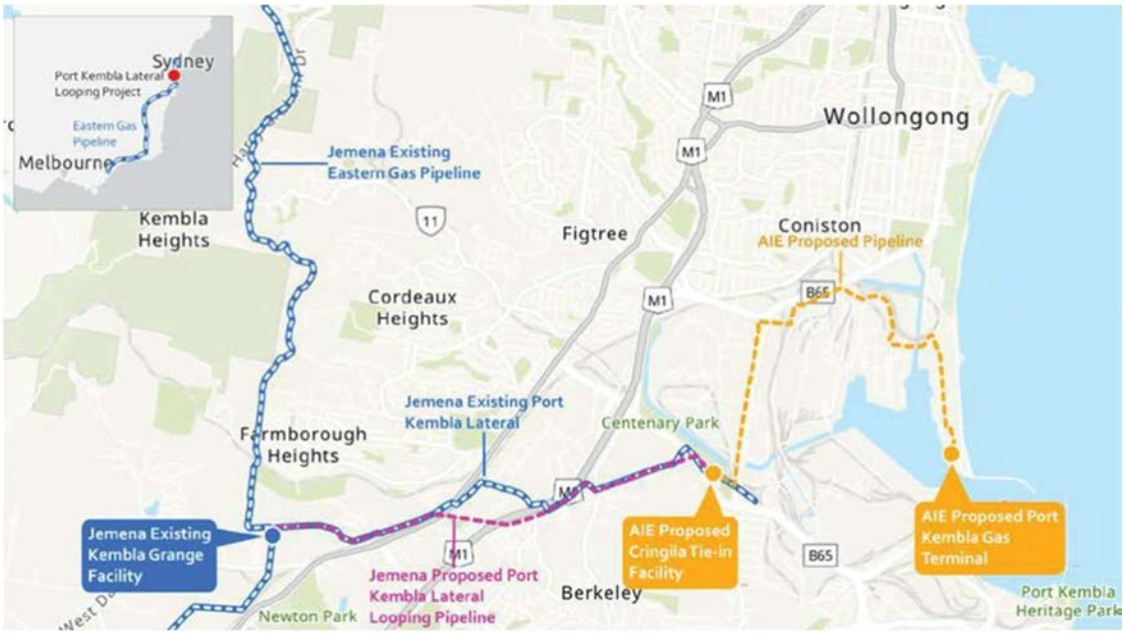


Figure 18: Jemena Lateral Looping Project

6.4.2 Recommendations

Based on the preliminary gas network assessment we recommend the following:

- Engage stakeholders within Port Kembla to collect information on the gas demands for both current and future use scenarios.
- Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.
- Continue to engage with Jemena and update infrastructure demands analysis as new information becomes available in response to major changes in the Port.

6.5 National Broadband Network (NBN)

The NBN Co provide the broadband network Australia wide. The Federal governments National Map is publicly available and provides information pertaining to a large number of data catalogues including the NBN technology dataset show in Figure 19.

Figure 19: NBN Network Map

6.5.1 Assessment

The data presented in Figure 19 illustrates that the entire project area is serviced by the NBN network. The southern and much of the BlueScope areas being serviced by Fibre with the Northen Area serviced by satellite. NBN has advised that this data was last updated as of June 2020 and would not take into account technology upgrades being undertaken to the fibre footprint.

6.5.2 Recommendations

NBN Co have provided a full coverage map within the Port and advised they are continuing to upgrade their fibre footprint. At this time there is no recommendation surrounding the NBN network within the Port.

- Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.
- Continue to engage with service providers and update infrastructure demands analysis as new information becomes available in response to major changes in the Port.

7 FLOODING

Port Kembla forms the confluence point of Allans Creek and Gurungaty Waterway. Each of these waterways have extensive catchments and are subject to widespread flooding during large storm events. Due to the size of these catchments and their interaction with urban areas, Wollongong City Council (WCC) maintain up to date flood studies that identify the extent and impact of flooding expected within these catchments. The current flood studies for these catchments are described below.

Allan's Creek Flood Study (2019)

The Allan's Creek Flood Study 2019 was prepared for WCC by Advisian Pty Ltd and builds upon the previous 2006 study. The study includes TUFLOW modelling of the creek system and provides detailed flood maps for all lower extents of the catchment including the Project Area.

Allan's Creek begins west of Unanderra and extends east through the Three Port SEPP area to discharge into Tom Thumbs Lagoon. The creek crosses the Princes Highway, Five Islands Road, the Princes Motorway and Springhill Road, and many key rail connections in the Project Area. As such, any flooding that occurs within the system has the potential for significant impact upon infrastructure and connectivity within the Project Area.

For the purpose of this assessment the 5% and 1% AEP flood events have been considered, with key figures extracted from the flood study and displayed below as follows:

- 5% AEP Event Peak Flood Depths and Levels Design Blockage Factors, Figure 5-3
- 1% AEP Event Peak Flood Depths and Levels Design Blockage Factors, Figure 9-3
- 1% AEP Event Provisional Flood Hazard Design Blockage Factors, Figure 42-3

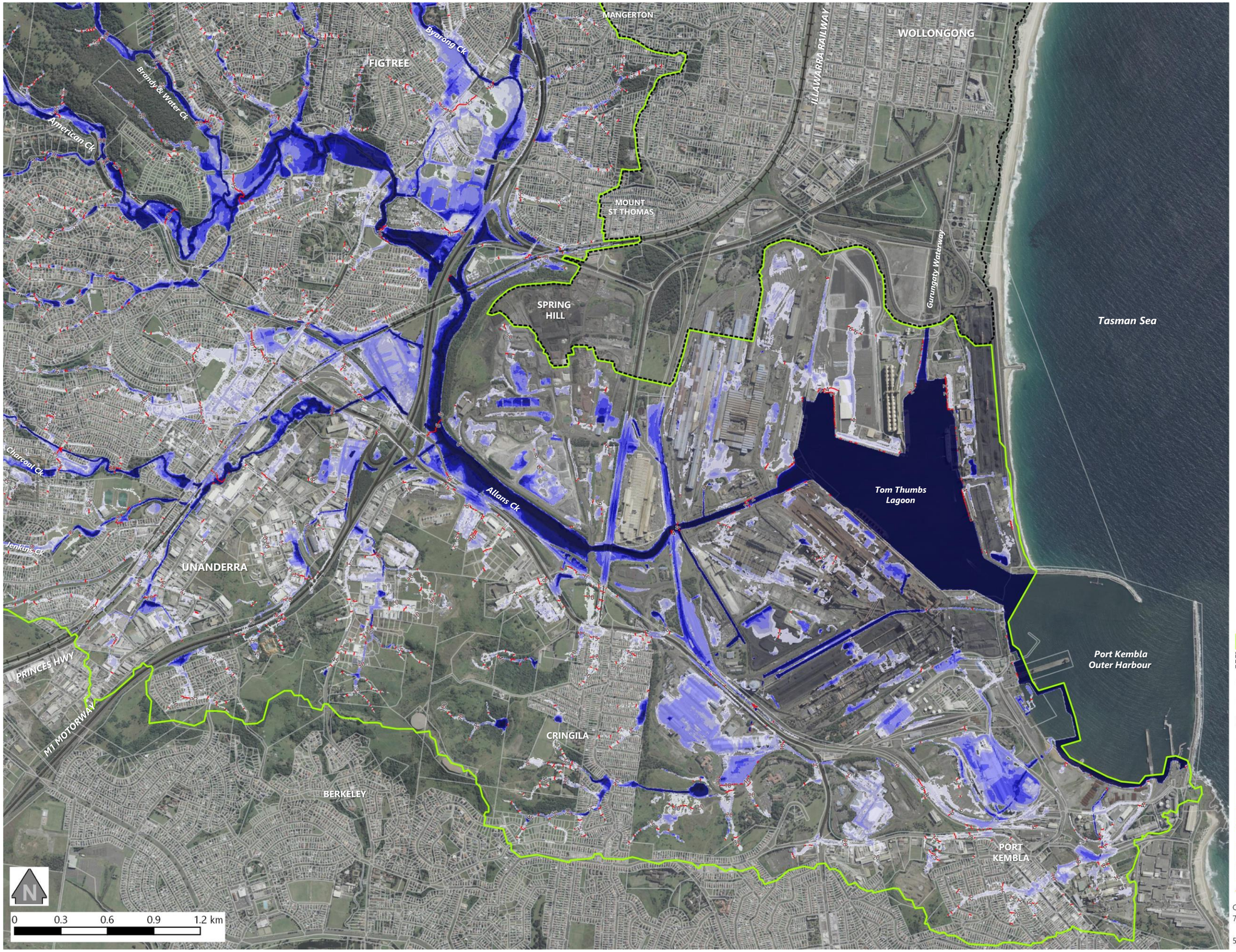
Wollongong City Flood Study (2019)

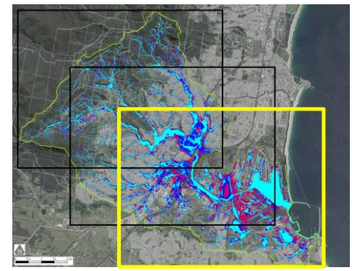
The Wollongong City Flood Study 2019 was prepared for WCC by Jacobs Pty Ltd and assesses the extent and depth of flooding within the CBD area and the industrial lands south of the CBD. The catchment eventually discharges into the Gurungaty Waterway, from where it flows south into Tom Thumbs Lagoon and Port Kembla.

For the purpose of this assessment the 5% and 1% AEP flood events have been considered, with key figures extracted from the flood study and displayed below as follows:

- Scenario ID2 'Design' blockage factor peak flood depth - 5% AEP Event, Figure 17
- Scenario ID2 'Design' blockage factor peak flood depth - 1% AEP Event, Figure 13
- Scenario ID2 'Design' factor provisional flood hazard - 1% AEP Event, Figure 37

FIGURE 5-3





LEGEND

- Allans Creek Catchment
- Wollongong City Catchment
- Major Roads
- Railway

Peak Flood Depths (m)

- 0.05 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 4.0
- > 4.0
- Peak Flood Level Contours (mAHD)

Contour levels: 2, 4, 6, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 350, 400 mAHD

5% AEP Event - Design Blockage Factors

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Rev:	C	Date: 21/10/2019	Scenario ID: 2
File:	fg301015-03839_191021_AllansCkFS_Vol2FloodMapping_ID2_A3L.pptx		
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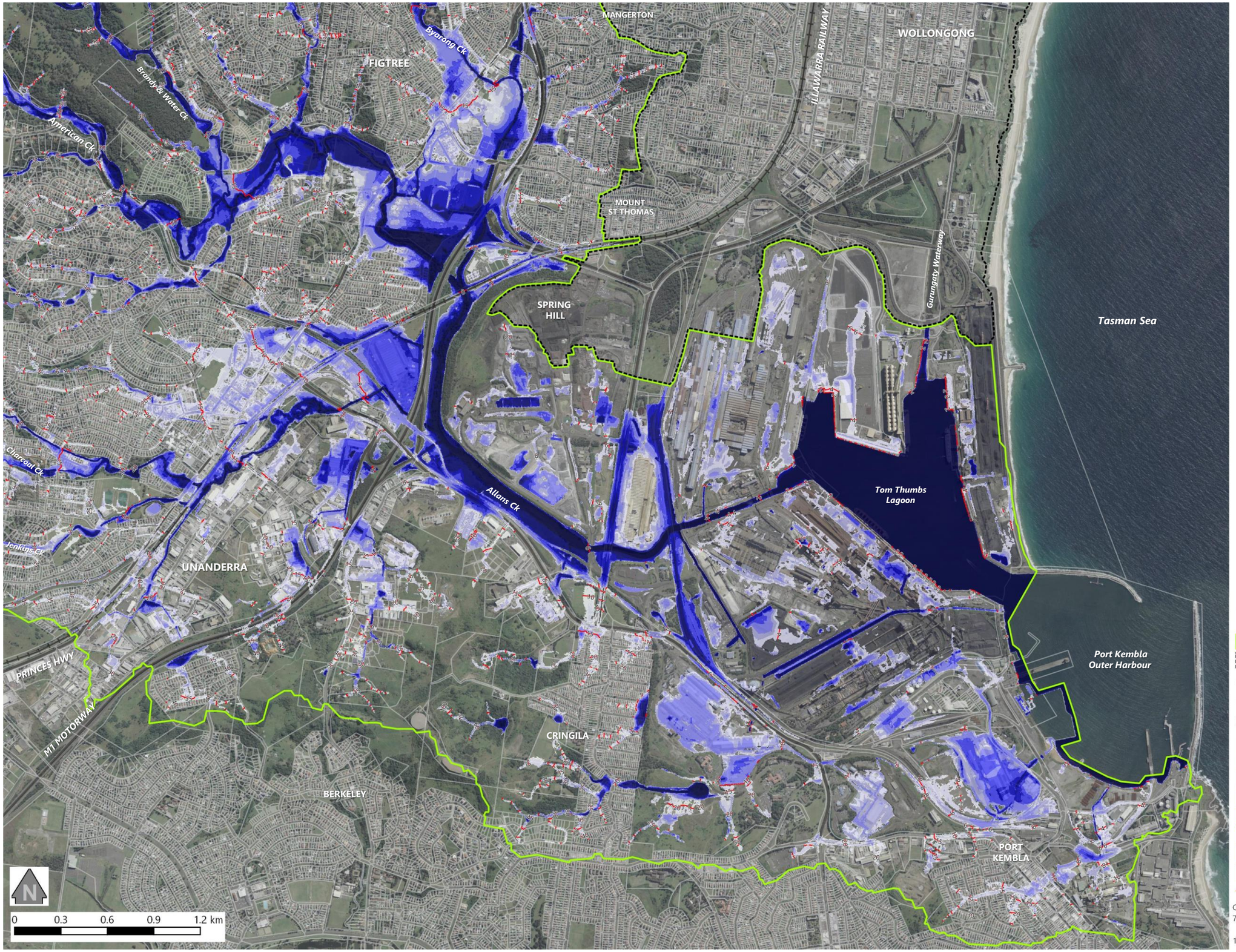
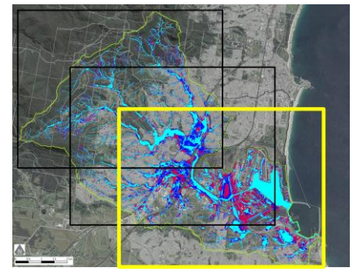
TUFLOW version:	AC_190531_~s1~_~e1~_~e2~_~s2~.tcf		

5% AEP EVENT PEAK FLOOD DEPTHS AND LEVELS DESIGN BLOCKAGE FACTORS – SHEET 3

FIGURE 9-3





LEGEND

- Allans Creek Catchment
- Wollongong City Catchment
- Major Roads
- Railway

Peak Flood Depths (m)

- 0.05 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 4.0
- > 4.0
- Peak Flood Level Contours (mAHD)

Contour levels: 2, 4, 6, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 350, 400 mAHD

1% AEP Event - Design Blockage Factors

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Prepared by: Advisian Worley Group

Rev: C
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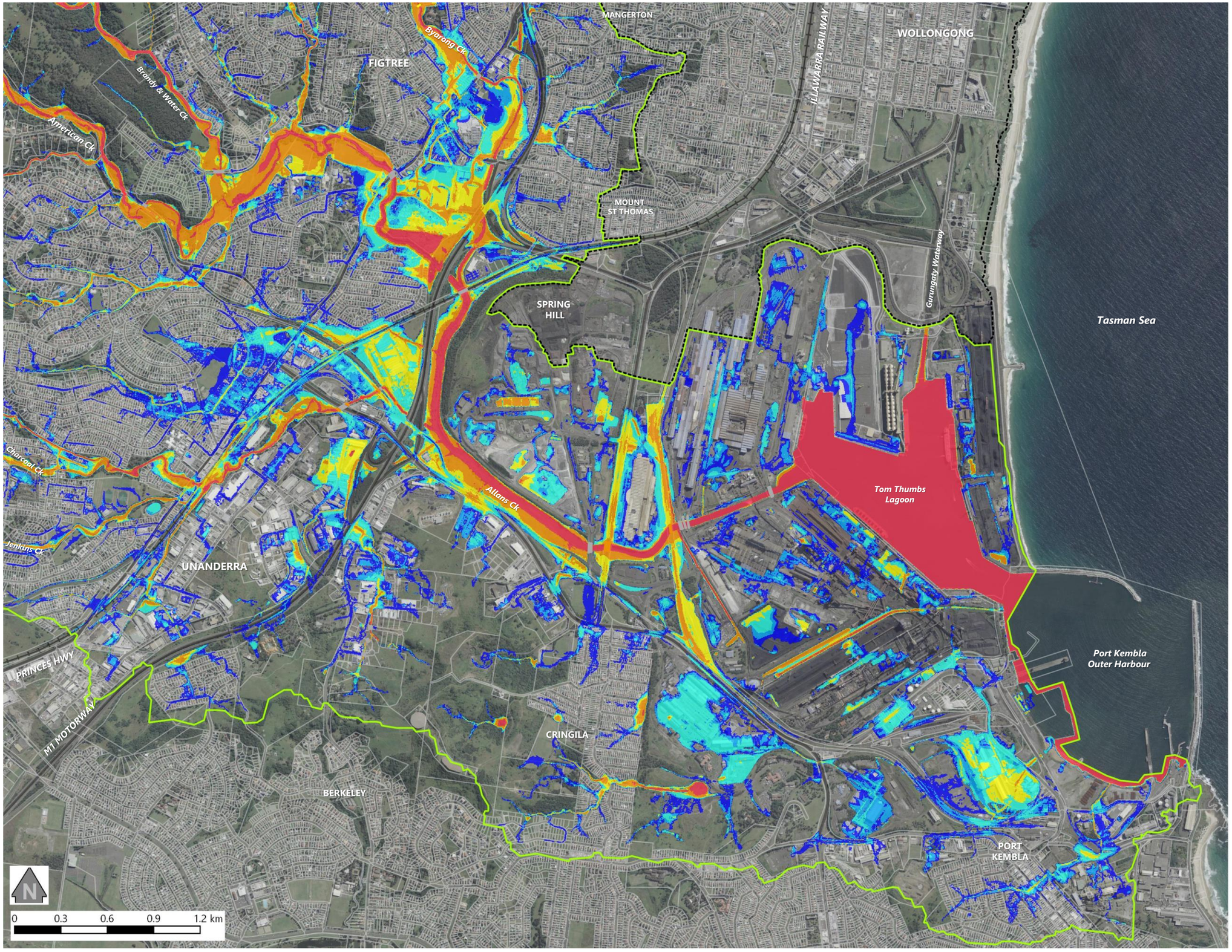
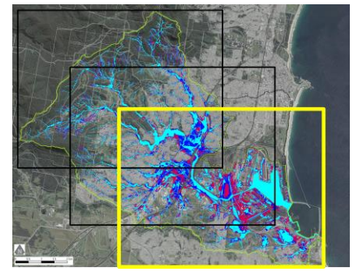
1% AEP EVENT PEAK FLOOD DEPTHS AND LEVELS DESIGN BLOCKAGE FACTORS – SHEET 3

FIGURE 42-3





LEGEND

- Allans Creek Catchment
- Wollongong City Catchment
- Major Roads
- Railway

Provisional Flood Hazard

- H1 - Generally safe
- H2 - Unsafe for small vehicles
- H3 - Unsafe for all vehicles, children & elderly
- H4 - Unsafe for all vehicles & people
- H5 - Unsafe, buildings vulnerbale to structural damage or failure
- H6 - Unsafe, all buildings vulnerable to failure

1% AEP Event - Design Blockage Factors

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Prepared by: Advisian Worley Group

Rev: C
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Date: 21/10/2019 Scenario ID: 7

1% AEP EVENT PROVISIONAL FLOOD HAZARD DESIGN BLOCKAGE FACTORS – SHEET 3

Legend

- Wollongong City Study Area
- Roads
- Flow Paths

Flood depths (m)

- < 0.15
- 0.15 - 0.25
- 0.25 - 0.5
- 0.5 - 1.5
- > 1.5

A3

1:12,000

Data sources
Jacobs 2015
Ausimage 2014
RMS 2015
LPI 2015

Figure 17 | Scenario ID2 “Design” blockage factor peak flood depth – 5% AEP event

JACOBS NSW SPATIAL - GIS MAP file : Figure 17 Scenario ID2 "Design" blockage factor peak flood depth – 5% AEP event | 21/03/2019

Legend

- Wollongong City Study Area
- Roads
- Flow Paths

Flood depths (m)

- < 0.15
- 0.15 - 0.25
- 0.25 - 0.5
- 0.5 - 1.5
- > 1.5

N

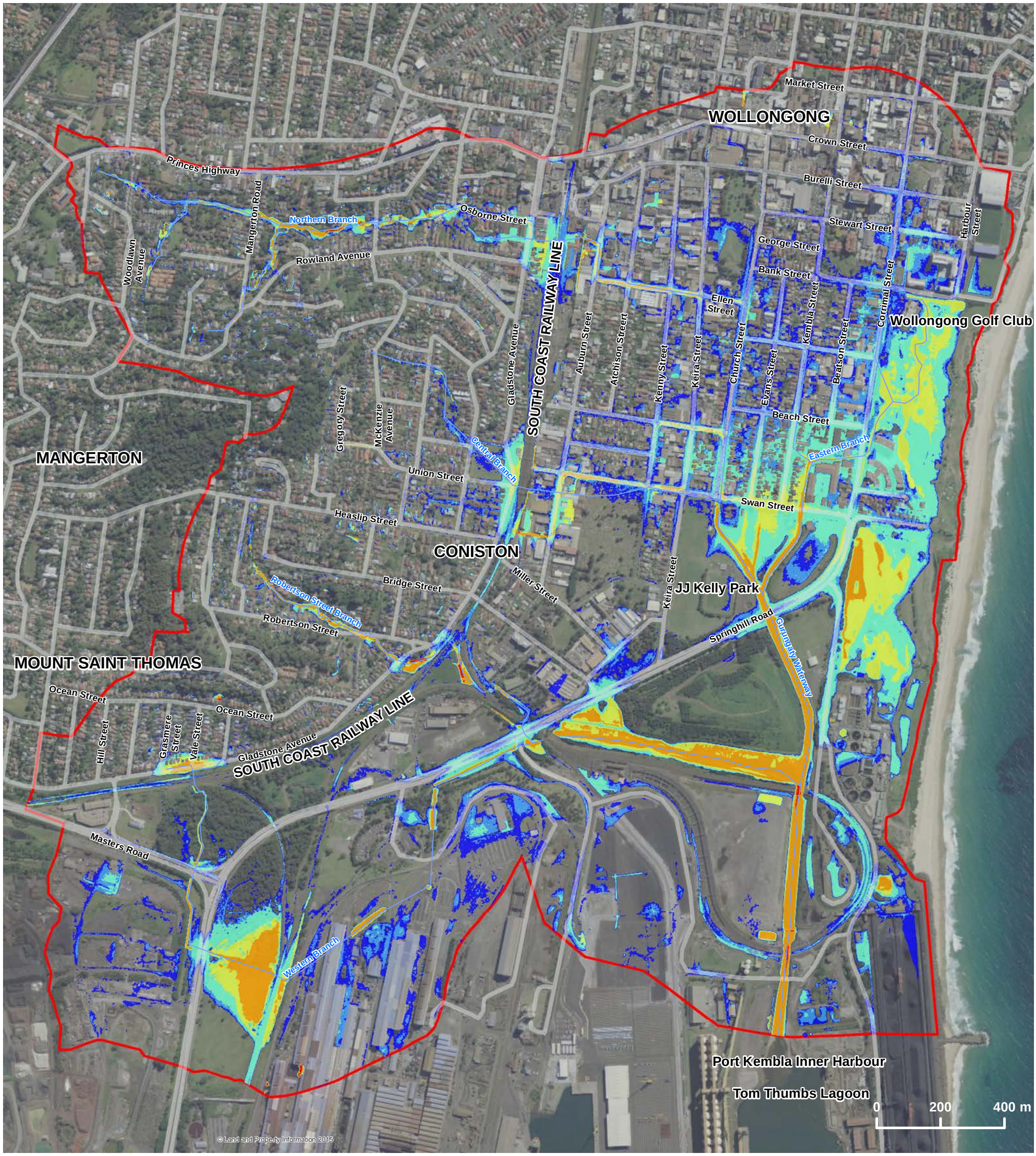
A3

1:12,000

Data sources
Jacobs 2015
Ausimage 2014
RMS 2015
LPI 2015

JACOBS NSW SPATIAL - GIS MAP file : Figure 13 Scenario ID2 "Design" blockage factor peak flood depth – 1% AEP event | 21/03/2019

Figure 13 | Scenario ID2 "Design" blockage factor peak flood depth – 1% AEP event



Legend

- Wollongong City Study Area
- Roads
- Flow Paths

Provisional Flood Hazard

- H1 - No restrictions
- H2 - Unsafe for small vehicles
- H3 - Unsafe for vehicles, children and the elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for people or vehicles. Buildings require special engineering design and construction
- H6 - Not suitable for people, vehicles or buildings

A3

1:12,000

Data sources
Jacobs 2015
Ausimage 2014
RMS 2015
LPI 2015

Figure 37 | Scenario ID2 “Design” blockage factor provisional flood hazard – 1% AEP event

JACOBS NSW SPATIAL - GIS MAP file : Figure 37 Scenario ID2 "Design" blockage factor provisional flood hazard – 1% AEP event | 21/03/2019

7.1.1 Assessment

As illustrated in Figures 20-25 flooding can be expected throughout much of the Project Area with inundation on many key infrastructure connections and industrial sites.

While this flooding represents a challenge in these areas, it is not expected to prevent further industrial activation of Port Kembla with industrial land uses generally considered compatible with flood affected areas when planned appropriately. Where use of flood prone land is to be considered, it is important that not only the depth of inundation, but the hazard of floodwaters and rising sea level be considered.

The Provisional Flood Hazard mapping provided above refers to the relationship between the depth of water and its velocity. This classification of this relationship is shown in Figure 26 taken from Wollongong DCP Chapter E13:

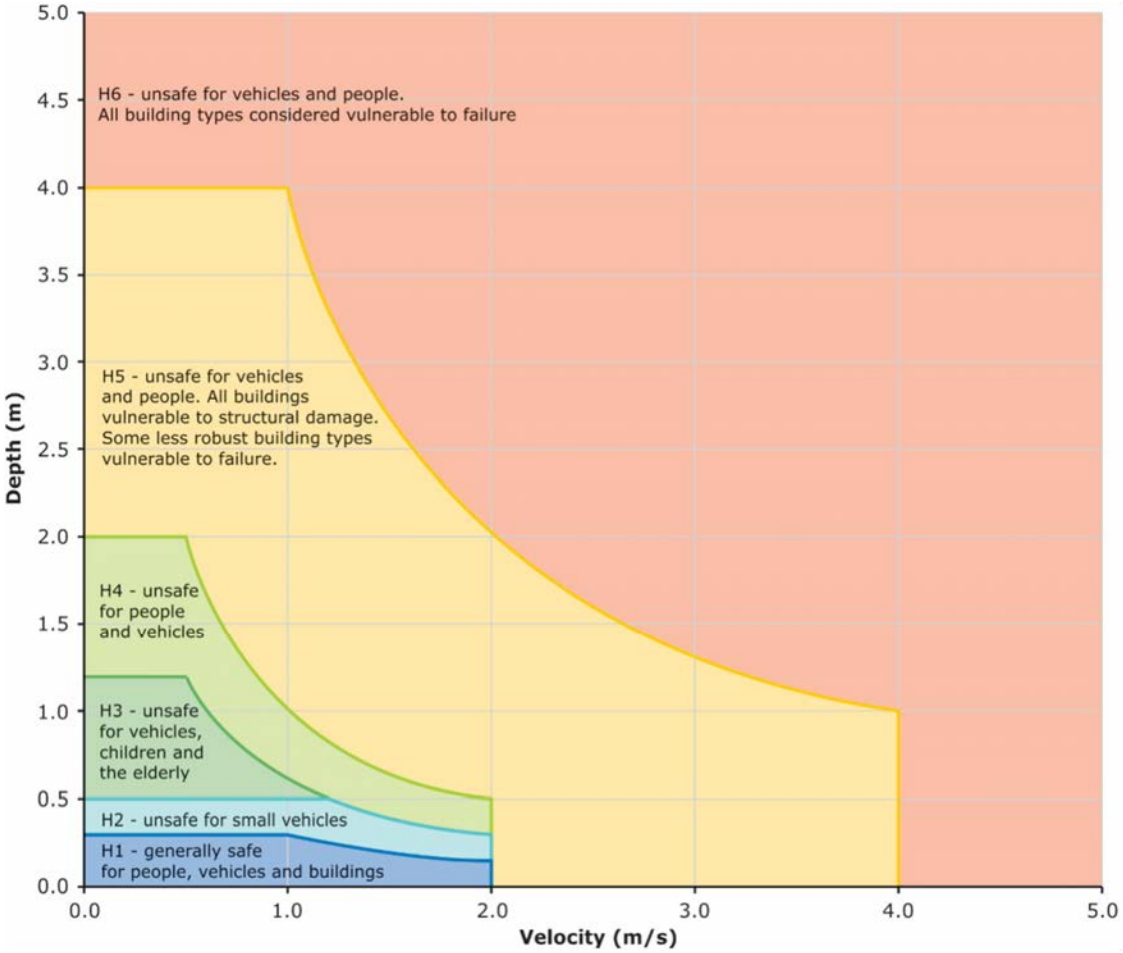


Figure 26: Combined Flood Hazard Curves

Specific hazards and flood risks to infrastructure at Port Kembla are detailed further in the following sections.

Roads and Rail

- Flooding from the intersection of Springhill Road and Five Island Road heading north up Springhill Road approximately 1.1km showing hazard levels up to H5
- Allan Creek's banks are flooding in both events within the BlueScope Core areas
- Springhill Road in the north is flooding and shows a hazard level of H3
- Access in and out of the Inner Harbour maintained on selected roads for large vehicles in 1% AEP
- The main passenger/freight line shows hazard levels of up to H5

Land

- All flooding within BlueScope Commonwealth Rolling Mills (CRM) Area, Non-Core Area (with exception of a single basin) pose minimal threat to building structural stability
- Flooding within the southern industrial area poses minimal threat to buildings' structural stability
- No infrastructure is within the H6 Areas, which are identified as impacts where all building types are considered vulnerable to failure.

7.1.2 Recommendations

- No further assessment of flooding is considered necessary at this time.
- Further preliminary flood reviews and flood impact risk assessments (where necessary) should be carried out on a case-by-case basis where any specific land use or change is proposed considering all possibilities including climate change.
- Any future changes or upgrades to infrastructure at Port Kembla should be subject to a detailed flood impact risk assessment due to the high level of interaction with the floodplain.
- Any future infrastructure or activation should maintain an appropriate riparian and floodway corridor to maintain a sustainable waterway as well as resilient and reliable infrastructure.
- Despite the above, flood prone land when not within the core waterway, represents an opportunity for industrial land use when planned appropriately and should be considered viable subject to individual assessment.

8 CONCLUSION AND RECOMMENDATIONS

The Port Kembla Three Ports boundary area will accommodate rapid development in the coming years and will need thorough planning and foresight to ensure opportunities are maximised within Port Kembla. This report has assessed the infrastructure in its current state and makes recommendations for additional assessments based on future projects and visions for Port Kembla.

Conclusions and/or matters addressed in Stage 2 (next section)	Matters Requiring Further Investigation
Roads and Intersections	
• Traffic consultant to review background documents and identify potential areas of concern and identify potential road upgrades that would provide most benefit for overall traffic improvements. • Engage stakeholders within Port Kembla to collect information regarding the traffic demands of services for both current and future use cases. • Using collected information, calculate baseload project and future demand scenario project traffic infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.	• DPE to continue to work with TfNSW regarding any future proofing strategies that are relevant. • Continue to update infrastructure demands analysis as new information becomes available in response to major change in the Port.
Freight Rail	
• Freight is critical in maximising the potential of Port Kembla. Freight infrastructure links currently being tabled, such as the Maldon-Dombarton Line and SWIRL will depend on collaboration and planning between all levels of government.	The Port Kemble Structure Plan should: • Assume additional freight capacity will be provided between Port Kembla and Western Sydney over the long term (20+ years). • Seek to protect existing freight/transport corridors from encroachment of incompatible development and prioritise freight movement.

Matters addressed in Stage 2 (next section)	Matters Requiring Further Investigation
Services – Water, Sewer, Electricity & Gas	
• Engage stakeholders within Port Kembla to collect information regarding the demands of services for both current and future use cases. • Using collected information, calculate baseload project and future demand scenario project infrastructure demands and provide high level analysis of likely required Port infrastructure needs/upgrades.	• Continue to engage with service providers and update infrastructure demands analysis as new information becomes available in response to major change in the Port.
Flooding	
• No further assessment required.	• Further preliminary flood reviews and flood impact risk assessments (where necessary) should be carried out on a case-by-case basis where any specific land use or change is proposed. • Any future changes or upgrades to infrastructure at Port Kembla should be subject to a detailed flood impact risk assessment due to the high level of interaction with the floodplain. • Any future infrastructure or activation of Port Kembla should maintain an appropriate riparian and floodway corridor to maintain a sustainable waterway as well as resilient and reliable infrastructure.

STAGE 2: INVESTIGATION OF FUTURE INFRASTRUCTURE DEMANDS

Stage 2 of this report focuses on Port Kembla's future services requirements and transport demands on existing services and transport infrastructure. The Stage 2 assessment builds on the Stage 1 assessment by incorporating the findings presented within the Port Kembla Structure Plan (PKSP) where several developments and theoretical uses are identified.

Short-Term to Medium-Term Developments

Key developments anticipated in the Short-Term (<10 years) and Medium-Term (10-20 years) in the PKSP that have commenced planning approval are identified as the baseline of the future infrastructure demands. These projects include:

- Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility)
- Squadron Energy Port Kembla Power Station
- Manildra Group Bulk Liquids Terminal
- BlueScope HyKembla Project
- BlueScope No. 6 Blast Furnace Reline
- Jemena Lateral Looping Pipeline
- NSW Ports Outer Harbour Expansion

Figure 27 Illustrates the locations of the Short-Term and Medium-Term projects. The final location of the Port Kembla Power Station is yet to be finalised.

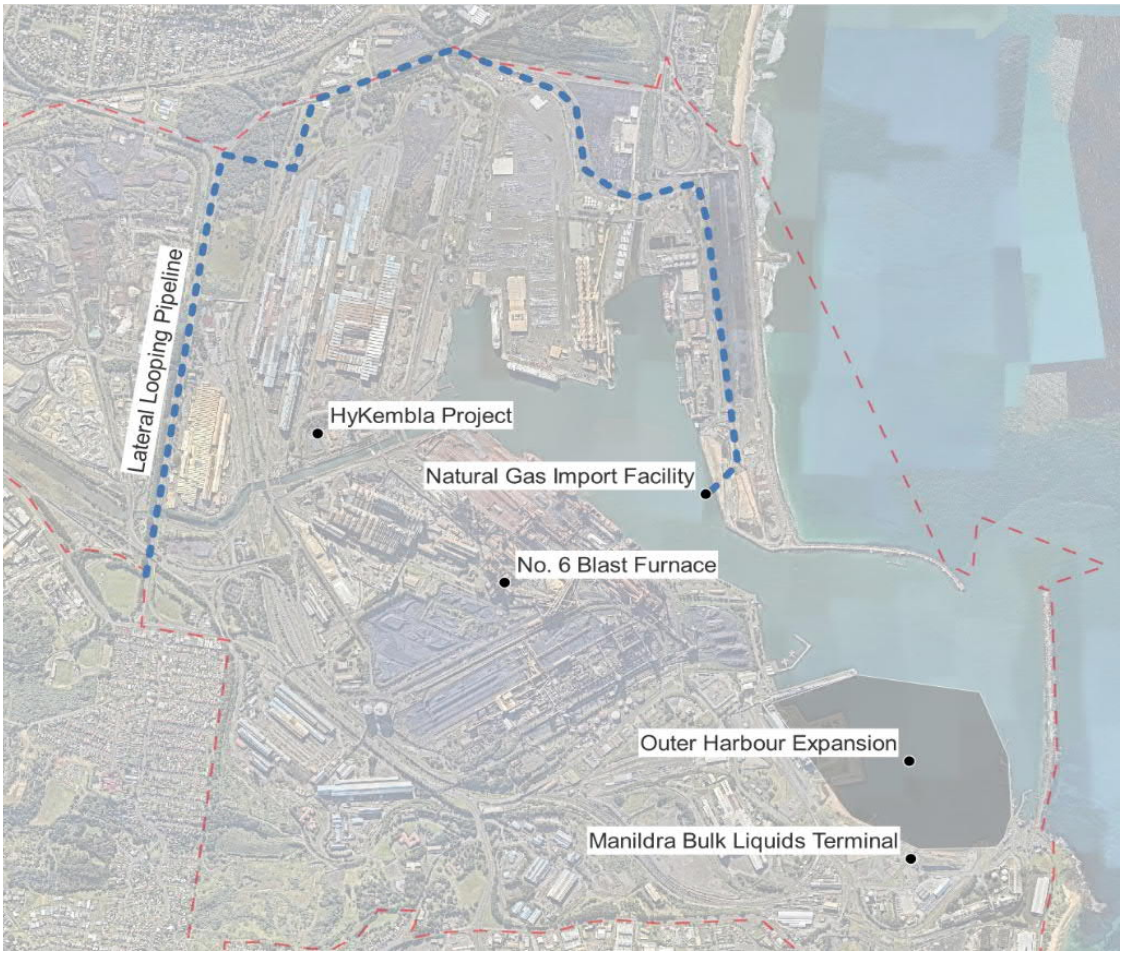


Figure 27: Baseline Project Locations

Future Developments

Building upon the baseline services demands, three future scenarios for Port Kembla have been investigated. These investigations primarily focused on future infrastructure demands with the specific locations within Port Kembla to be determined at a later stage in the development. These scenarios include the following:

- BlueScope Masterplan Non-Core Area Land Uses
- Port Kembla Hydrogen Hub
- Offshore Wind Farm Operations

While Port Kembla has been identified by the Federal Government as a potential Defence Base for Australia's nuclear-powered submarines, the final decision on the location is not expected to be made until the end of the decade. For this reason, the future development scenario does not consider a future Defence Base.

9 BASELINE DEMANDS

The Stage 2 baseline demands are the combined demand of the Short-Term and Mid-Term development servicing requirements including electricity, gas, sewer and water as well as road infrastructure requirements.

9.1 Baseline Project Description

9.1.1 HyKembla Project - Hydrogen Electrolyser (10MW) & Hydrogen Refuelling Station

During consultation, it was identified that there is the potential for the installation and operation of a hydrogen electrolyser and hydrogen refuelling stations (HRS) as part of the HyKembla development. The development would consist of two stages, with the first stage involving a 10MW electrolyser and HRS to service 100 vehicles. In the second stage, the electrolyser capacity would be upgraded to 40MW with the HRS servicing up to 200 vehicles.

At the time of publishing this report, BlueScope have advised that these projects are not currently progressing and may be reviewed at a later date.

9.1.2 Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility)

Squadron Energy is currently constructing the first stage of their Port Kembla Energy Terminal, a natural gas import facility that connects to the Eastern Pipeline (Jemena Lateral Looping Project) to supply more than 70% of NSW's gas needs.

9.1.3 Squadron Energy Port Kembla Power Station

The Port Kembla Power Station development includes a single H-class combined cycle gas turbine capable of supplying approximately 635MW of gas-fired power generation in the short to medium term and has been included in the baseline projects. During our investigation, Squadron Energy confirmed that the Energy Terminal location has yet to be finalised.

9.1.4 Manildra Bulk Liquids Terminal

The Manildra Groups Manildra Bulk Liquids Terminal is a storage facility dedicated to the export of Shoalhaven Starches Beverage Grade Ethanol produced at its Nowra facility. The proposed Bulk Liquids Facility offers additional storage and shipping capabilities with a total Ethanol storage capacity of 16ML. Approval for this development was obtained by Manildra in June 2023.

9.1.5 BlueScope No. 6 Blast Furnace Reline (6BF)

BlueScope's reline development is expected to be completed between 2026-2030 and given that development is upgrade/replacement work we have assumed that the blast furnace reline will have no additional demands on the existing services or infrastructure network and have been excluded from the baseline assumptions.

9.1.6 Jemena Lateral Looping Pipeline

The objective of the Jemena Lateral Looping Pipeline is to connect the Natural Gas Import Facility to the existing Eastern Gas Pipeline. This project is currently under construction,

and once operational will have no impact on the existing services or infrastructure network and have been excluded from the baseline assumptions.

9.1.7 NSW Ports Outer Harbour Expansion

NSW Ports Outer Harbour Expansion includes the reclamation of approximately 42 hectares of port operations area with berthing capabilities. While projects utilising, the expansion will have service requirements, we have assumed that the expansion works will have no additional demands on the existing services or infrastructure network and have been excluded from the baseline assumptions.

The NSW Ports 2063 Master Plan specifies that the Outer Harbour Expansion area (container terminal) is not expected to be in operation until 2045; and for this reason, operation of a container terminal is not considered in the baseline assumption. The container terminal will have significant impact on the surrounding infrastructure network, with the key constraint for this development expected to be the impact on the surrounding road and rail networks.

NSW Ports have released concept plans for the expansion area to be used as a windfarm assembly facility in the medium-term to long-term, with the terminal conversion expected at the conclusion of the windfarm assembly. The potential future infrastructure demands of offshore windfarms are discussed in the Future Scenario of this report.

9.2 Baseline Projects Infrastructure demands

The baseline project infrastructure demands are summarised in Tables 11 and Baseline Projects Road Network Demands are summarised in Table 12.

Table 11: Baseline Project Infrastructure Demands

Development Type	GFA (m2)	Service Demands (Unit/Day)			
		Electricity	Water	Sewer	Gas
		MWh	kL	kL	MJ
HyKembla Stage 1 Projects*	800[1]	168.22[2]	52.81[2]	15.85[2]	N/A[3]
Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility)	50[4]	0.33[5]	10.00[5]	0.00[5]	N/A[3]
Squadron Energy Port Kembla Power Station	800[6]	0.22[7]	588[8]	0.00[8]	4.5e+7[9]
Manildra Bulk Liquids Terminal	320[10]	0.09[11]	0.73[11]	0.73[11]	N/A[3]
Blue Scope Blast Furnace No. 6 Reline	N/A[12]	N/A[12]	N/A[12]	N/A[12]	N/A[12]
Port Kembla Lateral Looping Pipeline	N/A[13]	N/A[13]	N/A[13]	N/A[13]	N/A[13]
Outer Harbour Expansion	N/A[14]	N/A[14]	N/A[14]	N/A[14]	N/A[14]
Total	1920	168.86	651.54	16.58	4.5e+7

*At the time of publishing this report, BlueScope have advised that these projects are not currently progressing and may be reviewed at a later date.

References and Assumptions (See Appendix B for further information)

[1] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022, Figure 3-7.

[2] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022, Figure 3-6 operating 24 hours at 70% capacity includes office and amenities space based on service intensities.

[3] No service requirement.

[4] Maker ENG Information Request Form Feb 2023 (Squadron Energy) Assumes small office and meeting room.

[5] Maker ENG Information Request Form Feb 2023 (Squadron Energy – Gas Terminal).

[6] Assumed similar office and amenities requirement to HyKembla Electrolyser

[7] Assumes power required only for office and amenities space.

[8] Port Kembla Power Station, Scoping Report, October 2021, operating 24 hours at 70% peak volume, although not mentioned in report.

[9] Port Kembla Power Station, Scoping Report, October 2021.

[10] Maker ENG Information Request Form Feb 2023 (Manildra).

[11] Only the Office and Amenities demands considered as operational requirements not available.

[12] Limited information provided by BlueScope however its assumed no additional services required.

[13] Service carrier upgrade, no additional facilities required.

[14] Future usages expected to be largely storage and stockpiling no additional services anticipated.

Table 12: Baseline Projects Road Network Demands

Development Type	Movements per Day	
	Light Vehicles	Heavy Vehicles
HyKembla Projects* (HRS)[1]	20	200
Squadron Energy Port Kembla Energy Terminal[2] (Natural Gas Import Facility)	14	2
Squadron Energy Port Kembla Power Station[3]	14	2
Manildra Bulk Liquids Terminal[4]	2	15
BlueScope Blast Furnace No. 6 Reline[5]	N/A	N/A
Jemena Lateral Looping Pipeline[6]	N/A	N/A
Outer Harbour Expansion[7]	N/A	N/A
Total	52	232

*At the time of publishing this report, BlueScope have advised that these projects are not currently progressing and may be reviewed at a later date.

References and Assumptions (See Appendix B for further information)

[1] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022.

[2] Maker ENG Information Request Form Feb 2023 (Squadron Energy – Gas Terminal).

[3] Assumed similar requirements to Squadron Gas Terminal

[4] Maker ENG Information Request Form Feb 2023 (Manildra).

[5] Limited information provided by BlueScope however its assumed no additional movements required.

[6] Service carrier upgrade, no additional facilities required.

[7] Future usages expected to be largely storage and stockpiling no additional services anticipated.

Of all the baseline developments, HyKembla Stage 1 Projects has the highest drawdown on the electrical servicing requiring 168 MWh/day with the entire baseline electrical demand being nearly 169 MWh/day. Referencing the additional capacity in the Endeavour Energy Spring Hill Transmission Station there appears to be sufficient electricity available to supply the baseline electricity demand.

Information on potable water and sewer capacity is limited, however, mapping of the network and high-level discussions with Sydney Water suggests that there is capacity in both the potable water and sewer to supply the baseline demands.

Information on gas location and capacity is limited given that much of the infrastructure is private although as discussed in Stage 1 Jemena has advised there is capacity to extend the network dependent on the additional loads and associated locations within the Port and will be assessed on a case-by-case basis. The Port Kembla Power Station's gas requirement will be sourced from the Port Kembla Energy (Natural Gas) Terminal. The Power Station will be designed to be powered by hydrogen as supply becomes available over the medium to long-term which will reduce demand on the Port Kembla gas infrastructure.

The additional traffic generated in the baseline scenario is predominantly heavy vehicles with anticipated movements generated throughout the day. These movements can be managed to ensure they do not coincide with the AM peak.

10 FUTURE SCENARIO DEMANDS

The Stage 2 future scenario demands are the combined demand of the long-term development servicing requirements including electricity, gas, sewer and water as well as road infrastructure requirements.

10.1 Future Scenario Description

10.1.1 BlueScope Master Plan for Non-Core Area

BlueScope has identified 200 hectares of land that they consider surplus to their current core operations, and in 2022, engaged Danish architecture firm Bjarke Ingels Group and ColonySix to develop a Master Plan for the surplus land as illustrated in Figure 28.

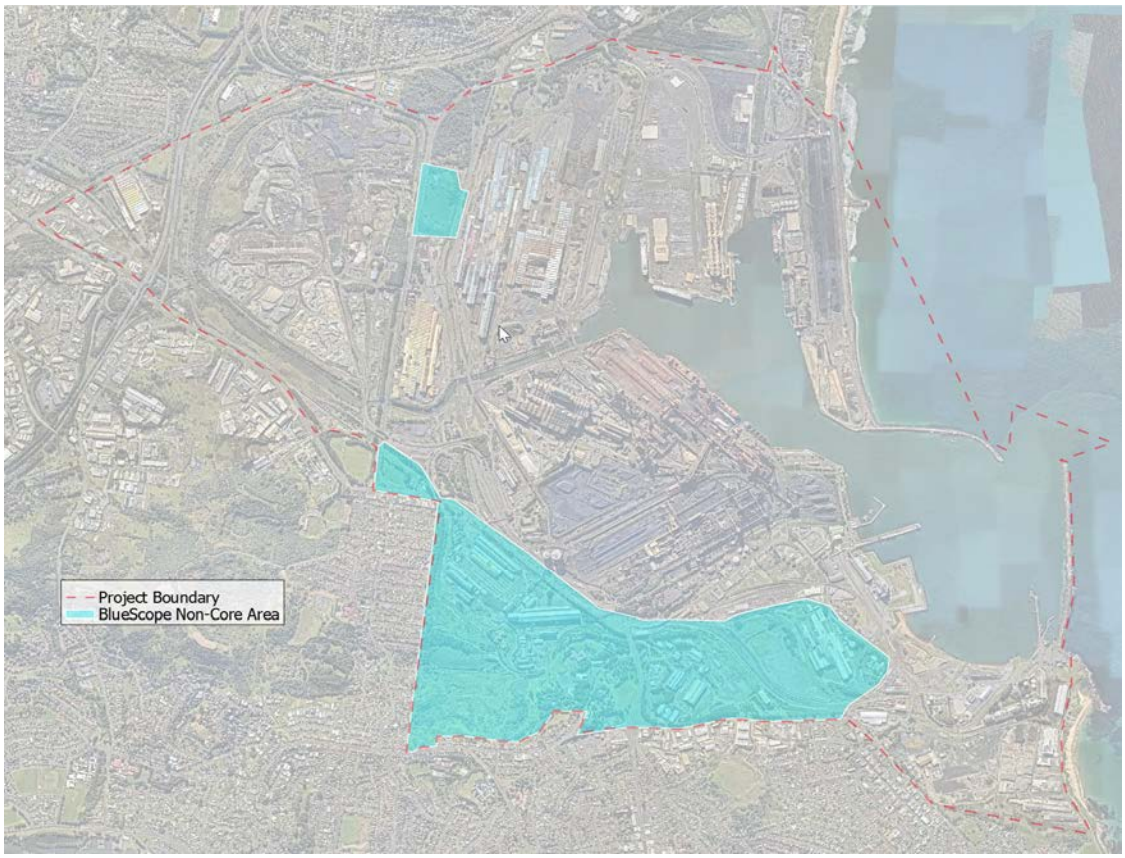


Figure 28: BlueScope Surplus Land

At the time of this investigation, specific details regarding the infrastructure requirements future uses of the non-core lands are largely unknown. However, high-level estimates of the Gross Floor Areas (GFA) of a range of potential future land uses have been estimated with the land uses broken down into the following categories:

- Office Space
- Manufacturing and Factories
- Warehousing
- Retail and Amenities
- Sports Field
- Education

10.1.1.1 Services Data and Estimation Methodology

Infrastructure demands are calculated based on average daily use/service intensity by development type provided by Sydney Water and the Department of Climate Change, Energy the Environment and Water as summarised in Table 13.

Table 13: Service Intensities – Future Demand Scenario

Development Type	GFA (m^2)	Service Intensities (Unit/m^2/Day)			
		Electricity[1]	Water[2]	Sewer[3]	Gas[1]
		kWh	L	L	kJ
Office Space	181,650	0.28	2.27	2.27	180.82
Manufacturing and Factories	357,032	0.08	2.82	2.82	48.49
Warehousing	37,500	0.07	2.82	2.82	46.58
Retail and Amenities	111,643	0.39	3.00	3.00	243.84
Sports Fields[4]	9,750	-		-	-
Education[5]	137,138	0.09[5]	1.33	1.33	56.99

References and Assumptions (See Appendix B for further information)

[1] Average Electrical Intensity and Gas Intensity taken and converted from the Department of Climate Change, Energy the Environment and Water's *Commercial Building Consumption Baseline Study 2022*.

[2] Water Intensity taken from Sydney Water's Average Daily Water Use By property development type.

[3] Ratio of 1:1 potable water consumption to wastewater consumption

[4] Sports fields assumed to be a low maintenance oval having no irrigation and minimal lighting.

[5] 9,150 estimated students based on TEFMA guidelines broad 'rule of thumb' planning parameter, 14-15m^2 GFA/Student

10.1.2 BlueScope Master Plan Infrastructure Demands

Table 14 presents an estimate of the additional demand of the services network within the BlueScope Master Plan area using the services intensities provided in Table 12.

Table 14: BlueScope Master Plan Potential Service Demands

Development Type	GFA (m^2)	Service Demands (Unit/Day)			
		Electricity	Water	Sewer	Gas
		MWh	kL	kL	MJ
Office Space	181,650	51.01	412.35	412.35	32,846.30
Manufacturing and Factories	357,032	29.07	1,006.83	1,006.83	17,314.61
Warehousing	37,500	2.76	105.75	105.75	1,747.58
Retail and Amenities	111,643	43.29	334.93	334.93	27,222.54
Sports Fields	9,750	-	-	-	-

Education Facilities	137,138	12.96	182.86	182.86	7,814.99
Total	834,713	139.10	2,042.71	2,042.71	79,129.02

10.1.3 Transport Data and Estimation Methodology

BlueScope announced at the annual BlueScope Steel i3net Industry Breakfast that the surplus land Masterplan has the potential to create an additional 30,000 jobs in Port Kembla. Based on Wollongong City Council's most recent Census Data (2021) the main method of travel will be Vehicle Movement (87%), Public Transport (4%) and Other (9%).

Table 15 below presents an estimate of the additional demand on both the road network and public transport network using the Wollongong City Council Census Data.

Table 15: BlueScope Surplus Land Potential Transport Demands

Vehicle Movements [1,2]	Public Transport [1,2]	Other [1,2]
52,220	2,400	5,400

References and Assumptions (See Appendix B for further information)

[1] Wollongong City Council's 2021 Census Data (2021) Vehicle Movement (87%), Public Transport (4%) and Other (9%)

[2] Estimated vehicle movements are twice the number of daily visits/commutes.

Considering the BlueScope Surplus Land potential transport demands we expect that the road network capacity will be exceeded at the key intersections identified in Stage 1 primarily along the road network associated with the AM peak as shown in the Figure 29 below and will require further investigation.

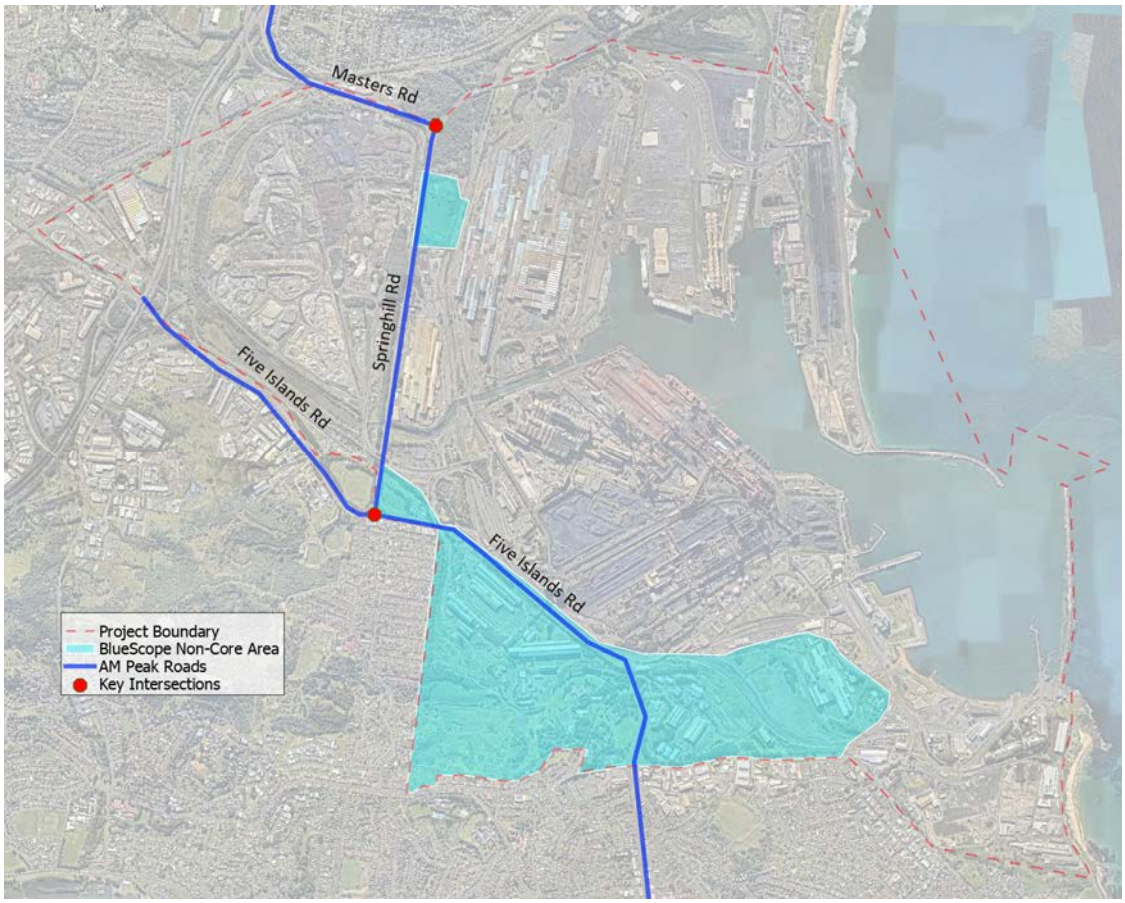


Figure 29: AM Peak Affected Road Network

Cringila and Port Kembla train stations will also play an important role in supporting these uses. This may include providing additional train services to support the employment catchment as part of broader efforts to reduce private vehicle use on key Port access roads, augmentation of key infrastructure (subject to investigation) to improve travel choices and/or the provision of space for potential public transport interchanges around these stations due to increased use by incoming employees and to make them more functional and accessible. The PKSP may provide guidance on the above. Additional bus services and routes (subject to investigation) may also need to be considered to service these areas.

There appears to be sufficient capacity within the combined Endeavour Energy Zone Substations, and Transmission Stations outputs when considering the baseline demands and additional electricity demands from the BlueScope Surplus Land. It should be noted that data used assumes an average intensity and does not account for peak loads. However, it is assumed that Endeavor Energy can reconfigure the existing network to meet the demands if required.

Information on potable water and sewer capacity is limited, however, considering the sewer and potable water demand from an additional 30,000 people travelling into Port Kembla daily, we expect that these services will need to be upgraded to service the BlueScope Surplus Lands in perpetuity.

As with the baseline scenario, gas network information and mapping is limited given that much of the infrastructure is private. High-level advice from Jemena indicates gas capacity and coverage could be extended (depending on loads). Further, given that the Port Kembla Power Station's gas requirements will be powered by hydrogen over the

medium to long-term, there will be an overall reduced demand for gas that should be able to be reallocated to the BlueScope Surplus Land should it be required.

10.2 Port Kembla Hydrogen Hub

The Port Kembla Hydrogen Hub represents the vision for establishing Australia's first green hydrogen Hub. The NSW Government has been facilitating this initiative since February 2020 with the goal of reducing the cost of low-carbon hydrogen pathways.

Several of the baseline projects will be beneficial to development of the Hydrogen Hub, including the Port Kembla Energy Terminal (Gas Import Facility), the Port Kembla Power Station, Jemena's Lateral Looping Pipeline, and BlueScope's HyKembla project (hydrogen electrolyser and refuelling station). Potential future use of Port Kembla to service offshore windfarms will further contribute to the development of the Port Kembla Hydrogen Hub.

10.2.1 Hydrogen Electrolysers

The Port Kembla Hydrogen Hub requires the development of hydrogen electrolysers to produce hydrogen; with BlueScope's HyKembla development forming the baseline for future hydrogen systems and products.

The hydrogen electrolyser development includes two stages, with Stage 1 requiring a 10MW electrolyser to support the first hydrogen refuelling station (servicing 100 vehicles) and subsequently Stage 2 which involves upgrading the electrolyser capacity to 40MW to support the final hydrogen refuelling station configuration (servicing up to 200 vehicles).

It is understood that Port Kembla will have the infrastructure in place to produce 10MW by 2025 with expansion potential up to 1 GW in the long-term. The estimated energy, water, and sewer demand to produce the base line scenarios and 1GW scenario is summarise in Table 15 below.

Table 16: Hydrogen Electrolyser

Development Type	GFA[1] (m^2)	Service Demands (Unit/Day)			
		Electricity	Water	Sewer	Gas
		MWh	kL	kL	MJ
HyKembla Stage 1 (10MW)	800[1]	168.22[2]	52.81[2]	15.85[2]	N/A[3]
HyKembla Stage 2 (40MW)[4]	800[1]	672.09	211.24	63.40	N/A
1 GW Hydrogen Production[4]	800	16,800.09	5,280.90	1,584.90	N/A

References and Assumptions (See Appendix B for further information)

[1] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022, Figure 3-7.

[2] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022, Figure 3-6 operating 24 hours at 70% capacity includes office and amenities space.

[3] No service requirement.

[4] Scaled from the 10 MW requirements.

Scaling up hydrogen production to 1GW presents challenges when considering the current servicing infrastructure available at Port Kembla. The demand on water for the generation of 1GW would likely require an additional water supply source such as a desalination plant, which at the time of this investigation, has not been proposed.

Approximately 16,810MWh of power per day is required to power a 1GW hydrogen electrolyser with 24-hour operation. This supply required to meet this demand exceeds the expected theoretical output of the future Squadron Energy Port Kembla Power Station.

While offshore windfarms have the potential to provide the necessary power for a 1GW hydrogen electrolyser, determining the scale of such a project is challenging. Given that wind farming outputs fluctuate it is unlikely that windfarms alone can be relied on as the source of power for the hydrogen electrolysers. However, during good wind conditions it is conceivable that a 2000MW offshore windfarm can provide the necessary power for a 1GW hydrogen electrolyser.

10.2.2 Hydrogen Refuelling Station (HRS) Developments

The establishment of refuelling stations and associated infrastructure is critical to the implementation of hydrogen vehicles. Currently two refuelling projects have been publicly announced, these include the BlueScope's HyKembla HRS and the Coregas refuelling station. While the details of Coregas's refuelling station, including its scale and requirements, have not been publicly disclosed, our assessment uses the information available for the HyKembla HRS project.

The HyKembla HRS has been designed to initially serve 100 vehicles per day, with the potential for expansion to accommodate up to 200 vehicles. In the initial phase, the station anticipates a maximum of 8 vehicles per hour, with an average expectation of 6 vehicles per hour. The scalability of the refuelling station hinges on traffic considerations, as the introduction of a significant number of heavy vehicles poses the primary constraint.

While the station itself requires relatively minimal services, the influx of hundreds of heavy vehicles will require a comprehensive assessment of traffic impacts.

Although Stage 1 of this report has identified the potential for upgrades at critical intersections, future traffic studies and road improvements would likely be necessary to ensure smooth operations and accommodate future traffic demand associated with hydrogen refuelling stations.

10.2.3 Hydrogen Hub Infrastructure Demands

The following tables outline the potential service demands associated with a 40MW hydrogen electrolyser, as well as the potential traffic demands with introduction of the two potential refuelling developments.

It is important to acknowledge that as the hub expands, there will be increased demands across various aspects. However, the focus here is on the two specific development types presented below, as they represent the significant constraints to be addressed.

Table 17: 40MW Hydrogen Electrolyser Services Demands

Development Type	GFA[1] (m^2)	Service Intensities (Unit/m2/Day)			
		Electricity	Water	Sewer	Gas
		kWh	kL	kL	kJ
HyKembla 40MW Hydrogen Electrolyser	800[1]	672.09	211.24	63.40	N/A

Table 18: Hydrogen Refueling Development Traffic Demands

Development Type	Heavy Vehicles	Heavy Vehicles / Hour
HyKembla HRS[1]	200	16
Coregas Refuelling station[2]	200	16
Total	400	32

References and Assumptions (See Appendix B for further information)

[1] HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022.

[2] No information was provided by CoreGas but it has been assumed to be a similar size to the HRS proposed by BlueScope

The above information highlights the significance of addressing the increasing demands and constraints that emerge as the hydrogen hub expands. While this information focuses on specific aspects, additional analysis and considerations are necessary to effectively manage the growing demands associated with the hub's development. While it is likely that the 10 MW hydrogen electrolyser, and possibly the 40 MW hydrogen electrolyser, can be accommodated using the current infrastructure, scaling up to 1GW and any potential expansion of a green hydrogen hub beyond this will necessitate additional electrical demands such as offshore windfarms and the possible provision of an additional water source such as a desalination plant.

At the time of publishing this report, BlueScope have advised that HyKembla related projects are not currently progressing and may be reviewed at a later date.

10.3 Offshore Windfarms

Several offshore windfarm locations along the NSW coast are currently being investigated with proposed offshore windfarms near Port Kembla being identified as having high potential for implementation.

The development and operation of offshore windfarms can be broken down into the following three stages:

- Stage 1 - Manufacturing and Fabrication
- Stage 2 - Assembly and Installation
- Stage 3 - Operation and Maintenance

Bluescope has the potential to undertake Stage 1 works by manufacturing/fabricating windfarm components; however, Bluescope have confirmed that at the time of this assessment it does not propose to undertake this work. Further, no other manufactures have expressed interest in manufacturing windfarm components in Port Kembla.

Stage 2 works which includes the assembly and deployment of wind turbines at sea is proposed to be undertaken from Port Kembla. The Stage 2 process is relatively short (4 years) and includes the following activities:

- House construction operations/vessels and materials
- Turbine component assembly
- Cable and transmission asset installation

Stage 3 works which includes windfarm operation and maintenance is proposed to be undertaken from Port Kembla. The operation and maintenance cycle spans the entire duration of the windfarm which is estimated to be 30 years and includes the following activities:

- House support base/vessels and crews
- Monitor and maintain offshore windfarm assets
- Monitor and maintain cables and onshore power transmission assets

10.3.1 Infrastructure Data

At present, Australia does not have active offshore windfarm operations. However, on a global scale, the total capacity of offshore windfarms exceeds 30GW. Oceanex and Bluefloat are currently investigating/building business cases for the establishment of offshore windfarm operations based out of Port Kembla.

Oceanex released their *"Energising Australia with Offshore Wind"* document (March 2022) that outlined the significant opportunities of the current supply chain and identified areas requiring further funding to allow their Port Kembla windfarm operations to be realised.

Limited information has been received from Bluefloat,

Table 19 summarises the Oceanex's Stage 2 and Stage 3 specifications for a 2000MW offshore windfarm.

Table 19: Oceanex 2000MW Offshore Windfarm Specifications

Stage 2: Assembly and Installation Requirements	
Total Area (ha)	12 ha
Laydown Area	12 ha
Stage 3: Operation and Maintenance Requirements	
Total Area (m2)	3.25 ha
Warehousing	0.7 ha
Office and Amenities	0.3 ha
Laydown Area	2.0 ha
Carpark	0.25 ha
Fulltime Employees	300

10.3.2 Servicing Methodology

Applying a similar approach as in Section 10.1.1, average service intensities have been used to determine the overall service demands for Stages 2 and 3 of the Oceanex 2000 MW Offshore Windfarm.

Table 20: 2000MW Offshore Windfarm Service Intensities

Development Type	GFA[1] (m^2)	Service Intensities (Unit/m2/Day)[5]			
		Electricity[2]	Water[3]	Sewer[4]	Gas[1]
		kWh	L	kL	kJ
Warehousing	7,000	0.07	2.82	2.82	46.58
Office and Amenities	3,000[6]	0.31	2.45	2.45	196.58
Total	10,000				

References and Assumptions (See Appendix B for further information)

[1] Energising Australia with Offshore Wind, Supply Chain and Investment Opportunities To Be Created By Oceanex Energy Kickstarting A Floating Offshore Wind Industry In New South Wales, March 2022, Figure 22, Floorspaces assumed to be GFA for estimation purposes.

[2] Average Electrical Intensity and Gas Intensity taken and converted from the Department of Climate Change, Energy the Environment and Water's *Commercial Building Consumption Baseline Study 2022*.

[3] Water Intensity taken from Sydney Water's Average Daily Water Use By property development type.

[4] A conservative ratio of 1:1 was used to estimate that potable water consumption would result in an equal amount of wastewater.

[5] 24-hour operation assumed.

[6] Assumed a ratio of 3:1 for office to amenities space.

10.3.3 Transport Methodology

Oceanex estimates that up to 300 full-time employees will be needed to ensure the smooth operation of the development. Considering the relatively small scale of the operation, no provisions have been made for public transport or alternative modes of travel. It is assumed that all workers will be accounted for as two vehicle movements to accommodate commuting to and from work.

10.3.4 Offshore Windfarm Infrastructure Demands

Table 21 presents an estimate of the potential total demand on the services network and the potential daily vehicle movements calculated using the methodology and data highlighted in Section 10.7 for a single 2,000 MW offshore windfarm.

Table 21: 2000MW Offshore Windfarm Operation Potential Infrastructure Demands

Development Type	GFA (m^2)	Service Demands (Unit/Day)			
		Electricity	Water	Sewer	Gas
		MWh	kL	kL	MJ
Warehouse and Service Facility	7,000[1]	0.52	19.74	19.74	326.03

Office and Amenities	3,000[1]	0.92	7.36	7.36	589.73
Total	10,000	1.44	27.10	27.10	915.75
Total Daily Vehicle Movements					
600[1]					

References and Assumptions (See Appendix B for further information)

[1] Energising Australia with Offshore Wind, Supply Chain and Investment Opportunities To Be Created By Oceanex Energy Kickstarting A Floating Offshore Wind Industry In New South Wales, March 2022, Figure 22, assumed 300 staff covering 24 hour operation

Potential service and traffic demands for ongoing operation of the offshore windfarms shown in Table 20 is anticipated to require minimal infrastructure to service the windfarm warehouse and office amenities.

Traffic movements for Stages 2 and 3 are limited to 600 movements per day which if undertaken outside of the weekday AM peak will have no impact the existing road infrastructure performance.

The primary road infrastructure constraint is the requirement for Oversize and/or Overmass (OSOM) vehicle movements to deliver wind tower infrastructure. As discussed in Stage 1 of this report the key intersection within Port Kembla appear to have the capability to be upgraded to cater for large cargo but the key constraint will be vertical clearance which is limited by existing bridge clearances that will be exceeded by OceanEx tower base estimates of diameters up to 8-10m.

Considering bridge clearance restrictions to Port Kembla, it is likely that the windfarm components will either need to be manufactured at Port Kembla or delivered by ship. If vehicle transport is necessary, additional investigation and development into OSOM is required. This includes addressing logistical considerations, coordinating transport arrangements, and implementing appropriate regulations to facilitate the transportation of OSOM vehicles.

In August 2023, it was estimated the draft Illawarra Offshore Renewable Energy Zone could generate up to 4.2GW of electricity which may necessitate extrapolation of the above demands to make informed decisions about required infrastructure provision.

10.3.5 Outer Harbour Expansion and Offshore Windfarm Electricity Generation

The area requirement to assemble and deploy offshore windfarms pose a notable constraint to the development. During the relatively short assembly phase, a large expanse of valuable land is needed, which presents inherent challenges in finding suitable locations for these developments.

The Port Botany container terminal is expected to near capacity in 2045 and trigger the need for an additional container terminal, the Outer harbour Expansion is earmarked as the likely location for this addition. There exists a unique opportunity with the Outer Harbour expansion to accommodate the assembly and deployment of offshore windfarm units in the short term while waiting for the additional container terminal to be required.

By capitalising on the Outer Harbour expansion, the potential for an offshore windfarm development can be maximised, optimising the utilisation of available space while considering future port infrastructure expansions. This strategic alignment would provide

a favourable scenario for the coexistence of various maritime activities and facilitate the efficient utilisation of Port areas.

11 SUMMARY

The Stage 2 assessment focuses on Port Kembla's future service and transport infrastructure requirements considering both the existing services and transport infrastructure requirements, as well as the baseline services and transport infrastructure requirements for key developments planned for Port Kembla in the Short-Term (<10 years) and Medium-Term (10-20 years). The intent is to illustrate where augmentation may be required and to allow this augmentation to be considered from a land use perspective, with land allocated to allow future upgrades as needed. Examples include ensuring land is not developed where it is potentially required for increased road corridors, larger intersections, or utilities augmentation.

Table 22 summarises the service demands for baseline projects and future developments proposed for Port Kembla.

Table 22: Port Kembla Potential Future Daily Service Demands

Development Type	GFA (m^2)	Service Demands (Unit/Day)				Vehicle Movements	
		Electricity	Water	Sewer	Gas		
		MWh	kL	kL	MJ	Light	Heavy
Total Base Line Projects	1920	168.86	651.54	16.58	4.5e+7	52	232
BlueScope Master Plan	834,713	139.10	2,042.71	2,042.71	79,129.02	52,220[2]	
40 MW Hydrogen Electrolyser & HRS[1]	800	672.09	211.24	63.40	N/A	-	400
2000 MW Offshore Windfarm	10,000	1.44	27.10	27.10	915.75	600	-

References and Assumptions

[1] 200 Vehicle HRS Capacity Facility

[2] Non-inclusive of public transport

Table 23 provides a visual presentation of the likelihood of infrastructure network augmentation to service the potential future service demands.

Table 23: Network Augmentation Likelihood Assessment

Development Type	Electrical	Water	Sewer	Gas	Roads
Total Base Line Projects					
BlueScope Master Plan					
40 MW Hydrogen Electrolyser & HRS					
2000 MW Offshore Windfarm					

Green – Highly Unlikely

Yellow – Unlikely

Orange – Likely

Red – Highly Likely

If all scenarios are undertaken the cumulative demands would likely require all services and infrastructure networks to be augmented to meet the demand requirements.

Baseline Projects

The calculated baseline electrical demand appears to be able to be serviced by the spare capacity in the Endeavour Energy Spring Hill Transmission Station.

Information on potable water and sewer capacity is limited, however, mapping of the network and high-level discussions with Sydney Water suggests that there is capacity in both the potable water and sewer to supply the baseline demands.

Information on gas location and capacity is limited given that much of the infrastructure is private although as discussed in Stage 1 Jemena has advised there is capacity to extend the network dependent on the additional loads and associated locations within the Port and will be assessed on a case-by-case basis. The Power Station will be designed to be powered by hydrogen as supply becomes available over the medium to long-term which will reduce demand on the Port Kembla gas infrastructure.

The additional traffic generated in the baseline scenario is predominantly heavy vehicles with anticipated movements generated through the day and can be managed to ensure that the movements do not coincide with the AM peak.

BlueScope Master Plan

There appears sufficient capacity within the combined Endeavour Energy Zone Substations and Transmission Stations outputs when considering the baseline demands and additional electricity demands from the BlueScope Surplus Land. It should be noted that data used assumes an average intensity and does not account for peak loads. However, it is assumed that Endeavor Energy can reconfigure the existing network to meet the demands if required.

Information on potable water and sewer capacity is limited, however, considering the sewer and potable water demand from an additional 30,000 people travelling into Port Kembla daily, we expect that these services will need to be upgraded to service the BlueScope Surplus Lands in perpetuity.

As with the baseline scenario, the information on gas location and capacity is limited given that much of the infrastructure is private. Although as discussed in similarly to the Baseline Projects Jemena has advised there is capacity to extend the network dependent on the additional loads and associated locations within the Port and will be assessed on a case-by-case basis. Additionally given that the Port Kembla Power Station's gas requirements will be powered by hydrogen as supply becomes available over the medium to long-term there will be an overall reduced demand on the Port Kembla gas infrastructure that should be able to be reallocated to the BlueScope Surplus Land if required.

Considering the BlueScope Surplus Land potential transport demands we expect that the road network capacity will be exceeded at the key intersections identified in Stage 1 primarily along the road network associated with the AM peak as shown in Figure 30 below and will require further investigation.

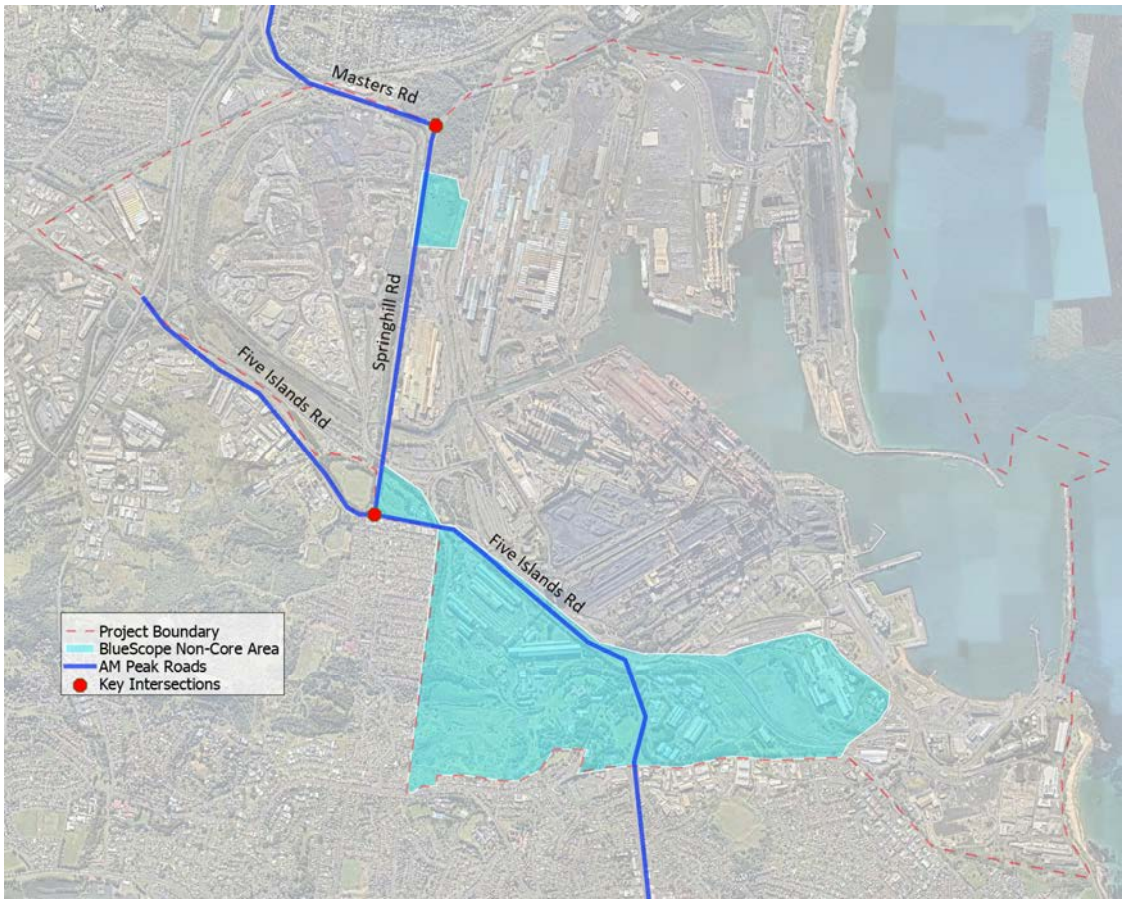


Figure 30: AM Peak Affected Road Network

Cringila and Port Kembla train stations will also play an important role in supporting these uses. This may include providing additional train services to support the employment catchment as part of broader efforts to reduce private vehicle use on key Port access roads, augmentation of key infrastructure (subject to investigation) to improve travel choices and/or the provision of space for potential public transport interchanges around these stations due to increased use by incoming employees and to make them more functional and accessible. Additional bus services and routes (subject to investigation) may also need to be considered to service these areas.

Hydrogen Hub

Early stages of the Hydrogen Hub are anticipated to be serviceable by the current services and road network. Additional investigation is necessary to assess the growing demands associated with the hydrogen hub development. While it is likely that the 10 MW hydrogen electrolyser, and possibly the 40 MW hydrogen electrolyser, can be accommodated using the current infrastructure, scaling up to 1GW and any potential expansion the hydrogen hub beyond this will necessitate additional electrical demands such as offshore windfarms and the possible provision of an additional water source such as a desalination plant.

Offshore Windfarms

It is anticipated that the existing servicing network will be sufficient for the additional service demands from the operation of offshore windfarms.

Considering bridge clearance restrictions to Port Kembla, it is likely that the windfarm components will either need to be manufactured in Port Kembla or delivered by ship. If

vehicle transport is necessary, additional investigation and development into oversize movements is required. This includes addressing logistical considerations, coordinating transport arrangements, and implementing appropriate regulations to facilitate the transportation of OSOM vehicles.

The additional traffic generated in this scenario is predominantly the workforce with an expected 600 movements per day. Considering 24-hour operation is expected, shift times can be staggered to fall outside of the weekday AM peak to no impact the existing road infrastructure performance.

In conclusion, Port Kembla's high-value industrial land offers diverse future possibilities, with careful planning required to address associated constraints. The investigation has identified constraints related to service demand and increased vehicle volumes on the road network. This information can be used (and extrapolated where necessary) to make informed decisions about the infrastructure demands of each scenario, ensuring effective future development in Port Kembla.

APPENDIX A

AMBER Memo - Review of Background Documentation and Initial Traffic Engineering Advice

Memorandum

To:	Jarrod Nicholls, Civil Engineer	Company:	Maker ENG
From:	Mike Willson	Time/Date:	1 June 2023
Job Number:	683 - Port Kembla Infrastructure Assessment		

Subject: **Review of Background Documentation and Initial Traffic Engineering Advice**

Amber has reviewed the background information associated with Traffic Impact Assessment prepared for various projects with Port Kembla in order to provide traffic engineering advice in relation to the Port Kembla Infrastructure Assessment. The document review has been undertaken in order to achieve the following:

- Identify the operating characteristics of the existing road network based on previous traffic studies;
- Provide recommendations as to potential road upgrades of the road network that would provide the most benefit;
- Provide high level comment on where future development could be achieved with the least impact / road upgrades to the road network; and
- Confirm what future assessment should be completed in order to provide a more accurate assessment of the traffic impacts associated with future projects.

The following provides a summary of the document review and outlines the outcomes of our investigation and assessment.

1. Document Review

1.1 Traffic Impact Assessments

1.1.1 Blast Furnace No. 6 Reline Project Traffic Impact Assessment 2022, GHD

The Traffic Impact Assessment reviewed the traffic impacts associated with the return to operation of the No. 6 Blast Furnace. The furnace is located to the northeast of the intersection of Five Islands Road and Springhill Road.

The Traffic Impact Assessment provides traffic survey data for the following intersections:

- Cringila Car Park Road / Five Islands Road intersection (left in, left out only).
- Loop Road / Cringila Car Park Road intersection.
- Five Islands Road / Emily Road (Entry) intersection.
- Five Islands Road / Emily Road (Exit) intersection.

- Springhill Road / BlueScope Access Road signalised intersection.

- Five Islands Road / Flagstaff Road intersection (left in, left out only).

The traffic surveys were undertaken in September 2021 and as such, could be impacted by the changed travel behaviour as a result of the COVID-19 pandemic. As such, any future analysis should avoid the use of the data.

The report provided a crash search which indicates the road network within the vicinity of the subject site is currently operating in a relatively safe manner.

A traffic modelling exercise was undertaken which indicated the above intersections currently operate with a Level of Service (LOS) A or B. However, the assessment focused on minor roads or accesses to the BlueScope site.

Overall, the assessment indicates that there is midblock capacity on the adjacent road network, including Springhill Road and Five Islands Road but the data used may not be suitable due to the COVID-19 pandemic. The project would generate an increase in traffic during construction with minimal information available for the operation period of the project.

1.1.2 Proposed Port Kembla Bulk Liquids Terminal Traffic Impact Assessment 2015, Cardno

The project is located to the east of Tom Thumb Road. The Traffic Impact Assessment provided survey data for the following intersections:

- Masters Road / Springhill Road

- Springhill Road / Tom Thumb Road

- Tom Thumb Road / Yampi Way

- Tom Thumb Road / Farrer Road

- Tom Thumb Road / Access Road

It also provided midblock counts on Springhill Road between Masters Road and Tom Thumb Road. The survey data was recorded in 2015 and as such is unsuitable for use in future assessments given the change in travel behaviour following the COVID-19 pandemic and likely growth in traffic volumes in the surrounding area.

A SIDRA analysis was provided which indicates the intersection of Masters Road and Springhill Road operates with a LOS D with the development while the other interactions operate with a LOS A or B. It also indicates Springhill Road is operating with a LOS C during the AM peak.

The report also provides a 2026 assessment year which added traffic associated with a number of other developments within the area, including:

- Maldon to Dombarton Rail Line

- Port Kembla Outer Harbour (PKOH) development

- Quattro Second Grain Terminal development

- Port Kembla Grinding Mill

The assessment indicates that the intersection of Masters Road and Springhill Road is expected to reach capacity with the future projects and a subsequent alternative design is proposed. The report states:

> *It is therefore evident that this intersection represents a key constraint on the future development of Port Kembla and a suitable mitigation measure (either the Cardno proposed upgrade or some other) will be required to be developed by RMS in the medium term.*

A revised layout with a conversion of the existing short left turn lane on Masters Road west into a continuous free-flow lane and a short exit lane on Springhill Road north is provided which shows the intersection subsequently operates with acceptable conditions (although still LOS D).

The remaining intersections continue to operate with LOS A or B.

Whilst the assessment is from 2015 it has provided a future analysis which indicates the intersection of Masters Road and Springhill Road is either at or near capacity.

1.1.3 Port Kembla Gas Terminal Traffic Impact Assessment 2018, GHD

The assessment provided a range of data from 2015, 2017, and 2018 for most key roads within the wider Port Kembla area. The data is subsequently a minimum of 5 years old and would not be suitable for future assessments as it does not allow for the change in travel behaviour following the COVID-19 pandemic and likely growth in traffic volumes in the surrounding area. The report provides the following comments in relation to the surveys:

> *The data indicates that the majority of key roads in the vicinity of the project are operating well within the acceptable capacity for weekday morning and evening peak periods. However, Springhill Road to the north of Masters Road has a V/C ratio of 0.94 in the northbound direction during the weekday AM peak, which indicates that these traffic lanes are approaching capacity.*

The assessment reflects the conclusions of the other Traffic Impact Assessments discussed above.

The report provides a review of crashes along the adjacent road network and indicates there were 91 injury crashes and one fatal crash. The report provides the following comments:

> *Rear end crashes were the highest crash type along Springhill Road, which can be associated with driver observation being a factor to this type of crash;*
>
> *At Five Islands Road, Flinders Street and Old Port Road, collisions with objects off the roadway were the most common crash type. This indicates that driver behaviour, such as fast driving speeds or poor observation, could be a factor.*

It is considered that the number of injury crashes is high given the road classifications and associated traffic volumes. In particular, there are a number of crashes along Springhill Road.

1.1.4 Port Kembla Grinding Mill Traffic Impact Assessment 2011, Bitzios Consulting

Given the report is more than 10 years old and newer data is available no comment has been provided on this report.

1.1.5 Site B Foreshore Road, Port Kembla Transport Impact Assessment 2022, TTPP

The assessment provides tube count data for Foreshore Road which indicates it accommodates a moderate level of traffic. It also provides a turning movement count survey at the intersection of Five Islands Road and Darcy Road. The surveys were all undertaken in 2021 and subsequently may be impacted by changed travel behaviour as a result of the COVID-19 pandemic.

The assessment includes other known projects and concludes that the intersection of Five Islands Road and Darcy Road is expected to operate with LOS B.

1.1.6 Port Kembla Outer Harbour Development - Environmental Assessment, AECOM

Given the report is more than 10 years old and newer data is available no comment has been provided on this report.

1.1.7 Port Kembla Coal Terminal - Environmental Assessment, Cardno Eppell Olsen

Given the report is more than 10 years old and newer data is available no comment has been provided on this report.

1.2 Maker ENG Assessment

A summary of the traffic information was provided by Maker ENG as part of the Port Kembla Strategic Planning Infrastructure Assessment. The summary shows that the midblock of Springhill Road nears capacity during the AM peak and also that Masters Road and Five Islands Road both operate with a LOS C or D. The summary of the intersection performance also indicates that the intersection of Springhill Road and Masters Road reaches a LOS C while all other intersection are expected to operate with LOS A or B.

1.3 Summary

Overall, the document review indicates that the majority of the road network within the overall study area operates with a good level of service. Key locations where the road network is likely operating at or near capacity includes:

- Springhill Road experiences a high level of northbound traffic during the morning peak hour and is operating at or near capacity. It is noted that during the PM peak hour the road operates with acceptable conditions.

- The high proportion of northbound vehicles on Springhill Road during the morning peak hour results in the intersection with Masters Road nearing capacity associated with vehicles turning to/from Masters Road.

None of the reports provided an assessment of the intersection of Springhill Road and Five Islands Road. It is understood that a recent study indicates the intersection operates with a LOS F in the AM peak and a LOS B in the evening peak.

The results of the analysis presented within the reports demonstrates that there is a high level of through traffic operating on the State road network. In particular, there are a high number of northbound vehicles that travel along Five Islands Road and Springhill Road in the AM peak resulting in the roads and the associated intersections operating at or near capacity.

Masters Road also experiences a high level of traffic, with all other roads and intersections assessed operating with a good level of service.

It is noted that there are a number of roads and intersections that are not provided with data or analysis. However, it is likely that most roads, with the exception of Springhill Road, Masters Road, and Five Islands Road, are operating in a suitable manner and are able to accommodate an increase in vehicle movements.

The reports all identify the surrounding bicycle facilities and public transport services. However, the reports do not provide detailed comment on the use of the services/facilities. Given the proposed industrial type uses in the surrounding area this is not unsurprising. However, it is recommended that future developments consider incorporation of active transport connections and end of trip facilities in consultation with these existing services/facilities to reduce the reliance on private vehicle use.

It is noted that a high number of crashes were recorded on Springhill Road as part of the assessments which should be considered as part of any future projects.

2. Other Projects

A range of existing known projects has been provided with some projects currently approved but not operating and some projects currently in the development application stage. A detailed assessment has not been provided as part of the assessment given the limited information available.

From the document review detailed above, it is clear that a number of the projects generate a significant level of traffic during construction but generate modest levels of traffic during the AM and PM peak periods during operation. The staged construction of these projects should be considered to prevent the cumulative traffic volumes creating excessive congestion on the road network, particularly on Springhill Road, Masters Road, and Five Islands Road. Construction management techniques could also be considered to limit traffic impacts.

During operation timing of staff arrivals and heavy vehicle movements can limit the impact to the road network and should be considered as part of the development application process and to be implemented as part of future Traffic Management Plans.

3. Potential Road Upgrades

The document review indicates that the majority of the surrounding road network is operating with acceptable conditions with the exception of:

- Midblock along Springhill Road;
- Springhill Road / Masters Road intersection; and
- Springhill Road / Five Islands Road intersection.

The road and intersections operate at or near capacity during the AM peak but with acceptable conditions in the PM peak (although approaching capacity). The roads primarily fail due to the high proportion of northbound traffic which subsequently limits turn movements at the intersections. Any future road upgrades should address the capacity issues associated with these vehicle movements.

4. Future Development

Maker ENG have provided an indicative area map of the project which is provided below.

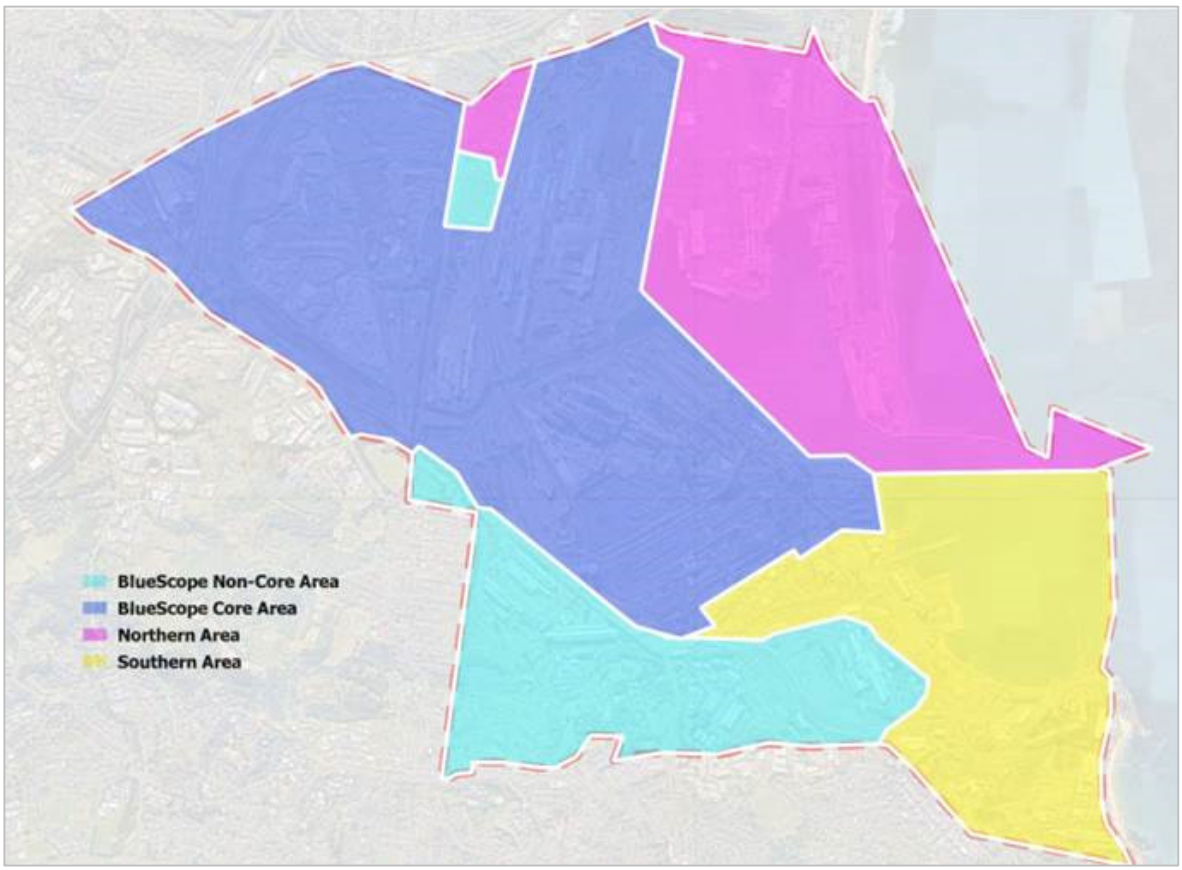
The traffic assessments indicate that the local road network typically operates with a good level of service. Assessment of a number of intersections within the Northern and Southern Areas indicates the local road network is able to accommodate an increase in vehicle movements and the subsequent connections with the State road network also operate with a good level of service.

There is little to no traffic data for the Non-Core Area.

It is recommended that any future development provide an assessment of the primary connections with Five Islands Road or Springhill Road that would be utilised by future users to confirm the intersection is able to accommodate the increase in vehicle movement. Any project should also consider the intersections of Springhill Road with Masters Road or Five Islands Road as minor changes to the traffic volumes at the intersections is likely to have a significant impact in delays and queue lengths given the intersections are at or near capacity.

Any future development within the Core Area should also provide an assessment of Springhill Road, Masters Road, and Five Islands Road, and the associated intersections.

Figure 1: Project Areas



5. Conclusions

Overall, the document review indicates that the majority of the surrounding road network is operating with acceptable conditions with the exception of:

- Midblock along Springhill Road;
- Springhill Road / Masters Road intersection; and
- Springhill Road / Five Islands Road intersection.

Any future development within the project area should consider upgrades or traffic management measures at these locations in order to accommodate an increase in vehicle movement. A review of lot boundaries and road reserves indicates potential land that could be utilised to accommodate intersection augmentation at:

- Springhill Road / Masters Road intersection; and
- Springhill Road / Five Islands Road intersection.

The assessment indicates that the surrounding local road network currently operates with a good level of service.

The traffic data provided within the Traffic Impact Assessments is either outdated or undertaken during the COVID-19 pandemic and as such, is unsuitable to provide accurate future analysis of the road network. It is recommended that intersection surveys be undertaken for the following intersections:

- Springhill Road / Masters Road;
- Springhill Road / Five islands Road / Lake Road (assess as one intersection);
- Springhill Road / Tom Thumb Way;
- Five Islands Road / Flinders Road;
- Five Islands Road / Wattle Street / King Street; and
- Five Islands Road / Old Port Road.

The remaining connects with the State road network are expected to currently be operating with acceptable conditions. Several of the above intersections have been identified as having a good level of service within the Traffic Impact Assessments however, they are expected to experience an increase in traffic as part of future projects and should be assessed.

Consideration should also be given to the interchange intersections of Five Islands Road and Princes Motorway. No assessment has been provided for these intersections and any assessment should be based on traffic survey data and modelling at the intersections.

It is recommended that tube count surveys be undertaken midblock on Springhill Road, Masters Road, and Five Islands Road. Tube counts would provide a profile of the traffic volumes throughout the day to determine midblock capacity but also identify times when the road network can accommodate additional vehicles. This would be able to advise future Traffic Management Plans. The tube counts also provide vehicle speeds which could be used to advise road safety assessments given the high number of crashes.

It is noted that based on our experience with other proejcts in the surroudning area there are height restrictions on the surrounding State road network which prevents higher loads from departing Port Kembla which should be identified as part of future relevant projects.

Overall, the document review identified key pinch points along the road network associated with northbound traffic on Five Islands Road and Spring Road in the AM peak. All existing traffic data presented is either old or undertaken during the COVID-19 pandemic and new data should be provided as part of future assessments.

APPENDIX B

Detailed Assumptions

General

Average Service Intensities Calculations

Average service Intensities taken from the Department of Climate Change, Energy the Environment and Water's Commercial Building Consumption Baseline Study 2022 were applied based on Gross Floor Areas (GFA). For instance, the average office space of 1 square meter will consume 2.27 litres of water per day. Therefore, for the estimated 181,650 square meters of office space, the calculation is as follows:

181,650 m2 x 2.27 L/day = 412,346 L/day

Sewer Assumptions

Where no information was provided for sewer demands a conservative assumption of a 1:1 ratio of water to sewer has been applied. For instance, for a water demand of 412kL/day, it would be assumed that 412kL/day of sewer capacity would be required.

Baseline Assumptions

10MW HyKembla Electrolyser and HRS: Detailed Assumptions

The data used in this report for the HyKembla Projects has been sourced from the HyKembla Scoping Report, HyKembla Hydrogen Electrolyser Pilot Plant Project, 7th July 2022, submitted as part of the development application. These findings have also been corroborated by a representative from BlueScope.

- GFA: Only the office and amenities were taken and measured using the Figure 3-7 Concept Layout of the electrolyser site, it was assumed that the remaining areas demands would be directly related to the operational demands.
- Electrical Usage:
  - A 10 MW supply is shown as required in Stage 1 for the electrolyser as shown figure 3-6 Preliminary flow diagram, this was converted to 240MWh of daily usage assuming 24hr operation, multiple sections throughout the report reference operational capacities of 70%, and for this reason, we have reduced the daily usage to 168MWh.
  - Additional power required for the office and amenities was included using average service intensities and the measured GFA.
- Water and Sewer: Similarly, to the Electrical usage, the demands required for Stage 1 for the electrolyser as shown figure 3-6 Preliminary flow diagram, the same assumption of 70% operating capacity was applied, with the additional water service intensity applied to the GFA.
- Gas: Was not specified as required for this development.
- HRS service demands are expected to be minimal and the only impact considered is the traffic impact.

Squadron Energy Port Kembla Energy Terminal (Natural Gas Import Facility)

All infrastructure demand data for the Natural Gas Import Facility was supplied directly by Squadron Energy. Squadron confirmed that all wastewater would be trucked out, as such no allowance to service wastewater was made.

Squadron Energy Port Kembla Power Station

Data relating to the water and gas requirements were taken from the Scoping Report submitted as part of the original development application. At the time of writing this report, Squadron Energy was unable to provide any additional information.

- GFA: No information was available it is assumed that requirements for office and amenities spaces would be similar to that of the Hydrogen electrolyser.
- Water and Sewer: The peak water demand was provided in the scoping report. The majority of water used in the operation of the gas-powered power station will be allocated for operational purposes such as cooling. As no sewer information could be provided a ratio of 1:1 between water and sewer was utilised.
- Electrical Usage: Power requirements were only considered for the GFA. As it's a PowerStation its assumed that its operation will have a net output rather than a demand.
- Gas: The yearly gas requirement is specified as 16.5 PJ, it is expected to decline as green hydrogen sources are identified. This is the equivalent of 4.5e+7 MJ (45,000,000MJ a day.)

Future Scenarios

BlueScope Master Plan

- Results were calculated using Average Service Intensities.
- Tertiary Education Facilities Management Association (TEFMA) released a Space and Planning Guideline that specifies the number of Equivalent Fulltime Student Loads (EFTSL) per m2 and the "general rule of thumb" of 14-15m2/EFTSL provided in this document was applied.
- Census Data provided that local trends in Illawarra surrounding methods of traveling to work were the following: Vehicle Movement (87%), Public Transport (4%) and Other (9%). These percentages were then applied to the estimated users and assumed that 2 trips a day would be undertaken.

Hydrogen Electrolyser

- 40MW Electrolyser: It is briefly discussed in the HyKembla Scoping Report and was confirmed by BlueScope that the demands of the 40MW Electrolyser would be directly proportional to the 10MW electrolyser. It was assumed, however, that while the demands may increase the GFA area required for office and amenities would not require upgrading.
- 1GW Electrolyser: While not covered in the report it was assumed that similarly to the 40MW electrolyser the demands were proportional, while office and amenities would not require an upgrade.
- HRS demands are expected to be minimal and have only been considered as a traffic impact.

Offshore Windfarms

The data used in this report for the Offshore Windfarms has been sourced from the Oceanex Document *"Energising Australia with Offshore Wind"* document (March 2022)

The demands presented represent the ongoing demands for the operation of the windfarm. It is assumed that infrastructure required to receive power from the windfarms will be provided by the windfarm operator as part of their development process.

- Service Demands results are based on the GFA provided and using Average Service Intensities Calculations.