Transport Assessment

Transport Assessment

Mayfield Site Port-Related Activities Concept Plan

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Prepared for

Newcastle Port Corporation

Prepared by

AECOM Australia Pty Ltd
Level 8, 17 York Street, Sydney NSW 2000
T +61 2 8023 9333 F +61 2 8023 9399   www.aecom.com
ABN 20 093 846 925

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1.0 Introduction

AECOM has been engaged to provide transport input into an Environmental Assessment (EA) of the Concept Plan for the proposed redevelopment of land in Mayfield, Newcastle (proposed concept). The proposed concept is being undertaken by Newcastle Port Corporation (NPC) and it is understood that the proposed concept will facilitate upgraded port-related activities over the next 25 years. The purpose of the EA is to anticipate environmental impacts that future developments may generate, and suggest mitigation measures, if necessary.

Concept approval for the proposed concept is sought to ensure a coordinated and environmentally sustainable approach to the proposed concept that will provide a level of certainty and a framework for future development. The purpose of the proposed concept is to assist in the achievement of several state and regional objectives and initiatives formulated to provide a secure major port use in the future.

The transport input into the EA consists of:

- A review of the existing road and rail conditions and the available capacity for the proposed concept;
- An evaluation of potential impacts from predicted future development scenarios (initial [2024] and final [2034]); and
- The development of criteria for future development of the proposed concept and potential mitigation measures to be adopted.

As part of the EA process, the impact of construction traffic would normally be assessed. However, in this case, as the exact nature of the infrastructure to be constructed on site and hence the future construction methods are unknown, this aspect of the EA will be dealt with as part of the future Project applications for the construction and operation of the five land-based precincts, when these are made by the prospective operators of the facilities.

The site is located along the South Arm of the Hunter River, within the Newcastle Local Government Area (LGA), 7 km northwest of Newcastle (see **Figure 1-1**).

Figure 1-1: Proposed Site for Redevelopment

Source: AECOM, 2010

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2.0 Existing Transport Conditions and Capacity

This section provides an overview of the current road and rail network surrounding the site, as well as the existing capacity of the main access points into the site. Modelling results which review the current performance of existing road intersections are also presented.

2.1 Road Network

2.1.1 Strategic Road Network

F3 (Sydney – Newcastle Freeway)

The F3 Freeway is a 127km motorway linking Sydney to the Central Coast, Newcastle and Hunter Regions. The freeway alternates between 2 and 3 lanes in each direction for its length. The northern section of the freeway in the vicinity of the site, from north of Wyong to its terminus at John Renshaw Drive, has 2 lanes in each direction. The freeway has a speed limit varying between 80 and 110km/h.

Pacific Highway

The Pacific Highway is a 1,025km major transport route which links Sydney and Brisbane along the east coast of Australia. The section of the Pacific Highway in the vicinity of Mayfield has 2 lanes in each direction and a speed limit that varies between 60km/h and 80km/h. The Hexham Bridge carries the Pacific Highway over the Hunter River and has 2 lanes in the southbound direction and 3 lanes in the northbound direction. Currently, the section of road between the F3 Freeway and the Raymond Terrace bypass (12.2km) is being upgraded from a single carriageway to a dual carriageway to improve safety and relieve traffic congestion.

New England Highway

The New England Highway connects to the Pacific Highway at Hexham and travels west towards Maitland. It is an alternative inland route to the Pacific Highway travelling between Sydney and Brisbane. The majority of the route is single carriageway; however, between Hexham and Maitland, it has 2 lanes in each direction. For most of its length the New England Highway has a 100km/h speed limit.

Cormorant Road

Cormorant Road is located on Kooragang Island, the site of a deep water port for the export of coal, and a major heavy industry area in the Newcastle area. Cormorant Road is a sealed road that predominantly consists of one lane in each direction; the eastern section of the road widening into a dual carriageway in each direction. There is a speed limit of 60km/hr in the westbound direction and 80km/hr in the eastbound direction.

Tourle Street

Tourle Street is the continuation of Cormorant Road over the South Arm of the Hunter River to the southern mainland. Tourle Street provides a direct route between Newcastle, the industrial area and Newcastle Port facilities on Kooragang Island. The new Tourle Street Bridge opened in May 2009, and consists of one lane in each direction, with 2m shoulders. Tourle Street has a speed limit of 60km/hr in both directions.

2.1.2 Local Road Network

The proposed concept is located on an existing industrial area on the South Arm of the Hunter River. The northern portion of the site is connected to the regional road network through Industrial Drive (via Ingall Street or Bull Street); while the southern portion of the site is connected to Industrial Drive via Selwyn Street and George Street (see **Figure 2-1**).

Industrial Drive

Industrial Drive is a major four lane divided, classified road providing connections to the Pacific Highway, site, and to the north bank of the South Arm of the Hunter River. It is used as a major link between Maitland and Newcastle CBD providing access to the Honeysuckle Precinct and is the preferred alternative to the Pacific Highway for southbound traffic. It is a B-Double approved vehicle route signed at 80km/h and operates as a public transport corridor for Bus Routes 104 and 118.

Ingall Street

Ingall Street currently provides access to the north of the site from Industrial Drive, terminating at a security gate. To the south of Industrial Drive, it is an undivided, two lane, two-way collector road connecting Industrial Drive to the Pacific Highway through a predominantly residential area. It is sign posted at 50km/h and 40km/h to the north and south of Industrial Drive respectively. There are slight cracks present on the road surface of Ingall Street making it uneven in places.

Bull Street

Bull Street is a one-way slip road off Industrial Drive for eastbound traffic. It joins Ingall Street at a T-junction and is signed at 50km/h. It has large cracks and an uneven road surface along most of its length.

George Street/Selwyn Street

To the west of Industrial Drive, George Street is a four lane road with two traffic lanes and two parking lanes. It is signed at 50km/h and runs through a residential area in Mayfield East. To the east of Industrial Drive, George Street connects immediately to Selwyn Street, which runs adjacent to the rail line to the south of the site, and provides access to the site. The section of Selwyn Street giving access to the site has an uneven road surface with cracks forming in places.

Figure 2-1: Intersection Locations

Source: AECOM (adapted from Google Maps), 2010

2.1.3 Traffic Volumes

Daily Traffic Counts

RTA traffic volume data has been obtained to determine the historical traffic growth and current mid-block traffic flows in the surrounding study area. **Table 2-1** shows historical Average Annual Daily Traffic (AADT) volumes at two stations in the vicinity of the site. Both stations are located on Industrial Drive to the west of the site.

Table 2-1: Historical Traffic Volumes and Growth

Station Number	Location	1995	1998	2001	2004	Growth (%)
05.953	Industrial Drive, (NW of Woodstock Street)	29,746	29,549	30,334	30,717	0.36
05.979	Industrial Drive, (West of Werribi Street)	22,952	21,608	21,559	23,339	0.19

Source: RTA Traffic Volume Data

The data shows that between 1995 and 2004, there has been an average yearly growth rate of 0.27% in the surrounding area.

AM and PM Peak Intersection Counts

In 2008, NPC commissioned Mark Waugh Pty Ltd to undertake Traffic Impact Statements (TIS) associated with the Industrial Development at Mayfield. These were undertaken in relation to the following:

- Proposed Bulk Liquid Storage Depot[1] – located in the north west portion of the site; and
- Proposed Industrial Site[2] – located to the south of the site.

As part of these impact statements, traffic count data was collected at the two key intersections providing access to the site from Industrial Drive, namely:

- Industrial Drive / Ingall Street; and
- Industrial Drive / George Street.

Based on these reports, the AM peak and PM peak periods occur between the hours of 7.30am – 8.30am and 4.45pm – 5.45pm respectively. Intersection turning movements for the AM peak and PM peak periods at these locations are illustrated in **Figure 2-2** and **Figure 2-3**. The figures show the number of Light Vehicles (LV) and the percentage of Heavy Goods Vehicles (HGV) on each movement.

[1] *Proposed Bulk Liquid Storage Depot, Mayfield North, NSW*, Mark Waugh Pty Ltd, Sept 2008

[2] *Proposed Interim Port Side Industrial Development, Selwyn Street, Mayfield, NSW*, Mark Waugh Pty Ltd, June 2008

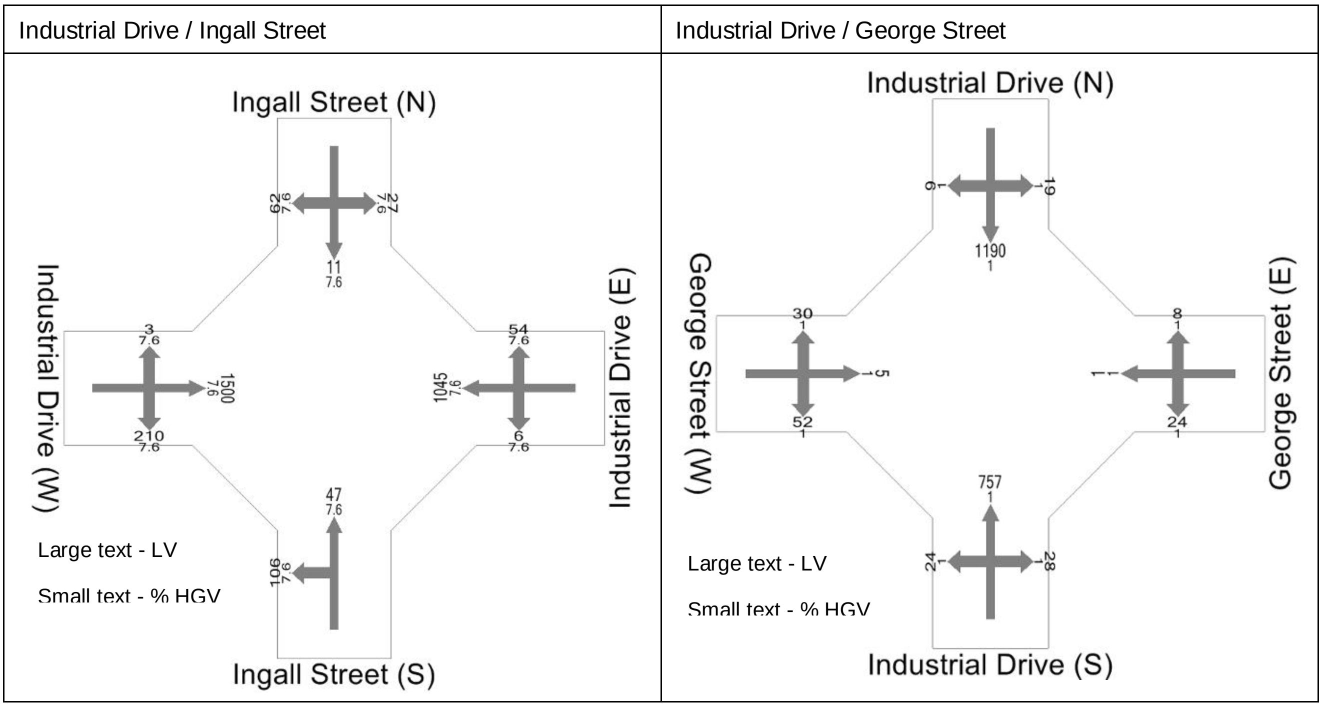

Figure 2-2: 2008 Intersection Movements – AM Peak Period

Source: Mark Waugh Pty Ltd, 2009

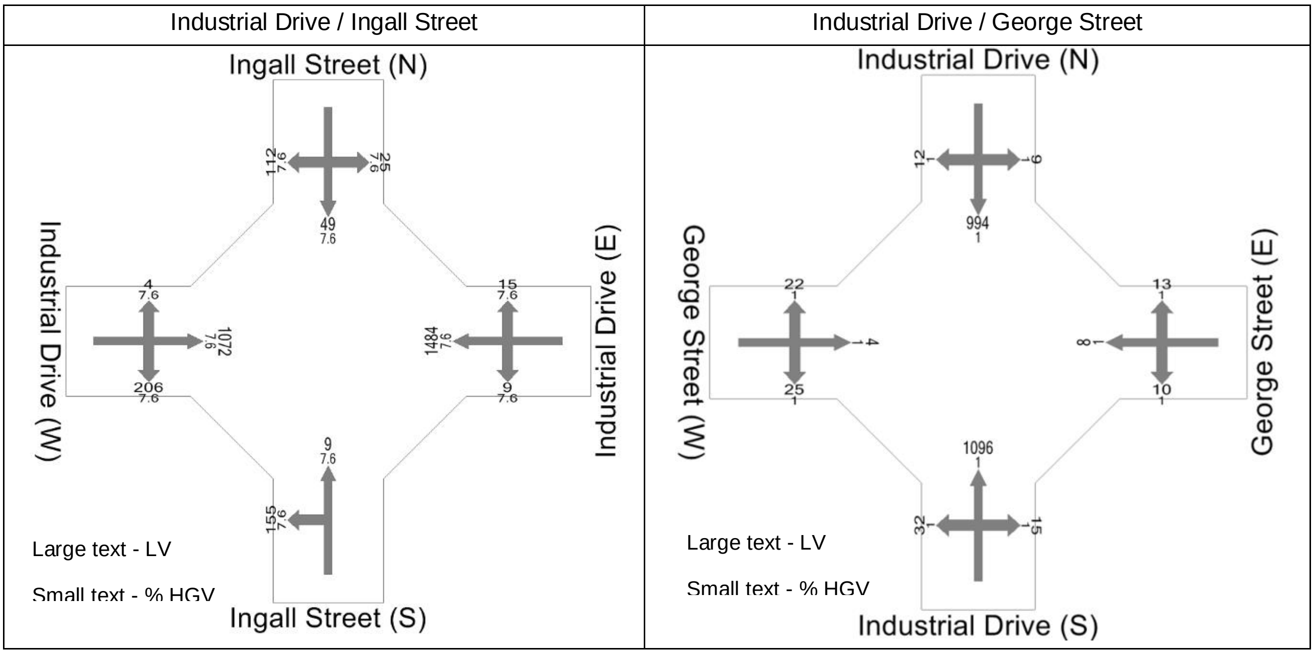

Figure 2-3: 2008 Intersection Movements – PM Peak Period

Source: Mark Waugh Pty Ltd, 2009

2.1.4 Intersection Performance

Intersection performance assessments have been evaluated using SIDRA Intersection 3.2, a computer based modelling package designed for calculating isolated intersection performance.

The main performance indicators for SIDRA Intersection 3.2 include:

- **Degree of Saturation (DoS)** – a measure of the ratio between traffic volumes and capacity of the intersection is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly;
- **Average Delay** – duration, in seconds, of the average vehicle waiting at an intersection; and
- **Level of Service (LOS)** – a measure of the overall performance of the intersection (this is explained further in **Table 2-2**).

Table 2-2: Level of Service and Average Delay Performance Criteria for Intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	<14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, RTA, 2002

Industrial Drive / George Street

The intersection of Industrial Drive and George Street is a signalised intersection with a pedestrian crossing on the northern leg. All turning movements are permitted. The schematic layout is illustrated in **Figure 2-4**, while **Table 2-3** and **Table 2-4** summarise the intersection performance based on the 2008 traffic flows for the AM and PM peak hours.

Table 2-3: 2008 AM Peak Hour Base Case Intersection Performance (Industrial Drive / George Street)

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	810	B	0.475	18.0	93
George St (E)	34	B	0.036	27.4	7
Industrial Drive (N Leg)	1,219	B	0.722	19.8	151
George St (W)	89	C	0.140	34.4	17
All Vehicles	**2,152**	**B**	**0.722**	**19.9**	**151**

Source: AECOM, 2010

Table 2-4: 2008 PM Peak Hour Base Case Intersection Performance (Industrial Drive / George Street)

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	1,145	B	0.748	23.5	154
George St (E)	32	B	0.029	28.3	5
Industrial Drive (N Leg)	1,016	B	0.658	20.9	128
George St (W)	51	C	0.065	31.4	9
All Vehicles	**2,244**	**B**	**0.748**	**22.6**	**154**

Source: AECOM, 2010

The intersection of Industrial Drive / George Street is shown to operate within capacity during the AM and PM peak and at LOS B. The longest 95th percentile queue occurs on Industrial Drive in both peaks. The queue reaches 151m on the northern approach in the AM peak and 154m on the southern approach in the PM peak.

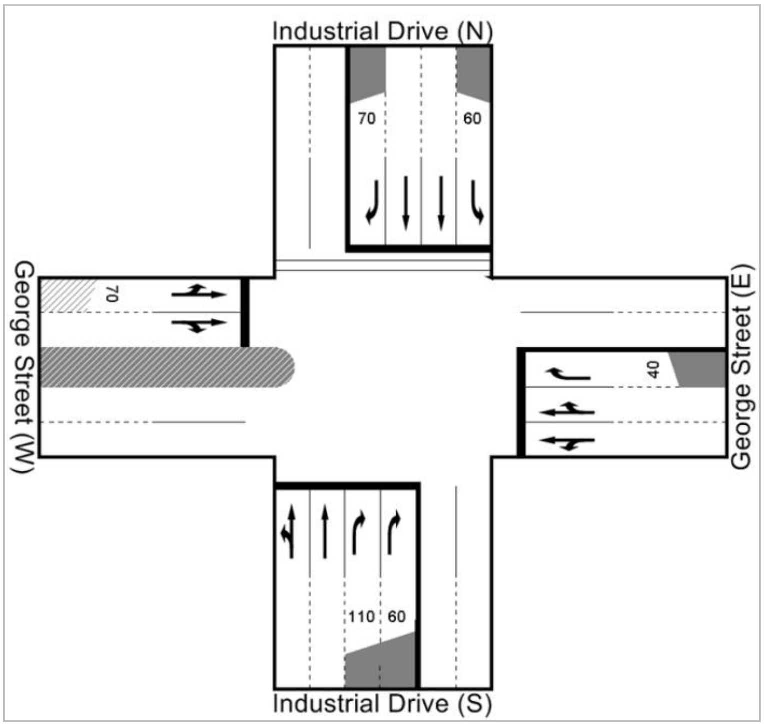

Figure 2-4: Industrial Drive / George Street Schematic Layout

Source: AECOM, 2010

Industrial Drive / Ingall Street

The Industrial Drive / Ingall Street intersection is a signalised intersection with a banned right turn from the south, and a left slip lane from the north. The schematic layout is illustrated in **Figure 2-5**, while **Table 2-5** and **Table 2-6** summarise the intersection performance based on the 2008 traffic flows for the AM and PM peak hours.

Table 2-5: 2008 AM Peak Hour Base Case Intersection Performance (Industrial Drive / Ingall Street)

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	153	D	0.541	47.9	46
Industrial Drive (E Leg)	1,106	B	0.575	19.5	129
Ingall St (N Leg)	100	D	0.585	42.5	31
Industrial Drive (W Leg)	1,714	B	0.651	15.9	160
All Vehicles	**3,073**	**B**	**0.651**	**19.6**	**160**

Source: AECOM, 2010

Table 2-6: 2008 PM Peak Hour Base Case Intersection Performance (Industrial Drive / Ingall Street))

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	164	D	0.528	45.6	61
Industrial Drive (E Leg)	1,508	B	0.817	24.7	223
Ingall St (N Leg)	186	D	0.818	47.8	54
Industrial Drive (W Leg)	1,283	B	0.811	24.1	134
All Vehicles	**3,141**	**B**	**0.818**	**26.9**	**223**

Source: AECOM, 2010

The results show that the intersection operates satisfactorily at LOS B during both the AM and PM peak. During the AM peak the largest 95th percentile queue occurs on Industrial Drive (western leg) and is indicated in the order of 160m, while during the PM peak, a 95th percentile queue in the order of 223m is indicated on Industrial Drive (eastern leg).

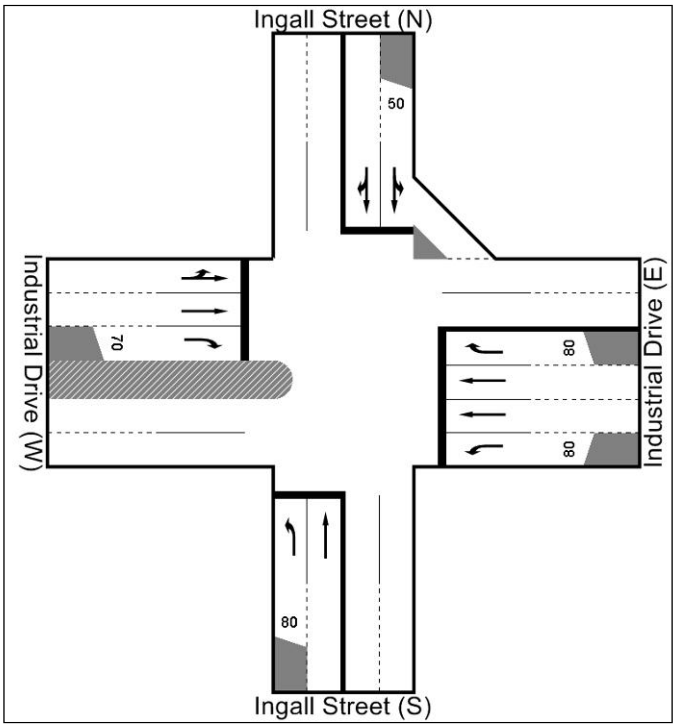

Figure 2-5: Industrial Drive / Ingall Street Schematic Layout

Source: AECOM, 2010

2.2 Rail Network

2.2.1 Description and Capacity of Infrastructure

Newcastle Port is currently served by two distinct rail loops – Kooragang Island and Port Waratah.

Kooragang Island is one of the busiest coal handling facilities in the world, connected via Kooragang Island Junction to the Main North Rail Line, and via Sandgate grade separation to the coal lines leading into coal mining districts in the Hunter Valley. For the purposes of this study, Kooragang Island and the Hunter Valley Coal chain will not be considered, except where it impacts on services to Port Waratah.

Port Waratah is a smaller coal handling facility, but also has a grain export facility that can be very heavily utilised in certain periods of the year. Port Waratah is connected to the Main North Rail Line via Islington Junction. There are a number of sidings and facilities connected to Port Waratah, namely:

- Port Waratah Coal handing facility;
- Brambles Sidings;
- Bullock Island Grain facility;
- Pasminco Siding;
- Grain Corp Grain loading facility;
- Morandoo Sidings; and
- OneSteel Sidings.

All of the above are connected to the Main North via Islington Junction, and two roads (Arrival Road and Storage Road 1). The Arrival Road services all but the Morandoo sidings and OneSteel, which are accessed via Storage Road 1 (see **Figure 2-6**).

A typical move for trains entering either facility from Sydney, is to head north on the Down Main, through Broadmeadow, moving across Islington Junction, then cross the Clyde Street Level crossing , before turning into the arrival roads for the port. Trains then cross from the Arrival Road onto Storage Road 1, and then onto Storage Road 2, before entering the Morandoo Sidings.

The Morandoo Arrival Road Links to the old BHP Billiton sidings (currently in use by OneSteel) and the link between the Morandoo and OneSteel Sidings are the subjects of this study.

The proposed port site is connected to Port Waratah via the One Steel Arrival Road. This siding, which will be used for any rail freight movements from the new berths, is currently used by OneSteel. The OneSteel site appears to be in use as an intermodal, with evidence of steel coils being transferred from rail wagons to trucks. This siding currently operates as a single siding, with no signalling control or separation for trains within the siding, so all operation is at 15km/h maximum by shunt manoeuvre. OneSteel currently operates up to three trains in and out of their site per day.

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AECOM

ROAD AND RAIL NETWORK

Transport Assessment

Mayfield Site Port-Related Activities Concept Plan

Figure 2-6

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3.0 Future Transport Conditions and Capacity

3.1 Road Network

This section reviews the likely impacts of changes to the traffic flows on the road network for the future assessment years (2024 and 2034) without the proposed concept occurring at the site. These future assessment years have been chosen as they represent the estimated timeframes for:

- 2024 - the initial stage of the proposed concept with the container terminal operating at a capacity of 600,000 TEU per annum;
- 2034 - the final stage of the proposed concept with the container terminal operating at a capacity of 1 million TEU per annum.

While the development of the F3 – Branxton and the F3 – Raymond Terrace upgrade works are likely to occur during this time period, they are not expected to impact on site access and egress and hence have not been considered as part of this study.

3.1.1 Intersection Performance

A growth rate of 0.27% per annum has been determined based on historical RTA Traffic Volume Data (as discussed in **Section 2.1.3**). This yearly growth rate has been applied to the existing intersection flows to determine the future traffic conditions in 2024 and 2034, without the proposed concept.

The intersections of Industrial Drive / George Street and Industrial Drive / Ingall Street have been assessed using SIDRA Intersection 3.2 for the two future year scenarios. The intersection layouts were tested unchanged from the base layouts.

Industrial Drive / George Street

The 2024 AM and PM peak hour performance results for the intersection of Industrial Drive / George Street are presented in **Table 3-1** and **Table 3-2** respectively.

Table 3-1: 2024 AM Peak Intersection Performance, Industrial Drive / George Street – without development

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	846	B	0.496	18.2	98
George St (E)	35	B	0.038	27.3	7
Industrial Drive (N Leg)	1,273	B	0.754	21.2	164
George St (W)	92	C	0.145	34.5	18
All Vehicles	**2,246**	**B**	**0.754**	**20.7**	**164**

Source: AECOM, 2010

Table 3-2: 2024 PM Peak Intersection Performance, Industrial Drive / George Street – without development

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	1,196	B	0.781	25.2	167
George St (E)	33	C	0.030	28.8	5
Industrial Drive (N Leg)	1,061	B	0.687	21.3	135
George St (W)	53	C	0.068	31.5	9
All Vehicles	**2,343**	**B**	**0.785**	**23.6**	**167**

Source: AECOM, 2010

The results indicate that in 2024 the intersection is likely to continue performing at LOS B in both AM and PM peak hours. The additional back ground traffic growth has a minor impact on the performance of the intersection of Industrial Drive / George Street. In both peaks, the intersection has spare capacity.

The 2034 AM and PM peak hour performance results for the intersection of Industrial Drive / George Street are presented in **Table 3-3** and **Table 3-4** respectively.

Table 3-3: 2034 AM Peak Intersection Performance, Industrial Drive / George Street – without development

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	867	B	0.508	18.3	100
George St (E)	37	B	0.039	27.5	8
Industrial Drive (N Leg)	1,305	B	0.773	22.2	172
George St (W)	95	C	0.151	34.5	18
All Vehicles	**2,304**	**B**	**0.773**	**21.3**	**172**

Source: AECOM, 2010

Table 3-4: 2034 PM Peak Intersection Performance, Industrial Drive / George Street – without development

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Industrial Drive (S Leg)	1,224	B	0.800	26.3	175
George St (E)	37	C	0.034	28.8	6
Industrial Drive (N Leg)	1,088	B	0.704	21.5	139
George St (W)	55	C	0.070	31.5	10
All Vehicles	**2,404**	**B**	**0.800**	**24.3**	**175**

Source: AECOM, 2010

The results indicate that in 2034 the intersection is likely to continue performing at LOS B in both AM and PM peak hours. The additional background traffic growth has a minor impact on the performance of the intersection of Industrial Drive / George Street. In both peaks, the intersection has spare capacity.

Industrial Drive / Ingall Street

The 2024 AM and PM peak hour performance results for the intersection of Industrial Drive / Ingall Street are presented in **Table 3-5** and **Table 3-6** respectively.

Table 3-5: 2024 AM Peak Intersection Performance, Industrial Drive / Ingall Street

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	160	D	0.628	49.7	49
Industrial Drive (E Leg)	1,154	B	0.600	19.8	136
Ingall St (N Leg)	104	D	0.708	44.3	33
Industrial Drive (W Leg)	1,790	B	0.668	15.5	166
All Vehicles	**3,208**	**B**	**0.708**	**19.7**	**166**

Table 3-6: 2024 PM Peak Intersection Performance, Industrial Drive / Ingall Street

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	171	D	0.517	44.6	62
Industrial Drive (E Leg)	1,575	C	0.873	32.1	268
Ingall St (N Leg)	194	D	0.806	47.5	55
Industrial Drive (W Leg)	1,340	B	0.844	25.4	144
All Vehicles	**3,280**	**C**	**0.873**	**30.9**	**268**

Source: AECOM, 2010

The results indicate that in 2024, the intersection is likely to perform at LOS B and C in the AM and PM peak respectively. Similar to the intersection of Industrial Drive / George Street, the additional background traffic growth between the existing traffic flows and 2024 traffic flows appears to have a minor impact on the intersection. The PM peak hour experiences a higher degree of saturation than the AM peak hour, particularly on Industrial Drive, but still performs satisfactorily.

The 2034 AM and PM peak hour performance results for the intersection of Industrial Drive / Ingall Street are presented in **Table 3-7** and **Table 3-8** respectively.

Table 3-7: 2034 AM Peak Intersection Performance, Industrial Drive / Ingall Street

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	163	D	0.579	48.2	49
Industrial Drive (E Leg)	1,183	B	0.615	20.0	140
Ingall St (N Leg)	107	D	0.646	43.0	33
Industrial Drive (W Leg)	1,834	B	0.696	16.4	177
All Vehicles	**3,287**	**B**	**0.714**	**20.2**	**177**

Source: AECOM, 2010

Table 3-8: 2034 PM Peak Intersection Performance, Industrial Drive / Ingall Street

Location	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
Ingall St (S Leg)	176	D	0.531	44.7	64
Industrial Drive (E Leg)	1,614	C	0.894	36.2	293
Ingall St (N Leg)	199	D	0.841	49.0	58
Industrial Drive (W Leg)	1,372	B	0.865	25.9	148
All Vehicles	**3,361**	**C**	**0.894**	**33.2**	**293**

Source: AECOM, 2010

The results indicate that in 2034, the intersection is likely to perform at LOS B and C in the AM and PM peak respectively. Similar to the intersection of Industrial Drive / George Street, the additional background traffic growth between the existing traffic flows and 2034 traffic flows appears to have a minor impact on the intersection. The PM peak hour experiences a higher degree of saturation than the AM peak hour, particularly on Industrial Drive, but still performs satisfactorily.

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