Mayfield Concept Plan

Response to Transport Issues Raised by Government Agencies

Mayfield Concept Plan

Mayfield Concept Plan

Response to Transport Issues Raised by Government Agencies

Prepared for

Newcastle Port Corporation

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

14 October 2011

60153583

AECOM in Australia and New Zealand is certified to the latest version of ISO9001 and ISO14001.

Mayfield Concept Plan

Quality Information

Document Mayfield Concept Plan

Ref 60153583

Date 14 October 2011

Prepared by Andrew Cook

Reviewed by Michael England

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	14-Oct-2011	Submission to Department of Planning and Infrastructure	Andrew Cook Technical Director	

Mayfield Concept Plan

Table of Contents

1.0 Introduction

1.1 Overview of Proposal

The proposal is to develop a 90 hectare parcel of land strategically located adjacent to the South Arm of the Hunter River for a range of port related activities including:

- Bulk and general precinct – capacity of 2.4 million tonnes per annum;
- General purpose precinct – capacity of 1.35 million tonnes per annum;
- Container terminal precinct – capacity of 1 million TEUs per annum;
- Bulk liquids precinct – capacity of 1,010 million litres per annum;
- NPC operations precinct.

Immediately adjoining the land along the edge of the South Arm of the Hunter River is a berth precinct containing 7 berths to service the port land although this precinct does not form part of the Concept Plan application. Road and rail infrastructure would also be provided to support development of the site.

The site forms part of the former BHP Steelworks closure area which is being progressively remediated. It is anticipated that the land would be developed progressively for port related uses over a timeframe of some 20 plus years.

1.2 Environmental Assessment Process

The following provides a summary of the key milestones in progression of the Concept Plan application and environmental assessment over the past 2 plus years:

- The application for Concept Plan approval was originally lodged by AECOM on behalf of Newcastle Port Corporation (NPC) with Department of Planning and Infrastructure (DPI) on 1 May 2009;
- The Director General's Environmental Assessment Requirements for the application were issued on 29 May, 2009;
- The environmental assessment was placed on public exhibition during the period August/September 2010. A total of approximately 176 submissions were received;
- A Submissions Report was prepared by AECOM on behalf of NPC and lodged with DPI in late December 2010;
- DPI placed the Submissions Report on public exhibition during the period February/March 2011. A number of further submissions were received;
- A further response to these submissions was prepared by AECOM on behalf of NPC and lodged with DPI dated 2 June, 2011;
- Further comments were received from Department of Transport (DoT) and NSW RTA in relation to transport related issues in mid/late August 2011. Section 2 of this submission provides a summary of these issues together with a response.

1.3 Purpose of this Report

The purpose of this report is to:

- provide the government agencies with a clear understanding of the road and rail transport arrangements proposed as part of the Concept Plan;
- explain the various road and rail transport assessments undertaken to date and, where appropriate, augment these assessments with additional analysis in response to specific transport related issues raised by the government agencies; and
- provide the government agencies with the confidence that the Concept Plan application can proceed provided suitable mitigation measures are in place to address potential transport related impacts.

This submission should be read in conjunction with the following documents:

- AECOM Environmental Assessment for Mayfield Concept Plan dated July 2010;
- AECOM Submissions Report for Mayfield Concept Plan dated December 2010;
- AECOM Transport Assessment for Mayfield Concept Plan dated 20 December 2010; and
- AECOM letter submission to Department of Planning and Infrastructure for Mayfield Concept Plan dated 2 June 2011.

1.4 Summary of Consultation

In responding to the transport related issues raised by the government agencies AECOM and NPC have held a series of meetings and conference calls with the key government transport agencies. In particular, the following meetings have been conducted since the lodgement of the most recent AECOM submission on 2 June, 2011:

- Meeting in Newcastle dated Thursday 1 September 2011 attended by NPC, AECOM, DPI, NSW RTA and DoT;
- Meeting in Sydney dated Friday 9 September 2011 attended by NPC, AECOM and DPI;
- Conference call dated Friday 16 September 2011 between AECOM and NSW RTA;
- Meeting in Sydney on Wednesday 28 September 2011 attended by NPC, AECOM and DoT (including ARTC);
- Meeting in Sydney on Friday 30 September 2011 attended by NPC (by phone), AECOM and DoT (including Railcorp).

2.0 Summary of Key Issues

2.1 Traffic Related Issues

2.1.1 Key Issues

The key traffic related issues raised by the NSW RTA and DoT are summarised below:

- Trip generation rates adopted for the port development during peak periods may be underestimated particularly by comparison to previous traffic assessment undertaken for Port Botany;
- Question raised regarding the assumed trip distribution and in particular the 80/20 directional split of traffic north/south at Industrial Drive. Suggestion that a revised assessment be undertaken for a 90/10 north/south directional split at Industrial Drive;
- Query regarding the proposed link road and the management measures proposed to facilitate the distribution of port traffic on the link road between the two key intersections;
- Analysis undertaken to date suggests there are mid block capacity issues at two locations along Industrial Drive. How will these capacity issues be addressed;
- Reservations about achieving the 80/20 road/rail modal split which was modelled in the AECOM Transport Assessment as the base case. Suggestion that an assessment of a 90/10 road/rail modal split be undertaken as a sensitivity analysis;
- Detail the assumption for closure time of the railway level crossings that underpinned the truck queuing analysis;
- Opposition to the new mid block intersection at Industrial Drive opposite Crebert Street as shown on Figure 1 in the AECOM submission dated 2 June, 2011;
- Based on the above, request that a revised intersection analysis be undertaken for the two key intersections (Industrial Drive/George Street and Industrial Drive/Ingall Street).

In response to these issues AECOM has carried out a further traffic analysis dated 13 October 2011 and a copy of this document is attached as Appendix A. This analysis examines a number of scenarios relating to road/rail modal split, directional split of traffic at Industrial Drive, background traffic growth rates on Industrial Drive, and average hour and peak hour truck loading.

The various scenarios assessed are summarised in the Table below:

Table 1 Mayfield Concept Plan - Scenarios for Traffic Analysis

Scenario	Road/Rail Split	Directional Split at Industrial Drive	Growth Rate on Industrial Drive	Port Hourly Truck Loading
Existing[1]	80/20 road/rail	80/20 north/south	1.0% per annum	Peak hour
Scenario 1	80/20 road/rail	90/10 north/south	1.0% per annum	Peak hour
Scenario 2	80/20 road/rail	90/10 north/south	0.27% per annum	Average hour
Scenario 3[2]	90/10 road/rail	90/10 north/south	1.0% per annum	Peak hour
Scenario 4[2]	90/10 road/rail	90/10 north/south	0.27% per annum	Average hour

1. Existing is scenario as modelled in AECOM Transport Assessment dated December 2010 and AECOM letter dated 2 June, 2011.
2. Scenarios modelled as a sensitivity analysis to demonstrate worst case impacts for modal split. Note that this does not reflect NPC's expectations for the port operation.

Note that in the above table Scenarios 2 and 4 used a lower growth rate on Industrial Drive and average hour truck loading assumption as requested by DPI.

2.1.2 Summary Response

Trip Generation Rates During Peak Periods

AECOM has analysed in some detail the traffic assessment carried out in 2002 for Port Botany and as a result has made the following comments in respect to comparing the trip generation rates at Port Botany to the rates proposed for the port operation at Mayfield:

- At the time in 2001 Port Botany was operating 16 hours per day and 5.5 days per week. This compares to the 24 hours per day and 7 days per week operation proposed at Mayfield.
- The rate used for Port Botany in 2002 was 1.61 TEUs per truck which compares to 1.8 TEUs per truck proposed at Mayfield. Importantly the Port Botany report forecast that the efficiency of container movement by truck was likely to increase over time for a number of reasons (more efficient B-double truck capacity and improved rate of backloading). The Sydney Ports Corporation Port Freight Logistics Plan 2008 notes that truck utilisation at Port Botany is expected to increase to 2.2 TEUs per truck by 2011 (refer Table 6 on page 26).
- Peak hour container truck movements at Port Botany were 8% (AM) and 4% (PM) of daily traffic compared to an estimated peak hour container truck movements of 7.5% of daily traffic at Mayfield.
- Port Botany included some additional truck traffic involved with moving empty containers from the Port to local freight container stations which is not proposed at Mayfield. NPC has advised that empty containers will be managed on site at Mayfield.
- It is not appropriate to rely on the Port Botany intersection counts from the 2002 traffic assessment to calculate trip generation as there are a number of other site/area specific factors at Port Botany which influence these counts. In the 2002 report the port road movements for Port Botany are set out in some detail (refer Table 3.5 on page 40) and this is the appropriate information to use.

Based on the above, AECOM is satisfied that the trip generation rates adopted for the various precincts of the Mayfield Concept Plan are realistic and (to the extent possible allowing for variables at each port) generally comparable with the peak hour rates observed at Port Botany.

It is recommended that an approval includes a requirement for monitoring of port traffic flows at regular intervals over the life of the Concept Plan. This will provide further validation of the trip generation rates that have been adopted and will allow variations to be identified and addressed, if required, in future traffic assessments.

Trip Distribution and Assumed Directional Split at Industrial Drive

The further traffic analysis undertaken by AECOM has included (in all 4 scenarios) a revised directional split at Industrial Drive of 90% of traffic to the north and 10% of traffic to the south as suggested by the NSW RTA.

This directional split is reflected in both the revised mid block capacity analysis on Industrial Drive and the revised analysis of intersection performance at Industrial Drive/George Street and Industrial Drive/Ingall Street.

The revised analysis indicates that the change in directional split has resulted in minimal changes to the peak hour traffic flows and as a result, the overall results of analysis and the recommended mitigation measures have not changed even assuming the worst case conditions (refer Revised Traffic Analysis - Scenarios 1 and 3).

Link Road and Managing Distribution of Port Traffic

One of the key mitigation measures suggested in the various AECOM Traffic Assessments has been the introduction of a link road to allow a greater proportion of the port traffic (and particularly the container precinct traffic) to be directed to the Industrial Drive/George Street intersection which has greater spare capacity. It is appropriate and consistent with good traffic management practice to utilise available intersection capacity before committing to upgrade intersections.

It is recommended that a Traffic Management Plan (TMP) should be required which documents all procedures associated with traffic access to the Port precinct including the use of the link road. Specifically in relation to use of the link road the TMP could include some or all of the following measures:

- Appropriate geometric layouts and directional signage at access points to each precinct. For example, to encourage trucks from the Container Precinct to use the Industrial Drive/George Street intersection, the access intersection at that precinct could be designed as right in and left out only to ensure the appropriate directional movement of traffic.

- Active management at each Precinct to guide trucks to the appropriate access points. This can be achieved either through marshalling or variable messaging signs (VMS) at the entry/exit of each Precinct with information on which access intersection to use.
- Education of truck drivers and transport operators about the procedures contained in the TMP.
- Monitoring of traffic at regular intervals throughout the life of the Concept Plan to check the effectiveness of the TMP in terms of managing traffic and use of the link road.
- If necessary enforcement of the TMP through fines and penalties.

Mid Block Capacity on Industrial Drive

AECOM has undertaken a mid block capacity analysis at two locations along Industrial Drive to assess projected impacts from the Concept Plan at 2024 and 2034. The analysis was undertaken for a number of scenarios as detailed in Table 1. The results of the analysis are summarised for the worst case location on Industrial Drive (Location 1) and using conservative assumptions for background traffic growth and peak hour loading (refer Appendix A - Scenario 1):

- Where mid block capacity is exceeded on Industrial Drive it is primarily due to background traffic growth without any contribution from Port traffic. In 2024, without Port traffic, capacity on Industrial Drive is 1.17 in AM peak and 1.13 in the PM peak while in 2034 capacity is 1.29 in the AM peak and 1.25 in the PM peak;
- In 2024 Port traffic will increase capacity issues on Industrial Drive in the AM peak by some 12.0% (1.17 to 1.31) and in the PM peak by some 12.4% (1.13 to 1.27);
- In 2034 Port traffic will increase capacity issues on Industrial Drive in the AM peak by some 15.5% (1.29 to 1.49) and in the PM peak by some 16.0% (1.25 to 1.45);

It is important to note that if alternative assumptions for lower background traffic growth and average hour loading are adopted (refer Scenario 2) there is considerable improvement in mid block capacity on Industrial Drive (in the order of 11-12% in 2024 and 16-18% in 2034).

In the AECOM submission dated 2 June, 2011 further analysis was undertaken to assess mid block capacity on an hourly basis over a 24 hour period. This analysis demonstrated that on Industrial Drive capacity issues were largely confined to a 3 hour period in the AM peak and a 3 hour period in the PM peak on week days.

As the port would operate 7 days a week and 24 hours a day this provides an opportunity to manage port traffic movements so they do not coincide with peak traffic periods on the arterial road network. It is noted that a similar management scenario is proposed at Port Botany (refer Section 4.1 of Sydney Ports Corporation Port Freight Logistics Plan 2008).

Therefore to address mid block capacity issues the following mitigation measures have been recommended:

- Introduce a Traffic Management Plan (TMP) which would aim to manage peak traffic movements to/from the Port so they occur outside the peak periods (6am to 9am and 3pm to 6pm weekdays) on the arterial road network. It is in the interests of future operators of the Concept Plan and transport operators to ensure that transport movements to/from the Port site occur as efficiently as possible;
- Strive for an increase in the modal split for rail beyond the base case of 20%. This can be achieved by adopting the recommendations to support the introduction of a 4th train per day for the Port (introduction of two additional 650m length sidings and moving to a more efficient gantry style loading/unloading operation). A higher rail modal split would effectively reduce road traffic on the arterial road network;
- Undertake monitoring of traffic flows generated from the Concept Plan at regular intervals focussing on the performance of the two key Industrial Drive intersections and mid block capacity issues on Industrial Drive in particular.

In addition it is recommended that a detailed Precinct Wide Traffic Study is undertaken in consultation with relevant government agencies and the local community to address road/intersection improvements required to service background traffic growth in addition to traffic associated with development of the port land and the adjoining Intertrade Industrial Park. For further details in respect to this Precinct Wide Traffic Study please refer to Section 2.3 of this submission.

Road/Rail Modal Split – Sensitivity Analysis of 90/10 Modal Split

As requested by NSW RTA a further sensitivity analysis has been carried out to demonstrate the extent of traffic related impacts should the modal split be 90/10 road/rail as opposed to the 80/20 modal split modelled as the base case in previous AECOM Transport Assessments.

It is noted that the 90/10 modal split has been modelled as a sensitivity analysis to demonstrate worst case impacts as requested by NSW RTA and does not represent NPC's expectations for the Port operations.

Furthermore the information contained below in Section 2.2.2 of this submission demonstrates that the 80/20 modal split previously modelled by AECOM as the base case is realistic and achievable having regard to the capacity constraints on the regional and local rail networks and the proposal to operate port trains at night time.

Nonetheless the traffic analysis has been revised for a 90/10 modal split and the worst case results have been presented in Appendix A (refer Scenario 3). By comparing the analysis for Scenarios 1 and 3 it is apparent that by changing the modal split there is a marginal deterioration (less than 1.5% in 2034) in the mid block capacity on Industrial Drive and (with one exception) no impact on the Level of Service (LoS) at the two key intersections as a result of this change.

The one exception is at the Industrial Drive/George Street intersection in 2034 where LoS in the PM peak (with mitigation) deteriorated from LoS C to LoS D. However, this change has no impact on the mitigation measures which are proposed.

Assumption for Closure Time of Railway Level Crossings

An assessment of potential traffic queuing at the two rail crossings was undertaken by AECOM based on an anticipated crossing closure time of 5 minutes. This closure time was calculated as follows:

- Port trains of 1300m length which would be split into 2 x 650m rakes before each rake enters the port land across the rail crossings;
- Train shunting speed within the port land of 10km/h, meaning each 650m rake would take 4 minutes to cross the rail crossings;
- Rail crossings closed for 30 seconds prior to and 30 seconds after each rake crossing;
- Total rail crossing closure time is 4 minutes plus 2 x 30 seconds = 5 minutes.

Proposed New Intersection at Industrial Drive Opposite Crebert Street

It was not intended as part of the Concept Plan to show a new intersection at Industrial Drive opposite Crebert Street. Figure 1 (attached) has now been amended to remove this intersection and to show the intended road layout on the adjoining site as detailed on the Draft Masterplan for the Intertrade Industrial Park.

Revised Intersection Analysis

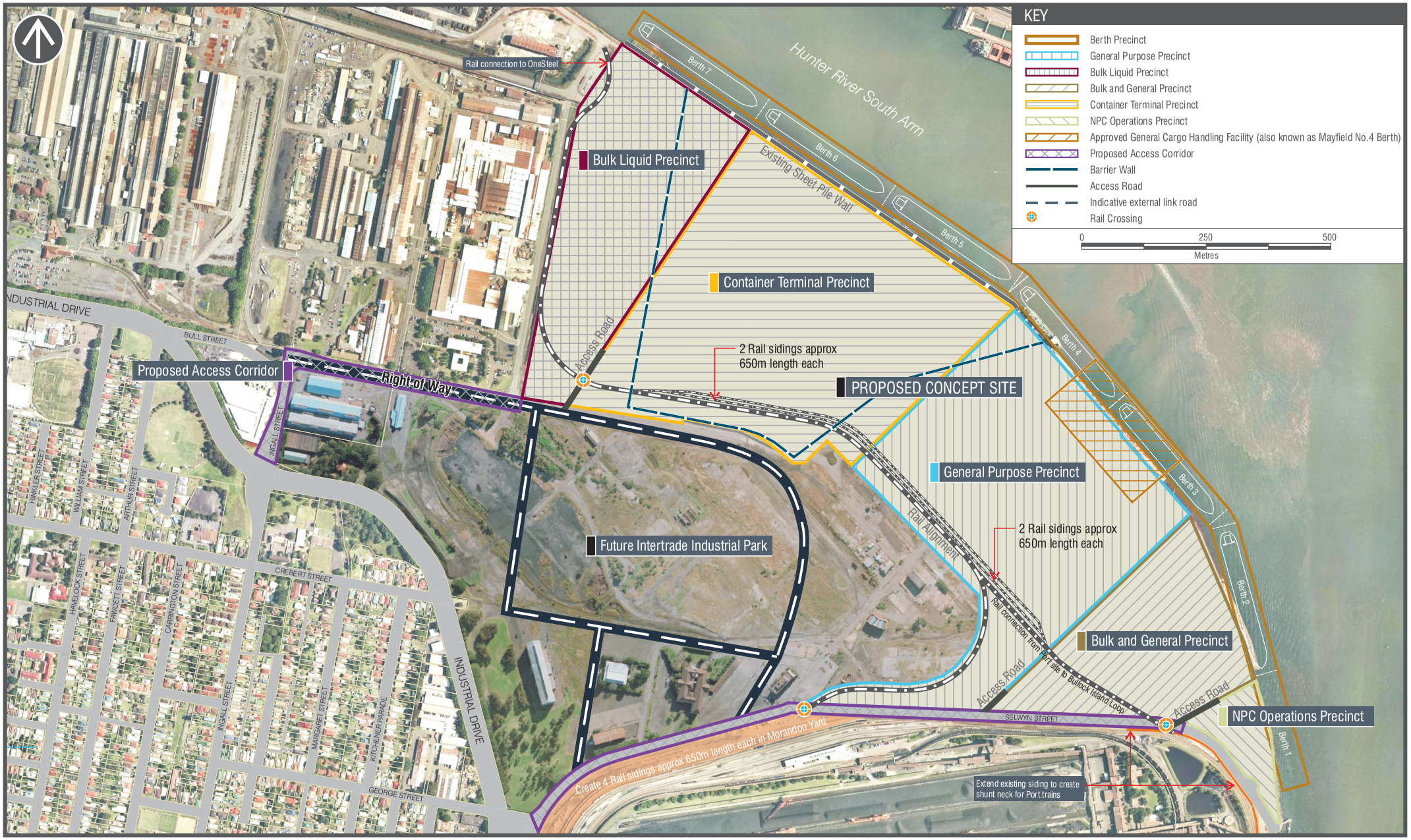
As requested by the NSW RTA, AECOM has undertaken a revised intersection analysis for the two key intersections (Industrial Drive/George Street and Industrial Drive/Ingall Street). The revised analysis reflects the changes to key assumptions relating to the directional split of traffic at Industrial Drive and road/rail modal split (as a sensitivity analysis).

The results of the revised intersection analysis are presented in some detail in the Further Traffic Analysis prepared by AECOM dated 13 October, 2011 as contained in Appendix A.

The analysis indicates that even for the worst case scenario (Scenario 3) there is no significant change in the level of service at either intersection by comparison with the previous assessment undertaken by AECOM in December 2010. The only changes were:

- at the Industrial Drive/Ingall Street intersection in 2024 where LoS in the AM peak with no mitigation deteriorated from LoS C to LoS D;
- at the Industrial Drive/George Street intersection in 2034 where LoS in the PM peak with mitigation deteriorated from LoS C to LoS D.

However, the recommended mitigation measures for both intersections have not changed.



AECOM

ROAD AND RAIL ACCESS CONFIGURATION

Response to Submissions

Mayfield Site Port-Related Activities Concept Plan

Figure 1

2.2 Rail Related Issues

2.2.1 Key Issues

The key rail related issues raised by the DoT are summarised below:

- Proposed rail loading calculations for port trains;
- Availability of train paths on the Main North line between Newcastle and Sydney before and after Stage 1 of the North Sydney Freight Corridor;
- Sharing the local rail network with coal and grain trains;
- Impacts of port trains on Islington and Scholey Street junctions.

2.2.2 Summary Response

Proposed Rail Loading Calculations for Port Trains

AECOM has provided detail about the methodology and assumptions used to calculate rail loading for port trains (refer letter submission dated 2 June, 2011). The details are summarised in the following table.

Table 2 Port Train Loading Assumptions

Issue	Assumption
Train length	1300m (two x 650m rakes including locomotives)
Number of wagons per train	80 x 15m wagons
Number of containers per train	160 (2 containers per wagon)
Container utilisation	85% (given night time rail operation trains have full day to be loaded)
Operating days per year	315 (86%)
Number of trains per day	3 (3 up and 3 down)
% Import and % Export	60% import and 40% export (similar to Port Botany)
Total Containers	**71,400 TEUs per annum x 3 trains = 214,200 TEUs per annum**

To cater for this number and size/length of trains certain upgrades to local rail infrastructure are proposed as detailed below:

- Within the Concept Plan site a new rail line will be extended between the One Steel line and the Bullock Island loop. This rail line will provide more direct access to the site for Port trains and it will also allow for two x 650m length rail sidings to be developed within the Port site to service the longer 1,300m length trains;
- An available shunt neck on the Bullock Island loop will be used and extended to a point some 700m beyond the new rail entry to the Port site to provide for Port trains to enter and exit. Trains will enter the shunt siding and then will be split into two x 650m lengths before entering the sidings either within the Port land or the Morandoo Yard (see below);
- The Morandoo Yard (road numbers 1 to 5) will be reconfigured to provide a total of four x 650m length rail sidings to hold two Port trains while a third train is within the rail sidings within the Port site. Much of the infrastructure within the Morandoo Yard is not currently used or is significantly under utilised. Discussions with ARTC have confirmed that this arrangement is feasible;
- The new operations are designed so that they do not directly impact on train operations on the One Steel line, the Port Waratah line and the Bullock Island loop. The additional Port trains will need to be scheduled within the available timetable slots to avoid conflict with these other train operations.

The methodology and assumptions used have been discussed with and accepted in principle by DoT.

Based on the full development scenario for the container terminal as detailed in the Concept Plan (1 million TEUs per annum in 2034) AECOM has demonstrated in the above table that the port would be able to move in excess of 20% mode share by rail.

In the short term while the container freight volumes are building up it is possible that the rail operations at the port could start with one 1300m length train per day (71,400 TEUs per annum). Alternatively smaller trains of around 780m in length could be used to service the port and these would move in the order of 42,800 TEUs per annum (60% of the 1300m train capacity). This smaller train scenario was assessed in the AECOM Transport Assessment dated December 2010.

In the long term the port rail operations have the potential to be expanded to up to 4 x 1300m long trains per day provided that two additional 650m long sidings are created either within the port site or on adjacent land such as within the Morandoo Yard and also by adopting more efficient gantry style loading/unloading operations. This would increase container volumes moved by rail to approximately 285,000 TEUs per annum (approaching a 30% mode share by rail).

Availability of Train Paths on the Main North line between Newcastle and Sydney

Recent discussions with ARTC and Railcorp have indicated that there are in the order of 9-10 train paths per day available on the Main North Line between Newcastle and Sydney but virtually none of these train paths are available during the daytime curfew period between 5am and 7pm (note that the curfew times apply in the vicinity of Hornsby not at Newcastle).

After Stage 1 of the North Sydney Freight Corridor (NSFC) project is completed (2015-16) additional train paths will be created but these will be prioritised to interstate freight and passenger services. Nonetheless ARTC and Railcorp have both recently indicated that in the order of 9-10 train paths per day would still be available after Stage 1 of NSFC, but again not during the daytime curfew period.

In recognition of the limited availability of train paths on the network, the proposed port train operations are based around trains arriving and departing the port during night time period between 7pm and 5am daily. Based on the full development scenario (1 million TEUs per annum in 2034) AECOM has calculated that a total of 3 x 1300m long port trains per day would be able to transport some 214,200 TEUs per annum (equivalent to more than 20% mode share by rail). There are a total of 6 sidings available to store and load/unload these trains including 2 sidings within the port land and 4 sidings within the reconfigured Morandoo Yard.

The train from Newcastle to Sydney would take in the order of 3.5 hours one way and loading/unloading time for a port train is estimated at approximately 4-5 hours, meaning that the cycle time between Newcastle, Sydney and Newcastle would take in the order of 11-12 hours total.

There is capacity on the rail network during the night time period to handle this number of port trains even if allowances are made for train paths associated with proposed projects such as the Cobbora coal mine in NSW. This project is understood to potentially require access to around 4 train paths per day to transport coal to power stations in the Hunter Valley and on the Central Coast. This application is still at an early stage in the assessment process.

Sharing the Local Rail network with Coal, Grain and One Steel Trains

The rail operations for the port have been designed to ensure that port trains do not interfere with the operation of coal trains on the Port Waratah loop and grain trains on the Bullock Island loop. These coal and grain arrival roads would remain clear and would not be impeded by the movement of port trains into and out of the site.

Port trains would be split into two x 650m length rakes and stored in the sidings within the port site or within the adjacent Morandoo Yard which will be reconfigured for this purpose. The existing shunting neck to the east of Morandoo Yard will be extended and connected to a new port exit road to cater for port trains as they enter and exit the port site. Port trains using the Morandoo Yard and the extended shunting neck will operate independently of trains using the coal and grain arrival roads.

Port trains will be operating at night time and will be scheduled to arrive and depart within the available timetable slots so they do not conflict with coal and grain trains. As detailed in Section 2.9 of the letter submission by AECOM dated 2 June 2011, the ARTC Train Plan for Islington Junction shows that there are up to 20 arrival slots within this night time period of which only 6 slots are currently used. This leaves 14 slots available which is more than ample for the ports needs.

Under the proposed rail arrangements, the One Steel arrival road would also remain clear and would not be impeded by the movement of port trains into and out of the site. It is understood that One Steel currently operates (on average) around 3 trains per day. Therefore in the short term, before the proposed port exit road is built, if shared use of this arrival road was required between port and One Steel trains this would be possible provided that the train movements were scheduled appropriately across a 24 hour period to avoid potential conflicts.

Impacts on Islington and Scholey Street Junctions

During discussions with Transport NSW, ARTC and Railcorp it was explained that due to network capacity constraints the port trains would be restricted to operating during the night time period. On this basis it was agreed that there were not likely to be capacity or scheduling issues at the Islington and Scholey Street Junctions.

2.3 Cumulative Impact Issues

2.3.1 Key Issues

The NSW RTA and DPI have identified concerns in relation to the cumulative traffic impacts associated with potential development of the Port land and the adjoining Intertrade Industrial Park (IIP). Further information has been requested in relation to:

- A proposed framework for managing cumulative traffic impacts into the future as both sites (Port land and Intertrade Industrial Park) are developed
- Improved definition of potential works required to address cumulative impacts including an indication of how these works could be staged over time.

2.3.2 Summary Response

Framework for Managing Cumulative Traffic Impacts

As part of the Transport Assessment undertaken by AECOM and dated December 2010, a cumulative impact assessment was undertaken which indicated that there would be significant cumulative traffic impacts in 2024 should both the development of the Port and the development of the Intertrade Industrial Park (IIP) proceed.

The key cumulative impacts would be felt at the two key intersections on Industrial Drive and also in respect to mid block capacity on Industrial Drive.

The analysis was based on establishing the theoretical development potential of the IIP site given that no approval has been granted and no formal application lodged for development of this site. As a result the form, layout and scale of any development of the IIP site remains unknown.

The analysis undertaken was relatively coarse but indicates that IIP could potentially be a significant generator of traffic in its own right, as demonstrated in the following table.

Table 3 Cumulative Traffic Generation – Port Land and IIP Site

Land Use	Estimated peak hour vehicle movements generated (2024)	Estimated peak hour vehicle movements generated (2034)
NPC Mayfield Concept Plan	219 (11%)	312 (15%)
Intertrade Industrial Park	1,775 (89%)	1,775 (85%)
Total	**1,994**	**2,087**

Without mitigation, this level of traffic would create significant capacity issues at the two key intersections on Industrial Drive as well as a significant mid block capacity issue.

Further investigation by the proponent of the IIP site development would be required once more detailed information is known in respect to the form and timing of development (and the traffic generation potential) of this site.

To address the cumulative traffic issues identified it is recommended that a detailed Precinct Wide Traffic Study is undertaken in consultation with relevant government agencies and the local community. It is suggested that the scope of such a study should include:

- determining the number of trips generated by both the Port and the IIP (once more detailed information is known);
- assessing the impacts of the generated traffic on the key intersections and local road network, in particular the mid block capacity of Industrial Drive;
- identifying appropriate mitigation measures to alleviate the impact of development of the Precinct on the local road network and the appropriate timing for such mitigation measures; and
- identifying an equitable apportionment of costs between the relevant parties involved namely the RTA, the Port land and IIP.

Improved Definition of Potential Mitigation Measures

In the Revised Traffic Analysis prepared by AECOM (refer Appendix A) a range of potential mitigation measures were prepared to address issues associated with cumulative traffic impacts on the road network in the vicinity of the site. The list includes a combination of:

- traffic management measures for the port such as managing peak traffic flows, increasing the rail modal split beyond 20% and gating the key intersections to provide additional green time during peak periods; and
- physical road works such as road widening (Industrial Drive), road re-alignment (Bull Street), increasing turning lane capacity at the key intersections and even grade separation.

The list is preliminary only and will require further investigation and consultation. However, the list has been prepared to demonstrate that there is a range of feasible measures available to ensure that capacity issues can be addressed.

2.4 References

This submission should be read in conjunction with the following documents which have been prepared as part of the Mayfield Concept Plan application:

- AECOM Environmental Assessment for Mayfield Concept Plan dated July 2010;
- AECOM Submissions Report for Mayfield Concept Plan dated December 2010;
- AECOM Transport Assessment for Mayfield Concept Plan dated 20 December 2010;
- AECOM letter submission to Department of Planning and Infrastructure for Mayfield Concept Plan dated 2 June 2011.

3.0 Summary Conclusion

The following presents a summary of the response to the key transport related issues raised by government agencies in respect to the Mayfield Concept Plan:

- The proposed train loading assumptions adopted for the Port which have been used in the assessment are realistic and support movement of approximately 71,500 TEUs per annum for each 1300m length train;
- These assumptions confirm that at full development in 2034 the Port is capable of achieving at least a 20% rail modal split based on 3 x 1300m length trains per day and possibly closer to 30% if 4 x 1300m length trains per day can be supported;
- The proposed rail arrangements for the Port including creation of a new exit road, two sidings within the Port land, reconfiguration of the Morandoo Yard to create 4 additional sidings and extension of the shunting neck are realistic and will support a functional and efficient Port rail operation;
- There is adequate capacity of the regional rail network between Newcastle and Sydney to support the proposed Port rail operations provided train movements from the Port are restricted to the night time period;
- Provided the recommended local rail infrastructure improvements are undertaken, Port trains can operate without detrimentally impacting on the operation of coal, grain and One Steel trains although detailed scheduling of trains will be required;
- Substantial work has been carried out to validate the peak hour trip generation rates adopted for the Port land by comparison to similar traffic assessments undertaken for Port Botany;
- A range of scenarios have been assessed to demonstrate the likely traffic impacts at the two key intersections on Industrial Drive and at mid block locations on Industrial Drive over the life of the Concept Plan and the details are provided in Appendix A;
- This further analysis confirms that provided that the recommended mitigation measures are adopted, Port traffic will have acceptable impacts on the arterial road network in the vicinity of the site;
- It is proposed that a Precinct Wide Traffic Study is undertaken to assess the cumulative traffic impacts associated with development of the Port land and the adjoining IIP site. The Study would quantify cumulative traffic generation, assess traffic impacts, recommend appropriate mitigation measures and calculate/apportion costs between the relevant parties;
- The Precinct Wide Traffic Study would be prepared with input from the relevant parties (NSW RTA, the Port and IIP) and also in consultation with other relevant government agencies and the local community;
- A range of preliminary mitigation measures have been identified to demonstrate that a range of feasible measures is available to ensure that cumulative traffic capacity issues can be addressed. These mitigation measures will require further investigation as part of the Precinct Wide Traffic Study.

The extensive assessment work undertaken to date demonstrates that the issues relating to road and rail traffic that may arise from approval of the Concept Plan are able to be satisfactorily managed.

Mayfield Concept Plan

Appendix A

AECOM Further Traffic Analysis

NPC Mayfield Concept Plan: Further Traffic Analysis

1.0 Introduction

This document has been prepared in response to the Road and Traffic Authority (RTA) and Department of Planning and Infrastructure (DPI) requirements with regards to traffic assumptions in the NPC Mayfield Concept Plan Transport Assessment (20 December 2010).

The analysis undertaken in the December 2010 report and the subsequent document prepared for DPI on 2 June 2011 is referred to as the existing analysis. The further analysis required by RTA and DPI with regards to traffic assumptions are referred to as revised analysis scenarios. The following scenarios with the associated traffic assumptions have been assessed:

Scenario	Road / rail split	Direction split	Growth rate on Industrial Dr	Hourly truck loading
Existing	80 / 20 road / rail	80 / 20 north / south	1%	Peak hour
Scenario 1	80 / 20 road / rail	90 / 10 north / south	1%	Peak hour
Scenario 2	80 / 20 road / rail	90 / 10 north / south	0.27%	Average hour
Scenario 3*	90 / 10 road / rail	90 / 10 north / south	1%	Peak hour
Scenario 4*	90 / 10 road / rail	90 / 10 north / south	0.27%	Average hour

*Scenarios 3 and 4 have been modelled as a sensitivity analysis to demonstrate worst case impacts for mode share.

The following traffic assumptions are consistent for each scenario:

- 1.8 TEUs per truck (container loading assumption)
- Container trade is 600,000 TEUs in 2024 and 1,000,000 TEUs in 2034; all other precincts are at full development in these years
- 24 hours a day, 7 days a week, 365 days a year operations
- 75% truck movements in the day, 25% at night
- 200 employees in 2024 and 300 employees in 2034
- All other assumptions as per the report dated 20 December 2010.

An 80 / 20 road / rail modal split has been modelled as the base case scenario on the basis of the proposed rail operations and is consistent with NPC's expectations for the Port operation.

A 90 / 10 road / rail modal split has been modelled as a **sensitivity analysis** to demonstrate worst case impacts as requested by RTA and DPI. It should be noted that this **does not represent NPC's expectations** for the Port operations.

2.0 Existing Analysis

Assumptions associated with the existing analysis, as per the latest report dated 20 December 2010 and 2 June 2011, are as follows:

- 80 / 20 road / rail modal split (container trucks)
- 80 / 20 north / south directional split at Industrial Drive
- 1% growth rate per annum on Industrial Drive
- Peak hour traffic loading assumption (50% higher than average hour)
- All other assumptions as per the report dated 20 December 2010.

2.1 2024 Initial Operations Analysis

Trip generation for the 2024 existing analysis is shown in the table below.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	24
General Purpose	40,857	112	5	11	16
Container Terminal	266,667	731	37	73	110
Bulk Liquid	20,481	56	3	6	9
Total	**386,719**	**1,060**	**53**	**106**	**159**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.5) and include an additional 60 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

2.1.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)[1]	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,966	B	0.870	19.9	424
AM peak – with mitigation	4,070	B	0.870	20.8	424
PM peak – no mitigation	4,082	B	0.861	24.8	361
PM peak – with mitigation	4,179	B	0.861	25.5	361

Mitigation for the George Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

[1] It should be noted that DoS for an intersection is based on the movement of an approach with the highest (worst) DoS. In the case of the George Street intersection the movement with the highest DoS is the through movement on Industrial Drive, which is often unaffected by the mitigation measures, hence the results show the same DoS for both with and without mitigation at the intersection.

2.1.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,022	C	0.942	40.6	465
AM peak – with mitigation	3,914	B	0.803	20.6	234
PM peak – no mitigation	4,111	F	1.107	167.7	1,199
PM peak – with mitigation	4,001	C	0.936	40.5	459

Mitigation for the Ingall Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection; and
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane (refer to Figure 1).

2.2 2034 Final Operations Analysis

Trip generation for the 2034 existing analysis is shown in the table below.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	24
General Purpose	40,857	112	5	11	16
Container Terminal	444,444	1,218	61	122	183
Bulk Liquid	20,481	56	3	6	9
Total	**564,496**	**1,547**	**77**	**155**	**232**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.22) and include an additional 90 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

2.2.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,388	B	0.933	28.0	642
AM peak – with mitigation	4,560	C	0.933	29.7	642
PM peak – no mitigation	4,515	B	0.872	22.9	427
PM peak – with mitigation	4,676	C	0.905	32.1	525

Mitigation for the George Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

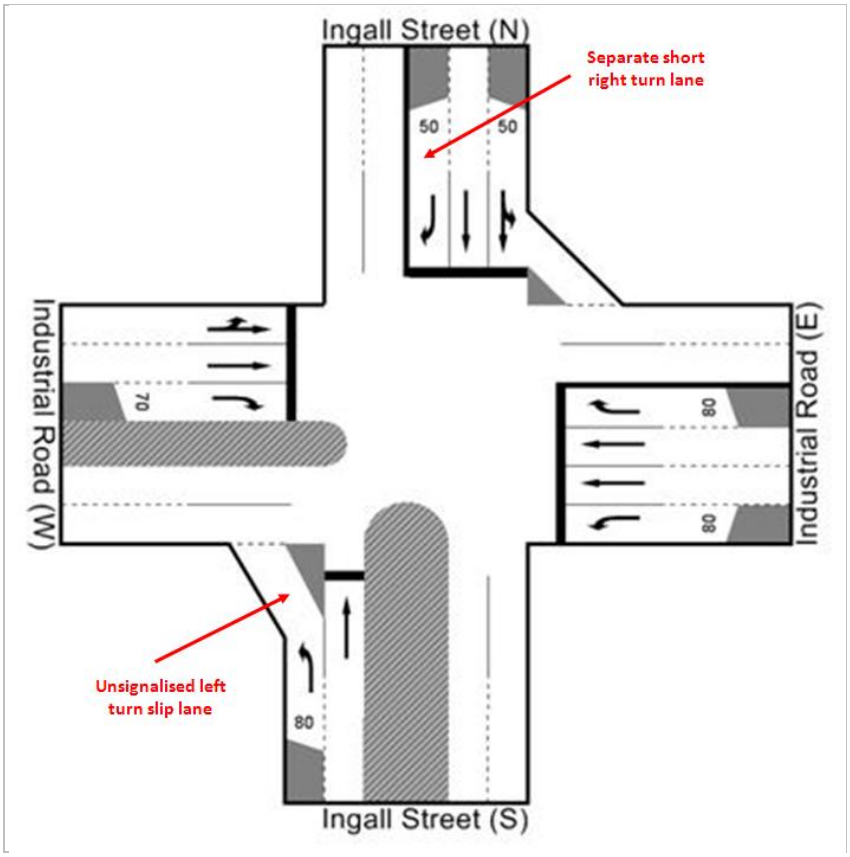
2.2.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,517	F	1.138	164.8	1,287
AM peak – with mitigation	4,334	B	0.861	27.7	320
PM peak – no mitigation	4,613	F	1.274	400.5	1,954
PM peak – with mitigation	4,429	E	1.000	59.2	736

Mitigation for the Ingall Street intersection in 2034 includes the following (as shown in the figure below):

- Link road, whereby all container precinct associated trucks will use the George Street intersection;
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane; and
- Provision of a separate short right turn lane of 50m from the Ingall Street northern approach (refer to Figure 1).

Figure 1: Ingall Street / Industrial Drive intersection layout with recommended mitigation measures

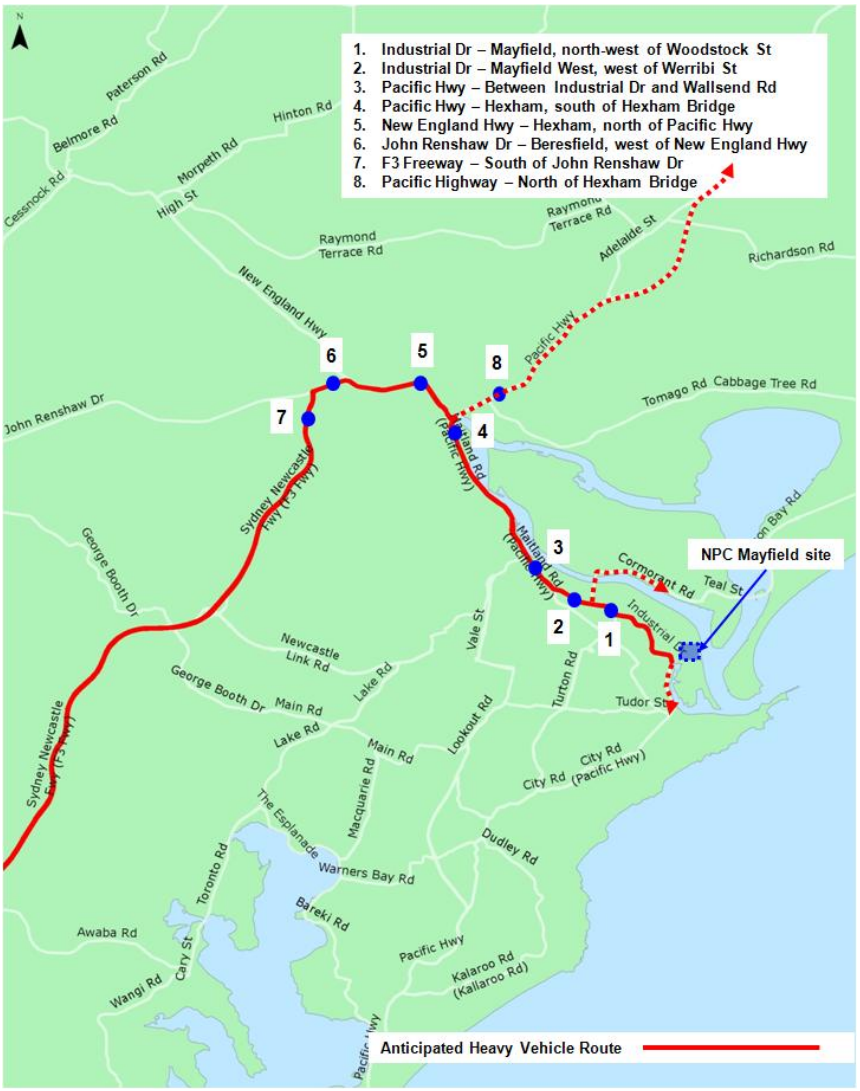


With mitigation measures recommended, both intersections can operate within capacity in both 2024 and 2034.

2.3 Midblock Analysis

Midblock analysis has been undertaken at the locations along the anticipated heavy vehicle route shown on the map below (Figure 2).

Figure 2: Midblock analysis locations



The following directional splits have been assumed:

- 80 / 20 north / south directional split on Industrial Drive;
- 80 / 20 west / north directional split at Tourle Street / Industrial Drive intersection; and
- 50 / 50 north / east directional split at Pacific Highway / New England Highway intersection.

AM peak hour – Existing scenario

ID	Road	Location	Direction	AM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	1.02	1.17	1.29	1.29	1.47
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.81	0.93	1.08	1.03	1.23
			WB	0.74	0.85	0.90	0.93	1.01
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.46	0.53	0.59	0.59	0.67
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.56	0.87	0.93	1.17	1.25
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.44	0.59	0.60	0.72	0.74
			SB	0.71	0.95	0.98	1.17	1.22
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.35	0.61	0.65	0.91	0.96
			WB	0.30	0.52	0.53	0.78	0.80
7	F3 Freeway	South of John Renshaw Drive	NB	0.41	0.56	0.60	0.70	0.75
			SB	0.28	0.38	0.39	0.47	0.49
8	Pacific Highway	North of Hexham Bridge	Two-way	0.47	0.53	0.56	0.59	0.63

PM peak hour – Existing scenario

ID	Road	Location	Direction	PM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	0.98	1.13	1.26	1.25	1.42
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.70	0.80	0.87	0.88	0.99
			WB	0.80	0.91	1.05	1.01	1.19
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.48	0.55	0.61	0.61	0.69
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.61	0.95	1.00	1.27	1.35
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.72	0.96	0.99	1.18	1.22
			SB	0.54	0.72	0.74	0.89	0.91
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.31	0.54	0.55	0.80	0.83
			WB	0.37	0.65	0.68	0.96	1.01
7	F3 Freeway	South of John Renshaw Drive	NB	0.33	0.45	0.47	0.56	0.58
			SB	0.42	0.42	0.57	0.60	0.71
8	Pacific Highway	North of Hexham Bridge	Two-way	0.50	0.57	0.60	0.63	0.67

Midblock capacity analysis identifies four main areas of concern namely:

- Industrial Drive at two locations;
- New England Highway (Hexham, north of Pacific Highway);
- Pacific Highway (south of Hexham Bridge)
- John Renshaw Drive (Beresfield, west of New England Highway) in 2034.

Where midblock road capacity is exceeded, it is primarily due to background traffic growth. As expected, traffic from the Concept Plan has the most significant impact on mid block capacity at the two locations on Industrial Drive (closest to the Port site). At other locations more distant from the Port site, such as the New England Highway and the Pacific Highway (north of Hexham Bridge), the contribution from Concept Plan traffic is more modest. It is noted that the planned major road upgrades of the Hunter Expressway and the extension of the F3 to Raymond Terrace will reduce the amount of background traffic on sections of the haulage route.

A more detailed **hourly** midblock analysis was undertaken and presented in the submission to DPI on 2 June 2011 (Tables 8 & 9). The analysis showed that for large periods of the day outside of the peak periods, and for all periods during the weekend, there is adequate midblock capacity to cater for Port traffic.

The RTA has indicated that its main concern in respect to the midblock analysis is in relation to Industrial Drive. To alleviate the impact of the port development on Industrial Drive, the following mitigation is recommended:

- Strive for an increase in the modal split for rail beyond the base case of 20%. A higher rail modal split would reduce road traffic on the arterial road network.
- Introduce a traffic management plan which seeks to manage peak traffic movements to/from the Port so they occur outside the peak periods on the arterial road network, similar to that described in Sydney Ports Corporation's *Port Freight Logistics Plan, June 2008*, a framework to improve road and rail performance at Port Botany. It is in the interests of future operators of the Concept Plan and transport operators to ensure that transport movements to/from the Port site occur as efficiently as possible.
- Undertake regular monitoring of traffic flows generated from the Concept Plan and the associated impacts on Industrial Drive, in particular.

3.0 NPC Mayfield Revised Analysis – Scenario 1

Assumptions associated with the revised Scenario 1 analysis, as per the RTA's requirements, are as follows:

- 80 / 20 road / rail modal split (container trucks)
- **90 / 10 north / south directional split at Industrial Drive**
- 1% growth rate per annum on Industrial Drive
- Peak hour traffic loading assumption (50% higher than average hour)
- All other assumptions as per the report dated 20 December 2010.

3.1 2024 Initial Operations Analysis

Trip generation for the 2024 Scenario 1 analysis is as per the trip generation for the existing analysis, shown in Section 1.1.

A change of directional split to 90 / 10 north / south results in an increase of 18 vehicles (both light and heavy vehicles) travelling to/from the north at the George Street intersection and an increase of 4 vehicles (both light and heavy vehicles) travelling to/from the north at the Ingall Street intersection in 2024 (with a link road in place between the two intersections) during the peak hours.

3.1.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,968	B	0.870	19.8	424
AM peak – with mitigation	4,074	B	0.870	20.6	424
PM peak – no mitigation	4,087	B	0.861	24.8	361
PM peak – with mitigation	4,188	B	0.861	25.5	361

Mitigation for the George Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

3.1.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,023	D	0.922	42.9	457
AM peak – with mitigation	3,914	B	0.809	20.6	236
PM peak – no mitigation	4,111	F	1.124	185.5	1,264
PM peak – with mitigation	4,002	C	0.936	40.8	459

Mitigation for the Ingall Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection; and
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane (as shown in Figure 1).

3.2 2034 Final Operations Analysis

Trip generation for the 2034 Scenario 1 analysis is as per the trip generation for the existing analysis, shown in Section 1.2.

A change of directional split to 90 / 10 north / south results in an increase of 27 vehicles (both light and heavy vehicles) travelling to/from the north at the George Street intersection and an increase of 5 vehicles (both light and heavy vehicles) travelling to/from the north at the Ingall Street intersection in 2034 (with a link road in place between the two intersections) during the peak hours.

3.2.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,390	B	0.933	27.9	642
AM peak – with mitigation	4,567	C	0.933	29.4	642
PM peak – no mitigation	4,523	B	0.872	23.0	427
PM peak – with mitigation	4,694	C	0.924	38.6	582

Mitigation for the George Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

3.2.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,517	F	1.119	167.6	1,294
AM peak – with mitigation	4,334	B	0.859	27.8	324
PM peak – no mitigation	4,613	F	1.300	452.8	2,089
PM peak – with mitigation	4,431	E	1.000	59.2	736

Mitigation for the Ingall Street intersection in 2034 includes the following (and is the same as the existing analysis):

- Link road, whereby all container precinct associated trucks will use the George Street intersection;
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane; and
- Provision of a separate short right turn lane of 50m from the Ingall Street northern approach (as shown in Figure 1).

With the mitigation measures recommended, both intersections can operate within capacity in both 2024 and 2034.

3.3 Midblock Analysis

AM peak hour – Scenario 1 analysis

ID	Road	Location	Direction	AM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	1.02	1.17	1.31	1.29	1.49
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.81	0.93	1.10	1.03	1.26
			WB	0.74	0.85	0.90	0.93	1.02
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.46	0.53	0.59	0.59	0.68
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.56	0.87	0.93	1.17	1.26
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.44	0.59	0.60	0.72	0.74
			SB	0.71	0.95	0.99	1.17	1.22
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.35	0.61	0.65	0.91	0.97
			WB	0.30	0.52	0.53	0.78	0.80
7	F3 Freeway	South of John Renshaw Drive	NB	0.41	0.56	0.60	0.70	0.75
			SB	0.28	0.38	0.40	0.47	0.49
8	Pacific Highway	North of Hexham Bridge	Two-way	0.47	0.53	0.57	0.59	0.64

PM peak hour – Scenario 1 analysis

ID	Road	Location	Direction	PM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	0.98	1.13	1.27	1.25	1.45
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.70	0.80	0.88	0.88	1.00
			WB	0.80	0.91	1.06	1.01	1.22
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.48	0.55	0.62	0.61	0.70
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.61	0.95	1.01	1.27	1.36
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.72	0.96	0.99	1.18	1.23
			SB	0.54	0.72	0.74	0.89	0.92
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.31	0.54	0.56	0.80	0.83
			WB	0.37	0.65	0.68	0.96	1.01
7	F3 Freeway	South of John Renshaw Drive	NB	0.33	0.45	0.47	0.56	0.59
			SB	0.42	0.57	0.60	0.71	0.76
8	Pacific Highway	North of Hexham Bridge	Two-way	0.50	0.57	0.60	0.63	0.67

The midblock analysis results for Scenario 1 show a minimal change (<1.5%) to that of the existing analysis in Section 2.3. Where midblock capacity is exceeded in the existing analysis, it continues to be exceeded in Scenario 1. The mitigation measures recommended in the existing scenario are also recommended for this scenario (refer to Section 2.3).

4.0 NPC Mayfield Revised Analysis – Scenario 2

Assumptions associated with the revised Scenario 2 analysis, as per DPI's requirements, are as follows:

- 80 / 20 road / rail modal split (container trucks)
- **90 / 10 north / south directional split on Industrial Drive**
- **0.27% growth rate per annum on Industrial Drive**
- **Average hour traffic loading assumption**
- All other assumptions as per the report dated 20 December 2010

4.1 2024 Initial Operations Analysis

Trip generation for the 2024 Scenario 2 analysis is shown in the table below, which is essentially the same trip generation as Section 2.1.

The impact of the change to directional split is discussed in Section 3.1.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	-
General Purpose	40,857	112	5	11	-
Container Terminal	266,667	731	37	73	-
Bulk Liquid	20,481	56	3	6	-
Total	**386,719**	**1,060**	**53**	**106**	**-**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.5) and include an additional 60 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

4.1.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,529	B	0.752	17.7	325
AM peak – with mitigation	3,599	B	0.752	18.2	325
PM peak – no mitigation	3,636	B	0.679	18.0	268
PM peak – with mitigation	3,704	B	0.679	18.8	268

Mitigation for the George Street intersection in 2024 includes:

- Internal link road, whereby all container precinct associated trucks will use the George Street intersection.

4.1.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,559	B	0.830	24.8	249
AM peak – with mitigation	3,485	B	0.743	20.8	197
PM peak – no mitigation	3,637	F	1.004	79.8	645
PM peak – with mitigation	3,563	D	0.925	44.9	422

Mitigation for the Ingall Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

4.2 2034 Final Operations Analysis

Trip generation for the 2034 Scenario 2 analysis is shown in the table below, which is essentially the same trip generation as Section 2.2.

The impact of the change to directional split is discussed in Section 3.2.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	-
General Purpose	40,857	112	5	11	-
Container Terminal	444,444	1,218	61	122	-
Bulk Liquid	20,481	56	3	6	-
Total	**564,496**	**1,547**	**77**	**155**	**-**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.22) and include an additional 90 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

4.2.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,639	B	0.773	18.0	344
AM peak – with mitigation	3,758	B	0.773	18.9	344
PM peak – no mitigation	3,748	B	0.698	18.5	282
PM peak – with mitigation	3,863	B	0.730	21.1	289

Mitigation for the George Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

4.2.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,716	C	0.885	33.4	353
AM peak – with mitigation	3,596	B	0.781	21.2	209
PM peak – no mitigation	3,798	F	1.077	142.6	982
PM peak – with mitigation	3,675	E	0.967	57.1	525

Mitigation for the Ingall Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

No further additional mitigation measures are required for the revised Scenario 2.

With the mitigation measure of a link road, both intersections are predicted to operate within capacity in both 2024 and 2034.

4.3 Midblock Analysis

AM peak hour – Scenario 2 analysis

ID	Road	Location	Direction	AM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	1.02	1.06	1.16	1.08	1.22
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.81	0.84	0.96	0.86	1.03
			WB	0.74	0.76	0.80	0.78	0.84
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.46	0.53	0.57	0.59	0.65
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.56	0.87	0.91	1.17	1.23
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.44	0.59	0.60	0.72	0.74
			SB	0.71	0.95	0.98	1.17	1.21
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.35	0.61	0.64	0.91	0.95
			WB	0.30	0.52	0.53	0.78	0.79
7	F3 Freeway	South of John Renshaw Drive	NB	0.41	0.56	0.59	0.70	0.74
			SB	0.28	0.38	0.39	0.47	0.49
8	Pacific Highway	North of Hexham Bridge	Two-way	0.47	0.53	0.56	0.59	0.62

PM peak hour –Scenario 2 analysis

ID	Road	Location	Direction	PM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	0.98	1.02	1.12	1.05	1.19
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.70	0.72	0.78	0.74	0.82
			WB	0.80	0.83	0.94	0.85	1.00
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.48	0.55	0.60	0.61	0.68
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.61	0.95	0.99	1.27	1.34
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.72	0.96	0.98	1.18	1.21
			SB	0.54	0.72	0.73	0.89	0.91
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.31	0.54	0.55	0.80	0.82
			WB	0.37	0.65	0.67	0.96	1.00
7	F3 Freeway	South of John Renshaw Drive	NB	0.33	0.45	0.46	0.56	0.58
			SB	0.42	0.57	0.59	0.71	0.74
8	Pacific Highway	North of Hexham Bridge	Two-way	0.50	0.57	0.59	0.63	0.66

The midblock analysis results for Scenario 2 show an improvement in midblock capacity on Industrial Drive compared to the existing analysis in Section 2.3. This improvement is due to the lower growth rate per annum adopted for the background traffic growth on Industrial Drive and the average hourly traffic loading onto the road network as opposed to peak hour traffic loading.

The mitigation measures recommended in the existing scenario are also recommended for this scenario (refer to Section 2.3)

.

5.0 NPC Mayfield Revised Analysis – Scenario 3

Assumptions associated with the revised Scenario 3 analysis, as per DPI's requirements, are as follows:

- **90 / 10 road / rail modal split (container trucks)**
- **90 / 10 north / south directional split at Industrial Drive**
- 1% growth rate per annum on Industrial Drive
- Peak hour traffic loading assumption (50% higher than average hour)
- All other assumptions as per the report dated 20 December 2010

It should be noted that this analysis has been undertaken as a sensitivity analysis and does not represent NPC's expectations of the port operations.

5.1 2024 Initial Operations Analysis

Trip generation for the 2024 Scenario 3 analysis is shown in the table below.

A change of directional split to 90 / 10 north / south and an increase in the road modal split to 90% results in an increase of 31 vehicles (both light and heavy vehicles) travelling to/from the north at the George Street intersection and an increase of 4 vehicles (both light and heavy vehicles) travelling to/from the north at the Ingall Street intersection in 2024 (with a link road in place between the two intersections) during the peak hours.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	24
General Purpose	40,857	112	5	11	16
Container Terminal	300,000	822	41	82	123
Bulk Liquid	20,481	56	3	6	9
Total	**420,052**	**1,151**	**57**	**115**	**172**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.5) and include an additional 60 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

5.1.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,968	B	0.870	19.8	424
AM peak – with mitigation	4,087	B	0.870	20.9	424
PM peak – no mitigation	4,087	B	0.861	24.8	361
PM peak – with mitigation	4,203	B	0.861	25.7	361

Mitigation for the George Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

5.1.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,036	D	0.938	48.9	512
AM peak – with mitigation	3,914	B	0.809	20.6	236
PM peak – no mitigation	4,125	F	1.124	190.2	1,264
PM peak – with mitigation	4,002	C	0.936	40.8	459

Mitigation for the Ingall Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection; and
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane (as shown in Figure 1).

5.2 2034 Final Operations Analysis

Trip generation for the 2034 Scenario 3 analysis is shown in the table below.

A change of directional split to 90 / 10 north / south and an increase in the road modal split to 90% results in an increase of 47 vehicles (both light and heavy vehicles) travelling to/from the north at the George Street intersection and an increase of 5 vehicles (both light and heavy vehicles) travelling to/from the north at the Ingall Street intersection in 2034 (with a link road in place between the two intersections) during the peak hours.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	24
General Purpose	40,857	112	5	11	16
Container Terminal	500,000	1,370	68	137	205
Bulk Liquid	20,481	56	3	6	9
Total	**620,052**	**1,699**	**84**	**170**	**254**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.22) and include an additional 90 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

5.2.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,390	B	0.933	27.9	642
AM peak – with mitigation	4,589	C	0.974	29.5	642
PM peak – no mitigation	4,523	B	0.872	23.0	427
PM peak – with mitigation	4,716	D	0.944	47.4	651

Mitigation for the George Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

5.2.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	4,539	F	1.107	200.6	1,571
AM peak – with mitigation	4,334	B	0.859	27.8	324
PM peak – no mitigation	4,636	F	1.339	517.9	2,180
PM peak – with mitigation	4,431	E	1.000	59.2	736

Mitigation for the Ingall Street intersection in 2034 includes the following (and is the same as the existing analysis):

- Link road, whereby all container precinct associated trucks will use the George Street intersection;
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane; and
- Provision of a separate short right turn lane of 50m from the Ingall Street northern approach (as shown in Figure 1).

With the mitigation measures recommended, both intersections are predicted to operate within capacity in both 2024 and 2034.

5.3 Midblock Analysis

AM peak hour – Scenario 3 analysis

ID	Road	Location	Direction	AM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	1.02	1.17	1.32	1.29	1.51
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.81	0.93	1.11	1.03	1.28
			WB	0.74	0.85	0.91	0.93	1.03
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.46	0.53	0.60	0.59	0.68
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.56	0.87	0.94	1.17	1.27
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.44	0.59	0.60	0.72	0.75
			SB	0.71	0.95	0.99	1.17	1.23
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.35	0.61	0.65	0.91	0.97
			WB	0.30	0.52	0.54	0.78	0.80
7	F3 Freeway	South of John Renshaw Drive	NB	0.41	0.56	0.60	0.70	0.76
			SB	0.28	0.38	0.40	0.47	0.50
8	Pacific Highway	North of Hexham Bridge	Two-way	0.47	0.53	0.57	0.59	0.64

PM peak hour – Scenario 3 analysis

ID	Road	Location	Direction	PM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	0.98	1.13	1.28	1.25	1.46
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.70	0.80	0.89	0.88	1.01
			WB	0.80	0.91	1.07	1.01	1.23
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.48	0.55	0.62	0.61	0.71
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.61	0.95	1.02	1.27	1.37
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.72	0.96	0.99	1.18	1.23
			SB	0.54	0.72	0.74	0.89	0.92
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.31	0.54	0.56	0.80	0.83
			WB	0.37	0.65	0.68	0.96	1.02
7	F3 Freeway	South of John Renshaw Drive	NB	0.33	0.45	0.47	0.56	0.59
			SB	0.42	0.57	0.61	0.71	0.76
8	Pacific Highway	North of Hexham Bridge	Two-way	0.50	0.57	0.60	0.63	0.68

The midblock analysis results for Scenario 3 show a minimal change (<4%) to that of the existing analysis in Section 2.3. Where midblock capacity is exceeded in the existing analysis, it continues to be exceeded in Scenario 3.

The mitigation measures recommended in the existing scenario are also recommended for this scenario (refer to Section 2.3).

6.0 NPC Mayfield Revised Analysis – Scenario 4

Assumptions associated with the revised Scenario 4 analysis, as per DPI's requirements, are as follows:

- **90 / 10 road / rail modal split (container trucks)**
- **90 / 10 north / south directional split on Industrial Drive**
- **0.27% growth rate per annum on Industrial Drive**
- **Average hour traffic loading assumption**
- All other assumptions as per the report dated 20 December 2010

6.1 2024 Initial Operations Analysis

Trip generation for the 2024 Scenario 4 analysis is shown in the table below.

The impact of the change to directional split and modal split is discussed in Section 5.1.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	-
General Purpose	40,857	112	5	11	-
Container Terminal	300,000	822	41	82	-
Bulk Liquid	20,481	56	3	6	-
Total	**420,052**	**1,151**	**57**	**115**	**-**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.5) and include an additional 60 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

6.1.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,529	B	0.752	17.7	325
AM peak – with mitigation	3,609	B	0.752	18.3	325
PM peak – no mitigation	3,636	B	0.679	18.0	268
PM peak – with mitigation	3,713	B	0.679	19.0	268

Mitigation for the George Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

6.1.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,568	B	0.841	26.3	268
AM peak – with mitigation	3,485	B	0.743	20.8	197
PM peak – no mitigation	3,646	F	1.020	90.9	700
PM peak – with mitigation	3,563	D	0.925	44.9	422

Mitigation for the Ingall Street intersection in 2024 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

6.2 2034 Final Operations Analysis

Trip generation for the 2034 Scenario 4 analysis is shown in the table below. The impact of the change to directional split ad modal split is discussed in Section 5.2.

Precinct	Trucks per year	Trucks per day	Trucks per daytime hour	Truck movements per daytime hour	Truck movements per daytime peak hour
Bulk and General	58,714	161	8	16	-
General Purpose	40,857	112	5	11	-
Container Terminal	500,000	1,370	68	137	-
Bulk Liquid	20,481	56	3	6	-
Total	**620,052**	**1,699**	**84**	**170**	**-**

It should be noted that employee vehicles are not included in the above table but were assessed in the AECOM Transport Assessment dated December 2010 (Table 5.22) and include an additional 90 vehicle movements in peak hour. The intersection analysis and mid block analysis below include both truck and employee vehicles.

6.2.1 George Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,639	B	0.773	18.0	344
AM peak – with mitigation	3,772	B	0.773	19.1	344
PM peak – no mitigation	3,748	B	0.698	18.5	282
PM peak – with mitigation	3,876	B	0.751	21.4	283

Mitigation for the George Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

6.2.2 Ingall Street / Industrial Drive

Scenario	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Aver Delay (sec)	95% Back of Queue (m)
AM peak – no mitigation	3,732	C	0.889	35.0	367
AM peak – with mitigation	3,596	B	0.781	21.2	209
PM peak – no mitigation	3,814	F	1.092	147.1	982
PM peak – with mitigation	3,675	E	0.967	57.1	525

Mitigation for the Ingall Street intersection in 2034 includes:

- Link road, whereby all container precinct associated trucks will use the George Street intersection.

No further additional mitigation measures are required for the revised Scenario 4.

6.3 Midblock Analysis

AM peak hour – Scenario 4 analysis

ID	Road	Location	Direction	AM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	1.02	1.06	1.16	1.08	1.24
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.81	0.84	0.97	0.86	1.04
			WB	0.74	0.76	0.81	0.78	0.85
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.46	0.53	0.58	0.59	0.65
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.56	0.87	0.92	1.17	1.24
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.44	0.59	0.60	0.72	0.74
			SB	0.71	0.95	0.98	1.17	1.21
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.35	0.61	0.64	0.91	0.96
			WB	0.30	0.52	0.53	0.78	0.79
7	F3 Freeway	South of John Renshaw Drive	NB	0.41	0.56	0.59	0.70	0.74
			SB	0.28	0.38	0.39	0.47	0.49
8	Pacific Highway	North of Hexham Bridge	Two-way	0.47	0.53	0.56	0.59	0.62

PM peak hour –Scenario 4 analysis

ID	Road	Location	Direction	PM Peak				
				2010 Base	2024 Base	2024 + Dev	2034 Base	2034 + Dev
1	Industrial Drive	Mayfield, north west of Woodstock St	Two-way	0.98	1.02	1.13	1.05	1.20
2	Industrial Drive	Mayfield West, west of Werribi St	EB	0.70	0.72	0.78	0.74	0.83
			WB	0.80	0.83	0.94	0.85	1.01
3	Pacific Highway	B/w Industrial Dr and Wallsend Rd	Two-way	0.48	0.55	0.60	0.61	0.68
4	Pacific Highway	Hexham, south of Hexham Bridge	Two-way	0.61	0.95	1.00	1.27	1.34
5	New England Highway	Hexham, North of Pacific Hwy	NB	0.72	0.96	0.98	1.18	1.22
			SB	0.54	0.72	0.74	0.89	0.91
6	John Renshaw Drive	Beresfield, west of New England Hwy	EB	0.31	0.54	0.55	0.80	0.82
			WB	0.37	0.65	0.67	0.96	1.00
7	F3 Freeway	South of John Renshaw Drive	NB	0.33	0.45	0.46	0.56	0.58
			SB	0.42	0.57	0.60	0.71	0.74
8	Pacific Highway	North of Hexham Bridge	Two-way	0.50	0.57	0.59	0.63	0.66

The midblock analysis results for Scenario 4 show an improvement in midblock capacity on Industrial Drive compared to the existing analysis, despite the change in directional split and a higher proportion of container trucks travelling by road (90%). The improvement on Industrial Drive in the AM and PM peak in 2034 with development is in the order of 20% more capacity. This improvement is due to the lower growth rate per annum adopted for the background traffic growth on Industrial Drive and the average hourly traffic loading onto the road network as opposed to peak hour traffic loading.

The mitigation measures recommended in the existing scenario are also recommended for this scenario (refer to Section 2.3).

7.0 Cumulative Impacts Assessment

7.1 Background

DPI requested that NPC undertake an assessment of the cumulative traffic impact of uncommitted development land located immediately southwest of the proposed Concept Plan, namely the Intertrade Industrial Park (IIP) which is being developed by Buildev. Therefore an assessment of the cumulative traffic impact of uncommitted development was undertaken and presented in the 20 December 2010 traffic report.

Further analysis of the cumulative traffic impacts has since been requested by DPI, in which more detail of the mitigation measures recommended in the previous report is required.

The revised analysis undertaken uses the same assumptions as the previous analysis with regards to the nature of the Intertrade Industrial Park and associated land use and trip generation as well as the following assumptions:

- 80 / 20 road / rail modal split (container trucks)
- 1% growth rate per annum on Industrial Drive
- Peak hour traffic loading assumption (50% higher than average hour)
- 1.8 TEUs per truck (container loading assumption)
- Container trade is 600,000 TEUs in 2024
- 24 hours a day, 7 days a week, 365 days a year operations
- 75% truck movements in the day, 25% at night

The revised analysis however consists of a directional north/south split of 90% of NPC generated traffic travelling to and from the north and 10% to and from the south (to satisfy RTA requirements).

The following table highlights the estimated number of trips generated by the Intertrade Industrial Park, based on the draft Masterplan, compared with the number of trips expected to be generated by the Port in 2024. The assessment is conservative and based on a number of assumptions relating to the likely development of the Intertrade Industrial Park (refer to Table 6.1 of AECOM Transport Assessment dated 20 December 2010 for more detail).

A further and more detailed assessment will be required when more definitive information is available.

Land use	Estimated number of vehicles# generated in peak hour 2024
NPC Mayfield Concept Plan (2024)	219 (11%)
Intertrade Industrial Park	1,775 (89%)
Total	**1,994**

Vehicles include both truck and employee vehicles

7.2 Intersection Performance

In keeping with the assessment undertaken for the previous report, the intersections of Industrial Drive / George Street and Industrial Drive / Ingall Street have been assessed using SIDRA Intersection 3.2 for the future year scenario in 2024.

The analysis has assessed potential trips generated by the IIP development and these have then been added to the development traffic scenario (i.e. background traffic plus the NPC Mayfield development traffic). All intersection upgrades and mitigation measures recommended in the previous report are included in the intersection layouts, namely:

- Link road, whereby all container precinct associated trucks will use the George Street intersection;
- Conversion of the left turn lane of the southern approach on Ingall Street into an unsignalised slip lane; and
- Provision of an additional short right turn lane of 50m from the Ingall Street northern approach.

Intersection performance assessments for the intersections of Industrial Drive / George Street and Industrial Drive / Ingall Street for both AM and PM peaks in 2024 have been assessed and the results are summarised in the tables below.

2024 AM Peak Hour – 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)	1,819	C	1.018	36.4	293
George St (E Leg)	255	F	1.095	191.0	285
Industrial Drive (N Leg)	2,753	F	1.12	261.6	1,867
George St (W Leg)	152	F	0.447	70.6	60
All Vehicles	**4,979**	**F**	**1.120**	**169.8**	**1,748**

2024 PM Peak Hour – 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)	2,169	F	1.158	345.2	1,497
George St (E Leg)	495	F	1.156	303	883
Industrial Drive (N Leg)	2,180	F	1.168	346	1,581
George St (W Leg)	92	D	0.144	43.8	29
All Vehicles	**4,936**	**F**	**1.168**	**335.7**	**1,543**

2024 AM Peak Hour – 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)	192	C	0.303	34.6	49
Industrial Drive (E Leg)	1,646	D	1.00	45.5	377
Ingall St (N Leg)	342	F	1.073	162.5	273
Industrial Drive (W Leg)	2,442	F	1.059	177.9	1,287
All Vehicles	**4,622**	**F**	**1.073**	**123.7**	**1,287**

2024 PM Peak Hour – 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)	208	B	0.430	26.7	55
Industrial Drive (E Leg)	2,045	F	1.155	323.7	1,243
Ingall St (N Leg)	695	F	1.143	206.3	630
Industrial Drive (W Leg)	1,764	F	1.002	107.0	582
All Vehicles	**4,712**	**F**	**1.155**	**212.2**	**1,242**

The intersection of Industrial Drive / George Street is shown to operate over and at LOS F in both the AM and PM peak hour periods. During both the AM and PM peak, the largest 95th percentile queue occurs on Industrial Drive (northern leg) and is indicated in the order of 1,867 m and 1,581 m respectively.

The intersection of Industrial Drive / Ingall Street is shown to operate over capacity during the AM and PM peak and at LOS F in both the AM and PM peaks. During both the AM and PM peak, the largest 95th percentile queue occurs on Industrial Drive (western leg) and is indicated in the order of 1,287 m, while during the PM peak, a 95th percentile queue in the order of 1,243 m is indicated on Industrial Drive (eastern leg).

It is very likely that midblock capacity would also be exceeded along Industrial Drive with both Port traffic and Intertrade Industrial Park traffic present on the local road network in 2024 given the performance of the intersections and that midblock capacity on Industrial Drive is exceeded in the existing analysis (as discussed in Section 2.3).

It has been considered unnecessary to assess the 2034 scenario (full development of the port) given the analysis for 2024 shows unsatisfactory performance results at both intersections and significant upgrade works would be required.

7.3 Possible Mitigation Measures

The assessment suggests that when traffic from the proposed IIP development is included, the intersections of Industrial Drive / George Street and Industrial Drive / Ingall Street are unable to operate at an acceptable level of service in the year 2024. Under this scenario, both intersections fail with regards to performance.

To address the issues identified it is recommended that a detailed Precinct Wide Traffic Study is undertaken in consultation with relevant government agencies and the local community. The scope of such a study would include:

- determining the number trips generated by both the Port and the Intertrade Industrial Park (once more detailed information is known);
- assessing the impacts of the generated traffic on the key intersections and local road network in particular the mid block capacity of Industrial Drive;
- identifying appropriate mitigation measures to alleviate the impact of development of the Precinct on the local road network and the appropriate timing for such mitigation measures; and
- identifying an equitable apportionment of costs between the relevant parties involved namely the RTA, the Port land and Intertrade Industrial Park.

To improve the levels of service anticipated for the intersections of Industrial Drive / George Street and Industrial Drive / Ingall Street and midblock capacity on Industrial Drive, the following indicative range of potential mitigation measures are suggested to demonstrate that, with further assessment and proper planning, the identified cumulative capacity issues can be addressed.

- Implement a port wide traffic management plan which seeks to manage peak traffic movements to/from the Port so they occur outside the peak periods thereby minimising impact on the arterial road network.

- Promote the use of rail beyond the base case 80/20 road/rail modal split proposed for the port land, i.e. transport more by rail and less by road.
- 'Gate' the traffic signals at the George Street / Industrial Drive and Ingall Street / Industrial Drive intersections to provide additional green time for through traffic on Industrial Drive during peak periods.
- Promote the use of Bull Street and potentially re-align it to allow left turning traffic to enter the site more directly from Industrial Drive and avoiding the key intersections (refer to Photo 1).

1. Photo of Industrial Drive and the potential for vehicles to use Bull Street

- Create left in/left out intersection to service the Intertrade site midway between Ingall and Selwyn Streets.
- Increase turning lane lengths on Industrial Drive, George/Selwyn Street and Ingall Street so as to minimise interference with through traffic.
- Widening of Industrial Drive to provide 3 lanes of traffic in each direction. This could be undertaken within the existing road reserve (approximately 25m wide), but may require relocation of services and would be subject to further investigation (refer to Photo 2).

2. Photo of Industrial Drive and potential to create new lanes within existing road reserve

- Grade separation of one of the two intersections. The Ingall Street / Industrial Drive intersection may be the more logical option given the level difference surrounding the intersection (refer to Photo 3). There is potential to raise Industrial Drive over Ingall Street thereby reducing the impact of turning vehicles onto Industrial Drive. However, this is a long term option and further investigation would be needed into the feasibility of this option.

3. Photo of Industrial Drive looking south towards the Ingall Street intersection