10.0 Road Traffic and Transport

This chapter provides an assessment of the potential impacts of the proposed modification on road traffic and transport.

10.1 Existing Environment

10.1.1 Road Transport Infrastructure

The Southern Freeway is the primary road between Sydney and Wollongong. A number of east-west transport links, such as Picton Road and Appin Road provide access between the Southern Freeway, Hume Motorway, M5 Motorway, M7 Motorway, the Sydney metropolitan area and wider region.

The main access and haulage route to/from the Outer Harbour from the Southern Freeway is via Five Islands Road, Flinders Street and Old Port Road, with local connections via Christy Drive and Foreshore Road (refer to **Figure 10-1**). This haulage route is an approved B-double route. The characteristics of the major road network are listed below:

- Southern Freeway. The freeway is the primary arterial road link between Sydney and Wollongong and is an authorised B-double route.
- Princes Highway. The Princes Highway runs parallel with the Southern Freeway between Waterfall and Bulli Tops, where it deviates through Bulli Pass and follows the coastline to Wollongong. Bulli Pass is characterised by difficult road geometry, including tight curvatures and steep grades. This makes the use of this road difficult for heavy vehicles.
- Masters Road. This road connects Springhill Road to the Southern Freeway and is the main access route from the Inner Harbour of Port Kembla to destinations to the north and south. It has a speed limit of 80 kilometres per hour and consists of a divided carriageway with three lanes in each direction.
- Springhill Road. This road runs around the northern boundary of the Inner Harbour of Port Kembla and passes through the Port Kembla Steelworks precinct. The majority of freight accessing the Inner Harbour must use or cross this road. It has a speed limit of 80 kilometres per hour and comprises a divided carriageway with three lanes in each direction.
- Five Islands Road. This road is a major link to Port Kembla from the Southern Freeway and Princes Highway, and provides links to the both Inner and Outer Harbours via Springhill Road and Flinders Street. It consists of a divided carriageway with three lanes in each direction. The speed limit on Five Islands Road is 80 kilometres per hour.
- Flinders Street and Old Port Road. These roads provide a loop off Five Islands Road to give access to the Outer Harbour, as well as Port Kembla North. It is a two lane, undivided carriageway with one lane in each direction and is an approved B-double route. The speed limit on this route is 60 kilometres per hour.
- Foreshore Road. This road provides access to the southern extent of the Outer Harbour and the recreational boat harbour from Old Port Road. It is a two lane, undivided carriageway with one lane in each direction and is an approved B-double route.
- Christy Drive. Christy Drive leads to the Port Kembla Gateway and continues northwards to the tug berth and parts of the Port Kembla Steelworks. It has a wide, two lane undivided carriageway.
- Rail bridge over Old Port Road. This bridge is located approximately 150 metres south of Christy Drive and provides the Outer Harbour freight rail loop northern crossing of Old Port Road. It has a height restriction of 4.5 metres for road traffic (refer to **Figure 10-2**).
- At-grade railway crossing on Old Port Road. The crossing is located approximately 220 metres north of Foreshore Road. It provides the Outer Harbour freight rail loop southern crossing of Old Port Road and is controlled by railway crossing flashing signals without automated boom gates. Passive pedestrian crossing controls with a pedestrian maze are provided on the shared path at the north of the crossing (refer to **Figure 10-3**).
- Downie's Bridge. This road-over-rail bridge on Old Port Road between Foreshore Road and Darcy Road is located approximately 120 metres south of Foreshore Road.

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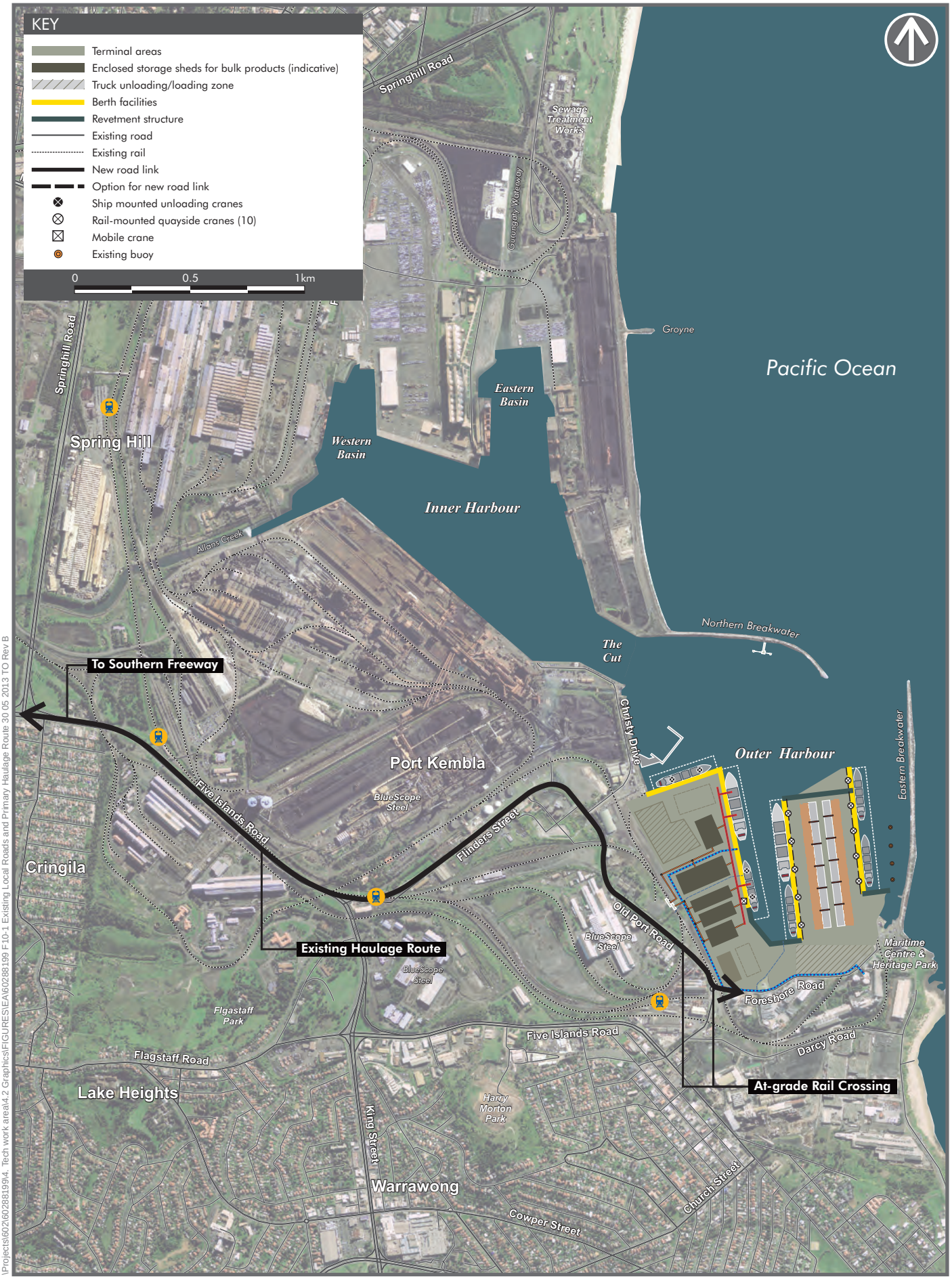

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AECOM

EXISTING LOCAL ROADS AND PRIMARY HAULAGE ROUTE

Port Kembla Outer Harbour Development
Environmental Assessment

FIGURE 10-1

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Figure 10-2 Rail bridge over Old Port Road

Figure 10-3 At-grade railway crossing on Old Port Road

10.1.2 Traffic Characteristics

A Traffic Impact Assessment was prepared in 2010 for the Concept Plan and Major Project (Stage 1) to support the previous Environmental Assessment. This assessment considered the potential impacts on the road network as a result of the operation of the Outer Harbour Development and provided recommendations for mitigation measures. Construction related impacts were also assessed for the Major Project (Stage 1).

Within that assessment, the following links/intersections were assessed:

- Southern Freeway on/off ramps.
- Five Islands Road/King Street/Wattle Street.
- Five Islands Road/Flinders Street.
- Five Islands Road/Springhill Road.
- Springhill Road/Masters Road.

By 2036 and without the proposed development, all of the assessed intersections were reported to operate satisfactorily at a Level of Service C or better, with the exception of the Springhill Road and Masters Road intersection. The Southern Freeway ramps were also considered to have sufficient capacity to accommodate the predicted 2036 traffic volumes (without the development).

To confirm if the future scenarios assessed in the previous Environmental Assessment were still valid, historical traffic data was obtained from RMS to determine the background traffic growth in Port Kembla in recent years. The daily traffic midblock traffic volumes on Five Islands Road are presented in **Table 10-1**. The data indicates that there has been no significant growth in traffic volumes during this period. As such, the models for future scenarios in the previous Environmental Assessment are considered to remain valid and are appropriate to assess the potential impacts resulting from the proposed modification.

Table 10-1 Daily traffic counts on Five Islands Road

Station ID	Location	AADT								ADT	
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
07.097	North of Flinders St	41,030	40,205	-	35,996	-	-	40,379	-	-	40,764
07.261	West of King St	12,271	-	10,311	-	9,754	-	-	-	11,238	-

Source: RMS, 2013.

Note: AADT: Annual Average Daily Traffic, ADT: Average Daily Traffic.

In September 2011, the Planning Assessment Commission granted approval for the Cement Australia CGM to be located within the multi-purpose terminal. As noted in **Chapter 3.0**, the CGM is currently under construction and is expected to commence operations in 2014.

Concurrent to this determination, the Planning Assessment Commission approved a modification to the Concept Plan and Major Project (Stage 1) approvals to recognise the traffic generated by the CGM within the approved traffic cap for the Outer Harbour Development. The revised approved traffic cap for the Outer Harbour Development with the CGM is presented in **Table 10-2**.

Table 10-2 Approved road traffic movement cap for the Outer Harbour Development

	Stage 1	Concept Plan
Approved vehicle movement cap for Outer Harbour Development (excluding the CGM)	29 vehicle movements per hour (21 trucks + 8 employees)	84 vehicle movements per hour (64 trucks + 20 employees)
CGM truck movements	42 vehicle movements per hour (42 trucks)	42 vehicle movements per hour (42 trucks)
Pro-rata reductions[3]	1.9 vehicle movements per hour (1.3 trucks + 0.5 employees)	5.4 vehicle movements per hour (4.1 trucks + 1.3 employees)
Approved vehicle movement cap for Outer Harbour Development (including the CGM)	70 vehicle movements per hour (62 trucks + 8 employees)	121 vehicle movements per hour (102 trucks + 19 employees)

10.2 Methodology

The DGRs for the proposed modification, as they relate to road traffic impacts, require the following to be addressed:

- An assessment of the capability of the existing rail network to effectively accommodate increased freight movements, including network operational and infrastructure implications of the proposed modification in the short, medium and long term.
- An assessment of the impacts associated with the upgrade of the Old Port Road level crossing.

Information from the previous Environmental Assessment (and the technical appendix), the CGM traffic impact assessment and the latest RMS count data was reviewed and has been used to assess potential traffic impacts from the proposed modification.

A meeting with RMS was held in March 2013 to inform the preparation of this assessment. After this consultation, an additional origin-destination (O-D) survey was undertaken to determine the impact of closure of a railway crossing on Old Port Road due to the proposed increase in bulk train operations. Preliminary options have been proposed for the short term and long term period, and discussed with RMS in May 2013.

10.3 Impact assessment

10.3.1 Construction

Trip generation

As noted in the previous Environmental Assessment, the highest construction traffic would be generated during Stage 1 of the Outer Harbour Development. This is primarily due to the transportation of fill required for reclamation works. Therefore, the assessment of potential construction-related impacts for the Major Project (Stage 1) would represent the worst case scenario. This is consistent with the approach taken for the previous Environmental Assessment.

It should be noted that 671,250 cubic metres of imported fill has already been delivered to the site by road as part of the initial reclamation works for the Major Project (Stage 1). An additional 70,000 cubic metres of fill would need to be imported to the Outer Harbour Development as part of the proposed modification, resulting in a total of 1.87 million cubic metres of imported fill to be delivered over three years. It is assumed that all of this fill would be transported by road as the worst case scenario.

[3] RMS calculated the traffic reduction based on the area of land taken up by the CGM project, in comparison to the entire Concept Plan.

The increase in traffic volumes that would occur as result of the proposed modification was determined by applying the following assumptions from the previous Environmental Assessment:

- Construction hours based on a five-day week (260 days per year) and 11-hour days (7 am to 6 pm).
- Truck loading assumption of 15 cubic metres per truck for fill.
- No peak hour loading for network peak (it is assumed the busiest hour for construction vehicles would occur at off-peak times)

The fill is likely to be transported in more intensive campaigns as it depends on its availability from construction site. As a worst case scenario, all fill quantities for reclamation were assumed to be transported by road to the site over three years.

The expected volume of imported fill trucks would be 15 trucks per average weekday hour, which is similar to the previous approved truck numbers during the peak period. However, the experience from the initial reclamation works occurring in the Outer Harbour indicates that the highest total volume of trucks could be about 35 trucks per hour (70 movements). Therefore, the assessment for the modification has assumed an increase of eight trucks per hour per day (or 16 movements per hour per day) as the worst case scenario. This would result in a total of 35 trucks per hour per day during the Major Project (Stage 1), as shown in **Table 10-3**.

Table 10-3 Proposed modification – construction road traffic for the Major Project (Stage 1)

	Approved	Proposed Modification	Difference
Total fill transported by road required for reclamation (Stage 1)	1,800,000 m^3 (650,000m^3 of blast furnace slag and 1,150,000 m^3 of coal wash) over 7 years	1,870,000 m^3 over 3 years[4]	An additional 70,000 m^3
Construction traffic (imported fill trucks only)	4 to 16 trucks per hour	15 trucks per hour (average)	No change
Construction traffic (imported fill and general construction trucks)	27 trucks per hour	35 trucks per hour	An additional 8 trucks per hour
Construction traffic (workforce vehicles)	11 vehicles per hour	11 vehicles per hour	No change

Source: AECOM, 2013.

The 35 trucks per hour is comparable to the number of vehicles generated by the approved operational phase of the Major Project (Stage 1) (including the CGM), which consists of 62 truck movements per hour and is well within the approved operational traffic volume generated by the Concept Plan. As the previous Environmental Assessment showed that the Major Project (Stage 1) would not result in any significant traffic impacts to the existing road network, it is reasonable to expect a similar result when including the additional traffic volumes generated by the modification. Therefore, no intersection upgrades would be required for the additional construction traffic.

Trip distribution

Initial reclamation of the central portion of the multi-purpose terminal was undertaken using uncrushed blast furnace slag produced from the nearby Port Kembla Steelworks. This resource has been subsequently exhausted and PKOPL is investigating alternative sources of fill for the remainder of the reclamation works.

The sources of additional fill could be different from the sources originally assumed in the previous Environmental Assessment, and the fill would be transported by road for the worst case scenario. The potential sources are summarised in **Table 10-4**. The traffic distribution to the local road network would be however similar to that described in the previous Environmental Assessment. The trucks are likely to access the site via Five Islands Road, Flinders Street and Old Port Road. As required by Major Project Condition C37b, a Construction Traffic Management Plan would be prepared when the fill quantities and source locations are approved.

[4] This amount excludes 671,250 cubic metres already reclaimed during the Major Project (Stage 1).

Table 10-4 Potential reclamation fill sources (indicative only)

Reclamation Fill Material	Potential Sources of Fill	Likelihood
Dredge spoil (rock and material other than rock)	Outer Harbour Development dredging	Certain
	Inner Harbour and Outer Harbour maintenance dredging	Possible
Interburden rock	Southern Illawarra quarries (Albion Park, Bass Point, Dunmore)	Possible
Quarry overburden material		
Coal washery refuse	BlueScope Steel Coal Preparation Area, Flinders Street	Possible
Tunnelling and excavation spoil	Civil construction projects within the Sydney Basin and/or Illawarra regions (e.g. WestConnex, North West Rail Link, Gerringong to Berry Bypass, Berry to Bomaderry Bypass, Maldon-Dombarton Rail Link)	Uncertain

Source: PKPC, 2013.

10.3.2 Operation

Concept Plan

The proposed modification to the Concept Plan operations includes:

- An increase in total volume of bulk cargo from 4.25 Mtpa to 16 Mtpa per year.
- An additional nine bulk trains operating per day.
- No further increases in heavy vehicle movements during operation, with all of the increase in bulk cargo throughput to be transported by train.

As a result of the modification, there would be an additional 75 employees[5] working at the Outer Harbour Development. Applying the original assumptions from the previous Environmental Assessment, this would generate an additional eight car movements during the peak hour[6]. **Table 10-5** provides a comparison of predicted traffic volumes as per the Concept Plan (as approved) and the proposed modification. It is anticipated that there would be no additional truck traffic due to the proposed modification.

[5] It is estimated that employment associated with Stage 1 would be double as a result of modification (from 75 employees to 150 employees)
[6] Assuming 10 percent of employee movements will occur during each of the peak hours, as per 2010 TIA (Significant proportion of shift workers plus staggering of start and finish times would explain this low percentage)

Table 10-5 Proposed modification – operational road traffic for the Concept Plan

	Approved	Proposed Modification	Difference in Road Traffic
Total bulk / dry goods volume	4.25 mtpa (2.125 mtpa by road, 2.125 mtpa by rail)	16 mtpa (2.125 mtpa by road, 14 mtpa by rail)	No change
Total general purpose cargo volume	2 mtpa (1.6 mtpa by road, 0.4 mtpa by rail)	2 mtpa (1.6 mtpa by road, 0.4 mtpa by rail)	No change
Total container volume	1.2 Million TEU (0.12 Million TEU by road, 1.08 Million TEU by rail)	1.2 Million TEU (0.12 Million TEU by road, 1.08 Million TEU by rail)	No change
Total train movements	21 trains per day	30 trains per day	No change in road traffic
Total truck movements (including the CGM)	102 truck movements per hour	102 truck movements per hour	No change
Total employee movements (including the CGM)	19 employee car movements per hour	27 employee car movements per hour	An additional 8 employee car movements per hour in the peak
Total vehicle movements (including the CGM)	121 vehicle movements per hour	129 vehicle movements per hour	An additional 8 employee car movements per hour in peak period

Source: AECOM, 2013.

Overall intersection performance is normally based on a Level of Service indication which depends on the average delay to motorists using the intersection. In 2036, the key intersections on the primary haulage route are expected to perform satisfactorily at Level of Service C or better with the Concept Plan (as approved), except for the Springhill Road / Masters Road intersection. This intersection was forecast to have insufficient capacity regardless of the Outer Harbour Development, as approved .The previous Environmental Assessment concluded that there is no requirement for road network upgrades to cater for the traffic generated by the Outer Harbour Development.

With only eight additional employee car movements during the peak hour, there would be a minimal traffic impact on intersections and no additional mitigation is considered necessary at these intersections.

Stage 1 (Major Project)

The proposed modification for Major Project (Stage 1) operational road traffic includes:

- An increase in total volume of bulk cargo from 4.25 Mtpa to 16 Mtpa per year.
- An additional nine bulk trains operating per day.
- No further increases in heavy vehicle movements during operation, with all of the increase in bulk cargo throughput to be transported by train.
- An additional 75 employees[7] working on site which would generate an additional eight car movements during peak hour[8].

Table 10-6 presents the difference between the approved Stage 1 and the proposed modification in regard to the operational road traffic.

[7] It is estimated that employment associated with Stage 1 would be double as a result of modification (from 75 employees to 150 employees)
[8] Assuming 10 percent of employee movements will occur during each of the peak hours, as per 2010 TIA

Table 10-6 Proposed modification - operational road traffic for Major Project (Stage 1)

	Approved	Proposed Modification	Difference in Road Traffic
Total bulk / dry goods volume	4.25 mtpa (2.125 mtpa by road, 2.125 mtpa by rail)	16 mtpa (2.125 mtpa by road, 14 mtpa by rail)	No change
Train operation for bulk good	4.3 trains per day	13 trains per day	No change in road traffic[9]
Vehicle movements (including the CGM)	70 vehicle movements per hour (62 trucks + 8 employee car movements)	78 vehicle movements per hour (62 trucks + 16 employee car movements)	An additional 8 employee car movements per hour in peak period

Source: AECOM, 2013.

The previous Environmental Assessment considered the potential impacts of the Major Project (Stage 1) at 2016, which was the year that Stage 1 was expected to be operational. This concluded that the key intersections on the primary haulage route would be expected to perform satisfactorily at Level of Service C or better. As such, it was concluded that there was no requirement for road network upgrades to cater for the traffic generated by the Major Project (Stage 1) development.

It is anticipated that there would be an additional eight car movements as a result of the modification for the Major Project (Stage 1), with no change in truck traffic from the development. Therefore, the traffic impact due to the proposed modification is expected to be minimal. No further mitigation is considered required at the key intersections.

Upgrade of the Old Port Road level crossing

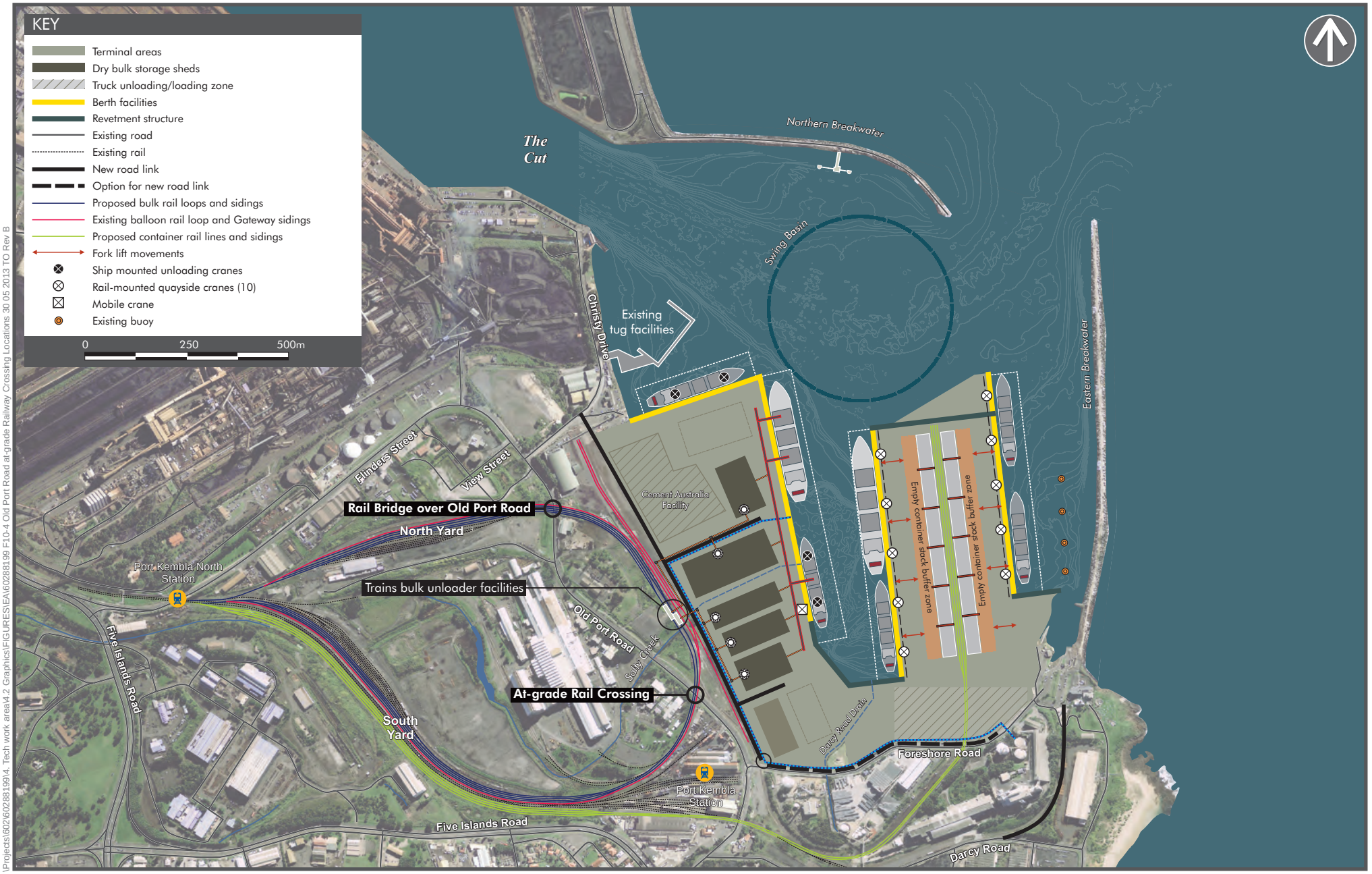
The Old Port Road rail level crossing is controlled by railway crossing flashing signals without automated boom gates, and is located approximately 220 metres north of Foreshore Road. Under the Major Project (Stage 1), PKOPL has approval to allow up to four bulk trains per day without any restriction on when the trains would arrive and depart.

A bulk train, when unloading at the multi-purpose terminal, could potentially block Old Port Road at the rail level crossing for up to 40 minutes[10]. As a result of the proposed modification, the number of train movements associated with bulk cargo would increase from four to 13 trains per day (over a 24 hour period). Consequently, the proposed modification would increase the frequency of when Old Port Road would be temporarily closed to road traffic.

The current road traffic volumes along Old Port Road are low. The growth of bulk cargo throughput to the ultimate 16 Mtpa and the associated increase in rail movements would occur progressively over time. While bulk cargo throughput volumes (and therefore train movements) at the multi-purpose terminal are low, there is potential for the effective management of road traffic impacts through the implementation of a temporary treatment option for the rail level crossing. As such, as part of the assessment for the modification, a preliminary options analysis was undertaken to identify temporary and permanent options for the short and long term. This included temporary and permanent closures of the level crossing at Old Port Road, the diversion of traffic along the future internal port road or a grade separation solution. These are discussed in detail later within this section.

After consultation with RMS, an O-D survey was undertaken over two days in March 2013 to understand the existing travel patterns on Old Port Road. This was to assist in determining the traffic impact of closing the at-grade railway crossing on Old Port Road. The location of the crossing is shown in **Figure 10-4**.

[9] Nine additional trains per day
[10] Assuming 1,000 metre train and average unloading speed of 1.6 kilometres per hour



\Projects\60216028819914. Tech work area\4.2 Graphics\FIGURES\EA\60288199 F10-4 Old Port Road at-grade Railway Crossing Locations 30 05 2013 TO Rev B

AECOM

OLD PORT ROAD RAILWAY CROSSING LOCATIONS

Port Kembla Outer Harbour Development
Environmental Assessment

FIGURE 10-4

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The O-D survey results suggested the following usage patterns:

- Approximately 45 percent of traffic recorded at the Old Port Road railway crossing was through traffic between Foreshore Road and Five Islands Road.
- Approximately 55 percent of traffic recorded was local traffic accessing the industrial premises in the area.
- Higher local traffic was observed heading north west during the nominal AM peak and heading south east during the nominal PM peak. This is likely to be local commuter traffic travelling to and from the industrial premises on Old Port Road.

Traffic count data collected in September 2012 indicated that there was no distinctive AM peak or PM peak periods on Old Port Road near the crossing with the two-way traffic remained at a similar level through the day. The average weekday two-way traffic is 2,350 vehicles and most of the traffic (85 percent) was recorded during the daytime period (6 am to 6 pm).

As indicated earlier, an unloading bulk train could potentially block Old Port Road at the railway crossing for up to 40 minutes[11]. Based on the O-D survey results, a total of approximately 110 to 125 vehicles per hour would potentially need to be diverted as a bulk train passes through the crossing.

Following the results of the O-D survey and consultation with RMS, a preliminary options assessment was conducted in order to examine options for treatment of the railway level crossing. The following sections describe the three treatment options identified for the railway level crossing and the potential traffic, air quality and noise impacts of each option (refer to **Chapter 13** for discussion of the potential land contamination issues associated with the options).

Option 1: Temporary Closure of the At-grade Crossing with Rail Scheduling

Option 1 consists of temporary closure of the at-grade crossing with rail scheduling (refer to **Figure 10-5**). As far as possible, bulk trains would be scheduled to operate at night time being 6pm to 6am (it has been assumed that 50 percent of bulk trains would operate during this period) in order to minimise the impact of the temporary closures. In addition, variable message signs/fixed signs would be provided on Five Islands Road and Old Port Road to inform motorists when the crossing is closed. Motorists could then change their route before arriving at the crossing; however, turn-around facilities and automatic boom gates would also need to be provided at the crossing. Rail signalling upgrades may also be required. Appropriate signs to communicate the closure to pedestrians and cyclists would also be required.

Traffic Impacts

Using the results of the O-D survey, the number of vehicles that would likely be diverted as a result of the temporary closure of Old Port Road was calculated based on an increasing number of bulk train movements. This was to reflect the likelihood that bulk train numbers would grow progressively over time in accordance with market demand. In doing so, it is assumed that 50 percent of trains would arrive during daytime and 50 percent during night time. An appropriate gap between the arrival of trains would occur to ensure trains do not block the at-grade crossing in consecutive hours. There are rail sidings proposed on entry to the loop to allow trains to be held temporarily before unloading commences and the trains block the at-grade crossing.

The impact associated with different train movements is provided in **Table 10-7**. During the initial stage (with two trains during the daytime period), approximately 250 vehicles per day would be required to be diverted to Five Islands Road and up to 850 vehicles per day at the ultimate completion of the Major Project (Stage 1) (with 7 trains during the daytime period). Based on 2011 traffic count data, the segment of Five Islands Road east of King Street has a traffic volume of 9,565 vehicles per day and therefore the diversion as a result of the Major Project (Stage 1) would represent a 3 to 8 percent increase in daily traffic. No traffic count data was available for the section of Five Islands Road between King and Flinders Streets, although it is likely that daily traffic would be heavier in this section. Therefore, diverted traffic would be a smaller percentage of daily traffic in this section of Five Islands Road.

[11] Assuming 1,000 metre train and average unloading speed of 1.6 kilometres per hour

Table 10-7 Estimated number of vehicles to be diverted due to the railway crossing closure

No. of trains per day	No. of trains during daytime (6am to 6pm)	Number of vehicles affected			
		AM Peak (6-9am)	Midday (9-3pm)	PM Peak (3-6pm)	Total
4	2	-	120 for 1 train (55 Through, 65 Local)	125 for 1 train (55 Through, 70 Local)	245 (110 Through, 135 Local)
8	4	110 for 1 train (40 Through, 70 Local)	240 for 2 trains (110 Through, 130 Local)	125 for 1 train (55 Through, 70 Local)	475 (205 Through, 270 Local)
12	6	110 for 1 train (40 Through, 70 Local)	480 for 4 trains (220 Through, 260 Local)	125 for 1 train (55 Through, 70 Local)	715 (315 Through, 400 Local)
13	7	110 for 1 train (40 Through, 70 Local)	480 for 4 trains (220 Through, 260 Local)	250 for 2 trains (110 Through, 140 Local)	840 (370 Through, 470 Local)

Notes:
1. Based on 2013 OD survey results on Old Port Road.
2. Same number of trains is expected to operate during the night time (6pm to 6am). However, the number of vehicles affected would be significant lower (approximately 15 percent of daytime traffic).
3. Assumes 50 percent of bulk trains would arrive during daytime period (6am to 6pm). It is not possible to run all the trains during night time only, because of the rail network constraint.
4. While the rail crossing is closed, traffic would be diverted to Five Islands Road.

The traffic impact of the temporary closure of the at-grade crossing on the mid-block capacity on Five Islands Road was assessed along with the intersection performance at the following two locations:

1. Five Islands Road / King Street / Wattle Street
2. Five Islands Road / Flinders Street

Table 10-8 and **Table 10-9** present the results of the mid-block capacity analysis and intersection performance with and without the temporary railway crossing closure. The results indicate:

- A slight increase in the volume/capacity ratio on Five Islands Road, but still well within capacity.
- The intersections on Five Islands Road are still expected to operate satisfactorily (with 125 additional diverted vehicles per hour) in terms of degree of saturation, average delay and level of service.

Therefore, no significant traffic impacts to the wider road network are expected if the crossing is closed temporarily. No intersection upgrades would be required as a result of the diverted traffic.

Table 10-8 Mid-block capacity with railway crossing closure on Old Port Road

Location	Without Railway Crossing Closure				With Railway Crossing Closure			
	Peak flow direction	Peak direction flow (veh/h)	Number of lanes	VCR	Peak flow direction	Peak direction flow (veh/h)	Number of lanes	VCR
AM Peak								
Five Islands Road, East of Lake Avenue	NB	2,231	3	0.62	NB	2,298	3	0.64
	SB	1,951	3	0.54	SB	1,995	3	0.55
Five Islands Road, West of Darcy Road	EB	329	3	0.09	EB	373	3	0.10
	WB	234	3	0.07	WB	285	3	0.08
PM Peak								
Five Islands Road, East of Lake Avenue	NB	2,012	3	0.56	NB	2,059	3	0.57
	SB	2,364	3	0.66	SB	2,443	3	0.68
Five Islands Road, West of Darcy Road	EB	249	3	0.07	EB	328	3	0.09
	WB	361	3	0.10	WB	408	3	0.11

Note:
1. Based on 2016 modelling volumes from the previous Environmental Assessment (AECOM, 2010)
2. No modelling volume is available on Five Islands Road at the east of Flinders Street. The closest location is to the east of Lake Avenue.
3. VCR – Volume Capacity Ratio. A VCR of one represents full capacity at the identified mid-block location

Table 10-9 Intersection performance summary with railway crossing closure

Location	Without Railway Crossing Closure			With Railway Crossing Closure		
	Degree of Saturation	Avg Delay (Sec / Vehicle)	Level of Service	Degree of Saturation	Avg Delay (Sec / Vehicle)	Level of Service
AM Peak						
Five Islands Road / King Street / Wattle Street	0.75	27.3	B	0.77	28.7	C
Five Islands Road / Flinders Street	0.48	7.4	A	0.49	7.1	A
PM Peak						
Five Islands Road / King Street / Wattle Street	0.76	29.2	C	0.73	30	C
Five Islands Road / Flinders Street	0.61	10.2	A	0.67	10.2	A

Note:
1. Based on 2016 intersection modelling results from the previous Environmental Assessment (AECOM, 2010) and SIDRA model outputs with diverted traffic.
2. Improved degree of saturation with diverted traffic at Five Islands Road / King Street intersection and improved average delays at Five Islands Road / Flinders Street intersection are due to an assumed change in optimised signal timings in the SIDRA modelling.

The additional travel time for a diverted vehicle would depend on the origin and route choice of that vehicle. Analysis based on travel at free flow speed with intersection delays shows that most of the vehicles using Old Port Road as a through route would experience a similar travel time if diverted. Vehicles accessing local industrial premises on Old Port Road could experience an additional one to four minutes travel time depending on their origin and final destination. This preliminary analysis is indicative only and further investigation using travel time surveys would be undertaken at a later stage.

Downie's Bridge on Old Port Road (between Foreshore Road and Darcy Road) is a road-over-rail bridge on an approved B-double route. When the at-grade crossing is temporarily closed, part of the diverted traffic, mainly to and from Foreshore Road and the properties south east of the crossing, would divert to use Downie's Bridge. Other impacted through and local traffic currently using Downie's Bridge would be diverted to Five Islands Road or Flinders Street which would reduce the traffic volume on the bridge. Overall, the net increase in diverted traffic is not expected to result in significant traffic impacts to the bridge.

There is a 4.5 metre height restriction at the rail overbridge at Old Port Road which is located to the north of the at-grade crossing and south of Christy Drive. The southern approach using the at-grade crossing is currently used for over-dimensioned vehicles (overheight or oversized) accessing the properties south of the rail overbridge. Over-dimensioned vehicles needing to access properties to the south of the rail overbridge would be required to wait at the at-grade crossing during temporary closure.

A shared pedestrian/cycle path is currently provided along the northern side of Old Port Road. Any closure of the crossing would have impacts to the existing cyclists and pedestrians. When the crossing is temporarily closed, cyclists could potentially use Five Islands Road and Military Road as an alternative route. Pedestrians could also use the existing footpaths along Darcy Road and Five Islands Road. This would result in additional travel time and distance travelled for pedestrians and cyclists. The final solution for pedestrian and cyclists would need to be determined alongside the selection of an option for treatment of the rail level crossing. This includes communication of the closure to these users.

Air Quality Impacts

Temporary closure of the at-grade crossing would result in a minor increase in air emissions associated with traffic stopping and starting if they wait for the crossing to open or if they use the turn-around facility. There is also potential for a slight increase in air impacts at residences close to Five Islands Road as a result of traffic being diverted from Old Port Road to Five Islands Road. The UK guidance document *Local Air Quality Management: Technical Guidance LAQM.TG(09)* (Department for Environment, Food and Rural Affairs, 2011) provides that an air quality assessment is only required if roads with more than 10,000 vehicles per day are expected to experience a 'large' (i.e. greater than 25 percent) increase in traffic. The increase in traffic volumes on Five Islands Road, as a result of the temporary closure of the rail crossing, is expected to be between three to eight percent. This is significantly lower than the 25 percent threshold outlined by the *Local Air Quality Management: Technical Guidance LAQM.TG(09)* (Department for Environment, Food and Rural Affairs, 2011) and therefore an air quality assessment of the additional diverted traffic is not warranted.

Noise Impacts

Train horns are currently, and would continue to be, sounded at night in three locations within the Port Kembla balloon loop. Horns are currently used as trains:

- cross the Old Port Road at-grade crossing
- cross Foreshore Road
- re-join the main line at Flinders Street Bridge.

The proposed temporary closure of the at-grade crossing with rail scheduling would result in continued noise levels from train horns and noise emissions associated with the use of boom gate bells. The use of boom gate bells and train horns would occur more frequently as the number of trains using the bulk loops increases over time. There would be a minor increase in noise emissions associated with traffic using the turn-around facilities, however, this is unlikely to be discernible at nearby residential receivers. Increases in noise levels due to traffic diverted on to Five Islands Road would be imperceptible at nearby residential receivers located along the road particularly at night-time (i.e. less than 1 dB(A) increase in noise levels).

Option 2: Permanent Closure of the At-grade Crossing

Option 2 consists of permanent closure of the at-grade crossing (refer to **Figure10-6**). Locked gates and turn-around facilities would be installed on Old Port Road either side of the railway line. Traffic would be diverted to Five Islands Road (through traffic) or the New Port Access Road (internal road to run between Christy Drive and Foreshore Road) (local traffic). Fixed signs would be provided on Five Islands Road and Old Port Road to inform motorists that the crossing is closed. Allowance to open the crossing at times to allow over-dimensioned vehicles access from the south would need to be maintained due to the height restriction of the rail bridge north of the level crossing.

Traffic Impacts

Traffic impacts associated with the permanent closure option (Option 2) would be similar in some respects to Option 1 except that:

- The diversion of traffic would occur over the whole day rather than for limited periods during the day.
- There would be less impact on local traffic as it would be redirected via the new port access road (a shorter route) rather than via Five Islands Road (a longer route).
- There would be more impact on through traffic as all through traffic over the day would be diverted to Five Islands Road rather than traffic for limited periods during the day.

As discussed previously, there is a 4.5 metre height restriction at the rail overbridge at Old Port Road which restricts use by over-dimensioned vehicles (overheight or oversized) accessing the properties south of the rail overbridge. Over-dimensioned vehicles seeking to access properties north of the rail overbridge do so using Flinders Street via Five Islands Road, and these properties would be unaffected by permanent closure of the rail crossing. Over-dimensioned vehicles seeking to access properties south of the rail bridge do so using Five Islands Road and Old Port Road. These properties south of the rail crossing on Old Port Road would potentially be impacted by the permanent closure of the rail crossing.

PKOPL would commit to maintaining access to the crossing for these over-dimensioned vehicles, should the crossing be permanently closed. Access by over-dimensioned vehicles would need to be prearranged with PKOPL and either PKOPL or the rail operator would unlock the gates at the crossing to grant access. A push button indicator could be installed at the crossing for use by vehicle operators to inform PKOPL or the rail operators of their arrival at the crossing. As over-dimensioned vehicles normally require a specific traffic management plan, this arrangement to maintain access could be incorporated within the specific traffic management plan for these journeys.

Permanent closure of the crossing would impact the cyclists and pedestrians who currently use the shared pedestrian/cycle path on the northern side of Old Port Road. The solution for maintaining pedestrian and cyclist access would need to be determined alongside development of the option for treatment of the rail level crossing. This includes communication of the closure to these users.

Air Quality Impacts

The air quality impacts associated with permanent closure of the at-grade crossing would be similar to the impacts associated with Option 1, resulting in a minor increase in air emissions. Permanent closure of the at-grade crossing has the advantage of enabling local traffic to use the New Port Access Road as compared to Option 1 which would result in local traffic waiting for the crossing to open or travelling on a less direct route via Five Islands Road. Once local motorists become accustomed to permanent closure of the crossing it is anticipated that few motorists would use the turn-around facilities. This option would potentially result in minor air emissions associated with over-dimensioned vehicles idling at the crossing while waiting for the crossing to be opened.

Noise Impacts

Noise impacts associated with permanent closure of the at-grade crossing would be similar to the impacts associated with Option 1, except that there would be reduced noise from train horns and boom gate bells because the crossing would only be opened at times to allow over-dimensioned vehicles access from the south. Once local motorists become accustomed to permanent closure of the crossing it is anticipated that there would be reduced use of, and noise from, the turn-around facilities. Permanent closure of the at-grade crossing has the advantage of enabling local traffic to use the New Port Access Road as compared to Option 1, which would result in local traffic waiting for the crossing to open or travelling on a less direct route via Five Islands Road. This would result

in reduced noise levels for residential receivers on Five Island Road. This option would potentially result in noise emissions from over-dimensioned vehicles idling at the crossing while waiting for the crossing to be opened, however, pre-scheduling access by these vehicles ought to reduce the wait/idle time and therefore the noise emissions.

Option 3: Grade Separation of the At-grade Crossing (Road over Rail)

Option 3 consists of a longer term option of grade separating the at-grade crossing (refer to **Figure 10-7**). This would require construction of bridge infrastructure such that Old Port Road and the shared pedestrian/cycle path would pass over the rail line. The bridge would need to have a clearance of at least 6 metres and would have 80 to 100-metre-long ramps on each approach. The ramps would most likely be constructed on earthen embankments supported by concrete abutments. This option would have greater capital cost compared to Options 1 and 2.

Traffic Impacts

Traffic flow and pedestrian and cycle access would be disrupted temporarily during construction and would need to be managed appropriately. However, once operational this option would maintain current traffic flows and be preferable in terms of pedestrian and cycle access, and result in reduced travel time and distance compared to Options 1 and 2. This option would also have an improved safety outcome compared to the current at-grade arrangement.

This option would require further investigation and design with consultation with RMS and adjoining landowners, who may be impacted by the physical bridge infrastructure and ramps. There is potential that property acquisition may be required to construct the bridge and that access to properties adjacent to the bridge may be impacted.

Air Quality Impacts

There is potential for dust emissions to occur during construction of the bridge infrastructure. Dust emissions would be controlled by covering truck loads of imported fill, road sweeping, enforcing vehicle speed limits, and using truck washes and shaker grids at site exits.

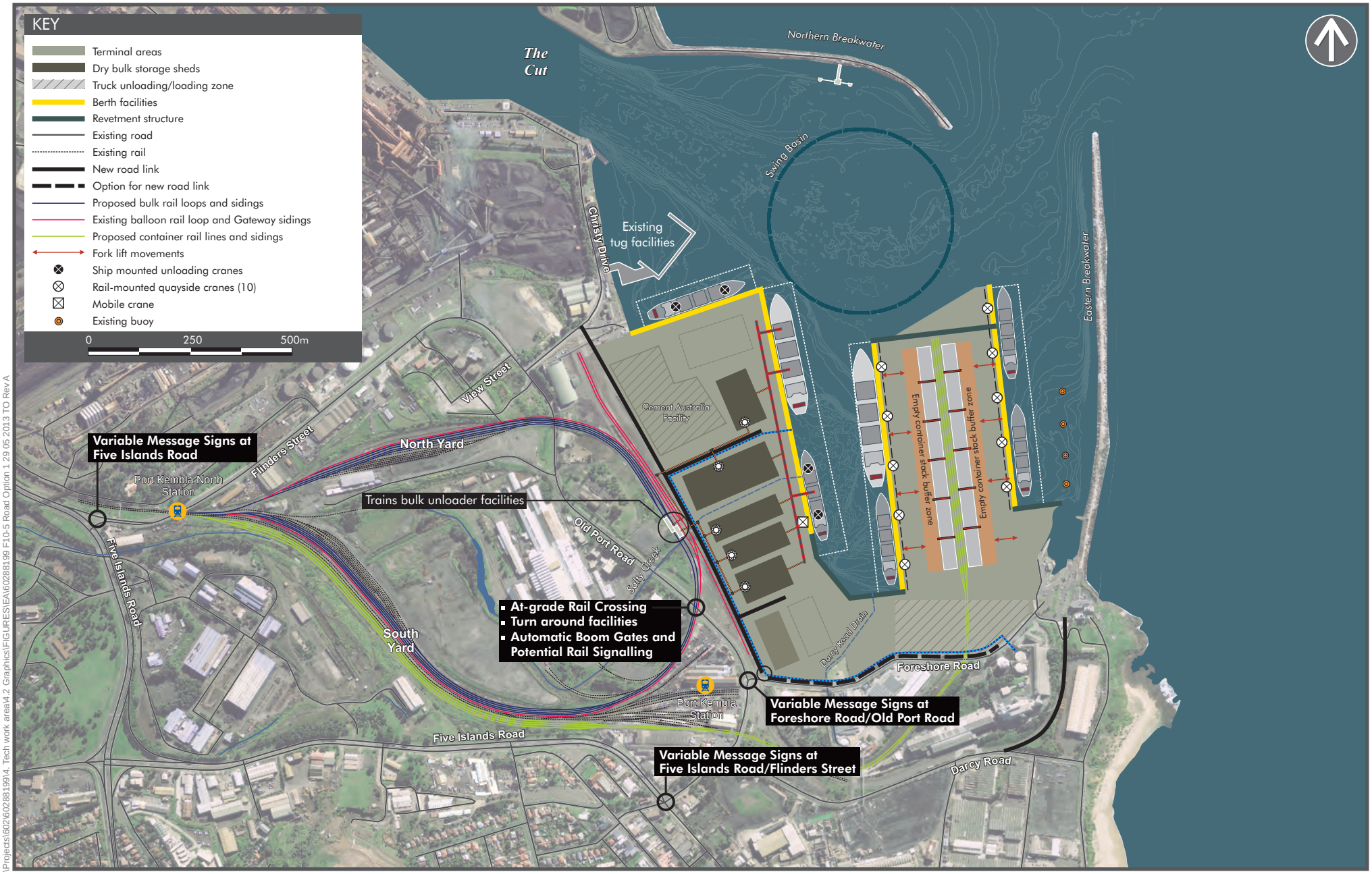
Once operational, this option would maintain current traffic flows and any changes in air emissions would be negligible from existing levels. Grade separation of the at-grade crossing would result in a minor increase in air emissions mostly from heavy vehicles accelerating up the grade.

Noise Impacts

Short-term noise impacts may be experienced by nearby residential receivers during the construction phase.

Once operational, this option would maintain current traffic flows on Old Port Road and compared to Options 1 and 2 it would not generate increased traffic noise from traffic diverted to Five Islands Road. Compared to Options 1 and 2, this option would not require the use of boom gates and therefore there would be no noise from boom gate bells or train horns.

Grade separation of the at-grade crossing would result in an elevation of traffic noise sources and increases in noise levels due to acceleration and breaking as heavy vehicles approach and depart the bridge. However this is unlikely to be discernible at nearby residential receivers which are located in the residential area to the south of Five Islands Road, given the separation distance from the grade-separated crossing and the existing background traffic noise created by vehicles using Five Islands Road.



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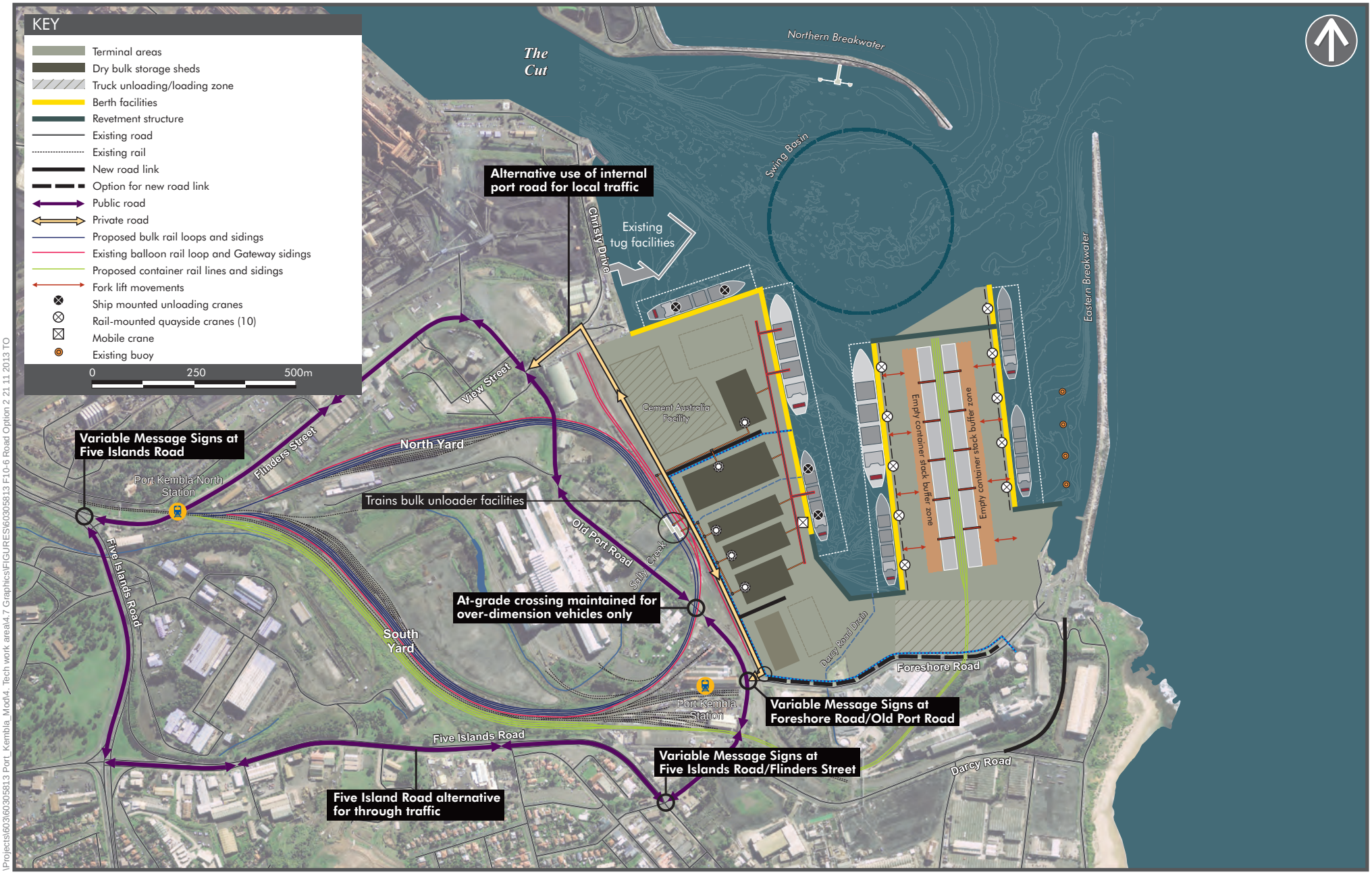
AECOM

ROAD OPTION 1: TEMPORARY CLOSURE OF AT-GRADE CROSSING WITH RAIL SCHEDULING

Port Kembla Outer Harbour Development
Environmental Assessment

FIGURE 10-5



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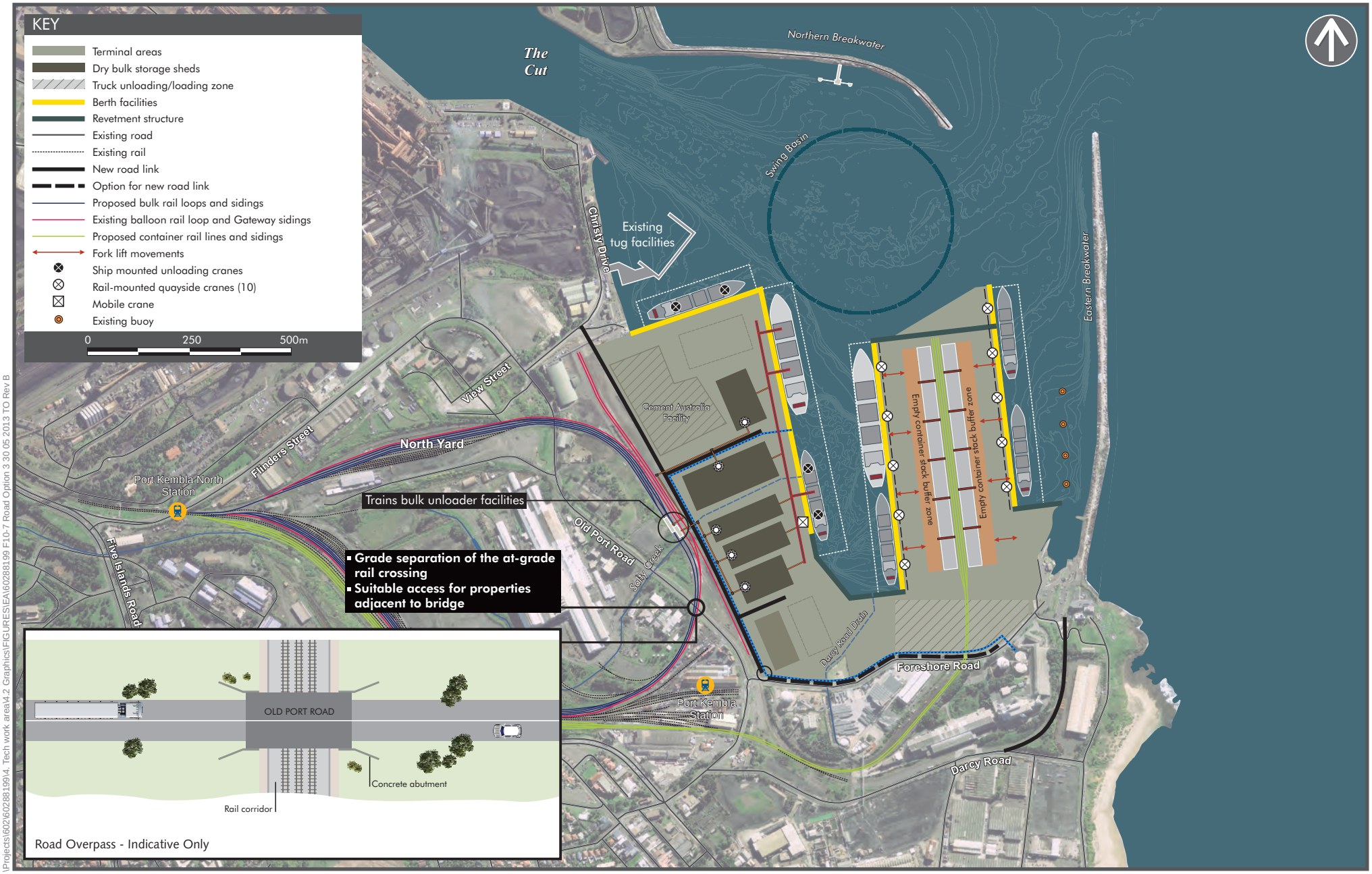
AECOM

ROAD OPTION 2: PERMANENT CLOSURE OF THE AT-GRADE CROSSING WITH DIVERSIONS

Port Kembla Outer Harbour Development
Environmental Assessment

FIGURE 10-6



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AECOM

ROAD OPTION 3: GRADE SEPARATION OF THE AT-GRADE CROSSING (ROAD OVER RAIL)

Port Kembla Outer Harbour Development
Environmental Assessment

FIGURE 10-7

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These options were presented and discussed with RMS. RMS has provided preliminary feedback on the identified options (as summarised in **Chapter 6.0**). RMS has not ruled its consideration of the identified options, subject to further investigation and extensive consultation as part of the modification process.

The matters relating to the potential impacts of the redistributed traffic during AM and PM peaks, Downie's Bridge and identification of options for overcoming the height restrictions at the rail overbridge, are discussed earlier in this section. However, it is recognised that additional investigations (including design work) and consultation with relevant stakeholders is needed before a preferred option(s) can be selected by PKOPL. This is discussed further in **Section 10.4.2**.

10.4 Mitigation and Management Measures

10.4.1 Construction

As identified in **Section 4.4**, a modification to Major Project Condition C15 is sought to reflect the proposed increase in the number of permitted construction trucks per hour. This would increase from 27 trucks per hour to 35 trucks per hour, with the equivalent increase to the total number of vehicles per hour specified in the condition (from 38 to 46 vehicles per hour, when including traffic movements associated with construction workers).

To manage the proposed increase, the existing consent conditions related to construction traffic are considered appropriate for the proposed modification as the additional construction traffic generated are not likely to result in any significant traffic impacts. The following mitigation and management measures from the existing consent conditions would still be implemented:

- The total number of construction vehicles accessing the site would be monitored so as not to exceed the approved traffic volume limits (Major Project Condition C15).
- When the source of fill/spoil material is confirmed, a further assessment would be undertaken to consider the impact on the road performance, if the number of trucks transporting the fill would exceed the approved volumes (Major Project Condition C16).
- A Construction Traffic Management Plan would be prepared to address the issues such as haulage routes to and from the site, performance measures to minimise traffic impacts and work practices on site (Major Project Condition C37b).

10.4.2 Operation

Stage 1 (Major Project)

As identified in **Section 4.4**, a modification to Condition B3 of the Major Project (Stage 1) approval is sought to reflect the proposed increase in the number of employee movements per hour during the peak from 27 vehicles to 35 vehicles per day.

The mitigation measures in the previous Environmental Assessment and approved consent conditions for the Major Project (Stage 1) include:

- The total number of operational vehicles accessing the site would be monitored so as not to exceed the approved traffic volume limits (Major Project Condition B3).
- An Operation Traffic Management Plan would be prepared to outline measures to minimise traffic network impact (Major Project Condition D7c).

Old Port Road Level Crossing

To provide for the requirements of the Outer Harbour Development while minimising impact on road traffic, particularly traffic associated with localised movements within Port Kembla, a staged approach could be undertaken. In the short to medium term, the crossing could be temporarily closed in conjunction with time management of trains (Option 1). As demonstrated in the assessment undertaken in **Section 10.3.2**, it is possible to allow up to four trains to operate from 6 am to 6 pm per day without unacceptable impacts on the assessed intersections. It is also noted that this is equivalent to the number of trains operating in the existing Major Project approval for Stage 1. When more than four trains operate during these daytime hours in the longer term, the traffic could be diverted to the New Port Access Road, as a temporary or interim arrangement (Option 2) or the crossing grade separated (Option 3).

As discussed earlier, PKOPL would undertake further investigations, design work and consultation to determine the preferred crossing treatment option(s) and the threshold for transitioning from a short-term option to a permanent option (if a transition is required). The additional investigations would preparation of concept designs for the short-listed treatment options, and consultation with locally affected businesses, RMS and Transport for NSW. Where diversions would occur (temporarily or permanently), more detailed travel time surveys cost-benefit evaluations would also be undertaken to inform the preferred crossing treatment option(s).

The preferred option(s) and any transition threshold would be selected in consultation with RMS and Transport for NSW. PKOPL would implement the selected option(s) as required and nominated through this process. However, a selected option (be it a temporary or permanent option) would be implemented and operational prior to the commencement of rail cargo movements associated with Stage 1 of the Outer Harbour Development.

It is also acknowledged that any preferred option(s) that requires road infrastructure changes, in particular a level crossing, would require the agreement of RMS, as the asset owner and the relevant authority under the *Roads Act 1993*.

Concept Plan

As identified in **Section 4.4**, a modification to Condition 2.7 of the Concept Plan is sought to reflect the proposed increase in the number of employee movements per hour during the peak.

The mitigation and management measures identified in the approved TIA remain relevant for the modification, as the additional operational traffic is minimal when comparing to the predicted traffic volumes within the previous Environmental Assessment. The mitigation measures in the previous Environmental Assessment and approved consent conditions for the Concept Plan include:

- Flinders Street/Old Port Road may require enhancement, such as improvements to pavement strength and turning radii for long vehicles.
- The total number of operational vehicles accessing the site should be monitored so as not to exceed the approved traffic volume limits (Concept Plan approval Conditions 2.4b, 2.7 and 2.8).
- An updated traffic and transport assessment should be prepared in the future to address the traffic and transport impacts of Stage 2 and Stage 3 (Concept Plan approval Condition 2.5f).

10.5 Conclusion

The proposed modification would slightly increase the number of construction-related trucks from 27 trucks per hour to 35 trucks per hour. This is comparable to the number of vehicles generated by the approved operational phase of the Stage 1 development (including the CGM) and well within the approved traffic volume generated at the ultimate completion of the Concept Plan. As the previous approved traffic assessment showed that the Major Project (Stage 1) development would not result in any significant traffic impacts to existing road network, it is reasonable to expect a similar result with the inclusion of proposed modification construction traffic. Therefore, no intersection upgrades would be required for the additional construction traffic.

For both the Major Project (Stage 1) and Concept Plan operational scenarios, it is anticipated that there would be an additional eight car movements, with no change in truck traffic, as a result of the proposed modification. Therefore, the traffic impact with the proposed modification is expected to be similar to that assessed in the previous Environmental Assessment.

As the bulk train operations are expected to increase from four to 13 trains per day in the Major Project (Stage 1) due to the modification, Old Port Road could be blocked at the at-grade railway crossing for up to 40 minutes at a time to unload each bulk train. Approximately 110 to 125 vehicles per hour on Old Port Road could potentially be diverted. The intersections and mid-block capacity on Five Islands Road are expected to operate satisfactorily with this traffic, if diversions are implemented.

The growth of bulk cargo throughput to the ultimate 16 Mtpa and the associated increase in rail movements would occur progressively over time. While bulk cargo throughput volumes (and therefore train movements) at the multi-purpose terminal are low, there is potential for the effective management of road traffic impacts through the implementation of a temporary treatment option for the rail level crossing. As such, preliminary options for the level crossing were identified and discussed with RMS. This included temporary and permanent closures of the level crossing at Old Port Road, the diversion of traffic along the future internal port road or a grade separation solution. In the short to medium term, the crossing could be temporarily closed in conjunction with time management of trains as well as use of traffic management plans for over-dimensioned vehicles. It is reasonable

to allow up to four trains to operate from 6 am to 6 pm per day, which is equivalent to the number of trains in the permitted under the Major Project (Stage 1) approval.

At this stage no preferred option(s) for the treatment of the rail level crossing on Old Port Road have been identified. However, a preliminary assessment indicates that the related environmental impacts associated with each option are reasonable and can be managed by adopting sensible mitigation measures. The selection of a preferred option(s) would be determined prior to the commencement of construction of the first multi-purpose berth and would include consideration of:

- anticipated growth in bulk trade from port customers
- associated growth in rail traffic using the Outer Harbour rail loop
- any change in road traffic conditions on Old Port Road or the surrounding road network
- the outcomes of consultation with directly affected businesses, RMS and Transport for NSW
- a cost/benefit analysis of the various options
- further investigation of environmental issues (if and where required).

The selected option (be it a temporary or permanent option) would be implemented and operational prior to the commencement of rail cargo movements associated with Stage 1 of the Outer Harbour Development.

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