

Stratford Mining Complex Statement of Environmental Effects

APPENDIX F

ROAD TRANSPORT ASSESSMENT



Stratford Mining Complex Modification 1 Road Transport Assessment

Client // Yancoal Australia Ltd
Office // NSW
Reference // 16S9048000
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Stratford Mining Complex

Modification 1

Road Transport Assessment

Issue: A 04/08/16

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GTA Consultants Office: NSW

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Table of Contents

1. Introduction	1
2. Stratford Extension Project and Modification	2
2.1 Stratford Extension Project	2
2.2 The Modification	4
3. Background Traffic Conditions	5
3.1 Road Network	5
3.2 Traffic Volumes	6
3.3 Road Safety	6
3.4 Changes to Road Transport Environment	7
3.5 Background Traffic Growth	11
4. Modification Traffic Conditions	12
4.1 Modification Construction Traffic	12
4.2 Modification Operational Traffic	13
4.3 Modification Traffic Impacts on Operating Conditions	15
4.4 Wenham Cox Road and Haul Road Intersection	16
5. Conclusion	22

Figures

Figure 2-1: Regional Location	3
Figure 4-1: Wenham Cox Road and Private Haul Road Intersection	18

Tables

Table 3.1: Average Weekday Surveyed Traffic Wenham Cox Road April-May 2016	6
Table 3.2: Reported Crashes (1 July 2010 to 30 June 2015)	7
Table 3.3: Average Weekday Stratford Extension Project Traffic (vehicles per day)	8
Table 3.4: Average Weekday Gloucester Gas Project Traffic (vehicles per day)	9
Table 3.5: Average Weekday Duralie Extension Project Traffic (vehicles per day)	10
Table 3.6: Daily RHCP Traffic Allowance in Stratford Extension Project Assessment (vehicles per day)	10
Table 3.7: Daily Amended RHCP Traffic (vehicles per day)	11
Table 4.1: Average Daily Private Haul Road Construction Traffic	12
Table 4.2: Daily Modification Construction Traffic (vehicles per day)	13

Table 4.3:	Proposed ROM Coal Truck Movements from the RHCP to the SMC	14
Table 4.4:	Daily Modification Peak Operational Traffic (vehicles per day)	15
Table 4.5:	Key changes in Contributions of Major Projects to Daily Traffic (vehicles per day)	16
Table 4.6:	Traffic Volumes at Intersection of Wenham Cox Road and Private Haul Road	17

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1. Introduction

This report has been prepared on behalf of Yancoal Australia Ltd (Yancoal) to present the findings of an assessment of the road transport implications of the proposed modification to the approved Stratford Extension Project (herein referred to as the Stratford Mining Complex [SMC]).

Yancoal is seeking a modification (the Modification) to Development Consent (SSD-4966) for the Project under Section 96(2) of the New South Wales (NSW) *Environmental Planning & Assessment Act, 1979*. The Modification relates to proposed interactions between the SMC and the Rocky Hill Coal Project (SSD-5156) (RHCP), a proposed open cut mining operation owned by Gloucester Resources Ltd (GRL). The proposed interactions principally relate to the processing and transportation of run-of-mine (ROM) coal from the RHCP using infrastructure at the SMC.

This assessment considers the implications of the Modification on the operation of the road network, and reviews the requirements for road works or upgrades associated with the Modification.

2. Stratford Extension Project and Modification

2.1 Stratford Extension Project

The SMC is an open cut coal operation located approximately 100 kilometres (km) north of Newcastle, NSW, in the Gloucester Basin (Figure 2-1). Yancoal owns both the SMC and the nearby Duralie Coal Mine, which is located approximately 20 km south of the SMC. ROM coal mined at the Duralie Coal Mine is transported on the North Coast Railway to the SMC, where it is unloaded and processed at the Coal Handling and Preparation Plant (CHPP).

Consent was granted for the Stratford Extension Project on 29 May 2015, and permits mining operations at the SMC until 31 December 2025. The Stratford Extension Project will operate 24 hours per day, and extract up to 2.6 million tonnes per annum (Mtpa) of ROM coal and processing of up to 5.6 Mtpa of ROM coal. All product coal will be transported from the site by rail, with no more than six laden trains permitted to leave the site per 24-hour period and no more than two laden trains permitted to leave the site during any night (all excluding the Duralie shuttle train).

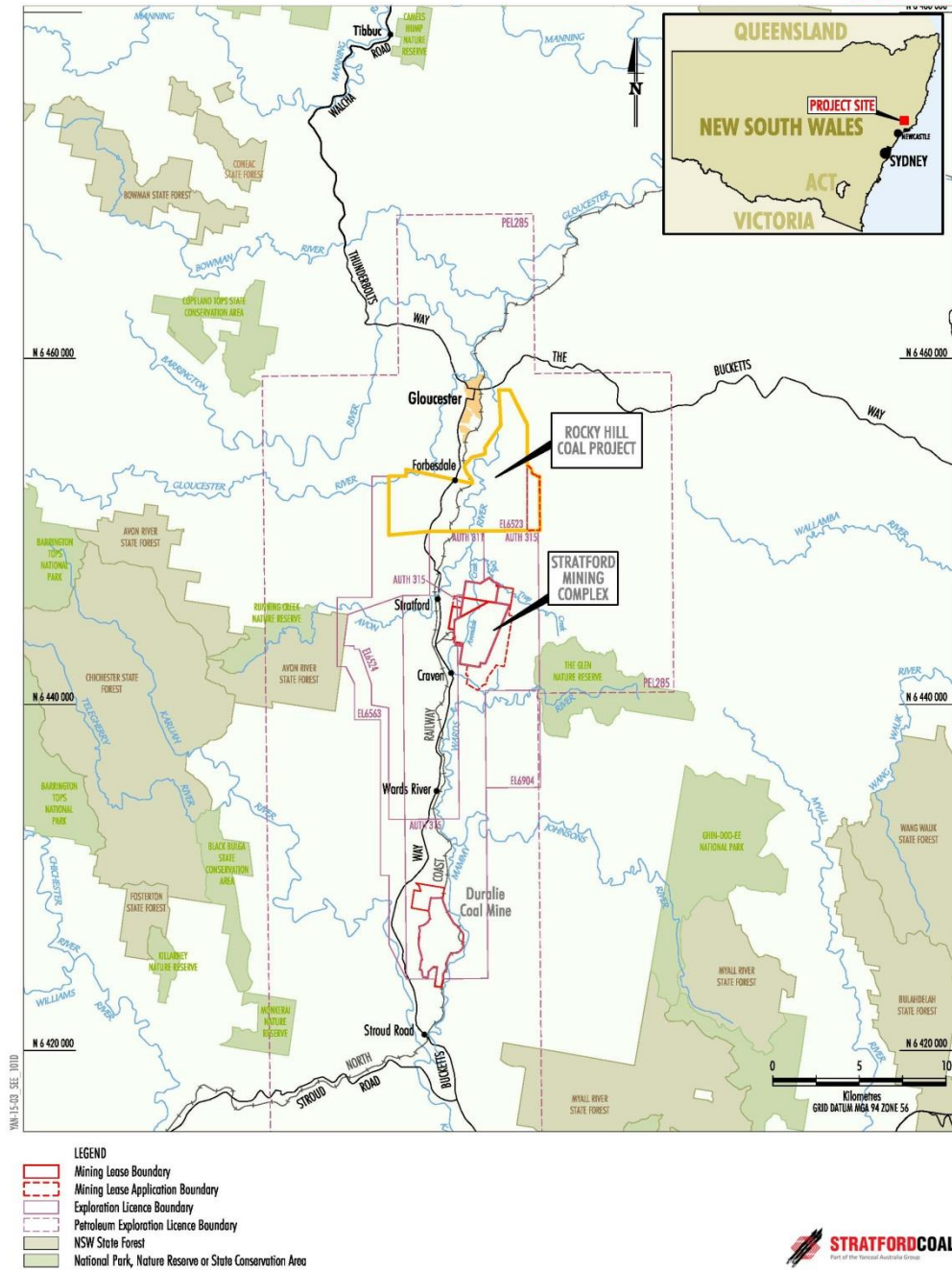
The assessment of the road transport implications of the Stratford Extension Project (Halcrow, 2012) considered the implications of both the construction phase and operational activity. With regard to the impacts on the road transport environment, the assessment of the Stratford Extension Project considered:

- an increase in the number of full time on-site personnel;
- an increase in the number of deliveries and visitors;
- an increase in the number of vehicle trips made on public roads between the SMC and the Duralie Coal Mine;
- the realignment of approximately 400 metres (m) of Wheatleys Lane and Bowens Road around the western extent of the Roseville West Pit Extension and upslope diversion; and
- the realignment of approximately 1.7 km of Wenham Cox Road and Bowens Road around the north-eastern extent of the Northern Waste Emplacement Extension and Avon North Open Cut.

Halcrow (2012) concluded that the Stratford Extension Project:

would have only minor impacts on the operation of the surrounding road system. The cumulative assessment found that the existing Levels of Service would be maintained on the surrounding roads, and key intersections would continue to operate satisfactorily. No significant impacts on the performance, capacity, efficiency and safety of the road network are expected to arise as a result of the [Stratford Extension] Project and other projects. No specific management or mitigation measures are considered to be warranted.

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Source: Geoscience Australia (2009); SCPA (2014); DECC (2011); IPI (2014); DPI-CIL (2012)

Figure 1

Figure 2-1: Regional Location

2.2 The Modification

The main changes to the operations of the SMC associated with the Modification include:

- transport of sized ROM coal from the RHCP to the SMC during daytime hours only (7.00 am to 6.00 pm, Monday to Saturday);
- extension of the SMC ROM pad to accommodate RHCP sized ROM coal;
- extension of SMC heavy vehicle parking areas;
- processing of RHCP coal at the SMC and transportation of the resulting product coal from the SMC to the Port of Newcastle;
- extension of on-site haul roads to accommodate RHCP haul trucks; and
- an at-grade level crossing (and associated controls) constructed at the intersection of Wenham Cox Road and the private haul road.

With regard to road transport, the Modification proposes the following:

- transport of sized ROM coal during daytime hours only from the RHCP to the SMC ROM pad, using a dedicated fleet of trucks on a private haul road;
- processing and transport (by rail) of coal from the RHCP at the SMC CHPP (in addition to the ongoing processing and transport of coal from the SMC and Duralie Coal Mine); and
- extension of on-site haul roads to accommodate the RHCP trucks.

The fleet of trucks used for transport of ROM coal from the RHCP to the Modification will be made up of B-Double type trucks, each with a capacity of 60 tonnes. Haulage will occur during daytime hours only, i.e. between 7.00 am and 6.00 pm, Monday to Saturday. The private haul road will have a speed limit of 60 kilometres per hour (km/h). It will be sealed along from the Rocky Hill Mine Infrastructure Area to the eastern boundary of Mining Lease (ML) 1528, and unsealed from that point to the SMC ROM pad.

3. Background Traffic Conditions

3.1 Road Network

The road network in the vicinity of the Stratford Extension Project is described below.

The Bucketts Way (Main Road 90) extends from the Pacific Highway (Highway 1) at Karuah in the south, to the Pacific Highway at Nabiac in the east, via Booral, Stroud, Gloucester and Krambach. It is classified by RMS as a regional road, performing a significant regional function. RMS and Mid-Coast Council each contribute towards its maintenance, and SCPL also contributes in accordance with SSD-4966).

The Bucketts Way generally has a 7.0 m wide carriageway, with single travel lane in each direction, and a posted speed limit of 100 km/h. The Bucketts Way received funding in 2015 for a package of upgrading and resurfacing works which included the section from Stratford village to 700 m north of the North Coast Railway underpass.

Stratford Mine Access Road is a private road that extends eastwards from The Bucketts Way, and provides access only for SMC traffic. It has a carriageway approximately 7.0 to 7.5 m wide, with a single travel lane in each direction and a posted speed limit of 60 km/h. At its intersection with The Bucketts Way, the access road is flared, and The Bucketts Way is widened, with left and right turn deceleration lanes, consistent with Austroads (2013) "CHR" and "AUL" treatments for rural intersections.

Wenham Cox Road is a local road that extends eastwards from The Bucketts Way just north of the village of Stratford and provides access to a limited number of private properties. It passes to the north and east of the Bowens Road North Open Cut. For most of its length, Wenham Cox Road has a sealed surface between 6.0 m and 7.5 m wide, with no centre linemarking. Two short sections are signposted for single lane traffic only, one of which lies at the bridge over Avon River approximately midway between The Bucketts Way and Wheatleys Lane, and the other at the crossing of a tributary of Dog Trap Creek approximately 450 m east of Wheatleys Lane. A realignment of Wenham Cox Road around the north-eastern extent to the Northern Waste Emplacement Extension and Avon North Open Cut will occur with the Stratford Extension Project. This will involve a 1.7 km section of Wenham Cox Road, which will be constructed to a similar standard to the existing road. From this point, Wenham Cox Road provides access to only one private property.

Bowens Road is a local road that extends eastwards from The Bucketts Way at the southern extent of Stratford. It has two distinct sections, following closure of the portion between Wheatleys Lane and Wenham Cox Road. The western section has a sealed surface with a minimum width of 5.5 m, and the eastern section (off Wenham Cox Road) is typically unsealed.

Wheatleys Lane is a local road that provides a north-south link between Bowens Road and Wenham Cox Road, with a sealed surface of between 5.5 m and 6.0 m wide. With the Stratford Extension Project, a sealed two-lane road realignment of Wheatleys Lane and Bowens Road will occur, over a distance of approximately 400 m around the western extent of the proposed Roseville West Pit Extension and upslope diversion. The existing right angle bend at the intersection of Wheatleys Lane and Bowens Road will be replaced with a curve of radius approximately 370 m.

3.2 Traffic Volumes

A survey was undertaken over one week in April-May 2016 of traffic on Wenham Cox Road. Hourly traffic volumes were recorded by direction, and vehicles classified as light or heavy. Light vehicles include motorcycles, cars, vans, 4WDs, and utes (including those towing a trailer). Heavy vehicles include single unit trucks and buses, and articulated vehicles including semi-trailers, rigid trucks with trailers, B-doubles and road trains (where permissible).

The results of the traffic survey are summarised in Table 3.1 for the average weekday. The busiest hour in the morning occurred between 10.00 am and 11.00 am, and the busiest hour in the afternoon occurred between 3.00 pm and 4.00 pm. Surveyed traffic on weekend days were well below those recorded on weekdays, with 40 vehicles per day on Saturday and 21 vehicles per day on Sunday.

Table 3.1: Average Weekday Surveyed Traffic Wenham Cox Road April-May 2016

	AM Peak (vehicles per hour)	PM Peak (vehicles per hour)	Daily (vehicles per day)
Light Vehicles	5	5	52
Heavy Vehicles	1	0	5
Total Vehicles	6	5	57

The results indicate that traffic volumes on Wenham Cox Road are very low, which is consistent with the limited local access role it performs. Halcrow (2012) conducted surveys of traffic on Wenham Cox Road and The Bucketts Way. At that time, Wenham Cox Road was found to carry an average weekday daily volume of 156 vehicles per day and a peak of 15 vehicles per hour. The Bucketts Way north of the SMC was found to carry an average daily traffic volume of 2,190 vehicles per day, and a peak of 193 vehicles per hour. At the time of those surveys, Gloucester Coal Limited (now Yancoal) was undertaking exploration activity at the eastern end of Wenham Cox Road, which contributed to atypical traffic conditions on Wenham Cox Road. With cessation of that activity, the peak hourly and daily traffic volumes on Wenham Cox Road have declined significantly.

3.3 Road Safety

To assess the history of road crashes in the vicinity of the SMC, road crash data was obtained from RMS for the most recent five year period available. The data covers finalised data for the period from 1 July 2010 to 30 June 2015. The data includes those crashes which conform to the national guidelines for reporting and classifying road vehicle crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.
- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

Crash data was obtained and reviewed for The Bucketts Way from 5 km south to 5 km north of the Stratford Mine Access Road, as well as the local roads around Stratford. Over the five years and area reviewed, a total of six crashes occurred, resulting in four people being injured. All of the reported crashes occurred on The Bucketts Way. Table 3.2 summarises the reported crashes, including contributing factors as identified by the police.

Table 3.2: Reported Crashes (1 July 2010 to 30 June 2015)

Location	Time and Date	Conditions	Description	Factors
The Bucketts Way 10 m south of Wenham Cox Road	9.15 pm 12 August 2010	Fine weather Dry road Darkness	Northbound car at 100 km/h left the carriageway to the right on straight and struck a fence (1 injured)	None
The Bucketts Way at Wenham Cox Road	2.00 pm 29 October 2010	Fine weather Dry road Daylight	Northbound light truck at 70 km/h struck rear end of a northbound stationary car and a northbound light truck waiting to turn right (1 injured)	None
The Bucketts Way 2 km north of Spring Creek Road	7.15 am 29 September 2011	Raining Wet road Daylight	Southbound car at 90 km/h left the carriageway to the right on straight and struck a fence (1 injured)	Fatigue
The Bucketts Way 340 m north of Wenham Cox Road	1.45 pm 22 July 2012	Raining Wet road Daylight	Southbound 4WD at 70 km/h left the carriageway to the left on a left hand bend and struck a fence (non-injury)	Speed
The Bucketts Way 20 m south of Woods Road	7.05 pm 21 March 2014	Overcast Wet road Darkness	Northbound car at 50 km/h left the carriageway to the right on a left hand bend and struck a fence (1 injured)	Speed Fatigue
The Bucketts Way 20 m south of Woods Road	8.52 am 20 April 2015	Raining Wet road Daylight	Northbound car at 65 km/h left the carriageway to the right on a left hand bend and struck a utility pole (non-injury)	Speed

The RMS data indicates that five of the six crashes involved single vehicles leaving the carriageway, known as run-off-road (ROR) crashes. This is consistent with Austroads (2015), which found that in rural road environments in Australia, off-path crashes were the most likely. ARRB (2011) states that known causes of ROR crashes include:

- driver behaviours such as speed, inattention, avoidance manoeuvres, errant vehicles;
- driver impairment including fatigue, alcohol, drugs, mood state;
- road conditions such as horizontal alignment, shoulder deficiencies, slippery surface, poor delineation, damaged surfaces;
- vehicle failure; and
- environmental conditions such as rain, fog, snow, livestock or native fauna.

The majority of ROR crashes on The Bucketts Way occurred on a wet road surface, with inappropriate speed and/or fatigue nominated as a contributing factor.

3.4 Changes to Road Transport Environment

The following subsections outline changes which are expected to occur on the road network serving the SMC due to approved major projects or other influences.

3.4.1 Stratford Extension Project

Halcrow (2012) assessed the likely traffic generation of the Stratford Extension Project during construction and operating periods, and its distribution on the surrounding road system. Table 3.3 summarises the total Stratford Extension Project traffic at key locations on the road network on an average weekday.

Table 3.3: Average Weekday Stratford Extension Project Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Construction Period			
Stratford Mine Access Road	621	47	668
The Bucketts Way North of Stratford Access Road	438	11	449
The Bucketts Way South of Stratford Access Road	183	36	219
Wenham Cox Road East of Wheatleys Lane	44	4	48
Bowens Road East of Stratford	22	2	24
Operating Period			
Stratford Mine Access Road	561	47	608
The Bucketts Way North of Stratford Access Road	390	11	401
The Bucketts Way South of Stratford Access Road	171	36	207
Wenham Cox Road East of Wheatleys Lane	44	4	48
Bowens Road East of Stratford	22	2	24

Source: Halcrow (2012)

As noted (Section 2.1), the Stratford Extension Project involves realignment of two sections of local roads for continued public accessibility, and would involve construction of:

- a sealed two-lane road realignment of Wheatleys Lane and Bowens Road of approximately 400 m around the western extent of the Roseville West Pit Extension and upslope diversion; and
- a sealed two-lane road realignment of Wenham Cox Road and Bowens Road of approximately 1.7 km around the north-eastern extent of the proposed Northern Waste Emplacement Extension and Avon North Open Cut.

3.4.2 Gloucester Gas Project

The traffic implications of the Gloucester Gas Project were considered in Halcrow (2012). This project included development of a Central Processing Facility with vehicular access from Wenham Cox Road. Table 3.4 summarises the total Gloucester Gas Project traffic at key locations on the road network on an average weekday included in the assessment undertaken by Halcrow (2012).

Table 3.4: Average Weekday Gloucester Gas Project Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Construction Period			
Stratford Mine Access Road	0	0	0
The Bucketts Way North of Stratford Access Road	172	73	245
The Bucketts Way South of Stratford Access Road	172	73	245
Wenham Cox Road East of Wheatleys Lane	208	118	326
Bowens Road East of Stratford	4	50	54
Operational Period			
Stratford Mine Access Road	0	0	0
The Bucketts Way North of Stratford Access Road	64	2	66
The Bucketts Way South of Stratford Access Road	64	2	66
Wenham Cox Road East of Wheatleys Lane	36	2	38
Bowens Road East of Stratford	18	2	20

Source: Halcrow (2012)

AGL has since announced that it will not proceed with the Gloucester Gas Project, and will commence a decommissioning and rehabilitation program for its well sites and other infrastructure in the region. The traffic volumes set out in Table 3.4 will therefore not eventuate, and the Halcrow (2012) overestimates future traffic volumes on the relevant routes.

Decommissioning activity is not likely to result in any significant or sustained cumulative traffic impacts on the surrounding road system, thus traffic impacts of the Gloucester Gas Project are not considered further in this assessment.

3.4.3 Duralie Extension Project

The road transport implications of the Duralie Extension Project were included in the Halcrow (2012) assessment of the Stratford Extension Project, and include a modest increase in the number of employees on the site and the number of delivery vehicles, as well as an extension to the life of the mine. The approved Duralie Extension Project permits mining operations until 31 December 2021.

Table 3.5 summarises the expected traffic generation of the Duralie Extension Project at full production on the locations of relevance to the Stratford Extension Project.

Table 3.5: Average Weekday Duralie Extension Project Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Operating Period to 31 December 2021			
Stratford Mine Access Road	0	0	0
The Bucketts Way North of Stratford Access Road	10	4	14
The Bucketts Way South of Stratford Access Road	10	4	14
Wenham Cox Road East of Wheatleys Lane	0	0	0
Bowens Road East of Stratford	0	0	0

Source: Halcrow (2012)

3.4.4 Rocky Hill Coal Project

An application by GRL for the RHCP has been subject to assessment by the Department of Planning and Environment. The application has been placed on hold by GRL. The RHCP is located to the north of the Stratford Extension Project.

Halcrow (2012) included the RHCP in its assessment of future traffic conditions with the Stratford Extension Project, and made reference to the preliminary documentation lodged with the Department of Planning and Environment at that time, as the Environmental Impact Statement (EIS) was not available. Table 3.6 summarises the traffic generation of the RHCP included in the Halcrow (2012) assessment of future traffic conditions with the SMC.

Table 3.6: Daily RHCP Traffic Allowance in Stratford Extension Project Assessment (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Construction Phase			
Stratford Mine Access Road	0	0	0
The Bucketts Way North of Stratford Access Road	74	51	125
The Bucketts Way South of Stratford Access Road	74	51	125
Wenham Cox Road East of Wheatleys Lane	0	0	0
Bowens Road East of Stratford	0	0	0
Operational Phase 2024			
Stratford Mine Access Road	0	0	0
The Bucketts Way North of Stratford Access Road	138	20	158
The Bucketts Way South of Stratford Access Road	138	20	158
Wenham Cox Road East of Wheatleys Lane	0	0	0
Bowens Road East of Stratford	0	0	0

Source: Halcrow (2012)

The EIS for the Amended RHCP includes a road transport assessment (Constructive Solutions, 2016) which provides an indication of the expected traffic generation during construction and operational phases. That assessment assumes that long term vehicular access to the RHCP mine

area would be via Jacks Road to the south of Gloucester, Waukivory Road and McKinleys Lane, following construction of a new bridge over the Avon River on Jacks Road.

Constructive Solutions (2016) assessed the likely volume of traffic generated by the RHCP and its distribution on the road network for the Amended RHCP. Table 3.7 summarises the volume of traffic expected to be generated by the RHCP on The Bucketts Way south of Gloucester during the construction and ongoing operational phases of the RHCP from that assessment.

Table 3.7: Daily Amended RHCP Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
RHCP Construction and Operational - 2019			
The Bucketts Way North of Jacks Road	68	4	72
The Bucketts Way South of Jacks Road	17	1	18
RHCP Operational Year 10 - 2029			
The Bucketts Way North of Jacks Road	151	7	158
The Bucketts Way South of Jacks Road	38	2	40
RHCP Operational Year 20 - 2039			
The Bucketts Way North of Jacks Road	34	1	35
The Bucketts Way South of Jacks Road	8	0	8

Source: Constructive Solutions (2016)

The Halcrow (2012) assessment of cumulative impacts with the Stratford Extension Project (Table 3.6) therefore assumed that the RHCP would generate higher or similar traffic volumes on The Bucketts Way than those now forecast to be generated by the Amended RHCP (Table 3.7).

3.5 Background Traffic Growth

Halcrow (2012) reviewed historic changes in traffic volumes on The Bucketts Way and applied a rate of 3 percent per annum to the background traffic (not generated by the SMC) as an estimate of future traffic growth in the region. No growth in traffic unrelated to specific projects was anticipated on Wenham Cox Road, Bowens Road or the Stratford Mine Access Road.

4. Modification Traffic Conditions

4.1 Modification Construction Traffic

Halcrow (2012) considered the various components of traffic expected to be generated by the short term construction activity associated with the Stratford Extension Project, including:

- light vehicle trips generated by the construction workforce; and
- heavy vehicle trips generated by construction and development activities.

The Modification would not result in any change to the number or distribution of those vehicle trips.

With the Modification, construction of the internal haul road would involve additional vehicles using Wenham Cox Road and the Stratford Mine Access Road. Constructive Solutions (2016) indicates that during the RHCP site establishment and construction stage, the level of use and timing of use of those roads would be as presented in Table 4.1.

Table 4.1: Average Daily Private Haul Road Construction Traffic

Access Route	Light Vehicle Trips per Day	Construction Months	Heavy Vehicle Trips per Day	Construction Months
Wenham Cox Road	24	2 to 9	16	8
Stratford Mine Access Road	0	-	2	8 to 10

Source: Constructive Solutions (2016)

This indicates that the highest overall use of those two accesses would occur during month 8 of the construction phase, with up to 24 light and 18 heavy vehicle trips generated at the two accesses in that month.

With the Modification, some additional vehicle trips will be generated prior to commencement of operational activity, being for the delivery of RHCP mining equipment using The Bucketts Way and Stratford Mine Access Road. Only four large items of equipment are expected to be delivered on floats along this route prior to construction of the private haul road, so these movements would not generate trips on the surrounding road network over an extended period, and are not considered further in this assessment.

Table 4.2 summarises the average daily traffic generated by the Modification on the roads serving the SMC as a result of construction of the private haul road. As a robust assessment, Table 4.2 is based on the busiest month of the RHCP construction activity. It further assumes that of the construction traffic using Wenham Cox Road or the Stratford Mine Access Road, 80 percent would arrive from and depart to the north, and 20 percent would arrive from and depart to the south. This is consistent with the distribution of traffic presented in Constructive Solutions (2016) for construction traffic using Jacks Road to access the Amended RHCP.

Table 4.2: Daily Modification Construction Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Stratford Mine Access Road	0	2	2
The Bucketts Way North of Wenham Cox Road	20	14	34
The Bucketts Way North of Stratford Access Road	4	6	10
The Bucketts Way South of Stratford Access Road	4	4	8
Wenham Cox Road East of Wheatleys Lane	24	16	40
Bowens Road East of Stratford	0	0	0
Private Haul Road At Wenham Cox Road	24	16	40

4.2 Modification Operational Traffic

Halcrow (2012) considered the various components of operational traffic expected to be generated by the Stratford Extension Project when operational, including traffic generated by:

- the workforce;
- deliveries;
- visitors; and
- exploration and operational trips.

The Modification would not result in any change to the number or distribution of those vehicle trips.

With the Modification, the fleet of trucks transporting ROM coal from the RHCP to the SMC would generate trips along the private haul road. The number of trucks required in the fleet will vary according to the amount of coal being transported. The required minimum number of trucks to meet the demand as supplied by GRL is presented in Table 4.3, together with the number of trucks expected to be provided in the fleet to take account of day-to-day variations in the transport task.

Table 4.3: Proposed ROM Coal Truck Movements from the RHCP to the SMC

Year	RHCP ROM Coal (Mtpa)	RHCP Sized ROM Coal (Mtpa)	Minimum Number of Trucks Required	Maximum Number of Trucks To Be Used
1	-	-	-	-
2	0.2	0.2	1	2
3	0.5	0.5	3	4
4	0.5	0.5	3	4
5	1.1	1.0	6	7
6	1.4	1.3	7	9
7	1.4	1.3	7	9
8	1.4	1.3	7	9
9	1.6	1.4	8	9
10	1.6	1.4	8	9
11	1.7	1.5	9	10
12	1.8	1.6	9	10
13	1.8	1.6	9	10
14	1.8	1.6	9	10
15	1.8	1.6	9	10
16	1.0	0.9	6	7
17	1.4	1.3	7	8

Table 4.3 demonstrates that the fleet would include a peak of ten trucks between Years 11 and 15. Based on the figures supplied by GCL, it is estimated that each truck would take approximately one hour to complete its cycle of loading at the RHCP, travelling to the SMC, unloading and returning to the RHCP empty. The private haul road would therefore carry a peak of 220 truck trips per day, or 20 truck trips per hour (two way) during those years.

With the Modification, some additional vehicle trips will be generated by the drivers of the RHCP haul trucks, who will start and end their shifts at the SMC, where the trucks will be parked overnight. In reality, some of the trucks are expected to be parked up overnight at the RHCP, however operational flexibility is sought by GRL to park-up at either site. For the purposes of this assessment, the truck drivers are therefore assumed to arrive and depart in their private vehicles using the Stratford Mine Access Road.

Based on the size of the truck fleet (Table 4.3), a peak of 10 haul truck drivers will arrive and depart using the Stratford Mine Access Road each day during Years 11 to 15. Those vehicles will result in 20 vehicle trips per day on the Stratford Mine Access Road. Assuming that the residential distribution of those drivers would be similar to that of the employees at the SMC (Halcrow, 2012), it is expected that approximately 16 vehicle trips will be to and from the north along The Bucketts Way, and 4 vehicle trips will be to and from the south along The Bucketts Way.

Table 4.4 summarises the daily traffic generated by the Modification on the surrounding roads during its peak operations during Years 11 to 15.

Table 4.4: Daily Modification Peak Operational Traffic (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Stratford Mine Access Road	20	0	20
The Bucketts Way North of Wenham Cox Road	16	0	16
The Bucketts Way North of Stratford Access Road	16	0	16
The Bucketts Way South of Stratford Access Road	4	0	4
Wenham Cox Road East of Wheatleys Lane	0	0	0
Bowens Road East of Stratford	0	0	0
Private Haul Road At Wenham Cox Road	0	220	220

4.3 Modification Traffic Impacts on Operating Conditions

With regard to the operation of the surrounding road network, Halcrow (2012) found that with the cumulative impacts resulting from the approved or proposed major projects in the region, the future traffic volumes on the surrounding road network would remain sufficiently low that drivers would continue to experience good levels of service. This included the traffic expected to be generated by the Gloucester Gas Project, which will no longer proceed, and higher forecasts for traffic generated by the Amended RHCP than anticipated and assessed for the previous RHCP scheme. Table 4.5 compares the expected contributions to daily traffic volumes on the surrounding road network of the major projects as assessed by Halcrow (2012) with those now anticipated with the Modification. The total volume assumes that construction activity at the various projects would occur concurrently and that peak operational activity would occur concurrently. The Duralie Extension and Stratford Extension Project contributions are not reported as the forecast traffic volumes associated with those projects have not changed since the Stratford Extension Project was assessed. The assumption that Duralie is unchanged is likely to be conservative as no further Duralie Coal Mine coal is currently planned for processing at the SMC beyond 2018.

Table 4.5: Key changes in Contributions of Major Projects to Daily Traffic (vehicles per day)

	Gloucester Gas Project		RHCP		SMC Modification		Total	
	Construction	Operational	Construction	Operational	Construction	Operational	Construction	Operational
Stratford Extension Project Assessment (Halcrow, 2012)								
Stratford Mine Access Road	0	0	0	0	0	0	0	0
The Bucketts Way North of Wenham Cox Road	445	64	125	158	0	0	570	222
The Bucketts Way North of Stratford Access Road	245	66	125	158	0	0	370	224
The Bucketts Way South of Stratford Access Road	245	66	125	158	0	0	370	224
Wenham Cox Road East of Wheatleys Lane	326	38	0	0	0	0	326	38
Bowens Road East of Stratford	54	20	0	0	0	0	54	20
Private Haul Road At Wenham Cox Road	0	0	0	0	0	0	0	0
Under Currently Approved or Expected Conditions								
Stratford Mine Access Road	0	0	0	0	12	20	12	20
The Bucketts Way North of Wenham Cox Road	0	0	18	40	34	16	52	56
The Bucketts Way North of Stratford Access Road	0	0	18	40	10	16	28	56
The Bucketts Way South of Stratford Access Road	0	0	18	40	8	4	26	44
Wenham Cox Road East of Wheatleys Lane	0	0	0	0	52	0	52	0
Bowens Road East of Stratford	0	0	0	0	0	0	0	0
Private Haul Road At Wenham Cox Road	0	0	0	0	52	220	52	220

No change to Duralie Coal Project or Stratford Extension Project Traffic between Stratford Extension Project Assessment and Modification

The traffic generated on public roads by the various major projects as now anticipated, including the Modification, will therefore be well below the traffic volumes previously assessed. Future traffic volumes with the Modification will therefore be lower than those assessed by Halcrow (2012), which found no issues of concern with regard to roadway capacity or levels of service experienced by drivers. It follows that with the Modification, there will be no concerns regarding the capacity or operating efficiency of the road system, and that drivers on the public roads will continue to experience good levels of service.

4.4 Wenham Cox Road and Haul Road Intersection

The private haul road will cross Wenham Cox Road at a new at-grade intersection. Should the approved diversion of Wenham Cox Road not be completed prior to the Modification, an intersection would be constructed on the existing Wenham Cox Road. A second intersection

would then be constructed on the Wenham Cox Road Diversion and the first intersection decommissioned with the closure of the existing alignment of Wenham Cox Road (

Figure 4-1). The conceptual design of the two intersections would be the same, with details of the design to be varied as required to take into account local conditions such as sight distances. The principles for the design of the intersections are set out below.

The intersections will be cross intersections, i.e. with legs. Typically unsignalised cross intersections are avoided in high speed environments (> 80km/h), however many aspects of the intersection are atypical, and it can be safely designed and constructed to address the specific requirements of the locality. The conceptual intersection design is presented in

Figure 4-1, and aspects of the design are discussed below.

4.4.1 Intersection Approach Volumes

Table 4.6 summarises the expected contributions to traffic on the private haul road and Wenham Cox Road during Years 11 to 15.

Table 4.6: Traffic Volumes at Intersection of Wenham Cox Road and Private Haul Road

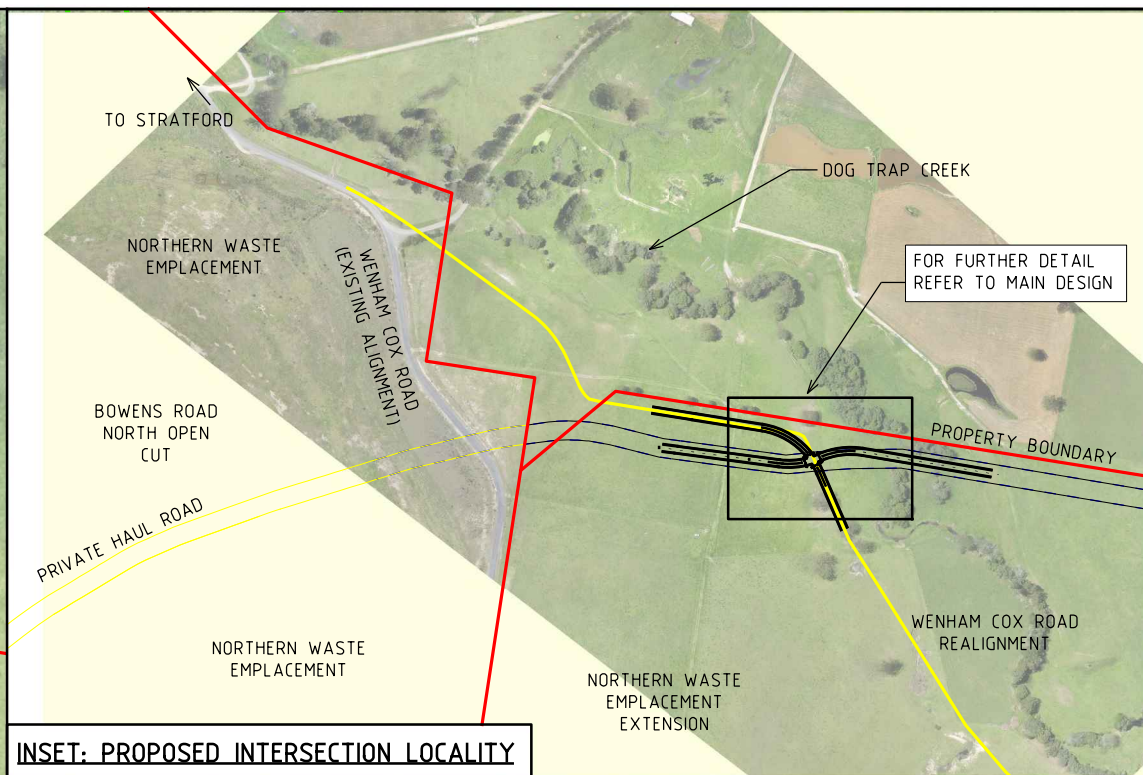
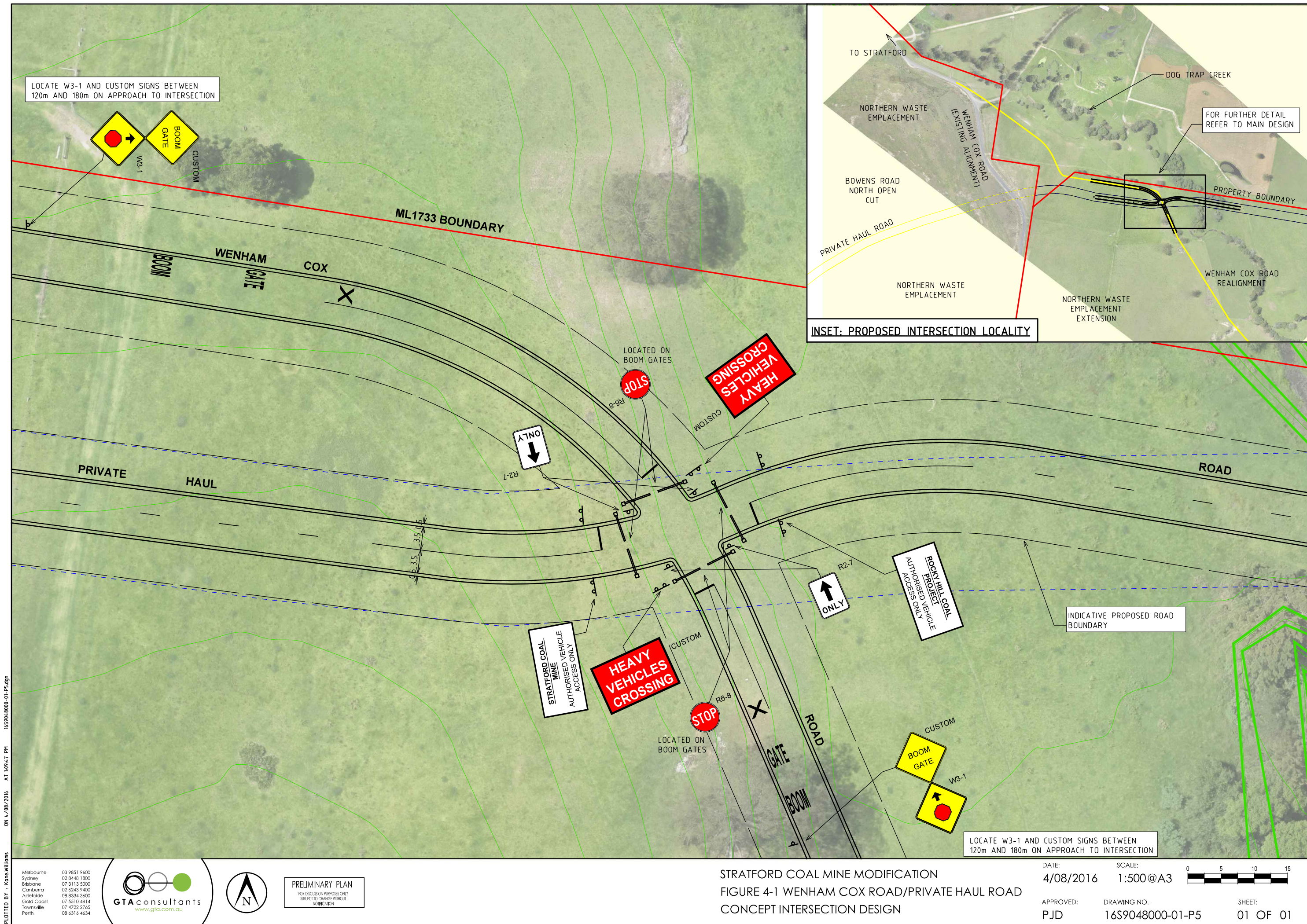
	Peak Vehicle Trips per Day		Peak Vehicle Trips per Hour	
	Light	Heavy	Light	Heavy
Private Haul Road				
RHCP Coal Transport	0	220	0	20
Total	0	220	0	20
Wenham Cox Road				
Background	52	5	5	0
Stratford Extension Project	44	4	6	2
Total	96	9	11	2

Table 4.6 indicates that the private haul road would carry higher traffic volumes than Wenham Cox Road. With this balance of traffic on the two roads, and taking into consideration the different types of vehicles using the two roads, the private haul road would typically form the major road at the intersection and that Wenham Cox Road forms the minor road. The priority at the intersection would reflect those designations, with Wenham Cox Road traffic required to yield to the private haul road traffic.

4.4.2 Road Width and Auxiliary Lane Provisions

Unlike most intersections, vehicles on Wenham Cox Road will remain on Wenham Cox Road, and vehicles on the private haul road will remain on the private haul road. There will not be any movement of vehicles turning between the two roads. The swept path requirements for vehicles turning between the two roads need not be considered in the design. Auxiliary turn lanes or shoulder widening for turning vehicles will not be required.

To allow for its use by heavy vehicles, in the vicinity of the intersection with Wenham Cox Road, the haul road would have a sealed pavement of minimum 8.0 m width, being two 3.5 m wide travel lanes and 0.5 m wide sealed shoulders. Unsealed shoulders 1.0 m should be provided on each side of the road. This is consistent with Austroads (2010a) guidelines, and allows heavy vehicles to pass without either vehicle having to move sideways towards the outer edge of the lane. The existing width of Wenham Cox Road of between 6.0 m and 7.5 m wide is satisfactory for the volume and composition of traffic it carries.



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ON 4/08/2016 AT 10:42 PM
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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT
NOTIFICATION

STRATFORD COAL MINE MODIFICATION
FIGURE 4-1 WENHAM COX ROAD/PRIVATE HAUL ROAD
CONCEPT INTERSECTION DESIGN

DATE:
4/08/2016

APPROVED:
PJD

SCALE:
1:500@A3

DRAWING NO.
16S9048000-01-P5



SHEET:
01 OF 01

4.4.3 Intersection Controls, Signage, and Linemarking

Considering the volumes of traffic on each road, the intersection would warrant control with "give way" (R1-2) signs on Wenham Cox Road unless the available sight distance requires "stop" (R1-1) signs in accordance with Australian Standard 1742.2 (2009). Yancoal has reviewed the intersection layout and in the interests of safety and community relations, proposes to install boom arms or gates across both Wenham Cox Road and the private haul road. Access along the private haul road will be limited to RHCP haulage trucks only, and the drivers governed by a Code of Conduct.

During the RHCP haulage hours (7.00 am to 6.00 pm Monday to Saturday), the gates on Wenham Cox Road would default to the closed position, and the gates on the private haul road would default to the open position. When a vehicle approaches on Wenham Cox Road, the private haul road gates would close after any passing truck departs the intersection. The Wenham Cox Road gates would then open, allowing the vehicle/s on Wenham Cox Road to proceed.

Outside of the RHCP haulage hours (overnight between 6.00 pm and 7.00 am, and all day Sunday), the gates on Wenham Cox Road would default to the open position, and the gates on the private haul road would default to the closed position.

Signage associated with the intersection is proposed to be consistent with that provided at railway level crossings with boom arm or gate controls, modified for the conditions proposed at Wenham Cox Road, with details to be modified to reflect the exact controls proposed (e.g. signage associated with boom barriers would differ from that of gates).

- "Boom Gate" warning signs (being a customised modified version of the railway gate warning sign W7-15) will be provided on each side of Wenham Cox Road in advance of the intersection.
- "BOOM GATE X" pavement markings will be provided on each side of Wenham Cox Road in advance of the intersection.
- A "Stop" banner (R6-8) will be affixed to the gate (on both gates if two gates are used) with a "heavy vehicle crossing" position sign (being a customised modified version of the railway crossing R6-25 sign) placed to the left of the gate. If a boom arm is used, the "Stop" sign (R1-1) would be placed below the heavy vehicle crossing sign.
- "Stop" lines will be provided on Wenham Cox Road at the intersection in conjunction with the signage and gates.
- Edge lines and centre lines will be provided on the approaches to the intersection on Wenham Cox Road.

The standard "Straight Ahead Only" sign (R2-7) will be used at the intersection to prohibit vehicles on Wenham Cox Road from turning into the private haul road in either direction. Additional signage to discourage access by the public to the private haul road would be appropriate, such as "Authorised Vehicle Access Only". The final intersection alignment, controls and signage would be subject to detailed design in consultation with Mid-Coast Council.

4.4.4 Intersection Operating Conditions

At unsignalised intersections where there are relatively low volumes of cross and turning traffic, such as those expected at the intersection of Wenham Cox Road with the private haul road, the capacity of the intersection is not a major factor, and does not require formal analysis of the

intersection operating conditions. The design should consider the safety of the intersection as the main objective.

Based on the intersection priority and controls, during haulage hours, vehicles on Wenham Cox Road would be delayed by the need to slow to stop at the intersection for haul road trucks to clear the intersection and the gates to open. The delay experienced by each vehicle will be low, and would be expected to be less than 30 seconds per vehicle, which is a good level of service. Outside of haulage hours, vehicles on Wenham Cox Road would be delayed by the need to slow to stop at the intersection, and the delay per vehicle would be very low.

4.4.5 Sight Distances

Intersection safety is dependent upon adequate sight distance for all drivers, and consequently, sight distance is a key consideration for the intersection design. With boom gates operating on both roads, sight distance requirements for vehicles to accept a gap in opposing traffic would be significantly reduced below that of a typical intersection, however the typical requirements have been considered in developing the concept intersection layout. Sight distance at the intersection will be impacted by the localised topography, and also influenced by the angle at which the private haul road and Wenham Cox Road intersect. Wenham Cox Road and the private haul road will intersect at not less than 70 degrees, which is consistent with Austroads (2010b) requirements. Sight distances to be provided are:

- Approach Sight Distance (ASD) is the sight distance which must be available on the minor road approaches to all intersections to ensure that drivers are aware of the presence of an intersection. It is also desirable that ASD be provided on the major road so that approaching drivers can see the pavement and any linemarking.
- Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection, and provides sufficient distance for a driver on the major road to observe a vehicle on the minor road moving into a collision situation (stalling across the traffic lanes as a worst case) and decelerate to a stop before reaching the collision point. SISD on the major road enables an approaching driver to see an articulated vehicle which has properly commenced a manoeuvre from the minor road but whose length creates an obstruction to the major road traffic.
- Minimum Gap Sight Distance (MGSD) is based on the distance corresponding to the smallest gap between approaching vehicles that drivers will accept when crossing or turning at the intersection.

The basic ASD and SISD distances relevant to the intersection have been calculated (Austroads, 2010a and 2010b) for the recommended priority conditions and assuming that vehicles approach the intersection at the relevant speed limits. The basic distances would be factored to account for grades (increased for downgrades and decreased for upgrades) however the following estimates are considered reasonable given the generally flat topography of Wenham Cox Road in the vicinity of the intersection.

Wenham Cox Road does not have a signposted speed limit, thus the default rural speed limit in non-built-up areas of 100 km/h applies, although it is noted that several bends in Wenham Cox Road would require lower vehicle speeds. As the minor road, basic ASD of 165 m would be required for vehicles approaching at 100 km/h. The required MGSD for car drivers on Wenham Cox Road to observe oncoming haulage trucks before crossing is 83 m.

The private haul road will have a speed limit of 60 km/h and will carry only heavy vehicles. The private haul road would be sealed between the Rocky Hill Mine Area and the eastern boundary of ML 1528, and be unsealed for the remaining length within the Stratford mining tenements. The

existing alignment of Wenham Cox Road lies approximately at the eastern boundary of ML 1528, while with the Wenham Cox Road Diversion, the intersection would be located farther to the east of the boundary. Assuming that the road surface is sealed on the approaches to the intersection as recommended, basic SSD of 142 m would be required for trucks approaching on the haul road.

Sight distances will be assessed as detailed design of the intersection progresses, noting that approach speeds may differ from the speed limit due to road alignment or access management measures.

5. Conclusion

This study has examined the likely road transport implications of the Modification to the approved Stratford Extension Project. It is concluded that no specific measures to mitigate the impacts of the development on the capacity, safety and efficiency of the road network would be required as a result of the changed road traffic conditions associated with the Modification. Future traffic volumes on public roads will be lower than those assessed for the Stratford Extension Project.

Where a new intersection is to be constructed on Wenham Cox Road for the Modification, this will be designed and constructed in accordance with the design principles outlined in this report and with Austroads requirements and to the satisfaction of Mid-Coast Council.

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