13. Transport and Infrastructure

13.1 Roads and Traffic

13.1.1 Introduction

This section describes the existing road network and intersections within the Project area. It also provides an assessment of potential construction and operational impacts associated with the Project and the associated activities and recommends mitigation measures.

13.1.2 Existing Environment

13.1.2.1 State-Controlled Roads

The road network in the Project area is made up of State -Controlled roads that are controlled by the Department of Main Roads (DMR) and local roads controlled by Stanthorpe Shire Council (SSC).

The Project area is situated in the Border District of the DMR.

The principal State-Controlled roads within the Project area are presented in **Table 13-1**. Each of these roads is described below.

Table 13-1 State-controlled Roads and Multi-Combination Vehicle Permits

Road	Name	Category	Permitted Maximum Size of Vehicle[1]
22C	New England Highway (Warwick - Wallangarra)	National Highway (AusLink road)	23m and 25m B-doubles only
223	Stanthorpe Connection Road	District road	B-doubles <19m
224	Stanthorpe - Amosfield Road	District road	B-doubles <19m
232	Stanthorpe - Texas Road	Regional road	B-doubles <19m
2301	Amiens Road	District road (between Thulimbah and Amiens only)	B-doubles <19m

Source: QT 2001

- New England Highway (22C)
  - connects Warwick to Wallangarra and further north to Brisbane and south to Sydney as part of the Australian National Highway Network (AusLink National Highway 15);
  - is generally a two lane road with 100 km/h speed limit, frequent overtaking facilities and suitable shoulders each side of the road.
- Stanthorpe - Texas Road (232)
  - connects Stanthorpe to Texas;
  - two lane rural road with 100 km/h speed limit situated in flat to rolling terrain.
- Stanthorpe Connection Road (223)
  - runs through Stanthorpe township and connects to New England Highway north and south of Stanthorpe.
  - two lane urban road with 50/60 km/h speed limit.
- Amiens Road (2301)
  - connects New England Highway to Thulimbah and Amiens townships.
  - two lane rural road with 100 km/h speed limit situated in flat to rolling terrain;

13.1.2.2 Local Roads

Roads within the Project area are either directly affected by the Project (roads with altered geometry/alignment or with changed designation/rank) or indirectly affected (road where works are performed in the road reserve and/or the traffic volumes are affected).

Those roads within the Project area controlled by SSC which are directly impacted by the Project are:

- Fletcher Road – connects New England Highway to Emu Swamp Road and provides access to a few farms and wineries along it. The road is a narrow (4 to 5 m wide) rural unmarked road with some tight curves that restrict the sight distance at places. The road is 6 km long, partially sealed and partially subject to flooding at the Severn River causeway. The road intersects the Toowoomba - Wallangarra railway and no railway crossing barriers are provided.
- Emu Swamp Road – a largely sealed, low traffic rural road servicing farms and rural properties along its length.
- Stalling Lane – a low traffic, two lane rural road providing access to two rural properties and situated in rolling type terrain.

State-controlled and local road networks within the Project area are presented in **Figure 13-1**.

13.1.2.3 Existing Traffic Volumes

The Average Annual Daily Traffic volumes (AADT) (as vehicle trips per day –vpd) and the percentage of commercial (heavy) vehicles for 2005 on the State-controlled roads in the Project area are provided in **Table 13-2** and marked on **Figure 13-1**. There were no available traffic counts on local roads in the Project area.

- **Table 13-2 Actual Traffic Volumes**

Road	DMR Traffic Counting Site	AADT (vpd)	Commercial Vehicles (%)	Traffic Growth (%/year)	
				5 Years	10 Years
New England Highway (22C)	3 km south of Stanthorpe Bypass	4,261	14	0.5%	2.3%
(Warwick - Wallangarra)	2 km north of Eukey Road (Ballandean)	2,830	18	-0.2%	0.5%
Stanthorpe Connection Road (223)	300 m north of New England Highway	2,465	5	9.6%	6%
Stanthorpe - Amosfield Road (224)	400 m east of Stanthorpe Connection Road	1,832	7	N/A	N/A
Stanthorpe - Texas Road (232)	100 m west of New England Highway	1,304	8	1.6%	0.5%
Amiens Road (2301)	2 km west of Thulimbah	725	14	8.2%	12.3%

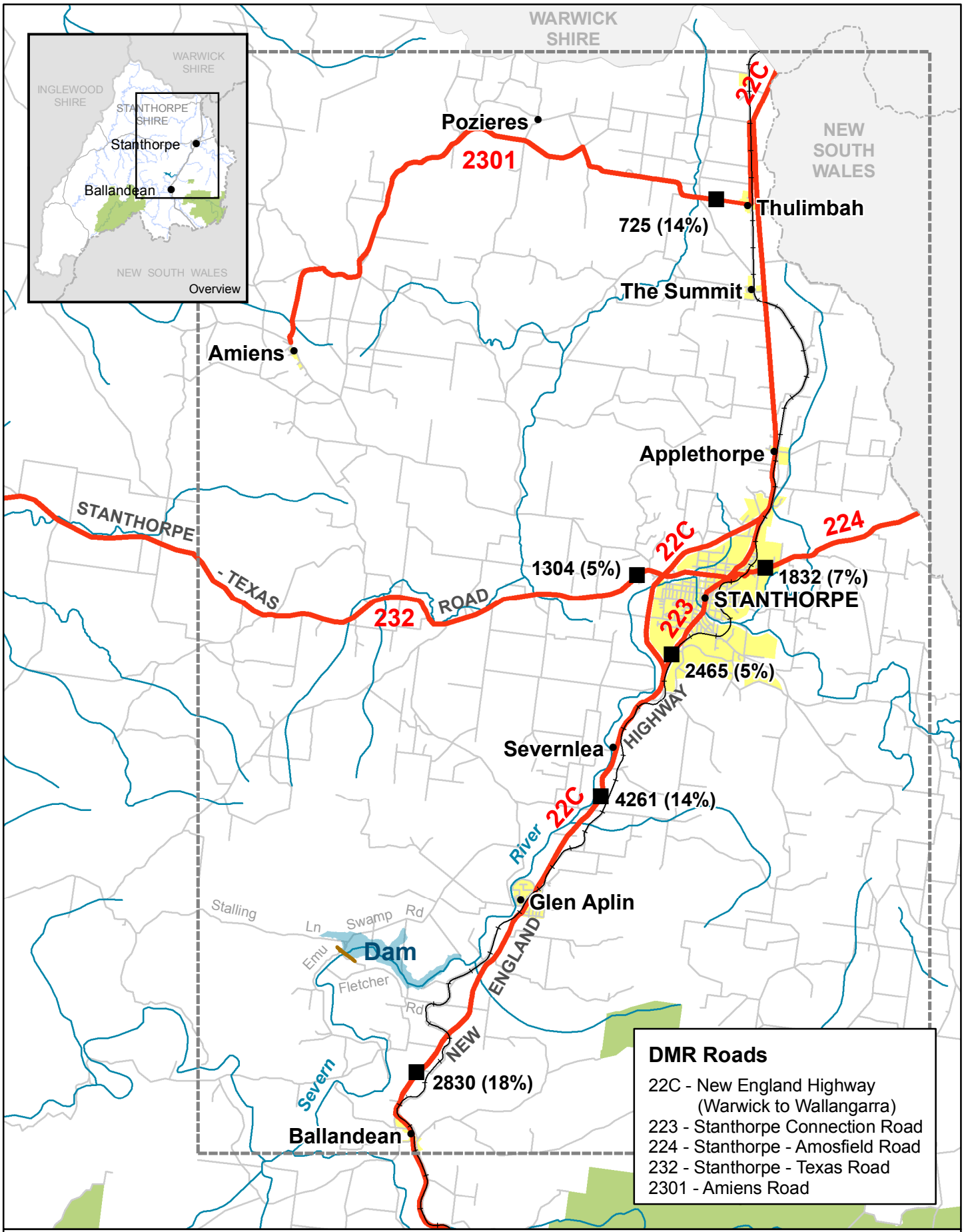
Source: DMR 2005 Traffic Census

13.1.2.4 Existing School Bus Services

Figure 13-2 shows the school bus routes in the Project area.

13.1.2.5 Existing Recreational River Traffic

The Severn River is an ephemeral stream with a number of weirs. There is limited opportunity for recreational boat use on the river. SSC permits jet skis, water skiing, power boats, and sail boats at Storm King Dam when sufficient water is available.


WARWICK SHIRE
INGLEWOOD SHIRE
STANTHORPE SHIRE
Stanthorpe
Ballandean
NEW SOUTH WALES
Overview
NEW SOUTH WALES
Pozieres
2301
22C
Thulimbah
725 (14%)
The Summit
Amiens
Applethorpe
STANTHORPE - TEXAS ROAD
232
224
1304 (5%)
1832 (7%)
STANTHORPE
223
2465 (5%)
HIGHWAY
Severnlea
4261 (14%)
River
Glen Aplin
Stalling Ln
Swamp Rd
Emu
Dam
Fletcher Rd
ENGLAND
NEW
2830 (18%)
Severn
Ballandean
DMR Roads
22C - New England Highway (Warwick to Wallangarra)
223 - Stanthorpe Connection Road
224 - Stanthorpe - Amosfield Road
232 - Stanthorpe - Texas Road
2301 - Amiens Road
SHIRE OF STANTHORPE
Legend
Traffic Count Sites
SSC Local Roads Network
DMR State Controlled Roads
Project Area
725 (14%) Daily Traffic Flows (% of heavy vehicles)
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Kilometres
Scale - 1:150,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Project Area
Figure 13-1
Existing Road Network and Traffic Volumes
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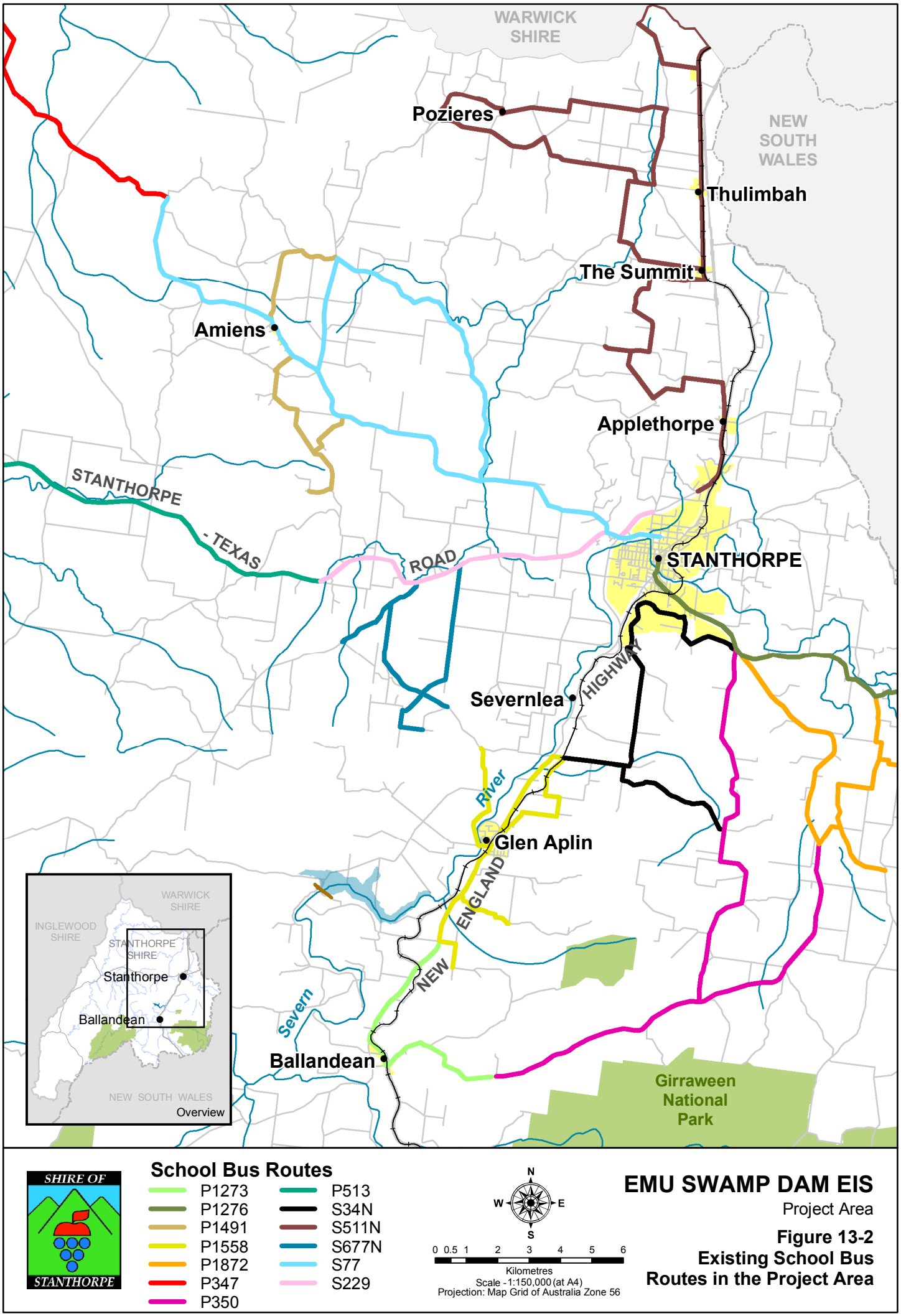
WARWICK SHIRE
NEW SOUTH WALES
Pozieres
Thulimbah
The Summit
Amiens
Applethorpe
STANTHORPE - TEXAS ROAD
STANTHORPE
Severnlea
HIGHWAY
River
Glen Aplin
NEW ENGLAND
Severn
Ballandean
Girraween National Park
INGLEWOOD SHIRE
STANTHORPE SHIRE
Stanthorpe
Ballandean
NEW SOUTH WALES
Overview
SHIRE OF STANTHORPE
School Bus Routes
P1273
P1276
P1491
P1558
P1872
P347
P350
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S511N
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Kilometres
Scale - 1:150,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Project Area
Figure 13-2
Existing School Bus Routes in the Project Area
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13.1.3 Proposed Development

Fletcher Road will constitute the main access road to the dam construction site. The road may be upgraded by the construction contractor to accommodate the construction traffic and it will be repaired and resurfaced at the completion of the Project to provide access to the proposed recreational facilities at the dam.

Emu Swamp Road will be closed at the intersection with Fletcher Road and to the east of the impoundment area. Emu Swamp Road is not intended to be used for construction access to the site. As a result of this closure Stalling Lane will no longer be accessible from Emu Swamp Road. Stalling Lane currently provides access to two properties. To maintain this access, the Stalling Lane Access is proposed to be constructed from Fletcher Road to the western end of Stalling Lane. The location of the Stalling Lane Access is presented in **Figure 3-4**.

13.1.4 Construction Phase Traffic Impact

13.1.4.1 Dam Construction Traffic Generation

For the daily traffic estimation purposes, the construction periods considered were between 6 AM to 6 PM, from Monday to Saturday for a period of:

- 56 weeks for the Urban Water Supply Dam; and
- 64 weeks for the Combined Urban and Irrigation Dam.

Emu Swamp Dam Construction Workforce Traffic and Routes

Staff management, employees, sub-contractors and visitors attending to the Emu SwampDam construction site is expected to be a maximum of 105 persons on any given day. A worst-case scenario of 105 employees commuting by their own vehicles and no car pooling has been considered. The equivalent light vehicle traffic is 105 trips in and 105 trips out each day. The light vehicle trips are likely to occur during the AM (in) and PM (out) peak hours. It is expected that the peak hour light vehicle traffic will be considerably less than 105 vehicles per hour. The peak hour traffic volumes have been assumed to be 80% of the daily light vehicle traffic to the construction site.

The construction contractor advised that two buses are likely to be provided for the employees' transportation between Stanthorpe and the construction site; this will result in a significant decrease in light vehicle traffic volumes attending the dam construction site.

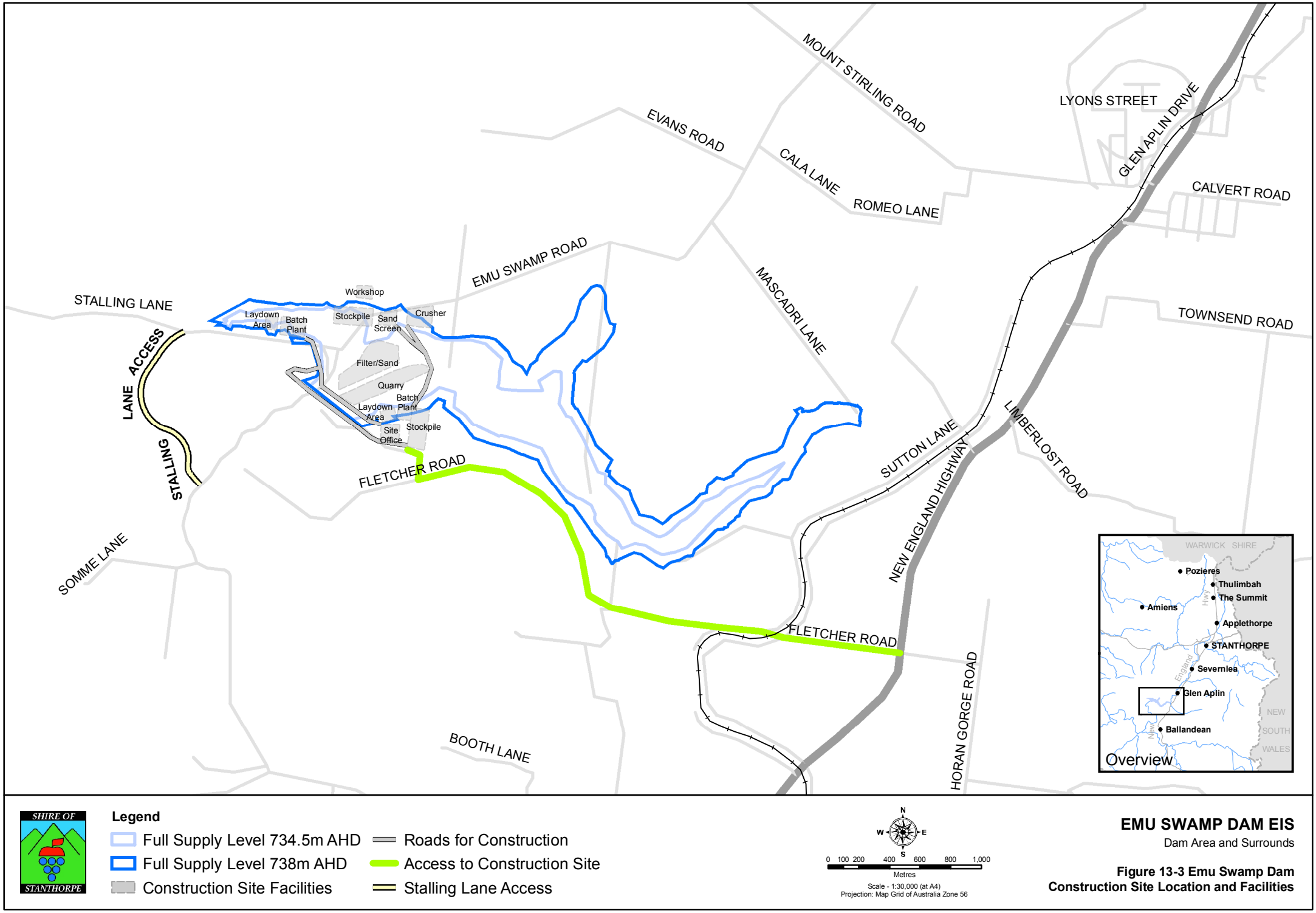
The number of employees is common for both options (urban water supply only and combined urban and irrigation supply), however the Combined Urgan and Irrigation option is planned to cover a longer construction period (64 weeks) than Option 1 (56 weeks).

The workforce is expected to be sourced mainly from Stanthorpe. For the purpose of this study a 90/10 split between north and south regions has been adopted. The subsequent routes for the workforce attending the dam construction site are New England Highway (north) - Fletcher Road (90%) and New England Highway (south) - Fletcher Road (10%).

The light vehicle daily traffic for the dam construction is shown in **Table 13-3** and the routes for the workforce attending the dam construction site are shown in **Figure 13-4**.

- **Table 13-3 Light Vehicle Traffic Volumes During Dam Construction**

Route	Section	AM Peak (vehicles/h)	PM Peak (vehicles/h)	Daily Traffic (vehicles/day)
New England Highway	North of Fletcher Road	76	76	190
	South of Fletcher Road	8	8	20
Fletcher Road	From New England Highway to the construction site	84	84	210


MOUNT STIRLING ROAD
EVANS ROAD
CALA LANE
ROMEO LANE
LYONS STREET
GLEN APLIN DRIVE
CALVERT ROAD
EMU SWAMP ROAD
MASCADRI LANE
TOWNSEND ROAD
STALLING LANE
LANE ACCESS
STALLING
Workshop
Laydown Area
Batch Plant
Stockpile
Sand Screen
Crusher
Filter/Sand
Quarry
Batch Plant
Laydown Area
Site Office
Stockpile
FLETCHER ROAD
SUTTON LANE
NEW ENGLAND HIGHWAY
LIMBERLOST ROAD
SOMME LANE
FLETCHER ROAD
HORAN GORGE ROAD
BOOTH LANE
WARWICK SHIRE
Pozieres
Thulimbah
The Summit
Amiens
Applethorpe
STANTHORPE
Severnlea
Glen Aplin
Ballandean
NEW SOUTH WALES
Overview
SHIRE OF STANTHORPE
Legend
Full Supply Level 734.5m AHD
Full Supply Level 738m AHD
Construction Site Facilities
Roads for Construction
Access to Construction Site
Stalling Lane Access
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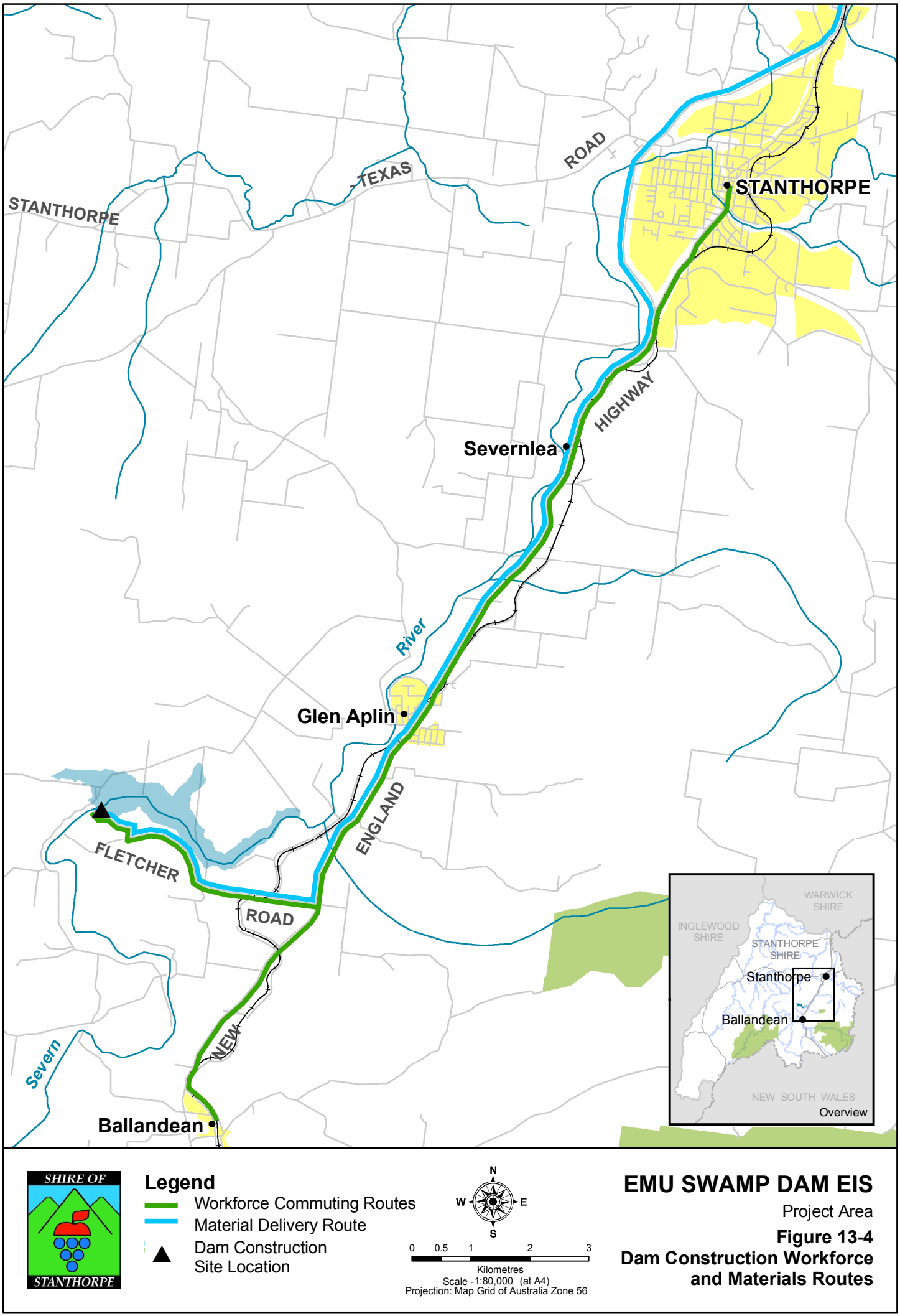
Metres
Scale - 1:30,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Dam Area and Surrounds
Figure 13-3 Emu Swamp Dam
Construction Site Location and Facilities


STANTHORPE
TEXAS
ROAD
STANTHORPE
HIGHWAY
Severnlea
River
Glen Aplin
ENGLAND
FLETCHER
ROAD
NEWA
Severn
Ballandean
WARWICK SHIRE
INGLEWOOD SHIRE
STANTHORPE SHIRE
Stanthorpe
Ballandean
NEW SOUTH WALES
Overview
SHIRE OF
STANTHORPE
Legend
Workforce Commuting Routes
Material Delivery Route
Dam Construction Site Location
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Kilometres
Scale - 1:80,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Project Area
Figure 13-4
Dam Construction Workforce and Materials Routes
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Emu Swamp Dam Construction Materials Traffic and Routes

Materials deliveries and collections will mostly be by either semi-trailer or B-doubles or smaller (12 tonnes capacity trucks) with an even spread throughout the daily working hours.

The estimated deliveries and collections loads are presented in **Table 13-4**. The average daily traffic is estimated by assuming one load is equivalent to 2 vehicle trips, with 56 and 64 week construction periods for Option 1 and Option 2 respectively, working 6 days per week.

- **Table 13-4 Summary of Transport of Construction Materials over the Construction Period**

Material	Urban Water Supply Dam	Combined Urban and Irrigation Dam
Construction Site Establishment	170	170
Construction Site Disestablishment	120	120
Cement	215	310
Fly ash	165	240
Reinforcing steel	25	40
Building materials	15	15
Pipe, valves, gates, pumps, electrics	15	15
Culverts	3	3
Gravel, primer & bitumen	138	138
Diesel fuel	30	40
Construction water (half on-site)	980	1,400
Potable water	155	225
Waste collection & septic services	315	450
Miscellaneous supplies and spare parts	315	450
Formwork & temporary work materials	20	20
Total	**2,670**	**3,626**
Average Daily traffic (vpd)	**20**	**22**

The summary of the dam construction generating traffic is shown in **Table 13-5**.

- **Table 13-5 Heavy Vehicle Traffic Volumes (vehicles/day) During Dam Construction**

Route	Section	Urban Water Supply Dam	Combined Urban and Irrigation Dam
New England Highway	North of Fletcher Road	20	22
	South of Fletcher Road	0	0
Fletcher Road	From New England Highway to the construction site	20	22

Materials for Emu Swamp Dam construction will be mainly sourced from Brisbane and delivered to the construction site via New England Highway (north) and Fletcher Road. The routes for the construction materials delivery are shown in **Figure 13-4**.

Emu Swamp Dam Construction Equipment

A total number of 64 equipment loads will be delivered by road during the construction period. This equates to approximately one transport per week and will not significantly affect the daily heavy vehicle volumes. All the equipment will be sourced from Brisbane and will follow the New England Highway - Fletcher Road route as shown in **Figure 13-4**.

13.1.4.2 Pipeline Construction Traffic Generation

The Urban and Irrigation Pipeline routes are shown in **Figure 3-5**.

Pipeline Construction Period

The construction period is expected to be 32 weeks for the Urban Pipeline and 44 weeks for the Urban and Irrigation Pipeline.

Pipeline Construction Workforce Traffic Generation and Routes

Staff management, employees, sub-contractors and visitors attending to the pipeline satellite construction sites is expected to be maximum 80 persons per day for both the Urban Water Supply Dam and the Combined Urban and Irrigation Dam. The workforce will be sourced from Stanthorpe (modelled at 90%) and south of the proposed Emu Swamp Dam (10%).

The light vehicle trips are likely to occur during the AM (in) and PM (out) peak hours for the workforce but visitors, sub-contractors, service and courier deliveries (approximately 20% of the total trips) usually appear during the working hours period, outside the peak hours.

Therefore, for the purpose of this assessment 80% of daily number of trips has been considered for the peak hour traffic volume.

The Urban Pipeline construction will commence at the proposed Emu Swamp Dam and proceed north to Stanthorpe. For the construction of the Urban Pipeline between the Emu Swamp Dam and Glen Aplin the construction workforce will be located at the dam construction camp. When construction reaches Glen Aplin, the Urban Pipeline workforce will be based at a satellite construction camp located on Back Creek Road. The Urban Pipeline construction camp and workforce will be located at the dam construction site for half the construction period (16 weeks) and then at Back Creek Road for the remaining half of the construction period (16 weeks). The resulting traffic volumes on the selected routes are described in **Table 13-6**.

- **Table 13-6 Light Vehicle Traffic Volume Generation and Distribution – Urban Pipeline Construction**

Pipeline Segment	Construction Site Location	Route		AM Peak (vehicles/h)	PM Peak (vehicles/h)	Daily Traffic (vehicles/day)
South of Glen Aplin area	Proposed Dam Construction Site	New England Highway	North	58	58	144
			South	6	6	16
		Fletcher Road		64	64	160
North of Glen Aplin and the Stanthorpe area	Back Creek Road satellite construction site	New England Highway	North	58	58	144
			South	6	6	16
		Back Creek Road		64	64	160

The selected routes for the workforce and material delivery traffic and the location of the satellite construction site for the Urban Pipeline are shown in **Figure 13-5**.

The Urban and Irrigation Pipeline construction will require the same workforce as the Urban Pipeline but the construction period will be extended over 44 weeks. Same assumptions made for the Urban Pipeline for the peak hour traffic apply to the combined option.

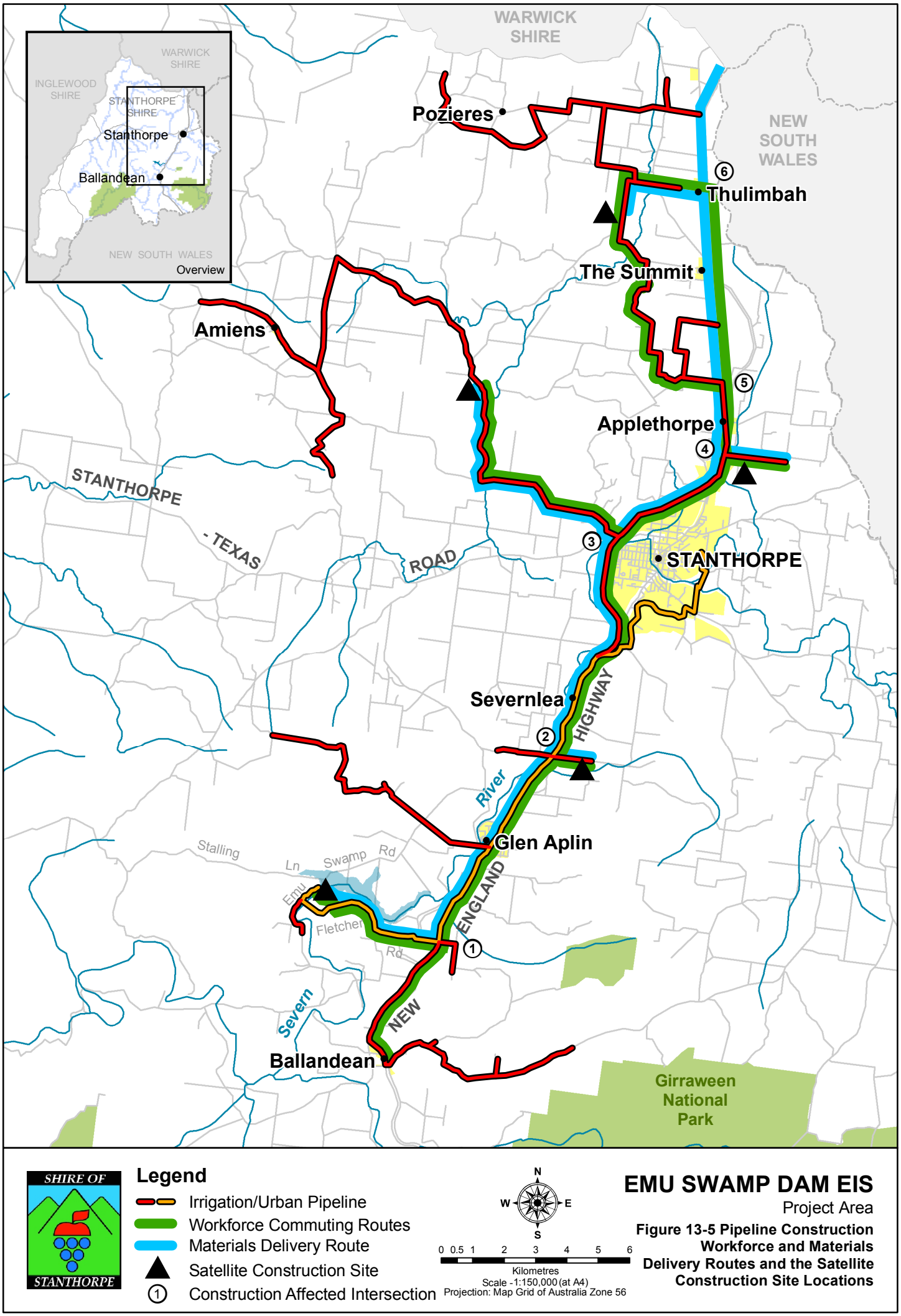
The Irrigation Pipeline will be constructed after the Urban Pipeline. The northern section of the Irrigation Pipeline will be constructed progressively along the New England Highway, Aerodrome Road, Ellwood Road, Church Road to Amiens Road. The western section of the Irrigation Pipeline will then be constructed along the Texas - Stanthorpe Road, Cannon Creek Road and Bapaume Road. The satellite construction camps will be situated near Aerodrome Road, Goodwin Road and Cannon Creek Road.

The resulting traffic volumes on the selected routes are described in **Table 13-7**.

- **Table 13-7 Light vehicle Traffic Generation and Distribution - Urban and Irrigation Pipeline Construction**

Pipeline Segment	Construction Site Location	Route		AM Peak (vehicles/h)	PM Peak (vehicles/h)	Daily Traffic (vehicles/d)
South of Glen Aplin area	Proposed Dam Construction Site	New England Highway	North of Fletcher Road	58	58	144
			South of Fletcher Road	6	6	16
		Fletcher Road		64	64	160
North of Glen Aplin and the Stanthorpe area	Back Creek Road satellite construction site	New England Highway	North of Back Creek Road	58	58	144
			South of Back Creek Road	6	6	16
		Back Creek Road		64	64	160
North of Stanthorpe and Applethorpe area	Aerodrome Road satellite construction site	New England Highway /Old Warwick Road	North of Aerodrome Road	0	0	0
			South of Aerodrome Road	64	64	160
		Aerodrome Road		64	64	160
Thulimbah and Poziers area	Goodwin Road satellite construction site	New England Highway	North of Amiens Road (North)	0	0	0
			South of Amiens Road (North)	32	32	80
		Amiens Road		32	32	80
		New England Highway	North of Ellwood Road	0	0	0
			South of Ellwood Road	32	32	80
		Ellwood Road / Church Road / Goodwin Road		32	32	80
West of Stanthorpe area	Cannon Creek Road satellite construction site	New England Highway	North of Stanthorpe - Texas Road	0	0	0
			South of Stanthorpe - Texas Road	64	64	160
		Stanthorpe - Texas Road		64	64	160
		Amiens Road (South) / Cannon Creek Road		64	64	160

The selected routes for the workforce and material delivery traffic and for the Urban and Irrigation Pipeline are shown in **Figure 13-5**.


WARWICK SHIRE
INGLEWOOD SHIRE
STANTHORPE SHIRE
Stanthorpe
Ballandean
NEW SOUTH WALES
Overview
Pozieres
NEW SOUTH WALES
6
Thulimbah
The Summit
Amiens
5
Applethorpe
4
STANTHORPE - TEXAS ROAD
3
STANTHORPE
Severnlea
HIGHWAY
2
River
Glen Aplin
Stalling Ln
Swamp Rd
Emu
Fletcher Rd
ENGLAND
1
NEW
Severn
Ballandean
Girraween National Park
SHIRE OF STANTHORPE
Legend
Irrigation/Urban Pipeline
Workforce Commuting Routes
Materials Delivery Route
Satellite Construction Site
1 Construction Affected Intersection
N
W
E
S
0 0.5 1 2 3 4 5 6
Kilometres
Scale -1:150,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Project Area
Figure 13-5 Pipeline Construction Workforce and Materials Delivery Routes and the Satellite Construction Site Locations
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Pipeline Construction Materials Traffic Distribution and Routes

Pipeline construction materials will be delivered on site by semi-trailers or 26 tonnes capacity B-doubles.

The summary of the transportable materials and quantities for both Urban Pipeline and Urban and Irrigation Pipeline construction as provided by is presented in **Table 13-8**. The average daily traffic is estimated by assuming one load is equivalent to 2 vehicle trips, 5 days per week for 32 weeks construction period for Urban Pipeline and 44 weeks construction period for the Urban and Irrigation Pipelines.

- **Table 13-8 Pipelines Transportable Construction Materials Traffic Summary**

Material	Urban Pipeline (loads)	Urban and Irrigation Pipeline (loads)
Construction Site Establishment	5	10
Construction Site Disestablishment	5	10
Concrete	10	25
Reinforcing steel	Included in dam	5
Building materials	Included in dam	10
Bedding sand	500	1,250
Pipes	70	170
Valves, fittings, pumps, electrics	5	15
Waste rock / excavated material	400	1,000
Diesel fuel	30	70
Construction water	180	450
Potable water	90	230
Waste collection & septic services	90	230
Miscellaneous supplies and spare parts	150	370
Total Loads	**1,535**	**3,845**
Average Daily traffic (vpd)	**20**	**36**

For the purpose of this study construction materials quantities have been assumed as being evenly split between the two proposed construction sites (dam construction site and the Back Creek Road satellite construction site).The construction site locations and construction material routes are presented in **Figure 13-5**.

- **Table 13-9 Heavy Vehicle Traffic Generation and Distribution - Urban Pipeline Construction**

Pipeline Segment	Construction Site Location	Route		Heavy Vehicles (vehicles per day)
Fletcher Road and New England Highway South of Glen Aplin	Proposed Dam Construction Site	New England Highway	North of Fletcher Road	10
			South of Fletcher Road	0
		Fletcher Road		10
New England Highway North of Glen Aplin and the local roads within Stanthorpe area	Back Creek Road satellite construction site	New England Highway	North of Back Creek Road	10
			South of Back Creek Road	0
		Back Creek Road		10

For the purpose of this study construction materials quantities have been assumed as being evenly split between the five proposed construction sites (dam construction site and the Back Creek Road, Aerodrome Road, Goodwin Road

and Cannon Creek Road satellite construction camps). The construction site locations and construction material routes are presented in **Figure 13-5**.

The construction period for each segment of the Urban Pipeline was assumed as being nine weeks with an even split over the total construction period of 44 weeks.

- **Table 13-10 Heavy Vehicle Traffic Generation and Distribution - Urban and Irrigation Pipeline**

Pipeline Segment	Construction Site Location	Route		Heavy Vehicles (vehicles per day)
South of Glen Aplin area	Proposed Dam Construction Site	New England Highway	North of Fletcher Road	8
			South of Fletcher Road	0
		Fletcher Road		8
North of Glen Aplin and the Stanthorpe area	Back Creek Road satellite construction site	New England Highway	North of Back Creek Road	8
			South of Back Creek Road	0
		Back Creek Road		8
North of Stanthorpe and Applethorpe area	Aerodrome Road satellite construction site	New England Highway /Old Warwick Road	North of Aerodrome Road	8
			South of Aerodrome Road	0
		Aerodrome Road		8
Thulimbah and Poziers area	Goodwin Road satellite construction site	New England Highway	North of Amiens Road (North)	8
			South of Amiens Road (North)	0
		Amiens Road (North)/Goodwin Road		8
West of Stanthorpe area	Cannon Creek Road satellite construction site	New England Highway	North of Stanthorpe - Texas Road	0
			South of Stanthorpe - Texas Road	160
		Stanthorpe - Texas Road between New England Highway and Amiens Road (South)		160
		Amiens Road (South) / Cannon Creek Road		160

Pipeline Construction Equipment

Equipment for the Urban and Irrigation Pipeline construction is in order of 11 trucks and will be delivered via New England Highway - Fletcher Road from Brisbane. The average daily heavy vehicle traffic is not expected to be significantly influenced by the equipment delivery.

Construction Traffic Flows Summary

The detailed summary of the construction generated traffic for the various construction options over the construction period is shown in **Appendix F**.

The maximum daily volumes for the peak construction period on affected road segments for dam and pipeline construction for both the Urban Water Supply and Combined Urban and Irrigation are presented in **Table 13-11**.

- **Table 13-11 Maximum Daily Traffic Volumes during Dam and Pipeline Construction for both Options**

Road Segment		Urban Water Supply Dam		Combined Urban and Irrigation Dam	
		Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
New England Highway	North	334	30	334	30
	South	36		36	
Fletcher Road		370	30	370	30
New England Highway	North	144	10	144	8
	South	16		16	
Back Creek Road		160	10	160	8
New England Highway/Old Warwick Road	North			16	8
	South			144	
Aerodrome Road				160	8
New England Highway/Teal Road	North			16	8
	South			144	
Goodwin Road				160	8
New England Highway/Amiens Road	North			0	
	South			160	8
Cannon Creek Road				160	8

Heavy and Oversized Vehicles

No oversized transport is expected for the Emu Dam Swamp Dam and/or the associated pipeline construction.

Service Vehicles

Service vehicle movements to and from the site during the construction phase are most likely to include postal deliveries, canteen and office supplies and waste removal trucks. The service vehicle traffic has been included in the dam construction traffic.

13.1.4.3 Construction Stage Traffic Impact Assessment

Road Link Impact Assessment

Several state-controlled and local roads in the Project area will be ultimately totally or partially affected by the proposed Project either by the dam construction traffic or by the pipelines which are proposed to be built within the road reserve. The affected roads are presented in **Table 13-12**.

- **Table 13-12 Roads affected by the Project**

Construction Phase	Route/Affected roads		
Emu Swamp Dam	Fletcher Road	Stalling Lane	Emu Swamp Road
Urban Pipeline	Fletcher Road	Hale Haven Drive	Kingston Road
	New England Highway	Rifle Range Road	Greenup Street
	Whiskey Gully Road	Eukey Road	Diamondvale Road
	Brunckhorst Avenue	Sugarloaf Road	
Urban and Irrigation Pipeline	Eukey Road	Bapaume Road	Teale Road
	New England Highway *	Swans Lane	Goodwin Road
	Horans Gorge Road	Spring Creek Road	Gangemi Road
	Mt Stirling Road	Barrack Road	Pozieres Road
	Winkler Road	Aerodrome Road	Newlands Road
	Back Creek Road	Applethorpe Road	Pfrunder Road
	Stabiles Road	Ellwood Road	Pradella Road
	Amiens Road *	Rogers Road	Scotts Camp Road.
	Cannon Creek Road	Church Road	

* DMR (state-controlled road). All the other roads are local roads controlled by the SSC.

Table 13-12 shows that the road segments most affected by the construction traffic are Fletcher Road and New England Highway north of Fletcher Road. As expected, the worst option in term of additional traffic is the Combined Urban and Irrigation option. The daily levels of additional traffic on these two sections of the roads for this option are in order of 364 (334 light and 30 heavy vehicles) for New England Highway north of Fletcher Road and 400 (370 light and 30 heavy vehicles) for Fletcher Road between New England Highway and the construction site.

Lower levels of additional traffic flows due to the Emu Swamp Dam construction will be experienced on the local roads that provide access to the satellite construction sites (Back Creek Road, Aerodrome Road, Goodwin Road and Cannon Creek Road) The additional traffic due to construction on these roads is in the order of 154 (144 light and 8 or 10 heavy) vehicles per day. From the satellite construction sites short trips to deliver construction materials will occur but the amount is difficult to be quantified. Given the relatively short construction period (nine weeks for each site) it is reasonable to assume that the average number of trips generated is as described above.

The assessment is based on worst case light vehicle traffic due to the workforce commuting to/from the construction sites. Significantly lower levels of light vehicle traffic volumes are expected with the provision for this purpose.

As the current traffic data was not available for all the affected local roads and the amount of additional traffic on these roads (maximum 370 vehicles per day) is not considered to produce a significant impact given the limited period of time where the (four to five months) where the dam construction and pipeline construction activities overlap. Outside the peak construction period, the construction generated traffic is situated in the order of 210 vehicles per day for New England Highway and 152/154 vehicles per day on the local roads that provide access to the satellite construction camps.

Guidelines for Assessment of Road Impacts of Developments (DMR 2006) stipulate that a road impact assessment is required for the state controlled roads where the construction generated traffic equals or exceeds 5% of the existing AADT on a specific section of the road. It was identified and confirmed with DMR Border District that road segments that require an impact assessment are New England Highway between Stanthorpe and Fletcher Road and Fletcher Road for the construction peak period.

The performance criterion for road links is the Level of Service (LoS) as defined in Austroads (1988) *Guide to Traffic Engineering Practice:*

- LoS 'A' – between 0 and 1,100 vehicles per day;
- LoS 'B' – between 1,100 and 2,800 vehicles per day;
- LoS 'C' – between 2,800 and 5,200 vehicles per day;
- LoS 'D' – between 5,200 and 8,000 vehicles per day; and
- LoS 'E' – between 8,000 and 14,800 vehicles per day

In rural areas, LoS 'C' can be considered the minimum standard, changes between the LoS ranking below LoS 'C' imply remedial measures to maintain the required LoS would be sought.

For the purpose of this project, the following assumptions have been made:

- Annual Average Daily Traffic (AADT) levels for various LoS for level or rolling terrain, two-lane, two-way ;
- the ratio between the design hour volume and the annual average daily traffic (AADT) of 0.10;
- average traffic growth of 3% per annum for three years has been applied to the 2005 AADT volumes in order to determine the 2008 background traffic volumes ;
- background daily traffic volumes on Fletcher Road assumed to be 54 vehicles per day (based on 9 vehicles per day for each of the six properties)

The results of the assessment and a comparison between the 'without the dam' and 'construction phase of the dam' Options are shown in **Table 13-13**.

- **Table 13-13 Road Link Impact Assessment - Urban Water and Combined Urban and Irrigation Water Supply Dam Options**

Road	Section	2008 Background Traffic (vehicles/day)			2008 Construction Phase Traffic (vehicles /day)		
		AADT	Heavy Vehicles	LoS	AADT	Heavy Vehicles	LoS
New England Highway (22C)	Between Stanthorpe and Fletcher Road	4656	596 (14%)	C	4990	681 (14%)	C
Fletcher Road	Between New England Highway and the construction site	55	1 (2%)	A	455	31 (7%)	A

The construction phase of the project is not expected to have significant impact on traffic operations of any of the studied road links. The LoS for the construction phase scenario is unchanged for each road section in comparison to the background traffic volumes. The traffic generated during the construction phase of the Project will not significantly impact the capacity of the roads situated on the delivery routes.

Intersections Impact Assessment and Mitigation Measures

The affected intersection for each scenario are revealed in **Table 13-14** and shown in **Figure 13-3**.

- **Table 13-14 Affected Intersections**

Project Phase	Construction Activity	Affected Intersections
Dam Construction	Urban Water Supply Dam Combined Urban and Irrigation Dam	1 New England Highway / Fletcher Road
Pipeline Construction	Urban Water Supply Dam	1 New England Highway / Fletcher Road 2 New England Highway / Back Creek Road
	Combined Urban and Irrigation Dam	1 New England Highway / Fletcher Road 2 New England Highway / Back Creek Road 3 Stanthorpe - Texas Highway / Amiens Road 4 New England Highway / Aerodrome Road 5 New England Highway / Ellwood Road 6 New England Highway / Amiens Road (North)

Early discussions with the DMR Border District representatives revealed that the intersection where mitigation measures are specifically required is New England Highway/Fletcher Road. DMR has confirmed that the other five intersections affected have been either recently upgraded or the geometry is considered suitable to accommodate the construction generated traffic.

The New England Highway/Fletcher Road intersection is considered most affected by the construction phase and has been tested using the SIDRA Intersection V3.0 computer package for intersection analysis.

The key indicator for operational performance for unsignalised intersections is the the Degree of Saturation (DoS) for entering movements. The DoS represents the ratio of demand to available capacity for the most critical movement at the intersection. A DoS of 0.90 represents a desirable maximum for acceptable operation of signalised intersection and roundabouts. For priority junctions, the DoS level for any movement should not exceed 0.80 as per the *Guidelines for Assessment of Road Impacts of Developments* (DMR 2006) standard requirements.

The following assumptions were made in order to assess the impact of the construction traffic on the New England Highway/Fletcher Road intersection:

- saturation flow 1,950 through-car unit per hour as per SIDRA default;
- LoS performance measure - Average delay (*Highway Capacity Manual*);
- gap acceptance values specified by SIDRA default;
- peak hour traffic for construction activity occurs between 6 and 7AM (AM peak) and 5 to 6PM (PM peak). During these time periods of time the traffic on the New England Highway is approximately 8% of the AADT (DNR 2005);
- background peak hour flows are distributed 50/50 between the northbound and southbound directions during the peak hour consistent with the hourly traffic pattern surveyed at the DMR's permanent traffic count site situated 2.5 km north of Wallangarra (DMR 2005);
- additional traffic due to the proposed Emu Swamp Dam and associated pipeline construction as per **Table 13-11**; and
- average annual traffic growth of 3%.

The outputs of the intersection analysis for 2008 background traffic and construction phase traffic are presented in **Table 13-15** with further information presented in **Appendix F**. The intersection analysis for the New England Highway/Fletcher Road intersection for 2008 for AM and PM peak hours indicates that the intersection operates within the acceptable DoS range and there is considerable spare capacity. No other remedial works are required to improve the intersection performance.

- **Table 13-15 Intersection Performance Comparison between the 'without the Development' and 'with the Development' Scenarios**

Intersection			Background Traffic			Construction Phase Traffic		
			Max DoS	Queue Length (m)	Average Delay (sec)	Max DoS	Queue Length (m)	Average Delay (sec)
New England Highway/Fletcher Road	Give Way	AM	0.147	20	4.3	0.399	48	8.8
		PM	0.147	20	4.3	0.341	27	9.1

Although the intersection does not require specific measures to improve its capacity, several safety improvement and accessibility measures are recommended as result of the increased in traffic volumes.

- Provide auxiliary right turn lane into Fletcher Road by altering the pavement marking accordingly (type AUR for rural intersections as defined by the *Guide to Traffic Engineering Practice* (Austroads 2005);
- The length of the right turning slot should be at least 50 metres in order to accommodate the queue on New England Highway determined by the SIDRA analysis (refer to **Table 13-15**);
- Vegetation control to improve visibility along New England Highway for the vehicles exiting Fletcher Road;
- Inform the drivers travelling on New England Highway about the presence of heavy vehicles in the area by providing adequate signage as per *Manual of Uniform Traffic Control Devices* (DMR 2003).

Mitigation measures will not necessarily be limited to the above and will be included in the Traffic/Transportation Management Plan that the Contractor will be required to produce and submit to the SSC and DMR Border District for approval upon commissioning.

Impacts on School Bus Routes and Operation

There are six school bus routes that intersect the construction traffic routes at some points. These school bus routes service the schools in the Project area (Ballandean State School, Stanthorpe State High School, Glen Aplin State School, Applethorpe State School, The Summit State School, Thulimbah State School, Pozieres State School and Severnlea State School).

Table 13-16 below lists the school bus routes potentially affected by the construction activities in the Project area.

- **Table 13-16 School Bus Routes in Project Area**

School Bus Route Number	Description
S34N	Wallangarra to Stanthorpe (via New England Highway and Beverley Road, Whiskey Gully Road to Severnlea State School)
P1558	Horans Gorge Road / Limberlost Road to Glen Aplin State School and Stanthorpe State High School (via New England Highway)
S77	Goldfields Road, Cannon Creek Road, Bapaume Road to Amiens State School and Stanthorpe Schools (via Amiens Road)
P1491	Spring Creek Road to Amiens State School (via Amiens Road)
S511N	Mayfair Lane, Spiller lane, Teale Road, Goodwin Road, Amiens Road, Pozieres Road, Granite Berlt Drive to Posiers State School, Thulimbah State School, The Summit State School, Applethorpe State School (via New England Highway)
P1273	Eukey Road to Ballandean State School

Source: Queensland Transport - Passenger Transport Innovation and Business Solutions Unit - Toowoomba Office.

School buses operation will not be directly affected by the Project, except for a potential increase in travel time due to the construction equipment being delivered. Consultation with Queensland Transport Toowoomba Office indicates that the current contractual arrangements with the bus service providers will not have to change. In order to minimise this impact, movements of construction equipment will be scheduled outside the school drop-off and pick-up times

13.1.5 Operation Phase Traffic Impact

The operational phase of the Emu Swamp Dam will start with the dam commissioning. The activities associated with the operational phase of the dam are typical maintenance activities and recreational activities as described in **Section 3** of the EIS.

The road access to the dam (Fletcher Road) will be upgraded upon commissioning such as to provide a safe access to the tourist/recreational facilities. The proposed Stalling Lane deviation will provide a connection between Emu Swamp Road and Stalling Lane to replace the inundated Emu Swamp Road / Stalling Lane intersection. As stated before, Emu Swamp Road will be closed west of the new Fletcher Road intersection and east of the impoundment area as shown in **Figure 13-3**.

In terms of ongoing activities associated with the operational phase of the Project, maintenance personnel will be required to periodically attend to the dam infrastructure. Also, an increase in tourist trips is likely to occur as various recreation facilities are planned to be provided. This additional traffic is not expected to have a significant impact on the surrounding road network during the operational phase.

The Severn River is not used for river transport. Recreational boating occurs at Storm King Dam when there is sufficient water. Emu Swamp Dam provides further opportunity for recreational river craft.

13.1.6 Traffic Impact Mitigation Measures

The potential mitigation measures for transporting people and materials to and from the construction sites include but are not limited to:

- controlling working hours and avoiding haulage tasks during peak traffic periods and school drop-off and pick-up times. Where haulage in peak hours are unavoidable, the activities should be managed in accordance with specific traffic/transport management plans (TMP) provided to the relevant agencies in advance;
- using the established truck routes and arterial roads for the haulage of construction materials in order to minimise truck traffic on local roads;
- minimising congestion effects by effectively staging of the construction work;
- continually monitoring the construction conditions and reviewing the TMP as appropriate in order to address any negative impact;
- notifying the local communities about proposed changes to local traffic access due to construction activities and provide clear signage of changed traffic conditions.
- providing traffic control measures designed for the safe movement of vehicles, pedestrians and cyclists accessing the residential properties in the Project area.
- providing adequate on-site parking to accommodate employee vehicles and instructing the commuting employees to use the providing parking facilities in order to avoid traffic disruption due to road side parking;
- providing buses and encouraging car pooling for transportation of construction workforce; and
- maintaining at least one lane open for traffic at any time near the construction sites.

13.2 Infrastructure

13.2.1 Introduction

This section of the EIS is focussed on the potential for existing infrastructure to be affected by the Project including:

- existing dwellings;
- rail;
- telecommunications;
- power supply;
- gas;
- water supply; and
- sewerage.

13.2.2 Existing Infrastructure and Facilities

The following outlines the potential impacts of the Project on existing infrastructure. In general, the dam site is located in a rural area, and existing infrastructure is limited. The water reticulation/transfer pipelines from the dam will be located in existing infrastructure easements (such as road, electricity easements) wherever possible.

13.2.2.1 Existing Buildings

There are a few dwellings and sheds within the inundation area, mainly in the western part near the dam wall. These buildings consist of houses, machinery sheds and farm dams (see **Figure 3-1**).

13.2.2.2 Rail

Queensland Rail's (QR) Southern Railway runs to the east of the Project, approximately 4 km from the proposed dam wall. This railway line used to provide freight services but closed down more than 20 years ago.

13.2.2.3 Telecommunications

There are existing underground telecommunications services along Fletcher Road and Emu Swamp Road. Some telephone lines will be within the inundation area of the proposed dam and will require removal, replacement, or

realignment. There are no mobile phone towers within the inundation area, however, mobile communications are available. There are existing underground services along the New England Highway and along the pipeline routes.

13.2.2.4 Power Supply

Electricity supply in and around the inundation area is via direct connection to the State grid. Electricity access is supplied to most premises in the catchment by Ergon.

There are few power lines (only low voltage lines) located within the inundation area. No substations or associated infrastructure were identified in the inundation area.

There are existing power lines along the New England Highway and along the pipeline routes. The power supply from Stanthorpe to Ballandean is being upgraded to 11 kV but this line is expected to be outside the road reserve.

There is no high voltage electricity infrastructure located within the inundation area.

13.2.2.5 Gas

There are no gas pipelines in the vicinity of the Project, including the dam inundation area and the associated infrastructure including the water pipeline routes.

13.2.2.6 Water Supply

The current water supply for the majority of residences around the dam site and pipeline routes is primarily sourced from tank water supplies or local bores. However, at pipeline sites closer to Stanthorpe, town water supplied from the Storm King Dam would be the main water supply. Further details on the location of local bores and extraction points are provided in **Section 8** of the EIS.

13.2.2.7 Sewerage

No sewerage network was identified within the inundation area area. Premises within and surrounding the inundation area are served by septic tanks. The town of Stanthorpe is serviced by a sewerage network and the Stanthorpe Sewerage Treatment Plant. The network includes 8 sewerage pump stations, 57.5 km of reticulation mains, 3.2 km of rising main and over 2000 property connections.

13.2.3 Potential Infrastructure Impacts and Mitigation Measures

The assessment of potential impacts on existing infrastructure has been based on details provided within the Emu Swamp Dam Preliminary Design Report (URS 2007). Telstra and Ergon have been consulted and have provided information for impact assessment.

13.2.3.1 Existing Buildings

Dwellings identified within the proposed inundation area will be removed from site before the end of the dam wall construction period, and may be used as site offices. Where possible, materials such as wood and steel will be recycled and reused within the Project, or supplied to other local projects . Disposal to landfill will only be used as a last resort, provided that all other alternatives are not feasible. Areas of localised contamination will be treated or removed and disposed of at a licencsed facility, if applicable.

13.2.3.2 Rail

The Southern Railway will not be affected by the proposed Dam. Further, a hydraulic analysis of the proposed dam effects was undertaken as part of the Preliminary Design found that a Q100 flood event will not compromise the flood immunity of the railway line (refer to **Section 7** of the EIS).

There will be a need for pipelines to cross the railway in various locations along the Southern Railway. These crossings will be constructed by directional drilling or other suitable methods agreed with QR to ensure minimal

interruption to all train services. The location and form of the crossing will be agreed with QR during detailed design.

13.2.3.3 Telecommunications

The Project will affect a limited number of telecommunications services. Some of these existing power and telephone lines will require replacement or realignment. For the relocation of telecommunications cables, Telstra is required to organise the appropriate approval, in accordance with the *Commonwealth Telecommunications Act 1997*. The Fletcher Road services will not be affected by the project construction; however, some Emu Swamp Road services require re-location to the nearest road reserve, such as Stalling Lane.

Relocation works will include removing redundant infrastructure and installing new communications infrastructure where required. If existing communications infrastructure to be removed is installed in conduits, then the cable will be removed but the conduit left in the ground to minimise disturbance. Buried solid cable will not be removed.

Where possible, new telecommunications infrastructure will be installed within existing or new road reserve boundaries, depending on environmental constraints such as cultural heritage issues and threatened flora and fauna.

The equipment required for the relocations will generally include an excavator, chain digger, or plough dozer depending upon works required. Machinery maintenance will generally occur off site. No one site will be subject to a long period of disruption. There should be no discernable communication disruptions to any customer.

The construction period for the relocations is estimated to be less than one month. The sequencing of works will be co-ordinated with other services or activities. Work will generally be conducted between the hours of 7am to 6pm from Monday to Saturday.

Existing and future underground services will be located by survey and by reference to the relevant authorities and this information will be used during detailed design to select suitable water pipeline alignments to ensure minimal disruption to telecommunications infrastructure.

13.2.3.4 Power Supply – Ergon Infrastructure

The electrical infrastructure affected within the inundation area includes low voltage power lines. *The Electricity Act 1994* requires that Ergon will gain the appropriate approvals for relocation of electricity infrastructure.

The existing aerial power line along Fletcher Road will require upgrading to supply the dam intake tower and the pipeline pump station. These facilities will only require upgrading of the supply and will not require the installation of larger poles than those currently in place.

It is envisaged that the vast majority of power line relocations, if required, would occur by moving them to existing road reserves – which are already a designated easement. This reduces the likelihood of local disturbance, such as the clearing of vegetation and earthworks. Detailed design and planning will ensure that the impact from relocating infrastructure on endangered flora and fauna is minimised during construction works.

The overall power supply to the region will not be interrupted during the relocation works. There will be some local outages but these will be supplemented by intermittent generator power to ensure supply is not affected.

Consideration of environmental issues will be undertaken as part of the planning, design construction and maintenance phases of any power infrastructure works, with the aim of minimising any environmental impacts.

Depending on the outcome of detailed design, Ergon would be on site intermittedly for 2-3 months, presuming that the activities for relocation are run concurrently with the supply requirements.

There is the potential for land contamination to occur from oil present in the transformers on the power poles. Poles within the inundation area will be managed by digging out an area around the pole to remove any possibility of any contaminated soil remaining at the site. The transformers on power poles will be decommissioned, the oil

drained and the transformer removed from the pole and taken off site. The waste oil is to be disposed of at a licensed regulated waste disposal facility.

During the relocation works, Ergon may use sub-contractors or its own workforce, and on-site amenities at the construction area will be required during the relocation.

It is anticipated that the relocation works would occur within normal working daylight hours (Monday to Friday). There may be some requirement to work outside of these hours, based on access, traffic management, and other timing requirements.

New power supplies for the irrigation pump stations in Aerodrome Road and Canon Creek Road will be required but these supplies are not large and can be provided from the existing network possibly requiring minor upgrades.

Existing and future aerial services will be located by survey and by reference to the relevant authorities. This information will be used during detailed design to select suitable water pipeline alignments to ensure minimal disruption to power lines.

13.2.3.5 Water Supply

The Project will not impact on existing water supply pipelines as existing dwellings at the inundation area are supplied by tank or bore water. The planned water pipelines will be located in road easements, minimising the possibility of affecting existing water supplies and reticulation around Stanthorpe.

13.2.3.6 Sewerage

Any septic tanks on properties within the inundation area will be emptied and removed from the site. More discussion on this is found in **Section 6** of the EIS. The Project will not impact on the existing sewerage network as the planned water pipelines will be located in road easements, minimising the possibility of affecting the existing sewerage network around Stanthorpe.

13.2.4 Summary of the Impacts on Infrastructure

The disturbance caused by the relocations and decommissioning of existing infrastructure such as telecommunications and electricity assets will be minimal and temporary in nature. All efforts will be made to relocate infrastructure within existing infrastructure corridors, such as road reserves so that disturbance to land and vegetation is minimised. Relocations will be undertaken by the relevant utility and will be paid for by SSC. All works will be carried out under an Environmental Management Plan to be drafted by relevant authority that will address issues such as vegetation management, erosion control, noise and other relevant potential impacts.

Water pipelines will be located within existing road reserves to minimise environmental impacts. There appears to be sufficient space to locate the pipelines alongside other existing infrastructure. The survey work as part of detailed design will determine the existing infrastructure represents a constraint to the pipeline layout.

Further survey work will be undertaken as part of the detailed design phase to identify any additional affected infrastructure identified.