



Traffic Impact Assessment Report

Muswellbrook Pumped Hydro Energy Storage Lower Reservoir Geotechnical Investigation

Prepared for: AGL Energy Pty Ltd 24 November 2022

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Contents

1.	Introduction1			
2.	The Proposal			
	2.1 Lower Reservoir Geotechnical Investigations			2
	2.2	Site Locat	tion	2
	2.3	Program	me	3
	2.4	Generate	d Traffic	3
	2.5	Proposed	Access Routes	4
3.	Existi	ng Conditio	ons	.5
	3.1	External I	Road Network	5
		3.1.1	New England Highway	5
		3.1.2	Sandy Creek Road	5
		3.1.3	Limestone Road	6
	3.2	TfNSW Pe	ermanent Count Site	6
	3.3	Public Tra	ansport	7
4. Impacts Assessment		nent	.8	
4.1 Road Network Capacity		work Capacity	8	
	4.2	Pavemen	t Conditions	8
	4.3	Average ⁻	Travel Speed	8
	4.4	Property	Access	8
	4.5	Pedestria	in and Cyclists	8
5.	Concl	usion		.9

Figures

Figure 2-1: Lower Reservoir Geotechnical Investigations Locality Map	3
Figure 2-2: Proposed Access Tracks	4
Figure 3-1: Surrounding Road Network (Image Source: MetroMap)	5
Figure 3-2: Daily Traffic Flow Profile by Vehicle Type	6
Figure 3-3: Bus Route 413	7
Figure 3-4: Bus Route 414	7

Tables

Table 2-1: Estimated Heavy and Light Vehicle Movements (one-way)	4
Table 3-1: Hourly Traffic Flows and Heavy Vehicle Percentage Along New England Highway	7

1. Introduction

SMEC was engaged by Muswellbrook Pumped Hydro Pty Ltd which is a joint venture between AGL Energy Limited and Idemitsu Australia Pty Ltd (the JV) to prepare a Statement of Environmental Effects (SEE) for the proposed geotechnical investigations, which will be submitted to Muswellbrook Shire Council under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The proposal seeks consent for geotechnical investigations at Bells Mountain, Muswellbrook for a potential future Pumped Hydro Energy Storage (PHES) scheme using land associated with and adjacent to Muswellbrook Coal Mine. The mine operator, Muswellbrook Coal Company Limited (MCC), intends to close the mine and complete rehabilitation by 2026.

This report outlines the traffic and transport assessment undertaken to identify the potential impacts of the proposed geotechnical investigations for the lower reservoir on the road network surrounding the Muswellbrook Coal site.

2. The Proposal

2.1 Lower Reservoir Geotechnical Investigations

The geotechnical investigation works will be undertaken using a total of two borehole sites and a total of seven testing pits to be dug prior to construction to allow geotechnical engineers an opportunity to assess soil composition.

The proposed development specifically comprises of the following:

- Site mobilisation works and laydown area establishment,
- Augmentation and improvement of existing access tracks to facilitate safe site access
- Creation of new access tracks involving vegetation removal
- Borehole creation using a drilling rig, reaching depths of around 200 m 300 m below ground surface
- Storage of excess drilling water and cuttings in a temporary waste skip bin to be removed offsite
- Rock core transportation and storage offsite
- Drill stem testing at the completion of drilling whilst the drill is still in position
- Borehole decommissioning within 28 days of completing the works either by installing a fully grouted vibrating wire piezometer and data logger, or fully grouted backfilling
- Geophysical surveys utilising seismic refraction tomography profiling
- Excavating up to seven test pits using a track mounted excavator digging pits up to 5m deep, 1m wide and 4m long. Test pits are backfilled immediately after reaching target depth and geotechnical logging and sampling is completed.

Site rehabilitation works, including:

- 1. Reinstating areas where a cut/fill bench was created
- 2. Re-seeding access tracks
- 3. Removing all equipment and environmental controls

Minor filling around existing culverts where the existing ground has eroded

Insitu stress measuring, undertaken progressively down the borehole whilst the drill rig is still in position

Borehole imaging, undertaken by a specialist sub-contractor, including optical and acoustic imaging and a sonic logging profile.

2.2 Site Location

The geotechnical investigation site is located within the existing Muswellbrook Coal Mine site approximately 8 km north-east of the town of Muswellbrook, in the Muswellbrook Local Government Area (LGA) as shown in Figure 2-1. Land use of the Project site comprises primarily Primary Production areas and Environmental Management areas.



Figure 2-1: Lower Reservoir Geotechnical Investigations Locality Map

2.3 Programme

The geotechnical investigations are proposed to be carried out in 2023 once development consent granted. The total duration of works is anticipated to be up to 12 weeks from date of commencement.

2.4 Generated Traffic

Table 2-1 shows the estimated heavy and light vehicle movements (one-way) during various stages of the proposed works. For purposes of this assessment, a worst-case scenario has been assumed, whereby the proposed geotechnical investigations for both the lower and upper reservoirs will occur in parallel, although this may not necessarily be the case depending on confirmation of final program.

Table 2-1: Estimated Heavy and Light Vehicle Movements (one-way)

Task Name	Vehicle Type	No. of one-way vehicle Type per day- Lower Reservoir		Total no. of one-way heavy vehicle movements per day
Site mobilization and demobilisation (first/ last few days)	Medium Rigid Truck	6	6	12
Geotechnical investigation works	Light Vehicles	4	4	8
	Medium Rigid Truck (water cart plus sucker truck)	2	2	4

Assuming an average 10 working hours per day (assuming standard working hours 7am to 6pm on weekday Monday to Friday and 8am to 1pm on Saturday), there would be 12 one-way heavy vehicle movements per day (around 1 one-way heavy vehicle movement per hour) during the site mobilisation and demobilisation phases and 4 one-way heavy vehicle movements per day (around 1 one-way heavy vehicle movements every 2 hours) during the geotechnical investigation works. In addition, the proposed works would generate 8 one-way light vehicle movements per day.

2.5 Proposed Access Routes

Proposed access to the lower reservoir site is primarily gained from the New England Highway and Sandy Creek Road on the northern edge of Muswellbrook via Limestone Road (at approximately 2.85 km from the New England Highway) then the existing dirt tracks would be used as shown in Figure 2-2.



Figure 2-2: Proposed Access Tracks

Limestone Road is approximately 3.25m wide, therefore a two-way communications protocol is required to avoid multiple vehicles attempting to traverse the road in conflicting directions at the same time. Waiting areas would need to be provided at selected points adjacent to the access track to maintain a clear path. Further information is provided in a standalone assessment report prepared by SMEC to investigate the feasibility of proposed access tracks and to identify alternative tracks and improvements, where required.

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Muswellbrook Pumped Hydro Energy Storage Lower Reservoir Geotechnical Investigation Prepared for Muswellbrook Pumped Hydro Company Pty Ltd

3. Existing Conditions

3.1 External Road Network

Error! Reference source not found. shows the existing road network in the vicinity of the project which includes New England Highway, Sandy Creek Road and Limestone Road. New England Highway is a designated heavy vehicle route and a section of Sandy Creek Road (approximately 2 km from the intersection of New England Highway) is an approved 19m B-double route with travel conditions.



Figure 3-1: Surrounding Road Network (Image Source: MetroMap)

3.1.1 New England Highway

The New England Highway (NEH) is a State Road that forms part of the inland Sydney to Brisbane road link. In the vicinity of the Project, the road is a two-lane, two-way road with a posted speed limit of 60 Km/h. An overtaking lane (approximately 125 m) is provided on the northbound carriageway at the intersection of Sandy Creek Road. Within Muswellbrook, the highway continues as Bridge Street south of Hunter Street with a posted speed limit of 50 km/h and two-lanes in each direction for most of its length. New England Highway/ Bridge Street forms the spine of the traffic network, providing direct access to the town centre and strategic trips through Muswellbrook heading to Aberdeen to the north and Singleton to the south east.

3.1.2 Sandy Creek Road

Sandy Creek Road is a two-way, two-lane road with a speed limit of 100 Km/h reduced to 60 km/h on the approach to the New England Highway. The road has an at-grade rail crossing facility located approximately 40m to the east of New England Highway.

3.1.3 Limestone Road

Limestone Road is a narrow gravel access track located approximately 2.85 km to the east of New England Highway. The road intersects with Sandy Creek Road at its northern end and provides direct access to the Project site.

3.2 TfNSW Permanent Count Site

A permanent classified traffic counter site ID 6157 is located on New England Highway approximately 60m north of Burtons Lane. A review of traffic data for the week Monday 15th to Friday 19th November 2021 (excluding 16th November due to missing data) is presented in Figure 3-2, which shows the daily traffic volume profile in 1 hour increments by vehicle type, including light and heavy vehicles, as well as total vehicle volumes. This traffic data was used to identify AM and PM peak hour traffic volumes on New England Highway, which were used for impact assessment purposes. The identified AM and PM peaks are 08:00-09:00 and 15:00-16:00, respectively.



Figure 3-2: Daily Traffic Flow Profile by Vehicle Type

Table 3-1 summarises weekday peak hourly traffic volumes and the heavy vehicle percentages along New England Highway. On average, 164 heavy vehicles were recorded during the AM peak which represents 19% of the total traffic volume. In the PM peak however, there were 196 heavy vehicles which accounted for 16% of the daily traffic volume.

	5 1 11	Weekday AM peak (1 hour)		Weekday PM peak (1 hour)	
Date	Direction	Total	Heavy	Total	Heavy
	Northbound	469	92 (20%)	390	102 (21%)
15/11/2021	Southbound	406	64 (16%)	102	87 (21%)
	Two-way	875	156 (18%)	492	189 (21%)
17/11/2021	Northbound	424	105 (25%)	324	101 (23%)
	Southbound	400	63 (16%)	87	101 (23%)
	Two-way	824	168 (20%)	411	202 (23%)
18/11/2021	Northbound	419	101 (24%)	347	92 (21%)
	Southbound	424	70 (17%)	101	109 (22%)
	Two-way	843	171 (20%)	448	201 (21%)
19/11/2021	Northbound	417	88 (21%)	341	101 (18%)
	Southbound	427	73 (17%)	101	90 (17%)
	Two-way	844	161 (19%)	442	191 (18%)
Average	Northbound	432	97 (22%)	483	99 (21%)
	Southbound	414	68 (16%)	469	97 (21%)
	Two-way	847	164 (19%)	952	196 (16%)

Table 3-1: Hourly Traffic Flows and Heavy Vehicle Percentage Along New England Highway

3.3 Public Transport

Bus route 413 uses a section of New England Highway providing services to residents within the town centre and bus route 414 runs through Muswellbrook using New England Highway to Scone via Aberdeen, as shown in Figure 3-3 and Figure 3-4, respectively.



Figure 3-3: Bus Route 413

Figure 3-4: Bus Route 414

4. Impacts Assessment

4.1 Road Network Capacity

In regard to New England Highway, Project traffic would travel to site before the AM peak (08:00-09:00) and would leave the site after the PM peak (15:00-16:00). The highway is anticipated to have sufficient capacity to accommodate the additional 16 two-way light vehicle movements for the duration of the works, as well as the maximum of 24 two-way heavy vehicle movements associated with mobilisation and demobilisation. Thus, Project traffic would have minor impacts on the operation of the highway, which already carries a high proportion of heavy traffic.

Sandy Creek Road provides local access to a number of properties and Limestone Road is a narrow access track providing access to the coal mine, these roads currently have low traffic volumes. While the capacity of these roads is able to accommodate the additional traffic generated by the Project, additional traffic on Limestone Road would need to be managed, as indicated in Section 4.2.1. delineation

4.2 Pavement Conditions

New England Highway is a designated heavy vehicle route and the section of Sandy Creek Road (approximately 2 km from the intersection of New England Highway) is an approved 19m B-double route with travel conditions, therefore the nominal increase in heavy vehicle traffic on these roads is not expected to have any adverse impacts. In regard to Limestone Road, this is an unsealed gravel road, therefore it is recommended to monitor its conditions during use and repair as necessary.

4.3 Average Travel Speed

Heavy vehicles are likely to travel at lower speeds than other vehicular traffic. The access route via Sandy Creek Road has one lane in each direction. It should be noted that very low traffic volumes are expected to use this road, as it provides local access only and the impacts of Project related traffic on average travel speed are therefore considered to be minor.

The access route via New England Highway between north of Aberdeen Street has one lane in each direction except at the interception of Sandy Creek Road, where an overtaking lane is provided on the northbound carriageway. South of Aberdeen Street, the access route carriageway varies from two to four lanes. New England Highway/ Bridge Street is a designated B-double route and there is already a high percentage of heavy vehicles using this road. The impacts on average travel speed along the highway is anticipated to be minimal.

4.4 Property Access

Existing property access will be maintained during the whole period of the works and no impacts are anticipated due to vehicle movements associated with the project.

4.5 Pedestrian and Cyclists

Active transport infrastructure is not provided along Sandy Creek Road, Limestone Road, or the section of New England Highway north of Aberdeen Street. Given the low volume of anticipated Project related vehicles, it is expected that the Project would have no impact on pedestrians and cyclists along these roads.

In addition, the proposed access route passes through the township of Muswellbrook where active transport infrastructure is provided along New England Highway/ Bridge Street south of Aberdeen Street. The low volume of the additional traffic generated by the project is not anticipated to impose impacts on pedestrian and cyclist movements along this section of the road.

5. Conclusion

The introduction of 24 heavy vehicle movements per day during mobilisation and demobilisation and 8 light vehicle movements during the AM and PM peaks for the duration of the proposed works is anticipated to have minimal impacts on the operation of surrounding road network.



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