



# CHAPTER 5.8

## OTHER MATTERS

## 5.8 Other matters

### 5.8.1 Noise

A noise and vibration assessment (NVA) has been prepared by EMM to assess the potential noise and vibration impacts of Exploratory Works and is presented in Appendix T. The NVA assessed potential impacts described in the following sections.

#### i Construction noise

Construction noise has been assessed in line with the *Interim Construction Noise Guideline* (ICNG) (DECC 2009). The NVA provides the recommended noise management levels (NML) for Exploratory Works construction noise to be assessed against. The NVA identified assessment locations to identify potential impacts to sensitive receptors, such as residences in Talbingo (some 400 m from Spillway Road and about 1.6 km from the Talbingo barge infrastructure area) or users of KNP.

All construction activities were modelled and assessed, and total noise levels at those assessment locations were calculated. The April/May 2019 construction period provided a fair representation of worst case construction noise levels at all assessment locations. This period was adopted as a snap-shot in time to represent worst case construction noise levels for Exploratory Works via predicted single point construction noise levels (represents worst case at a point in time) and noise contours (represents the outer envelope from all activity across the entire construction pad) for standard and out of hours (OOH) periods.

#### ii Sleep disturbance

Sleep disturbance has been assessed in line with the NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy* (RNP). Construction activity will occur between the ICNG night-time hours of 10pm to 7am. Therefore, blasting and intermittent noises such as loading/unloading of materials, equipment start-up alarms or other similar construction activities have been assessed against the sleep disturbance criteria at residential assessment locations.

#### iii Construction vibration

Construction vibration has been assessed in line with *Environmental Noise Management – Assessing Vibration: a technical guideline* (DEC 2006). Safe working distances for typical items of vibration intensive plant equipment have been identified for both cosmetic damage and human comfort and used to assess the potential for contraction vibration impacts based on proposed construction activities.

#### iv Blasting

The limits adopted by the EPA for blasting are provided in the Australian and New Zealand Environment Council (ANZEC) guidelines *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC 1990). It is noted that this criteria applies to residences only with the aim to minimise annoyance and discomfort. Notwithstanding the above, the restrictions and times and frequency of blasting do not apply to premises where the effects of blasting are not perceived at noise sensitive sites.

Indicative vibration levels from drill and blast activities were predicted using the guidance given in *AS2187-2-2006: Explosives – Storage and Use Part 2: Use of Explosives* and formulae provided in Imperial Chemical Industries (ICI) *Explosives Blasting Guide* (ICI Technical Services 1995).

A quantitative blast assessment has been undertaken to calculate blast ground vibration and overpressure based on conservative empirical prediction formula provided in the ICI guideline. An offset distance has been developed for vibration sensitive receivers which would satisfy vibration criteria for both road construction and tunnel excavation.

#### v Road traffic noise

The RNP and US EPA Federal Highways (FHWA) method was used to predict noise levels at assessment locations for additional traffic from the construction of Exploratory Works. Road traffic noise levels have been assessed by calculating existing and existing plus project traffic at representative residential assessment locations using FHWA methods.

#### vi Impact assessment and mitigation measures

Table 5.19 outlines key assessment results and mitigation measures to manage predicted impacts.

**Table 5.19 Potential noise and vibration impacts and mitigation measures**

Impact	Reference	Environmental management measure
<b>Construction activities</b>	NOI01	A Construction Noise and Vibration Management Plan will be prepared and implemented during construction.  The main objective plan would be to manage construction activities to meet ICNG NMLs and applicable vibration criteria across the project.
<b>Construction noise</b>  Assessment results for the single point calculations indicate that construction noise levels satisfy NMLs at all assessment locations with the exception of R2 where a 2 dB and 5 dB exceedance is predicted for the OOH period during calm and adverse weather conditions, respectively.  The predicted exceedance at location R2 is generated by Spillway Road construction activities (near Talbingo). Road construction for this activity is scheduled to occur for six weeks. The time spent in this zone and therefore the duration of noise levels above the NMLs will therefore be less.  Predicted noise contours representing worst case noise level footprint from the project construction during worst case meteorological conditions are presented Figure 5.14.	NOI02	Snowy Hydro will notify noise affected residents (including R2) of the scheduled construction works and the potential noise impacts.  Noise monitoring during the initial stages of construction will be undertaken to determine if actual construction noise levels are above NMLs. If NMLs are exceeded, the proponent will: <ul style="list-style-type: none"> <li>• identify feasible and reasonable mitigation measures that reduce construction noise levels to at or below NMLs;</li> <li>• limit road construction for areas where there are noise affected residents to ICNG standard hours only; or</li> <li>• enter into a negotiated agreement with the property owners.</li> </ul>

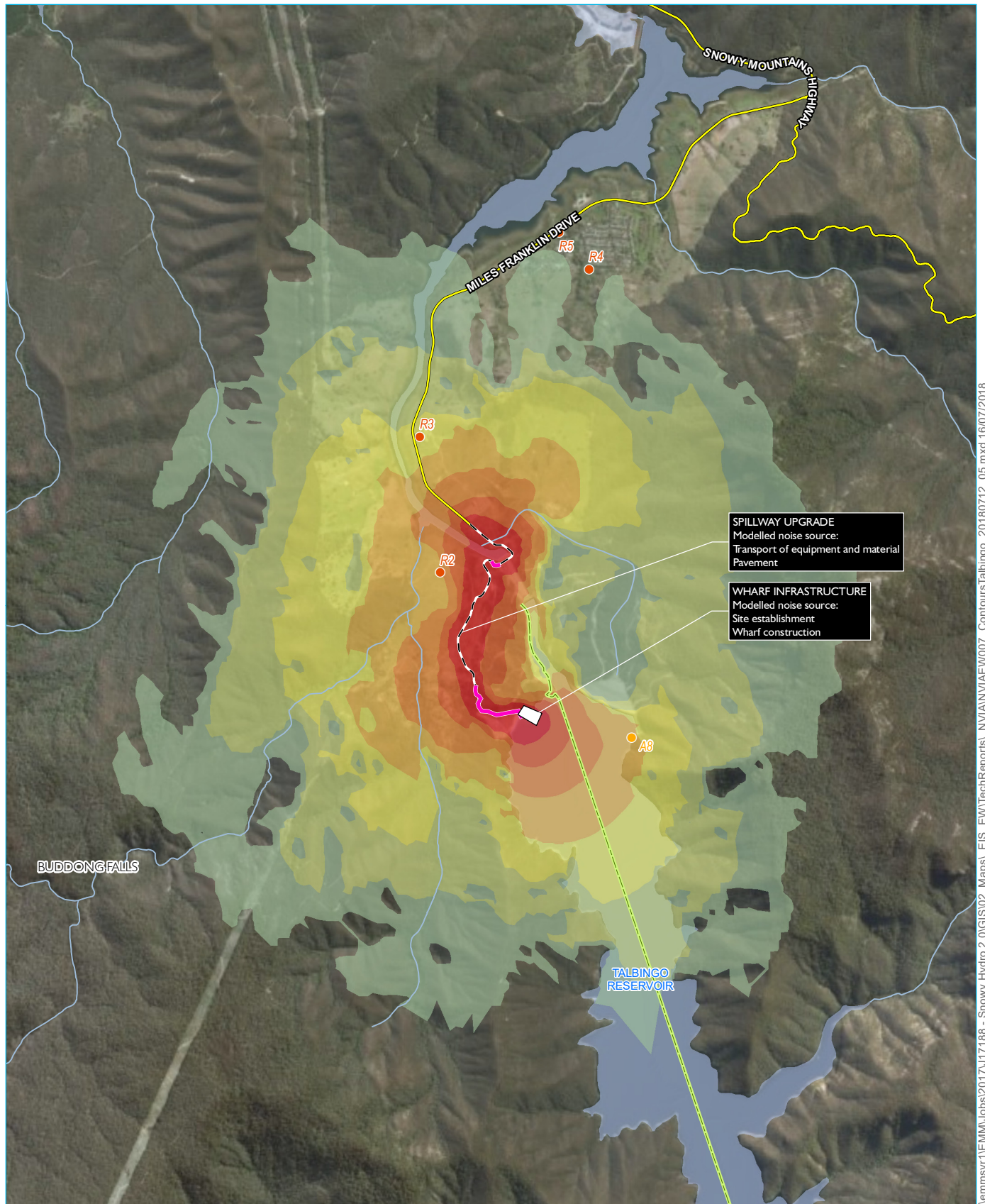
**Table 5.19 Potential noise and vibration impacts and mitigation measures**

Impact	Reference	Environmental management measure
<p><b>Sleep disturbance</b></p> <p>Predicted maximum noise levels from project construction at residential assessment locations during adverse weather are provided in the NVA. Predicted noise levels from the project satisfy sleep disturbance criteria at all assessment locations.</p>	-	No specific mitigation measures identified.
<p><b>Construction vibration</b></p> <p>The nearest residence to construction activity is assessment location R2 which is about 400 m away from Spillway Road construction. This places this assessment location well outside of the safe working distances for human response. Vibration impacts from construction at residential assessment locations are therefore highly unlikely.</p> <p>For safe working distances for cosmetic damage, based on the guidelines, if construction is within 25 m of sensitive structures, then work practices should be reviewed so that the safe working distance in the NVA are followed.</p>	-	<p>The safe working distances for cosmetic damage should be monitored throughout the construction process.</p> <p>If the safe working distances outlined in the NVIA are encroached, real time vibration monitoring with audible and visual alarms should be undertaken at vibration sensitive structures so actual vibration levels can be monitored and managed appropriately.</p>
<p><b>Blasting.</b></p> <p>Residential receivers surrounding the project are well outside the blast offset distances from road construction and tunnel excavation. Therefore, blast impacts on residential receivers are considered highly unlikely.</p> <p>There is the potential for one blast to occur each night for tunnel excavation. However, because of the proposed blast frequency and the controlled blast parameters typical of the proposed construction method, it is unlikely that emissions would cause significant impact at nearest residences in Talbingo.</p> <p>Several vibration assessment locations fall within the required offset distances as shown in Figure 5.15.</p>	NOI03	<p>A Blasting Procedure is to be developed and implemented during construction.</p> <p>Blast practices should be reviewed when blasting occurs in the vicinity of significant heritage items. This may include limiting the maximum instantaneous change or re-assessing the significance and/or the sensitivity of these items to vibration prior to construction commencing in the area.</p> <p>The potential for blast impacts on residents during the night period is considered highly unlikely given the distance and topography separation between construction and nearest residents in Talbingo. Notwithstanding, blast practices will be constantly reviewed and adapted if complaints are received from residents due to night blasting (noting that no more than one blast will occur during the night period).</p> <p>A survey of heritage items and other potential vibration sensitive receivers should be undertaken in the blast offset zone identified around the tunnel excavation portal.</p>

**Table 5.19 Potential noise and vibration impacts and mitigation measures**

Impact	Reference	Environmental management measure
<p><b>Road traffic noise</b></p> <p>To assess road traffic noise at the residential assessment locations it has been assumed that the majority (95%) of project related traffic will use the Snowy Mountains Highway approach from the east. The remaining 5% will utilise the northern route through Talbingo down to Talbingo Reservoir.</p> <p>Nearest residential assessment location potentially affected by project related traffic are located on Miles Franklin Drive, Talbingo and Snowy Mountains Highway to the east of the project area.</p> <p>Road traffic noise levels are predicted to satisfy RNP assessment requirements</p>	-	None required
<p><b>Noise and vibration impacts on fauna</b></p> <p>Very little evidence is available in literature on the direct impacts that noise and vibration has on fauna. However, it is likely that if levels are suitable for humans, they would also for a large extent be tolerable by fauna. It is also understood the construction will be avoided in areas with recorded pygmy possum population which will minimise potential for noise and vibration exposure on this species. More information on this provided Section 5.1.</p>	-	None required





Source: EMM (2018); Snowy Hydro (2018); ESRI (2018); SMEC (2018); DFSI (2018); GA (2017); LPMA (2011)

#### KEY

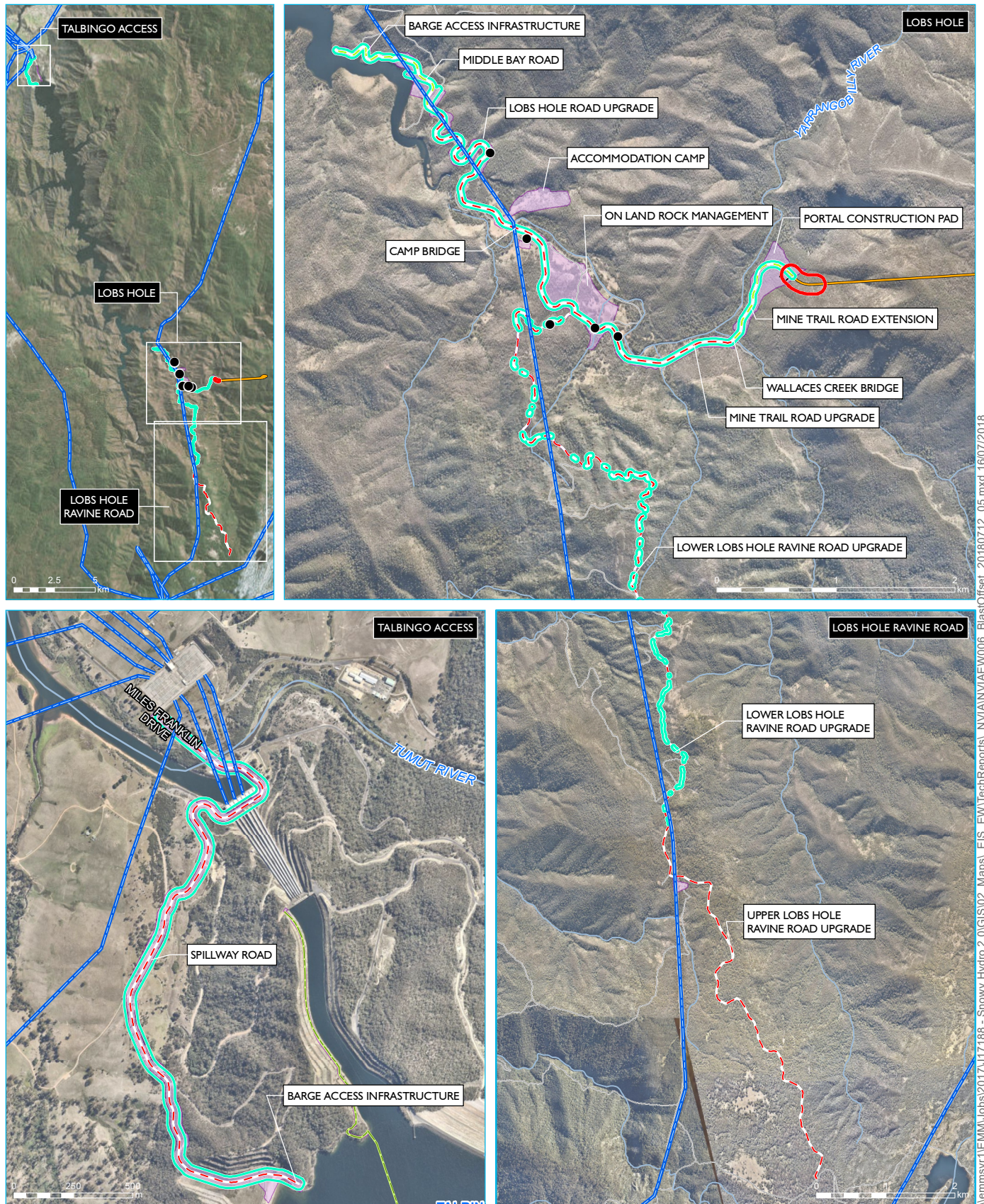
- |                         |                                      |  |
|-------------------------|--------------------------------------|--|
| — Communications cable  | — Access road                        | <b>Noise contours - dB</b><br><div style="display: flex; justify-content: space-between; width: 100%;"> <span>35-39</span> <span>40-44</span> <span>45-49</span> <span>50-54</span> <span>55-59</span> <span>60-64</span> <span>&gt;65</span> </div> |
| — Main road             | □ Construction area                  |  |
| — Perennial watercourse | ● Receptors                          |  |
| ■ Scheme storage        | ● Passive recreation                 |  |
|                         | ● Residential                        |  |
|                         | — Spillway Road construction zone    |  |
|                         | — OOH NML exceedance predicted at R2 |  |

0 1 2 km  
GDA 1994 MGA Zone 55

Outer envelope construction noise contours, day and night - Talbingo

Snowy 2.0  
Environmental Impact Statement  
Exploratory Works  
Figure 5.14





Source: EMM (2018); Snowy Hydro (2018); NearMap (2018); SMEC (2018); NSW Archaeology (2018); Robert Bird (2018); DFSI (2017); LPMA (2011)

GDA 1994 MGA Zone 55

## KEY

- - Access road upgrade
- - Access road extension
- - Exploratory tunnel
- - Main road
- - Local road or track
- - Watercourse
- Disturbance footprint
- Blast offset zones
- Tunnel portal entry blast emission zone
- Potential granite blasting emission zone
- Vibration monitoring location
- Heritage site
- Electricity transmission line

Blast offset distances to achieve ground vibration criteria

Snowy 2.0  
Environmental Impact Statement  
Exploratory Works  
Figure 5.15



### 5.8.2 Air quality and greenhouse gas

An air quality and greenhouse gas assessment (AQGGA) has been prepared by Jacobs Group (Australia) Pty Limited (Jacobs) to provide an assessment of the air quality and greenhouse gas impacts of Exploratory Works. The AQGGA is provided in Appendix U and has been carried out in line with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2016).

The primary air quality matter was identified as airborne particulate matter (ie dust) from the handling and transport of excavated material.

The CALPUFF computer-based air dispersion model was used to predict ground-level concentrations and deposition levels due to the identified emission sources, and the model predictions have been compared with relevant air quality criteria. The model considered the expected transport distances for the emissions, as well as influences of the locally complex terrain, non-uniform land use, and potential for stagnation conditions characterised by calm or very low wind speeds with variable wind directions.

The model predicted that particulate matter, 10 micrometers or less in diameter and particulate matter 2.5 micrometers or less in diameter (PM<sub>10</sub>, PM<sub>2.5</sub>) total suspended particles (TSP) and deposited dust levels would not exceed relevant EPA assessment criteria at the nearest sensitive receptor (that is, the accommodation camp). The modelling did however show that there was a potential for the 24-hour average PM<sub>10</sub> concentration to approach the criterion (50 µg/m<sup>3</sup>) if the contribution from the works were high and the background levels were elevated on a particular day. The results were taken to be indicative of the potential impacts given that background levels were not known and necessarily had to be estimated.

In summary, acceptable air quality outcomes are achievable for the nearest sensitive receptor (the accommodation camp). Nevertheless, monitoring will be carried out prior to and during construction activities to characterise the existing air quality environment and to inform the daily management of the proposed activities.

#### i Mitigation measures

Table 5.20 outlines mitigation measures to manage predicted impacts for air quality.

**Table 5.20 Potential air quality mitigation measures**

Impact	Reference	Environmental management measure
<b>Air quality</b>		
General construction activities	AIR01	<p>Air quality management procedures to cover the proposed Exploratory Works will be developed in an Air Quality Management Plan (AQMP) prior to commencement.</p> <p>The AQMP would provide procedures and measures to address the following activities:</p> <ul style="list-style-type: none"><li>● hauling spoil on unsealed roads;</li><li>● loading and unloading of excavated material;</li><li>● dozer shaping excavated rock emplacement areas;</li><li>● excavated rock emplacement areas; and</li><li>● machinery exhausts and plant and equipment.</li></ul>



### 5.8.3 Greenhouse gas

The greenhouse gas assessment identified vegetation removal, stationary and mobile construction plant and equipment and the production of construction materials for Exploratory Works as the main sources of greenhouse gas emissions. Concrete and cement based materials were the main sources of emissions with regards to the production of materials, with over 70% of emissions coming from these sources. However, the total estimated emissions reflect a small increase and total in the context of State and National emissions and no significant greenhouse gas emissions management is warranted.

### 5.8.4 Public safety

A Bushfire risk and hazard assessment (BFRHA) was prepared by EMM to assess the bushfire and hazard impacts of Exploratory Works and is provided in Appendix V. The BFRHA was prepared in line with the NSW Rural Fire Service (RFS) *Planning for Bush Fire Protection Guideline* (PBP) (NSW RFS 2006).

The BFRHA also considered other relevant guidelines and documents including the KNP PoM (NPWS 2006) and the *KNP Fire Management Strategy* (FMS) (NPWS 2008). The BFRHA considered impacts including bushfire, emergency egress and evacuation and dangerous goods. The BFRHA assessed bushfire and hazard impacts as they relate to the accommodation camp, portal construction pad and barge access infrastructure. These are described in the following sections.

#### i Asset protection zones

The accommodation camp was found to fully comply with the PBP APZ requirements for radiant heat levels, slope and maintenance for 'residential and rural residential subdivisions'. The portal construction pad and barge access infrastructure were both considered against APZ requirements for 'other development'. The portal construction pad achieves the recommended 10 m minimum hazard setback for all structures. The design of the barge access infrastructure is yet to be finalised, however, during detailed design allowance of appropriate APZs will be provided.

#### ii Location and adequacy of services

The accommodation camp was found to fully comply with the PBP standards for services for non-reticulated water supply, electricity services and gas services for 'residential and rural residential subdivisions'. Water supply at the portal construction pad was found to be in accordance with the KNP FMS. Consideration will be given to providing a static water supply at Middle Bay barge ramp and Talbingo barge ramp.

#### iii Construction standards and design

The accommodation camp will comply with the construction requirements of PBP and the bushfire construction standards. The portal construction pad and barge access infrastructure will comply with the construction standards of the PBP and relevant Australian Standards.

#### iv Emergency egress and evacuation

The location and topography of the project area means that not all access solutions for residential and rural residential subdivision will be met for the accommodation camp. Specifically only single road access and egress to the accommodation camp will be provided via Lobs Hole Ravine Road. Similarly Lobs Hole Ravine Road will be constrained in terms of width due to avoidance of Smoky Mouse habitat and will not include passing bays every 200 m. Therefore several solutions will be implemented to meet the objectives of PBP for access.

In the event of an emergency the barge access route provides a secondary egress option. This secondary access route will be via dedicated watercraft to be kept at the barge ramps. There is also an existing helipad at Lobs Hole that provides another alternative access/egress point in the event of an emergency.

#### vii Dangerous goods

Diesel generators and associated fuel storage tanks at the accommodation camp, portal construction pad and the barge access will be designed and maintained to avoid risks to surrounding bushland and will be located away from the hazard, wherever possible. During detailed design, suitable storage facilities will be provided for storage of ammunition and fuel, to prevent ignition of surrounding vegetation and to reduce the storage area susceptibility to bush fire impacts.

#### viii Mitigation measures

Table 5.21 outlines mitigation measures to manage public safety.

**Table 5.21 Public safety mitigation measures**

Impact	Reference#	Environmental management measure
Worker safety	PUS01	An Emergency Response Plan (ERP) will be prepared and implemented during construction. The ERP will contain all procedures relating to flood, bushfire and other emergencies.
APZs	PUS02	<ul style="list-style-type: none"> <li>• APZs will be designed implemented and maintained as prescribed in the BFHRA.</li> <li>• At the detailed design stage, consideration will be given to the administration building, for the allowance of an APZ.</li> <li>• At the detailed design stage, consideration will be given to the accessibility of fire trucks within the defendable space of the portal construction pad structures, as well as the accessibility to the fire water tanks at this location.</li> </ul>
Access	PUS03	<ul style="list-style-type: none"> <li>• Consideration should be given to the implementation of passing bays or reversing bays at regular intervals in the upgrade of Upper and Lower Lobs Hole Ravine Road.</li> <li>• Consideration of marine traffic management to minimise conflict between reservoir users and barge activities during Exploratory Works.</li> <li>• At the detailed design stage, consideration should be given to a fire trail, around the perimeter of the accommodation camp and within the APZ of the camp.</li> </ul>
Water supply	PUS04	If spray systems are to be incorporated into the design of the buildings, dedicated fire water supplies will be increased to accommodate the systems.
Services (gas and electricity)	PUS05	Location and maintenance of services will be carried out so as not to contribute to the risk of bush fire or impede the fire fighting effort.

**Table 5.21**      **Public safety mitigation measures**

Impact	Reference#	Environmental management measure
The storage of hazardous materials and ignition sources	PUS06	<p>Diesel generators and associated fuel storage at the portal construction pad, construction compound at Lobs Hole and the barge access infrastructure will be designed, housed and maintained so that they will not serve as a risk to surrounding bushland and will be located away from the hazard, wherever possible.</p> <p>A suitable storage facility will be designed for storage of the ammunition for blasting activities and fuel storage, to prevent ignition of surrounding vegetation and to reduce the storage area susceptibility to bush fire impacts.</p> <p>A Bush Fire Management Plan (BFMP) for the Exploratory Works will be prepared and approved as part of the Conservation Management Plan prior to construction and will detail measures and procedures to prevent fires igniting during the works.</p>
Construction standards and design	PUS07	Buildings will be constructed in accordance with relevant National Construction Code (NCC), Building Code of Australia (BCA) and Australian Standards as prescribed in the BFHRA.
Community bush fire refuge	PUS08	A community bush fire refuge will be required at Lobs Hole providing a refuge for anyone caught out by fire preventing an escape by way of the single entry and exit road. This will include those staying at the accommodation camp. The location and design for the refuge will be determined during detailed design.
Bush fire preparedness and procedures	PUS09	<p>Specific management actions to ensure suitable bush fire preparedness are undertaken as part of Exploratory Works and ahead of the bush fire season will be included in the BFMP.</p> <p>Appropriate work procedures, so as to limit the potential of ignition of surrounding bushland will be included in the BFMP.</p> <p>The BFMP for Exploratory Works will detail the maintenance measures and procedures during the works.</p>
Bush fire emergency management	PUS10	Bush fire emergency response and evacuation procedures will be included in the ERP for Exploratory Works. The procedures will include bush fire response and evacuation, bush fire awareness, a community bush fire refuge place in the case that offsite evacuation cannot occur and monitoring and review procedures.

### 5.8.5 Cumulative impacts

No other construction projects are currently underway or planned within the project area that may interact with Exploratory Works.

Elements of Exploratory Works that relate to land based construction activities, such as road works, tunnelling, and establishment of the portal construction pad, accommodation camp, rock emplacement areas and supporting infrastructure, do not have any interaction with the existing Snowy Scheme.

Interaction with the existing Snowy Scheme is limited to construction activities in Talbingo Reservoir such as dredging and construction of barge access infrastructure, establishment of communications cable and the water services pipeline, and subaqueous placement of excavated material from the exploratory tunnel. These activities all take place on or within Talbingo Reservoir, an existing supply reservoir for the Snowy Scheme. The impact of Exploratory Works on the operating regime, water quality and quantity of the reservoir has been considered as part of this EIS. No impacts to the existing Scheme are expected.



Cumulative impacts for Exploratory Works are limited to the interaction of environmental and social impacts for the duration of construction, and with regard to the staging of construction activities and management of KNP. As part of this EIS, technical assessments have been prepared in line with relevant guidelines, policies, plans and industry codes of practice. They have accounted for interactions with other key issues where relevant. For example, the assessment of noise and vibration impacts has informed the assessment of impacts to heritage items, biodiversity, aquatic ecology, and social amenity. Similarly, the cumulative impact of Exploratory Works on KNP has been assessed in Section 5.2, and is informed by a number of these technical assessments.

Cumulative impacts of Exploratory Works also include consideration of short and long term benefits. These benefits relate to opportunities for recreational improvements, conservation programs, and other compensatory measures that will be focused on contributing to the values of KNP. The overall cumulative impact of Exploratory Works is considered in terms of residual impacts as well as these long term management opportunities, which is further evaluated in Chapter 7.