Googong Township water cycle project: Stage A - Network (east)

Noise and Vibration Management Plan

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1 Introduction

1.1 Context

This Noise and Vibration Management Plan (NVMP) forms part of the Construction Environmental Management Plan (CEMP) for the Googong Township water cycle project Stage A – Network (east) (the Project).

Refer to Section 1 and Section 2 of the CEMP for additional detail on the scope of the Project to which this NVMP applies.

This NVMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the Statement of Commitments (SoC), the safeguards listed in the Googong Township water cycle project Environmental Assessment (EA), submissions report, and all applicable legislation.

1.2 Background

The Googong Township water cycle project EA assessed the potential noise and vibration impacts of construction and operation of the Project.

As part of EA development, a detailed assessment was prepared to address the Director-General's Requirements issued by the Department of Planning and Infrastructure (DP&I). Noise and vibration was addressed in Section 13.4 and Appendix J of the EA.

The EA concluded that there is unlikely to be significant noise and vibration impacts associated with the construction and operation of the Project, following the implementation of the proposed mitigation measures identified in the EA.

1.3 Environmental management systems overview

The overall Environmental Management System for the Project is described in Section 1.5 of the CEMP.

This NVMP is part of the environmental management framework for the Project, as described in Section 1.5 of the CEMP. In accordance with CoA C20(d), this Plan has been developed in consultation with the Office of Environment and Heritage (OEH) and Queanbeyan City Council (QCC).

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how the Principal and the contractor will manage noise and vibration impacts during construction of the Project.

2.2 Objectives

The key objective of the NVMP is to ensure that construction noise and vibration impacts are minimised and that compliance with construction noise and vibration requirements is achieved. To realise these objectives, the following will be undertaken:

- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this NVMP.
- Ensure appropriate measures are implemented to address the relevant CoA and SoC, and the safeguards detailed in the EA and submissions report (refer Sections 3.2 and 3.3 respectively).
- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise potential adverse noise and vibration impacts (refer Section 5.1).

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislative requirements

Section 3.1 of the CEMP identifies the 'legal and other requirements' applicable to the Project. This section identifies the key legislation applicable to managing noise and vibration on the Project.

Environmental Planning and Assessment Act 1979

As outlined in Section 3.1 of the CEMP, the Project has been assessed and approved by the NSW Department of Planning and Infrastructure (DP&I) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Construction must be undertaken in accordance with the CoA. Mechanisms for evaluating compliance with the EP&A Act will be achieved through:

- Undertaking programmed environmental audits of the CEMP and associated management plans (refer Section 6.4).
- Obtaining the Minister for Planning's approval of the CEMP and relevant management plans.

Protection of the Environment Operations Act 1997 (POEO Act)

The POEO Act is the key piece of environment protection legislation, and is administered by the Environment Protection Agency (EPA). The following approaches/tools are used to administer the POEO Act:

- Integrated environment protection licensing.
- Regulation of scheduled and non-scheduled activities.
- Environmental protection offences and penalties.
- Environmental protection notices.
- Establishment of a general duty to notify of environmental harm.
- Powers for authorised officers to investigate actual or potential pollution events.

Schedule 1 of the POEO Act lists activities that are subject to environmental licensing. The construction of the Project is not subject to a licence under the POEO Act.

The following apply to the construction of the Project:

- Section 139 of the POEO Act identifies requirements associated with the operation of plant (maintenance and operation in a proper and efficient manner).
- Section 140 of the POEO Act identifies requirements for dealing (process, handling store etc) with materials that cause the emission of noise.

Compliance with the POEO Act will be achieved through implementation of the CEMP and associated management plans, including this NVMP. Mechanisms for evaluating compliance with the POEO Act will include:

- Environmental site inspections.
- Environmental audits against the CEMP and this Plan.
- Development and implementation of monitoring programs to demonstrate compliance as required.
- Achievement of Project goals, eg no penalty infringement notices (PINs) issued by the EPA for the Project.

3.1.2 Applicable guidelines

This NVMP has been prepared based upon the following documents:

- *Interim Construction Noise Guideline* (ICNG) (DECC, 2009).
- *Assessing vibration: A technical guideline* (DECC, 2006).
- Australian Standard AS 2436 *Guide to noise control on construction, maintenance and demolition sites* (AS 2436, 2010).
- British Standard BS 7385 *Evaluation and measurement for vibration in buildings Part 2* (BS 7385, 1993).
- *Development Construction Specification C101 – General* (QCC, 2011).
- *Development Construction Specification C212 – Clearing and grubbing* (QCC, 2011).
- *Development Construction Specification C220 – Stormwater Drainage* (QCC, 2011).

3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed Table 3.1. A cross reference is also included to indicate where the condition is addressed in this Plan or other management documents.

Table 3.1 Conditions of approval relevant to noise and vibration management

CoA No.	Condition requirements	Document reference
A8	The Proponent shall ensure that employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.	Section 6.2
C7	Subject to conditions C9 and C10, construction works that would generate audible noise at any sensitive receiver shall only be undertaken during the following hours: a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive; b) 8:00 am to 1:00 pm on Saturdays; and c) at no time on Sundays or public holidays. *Note: this condition does not apply in the event of a direction from police or other relevant authority for safety reasons.*	Table 5.1 (NV5, NV6, NV8)

CoA No.	Condition requirements	Document reference
C8	The hours of construction specified under condition C7 may be varied with the prior written approval of the Director-General. Any request to alter the hours of construction shall be: a) considered on a case-by-case basis; b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours and any other information necessary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site; and c) require that affected residential receivers are informed of the timing and duration of any construction activities approved under this condition at least 48 hours before that work commences.	Table 5.1 (NV8) Appendix A
C9	Any work generating high noise that has impulsive, intermittent, low frequency or tonal characteristics, including jack hammering, line drilling, pile driving, rock hammering, rock breaking, saw cutting, sheet piling, vibratory rolling but excluding blasting, shall only be undertaken: a) between the hours of 8.00 am and 6.00 pm Monday to Friday; b) between the hours of 8.00 am and 1.00 pm Saturday; and c) in continuous blocks of no more than three hours, with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers; d) except as otherwise approved by the Director-General. For the purposes of this condition “continuous” includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.	Table 5.1 (NV7)
C10	Blasting associated with the construction of the project is only permitted during the following hours: a) 9.00 am to 5.00 pm, Mondays to Fridays, inclusive; b) 9.00 am to 1.00 pm on Saturdays; and c) at no time on Sundays or public holidays. Where compelling safety reasons exist, the Director-General may permit blasting outside of these hours on a case-by-case basis where any request is accompanied by details of the nature and need for blasting outside the approved hours and the measures to be implemented to minimise impacts.	Table 5.1 (NV9, NV10)
C11	The Proponent shall implement all reasonable and feasible noise mitigation measures to minimise noise generated by construction of the project, consistent with the requirements of the *Interim Construction Noise Guidelines* (DECC, July 2009)	Table 5.1 (NV2, NV4, NV5, NV11, NV14, NV16, NV17, NV18, NV19)

<table>
<tr><th>CoA No.</th><th>Condition requirements</th><th>Document reference</th></tr>
<tr><td>C12</td><td>The Proponent shall ensure that blasting and vibration resulting from construction of the project does not cause exceedances of the criteria in Table C1.
Table C1: Blast impact criteria
<table>
<tr><th>Location</th><th>Airblast overpressure (dB(Lin Peak))</th><th>Ground vibration (mm/s)</th><th>Allowable exceedance</th></tr>
<tr><td rowspan="2">Residence on privately-owned land</td><td>120</td><td>10</td><td>0%</td></tr>
<tr><td>115</td><td>5</td><td>5% of the total number of blasts over a period of 12 months</td></tr>
</table></td><td>Table 5.1 (NV10)</td></tr>
<tr><td>C13</td><td>At least two weeks prior to commencing blasting activities, the Proponent shall notify Council and potentially affected landowners, including details of time, location and frequency of the blasting and providing a contact point for inquiries and complaints.</td><td>Table 5.1 (NV10)
Section 5.1.2</td></tr>
<tr><td>C20(d)</td><td>A Noise and Vibration Management Plan to identify measures to monitor and manage noise and vibration and to identify all feasible and reasonable noise and vibration mitigation measures. The Plan shall be developed in consultation with OEH and Queanbeyan City Council and include, but not necessarily be limited to:
(i) the identification [of] all potentially affected sensitive receivers (such as future residents of the Googong township due to the undertaking of final works associated with the water recycling plant), and noise management levels;
(ii) a review of the assumptions made in Appendix J of the EA to the final determined construction noise levels;
(iii) details of the measures to avoid and/or mitigate the actual noise levels, including the noise mitigation measures identified under section 13.4.4 of the Environmental Assessment;
(iv) an assessment, if blasting is proposed, to calculate the maximum instantaneous charge (MIC) able to be used in order to meet amenity-based ground vibration and overpressure criteria in condition C12;
(v) details of the consultation process for noise mitigation measures with any affected sensitive receivers; and
(vi) details of noise monitoring to be undertaken to manage potentially elevated noise levels.</td><td>Section 4.1.1
Table 5.1 (NV3, NV4, NV11, NV12, NV13, NV14, NV16, NV17, NV18, NV19)</td></tr>
<tr><td>D1</td><td>Noise emitted from the operation of project-related infrastructure shall not exceed 35 dB(A) ($L_{Aeq\ (15min)}$) at any residence on privately-owned land.
Note: Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.</td><td>N/A (operational requirement)</td></tr>
</table>

3.3 Statement of commitments

The SoC relevant to this Plan are listed in Table 3.2. A cross reference is also included to indicate where the condition is addressed in this Plan or other management documents.

Table 3.2 Statement of commitments relevant to construction noise and vibration

Objective	Ref. No.	Commitment	NVMP reference
Minimise impacts on human amenity as a result of construction hours.	C2	Construction work will generally be undertaken between the hours of 6.00am and 7.00pm Monday to Friday, and 8.00am to 1.00pm Saturdays. At all other times, construction noise levels will be as agreed with the relevant receiver(s).	Table 5.1 (NV5)
Minimise the noise impact associated with construction.	N1	Construction noise and vibration management strategies will be outlined in the CEMP. Measures will include the overall construction times (refer to C2) as well as the following: • Construction noise goals. • Liaising with community to advise on likely timing and duration of noisy activities. • Procedures for resolving complaints received from residents and landowners and dealing with exceedances (including the appointment of a liaison person to maintain relationships between the community and the construction contractors in accordance with AS 2436:1981 *Guide to noise control on construction, maintenance and demolition sites*). • Using noise abatement measures (physical and managerial) where reasonable and feasible. • Procedures for liaising with the relevant agencies to discuss the need to construct outside of regular hours, for specific cases.	Section 4.1.3 Section 5.1.2 Table 5.1 (NV2, NV3, NV6, NV8, NV14, NV16, NV17, NV18, NV19) Appendix A
Assess the potential for vibration impacts should blasting be required.	N1A	Should blasting at the WRP or SPS sites be necessary based on geotechnical information and construction methodology, a construction vibration assessment will be undertaken in accordance with *Assessing Vibration: A Technical Guideline* (DECC, 2006) to determine any additional management measures required for blasting activities.	At present, no blasting is proposed as part of the Stage A – Network (east) Project. However measures have been included in Table 5.1 (NV9, NV10)
Meet noise requirements near the WRP site boundary during operations.	N2	The acoustic treatments specified for the WRP components, as outlined in Appendix J, will be implemented and then reviewed for effectiveness following noise measurement verification.	N/A. The WRP does not form part of the Stage A Network (east) Project, to which this NVMP relates

4 Environmental aspects and impacts

The following sections summarise the existing noise environment and identifies sensitive noise and vibration receivers. Identified impacts are then reviewed. The key reference documents are Section 13.4 and Appendix J of the EA.

4.1 Environmental aspects

4.1.1 Existing noise environment

The area surrounding the Project site largely comprises farming land. Ambient noise surveys were carried out in February 2009 to characterise and quantify the noise environment for the area surrounding the Project. Noise levels at the representative receiver sites were found to be low due to the predominantly rural nature of the area, with identified sources of noise including birds, distant vehicles, aircraft and livestock. Due to the low ambient background noise levels (in the range of 24 – 28 dBA), the Project has adopted a rating background level (RBL) L_{A90} of 30dBA. This is consistent with the methodology described in the Industrial Noise Policy (INP) (EPA, 2000), whereby where the rating background level is found to be less than 30 dB(A), it is set to 30 dB(A).

The adoption of the methodology to determine the RBL outlined in the INP is permitted by the ICNG.

Figure 4.1identifies the sensitive noise and vibration receivers for the Project. Figure 4.2 identifies the sensitive noise and vibration receivers in the adjacent Stage A – Network (west) project area.

Figure 4.1 Sensitive receivers (in the Project area)

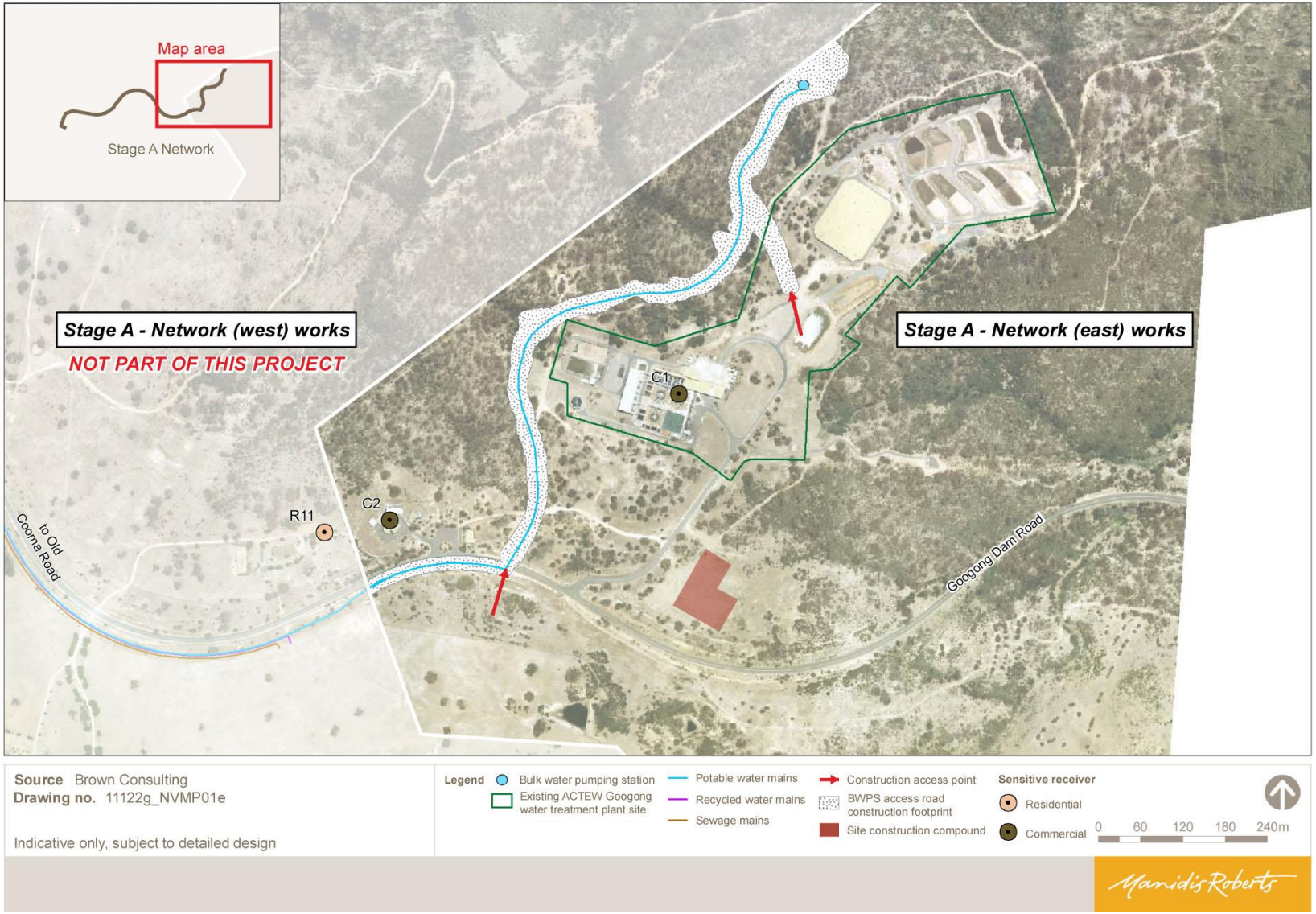
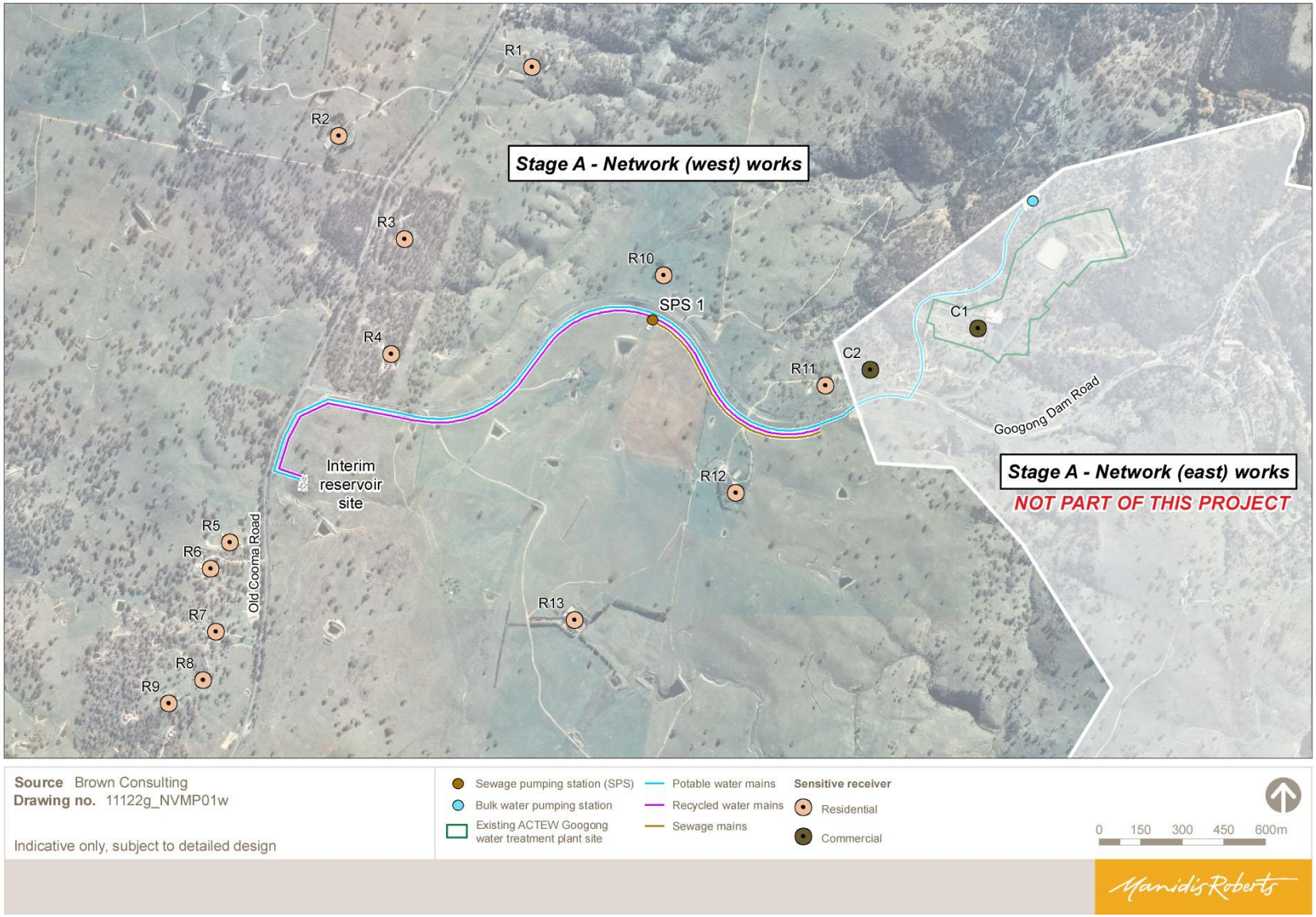


Figure 4.2 Sensitive receivers (in the Stage A – Network (west) area)



4.1.2 Existing traffic volumes

Current traffic volumes measured for the EA on Old Cooma Road and Googong Dam Road are very low. Along Googong Dam Road current traffic volumes are 260 vehicles per day. Traffic volumes under 1000 vehicles per day may be characterised as a series of discrete events rather than as a steady noise source.

4.1.3 Construction noise criteria

Table 4.1 identifies the construction noise criteria as outlined in the *Interim construction noise guidelines* (DECC, 2009).

Table 4.1 *Interim construction noise guideline* (DECC, 2009) construction noise criteria

Time of the day	Management level (dBA) $L_{Aeq(15\ min)}$
Standard hours: • Monday to Friday 7 am to 6 pm • Saturday 8 am to 1 pm • No work on Sundays or public holidays	Noise affected RBL + 10 dB
	Highly noise affected 75 dB(A)
Outside recommended standard hours	Noise affected RBL + 5 dB

Using the background noise levels and the methodology identified in the *Interim construction noise guidelines* (DECC, 2009), Table 4.2 provides the construction noise goals for the Project.

Table 4.2 Project construction noise goals

Receiver type	Time of day	Noise goal (dBA) $L_{Aeq(15\ min)}$
Residential receiver	Approved working hours	40
	Out of hours	35
Commercial receiver	Approved working hours	40

4.1.4 Construction vibration criteria

Human response

Acceptable values for intermittent vibration in terms of vibration dose values (VDV) are provided in Table 4.3. These are based on *Assessing vibration: a technical guideline* (DECC, 2006).

Table 4.3 Acceptable intermittent vibration dose values ($m/s^{1.75}$)

Location	Daytime[1] preferred	Maximum	Night-time[1] preferred	Maximum
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutes and places of worship	0.40	0.80	0.40	0.80

1. Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.

Building response

British Standard BS 7385 *Evaluation and measurement for vibration in buildings Part 2* (BS 7385, 1993) provides criteria against which the likelihood of building damage from ground vibration can be assessed.

Table 4.4 provides the building damage vibration criteria for the Project. The values are based on a conservative value to achieve a minimal risk of cosmetic damage.

Table 4.4 Transient vibration guide values

Building type	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures – residential or light commercial type buildings	7.5 mm/s at 4 Hz increasing to 10 mm/s at 15 Hz	10 mm/s at 15 Hz increasing to 25 mm/s at 40 Hz and above

4.1.5 Blasting criteria

The *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) are used to assess potential blast emissions impacts at residential and other noise and vibration receivers. Blast impact criteria for PPV and airblast overpressure are provided in Table 4.5 as required by CoA (C12).

Table 4.5 Blast impact criteria

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

4.1.6 Construction traffic criteria

The NSW Road Noise Policy (RNP) presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments.

Table 4.6 Road traffic noise assessment criteria

Road category	Type of project	Assessment criteria dBA	
		Day (7am to 10pm)	Night (10pm to 7am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use development	L_{Aeq}(1hour) 55 dBA (external)	L_{Aeq} (1hour) 50 dBA (external)

4.2 Construction activities

Key aspects of the Project that could result in adverse construction noise and vibration impacts on sensitive receivers include:

- Trenching and installation of pipes.
- Earthworks and construction of the bulk water pumping station.

- Compound operation.
- Blasting (if required).

Plant and equipment required to construct these aspects of the Project are identified in Table 4.7.

4.3 Noise and vibration impacts

4.3.1 Construction noise impacts

Noise levels experienced at any receiver along the Project will depend on numerous factors, such as the distance to the construction site, shielding/topography between the site and receivers, and the activities occurring. The length of the Project and the transient nature of the construction activities could also alter the noise levels experienced at individual receivers. For example, as trenching for pipework is likely to progress around 20 – 100 metres per day, depending on the number of pipes being installed in any one location, the duration of worst-case construction noise impacts would be limited to the period when all activities are occurring in close proximity to a receiver. Noise impacts would reduce as trenching works move away from residences.

A range of noise management measures to minimise noise impacts are outlined in Table 5.1. These management measures are to be implemented where feasible and reasonable. Management measures and work practices including limiting use of reversing alarms, switching off plant and equipment when not in use and ensuring work occurs within approved working hours would be implemented to reduce the predicted noise impacts and/or reduce the intrusiveness or nuisance of construction noise impacts at sensitive receivers.

Construction noise impacts have assumed the plant and equipment identified in Table 4.7 will be operated simultaneously during each construction activity.

Table 4.7 Plant and equipment associated with each activity

Activity	Plant and equipment	Sound power levels (dBA)
Trenching and installation of pipes. Earthworks and access road.	• Trucks as required • Excavator loading • Rock breaker • Front end loader • Dozer D9 or equivalent • Grader 12G or equivalent • Water truck • Compactor • Backhoe	• 109 • 12 • 121 • 115 • 119 • 118 • 105 • 115 • 108
Bulk water pumping station construction.	• Trucks as required • Concrete transit mixer (deliveries) • Backhoe • Crane • Paver • Hand tools	• 109 • 115 • 108 • 115 • 117 • 120

Noise modelling has been undertaken and noise impacts predicted for construction noise. The noise modelling takes into consideration the source noise levels of the anticipated equipment, and the distance and topography between the equipment and the nearest receivers. Table 4.8 identifies predicted noise levels for each activity, and assumes that all plant/equipment are operating concurrently for the 15-minute assessment period. Exceedences of the construction noise goal at each sensitive receiver (refer Figure 4.1 and Figure 4.2 for receiver locations) are identified in **bold.**

Table 4.8 Predicted activity-specific construction noise impacts

Receiver	Noise goal*	BWPS access road	BWPS earth works	BWPS building works	Pipe laying
R1	40	**48**	**42**	**46**	**58**
R2	40	**45**	38	**42**	**58**
R3	40	**46**	38	**43**	**64**
R4	40	**46**	37	**41**	**73**
R5	40	**40**	31	36	**61**
R6	40	**40**	31	35	**58**
R7	40	39	<30	34	**54**
R8	40	36	<30	32	**52**
R9	40	37	<30	33	**51**
R10	40	**58**	**48**	**52**	**75**
R11	40	**68**	**53**	**56**	**79**
R12	40	**60**	**46**	**50**	**72**
R13	40	**49**	38	43	**59**
C1	40	**78**	**61**	**63**	**70**
C2	40	**73**	**55**	**58**	**80**

* Based on the *Interim Construction Noise Guideline* (DECC, 2009)

Table 4.9 identifies predicted cumulative noise impacts using the following scenarios:

- All Stage A – Network (east) (Project) activities.
- All Stage A – Network (west) (Project) and Stage A – Network (east) activities, including construction of the bulk water pumping station, access road and pipelines, as the Stage A – Network (east) works will be occurring concurrently.
- All Stage A – Network (west) and Stage A – Network (east) activities except pipelaying (as this is a short term transitional activity).

In these worst-case scenarios, the construction noise goals will be exceeded at all sensitive receivers should all activities occur at the same time**.** In most cases the exceedance is reduced when pipelaying is

not occurring. Furthermore, the predicted exceedances are only likely to be apparent at any one receiver for a relatively short period of time. As plant and equipment move away from the receiver, the noise levels will reduce accordingly.

Table 4.9 Predicted cumulative construction noise impacts

Receiver	Construction noise goal*	Predicted cumulative noise level (dBA) $L_{Aeq(15\ min)}$ Including all Stage A – Network (east) activities	Predicted cumulative noise level (dBA) $L_{Aeq(15\ min)}$ Including all Stage A – Network (west) and Stage A – Network (east) activities	Predicted cumulative noise level (dBA) $L_{Aeq(15\ min)}$ Including all Stage A – Network (west) and Stage A – Network (east) activities EXCEPT pipelaying
R1	40	50	59	54
R2	40	47	59	53
R3	40	48	65	56
R4	40	47	73	56
R5	40	42	62	55
R6	40	41	59	53
R7	40	40	56	50
R8	40	38	53	47
R9	40	39	52	47
R10	40	59	77	72
R11	40	69	79	69
R12	40	60	73	62
R13	40	50	60	54
C1	40	78	79	78
C2	40	73	81	73

* Based on the *Interim Construction Noise Guideline* (DECC, 2009)

4.3.2 Construction traffic noise impacts

Construction traffic (including the likely construction vehicles required for construction of the Project and adjacent Stage A – Network (west) works) is estimated to generate an additional 182 truck movements and 76 light vehicles movements per day (refer to Traffic Management Protocol, CEMP Appendix C).

The closest sensitive receiver to Googong Dam Road is R11 at approximately 75 metres. Based on the likely hourly peak flows the L_{Aeq}(1 hour) noise level is predicted to be 54dBA. This is below the daytime criterion of 55dBA (refer Table 4.6).

4.3.3 Construction vibration impacts

Human response

The major vibration generating activities will occur during site preparation and access road construction (earthworks) and construction of the bulk water pumping station, resulting from the use of vibratory

rollers, rock breakers etc. Should blasting be required, vibration impacts associated with blasting would be considered in a Blast Management Plan (refer to Table 5.1 – NV10).

Due to the distance of vibration causing activities and sensitive receivers (the closest receiver is around 80 metres from vibratory activities), the level of vibration will be below the level of human perception. For example a large vibratory roller would generate a vibration level of <0.1 mm/s (PPV) at a distance of 200 metres. The criterion for daytime residential receivers is 0.2 mm/s.

Building response

Based on five millimetres per second conservative criterion (refer Table 4.4), Table 4.10 provides indicative safe distances from buildings for vibration intensive equipment. Due to the separation of buildings from the works (the closest receiver is around 80 metres from vibratory activities), vibration due to construction is likely to be below the criterion for 'minimal risk of cosmetic damage'. Vibration monitoring is recommended to confirm the safe working distances of equipment at specific sites (refer to Section 6.4.2).

Table 4.10 Indicative safe distances from buildings for vibration intensive equipment

Item	Rating	Safe working distance
Rock breaker	Light	2 metres
	Medium	5 metres
	Heavy	20 metres

It is unlikely that blasting will be carried out as part of the Project. The need for blasting will be confirmed upon completion of additional geotechnical investigation. Should blasting be required, the contractor will be required to prepare a blast management plan. A blast management plan will identify the maximum instantaneous charge (MIC) possible to ensure that vibration levels do not exceed the criteria in Table 4.4 and Table 4.5.

4.3.4 Cumulative noise and vibration impacts

GTPL and it's contractors will be carrying out other construction work packages adjacent to the Stage 1A – Network (east) over the same time period. This includes the construction of Stage 1A – Network (west) and Stage A – water recycling plant (WRP) (both approved under Part 3A of the EP&A Act as part of Stage 1) and the Googong township subdivision (approved under Part 4 of the EP&A Act by Queanbeyan City Council). These works, when occurring at the same time in proximity to sensitive receivers, may increase the predicted construction noise impacts. As noted in Section 4.3.1, the noise impact assessment carried out for the Project included construction of the Stage A – Network (west) works to account for worst case noise and vibration impacts as the Stage A – Network (west) works will be occurring concurrently.

Each work package will be managed through a separate CEMP. GTPL, as the proponent of each package of work, will ensure that the separate projects liaise with one another to ensure that high noise generating activities are scheduled to minimise cumulative construction noise impacts at sensitive receivers as far as practical (refer to Table 5.1 – NV20).

5 Environmental control measures

5.1 Noise and vibration mitigation and management measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the CoA, SoC and the EA. Specific measures and requirements to address noise and vibration impacts are outlined in Table 5.1.

Table 5.1 Mitigation measures

ID	Measure	When to implement	Reference	Responsibility
NV1	All Project personnel will be provided training on the requirements of this Plan through site inductions, toolbox talks or specific training.	Prior to construction, construction	CoA A8	Construction Manager Environment Manager
NV2	Consultation will be undertaken in accordance with Community Information Plan. This consultation will include: • Prior consultation with nearby residents that may be affected by noise or vibration generating activities (including noisy construction activities, after hours work, and other activities that may result in noise and/or vibration complaints). • Notification of schedule for noisy works. The information provided to the community will include a telephone number for enquiries regarding the Project and/or lodging noise complaints.	Prior to construction, construction	CoA C11 SoC N1	Environment Manager
NV3	Noise complaints will be received, recorded and investigated in accordance with the Complaints Management Procedure, which forms part of the Community Information Plan. Complaints will be responded to within the timeframes specified in the Complaints Management Procedure.	Construction	CoA C20(d)(iv) SoC N1	Environment Manager
NV4	Where construction noise impacts on sensitive receivers exceed the noise criteria outlined in Table 4.1, appropriate mitigation measures will be investigated and considered, including: • Physical noise controls (eg temporary noise screens). • Noise impact management strategies (eg implementation of respite periods or other).	Construction	CoA C20(d)(iii)	Construction Manager Environment Manager

ID	Measure	When to implement	Reference	Responsibility
NV5	Construction works, other than blasting and high noise activities, will only be undertaken during the following hours: • 7:00 am to 6:00 pm, Mondays to Fridays. • 8:00 am to 1:00 pm on Saturdays. • At no time on Sundays or public holidays.	Construction	CoA C7 SoC C2	Construction Manager Environment Manager
NV6	Construction works associated with the Project, other than blasting, will only be undertaken outside the hours specified above in accordance with the **Out of Hours Works Procedure** (Appendix A). This procedure stipulates that works, other than blasting, can only be undertaken out of hours in the following circumstances (unless otherwise approved by the Director-General (DP&I)): • Any works that do not cause construction noise to be audible at any sensitive receiver. • For the delivery of materials required outside these hours by the police or other relevant authorities for safety reasons. • Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.	Construction	CoA C8 SoC N1	Construction Manager Environment Manager
NV7	Any work generating high noise that has impulsive, intermittent, low frequency or tonal characteristics, including jack hammering, line drilling, pile driving, rock hammering, rock breaking, saw cutting, sheet piling, vibratory rolling but excluding blasting, will be undertaken (unless otherwise approved by the Director-General (DP&I)): • Between the hours of 8.00 am and 6.00 pm Monday to Friday. • Between the hours of 8.00 am and 1.00 pm Saturday. • In continuous blocks of no more than three hours, with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers.	Construction	CoA C9	Construction Manager Environment Manager
NV8	In accordance with the **Out of Hours Works Procedure** (Appendix A) the hours of construction activities specified in NV5 may be varied with prior written approval. Requests for out of hours approval will be considered for construction activities which cannot be undertaken during standard construction hours for technical or other justifiable reasons and will be considered on a case by case or activity-specific basis. Any request to alter the hours of construction will: • Be accompanied by details of the nature and need for activities to be	Construction	CoA C8 SoC N1	Environment Manager

ID	Measure	When to implement	Reference	Responsibility
	conducted during the varied construction hours. • Include any other information necessary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact sensitive receivers. • Require that affected residential receivers are informed of the timing and duration of any construction activities approved under this condition at least 48 hours before that work commences.			
NV9	Blasting, if required, will only occur during the following hours (unless otherwise approved by the Director-General (DP&I)): • 9.00 am to 5.00 pm, Mondays to Fridays, inclusive. • 9.00 am to 1.00 pm on Saturdays. • At no time on Sundays or public holidays.	Construction	CoA C10 SoC N1A	Construction Manager Environment Manager
NV10	Should blasting be required, the contractor will be required to prepare a blast management plan. A blast management plan will: • Identify the maximum instantaneous charge (MIC) possible to ensure that vibration levels do not exceed the criteria in Table 4.3 and Table 4.4. • Include notification requirements for council and potentially affected landowners at least two weeks prior to commencing blasting activities. Notification will include the time, location and frequency of the blasting, and a contact point for inquiries and complaints.	Construction	CoA C13 SoC N1A	Environment Manager
NV11	Noise mitigation and management measures will be installed or implemented prior to relevant works commencing to reduce impact/nuisance to surrounding sensitive receivers.	Prior to construction, construction	CoA C11 CoA C20(d)(iii)	Construction Manager Environment Manager
NV12	Noise monitoring at sensitive receivers will be carried out in the event of a noise related complaint. Should monitoring indicate significant exceedances of the construction noise impacts identified in Table 4.9 the Project will consult with the Environmental Representative and implement additional and feasible mitigation measures as necessary.	Construction	CoA C20(d)(Vi)	Construction Manager Environment Manager
NV13	Vibration monitoring may be carried out in response to complaints, exceedances, or for the purpose of refining construction methods or techniques to minimise vibrations. Impacts will be avoided by changing work methods/equipment, or by providing some form of building protection where possible.	Construction	CoA C11 CoA C20(d)(iii)	Construction Manager Environment Manager

ID	Measure	When to implement	Reference	Responsibility
NV14	Where reasonable and feasible: • Site sheds, materials and stockpiles will be located to provide acoustic shielding. • Temporary noise barriers and/or hoardings will be installed around construction sites and site compounds.	Construction	CoA C11 CoA C20(d)(iii) SoC N1	Construction Manager Environment Manager
NV15	Compounds will be designed to promote one way traffic so that the requirement for vehicles to reverse is minimised, and noise from reversing alarms is minimised.	Pre-construction, construction	CoA C11	Construction Manager Environment Manager
NV16	Machines that are used intermittently such as dump trucks, rollers, bulldozers, excavators, bobcats, mulchers etc will be shut down when not operated for more than 15 minutes.	Construction	CoA C11 CoA C20(d)(iii) SoC N1	Construction Manager Foreman
NV17	All plant and equipment will be well maintained and fitted with adequately maintained silencers, will have engine covers fitted and be maintained in good order.	Construction	CoA C11 CoA C20(d)(iii) SoC N1	Construction Manager Foreman
NV18	Plant or machinery will not be permitted to ‘warm-up’ before nominated working hours.	Construction	CoA C11 CoA C20(d)(iii) SoC N1	Construction Manager Foreman
NV19	Reversing of vehicles and equipment, and use of horns will be minimised to prevent noise emissions to nearby sensitive receivers.	Construction	CoA C11 CoA C20(d)(iii) SoC N1	Construction Manager Foreman
NV20	GTPL will oversee the scheduling of high noise work for this Project, construction of the water recycling plant and the Googong township subdivision works. Cumulative noise impacts will be minimised as far as practical.	Pre-construction, construction		GTPL Assistant Project Director

5.1.2 Noise and vibration consultation

Community consultation requirements are outlined in the Community Information Plan, developed to meet CoA A14. This plan identifies the process and tools to liaise with the community to advise them of likely timing and duration of construction activities, including noisy activities.

This plan also provides a Complaints and Enquiries Management Procedure, which outlines the process for managing, resolving and recording complaints. Any noise specific complaints will be managed in accordance with this procedure, and with mitigation measure NV12 in Table 5.1 above.

Appendix A the **Out of Hours Works Procedure** outlines the process for liaising with relevant agencies to discuss the need to construct out of hours. This may include QCC, OEH, and DP&I.

6 Compliance management

6.1 Roles and responsibilities

The Project team's roles and responsibilities are outlined in Section 4.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 5 of this Plan.

6.2 Training

All employees, contractors and utility staff working on site will undergo site induction training relating to noise and vibration issues. The induction training will address elements related to noise and vibration management including:

- Normal work hours.
- What activities can and can't take place outside of these working hours.
- The process for seeking approval for out of hours works, including consultation.
- Location of noise sensitive areas.
- The employment of reasonable and feasible noise mitigation measures.
- Roles and responsibilities of the Project team related to noise and vibration.

Further details regarding induction and training are outlined in Section 5 of the CEMP.

6.3 Inspections

Inspections of activities with the potential to generate noise and vibration at sensitive receivers will occur for the duration of the Project.

Requirements and responsibilities in relation to inspections are documented in Section 8.1 of the CEMP.

6.4 Monitoring

6.4.1 Noise monitoring

Noise monitoring will be undertaken should noise complaints be received. Noise monitoring will be undertaken at sensitive receivers to determine if the actual construction noise generated exceeds the predicted 'worst case' construction noise levels identified in Section 4.3.1 of this Plan.

Where noise levels are found to exceed the predicted worst-case levels, the source of excessive noise will be identified, and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impacts on receivers.

6.4.2 Vibration monitoring

Vibration monitoring may be carried out in response to complaints, exceedances, or for the purpose of refining construction methods or techniques to minimise vibrations (refer to Table 5.1 NV13).

Should blasting be required, a Blast Management Plan would be prepared (refer to Table 5.1 NV10). This would include specific vibration monitoring relating to blasting.

6.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Plan, MCoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 8.4 of the CEMP.

6.6 Reporting

Reporting requirements and responsibilities are documented in Section 8.5 of the CEMP.

7 Review and improvement

7.1 Management plan update and amendment

The processes described in Section 7 and Section 8 of the CEMP (relating to incidents, inspections, monitoring and auditing) may result in the need to update or revise this Plan. This will occur as needed.

Appendix A Out of hours works procedure

A.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong Water Cycle Stage A- Network (east) project (the Project).

A.2 Purpose

This procedure details the process for conducting works outside of the approved hours for construction activities as required by Condition of Approval (CoA) C8 and Statement of Commitment (SoC) N1.

A.3 Induction/training

Where required, Project personnel will be made aware of this procedure as required through toolbox talks.

A.4 Scope

This procedure is applicable to any proposed out of hours construction activities conducted by the Project contractor or subcontractors. Standard construction hours, other than for blasting and high noise activities, are:

- 7:00 am to 6:00 pm, Mondays to Fridays.
- 8:00 am to 1:00 pm on Saturdays.
- At no time on Sundays or public holidays.

This procedure does not apply where:

- The delivery of materials is required by police or other authorities for safety reasons.
- The work is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

A.5 Procedure for inaudible out of hours work

Subject to approval by the Environment Manager, work can proceed out of standard construction hours where:

- The works do not cause construction noise to be audible at any sensitive receiver.

A request to the Environment Manager to conduct inaudible works should be accompanied by:

- Details of the nature and justification for activities to be conducted during the varied construction hours.
- A qualitative noise impact assessment of predicted noise impacts sensitive receivers.
- Details of any proposed noise monitoring during the out of hours work.

Complaints

Any complaints received as a result of the nominated inaudible out of hours works are to be managed in accordance with the **Complaints Management Procedure**, which forms part of the Community Information Plan. Details of noise complaints will be managed as a Category two incident as per Section 7.2 of the Construction Environmental Management Plan (CEMP).

A.6 Procedure for audible out of hours work

Out of hours noise assessment

Where (audible) out of hours work is proposed, an out of hours work (OOHW) assessment will be prepared by the Environment Manager. As part of the preparation of the OOHW assessment, the Environment Manager will consult with the Principal and the Environmental Representative. GTPL will consult with the Office of Environment and Heritage (OEH) and any affected receivers. Refer below for details on consultation requirements. The OOHW assessment will be provided to the Director-General, Department of Planning and Infrastructure (DP&I).

The OOHW assessment will include:

- Details of the nature and justification for activities to be conducted during the varied construction hours.
- A noise impact assessment of predicted noise levels at each sensitive receiver.
- Details of any additional proposed noise monitoring.
- Evidence that appropriate consultation with potentially affected sensitive receivers and notification to council and OEH has been undertaken.
- Evidence that all reasonable and feasible noise mitigation measures have been put in place.

Office of Environment and Heritage

GTPL will consult with OEH on the proposed variation in construction times. Consultation will include but not be limited to details on predicted noise impacts at sensitive receivers and reasonable and feasible noise mitigation measures that the Project will put in place to limit impacts.

Community consultation

GTPL will undertake community consultation to inform the community of the proposed out of hours activities and mitigation measures to be implemented, to obtain general community support. If there is opposition from the community for the proposed OOHW, the Project will review the proposed work program and mitigation measures, where reasonable and feasible.

Director-General approval

GTPL will forward the final draft OOHW assessment to the Director-General (DP&I) for approval.

Issue of notification to the community

Once approved, the Environment Manager will issue the letterbox notification to affected properties a minimum of seven days prior to the commencement of the proposed works, advising the start date and expected duration of the out of hours activities. Doorknocking and/or distribution of individual letters to affected properties will also be undertaken a minimum of 48 hours in advance of the proposed works.

Works approval

Following completion of the appropriate community notifications, subject to approval by the Principal, work as described in the OOHW assessment and approved by the Director-General DP&I can proceed out of standard construction hours.

Complaints

Any complaints received as a result of the works are to be managed in accordance with the **Complaints Management Procedure**, which forms part of the Community Information Plan.

Out of Hours Work Procedure

1.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong Water Cycle Stage A- Network (east) project (the Project).

1.2 Purpose

This procedure details the process for conducting works outside of the approved hours for construction activities as required by Condition of Approval (CoA) C8 and Statement of Commitment (SoC) N1.

1.3 Induction / training

Where required, Project personnel will be made aware of this procedure as required through toolbox talks.

1.4 Scope

This procedure is applicable to any proposed out of hours construction activities conducted by the Project contractor or subcontractors. Standard construction hours, other than for blasting and high noise activities, are:

- 7:00 am to 6:00 pm, Mondays to Fridays.
- 8:00 am to 1:00 pm on Saturdays.
- At no time on Sundays or public holidays.

This procedure does not apply where:

- The delivery of materials is required by police or other authorities for safety reasons.
- The work is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

1.5 Procedure for inaudible out of hours work

Subject to approval by the Environment Manager, work can proceed out of standard construction hours where:

- The works do not cause construction noise to be audible at any sensitive receiver.

A request to the Environment Manager to conduct inaudible works should be accompanied by:

- Details of the nature and justification for activities to be conducted during the varied construction hours.
- A qualitative noise impact assessment of predicted noise impacts sensitive receivers.
- Details of any proposed noise monitoring during the out of hours work.

Complaints

Any complaints received as a result of the nominated inaudible out of hours works are to be managed in accordance with the **Complaints Management Procedure**, which forms part of the Community Information Plan. Details of noise complaints will be managed as a Category two incident as per Section 7.2 of the Construction Environmental Management Plan (CEMP).

1.6 Procedure for audible out of hours work

Out of hours noise assessment

Where (audible) out of hours work is proposed, an out of hours work (OOHW) assessment will be prepared by the Environment Manager. As part of the preparation of the OOHW assessment, the Environment Manager will consult with the Principal and the Environmental Representative. GTPL will consult with the Office of Environment and Heritage (OEH) and any affected receivers. Refer below for details on consultation requirements. The OOHW assessment will be provided to the Director-General, Department of Planning and Infrastructure (DP&I).

The OOHW assessment will include:

- Details of the nature and justification for activities to be conducted during the varied construction hours.
- A noise impact assessment of predicted noise levels at each sensitive receiver.
- Details of any additional proposed noise monitoring.
- Evidence that appropriate consultation with potentially affected sensitive receivers and notification to council and OEH has been undertaken.
- Evidence that all reasonable and feasible noise mitigation measures have been put in place.

Office of Environment and Heritage

GTPL will consult with OEH on the proposed variation in construction times. Consultation will include but not be limited to details on predicted noise impacts at sensitive receivers and reasonable and feasible noise mitigation measures that the Project will put in place to limit impacts.

Community consultation

GTPL will undertake community consultation to inform the community of the proposed out of hours activities and mitigation measures to be implemented, to obtain general community support. If there is opposition from the community for the proposed OOHW, the Project will review the proposed work program and mitigation measures, where reasonable and feasible.

Director-General approval

GTPL will forward the final draft OOHW assessment to the Director-General (DP&I) for approval.

Issue of notification to the community

Once approved, the Environment Manager will issue the letterbox notification to affected properties a minimum of seven days prior to the commencement of the proposed works, advising the start date and expected duration of the out of hours activities. Doorknocking and/or distribution of individual letters to affected properties will also be undertaken a minimum of 48 hours in advance of the proposed works.

Works approval

Following completion of the appropriate community notifications, subject to approval by the Principal, work as described in the OOHW assessment and approved by the Director-General DP&I can proceed out of standard construction hours.

Complaints

Any complaints received as a result of the works are to be managed in accordance with the **Complaints Management Procedure**, which forms part of the Community Information Plan.