

# Appendices

## Appendix A – Site photographs



**Photo One:** Looking up Smith Street towards Princes Highway



**Photo Two:** Looking into the site from the sealed driveway. Gated entry. Vegetation to be removed.



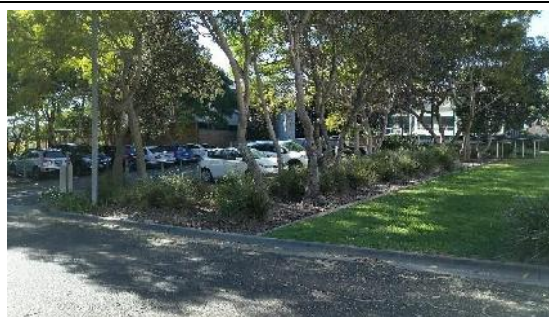
**Photo Three:** Building on site to be demolished. Hexagonal building.



**Photo Four:** Looking towards Belmore Street. Adjacent commercial/industrial land use.



**Photo Five:** Sensitive noise receivers immediately adjacent to the site at Smith Street



**Photo Six:** Front carpark on site.



**Photo Seven:** Lot 253 DP 787299, stockpiles removed.



**Photo Eight:** Existing building on site to be removed.





**Photo Nine:** Existing buildings to be demolished



**Photo Ten:** Existing building to be demolished (octagon)



**Photo Eleven:** Existing building to be demolished (octagon)



**Photo Twelve:** Existing building to be demolished (rear two story office)



**Photo Thirteen:** Existing building to be demolished (rear two story office)



**Photo Fourteen:** Existing building to be demolished (rear two story office)



**Photo Fifteen:** Existing building to be demolished (warehouse)



**Photo Sixteen:** Existing building to be demolished (warehouse)



**Photo Seventeen:** Existing building to be demolished (warehouse)



# **Appendix B** – Arboricultural Assessment



## **Jemena Gas Networks (NSW) Ltd**

Former Wollongong Gasworks Site – Demolition and  
Vegetation Removal Project  
Arboricultural Assessment

June 2019



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# 1. Introduction

## 1.1 Overview

Jemena Gas Networks (NSW) Ltd (Jemena) seeks development consent to demolish three existing commercial buildings to natural ground level and remove the majority of existing vegetation and structures on the former Wollongong Gasworks site ('the project'). The former gasworks site is located at 120 – 122 Smith Street, Wollongong (the 'site').

The project is required to facilitate the remediation of the former gasworks site. This will allow redevelopment of the site for a mixture of commercial and residential land uses at some stage in the future.

This Arboricultural Assessment has been prepared by GHD Pty Ltd (GHD) required to support the Development Application (DA) to be submitted to Wollongong City Council.

## 1.2 Scope

The Arboricultural Assessment includes those trees and shrubs which occur within the subject site, as well as those trees growing in adjacent properties, near proposed excavation boundaries or that may be otherwise affected by the proposed works. Recommendations for protective measures for retained trees are provided.

## 1.3 Purpose of this report

GHD Pty Ltd (GHD) has been engaged by Jemena to provide advice on potential impacts to existing trees and shrubs associated with the proposed remediation works. As excavation is proposed over the entire site, all existing trees are proposed for removal (with exception of the vegetated embankment to Throsby Drive). Some trees which are growing in adjacent properties, near proposed excavation areas are also described in this assessment. Each tree is described according to the requirements of Wollongong City Council DCP (2009), Chapters E11 and E17.

## 1.4 Scope and limitations

This report: has been prepared by GHD for Jemena Gas Networks (NSW) Ltd and may only be used and relied on by Jemena Gas Networks (NSW) Ltd for the purpose agreed between GHD and the Jemena Gas Networks (NSW) Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Jemena Gas Networks (NSW) Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Jemena Gas Networks (NSW) Ltd and others who provided information to GHD (including Government authorities),

which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## **1.5 Assumptions**

The services undertaken by GHD in connection with preparing this arboricultural assessment:

- were limited to those specifically detailed in section 1.1 and section 1.2 of this report
- assume that the extent of the proposed remediation works will be consistent with the details provided during the initial site meeting
- assume that all existing trees on the site (with exception of the vegetated embankment to Throsby Drive) will require removal, to enable excavation and remediation of contaminated soil.



## 2. Methodology

### 2.1 Desktop review

The following documents were reviewed prior to the site assessment:

- Wollongong Local Environmental Plan 2009 - Clause 5.9 – Preservation of trees or vegetation; Clause 7.2: Biodiversity Protection
- Wollongong Development Control Plan (DCP 2009 - Chapter E17: Preservation and Management of Trees and Vegetation; Chapter E18 – Threatened Species; Chapter E11 – Heritage Conservation.
- *Nominal Excavation Areas, Drawing*. Prepared by Senversa; dated 7/08/2018
- photographs of the Wollongong gas works site taken in 1980 by W.A. Bayley.

### 2.2 Arboricultural Survey

Arboricultural assessments were carried out on 22/05/19 by Gary Leonard, GHD Arborist and Senior Botanist (International Society of Arboriculture membership no. 212238 and Arboriculture Australia membership no. 2173). The survey was carried out after an initial site meeting with Mr Thomas Breadon, Project Engineer, Jemena.

#### 2.2.1 Visual Tree Assessment

Trees in the subject site were assessed by conducting a ground-based Visual Tree Assessment (VTA) (see Matheney and Clark 1994a and 1994b). The assessment included identification and assessment of all “trees” according to the following descriptions in WDCP (2009b):

- a tree that is 3 or more metres in height, or
- has a dbh of 200 mm or more at 1 m height
- has a branch spread of 3 m or more.

Some trees described in this report are smaller than the prescribed criteria; they are, however, described in order to provide an accurate assessment of the amount of vegetation removal which will be required for remediation to be carried out.

Attributes for each tree recorded included:

- Tree No or Tree Group number
- botanical name of tree species
- common name of tree species
- height of tree in metres (m)
- spread (radius m)
- Diameter at Breast Height (DBH) (m)
- age class
- health
- structure
- comments.

The height and crown spread of trees were estimated. The diameter of each tree at breast height (dbh) was measured using a Forestry DBH tape. Tagging of the trees was not necessary,

because of the ease of on-site location, with reference to paths, buildings and other features. Surveyed trees/tree groups were given a unique identity number. The identity number for the trees has been used in the generation of the Tree Survey Plan (Section 2.2) and Tree Schedule (Appendix B). Reference to specific tree/tree group identities is included throughout this report and cross reference should be made to the various appendices for further information. The information provided in this report reflects the condition of the trees at the time of inspection and only relates to the trees surveyed.

## 2.2.2 Structure and health

For each tree, the Safe Useful Life Expectancy (SULE) was determined based on the health and structure of the subject tree (after Barrell, 2001). The SULE code is provided in Appendix A. The health and structural integrity of each tree were evaluated per the criteria outlined in Table 2.1. All trees surveyed are located within the subject site, or in immediately adjacent areas.

**Table 2.1 List of items used to determine tree structure and health**

Structural Considerations *	
Presence/absence of cankers (abnormal growth caused by fungi or bacteria)	Evidence of 'end weight' (accumulation of mass at the end of a branch)
Presence/absence of cavities (open wound with evidence of decay)	Presence/absence of epicormic shoots (shoots arising from latent or adventitious buds)
Presence/absence of co-dominant stems (Stems or branches of equal diameter, often weekly attached)	Presence/absence of previous branch or trunk failure
Presence/absence of conks (fruiting body of decay fungi e.g. Bracket Fungus)	Evidence of girdling roots (roots that encircle the base [above ground] of the stem)
Presence/absence of decay (degradation of wood by fungi / bacteria)	Leaning trunk (bias)
Evidence of decline (loss of vigour)	Low canopy (branches that are close to ground may require heavy pruning for construction clearance)
Evidence of dieback (death of twigs and branches)	Presence/absence of wounds (injuries on the surface of a stem or branch)
Health Considerations	
Presence/absence of pest and diseases	Proportion of necrotic material in platform
Amount of extension growth	Absence/presence of epicormic growth
Density of canopy	Foliage size and colour

\* Adapted from Matheny & Clark (1998).

The estimate of a tree's age was based on the definitions outlined by Draper and Richards (2009). Trees were classed as follows:

- Young (Early Mature): age <20% of their life expectancy *in situ*
- Mature: aged between 20 to 80% of their life expectancy *in situ*
- Over-mature: aged >80% of their life expectancy *in situ*.

## 2.2.3 Tree protection zones

Although all trees in the subject site are proposed for removal, the Tree Protection Zone (TPZ) has been calculated for all trees assessed during the field survey. Of most relevance are the specimens in Tree Groups 14 and 16, which, although growing in an adjacent property, are located near proposed excavation areas which may encroach on the tree TPZs.

The calculations of the TPZs for assessed trees were based on the estimated DBH as outlined in *Australian Standard 4970 'Protection of Trees on Development Sites'* (SA, 2009).

TPZ radius = DBH x 12 where: DBH = Diameter at Breast height (in metres).

Where the trees have co-dominant leaders, the following formula was applied, in order to calculate DBH:

$$DBH=(dbh1^2+dbh2^2+...+dbhn^2)^{0.5}$$

The TPZ calculation according to SA (2009) is stated for each tree in Appendix B. Where there are several specimens of the same species within a Tree Group, an average calculation of DBH and TPZ was made, and is included in Appendix B.



## 3. Results

### 3.1 Location

The Gasworks site is located on a section of the Illawarra floodplain, between the Illawarra Railway Line and The Princes Highway. Fairy Creek flows through Beaton Park, on the western side of the Illawarra Railway. Topography of the proposed remediation site within the gasworks is level to very gently inclined. A constructed batter between Throsby Drive and the northern boundary of the site is moderately inclined.

The topsoils appear to have undergone past and recent disturbances and it is apparent that excavated subsoil has been mixed with the original topsoil and imported material. The original soils in this area would have been derived from soils of the Fairy Meadow Soil Landscape Group. Soils of the Fairy Meadow Group are derived from Quaternary Sediments and consist of friable Alluvial Loams and Siliceous Sands (see Hazelton and Tille 1990).

### 3.2 Trees and shrubs on the site

Original vegetation on the site would have consisted of Coastal Grassy Red Gum Forest or Lowland Woollybutt-Melaleuca Forest, although vegetation clearing of the floodplain would have commenced soon after European settlement (see Fuller 2011; Hazelton and Tille 1990; NSW NPWS 2002).

One specimen (not included in this report and not growing within the subject site) is possibly the only remnant tree of the original gas works infrastructure as this specimen appears to be at least 60 years old. The specimen is a Queensland Kauri (*Agathis robusta*) growing in a garden bed protected from vehicles by low metal fences near the entrance to Collegians Club, adjacent to a car park (Figure 3.1). Vegetation on the subject site has been planted or self-recruited.



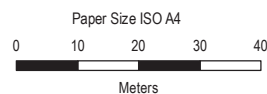
**Figure 3.1 Mature Kauri tree, growing in Collegians carpark (not on the subject site)**



#### Legend

- Trees to be retained
- Site Boundary

- Tree removal
- Streets
- Railway



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Former Jemena Wollongong Gasworks site  
120 – 122 Smith Street

Surveyed trees and tree groups

Project No. 21-28174  
Revision No. 0  
Date 17/06/2019

**FIGURE 3.2**

Data source: General topo - NSW LPI/DDB 2012, 2015. Aerial imagery - Created by: ecateblanco





**Figure 3.3 The subject site, showing original structures. Note the absence of vegetation. Photo taken in 1980 by W.A. Bayley**

Figure 3.3 taken in 1980, shows the original structures on the subject site and an absence of vegetation.

The locations of surveyed trees and tree groups are indicated on Figure 3.2. Details of surveyed trees and tree groups are presented in the Tree Schedule at Appendix B.

Vegetation in the subject site consists of a mixture of mature and early-mature trees, including numbers of specimens which are indigenous to the Wollongong LGA. The mature specimens are approximately 30 years old and appear to have been planted after construction of several buildings adjacent to Smith Street. There are also numbers of self-recruited or re-sprouted specimens within existing garden beds and open spaces. Tree Group 17, which covers the constructed batter at the northern end of the site consists mostly of self-recruited invasive exotic tree and shrub species, although two indigenous wattle species (*Acacia maidenii* and *Acacia mearnsii*) and an Illawarra Flame Tree (*Brachychiton acerifolius*) are also growing within this Tree Group.

Most planted specimens are in moderate health and form, in response to several factors, including crowding, moreover an abundance of surface roots indicates the likelihood of unsuitable growing conditions (for example, a thin layer of topsoil, high water table, inappropriate pH) (see Figure 3.4).



**Figure 3.4 Part of Tree Group 3, showing surface roots of a Coast Banksia and a Jacaranda. Note also distorted and biased growth of leaders**



## 4. Potential impacts

### 4.1 Tree removal on the subject site

It is likely that all trees on the subject site will require removal for the proposed remediation works (with exception of the vegetated embankment to Throsby Drive).

Of the trees requiring removal, the following specimens are indigenous to the Wollongong LGA:

- Tree Group 2: 2 x *Eucalyptus robusta*
- Tree Group 3: 4 x *Banksia integrifolia* subsp. *integrifolia*
- Tree Group 5: 4 x *Eucalyptus robusta*
- Tree Group 6: 5 x *Eucalyptus robusta*
- Tree Group 8: 1 x *Toona ciliata*, 1 x *Ficus rubiginosa*, 1 x *Homalanthus populifolius*, 1 x *Syzygium paniculatum*.
- Tree Group 9: 4 x *Eucalyptus robusta*
- Tree Group 10: 1 x *Eucalyptus robusta*, 1 x *Banksia integrifolia* subsp. *integrifolia*, 1 x *Brachychiton acerifolius*
- Tree Group 13: 1 x *Melaleuca armillaris*
- Tree Group 14: 3 x *Eucalyptus robusta*
- Tree Group 15: 1 x *Eucalyptus saligna*/*Eucalyptus botryoides* hybrid, 1 x *Melaleuca armillaris*, 1 x *Pittosporum undulatum*, 1 x *Eucalyptus robusta*.

Tree Group 8 includes species which occur in Illawarra sub-tropical or warm temperate closed forest. The species selection has probably been designed to accommodate the sheltered and shady conditions and has been successful, as the trees are all in good health.

Tree Group 8 includes a Magenta Lilly Pilly (*Syzygium paniculatum*) which is listed as an Endangered species under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). According to Fuller (2011), Magenta Lilly Pilly "...has only been found in the Upper Cordeaux Dam area west of Mount Kembla and on the lower parts of Stoney Creek at Coalcliff.....Magenta Lilly Pilly is commonly seen in cultivation." It is apparent that the specimen of Magenta Lilly Pilly has been planted and is not a natural occurrence, and it is likely that the existing tree has re-sprouted from the original (possibly damaged) leader (Figure 4.1).

The specimens of Red Cedar (*Toona ciliata*) and Port Jackson Fig (*Ficus rubiginosa*) are in good health, although the surface rooting and buttressing indicate shallow topsoil, possibly overlying unsuitable sub-soil for healthy root growth (Figure 4.2 and Figure 4.3).



**Figure 4.1 Bleeding Heart (*Homalanthus populifolius*) centre and Magenta Lilly Pilly (*Syzygium paniculatum*) to right, adjacent to metal rail. Part of Tree Group 8**



**Figure 4.2 Part of Tree Group 8, showing surface roots and buttressing of a Red Cedar**





**Figure 4.3 Part of Tree Group 8, showing leaders of Port Jackson Fig (foreground) and Red Cedar (right background), growing in sheltered, shady location**



**Figure 4.4 Swamp Mahoganies; Tree Group 9**



Tree Group 9 contains Swamp Mahoganies (*Eucalyptus robusta*) that appear to be stunted, although at the time of this survey, most specimens were flowering and fruiting copiously (Figure 4.4).

The Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*) specimens (Tree Group 3) are mostly stunted, possibly in response to crowding.

The most commonly occurring exotic species on the subject site is Jacaranda (*Jacaranda mimosifolia*). Most specimens are in good to moderate form and condition (Figure 4.5).



**Figure 4.5 Jacarandas, part of Tree Group 11**

## **4.2 Trees in adjacent areas**

Tree Group 17 is located along the northern boundary of the subject site on a constructed batter associated with a bridge over the Illawarra Railway (Figure 4.6). It is likely that the vegetation on this batter will be retained as excavation of the batter will not be undertaken as part of the remediation of the site. It is apparent that some tree planting had previously been carried out, although only one specimen of Illawarra Flame Tree (*Brachychiton acerifolium*) appears to have survived. The Wattle species which occur in this tree group (*Acacia maidenii* and *Acacia mearnsii*) are probably self-recruited specimens. Most of the vegetation in Tree Group 17, however, consists of self-recruited exotic species which are invasive in the Illawarra. Common species include African Olive (*Olea europaea* subsp. *cuspidata*), Privet (*Ligustrum lucidum* and *Ligustrum sinense*), Canary Island Date Palm (*Phoenix canariensis*), Hackberry (*Celtis sinensis*) and Camphor Laurel (*Cinnamomum camphora*).





**Figure 4.6 Part of Tree Group 17, adjacent to Throsby Drive**

Tree Group 14 is located in Collegians car-park and follows the boundary of the subject site (Figure 3.2). The Tree Group contains Jacarandas (Figure 4.7) and Swamp Mahoganies (Figure 4.8). Nominal Excavation Area A extends along a large section of this boundary and it is possible that the roots of these trees extend into the proposed excavation area. The TPZs of these specimens have been calculated as an average 3 m, in which case it is likely that less than 10% of their TPZs would be affected by the proposed excavation and therefore they should be able to be retained with protective measures (see Hamilton 1989, Perry 1982, Standards Australia 2009).



**Figure 4.7 Jacarandas, western end of Tree Group 14**



**Figure 4.8 Swamp Mahoganies (apparently lopped), eastern end of Tree Group 14**

Tree Group 16 is located in a car-park adjacent to Smith Street (Figure 3.2). Although the trees in this group are small and probably have a limited TPZ, care needs to be taken, if this car-park is used as access or parking for construction vehicles, or for storage of materials. The car-park and trees (Evergreen Ash *Fraxinus griffithii*) are indicated in Figure 4.9.

Recommendations for protection of Tree Groups 14 and 16 are outlined in Section 6.



**Figure 4.9 View of Smith Street, from south east portion of subject site. Tree Group 16 in middle ground**



## 5. Summary of findings

It is likely that thirty-five (35) trees which are indigenous to the Wollongong LGA) would require removal to allow remediation works to be carried out on the subject site. An additional six non-indigenous Australian specimens and 100 exotic specimens would require removal, including a large number which are invasive species.

The vegetation on the subject site has been planted or self-recruited. There are no threatened ecological communities on the subject site. There is one threatened species (Magenta Lilly Pilly – a component of Tree Group 8) which will be removed. However, the specimen has been planted, and does not occur in natural habitat. On this basis it is not considered to have the conservation significance of a threatened species within its natural habitat and distribution.

No trees which occur on the subject site are listed as Significant Trees or Heritage Trees.

It is likely that the trees and dense shrub thickets (e.g. Tree Group 17) provide shelter and forage for some common native fauna species typical of urban parks and gardens. No tree hollows occur within the subject site to provide habitat for hollow-dependent fauna. There are no indigenous trees which are sufficiently old for development of hollows (see Gibbons and Lindenmayer 2002). No bird nests were recorded in any of the trees.

There is the potential for some trees that are located adjacent to the subject site (e.g. Tree Groups 14 and 16) to be affected by the proposed remediation works. Protective measures are recommended for these trees in Section 6.



## 6. Recommendations

The trees which occur in Tree Groups 14, 16, and 17 should be protected prior to and during the project works. Appropriate fencing should be installed around the TPZ of individual trees or groups, or alternatively as a continuous line along the limit of soil disturbance. See Appendix B for dimensions of TPZ for trees which may be considered for retention.

The fencing should comply with Australian Standards 2009. An example of appropriate fencing is indicated in Appendix C. The fencing should be installed prior to commencement of clearing and should be retained in place until the completion of remediation works.

The following actions should not be permitted within the TPZs of any retained trees:

- storage of materials, plants or equipment
- installation of site sheds or portable toilets
- excavations, trenching, ripping or cultivation of soils
- modification of existing soil level or addition of fill materials
- disposal of waste materials and chemicals (both solid or liquid)
- mechanical removal of vegetation
- pedestrian or vehicular movement.

The following measures are also recommended:

- Any root pruning required within the TPZs should be approved by the project arborist and any digging and pruning of roots (only roots < 5 cm may be pruned) within the TPZ should be conducted by hand for a clean cut.
- To protect soil within the TPZ, a layer of organic mulch may be applied (no more than 75 mm thick). Any mulch used should comply with the Australian Standard – composts, soil conditioners and mulches AS4454-2012 (SA 2012).
- Irrigation systems may be installed if an extended period of drought occurs. As a guide, the watering should occur at least once per week and allow deep soil penetration. The specific watering requirements will also depend on the climatic conditions.
- Once the construction works are completed, retained trees should be re-inspected by the project arborist who should carry out a more in-depth assessment that would prescribe remedial work where necessary to reduce the risk to pedestrians or parked vehicles.
- In addition, the retained trees should be monitored after completion of the proposed development to assess their health, vigour and to identify potential hazards. This is of particular importance given the proximity of the trees to areas of public access.
- It is important to note that some defects, ill-health or decay in a tree are not always identifiable using VTA. In addition, there are occasions where supposed healthy and defect-free trees break or are damaged by wind-throw, especially those trees growing along a newly created edge. This is described as a 'normal failure rate' and is a function of the energy-saving, cost-effective and lightweight structure of a tree. Therefore, every tree represents some potential danger of failure (see Mattheck and Breloer, 2003). The trees should be monitored by the project arborist at six months and one year after completion of the works.
- Tree removal should be carried out according to the guidelines outlined in Safe Work Australia (2016).

- Prior to commencement of tree felling, trees should be either bumped by a machine, or rapped several times with a heavy implement, in order to encourage any sheltering fauna to leave the tree. Tree felling should not commence until it is evident that no fauna species are occupying the tree.

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Preservation and Management of Trees and Vegetation

# Appendices



# Appendix A – Safe Useful Life Expectancy (SULE) Matrix

The SULE value generated by the below matrix gives an indication of the time a tree is expected to be usefully retained. Adapted from Barrell (2001).

	1 Long SULE	2 Medium SULE	3 Short SULE	4 Removal	5 Move or Replace
A	Tree that appear to be retainable at the time of assessment for >40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Trees which should be removed within the next 5 years.	Trees which can be readily moved or replaced.
B	Structurally sound trees located in positions that can accommodate for future growth.	Trees that may only live for 15-40 years.	Trees that may only live for another 5-15 years.	Dead, dying, suppressed or declining trees.	Small trees <5 (m) in height.
C	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.	Dangerous trees because of instability or loss of adjacent trees.	Young trees less than 15 years old but over 5 m in height.
D	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	Dangerous trees because of structural defects.	
E		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees not safe to retain.	
F				Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	
G				Trees that are damaging or may cause damage to existing structures within 5 years.	

## Appendix B – Tree schedule

Tree or Tree group no	Botanical Name	Common Name	Height (m)	Canopy spread (radius m.)	DBH (m)	Age Class	Health1	Structure2	SULE3	TPZ4 (m)	Comments
1	<i>*Olea europaea subsp. cuspidata</i>	African Olive	4	3	multi	M	G	G	5A	NA	Self-recruited invasive weeds, growing as a small thicket in railway reserve, adjacent to boundary fence
	<i>*Celtis sinensis</i>	Hackberry	7	3	multi	M	G	G	5A	NA	
	<i>*Cinnamomum camphora</i>	Camphor Laurel	7	3	multi	M	G	G	5A	NA	
2	<i>Eucalyptus robusta</i>	Swamp Mahogany	11	3	0.31	M	G	G	2A	4	
	<i>Eucalyptus robusta</i>	Swamp Mahogany	4	2	0.18	M	M	F	3A	3	Suppressed by adjacent tree
	+ <i>Eucalyptus curtisii</i>	Plunkett Mallee	2	1.5	multi	M	M	F	3A	2	Suppressed by adjacent tree
	+ <i>Callistemon 'Little John'</i>	Dwarf Bottlebrush	2	1.5	multi	M	M	M	3A	2	Suppressed by adjacent tree
3	<i>*Jacaranda mimosifolia</i> x 9	Jacaranda	8	3	0.21 0.24	M	M	M	3A	4	Stunted, distorted growth
	<i>Banksia integrifolia subsp. integrifolia</i> x 4	Coast Banksia	9	3	0.28	M	M	M	3A	4	Suppressed growth, some borer damage and fungal decay
4	<i>*Pyrus calleryana 'Capital'</i>	Callery Pear	5	1.5	multi	M	G	G	3A	2	
4a	<i>*Magnolia grandiflora</i> x 3	Bull Bay Magnolia	4	1.5	0.14	EM	G	G	3A	3	Growing in small garden beds, adjacent to building
5	<i>Eucalyptus robusta</i> x 4	Swamp Mahogany	10	3	0.29	M	M	M	3A	4	Sparse canopies; suppressed growth

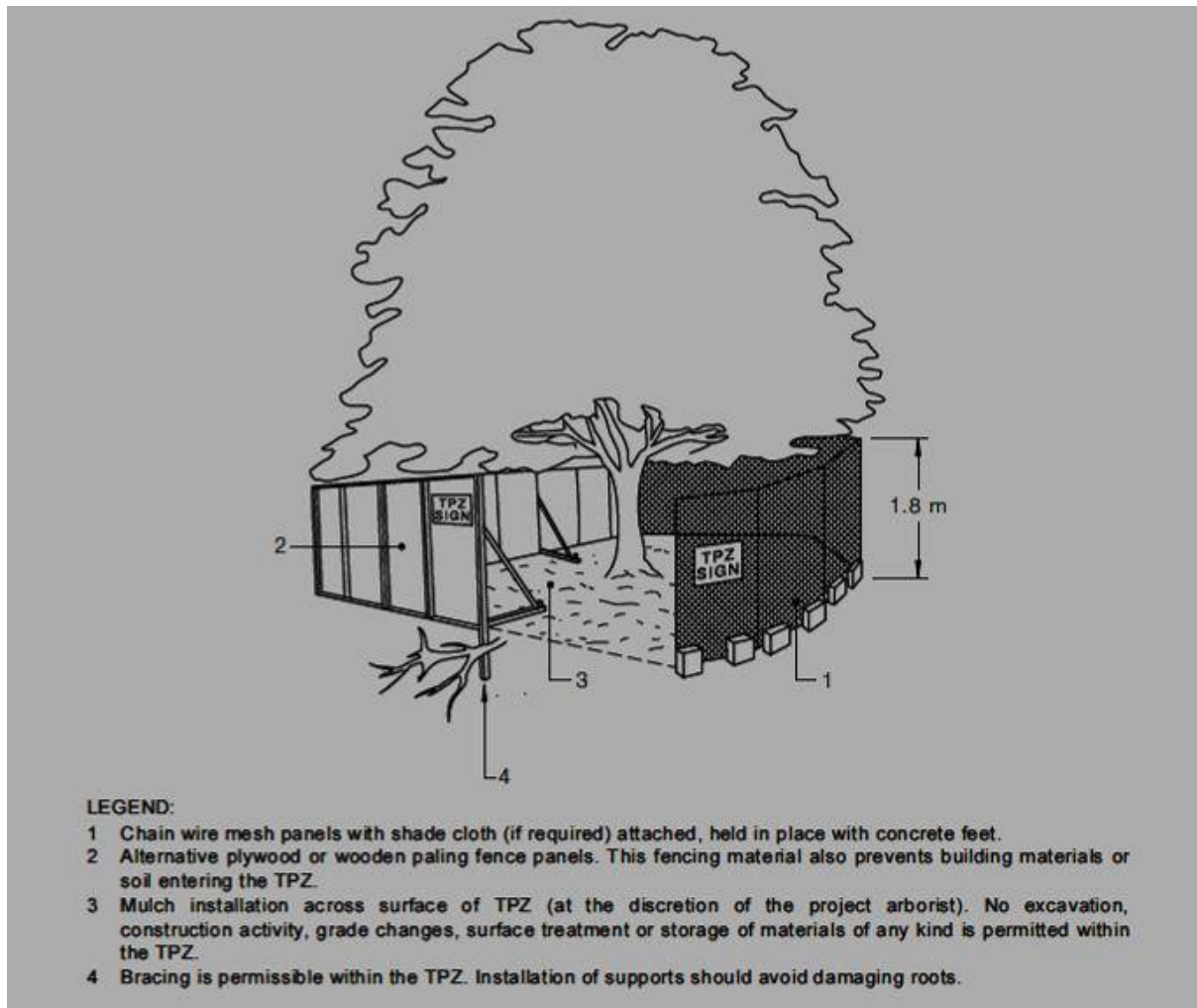
Tree or Tree group no	Botanical Name	Common Name	Height (m)	Canopy spread (radius m.)	DBH (m)	Age Class	Health1	Structure2	SULE3	TPZ4 (m)	Comments
6	<i>Eucalyptus robusta</i> x 5	Swamp Mahogany	10	3	0.27	M	M	M	2A	4	Suppressed growth
	* <i>Jacaranda mimosifolia</i> x 5	Jacaranda	8	3	0.24	M	M	M	2A	3	Suppressed and distorted growth
	+ <i>Callistemon viminalis</i>	River Bottlebrush	9	3	0.18 0.21	M	M	M	2A	3	Suppressed, crowded growth
7	* <i>Olea europaea subsp. cuspidata</i>	African Olive	2.5	1.5	multi	M	G	M	5A	NA	Invasive exotic, probably self-recruited
	+ <i>Callistemon 'Little John'</i>	Dwarf Bottlebrush	1.5	1	multi	M	G	M	3A	2	
	* <i>Pyrus calleryana 'Capital'</i>	Callery Pear	5	1.5	multi	M	G	G	3A	2	
	* <i>Jacaranda mimosifolia</i>	Jacaranda	10	4	0.25 0.26	M	G	M	3A	5	Co-dominant leaders
8	<i>Toona ciliata</i>	Red Cedar	15	4	0.37	M	G	G	1A	5	
	<i>Syzygium paniculatum</i> #	Magenta Lilly Pilly	2	1.5	multi	EM	G	M	2A	2	Planted threatened species; not in natural habitat Possibly regrowth from original damaged rootstock
	<i>Ficus rubiginosa</i>	Port Jackson Fig	14	6	0.69	M	G	G	1A	8	Slight bias
	<i>Homalanthus populifolius</i>	Bleeding Heart	4	2	0.18	EM	G	G	2A	3	
9	<i>Eucalyptus robusta</i> x 4	Swamp Mahogany	10	3	0.28	M	M	M	2A	4	
	<i>Eucalyptus robusta</i>	Swamp Mahogany	10	3	0.29	M	F	M	4A	4	Mostly necrotic
10	+ <i>Grevillea robusta</i> x 2	Silky Oak	14	4	0.33	M	M	G	2A	4	
	* <i>Jacaranda mimosifolia</i>	Jacaranda	9	3	0.27	M	M	M	2A	4	

Tree or Tree group no	Botanical Name	Common Name	Height (m)	Canopy spread (radius m.)	DBH (m)	Age Class	Health1	Structure2	SULE3	TPZ4 (m)	Comments
	<i>Eucalyptus robusta</i>	Swamp Mahogany	10	3	0.29	M	G	M	2A	4	
	<i>Brachychiton acerifolius</i>	Illawarra Flametree	11	2.5	0.29	M	G	G	2A	4	
	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	10	2	0.26	M	F	F	4A	3	necrotic
11	* <i>Jacaranda mimosifolia</i> x 5	Jacaranda	9	3	0.24 0.22	M	G	G	2A	4	
12	* <i>Jacaranda mimosifolia</i>	Jacaranda	4	2	0.23 0.15	EM	G	M	3A	3	Co-dominant leaders; cramped location
13	* <i>Jacaranda mimosifolia</i>	Jacaranda	3	1.5	0.16 0.12	EM	M	F	4A	2	Re-sprouted from rootstock
	<i>Melaleuca armillaris</i>	Bracelet Honey-myrtle	4	3	0.23	OM	M	M	4A	3	Over-mature specimen; several necrotic leaders
14	* <i>Jacaranda mimosifolia</i> x 16	Jacaranda	7	2	0.18 0.23	M	M	M	3A	3	Protective measures recommended during site remediation activities
	<i>Eucalyptus robusta</i> x 3	Swamp Mahogany	8	2	0.22	M	G	G	2A	3	Leaders lopped Protective measures recommended during remediation activities
15	<i>Eucalyptus saligna</i> x <i>Eucalyptus botryoides</i>	Wollongong Woollybutt	11	3	0.34	M	M	M	2A	4	
	<i>Melaleuca armillaris</i>	Bracelet Honey-myrtle	8	2	multi	M	G	M	3A	2	
	* <i>Jacaranda mimosifolia</i>	Jacaranda	7	2.5	0.26 0.16	M	G	M	3A	4	Co-dominant leaders



Tree or Tree group no	Botanical Name	Common Name	Height (m)	Canopy spread (radius m.)	DBH (m)	Age Class	Health1	Structure2	SULE3	TPZ4 (m)	Comments
	<i>Pittosporum undulatum</i>	Brush Daphne	4	2	multi	M	M	M	3A	2	Suppressed growth
	<i>Eucalyptus robusta</i>	Swamp Mahogany	9	3	0.26	M	G	M	2A	4	
16	* <i>Fraxinus griffithii</i> x 5	Evergreen Ash	2	1.5	0.17	M	M	M	3A	2	Protective measures recommended during site remediation activities
17	<i>Acacia maidenii</i> x 5	Maiden's Wattle	5	5	multi	M	G	G	3A	3	
	<i>Acacia mearnsii</i> x 6	Mearns' Wattle	3	2	0.15	M	G	G	3A	3	
	* <i>Phoenix canariensis</i> x 6	Canary Island Date Palm	5	4	0.41	M	G	G	5A	NA	Invasive exotic species which have self-recruited on road and bridge embankment
	* <i>Olea europaea subsp. cuspidata</i> x 11	African Olive	4	2	multi	M	G	G	5A	NA	
	* <i>Celtis sinensis</i> x 8	Hackberry	5	3	multi	M	G	G	5A	NA	
	* <i>Cinnamomum camphora</i> x 4	Camphor Laurel	4	2	multi	M	G	G	5A	NA	
	* <i>Ligustrum sinense</i> x 5	Small-leaved Privet	4	2	multi	M	G	G	5A	NA	
	* <i>Ligustrum lucidum</i> x 12	Large-leaved Privet	3	2	multi	M	G	G	5A	NA	
	<i>Brachychiton acerifolius</i>	Illawarra Flametree	7	3	0.29	M	G	G	1A	4	

## Appendix C – Tree protection zone fence example



GHD

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28/[https://projects.ghd.com/oc/sydney2/formerwollongonggasw/Delivery/Documents/2128174-REP\\_Arborist Assessment.docx](https://projects.ghd.com/oc/sydney2/formerwollongonggasw/Delivery/Documents/2128174-REP_Arborist%20Assessment.docx)

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	G. Leonard	J. Tipping	On file	Karl Rosen		21/06/2019

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# Appendix C – Relevant provisions of the Wollongong Development Concept Plan

Relevant DCP provisions	Comments
<b>GENERAL DEVELOPMENT CONTROLS</b>	
<b>E2: Crime Prevention through Environmental Design</b>	
3.1 Lighting 3.2 Natural surveillance and sightlines 3.3 Signage 3.4 Building design 3.5 Landscaping 3.6 Public open space and parks 3.7 Community Facilities and Public Amenities 3.8 Bus stops and taxi ranks	The site will be securely fenced prior to the commencement of works and will be inaccessible to the public.
<b>E3: Carparking, Access, Servicing/Loading Facilities and Traffic Management</b>	
7.1 Car Parking, Moto Cycle, Bicycle Requirements and Delivery/Servicing Vehicle Requirements 7.2 Disabled Access and Parking 7.7 Car Parking Layout and Design 7.13 Car Parking & Access Construction Requirements	The project would facilitate remediation of the site which would allow future redevelopment of the site for mixed commercial/residential use. Any parking or access changes associated with redevelopment of the site would be undertaken as part of a separate development application.
<b>E6: Landscaping</b>	
6.1 Planting Requirements 6.2 Excavation 6.3 Retaining walls 6.4 Green walls, green roofs and planting on a slab or podium 6.5 Embankments 6.6 Noxious Weeds 6.7 Street Trees 7 Car parking areas 8.1 Tree Protection during Construction 8.2 Maintenance	<p>All vegetation on site will be removed to prepare the site for remediation. Vegetation on site has either been planted or has self- recruited. The vegetation is not considered to be within its natural ecosystem as is evident through overcrowding.</p> <p>Revegetation is anticipated to occur following the redevelopment of the site.</p> <p>Potential impacts are discussed further in section 5.3.2.</p>
<b>E7: Waste Management</b>	
5.1 Demolition	A SWMMP accompanies this SEE. Disposal of demolition material will be undertaken in accordance with the SWMMP.
<b>E9: Hoardings and cranes</b>	
6.2 Type B and C Hoardings	The contractor will be responsible for preparing the site for the project and will undertake the

Relevant DCP provisions	Comments
6.3 Pipe Scaffolding 6.4 Lighting of Type B Hoardings 6.5 Hoarding Counterweights & Columns 6.6 Office Sheds & Fascia Screens 6.7 Use of Cranes 6.8 Protection of Street Trees 6.9 Fire Safety 6.10 Construction Vehicle Access Gates 6.11 External Finishes/Colours for Hoardings	works in accordance with the relevant provisions of E9.
<b>E10: Aboriginal Heritage</b>	
2 Areas of potential aboriginal archaeological/cultural heritage significance 3 Preliminary investigation survey of any recorded aboriginal site	<p>No Aboriginal sites or places were identified within 200 m during an AHIMS search. An Aboriginal heritage impact assessment is therefore not required.</p> <p>The project will not involve sub-surface works and therefore the likelihood of encountering an unexpected find is negligible.</p> <p>See section 5.5 of this SEE.</p>
<b>E11: Heritage Conservation</b>	
5 Principles of heritage conservation 6 Period building styles in Wollongong	<p>No recorded sites on the NSW and Australian heritage register are in the vicinity of the project. The nearest heritage items listed under the Wollongong LEP are a row of Canary Island Date Palms on Robinson Street (the closest is located approximately 188 metres south west of the site). The project would not directly impact these sites.</p> <p>The project will not involve sub-surface works and therefore the likelihood of encountering an unexpected find is negligible.</p>
<b>E12: Geotechnical Assessment of Slope Instability</b>	
4.1 Identification of Land which may be Subject to Slope Instability 4.2 Land Identified as Having an Acceptable Risk of Slope Instability	Not applicable - The site is on relatively flat land and project will not involve sub-surface works. The site has not been identified in Council's LEP maps.
<b>E13: Floodplain Management</b>	
2 Land to which the plan applies	Not applicable - A Floodway Assessment was completed for the site by Rienco Consulting in April 2018. The assessment concluded that the site is not identified within a floodway under the Wollongong LEP, and a Flood Study and Floodplain Risk Management Study and Plan, adopted by Council did not categorise the site as being within a floodway.

Relevant DCP provisions	Comments
<b>E17: Preservation and management of trees and vegetation</b>	
	<p>All vegetation on site will be removed to prepare the site for remediation. Vegetation on site has either been planted or has self- recruited. The vegetation is not considered to be within its natural ecosystem as is evident through overcrowding. The vegetation removal would form part of the project and therefore gain approval for occurring. The project would not result in the removal of any threatened vegetation.</p> <p>Revegetation is anticipated to occur following the redevelopment of the site.</p> <p>Potential impacts are discussed further in section 5.3</p>
<b>E18: Threatened Species</b>	
	Not applicable - no threatened species have been identified on site.
<b>E19: Earthworks (Land Reshaping Works)</b>	
	Not applicable - no sub-surface works will be undertaken as part of the project.
<b>E20: Contaminated Land Management</b>	
	<p>Not applicable - no sub-surface works will be undertaken as part of the project. The potential for exposure of contaminated soil is discussed further in section 5.1.</p> <p>Subsequent remediation works will occur following the completion of the project.</p>
<b>E21: Demolition and Hazardous Building Materials Management</b>	
5 Demolition of buildings 6 Hazardous Building Materials management	<p>Supporting figures in the SEE demonstrate the location of the buildings to be demolished. A SWMMP accompanies this SEE. Disposal of demolition material will be undertaken in accordance with the SWMMP.</p> <p>Demolition will be undertaken by an appropriately licensed contractor in accordance with the mitigation measures provided in this SEE and the relevant provisions of E21.</p>
<b>E22: Soil Erosion and Sediment Control</b>	
4.1 Site Preparation 4.2 Erosion Control Measures 4.3 Wash-out Areas 4.5 Stabilised Entry/Exit Points 4.6 Air Pollution 4.7 Early Roof Water Connection	No sub-surface works will be undertaken as part of the project, therefore there will be minimal soil erosion and sediment impacts. The SWMMP identifies the appropriate locations for temporarily stockpiling. The demolition contractor will be responsible for implementing the relevant control measures prior to the commencement of works.

Relevant DCP provisions	Comments
4.8 Position of Stockpiles 4.9 Revegetation	Potential impacts are discussed further in section 5.1.
<b>E23: Riparian Land Management</b>	
	Not applicable



## **Appendix D** – Database searches

Judy Tan  
133 Castlereagh Street  
Sydney New South Wales 2000  
Attention: Judy Tan  
Email: judy.tan@ghd.com

Date: 01 November 2018

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Lot : 253, DP:DP787299 with a Buffer of 200 meters, conducted by Judy Tan on 01 November 2018.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

**If your search shows Aboriginal sites or places what should you do?**

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

**Important information about your AHIMS search**

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.



[Home](#) > [Topics](#) > [Heritage places and items](#) > [Search for heritage](#)

# Search for NSW heritage

[Return to search page where you can refine/broaden your search.](#)

## Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by the Heritage Division.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the Heritage Division.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act, 1979 and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

## Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

## Section 2. Items listed under the NSW Heritage Act.

Your search returned 1 record.

Item name	Address	Suburb	LGA	SHR
<a href="#">Little Milton</a>	31-33 Smith Street	Wollongong	Wollongong City	00272

## Section 3. Items listed by Local Government and State Agencies.

Your search returned 14 records.

Item name	Address	Suburb	LGA	Information source
<a href="#">" Ken Elm"</a>	90 Smith Street	Wollongong	Wollongong City	LGOV
<a href="#">"Wye Lodge" and Magnolia</a>	63 Smith Street	Wollongong	Wollongong City	LGOV
<a href="#">Headmasters Residence</a>	53 Smith Street	Wollongong	Wollongong City	LGOV
<a href="#">House</a>	26 Smith Street	Wollongong	Wollongong City	LGOV
<a href="#">House</a>	65 Smith Street	Wollongong	Wollongong City	LGOV
<a href="#">House</a>	67 Smith Street	Wollongong	Wollongong City	LGOV



<u><b>House</b></u>	88 Smith Street	Wollongong	Wollongong City	LGOV
<u><b>Little Milton</b></u>	31-33 Smith Street	Wollongong	Wollongong City	GAZ
<u><b>Little Milton</b></u>	33 Smith Street	Wollongong	Wollongong City	LGOV
<u><b>Masonic Hall</b></u>	88 Smith Street	Wollongong	Wollongong City	LGOV
<u><b>Monument</b></u>	1 Smith Street Cnr Harbour	Wollongong	Wollongong City	LGOV
<u><b>Principal's Residence</b></u>	53 Smith Street	Wollongong	Wollongong City	GAZ
<u><b>School of Arts Building</b></u>	64 Smith Street	Wollongong	Wollongong City	LGOV
<u><b>Wollongong Public School</b></u>	55 Smith Street	Wollongong	Wollongong City	GAZ

There was a total of 15 records matching your search criteria.

**Key:**

LGA = Local Government Area

GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.


**Note:** While the Heritage Division seeks to keep the Inventory up to date, it is reliant on State agencies and local councils to provide their data. Always check with the relevant State agency or local council for the most up-to-date information.






## Coastal Management SEPP 2018

#### Coastal Wetlands

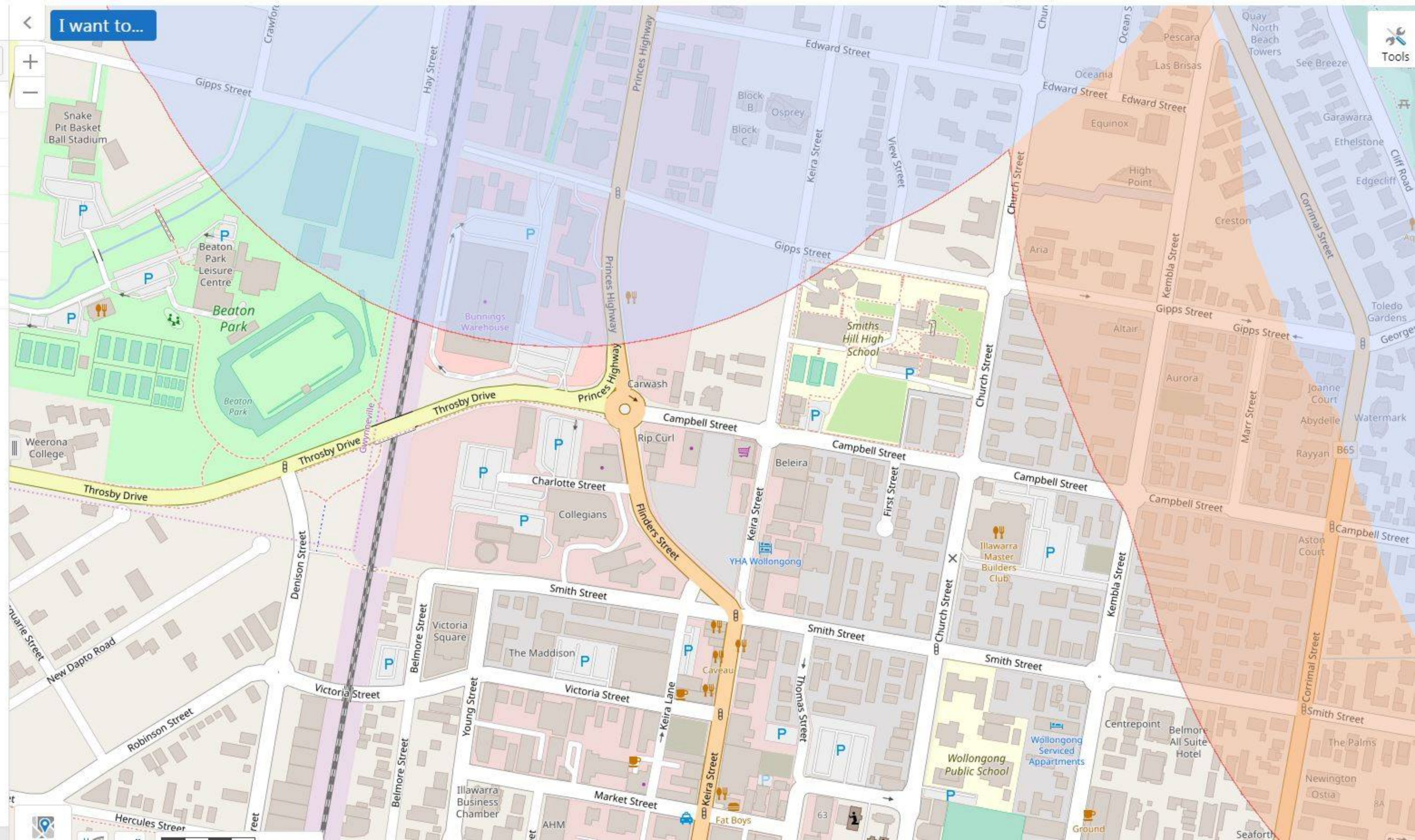
 Proximity Area for Coastal Wetlands

 Littoral Rainforests

 Proximity Area for Littoral Rainforests

Coastal Environment Area Map

Coastal Use Area Map

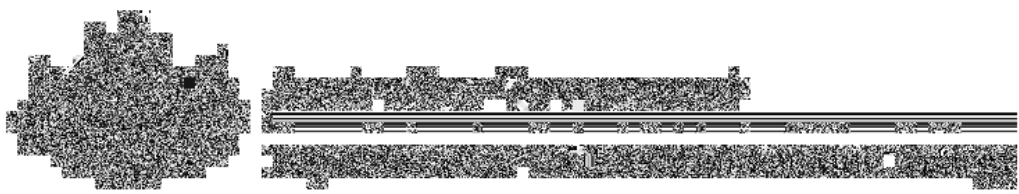
☐ Land Application Map



Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -34.37 West: 150.84 East: 150.94 South: -34.47] returned a total of 17,688 records of 1,409 species.  
Report generated on 10/06/2019 8:46 AM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Hylidae	3166	<i>Litoria aurea</i>		Green and Golden Bell Frog	E1,P	V	21	
Animalia	Reptilia	Cheloniidae	2004	<i>Caretta caretta</i>		Loggerhead Turtle	E1,P	E	1	        
Animalia	Reptilia	Cheloniidae	2007	<i>Chelonia mydas</i>		Green Turtle	V,P	V	4	
Animalia	Aves	Anatidae	0216	<i>Oxyura australis</i>		Blue-billed Duck	V,P		1	
Animalia	Aves	Columbidae	0025	<i>Ptilinopus magnificus</i>		Wompoo Fruit-Dove	V,P		1	
Animalia	Aves	Columbidae	0021	<i>Ptilinopus regina</i>		Rose-crowned Fruit-Dove	V,P		2	
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>		Superb Fruit-Dove	V,P		3	
Animalia	Aves	Diomedeidae	0086	<i>Diomedea exulans</i>		Wandering Albatross	E1,P	E,J	98	
Animalia	Aves	Diomedeidae	0847	<i>Diomedea gibsoni</i>		Gibson's Albatross	V,P	V	1	
Animalia	Aves	Diomedeidae	0859	<i>Thalassarche impavida</i>		Campbell Albatross	P	V	1	
Animalia	Aves	Diomedeidae	0088	<i>Thalassarche melanophris</i>		Black-browed Albatross	V,P	V	3	
Animalia	Aves	Procellariidae	0072	<i>Ardenna carneipes</i>		Flesh-footed Shearwater	V,P	J,K	2	
Animalia	Aves	Procellariidae	0929	<i>Macronectes giganteus</i>		Southern Giant Petrel	E1,P	E	3	
Animalia	Aves	Procellariidae	0937	<i>Macronectes halli</i>		Northern Giant-Petrel	V,P	V	1	
Animalia	Aves	Procellariidae	8684	<i>Pterodroma leucoptera leucoptera</i>		Gould's Petrel	V,P	E	1	
Animalia	Aves	Procellariidae	0067	<i>Puffinus assimilis</i>		Little Shearwater	V,P		1	
Animalia	Aves	Ciconiidae	0183	<i>Ephippiorhynchus asiaticus</i>		Black-necked Stork	E1,P		2	
Animalia	Aves	Ardeidae	0197	<i>Botaurus poiciloptilus</i>		Australasian Bittern	E1,P	E	1	   
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>		Black Bittern	V,P		3	
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>		White-bellied Sea-Eagle	V,P	C	1	
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>		Little Eagle	V,P		1	
Animalia	Aves	Accipitridae	0230	^^ <i>Lophoictinia isura</i>		Square-tailed Kite	V,P,3		6	 
Animalia	Aves	Accipitridae	8739	^^ <i>Pandion cristatus</i>		Eastern Osprey	V,P,3		1	
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>		Sooty Oystercatcher	V,P		24	 
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>		Pied Oystercatcher	E1,P		2	
Animalia	Aves	Charadriidae	0138	<i>Thinornis rubricollis</i>		Hooded Plover	E4A,P	V	1	 
Animalia	Aves	Charadriidae	0133	<i>Vanellus miles</i>		Masked Lapwing	P		85	
Animalia	Aves	Scolopacidae	0167	<i>Limicola falcinellus</i>		Broad-billed Sandpiper	V,P	C,J,K	1	   
Animalia	Aves	Scolopacidae	0152	<i>Limosa limosa</i>		Black-tailed Godwit	V,P	C,J,K	1	
Animalia	Aves	Laridae	0972	<i>Gygis alba</i>		White Tern	V,P		1	
Animalia	Aves	Laridae	0120	<i>Onychoprion fuscata</i>		Sooty Tern	V,P		1	
Animalia	Aves	Cacatuidae	0268	^^ <i>Callocephalon fimbriatum</i>		Gang-gang Cockatoo	V,P,3		10	 
Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>		Little Lorikeet	V,P		1	
Animalia	Aves	Psittacidae	0309	^^ <i>Lathamus discolor</i>		Swift Parrot	E1,P,3	CE	10	 
Animalia	Aves	Psittacidae	0302	^^ <i>Neophema pulchella</i>		Turquoise Parrot	V,P,3		1	
Animalia	Aves	Psittacidae	0709	^^ <i>Polytelis anthopeplus monarchoides</i>		Regent Parrot (eastern subspecies)	E1,P,3	V	1	 
Animalia	Aves	Strigidae	0246	^^ <i>Ninox connivens</i>		Barking Owl	V,P,3		1	
Animalia	Aves	Strigidae	0248	^^ <i>Ninox strenua</i>		Powerful Owl	V,P,3		10	 
Animalia	Aves	Tytonidae	0250	^^ <i>Tyto novaehollandiae</i>		Masked Owl	V,P,3		1	
Animalia	Aves	Tytonidae	9924	^^ <i>Tyto tenebricosa</i>		Sooty Owl	V,P,3		2	 
Animalia	Aves	Meliphagidae	0603	<i>Anthochaera phrygia</i>		Regent Honeyeater	E4A,P	CE	1	
Animalia	Aves	Meliphagidae	0598	<i>Grantiella picta</i>		Painted Honeyeater	V,P	V	1	 
Animalia	Aves	Campephagidae	0428	<i>Coracina lineata</i>		Barred Cuckoo-shrike	V,P		1	
Animalia	Aves	Pachycephalidae	0405	<i>Pachycephala olivacea</i>		Olive Whistler	V,P		2	
Animalia	Aves	Petroicidae	0382	<i>Petroica phoenicea</i>		Flame Robin	V,P		2	 
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>		Koala	V,P	V	2	
Animalia	Mammalia	Burramyidae	1150	<i>Cercartetus nanus</i>		Eastern Pygmy-possum	V,P		2	

Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		3	
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	246	
Animalia	Mammalia	Vespertilionidae	1346	<i>Miniopterus australis</i>	Little Bentwing-bat	V,P		2	
Animalia	Mammalia	Vespertilionidae	1834	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V,P		4	
Animalia	Mammalia	Vespertilionidae	1361	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		1	
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P		1	
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		1	
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		5	
Animalia	Mammalia	Balaenopteridae	1575	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	1	
Animalia	Mammalia	Physeteridae	1578	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		1	
Plantae	Flora	Apocynaceae	1226	<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	6	
Plantae	Flora	Fabaceae (Caesalpinioidae)	8772	<i>Senna acclinis</i>	Rainforest Cassia	E1		1	
Plantae	Flora	Fabaceae (Faboideae)	2974	<i>Pultenaea aristata</i>	Prickly Bush-pea	V	V	12	
Plantae	Flora	Fabaceae (Mimosoideae)	6577	<i>Acacia baueri subsp. aspera</i>		V		1	
Plantae	Flora	Myrtaceae	11397	<i>Gossia acmenoides</i>	Gossia acmenoides population in the Sydney Basin Bioregion south of the Georges River	E2		3	
Plantae	Flora	Myrtaceae	4283	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A		14	
Plantae	Flora	Myrtaceae	4293	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	1	



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/06/19 08:43:59

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[Matters of NES](#)

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[Caveat](#)

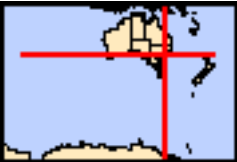
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 2.0Km](#)





# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	2
<a href="#">Listed Threatened Species:</a>	70
<a href="#">Listed Migratory Species:</a>	53

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	8
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	74
<a href="#">Whales and Other Cetaceans:</a>	12
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	43
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Listed Threatened Ecological Communities

[ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
<a href="#">Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community likely to occur within area
<a href="#">Illawarra and south coast lowland forest and woodland ecological community</a>	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[ Resource Information ]

Name	Status	Type of Presence
Birds		

<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea antipodensis gibsoni</a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
<a href="#">Fregetta grallaria grallaria</a> White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Limosa lapponica baueri</a> Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pterodroma leucoptera leucoptera</a> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
<a href="#">Pterodroma neglecta neglecta</a> Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche bulleri platei</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta cauta</a> Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche cauta steadi</a> White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or

Name	Status	Type of Presence
<a href="#">Thalassarche impavida</a>		related behaviour likely to occur within area
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a>		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche salvini</a>		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
<a href="#">Epinephelus daemeli</a>		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Prototroctes maraena</a>		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
<a href="#">Heleioporus australiacus</a>		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
<a href="#">Litoria aurea</a>		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Litoria littlejohni</a>		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
<a href="#">Balaenoptera musculus</a>		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
<a href="#">Chalinolobus dwyeri</a>		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a>		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eubalaena australis</a>		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
<a href="#">Isoodon obesulus obesulus</a>		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a>		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Petauroides volans</a>		
Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Petrogale penicillata</a>		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a>		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area



Name	Status	Type of Presence
<a href="#">Potorous tridactylus tridactylus</a> Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
<a href="#">Acacia bynoeana</a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caladenia tessellata</a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptostylis hunteriana</a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cynanchum elegans</a> White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
<a href="#">Genoplesium baueri</a> Yellow Gnat-orchid [7528]	Endangered	Species or species habitat may occur within area
<a href="#">Haloragis exalata subsp. exalata</a> Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
<a href="#">Melaleuca biconvexa</a> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
<a href="#">Persoonia hirsuta</a> Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area
<a href="#">Pimelea spicata</a> Spiked Rice-flower [20834]	Endangered	Species or species habitat likely to occur within area
<a href="#">Pterostylis gibbosa</a> Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat likely to occur within area
<a href="#">Syzygium paniculatum</a> Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thesium australe</a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area



Name	Status	Type of Presence
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Hoplocephalus bungaroides</a> Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
<a href="#">Carcharias taurus (east coast population)</a> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		
[ Resource Information ]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within

Name	Threatened	Type of Presence
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	area  Species or species habitat may occur within area
<a href="#">Sternula albifrons</a> Little Tern [82849]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta</a> Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
<a href="#">Balaena glacialis australis</a> Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat likely to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		area  Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[ <a href="#">Resource Information</a> ]
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The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Commonwealth Trading Bank of Australia
Defence - Graovac House
Defence - HYDROGRAPHIC OFFICE
Defence - TS ALBATROSS-WOLLONGONG
Defence - WOLLONGONG MULTI-USER DEPOT

Listed Marine Species	[ <a href="#">Resource Information</a> ]
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\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat likely to occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea gibsoni</a> Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
<a href="#">Sterna albifrons</a> Little Tern [813]		Species or species habitat may occur within area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta</a> Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche sp. nov.</a> Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
<a href="#">Acentronura tentaculata</a> Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus abdominalis</a> Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat likely to occur within area
<a href="#">Histiogamphelus briggsii</a> Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]		Species or species habitat may occur within area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]		Species or species habitat may occur within area
<a href="#">Notiocampus ruber</a> Red Pipefish [66265]		Species or species habitat may occur within area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
<a href="#">Solegnathus spinosissimus</a> Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Solenostomus paradoxus</a> Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area

Mammals		
<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
<a href="#">Arctocephalus pusillus</a> Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area

Reptiles		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans		
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Invasive Species

[ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur



Name	Status	Type of Presence within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and		Species or species

Name	Status	Type of Presence
Sterile Pussy Willow [68497]		habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-34.42056 150.89052

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.



# **Appendix E** – Noise and Vibration Impact Assessment



## **Jemena Gas Networks (NSW) Ltd**

Former Wollongong Gasworks Site – Demolition and  
Vegetation Removal Project  
Noise and Vibration Impact Assessment

June 2019

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Appendix D - Predicted construction noise contours



# 1. Introduction

## 1.1 Overview

Jemena Gas Networks (NSW) Ltd (Jemena) seeks development consent to demolish three existing commercial buildings to natural ground level and remove the majority of existing vegetation and structures on the former Wollongong Gasworks site ('the project'). The former gasworks site is located at 120 – 122 Smith Street, Wollongong (the 'site').

The project is required to facilitate the remediation of the former gasworks site. This will allow redevelopment of the site for a mixture of commercial and residential land uses at some stage in the future.

This Noise and Vibration Impact Assessment (NVIA) has been prepared by GHD Pty Ltd (GHD) on behalf of Jemena for the Statement of Environmental Effects (SEE), which is required to support the Development Application (DA) to be submitted to Wollongong City Council.

## 1.2 Scope of work

The scope of work for the NVIA include:

- review the existing information, proposed development and surrounding environment to identify the nearest sensitive receivers
- background noise monitoring was undertaken at one location
- construction noise impacts were assessed in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009)
- noise and vibration management measures have been provided where impacts have been identified
- preparation of a report summarising the findings of the assessment.

The report has been prepared with consideration to the following documents:

- *Interim Construction Noise Guideline* (ICNG) (EPA, 2009)
- *Road Noise Policy* (RNP) (DECCW, 2011)
- *Assessing Vibration: a technical guideline* (EPA, 2006).

## 1.3 Report structure

The report is comprised of the following sections:

- **Section 1 – Introduction:** provides the background and an overview of the project and the assessment
- **Section 2 – Existing environment:** summarises the existing noise conditions and details the noise monitoring methodology
- **Section 3 – Compliance criteria:** provides an overview of the construction noise, construction vibration and operational noise criteria
- **Section 4 – Construction impact assessment:** presents a summary of the noise modelling and identifies potential noise and vibration impacts during construction

- **Section 5 – Mitigation measures:** provides an overview of the proposed noise management measures during the construction and operational phases of the project
- **Section 6 – Conclusion:** presents a summary of the NVIA findings and sets out the principal conclusions for the assessment.

## 1.4 Limitations

*This report: has been prepared by GHD for Jemena and may only be used and relied on by Jemena for the purpose agreed between GHD and the Jemena.*

*GHD otherwise disclaims responsibility to any person other than Jemena arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by Jemena and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

## 2. Existing environment

### 2.1 Project location

The project is located about 60 kilometres south of Sydney, and 650 metres north of Wollongong Train Station. The project is surrounded by a variety of residential and commercial premises immediately to the north, south and east of the site, while a rail corridor, followed by residential and commercial premises borders the western site boundary.

The site is located at 120 – 122 Smith Street, Wollongong (Lot 253 DP 787299 and Lot 2411 DP 1097900), on the northern edge of the Wollongong commercial core. The site is approximately 1.6 hectares and is roughly an 'L' shape project (refer to Figure 2.1).

Accessed immediately off Smith Street, the site backs onto Throsby Drive with a vegetated embankment. Vegetation on the western lot consists of grass, exotic shrubs and weeds and trees border the western and northern boundaries of the site. Trees are also located along the eastern boundary outside the site fence line. A two storey office, a single storey office, and industrial warehouse occupy the site. The ground levels of these commercial buildings are slightly elevated above the surrounding carpark.

### 2.2 Sensitive receivers and land uses

This assessment considers all receivers that fall within a 500 meter buffer distance from the site. Noise and vibration sensitive receivers are defined based upon the type of occupancy and the activities performed within the land parcel. The receivers are classified within the following categories:

- residential premises
- educational institutes
- hospitals and medical facilities
- places of worship
- passive and active recreation areas
- commercial or industrial premises.

The following residential receivers in Table 2.1 were identified near the project area. They are also presented in Table 3.2.

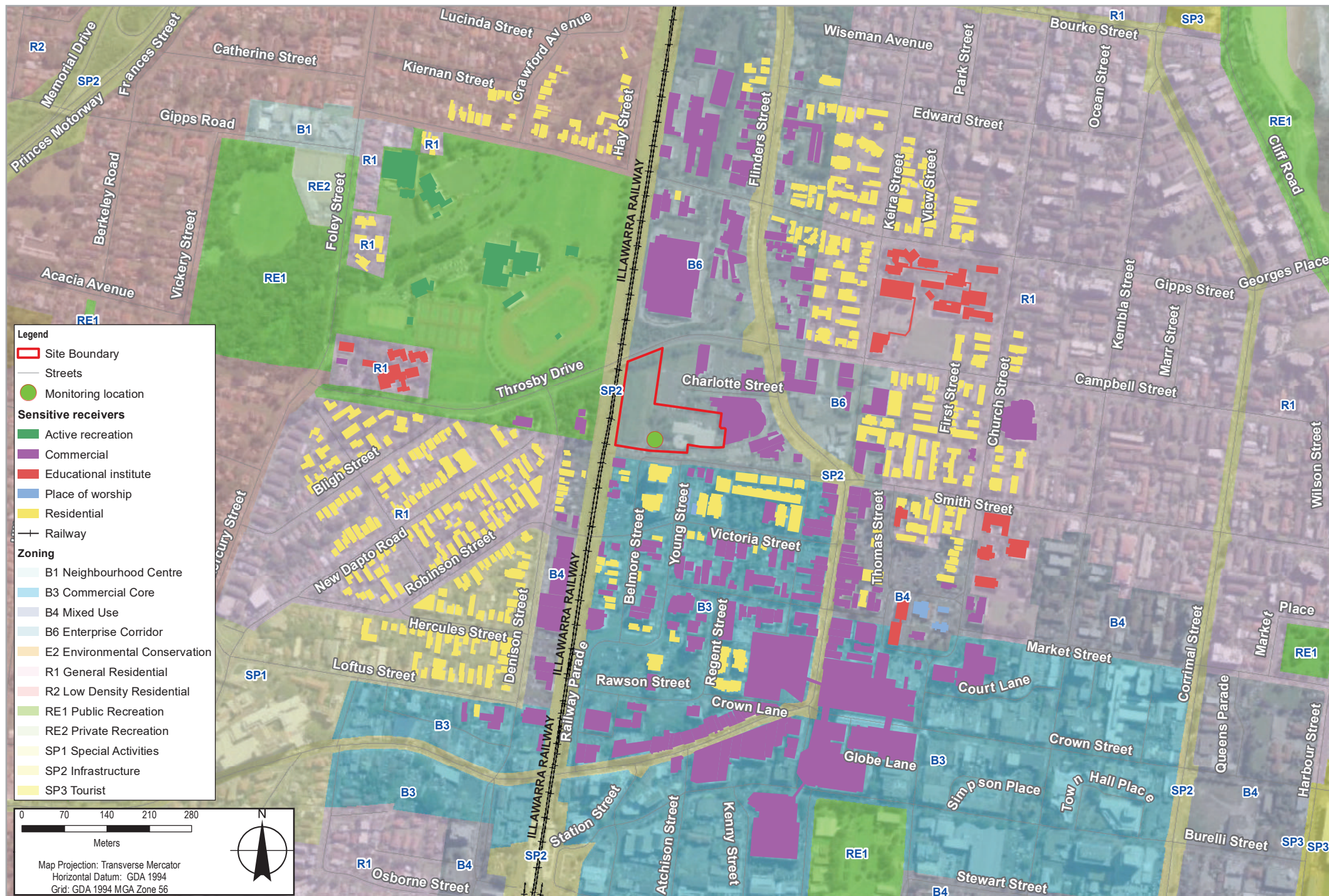
**Table 2.1 Residential receiver locations**

Residential street	Approximate distance from site
Smith Street	Directly adjacent – south
Young Street	30 m - south
Belmore Street	60 m - south
Victoria Street	110 m - south
Denison Street	130 m - west
New Dapto Road	200 m - west
Keira Street	220 m - east
Market Street	220 m - south
Keira Lane	230 m - south
Regent Street	240 m - south
Campbell Street	250 m - north

Residential street	Approximate distance from site
Gipps Street	320 m - north
Thomas Street	320 m - east
Bligh Street	350 m - west
Hay Street	370 m - north
First Street	380 m - east
Rawson Street	400 m - south
Church Street	440 m - east
Macquarie Street	440 m - west
Waters Place	450 m - south
View Street	475 m - north
Crawford Avenue	480 m - north
Edward Street	490 m - north
Vickery Street	800 m - west

Non-residential sensitive land uses identified in the vicinity of the project area. They have been classified and presented in Figure 2.1 and explicitly assessed towards in Appendix C.





**FIGURE 2-1: Sensitive receivers and land use map**

Data source: General topo - NSW LPI DT08 2012, 2015. Aerial imagery - Created by: ecateblanco

## 2.3 Noise monitoring

Long term monitoring was undertaken at one location for a period of 9 days between 22 May and 31 May 2019 at 120 Smith Street, Wollongong. It is suitably positioned to capture representative background noise levels typical of the most affected receivers. The noise environment was characteristic of an urban environment intermittent rail noise from the nearby South Coast line rail corridor and consistent road noise from Princes Highway.

### 2.3.1 Noise monitoring methodology


The methodology of the unattended noise monitoring data was:

- The noise loggers were set to record  $L_{A90}$ ,  $L_{A10}$ ,  $L_{Aeq}$  and  $L_{Amax}$  noise descriptors. The instrument was programmed to accumulate environmental noise data continuously over a sampling period of 15 minutes over the entire monitoring period.
- A calibration check was performed on the noise monitoring equipment using a sound level calibrator with a sound pressure level of 94 dB(A) at 1 kHz. At completion of the measurements, the meter's calibration was re-checked to ensure the sensitivity of the noise monitoring equipment had not varied. The noise loggers were found to be within the acceptable tolerance of  $\pm 0.5$  dB(A).
- Meteorological data for the monitoring period was sourced from the Bureau of Meteorology (BoM) Bellambi AWS (station number: 068228). The AWS is located about 6.75 km north-east of the site.
- Noise levels were excluded during periods of extraneous noise, periods where average wind speeds were greater than 7 m/s (height adjusted) or when rainfall occurred.

A summary of the noise monitoring location and noise monitoring equipment details are provided in Table 2.2.



**Table 2.2 Noise monitoring equipment details**

Parameter	Value
Monitoring location	120 – 122 Smith Street, Wollongong
Logger Type / Serial No.	SVAN 977 / SN 36871
Measurement started	11:30 am 22 May 2019
Measurement ceased	2:15 pm 31 May 2019
Pre/Post calibration	-0.3 dB
Freq. weighting	A
Time response	Fast
Photograph	

### 2.3.2 Noise monitoring results

The measured noise monitoring data was used to determine the Rating Background Levels (RBL) for the assessment during the day, evening and night-time periods in accordance with the *Noise Policy for Industry* (NPI) (EPA, 2017). A summary of the measured rating background levels and ambient noise levels is provided in Table 2.3. Daily noise level charts are provided in Appendix B.

**Table 2.3 Summary of measured noise levels, dB(A)**

Location	Rating background level, $L_{A90}$			Ambient level, $L_{Aeq}$		
	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
120-122 Smith St, Wollongong	46	45	37	55	53	51

## 3. Compliance criteria

### 3.1 Construction noise

#### 3.1.1 Proposed construction hours

Construction noise management levels for the project are based on the *Interim Construction Noise Guideline* (ICNG) (DECCW, 2009). Construction works would be conducted during standard construction hours. Works outside standard construction hours should only be conducted when it is not feasible or reasonable to work within standard hours. Any decisions to work outside of the standard construction hours shall be documented and assessed in the Out of Hours Work (OOHW) Application to justify the requirement.

The construction hours for the project are provided in Table 3.1.

**Table 3.1 Construction hours**

Construction hours	Monday to Friday	Saturday	Sunday/Public holiday
Standard hours	7 am to 6 pm	8 am to 1 pm	No work
Outside recommended standard hours	6 pm to 7 am	1 pm to 8 am	All times

The ICNG acknowledges that the following activities have justification to be undertaken outside the standard construction hours assuming all feasible and reasonable mitigation measures are implemented to minimise the impacts to the surrounding sensitive land uses:

- the delivery of oversized plant, equipment and materials that police or other authorities determine require special arrangements to transport along public roads
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services or considerations of worker safety do not allow work within standard hours
- public infrastructure works that shorten the length of the project and are supported by the affected community
- works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours
- works which maintain noise levels below the noise management levels outside of the recommended standard construction hours.

Works required outside standard construction hours would be identified during construction planning and nearby residents would be notified before such work is expected.

#### 3.1.2 Construction noise management levels

Construction noise management levels for residential premises and other sensitive land uses are provided in the ICNG. The method to determine the noise management levels for residential receivers in accordance with the ICNG is outlined in Table 3.2.

**Table 3.2 Noise management levels for residential receivers**

Time of day	Noise management level, $L_{Aeq}(15 \text{ min})$	Application notes
Recommended standard hours	Noise affected: RBL + 10 dB(A)	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured <math>L_{Aeq}(15 \text{ min})</math> is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</p>
	Highly noise affected: 75 dB(A)	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level.</p> <p>If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.</p>
Outside recommended standard hours	Noise affected: RBL + 5 dB(A)	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable measures have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should consult with the community.</p> <p>For guidance on negotiating agreements see Section 7.2.2 of the <i>Interim Construction Noise Guideline</i>.</p>

Noise management levels for other sensitive land uses are provided in Table 3.3 and only apply when the properties are in use.

**Table 3.3 Noise management levels for other sensitive land uses**

Land use	Noise management level, $L_{Aeq}(15 \text{ min})$
Commercial premises	70 dB(A) (external)
Educational institutes	45 dB(A) (internal)
Places of worship	45 dB(A) (internal)
Active recreation areas	65 dB(A) (external)

### 3.1.3 Sleep disturbance

The ICNG recommends that where construction works are planned to extend over two or more consecutive nights, the project should consider maximum noise levels and the extent and frequency of maximum noise level events exceeding the RBL. The potential for both sleep disturbance and awakenings should be considered in the assessment.



The NPI provides the latest EPA guidance for the assessment of sleep disturbance. The NPI recommends a maximum noise level assessment to assess the potential for sleep disturbance impacts which include awakenings and disturbance to sleep stages. An initial screening test for the maximum noise levels events should be assessed to the following levels.

- $L_{Aeq(15 \text{ min})}$  40 dB(A) or the prevailing RBL plus 5 dB, whichever is greater, and/or
- $L_{AFmax}$  52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater.

If the screening test indicates there is a potential for sleep disturbance then a detailed maximum noise level assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

### 3.1.4 Project noise management levels

A summary of the project construction noise management levels for each identified sensitive receiver type is provided in Table 3.4.

**Table 3.4 project construction noise management levels, dB(A)**

Receiver Type	Time of day	Management level
Residential	Recommended standard hours	Noise affected: 56
		Highly affected: 75
	Outside recommended standard hours <sup>1</sup>	Day: 51
		Evening: 50
		Night: 42
Commercial premises	When in use	70 dB(A) (external)
Educational institutes		45 dB(A) (internal)
Places of worship		55 dB(A) (external) <sup>2</sup>
		45 dB(A) (internal)
Active recreation areas		55 dB(A) (external) <sup>2</sup>
		65 dB(A) (external)

Note 1: The *Noise Policy for Industry* (EPA, 2017) defines day, evening and night time periods as:

- Day: the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.
- Evening: the period from 6 pm to 10 pm.
- Night: the remaining periods.

Note 2: These receivers have been assessed externally. This conversion is based on a partially opened window with a  $R_w$  of 10 dB

## 3.2 Construction traffic

The *Road Noise Policy* (RNP) (DECCW, 2011) provides road traffic noise criteria for residential land uses affected by construction traffic on the public road network.

Section 3.4.1 of the RNP states that any increase in the total noise level at existing residences and other sensitive land uses affected by traffic generation on existing roads should be limited to 2 dB(A) above current levels. This limit only applies when the noise level without the development is within 2 dB(A) or exceeds the road traffic noise criterion provided in the RNP.

This has been used to identify potential impacts as a result of noise produced by construction traffic. If road traffic noise increases as a result of construction works within 2 dB(A) of current levels then the objectives of the RNP are considered to be met and no specific mitigation measures would be required.

Where construction traffic increases the existing road traffic noise levels by more than 2 dB(A) then further assessment against the road traffic noise criteria in Table 3.5 is required.

**Table 3.5 Road traffic noise criteria, dB(A)**

Type of development	Day 7 am to 10 pm	Night 10 pm to 7 am
Existing residence affected by additional traffic on arterial roads generated by land use developments	60 L <sub>Aeq</sub> (15 hour)	55 L <sub>Aeq</sub> (9 hour)
Existing residence affected by additional traffic on local roads generated by land use developments	55 L <sub>Aeq</sub> (1 hour)	50 L <sub>Aeq</sub> (1 hour)

### 3.3 Construction vibration

#### 3.3.1 Human comfort

Acceptable vibration levels for human comfort have been set with consideration to *Assessing Vibration: a technical guideline* (DEC, 2006) which is based on the guidelines contained in British Standard *BS 6472 – 1992, Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*.

Typically, construction activities generate ground vibration of an intermittent nature. Intermittent vibration is assessed using the vibration dose value. Acceptable values of vibration dose are presented in Table 3.6 for sensitive receivers.

**Table 3.6 Human comfort intermittent vibration limits**

Receiver type	Period	Intermittent vibration dose value (m/s <sup>1.75</sup> )	
		Preferred value	Maximum value
Residential	Day (7 am and 10 pm)	0.2	0.4
	Night (10 pm and 7 am)	0.13	0.26
Offices, schools, educational institutes and places of worship	When in use	0.4	0.8

Whilst the assessment of response to vibration in *BS 6472:1992* is based on vibration dose value and weighted acceleration, for construction related vibration, it is considered more appropriate to provide guidance in terms of a peak value, since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

Humans are capable of detecting vibration at levels which are well below those causing risk of damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in British Standard, *BS 5228.2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration* and are shown below in Table 3.7.

**Table 3.7 Guidance on effects of vibration levels for human comfort**

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

### 3.3.2 Guidelines for general structures

The effects of transient vibration on structures is considered in *BS 7385 Part 2 – 1993 Evaluation and measurement for vibration in buildings*. The criteria provided in BS 7385 are presented in Table 3.8.

**Table 3.8 Transient vibration guide values – minimal risk of cosmetic damage**

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

The guide values in Table 3.8 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings. Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at lower frequencies, then the guide values may need to be reduced by up to 50 per cent.

The predominant vibration for most construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). However, a conservative vibration damage screening level per receiver type is given below:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s

## 4. Construction impact assessment

### 4.1 Construction noise assessment

#### 4.1.1 Construction works program

The plant and equipment likely to be required throughout each proposed stage of construction have been used to predict the noise levels that would be expected during construction works. The predicted noise levels were assessed against the construction noise management levels identified in Section 3.1.

Construction scenarios have been created based on construction equipment operating simultaneously at any given time. All works are located within the site. It is unlikely that construction machinery would be operating at the same time (as the modelling assumes), but analysing the 'worse-case' scenario helps to identify where noise impacts could be a concern and assists in the formulation of mitigation areas.

The project is anticipated to follow the following work methodology and staging provided in Table 4.1. These construction scenarios have been modelled to determine the potential construction noise impacts on the environment.

**Table 4.1 Construction staging**

Construction phase	Construction scenario
Site establishment	CS01
Demolition	CS02
Vegetation clearing	CS03

Table 4.2 presents the construction equipment proposed for each activity. Sound power levels have been sourced from the *Construction Noise and Vibration Guideline* (RMS, 2016) (CNVG). The activity sound power level has been calculated based on the two noisiest plant to determine the worst-case noise impacts during construction. The activity noise levels have been used to predict the noise levels that would be expected during construction works.

#### *Noise generating equipment*

Plant and equipment needed for the project would be determined during the construction planning phase. Noise level data has been obtained from the Australian Standards AS2436 – *Guide to noise and vibration control on construction, demolition and maintenance sites*. Other equipment may be used, however, it is anticipated that they would produce similar net noise emissions when used concurrently with the equipment listed.

The magnitude of off-site noise impacts associated with construction is dependent upon a number of factors:

- the intensity and location of construction activities
- the type of equipment used
- existing background noise levels
- intervening terrain and structures
- prevailing weather conditions.

Construction machinery would likely move about the site altering the received noise for individual receivers. During any given period, the machinery items to be used would operate at



maximum sound power levels for only brief stages. At other times, the machinery would produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Certain types of construction machinery would be present in the study area for only brief periods during construction. Therefore, noise predictions are considered conservative.

Table 4.2 below presents the number of construction equipment proposed for each construction scenario. The activity sound power level has been calculated based on the two noisiest plant to determine the worst-case noise impacts during construction. The activity noise levels have been used to predict the noise levels that would be expected during construction works.

**Table 4.2 Construction equipment and sound power levels, dB(A)**

Plant description	Sound power level	Construction scenario		
		CS01	CS02	CS03
Activity Sound Power Level		106	123	113
Concrete saw (5mins)	112		✓	
Crane (mobile)	102			
Excavator	102		✓	✓
Excavator with hammer attachment	123		✓	
Front end loader	112		✓	✓
Generator diesel	99			✓
Hand tools (electric)	97	✓	✓	✓
Truck (> 20 tonne)	102	✓	✓	
Vehicle (Light commercial eg 4WD)	104	✓	✓	✓
Mulcher	106			✓

#### 4.1.2 Noise modelling inputs

Noise modelling was undertaken using CandaA 2019. CandaA is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to *ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors'*.

The following noise modelling assumptions were made:

- surrounding land was modelled assuming a mix of 50 per cent soft and 50 per cent hard ground with a ground absorption coefficient of 0.5
- atmospheric absorption was based on an average temperature of 10°C and an average humidity of 70%
- atmospheric propagation conditions were modelled with noise enhancing wind conditions for noise propagation (downwind conditions) or an equivalently well-developed moderate ground based temperature inversions
- modelled scenarios take into account the shielding effect from surrounding buildings and structures on and adjacent to the site
- shielding from localised hoarding has not been considered as part of this assessment

- noise sources for each scenario are in some cases modelled at different locations. As such the noise modelling assesses the noise source at multiple locations and takes the maximum  $L_{Aeq}$  received noise level.

#### 4.1.3 Noise modelling parameters

Computer noise modelling was undertaken using CadnaA 2019 with the noise model parameters outlined within Table 4.3.

**Table 4.3 Noise model parameters**

Variable	Parameter Used
Calculation method	<i>ISO 9613 'Acoustics – Attenuation of sound during propagation outdoors'</i>
Meteorology	Well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation.
Topography	5.0 m resolution
Receiver heights	1.5 m for ground floor 4.5 m for first floor
Ground absorption	0.5 (mix of hard and soft ground areas)
Atmospheric absorption	Average temperature: 10°C Average humidity: 70%
Noise sources	1.5 m above ground level Multiple point sources within the project area to take the maximum $L_{Aeq}$ received noise level at each receiver based on the activity sound power levels in Table 4.2
Buildings	All buildings sourced from PSMA Australia Geoscape

#### 4.1.4 Construction noise impacts

Predicted noise levels from the construction scenarios outlined in Table 4.1 are presented in Appendix C. Construction noise contours for each modelled scenario are provided in Appendix D. A summary of the construction noise results is presented in Table 4.4 for residential receivers and Table 4.5 for non-residential receivers.

It is anticipated that all construction works will take place during standard construction hours. As such no assessment for out of hours work and sleep disturbance has been conducted. If it is anticipated that work may be taking place outside of standard construction hours then such assessments should be subsequently conducted.

Exceedances of the construction noise management levels are typical for construction projects of this scale. The noise impacts would be limited to the construction period only and would not have lasting effects on the community. The maximum noise impacts would be expected during construction scenario CS02. This is primarily due to the impact of the excavator with hammer attachment, used during demolition of the buildings, with a sound power level SWL of 123 dB(A). It is predicted that this scenario will trigger 102 exceedances of the noise management level of 56 dB(A) up to 175 m away from the project boundary. It is predicted five exceedances above the highly noise affected management level of 75 dB(A) will be triggered up to 60 m from the project site. The received noise levels due to the excavator with hammer attachment are significantly greater than received noise levels from other equipment, indicating that noise mitigation strategies focused on such would result in a significant noise reduction. Such strategies are presented in Section 5.1.2.

**Table 4.4 Residential receivers results summary**

Result	Construction scenario		
	CS01	CS02	CS03
Highest noise level, dB(A)	71	84	77
Number of exceedances above NA <sup>1</sup> management level	14 receivers above 56 dB(A) <sup>2</sup>	102 receivers above 56 dB(A) <sup>2</sup>	29 receivers above 56 dB(A) <sup>2</sup>
Highest exceedance above NA <sup>1</sup> management level, dB	15	28	21
Number of exceedances above HNA <sup>3</sup> management level	0 receivers above 75 dB(A)	5 receivers above 75 dB(A)	1 receiver above 75 dB(A)
Highest exceedance above HNA <sup>3</sup> management level, dB	-	9	2
Worst affected receiver	2-12 Young Street, Wollongong	2-12 Young Street, Wollongong	2-12 Young Street, Wollongong

1) NA refers to the Noise Affected management level

2) The criteria for the NA management level is 56 dB(A) measured externally

3) HNA refers to the Highly Noise Affected management level

4) The criteria for the HNA management level is 75 dB(A) measured externally

**Table 4.5 Non-residential results summary**

Receiver Type	Result	Construction scenario		
		CS01	CS02	CS03
Commercial	Number of exceedances above management level	3 receivers above 70 dB(A) <sup>1</sup>	11 receivers above 70 dB(A) <sup>1</sup>	6 receivers above 70 dB(A) <sup>1</sup>
	Highest noise level, dB(A)	97	92	92
	Highest exceedance, dB	27	22	22
	Worst affected receiver	3 Charlotte Street, Wollongong NSW	3 Charlotte Street, Wollongong NSW	3 Charlotte Street, Wollongong NSW
Educational institute	Number of exceedances above management level	0 receivers above 55 dB(A) <sup>2</sup>	4 receivers above 55 dB(A) <sup>2</sup>	0 receivers above 55 dB(A) <sup>2</sup>
	Highest noise level, dB(A)	46	61	53
	Highest exceedance, dB	-	6	-
	Worst affected receiver	Weerona College UOW	Weerona College UOW	Weerona College UOW
Place of worship	Number of exceedances above management level	receivers above 55 dB(A) <sup>3</sup>	2 receivers above 55 dB(A) <sup>3</sup>	2 receivers above 55 dB(A) <sup>3</sup>
	Highest noise level, dB(A)	63	78	69
	Highest exceedance, dB	8	23	14
	Worst affected receiver	Wollongong Seventh-Day	Wollongong Seventh-Day	Wollongong Seventh-Day

Receiver Type	Result	Construction scenario		
		CS01	CS02	CS03
		Adventist Church	Adventist Church	Adventist Church
Active recreation	Number of exceedances above management level	0 receivers above 65 dB(A) <sup>4</sup>	1 receiver above 65 dB(A) <sup>4</sup>	0 receivers above 65 dB(A) <sup>4</sup>
	Highest noise level, dB(A)	55	66	62
	Highest exceedance, dB	-	1	-
	Worst affected receiver	The Snakepit Stadium	The Snakepit Stadium	The Snakepit Stadium

- 1) The criteria for the management level for Commercial receivers is 70 dB(A) measured externally
- 2) The criteria for the management level for Educational institutes is 55 dB(A) measured externally
- 3) The criteria for the management level for Places of worship is 55 dB(A) measured externally
- 4) The criteria for the management level for Active recreational areas is 65 dB(A) measured externally

## 4.2 Construction traffic impacts

The RNP recommends that “any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘without construction’ scenario.” Construction would generate heavy vehicle movements associated with the transportation of construction machinery, equipment and materials to the site. Light vehicle movements would be associated with employees and smaller deliveries. Access to the construction site would be along the following roads listed below:

- Local Roads – Smith Street, Belmore Street, Young Street, Victoria Street, Throsby Drive
- Arterial Roads – Princes Highway.

A significant increase in traffic volumes would be required in order to increase road traffic noise by 2 dB(A) (a doubling in traffic roughly corresponds to a 3 dB(A) increase). Due to the existing traffic volumes along these roads, it is considered unlikely that construction traffic generation along these roads would cause construction traffic noise impacts. Therefore construction traffic noise impacts are not anticipated.

## 4.3 Construction vibration impacts

### 4.3.1 Assessment methodology

The methodology for the construction vibration assessment included:

- vibration from surface construction plant and equipment was predicted and assessed with consideration to *Assessing Vibration: a Technical Guideline* and German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of vibration on structures*
- Where noise and vibration levels were predicted to exceed the construction noise management levels, appropriate construction noise and vibration mitigation measures were provided to minimise impacts from each construction phase.
- Energy from construction equipment is transmitted into the ground and transformed into vibrations, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- the efficiency of the energy transfer mechanism of the equipment (i.e. impulsive; reciprocating, rolling or rotating equipment)
- the frequency content
- the impact medium stiffness
- the type of wave (surface or body)
- the ground type and topography.

Construction and demolition works have the potential to impact human comfort and / or cause structural damage to buildings. Potential vibration inducing activities identified during construction and demolition works include:

- Bulk earthworks, construction traffic movements and demolition works will be a source of intermittent or continuous vibration.

Safe working buffer distances to comply with the human comfort, cosmetic damage and criteria were calculated from the distance attenuation relationship provided in the *Construction Noise and Vibration Strategy* (TfNSW, 2018) and are provided in Table 4.6 for the equipment on site that is most likely to cause a vibration impact.

**Table 4.6 Vibration safe working buffer distances, m**

Activity	Approx. Size/Weight	Minimum distance, m	
		Cosmetic Damage	Human Comfort
Medium Hydraulic Hammer	900 kg (12 to 18t excavator)	7	23
Large Hydraulic Hammer	1600 kg (18 to 34t excavator)	22	73

### 4.3.2 Construction vibration impacts

#### *Impacts for standard structures*

The CNVS specifies a safe working buffer distance of 7 m for standard structures based on a 900 kg excavator with hammer attachment and no structures fall within this buffer distance. If the size of the excavator with hammer attachment is limited to 900 kg then no impacts for standard structures are anticipated.

The CNVS specifies a safe working buffer distance of 22 m for standard structures based on a 1600 kg excavator with hammer attachment. Only the Collegians Rugby League Football Club situated directly adjacent to the project site is located within this buffer. If this size of equipment is to be used then vibration mitigation measures should be implemented. These measures are presented in Section 5.2.

#### *Human comfort impacts*

The CNVS specifies a buffer distance of 23 m for human comfort based on a 900 kg excavator with hammer attachment and no residential premises fall within this buffer distance. If the size of the excavator with hammer attachment is limited to 900 kg then no human comfort impacts are anticipated.



The CNVS specifies a buffer distance of 73 m for human comfort based on 1600 kg excavator with hammer attachment. Only the following residential premises fall within this buffer distance and may experience some human comfort impacts if this size equipment is used:

- 2-12 Young Street
- 85-87 Smith Street
- 71-83 Smith Street.

## 5. Mitigation measures

### 5.1 Construction noise

#### 5.1.1 General mitigation recommendations

The following mitigation recommendations are provided in Table 5.1 to reduce the noise levels from the construction activities.

**Table 5.1 Construction noise mitigation measures**

Action required	Details
<b>Management measures</b>	
Construction hours	All work will be carried out within standard construction hours: Monday to Friday: 7 am to 6 pm Saturday: 8 am to 1 pm Sunday and public holidays: No construction activities.
Implement community consultation measures	Provide notification to potentially affected receivers about upcoming construction activities. The notification should include: <ul style="list-style-type: none"> <li>• details and timeframe of construction works</li> <li>• noise control measures implemented</li> <li>• provide contact details on a site board</li> </ul>
Complaints handling	A complaints register should be maintained throughout construction detailing: <ul style="list-style-type: none"> <li>• contact details and address of the complainant</li> <li>• the time and nature of complaint</li> <li>• review of work activities</li> <li>• measures undertaken in response to the complaint.</li> </ul> <p>If a complaint is received attended noise monitoring should be undertaken to confirm construction noise predictions at the affected complaint receiver.</p> <p>Staff should be briefed on current and future construction activities and notified of any complaints from the community.</p>
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> <li>• all relevant project specific and standard noise mitigation measures</li> <li>• relevant licence and approval conditions</li> <li>• permissible hours of work</li> <li>• any limitations on high noise generating activities</li> <li>• location of nearest sensitive receivers</li> <li>• construction employee parking areas</li> <li>• designated loading/ unloading areas and procedures</li> <li>• construction traffic routes</li> <li>• site opening/closing times (including deliveries)</li> <li>• environmental incident procedures.</li> </ul>
Behavioural practices	No unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.

Action required	Details
Update Construction Environmental Management Plans	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies
<b>Source controls</b>	
Equipment operation	Avoid simultaneous use of construction equipment where possible. Equipment should be turned off when not in use. Equipment should be serviced and maintained regularly.
Equipment selection	Use quieter construction methods where reasonable and feasible. Ensure plant including the silencer is well maintained
Plant noise levels	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with level in Table 4.2. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturer's specifications or Table 4.2
Use and siting of plant	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.
Plan worksites and activities to minimise noise	Plan traffic flow, parking and loading/ unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all vehicles and mobile plant regularly used on site and for any out of hours work. The use of ambient sensitive alarms that adjust output relative to the ambient noise level should be considered.
Construction movements	All deliveries and movements should be during standard construction hours.
Minimise disturbance arising from delivery of goods to construction sites	Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.
<b>Path controls</b>	
Shield stationary noise sources such as pumps, compressors, fans etc.	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.
Shield sensitive receivers from noisy activities	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of noise barriers (where practicable) and consideration of site topography when siting plant.

### 5.1.2 Additional mitigation recommendations

The construction noise impacts presented in Section 4.1.4 indicate that significant noise impacts emanate from the use and operation of the excavator with hammer attachment. The following mitigation recommendations for such are as follows:

- Localised hoarding should be implemented around rock breaking activities. A product such as EchoBarrier or similar is appropriate
- Community consultation prior to rock breaking activities should take place in order to schedule time periods for rock breaking. They should consider the follow:
  - respite periods with affected residences
  - scheduling of activities around times of high background noise (local road traffic or when other noise sources are active) where possible to provide masking or to reduce the amount that construction noise intrudes above the background.

## 5.2 Construction vibration

If the size of the excavator with hammer attachment cannot be limited to 900 kg then then compliance vibration monitoring should be undertaken where works are required within the safe working buffer distances of identified structures (Collegians Rugby League Football Club) and include:

- site tests to review of the measured frequency content to determine the structural damage criteria as per Table 3.8
- continuous vibration monitoring with a visual alarm installed to warn the equipment operator when the structural damage vibration criteria (considering frequency content) is exceeded.

## 6. Conclusion

Noise and vibration impacts for the construction and operational phases of the project has been assessed. Existing noise levels were identified through unattended noise measurements and used to establish construction noise management levels.

### 6.1 Construction noise

Construction activities are proposed to be undertaken during standard construction hours and exceedances of the noise management levels have been identified. Some residential receivers are also expected to experience noise levels above the highly affected noise level of 75 dB(A) during these hours. Exceedances of the noise management level for non-residential receivers have also been predicted.

It is typical for construction projects to exceed the construction noise management levels. Any impacts due to construction works are temporary in nature and would not represent a permanent impact on the community and surrounding environment. The predicted noise levels are generally conservative and would only be experienced for limited periods during construction. Impacts may be reduced through the introduction of feasible and reasonable mitigation measures which have been recommended. However, these mitigation measures are unlikely to reduce noise levels below the construction noise management levels.

Traffic noise impacts due to construction are not expected as noise levels along the construction traffic routes are not predicted to significantly increase road traffic noise levels.

### 6.2 Construction vibration

Safe working distances for vibration activities have been identified for standard structures. Site specific safe working distances are to be established on-site prior to vibration generating works commencing.

No residential buildings have been identified within the safe working distances for structural impacts. The Collegians Rugby League Football Club falls within safe working buffer distances dependant on the size of the excavator with hammer attachment (as discussed in Section 4.3.2). As such mitigation measures may need to be implemented and are presented in Section 5.2.

Residential receivers have been identified within 73 m of construction activities and may experience human comfort impacts if a larger excavator with hammer attachment is used. These receivers are presented in Section 4.3.2. Again, with the implementation of management measures provided in Section 5.2, including the use of smaller equipment this impacts would be avoided.

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## 7. References

Australian Standards (1997), *AS1055.1:1997 Acoustics – Description and measurement of environmental noise*

Australian Standards (2010), *AS2436:2010 Guide to noise and vibration control on construction, demolition and maintenance sites*

British Standards (1993), *BS7385-2:1993 Evaluation and measurement for vibration in buildings*

DECC (2009), *Interim Construction Noise Guideline*

DECCW (2011), *Road Noise Policy*

EPA (2017), *Noise Policy for Industry*

EPA (2013), *Rail Infrastructure Noise Guideline*

German Standards (1999), *DIN 4155-3 Structural Vibration Part 3: Effects of vibration on structures*

RTA (2001), *Environmental Noise Management Manual*

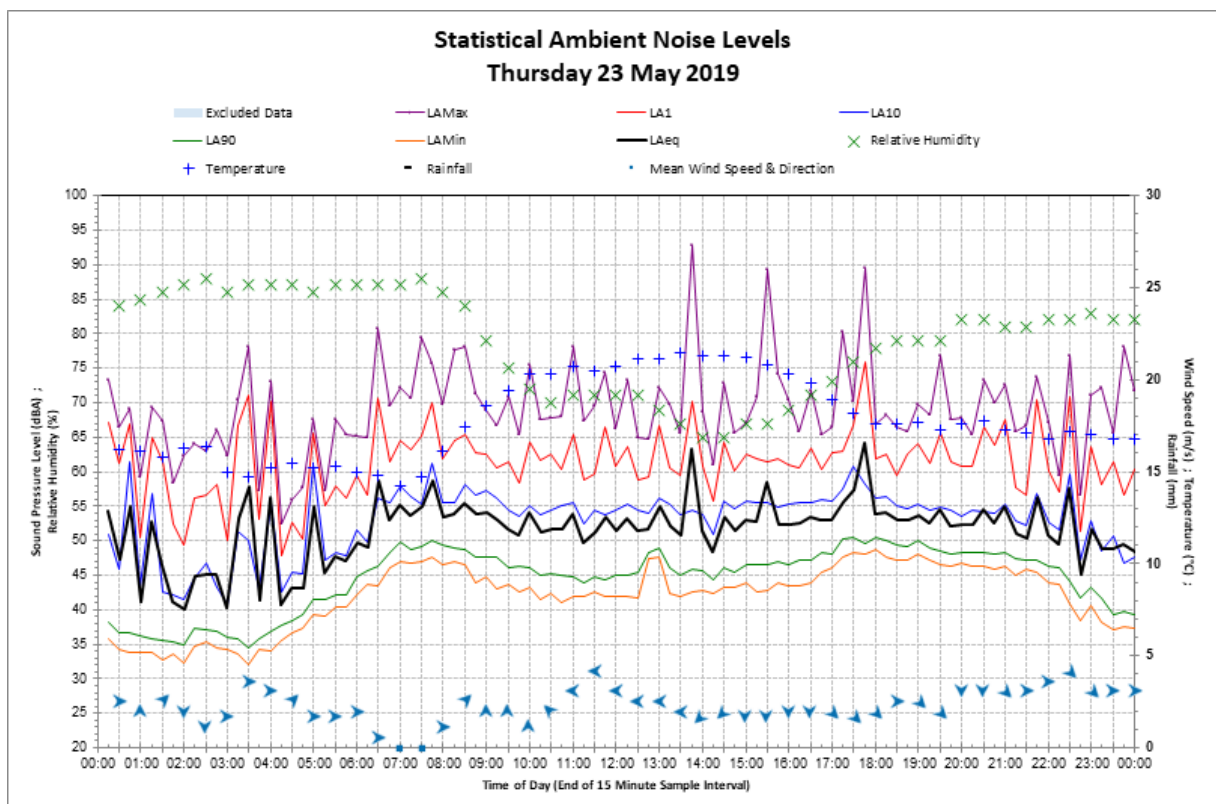
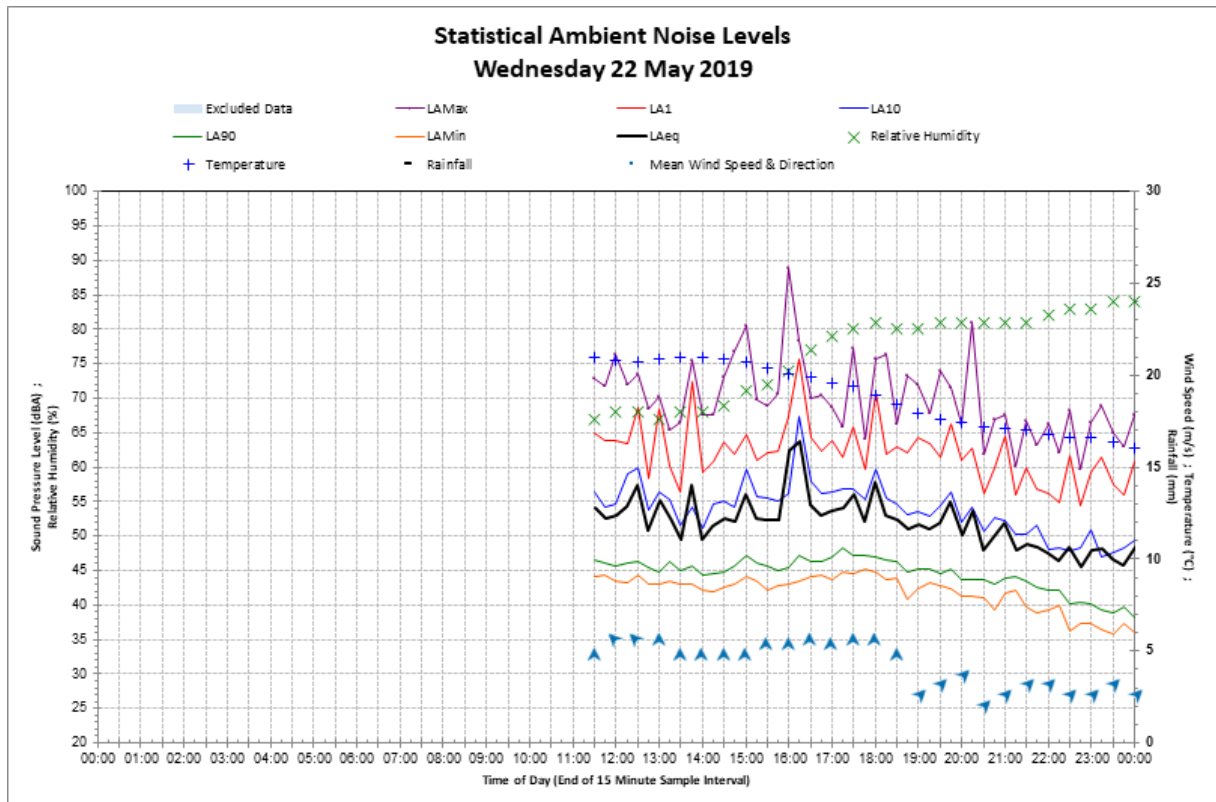
Transport for NSW (2018), *Construction Noise and Vibration Strategy*

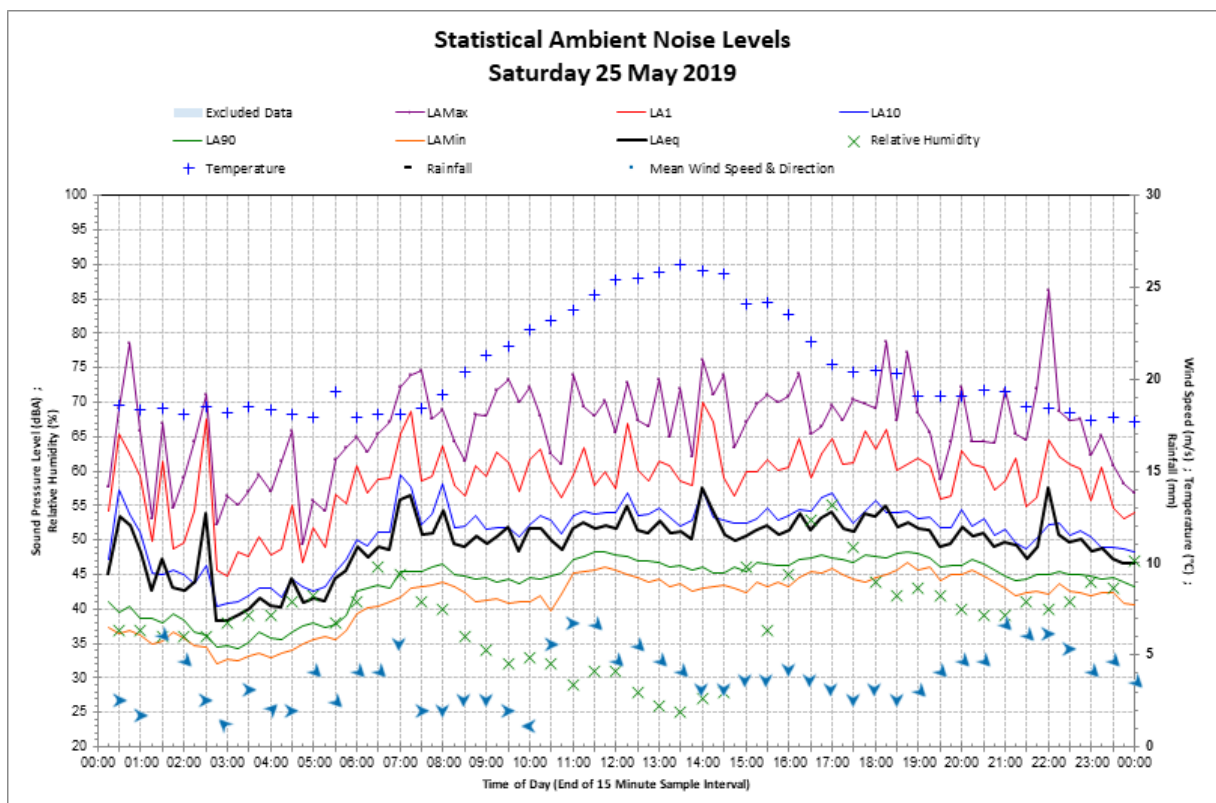
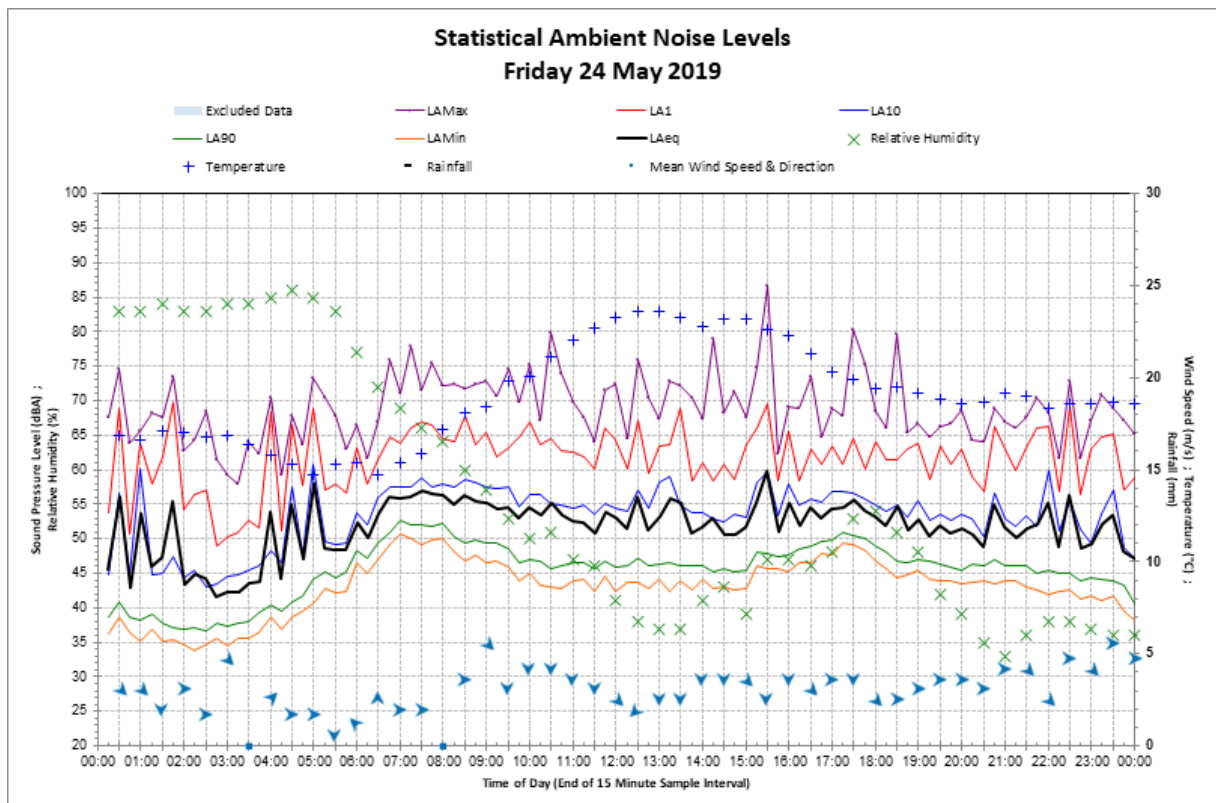
# Appendices

# Appendix A - Glossary

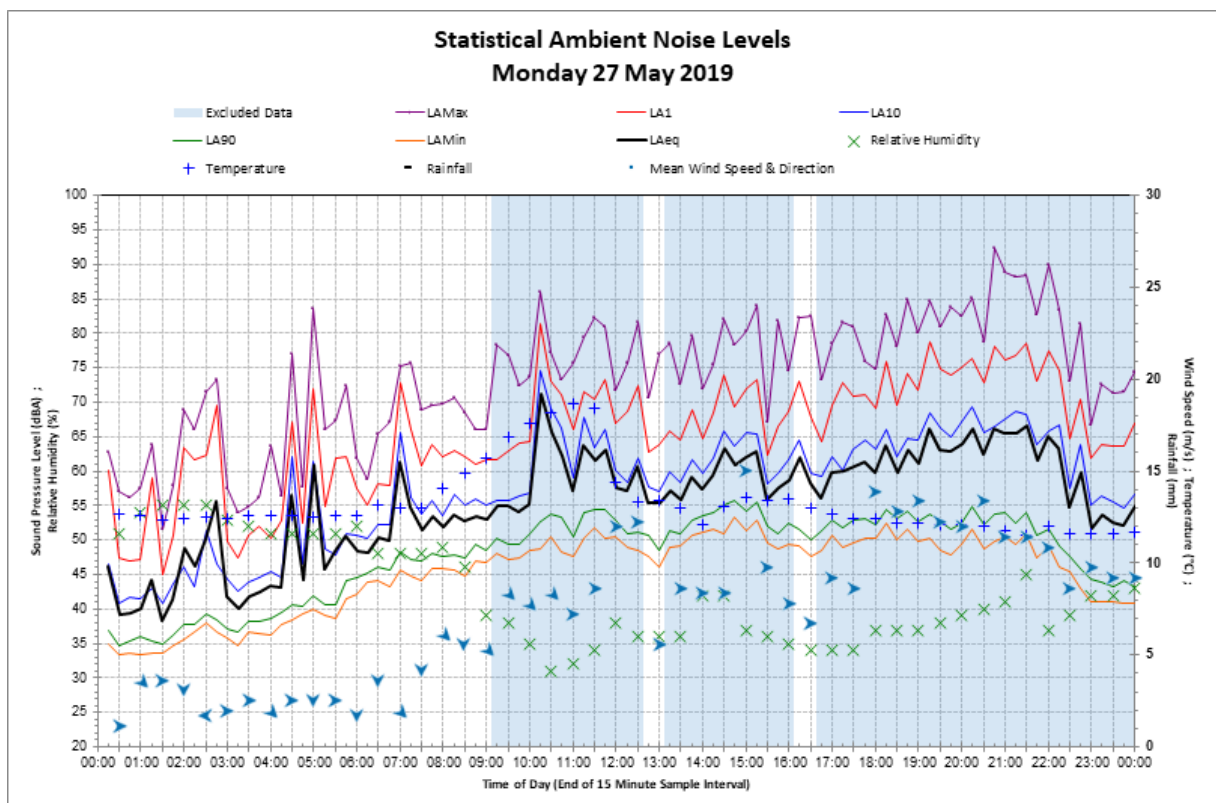
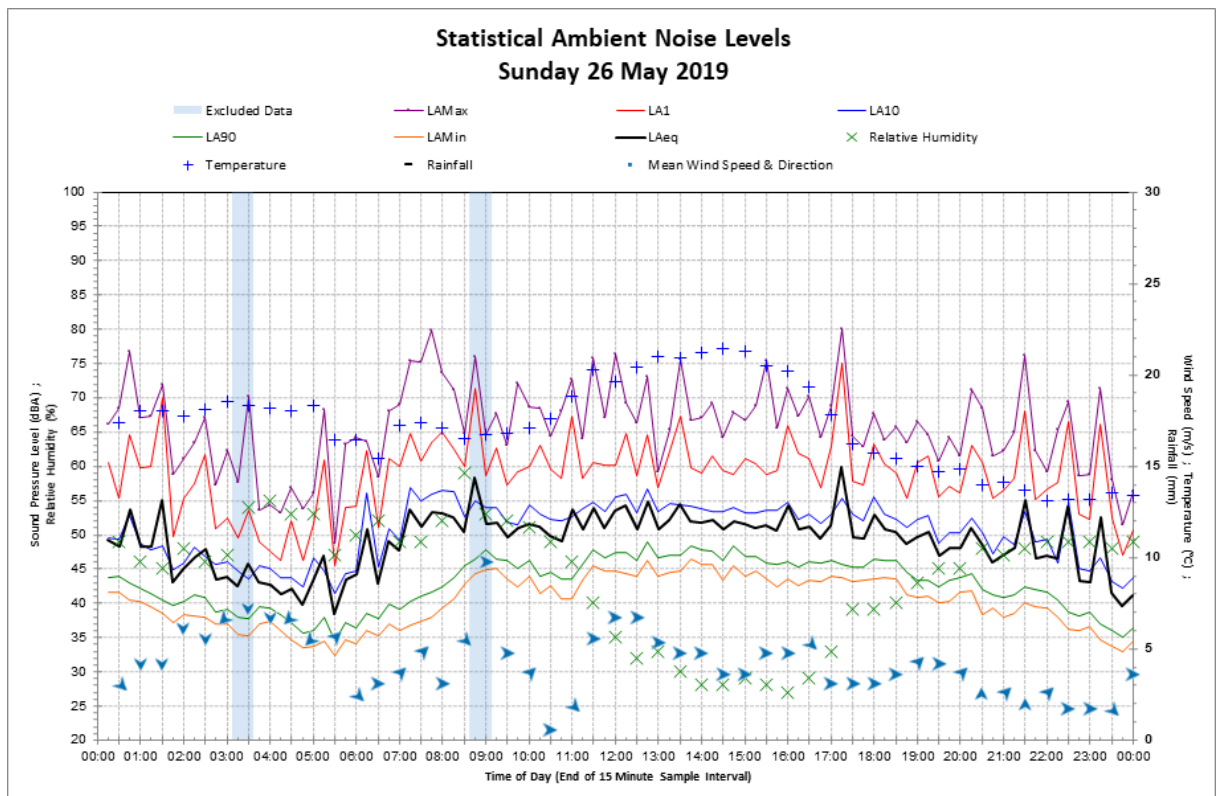
Abbreviation	Definition
Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the $L_{A90}$ descriptor.
dB	Decibel is the logarithmic unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
dB(C)	Frequency weighting filter used to measure 'C-weighted' sound pressure levels, which is designed to be more response to low frequency noise
DECCW	Department of Environment, Climate Change and Water
EPA	Environment Protection Authority
ICNG	<i>Interim Construction Noise Guideline</i> (DECCW, 2009)
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A90(period)}$	The sound pressure level exceeded for 90% of the measurement period.
$L_{Amax}$	The maximum sound level recorded during the measurement period.
$L_{Aeq(15hr)}$	The $L_{Aeq}$ noise level for the period 7 am to 10 pm.
$L_{Aeq(9hr)}$	The $L_{Aeq}$ noise level for the period 10 pm to 7 am.
$L_{Aeq(1hr)}$	The highest hourly $L_{Aeq}$ noise level during the day and night periods.
Noise sensitive receiver	An area or place potentially affected by noise including residential dwellings, schools, child care centres, places of worship, health care institutions and active or passive recreational areas.
NPI	<i>Noise Policy for Industry</i> (EPA, 2017)
Rating background level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
RNP	<i>Road Noise Policy</i> (DECWW, 2011)
TfNSW	Transport for New South Wales

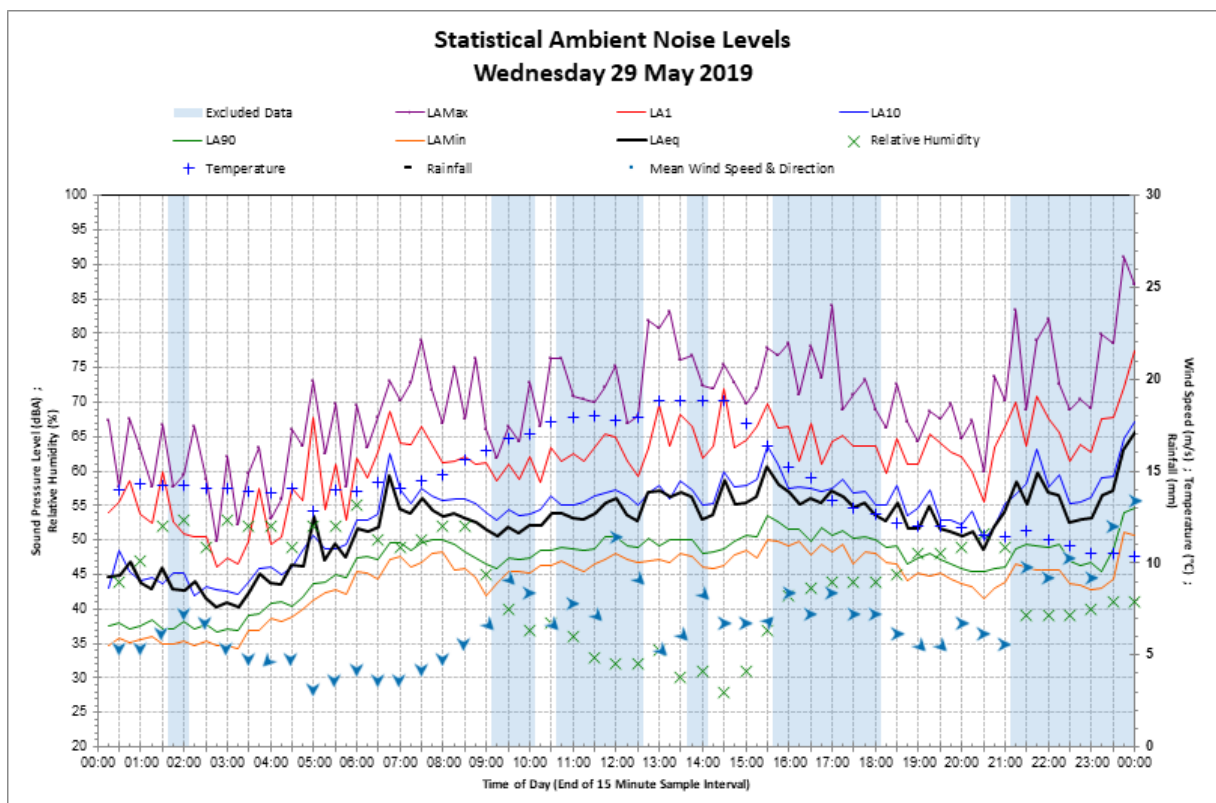
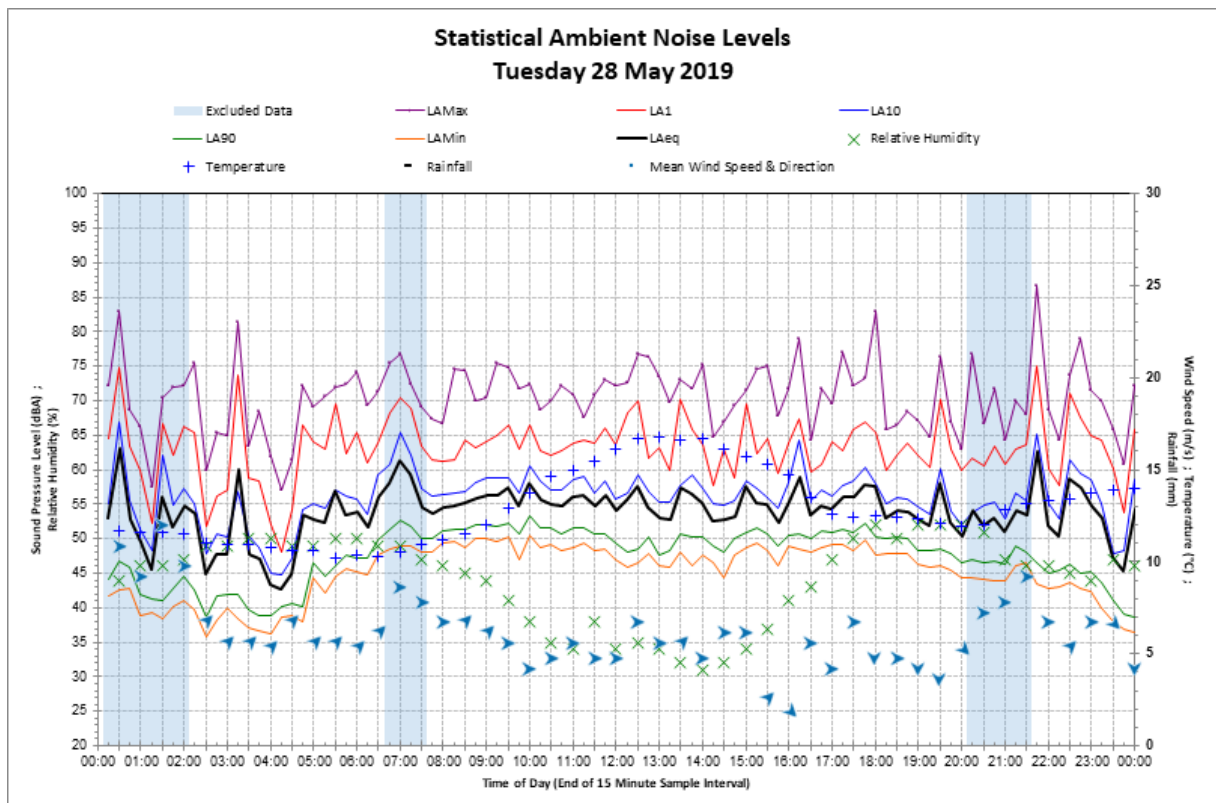
## Appendix B - Daily noise level charts

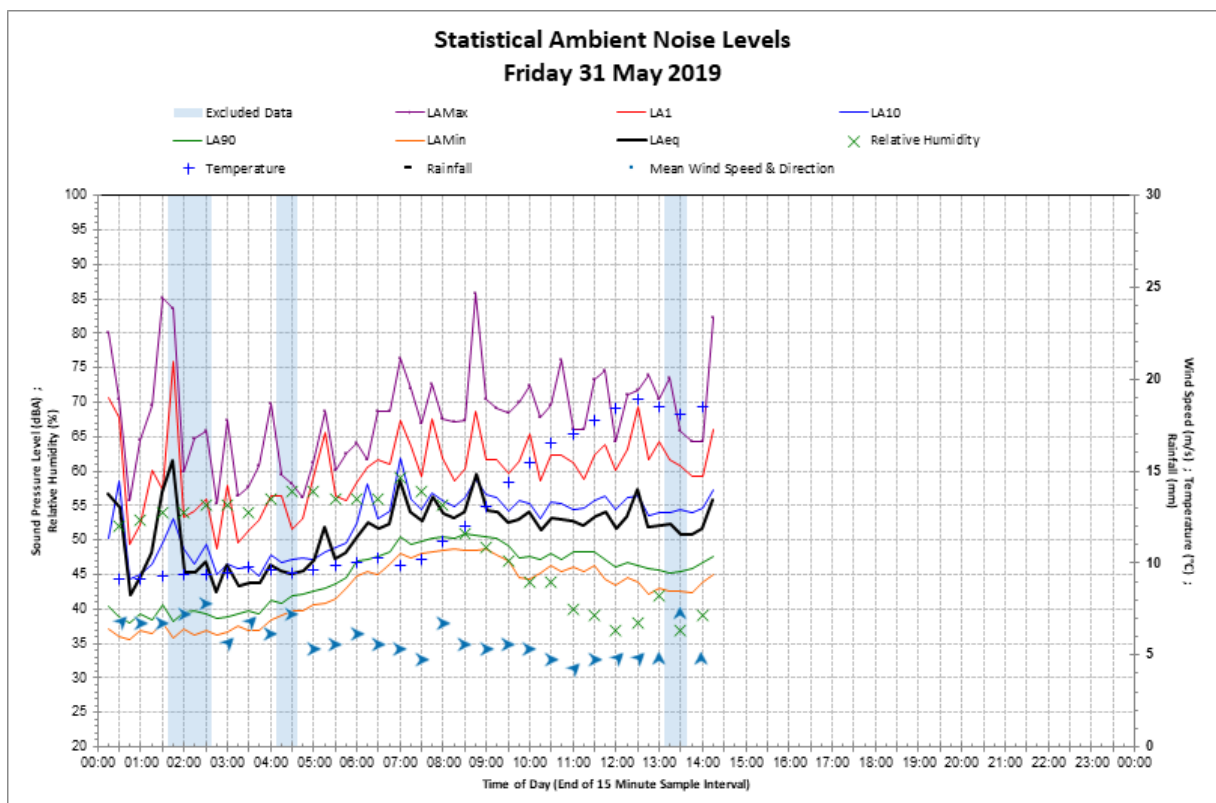
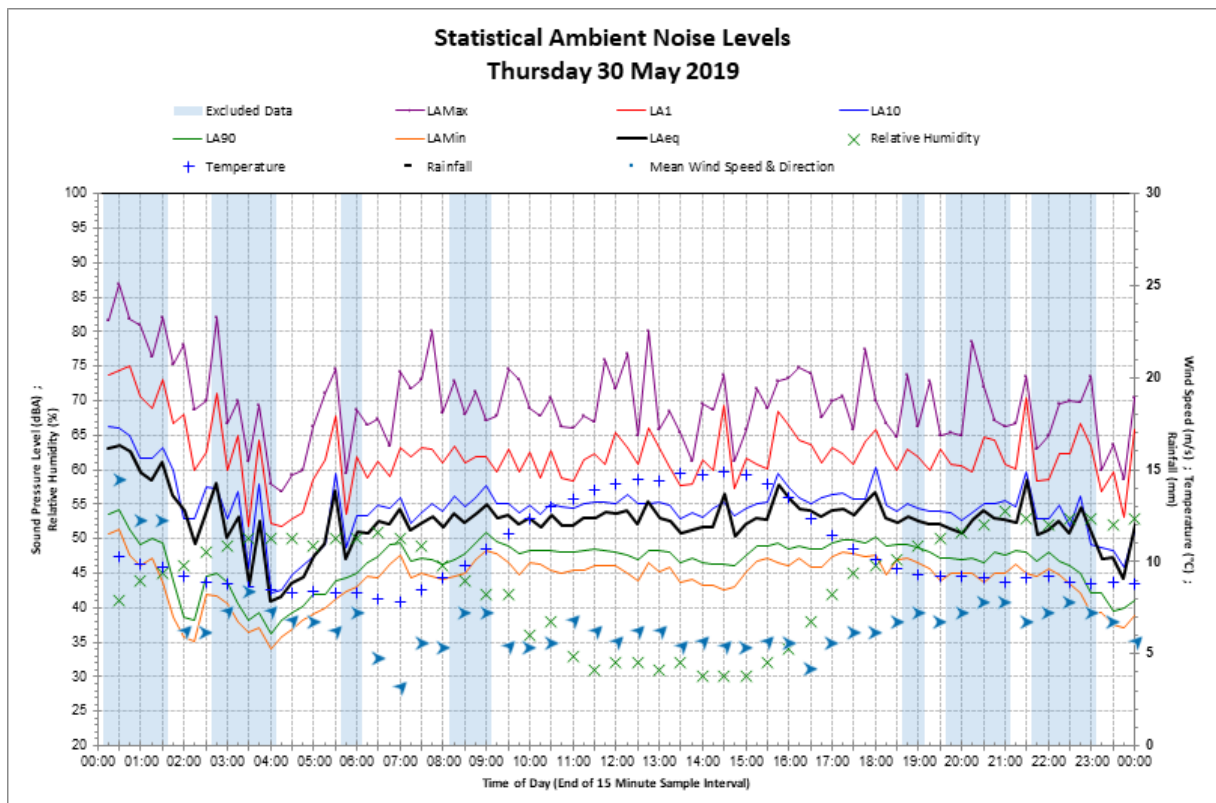












## **Appendix C** - Predicted construction noise levels, dB(A)

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f2f7;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R001	168-218 Crown Street, Wollongong NSW	Commercial	41	59	49
R002	71-83 Smith Street, Wollongong NSW	Residential	61	76	68
R003	Smiths Hill High School	Educational institute	37	53	44
R004	45-47 Market Street, Wollongong NSW	Commercial	34	51	41
R005	50-58 Flinders Street, Wollongong NSW	Commercial	46	63	53
R006	The Snakepit Stadium	Active recreation	38	53	48
R007	106 Gipps Street, Wollongong NSW	Commercial	39	52	46
R008	63 Flinders Street, Wollongong NSW	Commercial	50	51	46
R009	160-164 Keira Street, Wollongong NSW	Commercial	38	56	46
R010	Marketview UOW Accommodation	Educational institute	38	54	44
R011	73-75 Gipps Street, Wollongong NSW	Commercial	61	69	68
R012	Smiths Hill High School	Educational institute	42	54	49
R013	281-291 Crown Street, Wollongong NSW	Commercial	35	53	42
R014	61 Church Street, Wollongong NSW	Commercial	37	51	41
R015	281-291 Crown Street, Wollongong NSW	Commercial	35	52	42
R016	Beaton Park Leisure Centre	Active recreation	50	63	57
R017	106 Gipps Street, Wollongong NSW	Commercial	44	61	50
R018	84 Smith Street, Wollongong NSW	Residential	42	59	49
R019	3 Charlotte Street, Wollongong NSW	Commercial	97	92	92
R020	138 Gipps Street, Gwynneville NSW	Residential	42	57	49
R021	2-12 Young Street, Wollongong NSW	Residential	60	75	66
R022	65-69 Keira Street, Wollongong NSW	Commercial	44	57	51
R023	2-12 Young Street, Wollongong NSW	Residential	71	84	77
R024	19-23 Flinders Street, Wollongong NSW	Commercial	42	59	48
R025	21 View Street, Wollongong NSW	Residential	33	49	40
R026	19 Robinson Street, Wollongong NSW	Residential	39	54	45
R027	296-298 Crown Street, Wollongong NSW	Commercial	42	56	47
R028	73 Church Street, Wollongong NSW	Commercial	35	52	42
R029	3 Loftus Street, Wollongong NSW	Commercial	34	49	40
R030	18 Edward Street, Wollongong NSW	Residential	37	54	44
R031	78 Campbell Street, Wollongong NSW	Residential	48	60	54
R032	80 Smith Street, Wollongong NSW	Residential	36	51	42
R033	32 Keira Street, Wollongong NSW	Residential	39	56	46
R034	36-40 Young Street, Wollongong NSW	Commercial	48	63	53
R035	Weerona College UOW	Educational institute	46	60	52
R036	10 Thomas Street, Wollongong NSW	Residential	31	48	38
R037	40 Flinders Street, Wollongong NSW	Commercial	43	55	49
R038	88 Smith Street, Wollongong NSW	Residential	43	58	49
R039	175 Keira Street, Wollongong NSW	Commercial	36	52	43
R040	Weerona College UOW	Educational institute	44	59	50
R041	71 Market Street, Wollongong NSW	Commercial	40	57	47
R042	2 First Street, Wollongong NSW	Residential	31	47	38
R043	35 Flinders Street, Wollongong NSW	Commercial	48	63	55
R044	149-153 Keira Street, Wollongong NSW	Commercial	33	50	40
R045	100 Gipps Street, Wollongong NSW	Commercial	34	50	41
R046	15 Victoria Street, Wollongong NSW	Commercial	40	55	47
R047	8-10 Victoria Street, Wollongong NSW	Commercial	46	60	51
R048	100 Smith Street, Wollongong NSW	Commercial	61	76	67
R049	48 Keira Street, Wollongong NSW	Residential	36	52	43



Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f7fa;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R050	St Michaels Anglican Cathedral	Place of worship	27	44	34
R051	55 Church Street, Wollongong NSW	Residential	30	39	37
R052	30 Flinders Street, Wollongong NSW	Commercial	36	51	43
R053	89 Market Street, Wollongong NSW	Commercial	49	66	56
R054	306 Crown Street, Wollongong NSW	Commercial	42	51	47
R055	81 Keira Street, Wollongong NSW	Commercial	43	59	50
R056	156-158 Keira Street, Wollongong NSW	Commercial	39	56	46
R057	45 Gipps Street, Wollongong NSW	Residential	43	59	50
R058	32-36 Denison Street, Wollongong NSW	Commercial	35	51	42
R059	21-23 Denison Street, Wollongong NSW	Commercial	50	65	56
R060	Wollongong Public School	Educational institute	42	59	49
R061	Smiths Hill High School	Educational institute	33	44	39
R062	126-130 Keira Street, Wollongong NSW	Commercial	37	54	44
R063	90 Market Street, Wollongong NSW	Commercial	42	61	51
R064	100 Market Street, Wollongong NSW	Commercial	43	61	50
R065	75-79 Keira Street, Wollongong NSW	Residential	45	59	52
R066	237-241 Crown Street, Wollongong NSW	Commercial	21	38	28
R067	18 Denison Street, Wollongong NSW	Residential	38	50	44
R068	290-294 Crown Street, Wollongong NSW	Commercial	42	59	49
R069	63 Market Street, Wollongong NSW	Commercial	36	54	43
R070	81-85 Keira Street, Wollongong NSW	Commercial	48	64	55
R071	104 Gipps Street, Wollongong NSW	Commercial	41	58	48
R072	12 Charlotte Street, Wollongong NSW	Commercial	62	76	68
R073	177 Keira Street, Wollongong NSW	Commercial	33	50	40
R074	27 Denison Street, Wollongong NSW	Commercial	47	58	54
R075	46-48 Church Street, Wollongong NSW	Residential	40	52	47
R076	18 Loftus Street, Wollongong NSW	Residential	35	49	40
R077	11 New Dapto Road, Wollongong NSW	Residential	47	61	54
R078	3 New Dapto Road, Wollongong NSW	Residential	49	63	54
R079	Wollongong Tennis Club	Active recreation	45	60	52
R080	33 Flinders Street, Wollongong NSW	Commercial	47	63	52
R081	58 Keira Street, Wollongong NSW	Residential	40	49	47
R082	13 Hercules Street, Wollongong NSW	Residential	40	55	46
R083	54 Keira Street, Wollongong NSW	Residential	40	49	46
R084	233-235 Crown Street, Wollongong NSW	Commercial	21	39	28
R085	4 First Street, Wollongong NSW	Residential	39	46	44
R086	150 Keira Street, Wollongong NSW	Commercial	37	54	45
R087	59 Market Street, Wollongong NSW	Commercial	28	45	35
R088	54 Church Street, Wollongong NSW	Residential	38	42	41
R089	37 Denison Street, Wollongong NSW	Commercial	44	53	49
R090	4 Loftus Street, Wollongong NSW	Residential	36	52	43
R091	60-72 Flinders Street, Wollongong NSW	Commercial	52	65	59
R092	200 Keira Street, Wollongong NSW	Commercial	46	62	52
R093	106 Market Street, Wollongong NSW	Commercial	52	68	59
R094	27-29 Hercules Street, Wollongong NSW	Residential	37	54	45
R095	6-8 New Dapto Road, Wollongong NSW	Residential	51	65	56
R096	12-14 Denison Street, Wollongong NSW	Residential	45	56	47
R097	4-6 Victoria Street, Wollongong NSW	Residential	48	64	55
R098	31 Keira Street, Wollongong NSW	Residential	36	52	43

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f7fa;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R099	25 Edward Street, Wollongong NSW	Residential	34	47	41
R100	2 Loftus Street, Wollongong NSW	Residential	39	52	45
R101	56 Keira Street, Wollongong NSW	Residential	48	62	55
R102	47 Gipps Street, Wollongong NSW	Residential	44	59	51
R103	8 First Street, Wollongong NSW	Residential	38	51	43
R104	82-88 Flinders Street, Wollongong NSW	Commercial	56	71	60
R105	73 Campbell Street, Wollongong NSW	Residential	44	57	51
R106	302 Crown Street, Wollongong NSW	Commercial	31	44	38
R107	71-83 Smith Street, Wollongong NSW	Residential	58	74	65
R108	43 Flinders Street, Wollongong NSW	Commercial	48	64	55
R109	261 Crown Street, Wollongong NSW	Commercial	36	52	43
R110	3 Hay Street, Gwynneville NSW	Residential	44	53	51
R111	16-20 Keira Street, Wollongong NSW	Residential	40	56	47
R112	5 Victoria Street, Wollongong NSW	Commercial	37	54	44
R113	20 Young Street, Wollongong NSW	Commercial	52	66	59
R114	Kerryn McCann Athletic Centre	Active recreation	50	63	57
R115	18-20 Robinson Street, Wollongong NSW	Residential	43	59	49
R116	94 Flinders Street, Wollongong NSW	Commercial	64	78	71
R117	16-20 Keira Street, Wollongong NSW	Residential	39	55	45
R118	9 Hercules Street, Wollongong NSW	Residential	37	52	43
R119	Wollongong Public School	Educational institute	36	52	42
R120	7 Regent Street, Wollongong NSW	Residential	39	56	45
R121	Wollongong Seventh-Day Adventist Church	Place of worship	63	78	69
R122	44-46 Flinders Street, Wollongong NSW	Commercial	44	60	50
R123	51-55 Flinders Street, Wollongong NSW	Commercial	50	65	55
R124	Smiths Hill High School	Educational institute	34	47	41
R125	3 New Dapto Road, Wollongong NSW	Residential	52	61	56
R126	25 Victoria Street, Wollongong NSW	Commercial	55	71	62
R127	13 Railway Parade, Wollongong NSW	Commercial	43	53	50
R128	The Snakepit Stadium	Active recreation	38	52	45
R129	43-47 Denison Street, Wollongong NSW	Commercial	42	51	47
R130	78 Smith Street, Wollongong NSW	Residential	43	57	47
R131	2 Victoria Street, Wollongong NSW	Residential	31	47	38
R132	33-35 Denison Street, Wollongong NSW	Commercial	45	54	49
R133	38 Robinson Street, Wollongong NSW	Residential	39	55	46
R134	132 Keira Street, Wollongong NSW	Commercial	39	56	46
R135	7 Rawson Street, Wollongong NSW	Commercial	43	52	47
R136	69 Smith Street, Wollongong NSW	Commercial	49	65	56
R137	50-52 Keira Street, Wollongong NSW	Residential	44	59	51
R138	163-169 Keira Street, Wollongong NSW	Commercial	35	51	42
R139	Smiths Hill High School	Educational institute	27	39	34
R140	16 Bligh Street, Wollongong NSW	Residential	35	50	42
R141	11 Macquarie Street, Wollongong NSW	Residential	31	43	38
R142	5-7 Macquarie Street, Wollongong NSW	Residential	35	51	41
R143	14 Bligh Street, Wollongong NSW	Residential	35	50	42
R144	5-7 Macquarie Street, Wollongong NSW	Residential	35	50	41
R145	5-7 Macquarie Street, Wollongong NSW	Residential	30	48	38
R146	18 Bligh Street, Wollongong NSW	Residential	34	50	41
R147	248-250 Crown Street, Wollongong NSW	Commercial	23	38	30

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f7fa;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R148	45 New Dapto Road, Wollongong NSW	Residential	38	44	45
R149	66 Gipps Street, Wollongong NSW	Residential	36	52	42
R150	Wollongong Public School	Educational institute	35	52	42
R151	128 Gipps Street, Gwynneville NSW	Residential	44	58	51
R152	Smiths Hill High School	Educational institute	27	40	33
R153	27-29 New Dapto Road, Wollongong NSW	Residential	44	52	51
R154	31 Foley Street, Gwynneville NSW	Residential	43	58	50
R155	228 Keira Street, Wollongong NSW	Commercial	20	37	27
R156	122 Gipps Street, Gwynneville NSW	Residential	45	59	52
R157	44 Church Street, Wollongong NSW	Residential	34	43	41
R158	60 Campbell Street, Wollongong NSW	Residential	39	49	46
R159	St Michaels Anglican Cathedral	Place of worship	35	52	42
R160	6 Robinson Street, Wollongong NSW	Residential	43	58	48
R161	36-40 Young Street, Wollongong NSW	Commercial	49	66	56
R162	49-53 Gipps Street, Wollongong NSW	Residential	43	59	50
R163	18 View Street, Wollongong NSW	Residential	25	42	32
R164	40 Gipps Street, Wollongong NSW	Residential	31	44	38
R165	51 Crawford Avenue, Gwynneville NSW	Residential	43	54	50
R166	23 New Dapto Road, Wollongong NSW	Residential	39	54	44
R167	68 Smith Street, Wollongong NSW	Residential	41	53	48
R168	12 Loftus Street, Wollongong NSW	Residential	35	51	41
R169	89-91 Campbell Street, Wollongong NSW	Commercial	40	48	48
R170	187-189 Keira Street, Wollongong NSW	Commercial	21	38	28
R171	60-72 Flinders Street, Wollongong NSW	Commercial	48	64	54
R172	269-271 Crown Street, Wollongong NSW	Commercial	33	50	41
R173	66-68 Keira Street, Wollongong NSW	Commercial	44	52	51
R174	86 Gipps Street, Wollongong NSW	Commercial	38	54	44
R175	28 Belmore Street, Wollongong NSW	Commercial	41	52	45
R176	59 Smith Street, Wollongong NSW	Residential	39	56	46
R177	29 Flinders Street, Wollongong NSW	Commercial	44	61	50
R178	35 Flinders Street, Wollongong NSW	Residential	47	59	54
R179	47 Crawford Avenue, Gwynneville NSW	Residential	40	51	44
R180	191-193 Keira Street, Wollongong NSW	Commercial	23	40	30
R181	22 Victoria Street, Wollongong NSW	Residential	60	75	66
R182	16 Robinson Street, Wollongong NSW	Residential	40	56	46
R183	11 Hercules Street, Wollongong NSW	Residential	37	51	42
R184	85 Gipps Street, Wollongong NSW	Commercial	49	52	56
R185	61 Campbell Street, Wollongong NSW	Residential	35	52	42
R186	70 Keira Street, Wollongong NSW	Commercial	50	58	57
R187	St Michaels Anglican Cathedral	Place of worship	34	51	40
R188	102-104 Keira Street, Wollongong NSW	Commercial	51	68	58
R189	74 Church Street, Wollongong NSW	Commercial	20	36	27
R190	43 Belmore Street, Wollongong NSW	Commercial	48	62	53
R191	221-229 Crown Street, Wollongong NSW	Commercial	29	46	36
R192	19 Keira Street, Wollongong NSW	Residential	34	46	41
R193	37 New Dapto Road, Wollongong NSW	Residential	35	51	41
R194	57 Campbell Street, Wollongong NSW	Residential	35	50	42
R195	134-140 Keira Street, Wollongong NSW	Commercial	37	52	45
R196	Kerryn McCann Athletic Centre	Active recreation	41	51	43

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
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R197	65 Market Street, Wollongong NSW	Commercial	29	44	36
R198	61 Smith Street, Wollongong NSW	Residential	37	54	44
R199	96 Market Street, Wollongong NSW	Commercial	37	54	44
R200	32 Keira Street, Wollongong NSW	Residential	35	52	42
R201	246 Crown Street, Wollongong NSW	Commercial	22	39	29
R202	17 Denison Street, Wollongong NSW	Commercial	53	60	56
R203	57-61 Flinders Street, Wollongong NSW	Commercial	50	52	52
R204	20-22 Hercules Street, Wollongong NSW	Residential	41	56	47
R205	31 Foley Street, Gwynneville NSW	Residential	43	53	50
R206	29 Foley Street, Gwynneville NSW	Residential	42	57	47
R207	152-154 Keira Street, Wollongong NSW	Commercial	39	56	46
R208	26 Robinson Street, Wollongong NSW	Residential	38	53	44
R209	1 New Dapto Road, Wollongong NSW	Residential	53	66	57
R210	32 Flinders Street, Wollongong NSW	Commercial	27	42	34
R211	82 Smith Street, Wollongong NSW	Residential	41	57	48
R212	71-83 Smith Street, Wollongong NSW	Residential	56	71	62
R213	1 Victoria Street, Wollongong NSW	Commercial	38	55	45
R214	166-170 Keira Street, Wollongong NSW	Commercial	39	56	46
R215	61 Smith Street, Wollongong NSW	Residential	45	62	52
R216	43 New Dapto Road, Wollongong NSW	Residential	33	50	40
R217	4 Belmore Street, Wollongong NSW	Residential	65	75	70
R218	18 Denison Street, Wollongong NSW	Residential	39	49	44
R219	254-256 Crown Street, Wollongong NSW	Commercial	26	41	33
R220	23 New Dapto Road, Wollongong NSW	Residential	45	51	52
R221	8 Robinson Street, Wollongong NSW	Residential	44	61	52
R222	82 Smith Street, Wollongong NSW	Residential	27	43	34
R223	122-124 Keira Street, Wollongong NSW	Commercial	35	51	42
R224	106-108 Keira Street, Wollongong NSW	Commercial	44	60	51
R225	60 Keira Street, Wollongong NSW	Residential	32	45	37
R226	45 Gipps Street, Wollongong NSW	Residential	30	46	36
R227	7 Hay Street, Gwynneville NSW	Residential	43	52	50
R228	8 Denison Street, Wollongong NSW	Residential	43	57	48
R229	14 Hercules Street, Wollongong NSW	Residential	36	53	43
R230	24 Denison Street, Wollongong NSW	Residential	35	51	42
R231	24 View Street, Wollongong NSW	Residential	35	50	42
R232	22 Young Street, Wollongong NSW	Commercial	52	68	59
R233	179-181 Keira Street, Wollongong NSW	Commercial	23	39	30
R234	92 Gipps Street, Wollongong NSW	Commercial	44	60	50
R235	7 Hercules Street, Wollongong NSW	Residential	37	48	40
R236	248-250 Crown Street, Wollongong NSW	Commercial	25	40	32
R237	68 Market Street, Wollongong NSW	Commercial	22	39	29
R238	58 Gipps Street, Wollongong NSW	Residential	33	50	41
R239	10 Robinson Street, Wollongong NSW	Residential	41	57	48
R240	20-22 Denison Street, Wollongong NSW	Residential	37	52	43
R241	125-129 Keira Street, Wollongong NSW	Commercial	32	49	39
R242	288 Crown Street, Wollongong NSW	Commercial	36	53	43
R243	142 Gipps Street, Gwynneville NSW	Residential	42	57	49
R244	6-8 Regent Street, Wollongong NSW	Commercial	44	61	51
R245	89 Smith Street, Wollongong NSW	Commercial	67	83	74

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R246	9 Victoria Street, Wollongong NSW	Residential	37	54	44
R247	29 Foley Street, Gwynneville NSW	Residential	42	57	48
R248	104 Market Street, Wollongong NSW	Commercial	48	65	55
R249	81 Market Street, Wollongong NSW	Commercial	40	57	47
R250	3 Macquarie Street, Wollongong NSW	Residential	38	54	44
R251	56 Church Street, Wollongong NSW	Commercial	33	41	40
R252	47 Flinders Street, Wollongong NSW	Commercial	49	61	56
R253	Weerona College UOW	Educational institute	44	51	51
R254	95 Gipps Street, Gwynneville NSW	Residential	30	43	37
R255	81 Campbell Street, Wollongong NSW	Commercial	44	52	51
R256	12 Robinson Street, Wollongong NSW	Residential	40	56	47
R257	17 Flinders Street, Wollongong NSW	Commercial	38	55	44
R258	126 Gipps Street, Gwynneville NSW	Residential	44	59	51
R259	17 New Dapto Road, Wollongong NSW	Residential	41	56	47
R260	144-148 Keira Street, Wollongong NSW	Commercial	37	53	44
R261	21 Keira Street, Wollongong NSW	Residential	35	50	42
R262	5 Robinson Street, Wollongong NSW	Residential	41	52	45
R263	102 Market Street, Wollongong NSW	Commercial	45	61	52
R264	4 Regent Street, Wollongong NSW	Commercial	42	58	48
R265	70 Church Street, Wollongong NSW	Residential	36	53	43
R266	266-268 Crown Street, Wollongong NSW	Commercial	36	53	43
R267	85-87 Smith Street, Wollongong NSW	Residential	65	80	71
R268	15 Hercules Street, Wollongong NSW	Residential	38	52	43
R269	238-244 Crown Street, Wollongong NSW	Commercial	22	39	29
R270	34 Flinders Street, Wollongong NSW	Commercial	42	55	48
R271	293-297 Crown Street, Wollongong NSW	Commercial	35	52	42
R272	24 Robinson Street, Wollongong NSW	Residential	42	57	47
R273	34 Flinders Street, Wollongong NSW	Commercial	39	55	45
R274	70 Market Street, Wollongong NSW	Commercial	30	47	37
R275	13 New Dapto Road, Wollongong NSW	Residential	46	48	53
R276	19 Victoria Street, Wollongong NSW	Commercial	40	56	47
R277	63 Smith Street, Wollongong NSW	Residential	42	58	49
R278	3 Denison Street, Wollongong NSW	Residential	58	69	61
R279	3 First Street, Wollongong NSW	Residential	33	47	41
R280	73 Campbell Street, Wollongong NSW	Residential	37	45	41
R281	74-78 Gipps Street, Wollongong NSW	Residential	39	54	46
R282	65 Campbell Street, Wollongong NSW	Residential	35	49	42
R283	53 Crawford Avenue, Gwynneville NSW	Residential	43	58	50
R284	26 Denison Street, Wollongong NSW	Residential	35	52	42
R285	26 Young Street, Wollongong NSW	Commercial	39	56	46
R286	4 Robinson Street, Wollongong NSW	Residential	41	56	46
R287	11 Denison Street, Wollongong NSW	Residential	55	62	58
R288	114 Gipps Street, Gwynneville NSW	Residential	46	56	53
R289	115-117 Keira Street, Wollongong NSW	Commercial	35	52	42
R290	79 Gipps Street, Wollongong NSW	Commercial	39	56	46
R291	3 Kiernan Street, Gwynneville NSW	Residential	42	57	49
R292	Kerryn McCann Athletic Centre	Active recreation	50	63	57
R293	75 Market Street, Wollongong NSW	Commercial	37	53	43
R294	36 Robinson Street, Wollongong NSW	Residential	36	52	43



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R295	13 Victoria Street, Wollongong NSW	Commercial	41	56	48
R296	1 Governors Lane, Wollongong NSW	Residential	46	62	53
R297	26 View Street, Wollongong NSW	Residential	35	48	42
R298	41 Crawford Avenue, Gwynneville NSW	Residential	37	51	43
R299	23 Keira Street, Wollongong NSW	Residential	35	50	42
R300	226-228 Crown Street, Wollongong NSW	Commercial	19	36	26
R301	43 Flinders Street, Wollongong NSW	Commercial	49	64	56
R302	43 New Dapto Road, Wollongong NSW	Residential	37	51	44
R303	7 Regent Street, Wollongong NSW	Residential	38	54	43
R304	137-141 Keira Street, Wollongong NSW	Commercial	36	53	43
R305	88 Smith Street, Wollongong NSW	Residential	43	59	50
R306	66 Church Street, Wollongong NSW	Residential	34	51	41
R307	16-20 Keira Street, Wollongong NSW	Residential	40	56	47
R308	48 Gipps Street, Wollongong NSW	Residential	36	52	42
R309	59 Smith Street, Wollongong NSW	Residential	32	49	39
R310	71 Campbell Street, Wollongong NSW	Residential	34	45	42
R311	27-29 New Dapto Road, Wollongong NSW	Residential	43	53	50
R312	2 New Dapto Road, Gwynneville NSW	Commercial	53	66	59
R313	57 Gipps Street, Wollongong NSW	Residential	37	53	43
R314	60 Gipps Street, Wollongong NSW	Residential	42	57	49
R315	67-69 Market Street, Wollongong NSW	Commercial	38	47	45
R316	68 Church Street, Wollongong NSW	Residential	36	53	43
R317	27-29 New Dapto Road, Wollongong NSW	Residential	38	53	45
R318	Wollongong Public School	Educational institute	35	52	42
R319	29 Flinders Street, Wollongong NSW	Residential	39	55	45
R320	50-52 Keira Street, Wollongong NSW	Residential	46	60	53
R321	1 Denison Street, Gwynneville NSW	Commercial	62	70	64
R322	116 Gipps Street, Gwynneville NSW	Residential	45	59	52
R323	42 Flinders Street, Wollongong NSW	Residential	32	49	39
R324	101 Keira Street, Wollongong NSW	Commercial	49	66	56
R325	9 Denison Street, Wollongong NSW	Residential	53	67	58
R326	22 Robinson Street, Wollongong NSW	Residential	40	57	47
R327	43 Belmore Street, Wollongong NSW	Residential	47	44	51
R328	37 Edward Street, Wollongong NSW	Residential	27	43	33
R329	56 Church Street, Wollongong NSW	Residential	43	56	50
R330	45 Gipps Street, Wollongong NSW	Residential	32	47	39
R331	43 Crawford Avenue, Gwynneville NSW	Residential	35	50	42
R332	65 Smith Street, Wollongong NSW	Residential	46	63	53
R333	48 Keira Street, Wollongong NSW	Residential	45	61	52
R334	30 Keira Street, Wollongong NSW	Residential	33	48	41
R335	57 Smith Street, Wollongong NSW	Residential	39	56	46
R336	42 Church Street, Wollongong NSW	Residential	29	41	36
R337	60-72 Flinders Street, Wollongong NSW	Commercial	52	66	59
R338	1 Hay Street, Gwynneville NSW	Residential	45	54	52
R339	31 Foley Street, Gwynneville NSW	Residential	35	50	42
R340	66 Gipps Street, Wollongong NSW	Residential	37	53	43
R341	176-192 Keira Street, Wollongong NSW	Commercial	31	48	38
R342	39 New Dapto Road, Wollongong NSW	Residential	36	51	41
R343	20 Belmore Street, Wollongong NSW	Residential	51	59	58

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R344	67 Smith Street, Wollongong NSW	Commercial	37	54	44
R345	55 Campbell Street, Wollongong NSW	Commercial	34	44	41
R346	37 Flinders Street, Wollongong NSW	Commercial	49	64	56
R347	43 Crawford Avenue, Gwynneville NSW	Residential	35	50	42
R348	7 Kiernan Street, Gwynneville NSW	Residential	40	52	44
R349	14 View Street, Wollongong NSW	Residential	31	47	38
R350	22 View Street, Wollongong NSW	Residential	35	51	42
R351	51-55 Flinders Street, Wollongong NSW	Commercial	51	67	58
R352	12 Bligh Street, Wollongong NSW	Residential	36	50	43
R353	136 Gipps Street, Gwynneville NSW	Residential	42	57	49
R354	22 Flinders Street, Wollongong NSW	Residential	36	53	43
R355	2 Belmore Street, Wollongong NSW	Commercial	71	75	71
R356	34 Belmore Street, Wollongong NSW	Commercial	45	57	51
R357	119 Keira Street, Wollongong NSW	Commercial	42	59	49
R358	17 View Street, Wollongong NSW	Residential	34	50	41
R359	49-53 Gipps Street, Wollongong NSW	Residential	39	54	46
R360	2 Denison Street, Wollongong NSW	Residential	54	67	58
R361	280-282 Crown Street, Wollongong NSW	Commercial	30	40	35
R362	18-20 Robinson Street, Wollongong NSW	Residential	44	56	46
R363	71 Keira Street, Wollongong NSW	Residential	45	59	52
R364	2-4 Rawson Street, Wollongong NSW	Commercial	43	59	50
R365	3 New Dapto Road, Wollongong NSW	Residential	47	60	52
R366	74-78 Gipps Street, Wollongong NSW	Residential	41	56	47
R367	68 Smith Street, Wollongong NSW	Residential	33	46	39
R368	1 Thomas Street, Wollongong NSW	Residential	39	56	46
R369	12 Robinson Street, Wollongong NSW	Residential	41	48	45
R370	258 Crown Street, Wollongong NSW	Commercial	26	41	32
R371	103-107 Keira Street, Wollongong NSW	Commercial	40	57	47
R372	157 Keira Street, Wollongong NSW	Commercial	38	53	45
R373	15 Robinson Street, Wollongong NSW	Residential	43	57	49
R374	9 Robinson Street, Wollongong NSW	Residential	41	54	46
R375	36-40 Young Street, Wollongong NSW	Commercial	48	65	55
R376	6 Belmore Street, Wollongong NSW	Residential	62	74	68
R377	72 Market Street, Wollongong NSW	Residential	28	45	35
R378	62 Keira Street, Wollongong NSW	Residential	43	50	49
R379	12 View Street, Wollongong NSW	Residential	24	41	31
R380	19 View Street, Wollongong NSW	Residential	30	46	37
R381	25 Flinders Street, Wollongong NSW	Commercial	43	60	49
R382	18 Young Street, Wollongong NSW	Commercial	53	69	60
R383	6-8 Hercules Street, Wollongong NSW	Residential	37	51	43
R384	230-232 Crown Street, Wollongong NSW	Commercial	18	35	25
R385	1 Young Street, Wollongong NSW	Commercial	47	64	54
R386	13 Flinders Street, Wollongong NSW	Commercial	37	53	43
R387	5 Denison Street, Wollongong NSW	Residential	58	69	61
R388	7 Hercules Street, Wollongong NSW	Residential	35	48	42
R389	10 Belmore Street, Wollongong NSW	Commercial	58	72	64
R390	Margaret Mayo Women's College	Educational institute	32	49	39
R391	18 Hercules Street, Wollongong NSW	Residential	41	56	47
R392	59 Church Street, Wollongong NSW	Residential	34	46	41

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R393	7 New Dapto Road, Wollongong NSW	Residential	43	57	51
R394	26 Belmore Street, Wollongong NSW	Commercial	49	58	56
R395	10 View Street, Wollongong NSW	Residential	20	36	27
R396	1 Rawson Street, Wollongong NSW	Commercial	40	56	46
R397	30 Flinders Street, Wollongong NSW	Commercial	38	55	45
R398	13 Robinson Street, Wollongong NSW	Residential	40	55	46
R399	120 Gipps Street, Gwynneville NSW	Residential	45	59	52
R400	28 Flinders Street, Wollongong NSW	Residential	34	46	41
R401	12 Hercules Street, Wollongong NSW	Residential	39	54	45
R402	17 Denison Street, Wollongong NSW	Commercial	54	61	56
R403	3 Victoria Street, Wollongong NSW	Commercial	37	53	44
R404	12 Loftus Street, Wollongong NSW	Residential	39	54	45
R405	19 Hercules Street, Wollongong NSW	Residential	29	45	35
R406	39 New Dapto Road, Wollongong NSW	Residential	37	51	44
R407	42 Keira Street, Wollongong NSW	Residential	31	46	38
R408	26 Keira Street, Wollongong NSW	Residential	32	48	39
R409	280 Crown Street, Wollongong NSW	Commercial	35	51	41
R410	42 Gipps Street, Wollongong NSW	Residential	34	50	41
R411	270 Crown Street, Wollongong NSW	Commercial	35	52	42
R412	264 Crown Street, Wollongong NSW	Commercial	36	53	43
R413	65 Campbell Street, Wollongong NSW	Residential	34	44	41
R414	29 Edward Street, Wollongong NSW	Residential	33	50	39
R415	39 Flinders Street, Wollongong NSW	Commercial	39	51	46
R416	52 Church Street, Wollongong NSW	Residential	38	50	42
R417	83 Gipps Street, Wollongong NSW	Commercial	42	55	49
R418	102-104 Keira Street, Wollongong NSW	Commercial	51	68	58
R419	25 Keira Street, Wollongong NSW	Residential	35	51	42
R420	16 View Street, Wollongong NSW	Residential	32	48	39
R421	16 Loftus Street, Wollongong NSW	Residential	28	39	34
R422	121 Keira Street, Wollongong NSW	Commercial	37	54	44
R423	Weerona College UOW	Educational institute	43	51	50
R424	216-222 Keira Street, Wollongong NSW	Commercial	21	38	28
R425	304 Crown Street, Wollongong NSW	Commercial	39	55	46
R426	36 Flinders Street, Wollongong NSW	Commercial	31	48	37
R427	93 Gipps Street, Gwynneville NSW	Residential	42	56	49
R428	14 Robinson Street, Wollongong NSW	Residential	40	56	47
R429	69-71 Church Street, Wollongong NSW	Commercial	35	52	42
R430	30 Belmore Street, Wollongong NSW	Residential	48	55	55
R431	73-75 Gipps Street, Wollongong NSW	Commercial	53	67	60
R432	46 Gipps Street, Wollongong NSW	Residential	34	44	41
R433	17 Victoria Street, Wollongong NSW	Commercial	39	53	46
R434	65 Campbell Street, Wollongong NSW	Residential	36	43	43
R435	60 Church Street, Wollongong NSW	Residential	28	45	35
R436	161 Keira Street, Wollongong NSW	Commercial	34	50	40
R437	155 Keira Street, Wollongong NSW	Commercial	34	49	40
R438	14 Keira Street, Wollongong NSW	Residential	18	34	25
R439	42 Young Street, Wollongong NSW	Residential	47	64	54
R440	3 Thomas Street, Wollongong NSW	Residential	39	55	46
R441	19 Robinson Street, Wollongong NSW	Residential	39	54	45

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<b>Residential:</b> <span style="background-color: #e0f7fa;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R442	31 Edward Street, Wollongong NSW	Residential	33	50	39
R443	1 Kiernan Street, Gwynneville NSW	Residential	42	57	49
R444	3 Hay Street, Gwynneville NSW	Residential	37	52	44
R445	234-236 Crown Street, Wollongong NSW	Commercial	20	36	27
R446	Smiths Hill High School	Educational institute	25	41	32
R447	5 First Street, Wollongong NSW	Residential	34	47	40
R448	71-83 Smith Street, Wollongong NSW	Residential	54	70	61
R449	110 Keira Street, Wollongong NSW	Commercial	43	60	50
R450	22 Belmore Street, Wollongong NSW	Residential	50	54	57
R451	33 New Dapto Road, Wollongong NSW	Residential	36	45	43
R452	124 Gipps Street, Gwynneville NSW	Residential	44	59	51
R453	5 Rawson Street, Wollongong NSW	Commercial	41	57	48
R454	71-83 Smith Street, Wollongong NSW	Residential	64	79	70
R455	19 Denison Street, Wollongong NSW	Commercial	52	65	56
R456	8 Loftus Street, Wollongong NSW	Residential	36	52	42
R457	94 Market Street, Wollongong NSW	Commercial	40	57	47
R458	284-286 Crown Street, Wollongong NSW	Commercial	35	52	42
R459	32 Robinson Street, Wollongong NSW	Residential	36	52	43
R460	33 Foley Street, Gwynneville NSW	Residential	42	57	48
R461	61 Market Street, Wollongong NSW	Commercial	25	42	32
R462	80 Market Street, Wollongong NSW	Commercial	37	54	44
R463	Weerona College UOW	Educational institute	46	61	53
R464	26 Victoria Street, Wollongong NSW	Residential	60	76	66
R465	40 Keira Street, Wollongong NSW	Residential	31	48	38
R466	70-74 Smith Street, Wollongong NSW	Residential	42	55	49
R467	1 Hercules Street, Wollongong NSW	Residential	37	51	42
R468	25-27 Denison Street, Wollongong NSW	Commercial	48	63	54
R469	72 Church Street, Wollongong NSW	Commercial	34	51	41
R470	137-141 Keira Street, Wollongong NSW	Commercial	33	50	39
R471	62 Keira Street, Wollongong NSW	Residential	47	50	48
R472	71 Keira Street, Wollongong NSW	Residential	38	44	44
R473	38 Keira Street, Wollongong NSW	Residential	33	49	41
R474	3 First Street, Wollongong NSW	Residential	33	47	39
R475	1 Robinson Street, Wollongong NSW	Residential	44	58	49
R476	58 Campbell Street, Wollongong NSW	Residential	34	47	41
R477	27 Keira Street, Wollongong NSW	Residential	35	51	41
R478	16 Denison Street, Wollongong NSW	Residential	47	50	45
R479	1 Denison Street, Wollongong NSW	Residential	58	69	61
R480	20 View Street, Wollongong NSW	Residential	35	51	42
R481	74-78 Gipps Street, Wollongong NSW	Residential	35	44	42
R482	41 New Dapto Road, Wollongong NSW	Residential	38	51	45
R483	21 Robinson Street, Wollongong NSW	Residential	39	56	47
R484	91 Smith Street, Wollongong NSW	Commercial	70	83	76
R485	134 Gipps Street, Gwynneville NSW	Residential	43	57	50
R486	110 Gipps Street, Wollongong NSW	Commercial	45	53	52
R487	60-72 Flinders Street, Wollongong NSW	Commercial	51	66	56
R488	37 New Dapto Road, Wollongong NSW	Residential	42	51	49
R489	18 Belmore Street, Wollongong NSW	Commercial	52	67	59
R490	90 Smith Street, Wollongong NSW	Commercial	40	57	47

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="color: #00FFFF;">■</span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="color: #FF0000;">■</span> Exceeds noise management level					
R491	7 Regent Street, Wollongong NSW	Residential	39	55	46
R492	14 Bligh Street, Wollongong NSW	Residential	35	47	41
R493	26 Keira Street, Wollongong NSW	Residential	30	46	36
R494	49 Flinders Street, Wollongong NSW	Commercial	50	65	57
R495	19 New Dapto Road, Wollongong NSW	Residential	38	54	44
R496	168-218 Crown Street, Wollongong NSW	Commercial	22	35	29
R497	86 Gipps Street, Wollongong NSW	Commercial	41	57	48
R498	The Snakepit Stadium	Active recreation	37	52	44
R499	74-78 Gipps Street, Wollongong NSW	Residential	30	46	36
R500	32-36 Keira Street, Wollongong NSW	Residential	24	40	32
R501	49 Crawford Avenue, Gwynneville NSW	Residential	35	50	42
R502	1 Loftus Street, Wollongong NSW	Residential	35	51	42
R503	2 Thomas Street, Wollongong NSW	Residential	36	53	43
R504	24 Hercules Street, Wollongong NSW	Residential	33	44	40
R505	82 Market Street, Wollongong NSW	Commercial	28	40	31
R506	4 Thomas Street, Wollongong NSW	Residential	35	51	41
R507	13 Denison Street, Wollongong NSW	Residential	54	62	58
R508	16 Hercules Street, Wollongong NSW	Residential	38	53	43
R509	29-31 Belmore Street, Wollongong NSW	Residential	50	54	53
R510	47 New Dapto Road, Wollongong NSW	Residential	33	41	40
R511	The Snakepit Stadium	Active recreation	55	66	62
R512	2 Denison Street, Wollongong NSW	Residential	54	67	58
R513	75 Market Street, Wollongong NSW	Commercial	39	56	46
R514	25 Hercules Street, Wollongong NSW	Residential	35	51	42
R515	12 Hercules Street, Wollongong NSW	Residential	36	50	43
R516	28 Crawford Avenue, Gwynneville NSW	Residential	43	58	50
R517	17 Flinders Street, Wollongong NSW	Commercial	22	39	29
R518	7 New Dapto Road, Wollongong NSW	Residential	44	55	46
R519	10 Denison Street, Wollongong NSW	Residential	43	56	47
R520	3 Hercules Street, Wollongong NSW	Residential	36	51	41
R521	54 Church Street, Wollongong NSW	Residential	39	45	43
R522	29 Keira Street, Wollongong NSW	Residential	35	51	42
R523	23 New Dapto Road, Wollongong NSW	Residential	44	54	51
R524	140 Gipps Street, Gwynneville NSW	Residential	42	57	49
R525	1 Young Street, Wollongong NSW	Residential	35	50	41
R526	56 Church Street, Wollongong NSW	Residential	25	41	32
R527	31 Denison Street, Wollongong NSW	Commercial	39	53	45
R528	64 Church Street, Wollongong NSW	Residential	35	52	42
R529	43 Foley Street, Gwynneville NSW	Commercial	39	51	43
R530	24 Hercules Street, Wollongong NSW	Residential	24	41	32
R531	50 Church Street, Wollongong NSW	Residential	34	46	39
R532	3 Robinson Street, Wollongong NSW	Residential	42	56	47
R533	17 Keira Street, Wollongong NSW	Residential	34	46	41
R534	260-262 Crown Street, Wollongong NSW	Commercial	27	44	35
R535	1 Hay Street, Gwynneville NSW	Residential	45	54	52
R536	32 Belmore Street, Wollongong NSW	Residential	48	55	55
R537	25 Victoria Street, Wollongong NSW	Residential	50	67	57
R538	1 Thomas Street, Wollongong NSW	Residential	32	44	38
R539	30 Denison Street, Wollongong NSW	Residential	35	52	42



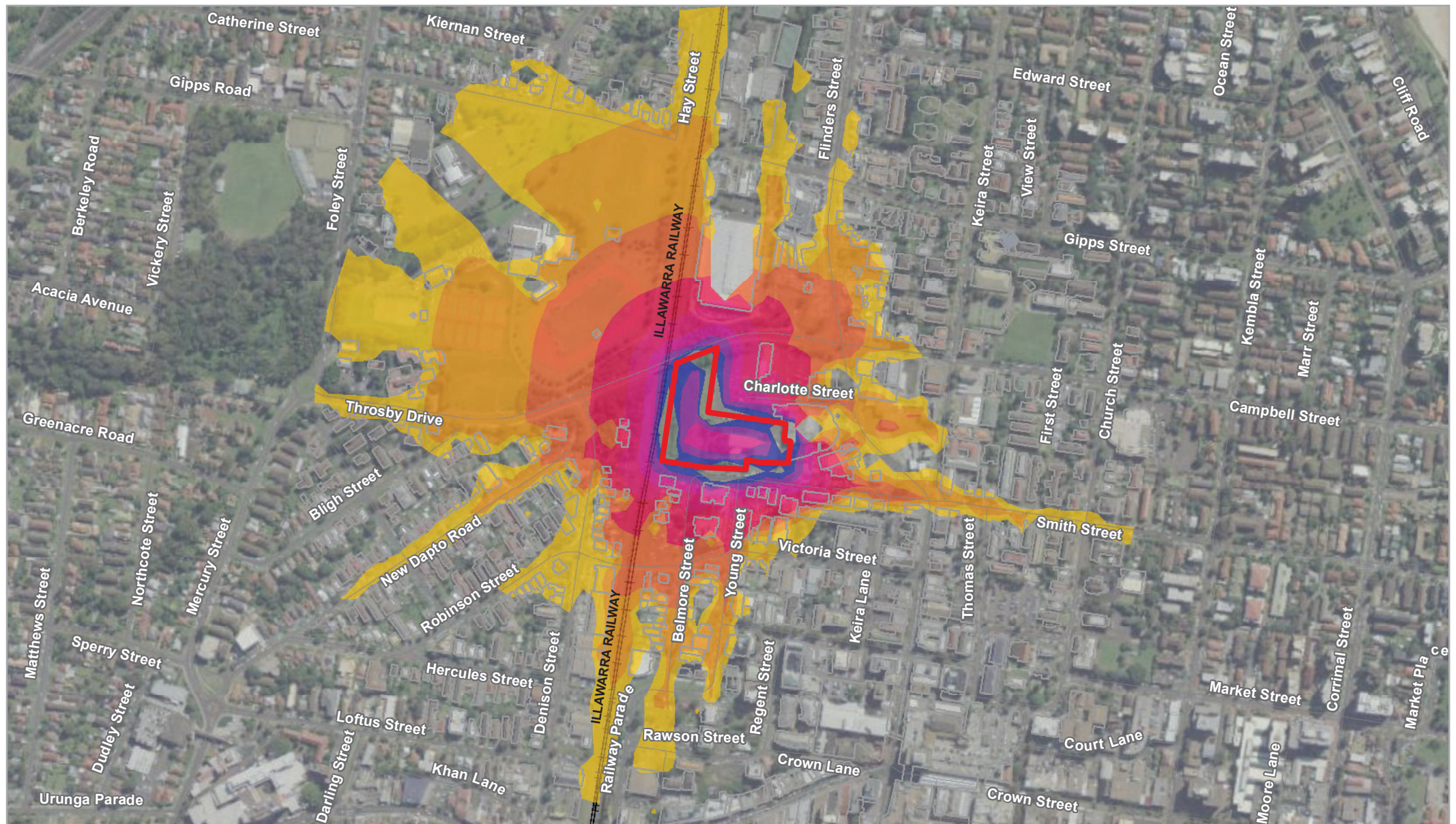
Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f2f7;"> </span> Exceeds noise management level <b>Bold</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R540	77 Gipps Street, Wollongong NSW	Commercial	37	53	43
R541	43 Flinders Street, Wollongong NSW	Commercial	48	64	55
R542	Tennis Wollongong	Active recreation	45	59	52
R543	2 First Street, Wollongong NSW	Residential	33	46	41
R544	54 Gipps Street, Wollongong NSW	Residential	33	50	40
R545	1 Denison Street, Gwynneville NSW	Commercial	61	70	64
R546	33 Edward Street, Wollongong NSW	Residential	25	42	32
R547	5 Hay Street, Gwynneville NSW	Residential	44	52	51
R548	39-41 Denison Street, Wollongong NSW	Commercial	44	50	48
R549	22 Flinders Street, Wollongong NSW	Residential	31	47	38
R550	5 Denison Street, Wollongong NSW	Residential	60	69	62
R551	98 Market Street, Wollongong NSW	Commercial	38	54	45
R552	2 Hercules Street, Wollongong NSW	Residential	37	50	43
R553	Wollongong Seventh-Day Adventist Church	Place of worship	57	74	64
R554	28 Robinson Street, Wollongong NSW	Residential	33	50	40
R555	8 Belmore Street, Wollongong NSW	Commercial	55	67	60
R556	16 Belmore Street, Wollongong NSW	Commercial	52	61	59
R557	70 Market Street, Wollongong NSW	Commercial	29	46	36
R558	11 New Dapto Road, Wollongong NSW	Residential	47	57	54
R559	13 Robinson Street, Wollongong NSW	Residential	40	55	46
R560	47-49 Flinders Street, Wollongong NSW	Commercial	50	65	57
R561	35 Edward Street, Wollongong NSW	Residential	25	42	32
R562	17 New Dapto Road, Wollongong NSW	Residential	46	45	53
R563	22 Belmore Street, Wollongong NSW	Residential	50	54	56
R564	21 Victoria Street, Wollongong NSW	Residential	49	59	56
R565	27 Edward Street, Wollongong NSW	Residential	26	41	33
R566	6 Loftus Street, Wollongong NSW	Residential	36	52	42
R567	56 Gipps Street, Wollongong NSW	Residential	31	48	38
R568	2 New Dapto Road, Wollongong NSW	Residential	52	65	57
R569	5 Kiernan Street, Gwynneville NSW	Residential	42	57	49
R570	61 Gipps Street, Wollongong NSW	Residential	33	48	40
R571	7 Victoria Street, Wollongong NSW	Residential	37	54	44
R572	17 Hercules Street, Wollongong NSW	Residential	36	52	42
R573	65 Church Street, Wollongong NSW	Residential	32	45	38
R574	26 Hercules Street, Wollongong NSW	Residential	35	44	40
R575	84 Campbell Street, Wollongong NSW	Residential	48	58	55
R576	60-72 Flinders Street, Wollongong NSW	Commercial	52	66	59
R577	62 Gipps Street, Wollongong NSW	Residential	38	53	45
R578	63 Campbell Street, Wollongong NSW	Residential	34	44	41
R579	24 Belmore Street, Wollongong NSW	Residential	49	54	56
R580	79 Gipps Street, Wollongong NSW	Residential	36	53	43
R581	38 Flinders Street, Wollongong NSW	Commercial	35	49	41
R582	16 Young Street, Wollongong NSW	Residential	54	70	60
R583	24 Flinders Street, Wollongong NSW	Residential	27	43	34
R584	23 New Dapto Road, Wollongong NSW	Residential	40	53	44
R585	21 Hercules Street, Wollongong NSW	Residential	28	45	35
R586	61 Keira Street, Wollongong NSW	Residential	38	48	45
R587	74-78 Gipps Street, Wollongong NSW	Residential	39	56	46
R588	23 Hercules Street, Wollongong NSW	Residential	35	46	40

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="background-color: #e0f7fa;"> </span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="background-color: #ffe0b2;"> </span> Exceeds noise management level					
R589	9 Robinson Street, Wollongong NSW	Residential	41	56	47
R590	30 Denison Street, Wollongong NSW	Residential	36	52	42
R591	31 Flinders Street, Wollongong NSW	Commercial	33	49	40
R592	30 Crawford Avenue, Gwynneville NSW	Residential	43	58	50
R593	10 Robinson Street, Wollongong NSW	Residential	42	47	46
R594	61 Gipps Street, Wollongong NSW	Residential	44	59	51
R595	28 Hercules Street, Wollongong NSW	Residential	34	50	40
R596	6-8 Hercules Street, Wollongong NSW	Residential	36	51	43
R597	118 Gipps Street, Gwynneville NSW	Residential	45	59	52
R598	67 Church Street, Wollongong NSW	Residential	30	45	35
R599	2 Thomas Street, Wollongong NSW	Commercial	31	48	38
R600	6-8 Hercules Street, Wollongong NSW	Residential	38	51	43
R601	63 Church Street, Wollongong NSW	Residential	35	44	42
R602	29 Crawford Avenue, Gwynneville NSW	Residential	33	44	40
R603	11 Hay Street, Gwynneville NSW	Residential	43	51	50
R604	50 Gipps Street, Wollongong NSW	Residential	35	51	42
R605	93 Smith Street, Wollongong NSW	Commercial	73	85	78
R606	7 Denison Street, Wollongong NSW	Residential	55	66	58
R607	168-218 Crown Street, Wollongong NSW	Commercial	25	38	31
R608	15 Denison Street, Wollongong NSW	Residential	54	61	57
R609	5 New Dapto Road, Wollongong NSW	Residential	48	57	55
R610	76-78 Market Street, Wollongong NSW	Commercial	33	48	40
R611	13 New Dapto Road, Wollongong NSW	Residential	40	53	45
R612	2 Regent Street, Wollongong NSW	Commercial	40	57	47
R613	9 Hay Street, Gwynneville NSW	Residential	39	51	46
R614	62 Church Street, Wollongong NSW	Residential	32	49	39
R615	96 Smith Street, Wollongong NSW	Commercial	52	68	59
R616	22 Belmore Street, Wollongong NSW	Residential	42	50	48
R617	53 Church Street, Wollongong NSW	Residential	32	43	39
R618	88 Smith Street, Wollongong NSW	Residential	42	56	49
R619	272 Crown Street, Wollongong NSW	Commercial	24	41	31
R620	44 Keira Street, Wollongong NSW	Residential	28	43	35
R621	130 Gipps Street, Gwynneville NSW	Residential	44	58	51
R622	67-69 Campbell Street, Wollongong NSW	Residential	35	45	41
R623	1 Hay Street, Gwynneville NSW	Residential	38	53	45
R624	4 Bligh Street, Wollongong NSW	Residential	45	57	51
R625	8 Macquarie Street, Wollongong NSW	Residential	43	58	50
R626	4 Bligh Street, Wollongong NSW	Residential	45	57	52
R627	8 Bligh Street, Wollongong NSW	Residential	41	56	48
R628	23 Bligh Street, Wollongong NSW	Residential	38	53	45
R629	39 Bligh Street, Wollongong NSW	Residential	35	50	41
R630	48 New Dapto Road, Wollongong NSW	Residential	39	51	45
R631	32 New Dapto Road, Wollongong NSW	Residential	45	54	51
R632	19 Bligh Street, Wollongong NSW	Residential	41	53	48
R633	25-27 Bligh Street, Wollongong NSW	Residential	27	43	34
R634	2 Macquarie Street, Wollongong NSW	Residential	31	48	39
R635	46 New Dapto Road, Wollongong NSW	Residential	38	52	45
R636	52 New Dapto Road, Wollongong NSW	Residential	36	51	42
R637	29 Bligh Street, Wollongong NSW	Residential	35	51	42

Receiver ID	Address	Receiver Type	CS01	CS02	CS03
<b>Residential:</b> <span style="color: #00AEEF;">■</span> Exceeds noise management level <b>Red</b> Highly noise affected <b>Non-residential:</b> <span style="color: #FF0000;">■</span> Exceeds noise management level					
R638	15 Bligh Street, Wollongong NSW	Residential	33	47	40
R639	56 New Dapto Road, Wollongong NSW	Residential	37	50	44
R640	4 Bligh Street, Wollongong NSW	Residential	38	53	45
R641	17 Bligh Street, Wollongong NSW	Residential	30	45	37
R642	1 Bligh Street, Wollongong NSW	Residential	48	58	54
R643	2 Bligh Street, Wollongong NSW	Residential	46	60	52
R644	38 New Dapto Road, Wollongong NSW	Residential	44	53	51
R645	6 Macquarie Street, Wollongong NSW	Residential	38	55	45
R646	26 New Dapto Road, Wollongong NSW	Residential	40	55	46
R647	42 New Dapto Road, Wollongong NSW	Residential	43	52	50
R648	38 New Dapto Road, Wollongong NSW	Residential	44	53	51
R649	7 Bligh Street, Wollongong NSW	Residential	40	55	46
R650	50 New Dapto Road, Wollongong NSW	Residential	42	51	49
R651	54 New Dapto Road, Wollongong NSW	Residential	41	51	48
R652	25-27 Bligh Street, Wollongong NSW	Residential	37	52	43
R653	31 Bligh Street, Wollongong NSW	Residential	36	51	42
R654	44 New Dapto Road, Wollongong NSW	Residential	42	52	49
R655	11 Bligh Street, Wollongong NSW	Residential	40	55	47
R656	36 New Dapto Road, Wollongong NSW	Residential	40	53	46
R657	18 New Dapto Road, Wollongong NSW	Residential	47	59	54
R658	10 Macquarie Street, Wollongong NSW	Residential	42	58	49
R659	22-24 New Dapto Road, Wollongong NSW	Residential	41	55	46
R660	37 Bligh Street, Wollongong NSW	Residential	35	51	41
R661	13 Bligh Street, Wollongong NSW	Residential	42	54	49
R662	10 Bligh Street, Wollongong NSW	Residential	38	52	45
R663	43 Bligh Street, Wollongong NSW	Residential	35	50	41
R664	60 New Dapto Road, Wollongong NSW	Residential	41	50	48
R665	25-27 Bligh Street, Wollongong NSW	Residential	36	52	42
R666	28 New Dapto Road, Wollongong NSW	Residential	41	55	47
R667	40 New Dapto Road, Wollongong NSW	Residential	43	53	50
R668	32 New Dapto Road, Wollongong NSW	Residential	40	54	45
R669	6 Bligh Street, Wollongong NSW	Residential	44	53	51
R670	9 Bligh Street, Wollongong NSW	Residential	40	55	45
R671	35 Bligh Street, Wollongong NSW	Residential	36	51	42
R672	7 Bligh Street, Wollongong NSW	Residential	34	49	41
R673	33 Bligh Street, Wollongong NSW	Residential	36	51	42

## **Appendix D** - Predicted construction noise contours





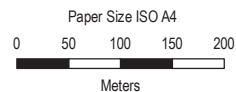
#### Legend

- Site Boundary
- Receiver buildings

#### Noise level dB(A)

- 40
- 45

- 50
- 55
- 60
- 65
- 70
- 75



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Former Jemena Wollongong Gasworks site  
120 – 122 Smith Street

**Scenario 1**  
**Predicted construction**  
**noise levels, dB(A)**

Project No. 21-28174  
Revision No. 0  
Date 21/06/2019

**FIGURE D-1**









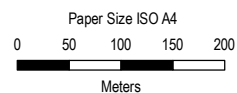
#### Legend

- Site Boundary
- Receiver buildings

#### Noise level dB(A)

- 40
- 45

- 50
- 55
- 60
- 65
- 70
- 75



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Former Jemena Wollongong Gasworks site  
120 – 122 Smith Street

**Scenario 3**  
**Predicted construction**  
**noise levels, dB(A)**

Project No. 21-28174  
Revision No. 0  
Date 07/06/2019

**FIGURE D-3**

Data source: General topo - NSW LPI/DDB 2012, 2015. Aerial imagery - Created by: ecastelblanco

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21/<https://projects.ghd.com/oc/sydney2/formerwollongonggasw/Delivery/Documents/2128174>

Wollongong Gasworks NVIA.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A Bagby / F Salmon	V Lau		K Rosen		21/06/2019

[www.ghd.com](http://www.ghd.com)



# **Appendix F** – Site Waste and Minimisation Management Plan





## **Jemena Gas Networks (NSW) Ltd**

Former Wollongong Gasworks Site – Demolition and  
Vegetation Removal Project  
Site Waste Minimisation and Management Plan

June 2019

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# 1. Introduction

## 1.1 Overview

Jemena Gas Networks (NSW) Ltd (Jemena) seeks development consent to demolish three existing commercial buildings to natural ground level and remove the majority of existing vegetation and structures on the former Wollongong Gasworks site ('the project'). The former gasworks site is located at 120 – 122 Smith Street, Wollongong (the 'site').

The project is required to facilitate the remediation of the former gasworks site. This will allow redevelopment of the site for a mixture of commercial and residential land uses at some stage in the future.

This Site Waste Minimisation and Management Plan (SWMMP) has been prepared by GHD Pty Ltd (GHD) on behalf of Jemena for the Statement of Environmental Effects (SEE), required to support the Development Application (DA) to be submitted to Wollongong City Council.

Table 1.1 provides an overview of the applicant and project details. Further details are provided in Section 3.

**Table 1.1 Applicant and project details**

Applicant details	
Application no	[to be completed]
Name	Jarrold Irving
Address	Lvl 13, 99 Walker Street North Sydney
Phone number(s)	0439 430 600
Email	Jarrold.irving@jemena .com
Project details	
Address of development	120-122 Smith Street, Wollongong Lot 253 DP 787299 and Lot 2411 DP 1097900
Existing buildings and other structures currently on the site	Two existing commercial buildings and a warehouse, hardstand and car parking areas, vegetation (trees, shrubs and grass).
Description of proposed development	The project includes preparation of the site, including the demolishing and removal of two office buildings and one industrial warehouse on Lot 2411 of the site, to allow for subsequent remediation works. The demolition and subsequent remediation works will render the site suitable for future commercial and residential mixed use. The remediation of the site and any future development will be subject to separate development application processes.
This development achieves the waste objectives set out in the DCP. The details on this form are the provisions and intentions for minimising waste relating to this project. All records demonstrating lawful disposal of waste will be retained and kept readily accessible for inspection by regulatory authorities such as Wollongong City Council, NSW EPA or NSW WorkCover.	
Name	Jarrold Irving
Signature	
Date	

## 1.2 Scope

The scope of work for the SWMMP includes:

- review of project information including:

- site plans and project scope
- building plans including building materials
- identification of key waste streams and likely volumes of waste to be generated based on available information
- identification of the likely waste classification of key waste streams
- identification of the methods of storage and treatment of waste and recyclables on site
- identification of potential recycling and disposal facilities for key waste streams
- estimation of the proportion of waste to be reused, recycled and disposal for key waste streams
- preparation of this SWMMP in accordance with the Wollongong Development Control Plan 2009 requirements.

### **1.3 Purpose of this report**

The SWMMP is a preliminary document which has been prepared to identify the wastes likely to result from the proposed demolition works at the site, identify opportunities for reuse and recycling of materials and support the development application for the project.

A more detailed SWMMP would be prepared by the demolition contractor prior to the works commencing.

### **1.4 Scope and limitations**

This report: has been prepared by GHD for Jemena Gas Networks (NSW) Ltd and may only be used and relied on by Jemena Gas Networks (NSW) Ltd for the purpose agreed between GHD and the Jemena Gas Networks (NSW) Ltd as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Jemena Gas Networks (NSW) Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Jemena Gas Networks (NSW) Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

### **1.5 Assumptions**

Preliminary estimates of waste quantities were based on available historic information and plans and aerial photography. A number of assumptions have been made in order to estimate demolition waste quantities.

## **2. Existing buildings and other structures currently on the site**

### **2.1 Lot 253**

Lot 253 is generally flat vacant land with grass covering the majority of the ground surface.

The far northern portion of Lot 253 comprises an embankment that presumably supports the Throsby Drive overpass. The embankment is vegetated with shrubs and trees.

The Lot is fenced, though the fencing is in poor condition in some areas.

### **2.2 Lot 2411**

Lot 2411 contains two existing commercial buildings and a warehouse.

Approximately 30% of Lot 2411 is occupied by commercial buildings comprising a two-storey office, a single storey octagonal room and an industrial warehouse.

External areas comprised bitumen paved roads and car parking (approximately 50% of the Lot area) and landscaping with grass and garden beds. Trees line the western boundary of the lot.

Entry pits to the stormwater system are present in the paved areas.



## 3. Proposed works

The project would generally involve the stages described below. The methodology would be finalised during the detailed planning and following engagement of the demolition contractor.

### 3.1 Site establishment and mobilisation

This would involve the following activities:

- mobilisation of site plant and equipment
- establishment of the site office/amenities and laydown areas
- installation of site environment management and traffic controls
- supply of power, water and other utilities to the site office/amenities
- clearing of vegetation and removal of trees on both lots of the site (as required).

### 3.2 Building demolition

This would involve the following activities:

- disconnection of utilities and services
- hazardous materials removal and disposal by a licensed contractor
- soft stripping of internal building materials
- demolition of the existing two commercial buildings and warehouse to ground level using an excavator, tipper, cranes or other conventional methods using a top-down approach.

### 3.3 Site reinstatement

Site reinstatement would involve dismantling of the site compound and removal of all plant, equipment and demolition materials, from the site.

## 4. Waste streams

The types of waste and recyclables expected to be generated from the project. Their likely classifications (EPA, 2014a) are summarised in Table 4.1. Estimated quantities/volumes of key waste streams are provided in Table 5.1.

**Table 4.1 Expected waste streams and likely classifications**

Activity	Potential waste streams	Likely classification
Activities at site office/compound	Putrescibles (food and other organic waste)	General solid waste (putrescible)
	Paper/cardboard	General solid waste (non-putrescible)
	Containers (cans, plastic, glass)	
	Other office waste	
Site establishment		
Vegetation clearance and tree removal	Vegetation/garden organics	General solid waste (non-putrescible)
Establishment of the site office/compound and laydown areas	Packaging	General solid waste (non-putrescible)
Utilities (supplying power, water and other utilities to the site office/compound)	Excavated material	Restricted solid waste General solid waste (non-putrescible)
	Pipe/conduit and cable offcuts	General solid waste (non-putrescible)
Building demolition		
Hazardous materials removal	Hazardous/special waste eg asbestos	Special waste or Hazardous waste or Restricted solid waste
Soft stripping of internal building materials	Furniture	General solid waste (non-putrescible)
	Fixtures and fittings	
	Floor coverings	
Demolition of existing buildings and warehouse	Timber	General solid waste (non-putrescible)
	Concrete	
	Metal	
	Glass	
	Plasterboard	
	Bricks/pavers	
Removal of hardstand surfaces under existing buildings	Tiles	General solid waste (non-putrescible)
	Concrete	
	Asphalt	

## 5. Waste minimisation and management

### 5.1 Overview

All waste would be handled, stored, treated and disposed in accordance with relevant legislation, guidelines and strategies including:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation)
- *Waste Avoidance and Resource Recovery Act 2001* (WARR Act)
- NSW Waste Avoidance and Resource Recovery Strategy 2014 – 21 (EPA, 2014b) (WARR Strategy).

The POEO Act establishes the procedures for environmental control, and for issuing environmental protection licences regarding matters such as waste, air, water and noise.

The Waste Regulation regulates matters such as the obligations of consignors (producers and agents), transporters, and receivers of waste in relation to waste transport licensing and tracking requirements.

The WARR Act aims to ensure that waste management options are considered against the following waste management hierarchy:

1. avoidance of unnecessary resource consumption
2. resource recovery (including reuse, reprocessing, recycling and energy recovery)
3. disposal.

The primary goal of the WARR Strategy (EPA, 2014b) is to enable NSW to improve environment and community well-being by reducing the environmental impact of waste and using resources more efficiently. To support the primary goal of the strategy, the project would be undertaken with consideration to the waste hierarchy.

### 5.2 Onsite controls

Where practicable, all demolition waste would be segregated on site and reused or recycled off-site at a licensed recycling facility. Only small quantities of waste are expected to be disposed of to landfill. Any special waste/restricted waste/hazardous waste would be handled and disposed of in accordance with relevant legislation and guidelines.

Onsite controls would include:

- implementation by the main site contractor of the SWMMP
- identification and removal of all hazardous materials (asbestos) by a certified asbestos removal contractor
- segregating wastes using different skip bins for recycling and waste, with separate bins for different recyclable materials
- discussion about the site's waste management and recycling policies and practices with employees and subcontractors during site inductions and tool box talks
- ensuring all waste disposal bins are clearly marked
- classification of all waste streams in accordance with the EPA (2014a) Waste Classification Guidelines

- keeping records of quantities of waste and recycled materials disposed of, and the destinations of these materials
- ensuring that wastes are only transported to licenced facilities for recycling or disposal that are lawfully able to receive the material.

### 5.3 Proposed reuse, recycling and disposal

Table 5.1 provides a summary of the estimated waste quantities and proposed reuse, recycling and disposal for the key waste streams. The volumes are indicative only and quantities would be confirmed during detailed planning once a contractor has been appointed and prior to demolitions works commencing.

All material would be removed off-site for either recycling or disposal to licenced waste facilities.

**Table 5.1 Estimated waste stream quantities and proposed management**

Type of waste generated	Reuse	Recycling	Disposal	Method
	Estimate volume (m <sup>3</sup> )	Estimate volume (m <sup>3</sup> )	Estimate volume (m <sup>3</sup> )	
Excavated material				
Timber		500		Recycling centre
Concrete		14,900		Recycling centre
Bricks/pavers		4,200		Recycling centre
Tiles		<1		Recycling centre
Metal		100		Recycling centre
Glass		100		Recycling centre
Furniture				
Fixtures and fittings			<10	Landfill
Floor coverings			20	Landfill
Packaging		<10		Recycling centre
Garden organics		600		Recycling centre
Containers (cans, plastic, glass)		<10		Recycling centre
Paper/cardboard		<10		Recycling centre
Residual waste			<10	Landfill
Hazardous/special waste e.g. asbestos			<1	Appropriately licensed disposal facility
Other			1,300	Landfill

The recycling centre and landfill/disposal facilities would be selected during detailed planning and once the contractor has been appointed. There are a number of facilities available in the region and surrounds such as (but not limited to):

- Whytes Gully Waste and Resource Recovery Centre
- Bingo Recycling Centre – Kembla Grange
- Wollongong Recycling & Building Supplies
- Benedict Recycling Unanderra
- SCE Recycling
- Coasties Big Shed
- Liberty Recycling – Unanderra.

## **5.4 Waste storage areas**

All temporary stockpile and waste storage areas would be located wholly within the site boundary. No waste would be stored on footpaths, gutters or public reserves/locations.

A preliminary location for the temporary stockpiles and waste storage is shown on Figure 5.1. The location and size of this area would be confirmed during detailed planning and once a contractor has been appointed.

## **5.5 Access for waste collection vehicles**

Access for waste collection vehicles would be via the existing sealed driveway on Smith Street. The laydown areas and waste storage area would be configured to allow collection vehicles to enter and exit in a forward direction and not impede general access to and from the site.

Figure 5.1 shows the likely access arrangement for waste collection vehicles.

## **5.6 Storage bin requirements**

Wastes generated on site would be segregated with separate bins for different recyclable materials or by sorting into separate stockpiles.

Wheelie bins would be provided for:

- Mixed containers (cans, plastic, glass) and paper/cardboard – 1 x 240 L
- Residual waste including food waste and non-recyclable packaging – 1 x 240 L

Construction and demolition wastes would be segregated into the following separate skip bins or stockpiles:

- timber and other wood waste
- concrete
- asphalt
- metals
- tiles and bricks
- garden organics (vegetation)
- soil/excavated material
- other mixed demolition wastes.

Wheelie bins and skip bins would be sized and collected as required.

## **5.7 Signage**

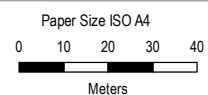
All wheelie bins, skip bins and stockpile areas would be fitted with signage to indicate the type of waste. This would facilitate the correct segregation of wastes and correct use of the temporary storage area.



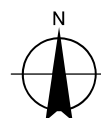


#### Legend

- Site Boundary
- Former stockpiles (removed in late 2018)
- Structures to be demolished
- Site office
- Temporary stockpile and waste storage area
- Waste vehicle access



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Former Jemena Wollongong Gasworks site  
120 – 122 Smith Street

Project No. 21-28174  
Revision No. 0  
Date 21/06/2019

Waste storage and access

**FIGURE 1**

Data source: General topo - NSW LPI/DDB 2012, 2015. Aerial imagery - Created by: ecateblanco

## 6. References

EPA (2014a), Waste Classification Guidelines. Part 1: Classifying waste.

EPA (2014b), NSW Waste Avoidance and Resource Recovery Strategy 2014 – 21

Wollongong City Council (2009), Wollongong Development Control Plan 2009.

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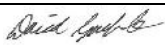
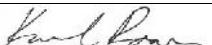
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23/[https://projects.ghd.com/oc/sydney2/formerwollongonggasw/Delivery/Documents/2128174-REP\\_Site Waste Minimisation and Management Plan.docx](https://projects.ghd.com/oc/sydney2/formerwollongonggasw/Delivery/Documents/2128174-REP_Site%20Waste%20Minimisation%20and%20Management%20Plan.docx)

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Revision	Author	Reviewer		Approved for Issue		
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0	A Montgomery	D Gamble		K Rosen		21/6/19

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		Name	Signature	Name	Signature	Date
0	J. Tan	A. Pyliotis		Karl Rosen		21/06/19



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