NEWCASTLE WEST 1 WWPS UPGRADE- CONCEPT DESIGN

JULY 2022

REVIEW OF ENVIRONMENTAL FACTORS

HUNTER WATER

TABLE OF CONTENTS

GLOSSARY

Term	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soil
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015*
CBD	Central Business District
CCLP	Construction Community Liaison Plan
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CMSC Act	*Coal Mine Subsidence Compensation Act 2017*
CNVG	Construction Noise and Vibration Guideline
CO	Carbon monoxide
DAWE	Australian Government Department of Agriculture, Water and the Environment
DCP	Development Control Plan 2012
DECC	Department of Environment and Climate Change (former)
DECCW	Department of Environment, Climate Change and Water (former)
DMP	Dewatering Management Plan

Term	Definition
DMS	Dimethyl Sulphide
DPE	Department of Planning and Environment
DPE – Water	Department of Planning and Environment – Water
NEPM	National Environment Protection Measures
EES	The Environment, Energy and Science Group of the Department of Planning, Industry and Environment (formerly the NSW Office of Environment and Heritage)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPBC Act	*The Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994*
HCA	Heritage Conservation Area
Heritage Act	*Heritage Act 1977*
HILs	Health investigation levels
Hunter Water	Hunter Water Corporation
HW Act	*Hunter Water Act 1991*
ICNG	Interim Construction Noise Guideline
IMP	Incident Management Plan
T&ISEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
KFH	Key Fish Habitat

Term	Definition
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
MNES	Matters of National Environmental Significance
NCA	Noise Catchment Areas
NML	Noise Management Level
NO_2	Nitrogen dioxide
NPI	Noise Policy for Industry
NPW Act	*National Parks and Wildlife Act 1974*
NRAR	Natural Resources Access Regulator
NSW	New South Wales
NVIA	Noise and vibration impact assessment
NW1	Newcastle West 1
OCU	Odour Control Unit
OEH	The (former) Office of Environment and Heritage
PM10	Particulate matter in the air with a diameter of 10 micrometres or less
POEO Act	The *Protection of the Environment Operations Act 1997* (NSW)
RBL	Rating Background Levels
REF	Review of Environmental Factors
RNP	Road Noise Policy
Roads Act	Roads Act 1993
RSC	Reduced Sulphur Compounds

Term	Definition
SEPP	*State Environment Planning Policy*
SHR	State Heritage Register
SIS	Species Impact Statement
SSD	State Significant Developments
SWL	sound power level
TMP	Traffic Management Plan
TPZ	Tree protection zone
VOC	Volatile Organic Compounds
WAL	Water Access Licence
WARR Act	*Waste Avoidance and Resource Recovery Act 2011*
WM Act	*Water Management Act 2000*
WWPS	Wastewater Pumping Station

EXECUTIVE SUMMARY

Hunter Water Corporation (Hunter Water) are proposing to remediate and replace infrastructure at the Newcastle West 1 (NW1) wastewater pumping station (WWPS) located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle (the proposal).

The proposal key elements include:

- Demolition and replacement of the existing 27 metre wooden vent stack (existing vent stack)
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the inlet well.

The proposed works would take place within a proposal area which includes the full construction footprint of the works including the ancillary and laydowns areas and areas that would be under temporary traffic control.

Need for the proposal

NW1 WWPS was initially constructed between 1908 and 1926 and has been the subject of odour complaints over the last decade. In addition, recent assessments of the NW1 WWPS have identified that the existing vent stack and the inlet well and chambers require remediation and replacement works. The proposal is needed to remediate and replace infrastructure at NW1 WWPS to enable ongoing operation and maintenance of a critical Hunter Water asset. It would also help to minimise odour emissions and improve the liveability for nearby residents and the general public around Marketown.

Statutory and planning framework

Division 18, Clause 2.125 of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&ISEPP). T&ISEPP enables development for the purpose of sewage system to be carried out without consent. As the proposal forms part of a sewage system and Hunter Water is a public authority, it is considered permissible without consent pursuant to the provisions of T&ISEPP and can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

Community and stakeholder consultation

Hunter Water has engaged with affected landowners throughout development of the proposal. In addition, Hunter Water carried out consultation with City of Newcastle and the Subsidence Advisory NSW under the T&ISEPP.

Environmental impacts

The assessment of the potential environmental impacts concluded that the proposal would have minor environmental impacts, including:

- Visual impact from the introduction of new infrastructure at NW1 WWPS
- The removal of up to 12 individual trees
- Amenity impacts (noise, dust, odour) during construction
- Noise impacts and operation from the new OCU
- Property impacts on Marketown including loss of carpark spaces during construction
- Traffic and access impacts during construction.

The proposal would not be expected to have a substantial long term adverse environmental impact provided the mitigation measures identified in this Review of Environmental Factors (REF) are implemented.

No Environmental Impact Statement (EIS) or Species Impact Statement (SIS) would be required and the proposal can be determined accordingly.

Justification and conclusion

While there would be some environmental impacts as a consequence of the proposal, they have been avoided or minimised wherever possible through design and site specific mitigation measures. The beneficial effects are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal. The proposal as described in this REF best meets the proposal objectives but would still result in some impacts on property, traffic and access and amenity (noise, dust, odour and visual impacts).

Mitigation measures as detailed in this REF would mitigate or minimise the assessed impacts and as such the proposal is not likely to have a significant environmental impact.

The proposal is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

The assessment identified that the proposal has the potential to result in some minor impacts. These are primarily related to the construction phase and would be short lived and temporary in nature. The proposal would increase capacity in response to the planned growth in the surrounding areas and to rectify low pressure issues related to potential failure scenarios.

1 INTRODUCTION

1.1 Proposal identification

Hunter Water Corporation (Hunter Water) are proposing to remediate and replace infrastructure at the Newcastle West 1 (NW1) wastewater pumping station (WWPS) located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle West (the proposal), refer to **Figure 1-1**.

NW1 WWPS was initially constructed between 1908 and 1926 and has been the subject of odour complaints over the last decade. In addition, recent assessments of the NW1 WWPS have identified that the existing vent stack and the inlet well and chambers require remediation and replacement work.

The proposal would help to minimise odour emissions and improve safety to assist in improving the liveability for nearby residents and the general public around Marketown. The proposal would also enable ongoing operation and maintenance of a critical Hunter Water asset.

The proposal key elements include:

- Demolition and replacement of the existing 27 metre vent stack
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the inlet well.

The proposal area comprises the full construction footprint of the proposed works including the ancillary and laydowns areas and areas that would be under temporary traffic control. The proposal is described further in **Chapter 3** and shown on **Figure 1-2**.

The construction of the proposal would be expected to start in mid-2023 and take between six to nine months (weather permitting) to complete.

1.2 Proposal location

NW1 WWPS is located on an existing Hunter Water easement (the site) at the northeast corner of the Marketown carpark adjacent to the King Street access road, refer to **Figure 1-1**. The site is currently accessed via the King Street access road.

The area around Newcastle West, and more specifically near Marketown, has seen substantial redevelopment over the 10 years following State and local planning changes to the Newcastle Central Business District (CBD). These changes resulted in the construction of several multi-storey residential apartment buildings to the north and east of the proposal. These developments include the twin 20-storey Verve Residences at 470 King Street and the seven storey Spire Apartments above the shopping precinct at Marketown.

NW1 WWPS is located within Lot 1 DP847509 and zoned mixed-use (B4) on the Newcastle Local Environmental Plan 2012 (Newcastle LEP). The immediate surroundings of the proposal are a mixture of commercial, infrastructure, mixed-used, public recreation, low-density residential and medium-density residential land zonings, with benefits to both residents and populations drawn to the area through commercial and recreation opportunities.

The proposal area is mostly cleared of native vegetation and part of the site is maintained grass with a small number of trees and shrubs located in the east-southeast of the proposal area, **Photo 1-1**.

The nearest waterway is Cottage Creek passing through a stormwater culvert immediately east of NW1 WWPS, refer to **Photo 1-2**. Before discharging to Thorsby Creek/Hunter River.

The proposal area has an elevation of around 1.94 metres Australian Height Datum (AHD) and is in the Newcastle Mine Subsidence District.

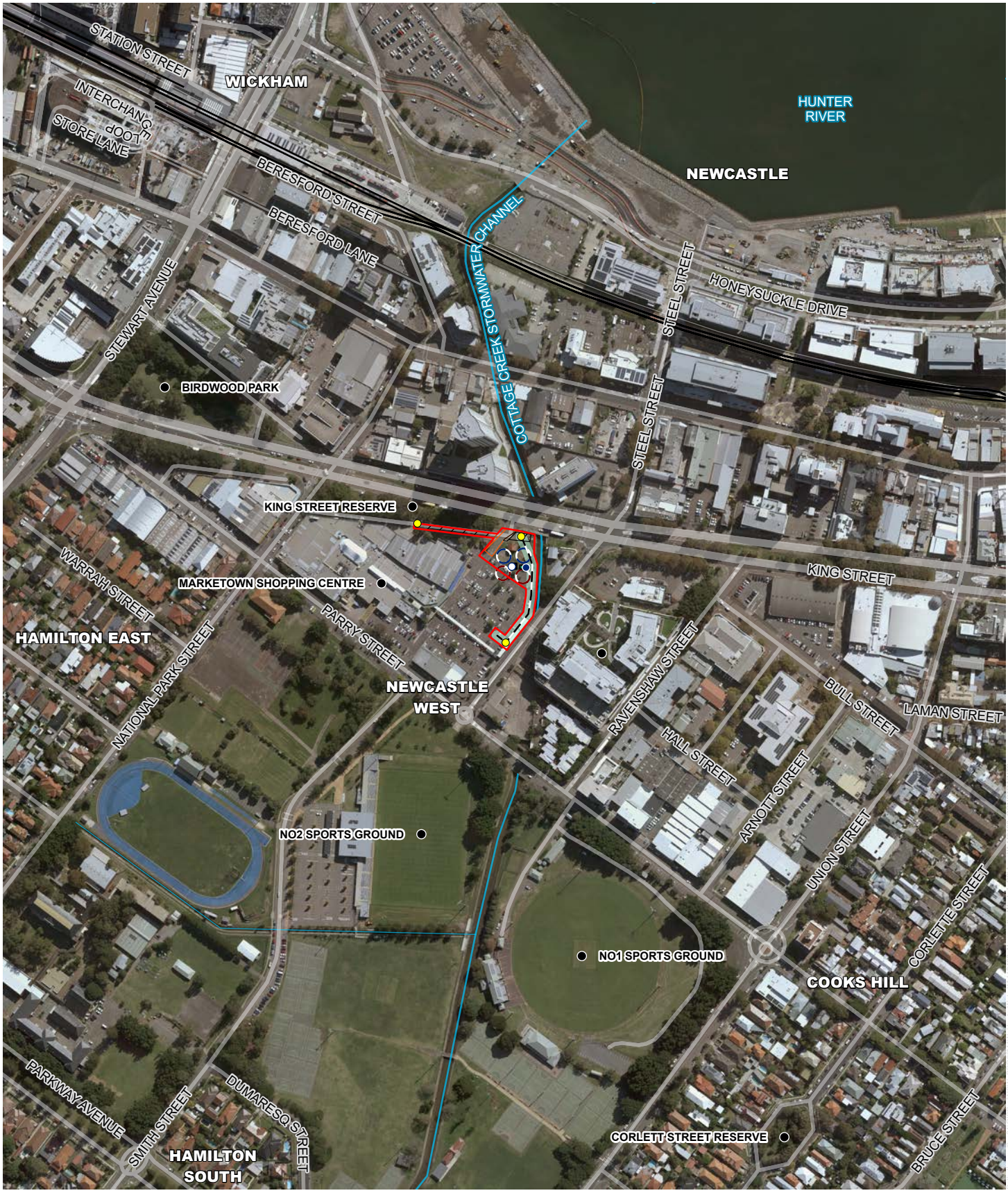
Photo 1-1 NW1 WWPS site

Photo 1-2 Cottage Creek looking south

1.3 Purpose of the report

This report has been prepared by Jacobs (Group) Australia Pty Ltd on behalf of Hunter Water. For the purposes of these works, Hunter Water is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the Review of Environmental Factors (REF) is to describe the proposal, to document the likely potential construction and operation environmental impacts of the proposal on the environment, and to detail mitigation measures to be implemented.



Proposal area
Sewer main bypass
Sewer main bypass 5m buffer
Ancillary Site
Access temporarily restricted

Temporary pump
Demolish existing vent stack
New vent stack
Decommissioned storage well
Existing wet well
Inlet well
Odour control unit

Railway
Road
Waterway

0 100 200 m

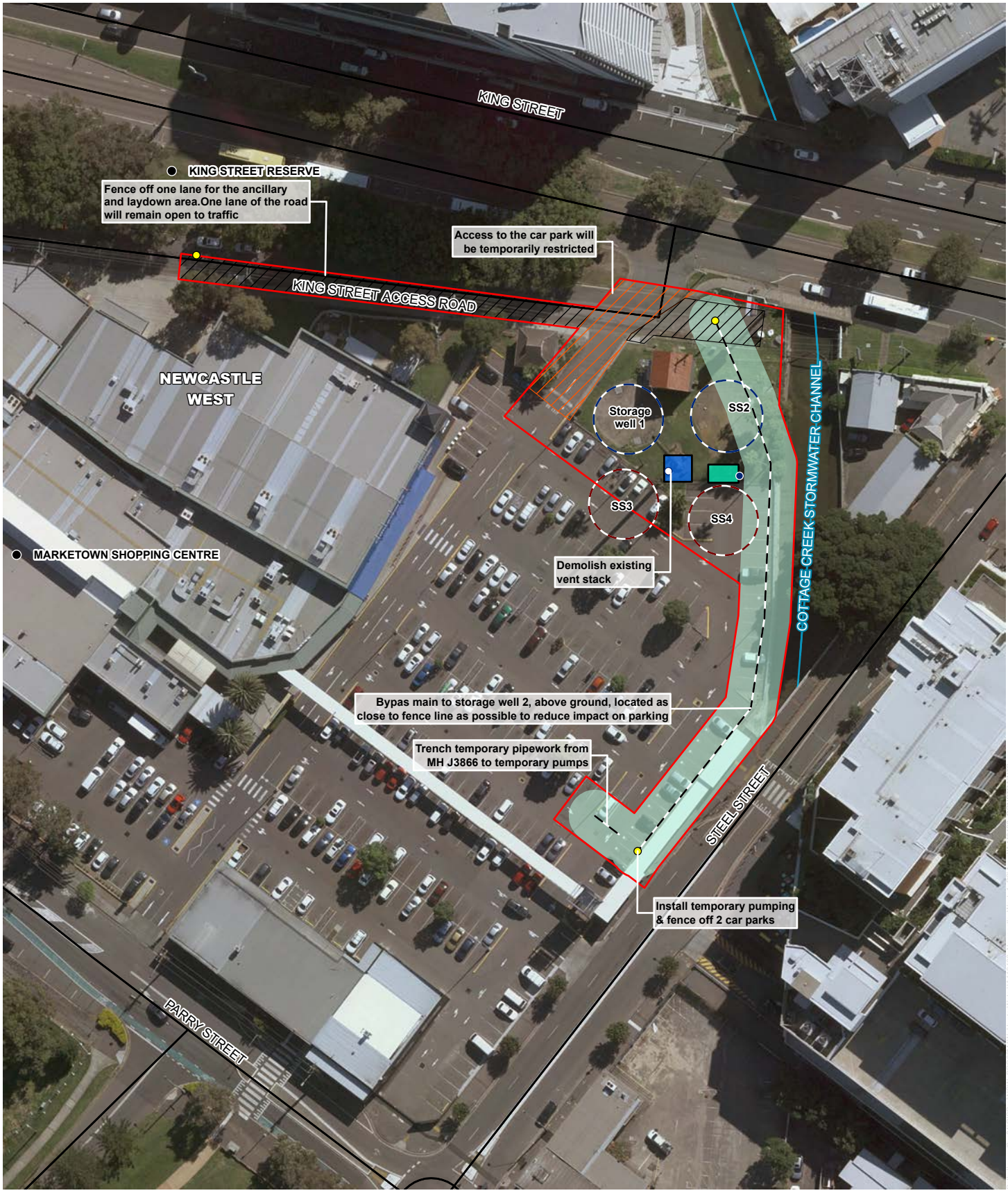
1:5,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Aerometrex 2021

Figure 1-1 Locality



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Waterway

0 20 40 m

1:1,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Aerometrex 2021

Figure 1-2 The proposal

2 PROPOSAL NEED AND JUSTIFICATION

The NW1 WWPS was initially constructed between 1908 and 1926. Currently, untreated air is naturally ventilated from the WWPS and discharged through an existing 27 metre high vent stack.

The existing vent stack has reached the end of its life and in 2021 it was recommended that it be removed and replaced due to poor structural integrity of the vent, and to address wellbeing and quality of life concerns raised by local residents concerning untreated noxious air discharge. Hunter Water are currently monitoring the existing vent stack due to its to poor structural integrity.

In order to minimise the impact of foul air extracted from NW1 on surrounding sensitive receptors, an OCU is proposed to be installed to treat foul air prior to discharge.

Due to the age of the WWPS, there is considerable deterioration of the concrete and infrastructure within the inlet well and storage wells, refer to **Photo 2-1** and **Photo 2-2**. Currently the penstocks (sluice gates) which were designed to allow isolation of each of the storage wells for maintenance are corroded open and non-functional. This means that maintenance at the station is difficult, and rehabilitation works required to maximise the working life of this structure cannot be undertaken. This has resulted in sediment accumulation in both the chamber and the storage wells contributing to the generation of odorous and corrosive gases contributing to the foul air.

Photo 2-1: Penstock spindle corrosion and concrete deterioration

Photo 2-2: North-western penstock corrosion

The proposal would help to minimise odour emissions from the WWPS through the installation of a new OCU. This would assist in improving the liveability for nearby residents and the general public around Marketown. While the removal of the existing vent stack would also protect the general public from potentially critical consequences should it collapse, the remediation of the inlet well will enable ongoing operation and maintenance of a critical Hunter Water asset.

The densification and increasing occupation of high-rise building developments in the vicinity of the proposal, means that the risk of future odour complaints from the WWPS may increase if left untreated.

2.1 Objectives of the proposal

The key objectives of the proposal are to:

- Address current odour complaints regarding air extracted from the WWPS
- Reduce the possibility of increased complaints as further residential development occurs

- Reduce risk of non-compliance with the Environmental Protection Licence (EPL) in relation to the emission of offensive odours
- Eliminate the risk to public safety by removing and replacing the vent stack and rehabilitating the inlet well
- Enabling ongoing operation and maintenance of a critical Hunter Water Asset.

2.2 Existing Hunter Water infrastructure

NW1 WWPS was constructed in between 1908 and 1926 and is one of Hunter Water's oldest WWPS. The NW1 WWPS receives both pumped and gravity flows from western parts of the Newcastle CBD as well as the suburbs of Adamstown, Broadmeadow, Hamilton, Islington, Mayfield, New Lambton, Tighes Hill and Wickham.

The WWPS was built with incoming sewers discharging into an inlet well. The inlet well subsequently distributed wastewater to four separate storage wells which acted as both WWPS wet wells and storm storage.

Originally there were four storage wells which operated as part of NW1 WWPS, each with a diameter of 12.7 metres. However, Storage Well 3 and Storage Well 4 (the southern 2 wells) have been decommissioned and filled. They are now under the Marketown car park. Storage Well 1 and Storage Well 2 are still operational and are located within the Hunter Water easement. Two vertical line shaft centrifugal pumps are mounted in the Pump Dry Well. There is no bypass on the inlet well, and access is limited, meaning that any remediation works require significant planning.

The existing vent stack as part of the NW1 WWPS is about 111 years old, 27 metres high and is supported by wire stays as seen in **Photo 2-3**. Its purpose is to disperse odours from the WWPS to the atmosphere at an elevation well above ground level for dispersion to minimise ground level odour impacts. The existing vent stack does not extend above the top of the new buildings in the locality.

The NW1 WWPS sewer rising main is approximately 200 metres long and discharges at another vent stack on the corner of King Street and Ravenshaw Street. Addressing potential odours from this vent is not part of the scope of this proposal.

There is a 600 millimetre (mm) diameter concrete overflow main from the inlet well which discharges into Cottage Creek under the east bound lane of the King Street Bridge about 50 metres north of the NW1 WWPS. The discharge is submerged under some tidal conditions which has caused the overflow to be blocked by barnacles and debris. The overflow does not have a non-return valve to prevent backflow from Cottage Creek flowing into the inlet well.

In February 2021, Hunter Water carried out interim works to help reduce odour from NW1 WWPS. These works included installation of:

- A drop pipe at the outlet of the NW1 WWPS sewer rising main to minimise turbulence in the inlet well. About a 30 per cent (%) reduction in Hydrogen Sulfide (H_2S) peak concentrations have resulted from this installation (Stantec, 2021)
- New gas tight hatch covers and sealed the penetrations associated with instrument ports to decrease odour leakage from gaps in the covers.

Photo 2-3: Existing Wooden Vent Stack

2.3 Options considered

The Newcastle West 1 WWPS Upgrade Business Case (Hunter Water, 2021) (the business case) identified four shortlisted options to address the odour complaints and risk of failure of the existing vent stack, at NW1, Newcastle West. These options included:

- **Option 1 – Do Nothing:** The 'do nothing' option reflects the current condition, configuration, operation and maintenance activities applied to the NW1 WWPS in this location. The vent stack would continue to deteriorate which may lead to increased odour emissions, environmental impacts and regulatory breaches. Hunter Water would continue to receive negative media attention and reputational damage by not addressing the customer odour complaints. This option was discounted as it does not address any of the proposal objectives
- **Option 2 – Replace existing vent stack and install a new OCU:** This option consists of the installation of a new standard 12 metre vent stack in the same location on the inlet well and the installation of an OCU
- **Option 3 – Replace existing vent stack, install a new OCU and remediate the inlet well**: This option is the same as Option 2 but also includes the remediation of the inlet well
- **Option 4 – Replace existing vent stack, install a two OCUs and remediate the inlet well**: This option is the same as Option 3 but also included the installation of a second OCU at the discharge point of the rising main from NW1 WWPS 1 in Ravenshaw Street.

2.4 Preferred option justification

The business case determined that Hunter Water's preferred option is Option 3 that would replace the existing vent stack, install a new OCU and remediate the inlet chamber.

This option would address the odour complaints and risk of failure of the existing vent stack, and was selected as the preferred option as:

- It addresses all objectives of the business case
- It reduces emerging safety, community and environmental risks
- It represents a more cost-effective investment decision.

There is insufficient evidence to justify the need for an additional OCU at the NW1 WWPS discharge point in Ravenshaw Street as no odour complaints have been registered at this location.

A further options assessment was carried out to select the preferred location, size and configuration for the OCU. Six potential locations were considered. This option assessment determined that the optimal location for the OCU unit was at the south-eastern side of the site as shown in **Figure 1-2**.

3 DESCRIPTION OF THE PROPOSAL

3.1 Scope of works

The scope of the proposal includes the installation of a new vent stack and OCU, removal of the existing vent stack and the remediation of the inlet well.

The construction works associated with the proposal would include:

- The installation of a new 12 metre tall vent stack
- Install a temporary connection from Storage Well 1 and Storage Well 2 to the new stack to vent the WWPS during construction of the OCU
- Construction of a bunded slab for the new OCU
- Installation of the OCU and ductwork odour ductwork connecting the OCU unit to the inlet well, Storage Well 1 and Storage Well 2
- Refurbishment of the inlet well
- Decommission and removal of the old vent stack.

No property acquisition would be required, and it is not anticipated that any public utilities would require relocation during construction of the proposal.

Details of the proposal and design are shown in **Figure 1-2**, and are described in more detail below.

3.1.1 Inlet Well remediation

The following remedial works on the inlet well would be carried out as part of the proposal:

- Removal of the existing vent stack, access hatches and associated surface fittings
- Removal of the cover slab
- Removal of the four existing penstocks and fittings in the inlet well
- Removal of the weir, penstock and fittings in the overflow chamber
- Removal of existing step irons in inlet well and overflow chamber
- High pressure jet blasting of the internal walls and floors of the chambers to remove corroded material
- Construction of new 100 mm penetration through chamber wall for OCU inlet pipe
- Localised repair of walls/floors etc. using epoxy mortar
- Epoxy coating of walls and floors with a Hunter Water approved coating system
- Installation of adjustable stainless steel weir within overflow chamber
- Installation of two penstocks (Storage Well 1 and Storage Well 2) in the inlet well
- Installation of two stainless steel cover plates (Storage Well 3 and Storage Well 4) to seal the outlet to the decommissioned wells
- Installation of a stainless steel stop board frame (excluding stop boards) on the incoming sewer pipe to the inlet well
- Replacement of the cover slab, access hatches and penstock actuators.

The inlet well refurbishment works would commence once bypass pumping systems are in operation and prior to the installation of the OCU.

3.1.2 OCU

The proposal includes the installation of a new OCU which would operate 24 hours a day, 365 days of the year. The location of the OCU is shown on **Figure 1-2** and the concept design is shown on **Figure 3-1**.

The OCU consisting of:

- Inlet filter

- Activate carbon filter
- Outlet extraction fan
- OCU bypass ducting
- Outlet silencer.

During normal operation of the OCU, air would be extracted from the two storage wells and Inlet well. The extracted foul air would flow through a two-stage particulate filter then through an up flow activated carbon filter before being discharged through an outlet silencer and the new 12 metre vent stack. A low flow switch on the fan outlet would detect if the fan fails. Differential pressure transmitters across the prefilter and activated carbon bed would provide an indication of blockage and stop the fan and raise an alarm for operator intervention.

The extraction fan will operate continuously at a fixed speed (notionally 2600 cubic metres per hour (m^3/hr) but can be manually increased to up to 3100 m^3/hr for short period if required in summer).

Existing ultrasonic level probes in each of the two storage wells would be used to detect high water levels and stop the fan due to the diminished head space to prevent the risk of drawing water, debris, and excess moisture into the system. H_2S breakthrough indicators on each OCU sampling port would provide a visual indication of when the activated carbon needs to be changed to prevent odour release from the stack.

The OCU would be situated on a concrete platform about 600 mm above the 1 % Annual Exceedance Probability (AEP) flood level (2.33 metres AHD) to mitigate flooding impacts. An AEP is a means of describing how likely a flood is to occur in a given year. A 1% AEP describes a flood event that, on average, occurs or is exceeded once every 100 years. These flooding events may also be referred to as a '100-year Average Recurrence Interval (ARI) flood', with the ARI describing the long-term average number of years between floods of a certain magnitude.

The platform would be about 11.2 metres long and up to 4.30 metres wide along the widest edge. The bunded area would be about 300 mm thick reinforced concrete slab with a minimum 150 mm high bund (kerb) around the perimeter of the slab. The slab and bund wall would be constructed from 32 Megapascals (MPa) concrete, in accordance with the Hunter Water requirement for concrete surfaces in contact with chemicals and/or wastewater.

During construction a temporary vent line connecting Storage Well 1 and Storage Well 2 to the new vent stack would be required to vent the WWPS during construction of the OCU. The temporary vent pipe would be removed following commissioning of the new OCU and associated infrastructure.

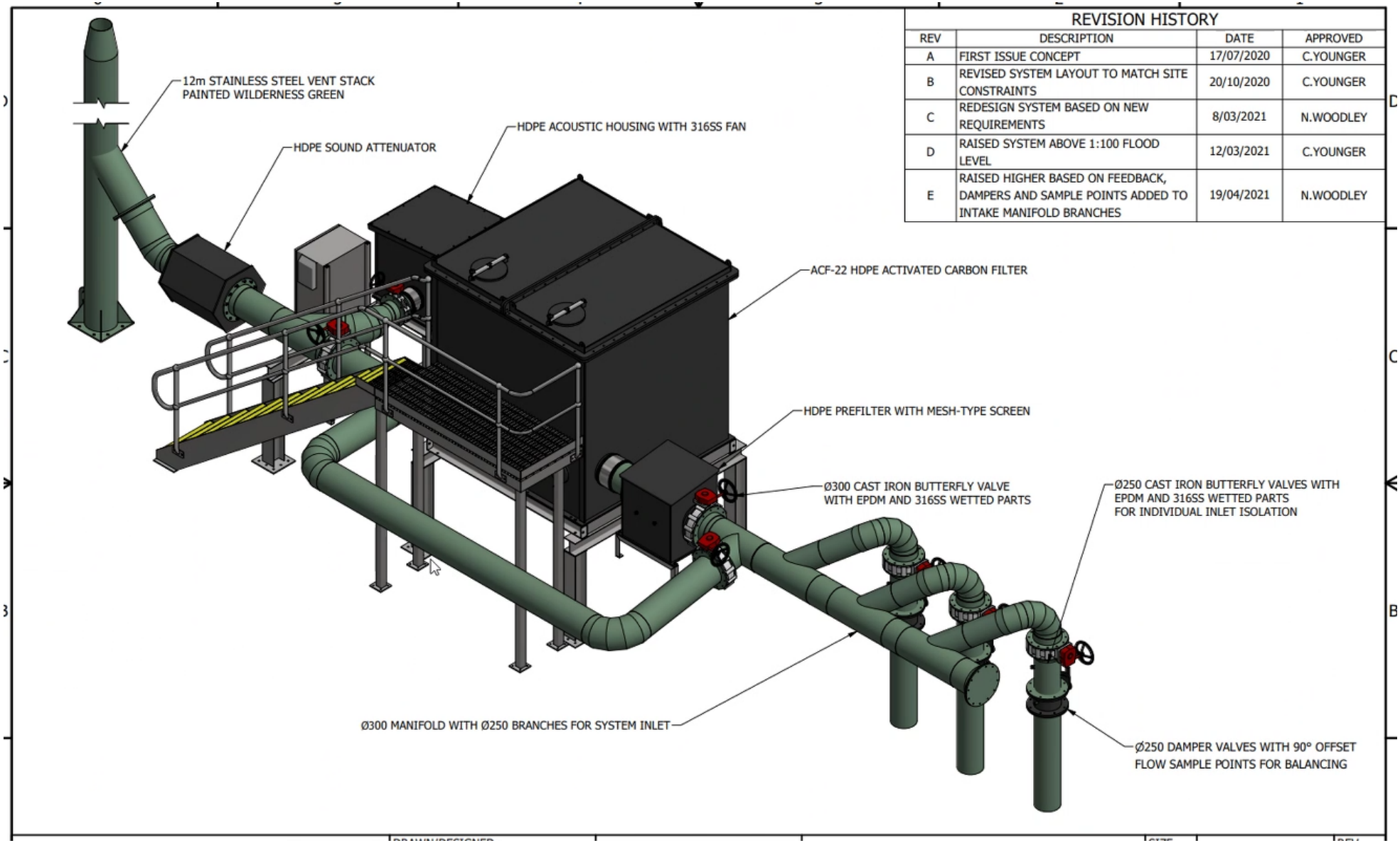


Figure 3-1 OCU concept design

3.2 Construction activities

This section provides a summary of the likely construction methodology, work hours, plant and equipment and associated activities that would be used to construct the proposal.

3.2.1 Work methodology

A Construction Environmental Management Plan (CEMP) would be prepared by the construction contractor and endorsed by Hunter Water prior to construction. The purpose of the CEMP is to provide a structured approach to the management of environmental issues during construction of the proposal.

The proposal would include the following construction stages and activities.

- Site establishment/mobilisation:
  - Set up and implement environmental management plan which would include risks and mitigation measures for the activity sequence
  - Obtainment of all work permits and site approvals as necessary
  - Location of services and protect if necessary
  - Install site fencing
  - Mobilisation of temporary ancillary and laydown areas
  - Set up site amenities
  - Temporary closure of the left-hand lane of King Street access road
  - Temporary closure of Marketown carpark's north entry
  - Temporary relocation of the post storage box to east of King Street access road
  - Sediment and erosion controls would be put in place
  - Vegetation clearing of up to 12 individual trees
- Construction of the new 12 metre high vent stack and temporary OCU bypass:
  - Earthworks
  - Pour new vent stack footing
  - Commission new vent stack
- Temporary OCU bypass pipework from storage wells to vent stack:
  - Penetrate Storage Well 1, Storage Well 2 and the inlet well to installation the temporary OCU bypass pipeline between the wet wells to new vent stack
  - Discharge the air flow from the existing stack through the OCU bypass pipeline and new stack. This would allow the decommissioning and removal of the existing stack
  - Risk assessment to determine if temporary odour mitigation works would be required during construction
  - Installation of a temporary OCU on the bypass line to treat air prior to discharge (if required).
- Demolish existing vent stack in sections and appropriate disposal.
- Divert incoming sewers (gravity, Oviform and pressure sewer) to Storage Well 2 to isolate the inlet well. This would include setting up temporary above ground pipework, submersible pumps and above ground diesel pumps to divert the sewers. The bypass of the main sewer to Storge well 2 would be located above ground and as close as the fence line as possible to reduce the impact on car parking spaces
- Install new OCU and connect to vent pipework and vent stack
- Inlet Well remediation:
  - Cut and removal of the inlet well lid to facilitate the inlet well remediation
  - Pump out and blast clean inlet well
  - Secure inside of the Inlet well to allow access and emergency extraction

- Carry out the Inlet well remediation as discussed in **Section 3.1.1**
- Install new roof
- Commission inlet well

- Remove sewer diversion and reinstate sewage inflow to back into the inlet well
- Site disestablishment/Demobilisation and site restoration:

  - Removal of temporary ancillary and laydown areas as well as clear up stockpiles
  - All construction material would be removed from site and the area would be rehabilitated
  - Erosion and sediment controls would be in place until the site is stabilised with grass groundcover.

The choice of materials procured for the proposal would aim to have a sustainability focus and where possible recycled content would be used.

3.2.2 Plant and equipment

The construction works would require the use of a variety of construction plant and equipment. The main plant and equipment required would be confirmed in detail design and would include, but is not limited to, the following:

- Delivery and haulage trucks
- Small tools
- Compactor
- Excavator and grader
- Trencher
- Welding equipment
- Franna crane
- Generators
- Dewatering equipment (e.g. generator, tank and pumps)
- Light vehicles and four-wheel drives for contractor staff
- Trucks (water, concrete, maintenance, fuel and vacuum)
- Concrete cutting equipment
- Submersible and diesel pumps
- Jet blasting equipment
- Spray painting equipment.

3.2.3 Construction workforce

The construction workforce is expected to fluctuate, depending on the stage of construction and associated activities. The final number of construction workers would be determined by the construction contractor during detailed design.

3.2.4 Timing and staging

The proposal is anticipated to commence in mid-2023 and take between six to nine months (weather permitting) to complete.

Work would be generally carried out during standard construction working hours as follows:

- Monday to Friday – 7am to 6pm
- Saturday - 8am to 1pm
- Sunday and public holidays – No work to take place.

However, in order to expedite the proposal in order to avoid potential impacts on access and Marketown, it would be necessary to carry out some construction activities outside these standard working hours, including at night.

An assessment of construction noise during the proposed construction hours is provided in **Section 6.4**, including the identification of appropriate control measures to minimise impacts to nearby sensitive receivers.

3.2.5 Ancillary facilities and access

Site access

The proposal would be accessed via the King Street access road and the Marketown carpark, refer to **Figure 1-2**. The use of the Marketown car park would be in agreement with the landowner.

Vehicle parking would occur within the proposed ancillary and laydown areas, refer to **Figure 1-2**. The majority of the vehicles would be parked within the southernmost ancillary laydown area.

A Traffic management plan (TMP) would be required for site activities and transporting material to site.

Ancillary and laydown areas

The number and location of proposed ancillary (including site office) and laydown areas for the proposal that would be determined during the detailed design and confirmed prior to the construction mobilisation phase. The ancillary and laydown areas which would be located on private property would be in agreement with the property owners.

For the purpose of this REF, the two ancillary and laydown areas have been considered as shown on **Figure 1-2**. These areas would be within existing sealed and cleared areas.

The ancillary and laydown areas would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions.

Following construction, the ancillary and laydown areas would be removed, and the sites would be cleared of all rubbish and materials and rehabilitated to their existing condition or as otherwise agreed with the landowner on completion of works.

Additional ancillary and laydown areas may be required and would require separate assessment and approval.

3.2.6 Property acquisition and leasing

No property acquisitions would be required for the proposal as it is located within an existing Hunter Water easement.

The construction of the proposal would require ancillary and laydown areas which would impact land outside of the Hunter Water easement. The locations of these areas are shown on **Figure 1-2**.

Temporary lease details would be determined by Hunter Water before construction.

Following construction, all leased land would be rehabilitated upon completion of construction and restored to their existing condition, or as otherwise agreed with the landowner.

3.3 Operational requirements

The proposal would operate 24 hours a day, 365 days of the year. However the OCU would need to be shut down for up to two days for routine maintenance and activated carbon media changeover. Hunter Water or its contractor would access the OCU via the gate on the King Street access road or the gate at the south of the NW1 WWPS via Marketown carpark.

The activated carbon is expected to require replacement annually. The activated carbon media replacement would be carry out via a sucker truck and take up to four hours for each of the two filters. During this change over a passive bypass around the activated carbon filter and fan to the new vent stack would be installed.

4 STATUTORY FRAMEWORK

4.1 Environmental Planning Instruments

The EP&A Act provides for the creation and implementation of State Environment Planning Policies (SEPPs) and Local Environment Plans (LEP). Collectively they are referred to as Environmental Planning Instruments (EPIs) and can be used to determine whether an activity is permissible. The following section outlines relevant EPIs for this proposal.

4.1.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&ISEPP) incorporates and repeals the provisions of the *State Environmental Planning Policy (Infrastructure) 2007*, *State Environmental Planning Policy (Educational Establishments and Childcare Facilities) 2017*, *State Environmental Planning Policy (Major Infrastructure Corridors) 2020* and *State Environmental Planning Policy (Three Ports) 2013*.

The T&ISEPP describes certain developments that may be carried out without consent in order to facilitate the delivery of infrastructure in New South Wales (NSW).

The aim of Chapter 2 (Infrastructure) is to facilitate effective delivery of infrastructure projects across NSW. This chapter describes certain developments that may be carried out without consent in order to facilitate the delivery of infrastructure in NSW.

Chapter 2, Division 18, Clause 2.125(6) of the T&ISEPP enables development for the purpose of sewage reticulation systems to be carried out without consent in the prescribed circumstances. As the proposal would form part of a sewage reticulation system and Hunter Water is a public authority, the prescribed circumstance, it is considered permissible without consent pursuant to the provisions of the T&ISEPP and can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal area is not located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) and does not affect land or development regulated by the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP).

The REF includes confirmation of any consultation requirements under Chapter 2, Part 2.2, Division 1 of the T&ISEPP.

4.1.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) incorporates and repeals 11 SEPPs including the *State Environmental Planning Policy* (*Vegetation in Non-rural areas) 2017* (Vegetation SEPP) and the *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala SEPP 2021).

Chapter 3 (Koala SEPP 20) and Chapter 4 (Koala SEPP 21) aim to encourage conservation and management of areas of natural vegetation that form koala habitats. Newcastle Local Government Area (LGA) is subject to the provisions of these chapters of the Biodiversity and Conservation SEPP. However, these chapters only apply to developments where Council are the consent authority. In addition, there are no mapped “potential’ or “core” koala habitat within the proposal area. As such, no further assessment in accordance with Biodiversity and Conservation SEPP is required.

4.1.3 State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) consolidates and repeals the provisions of the following three SEPPs including the *SEPP (Coastal Management) 2018* (Coastal Management SEPP), *SEPP 33 – Hazardous and Offensive Development* (SEPP 33) and *SEPP 55 – Remediation of Land* (SEPP 55).

Chapter 2 (Coastal management) aims to manage development in the coastal zone in a manner consistent with the objects of the *Coastal Management Act 2016* including the management objectives for each coastal management area.

The proposal would be located within the Coastal Environment Area, to which Chapter 2 of Resilience and Hazards SEPP applies. Under Chapter 2, Division 3, Section 2.10 of the Resilience and Hazards SEPP, any development on land within a Coastal Environment Area must not be granted consent unless the consent authority has considered the impact of the proposal on certain factors.

Although development consent is not required, consideration of these factors has been made in this REF where relevant as indicated in **Table 4-1**. It is considered that the proposal would meet the requirements of Chapter 2 of the Resilience and Hazards SEPP given the limited scale and size of the proposal, their location in relation to coastal areas and appropriate identification of mitigation measures to minimise potential impacts from relevant factors.

Table 4-1 Development on land within the Coastal Environmental Area

Factor: Coastal environment area	REF consideration
(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,	Hydrological and ecological factors are considered in **Section 6.2** and **Section 6.3** respectively
(b) coastal environmental values and natural coastal processes,	Not relevant given the location of the proposal
(c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,	Not relevant given the location of the proposal
(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	Not relevant given the location of the proposal
(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	Not relevant given the location of the proposal
(f) Aboriginal cultural heritage, practices and places,	Aboriginal heritage is considered in **Section 6.7**
(g) the use of the surf zone.	Not relevant given the location of the proposal

Chapter 4 (Remediation of land) of the Resilience and Hazards SEPP, provides a state-wide planning framework for the remediation of contaminated land and to minimise the risk of harm. Chapter 4, Clause 4.6 of the Resilience and Hazards SEPP requires consideration of whether the land is contaminated and whether it is suitable (or can be made suitable) for proposed development. As the proposal is being assessed under Division 5.1 of the EP&A Act, Hunter Water is not required to consider Chapter 4 of the Resilience and Hazards SEPP, however potential contamination impacts are discussed in **Section 6.1**.

4.1.4 Local Environmental Plan

The proposal would be located within the Newcastle LGA. The relevant local planning instrument for the proposal is the *Newcastle* LEP 2012.

Land zoning maps indicate that the existing NW1 WWPS is located on land zoned B4 (Mixed Use) and other land zones of immediate surroundings include the following (refer to **Figure 4-1**):

- RE1 (Public Recreation)
- B3 (Commercial Core)
- R4 (High density residential).

Clause 5.12 of the Newcastle LEP 2012 does not restrict or prohibit the carrying out of development by a public authority that is permissible without consent under Chapter 2 of the T&ISEPP. Despite any provision of the Newcastle LEP 2012, the T&ISEPP prevails over the Newcastle LEP 2012 to the extent of any inconsistences. Therefore, the proposal is permissible without consent due to the provisions of the T&ISEPP without the need for any further consideration of the Newcastle LEP 2012.

Proposal area

Land zoning

- B3 Commercial Core
- B4 Mixed Use
- R2 Low Density Residential
- R3 Medium Density Residential
- RE1 Public Recreation
- SP2 Infrastructure

- Railway
- Road
- Waterway

0 100 200 m

1:5,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Department of Planning and Environment 2021
Aerometrex 2021

Figure 4-1 Land zone

4.2 NSW legislation

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act and its associated regulation, *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation 2021) provide the framework for assessing the environmental impacts of proposed developments in NSW.

Hunter Water is the determining authority under Division 5.1 of the EP&A Act and is required to determine whether the proposal is likely to have a significant impact on the environment.

The description of the proposal and associated environmental impacts has been carried out with consideration of clause 171 of the EP&A Regulation 2021 (summarised in **Appendix A**), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act* (FM Act), and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the REF helps to fulfil the requirements of section 5.5 of the EP&A Act that Hunter Water examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the proposal.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement (EIS) to be prepared and approval to be sought from the Minister for Planning and Homes under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR).

Potential environmental impacts associated with the proposal are discussed in **Chapter 6**.

4.2.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the primary piece of legislation regulating pollution control and waste disposal in NSW and is administered by the NSW Environment Protection Authority (EPA).

Activities listed under Schedule 1 of the POEO Act are scheduled activities which require an environment protection licence (EPL). Sewage treatment is listed as a scheduled activity under Schedule 1 of the POEO Act. Hunter Water currently holds EPL No. 1683 for the Burwood Beach Wastewater Treatment Works which NW1 WWPS forms part of. The proposal would assist Hunter Water in meeting their EPL obligations.

4.2.3 Contaminated Land Management Act 1997

Contaminated land is regulated in NSW by the *Contaminated Land Management Act 1997* (CLM Act) and Contaminated Land Management Regulation 2013. Upon excavation, contaminated soils that are removed from a site as spoil may be classified as waste, the regulation and management of which is governed by the POEO Act and EPA Waste Classification Guidelines.

The identification of elevated lead and Benzo(a)pyrene concentrations within the proposal area may trigger a notification obligation to the EPA, under section 60 of the CLM Act.

4.2.4 Biodiversity Conservation Act 2016

The BC Act lists out the legislative requirements needed to maintain a healthy, productive and resilient environment in NSW, consistent with the principle of ecologically sustainable development (ESD). If any of the listed threatened species or ecological communities under the BC Act could be significantly impacted by the proposal, the proponent may either apply the Biodiversity Offset Scheme or prepare a SIS.

The proposal would be unlikely to have a significant impact on any threatened species or ecological community listed under the BC Act, as such, a SIS or a referral to the Commonwealth under the EPBC Act is not considered a requirement for the proposal.

Section 6.3 provides further discussion in relation to ecology.

4.2.5 Biosecurity Act 2015

The Biosecurity Act 2015 (Biosecurity Act) covers all biosecurity risks, including pest animals, plant diseases and noxious weeds. The Act provides the regulatory controls and powers to manage noxious weeds in NSW and introduces the legally enforceable concept of a General Biosecurity Duty. This means that a person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as reasonably practicable).

The site is located within the Hunter Local Land Services (LLS) region of NSW. The *Hunter Regional Strategic Weed Management Plan (2017-2022)* (Hunter LLS, 2017) provides the framework for weed management within the Hunter region. Appendix 1 of the *Hunter Regional Strategic Weed Management Plan* lists the State and regional priority weeds.

No Priority Weeds listed in the *Hunter Region Strategic Weed Management Plan 2017-22* or Weeds of National Significance under the *National Weeds Strategy* were identified within the proposal area.

4.2.6 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to protect and conserve non-Aboriginal cultural heritage in NSW, including scheduled heritage items, sites and relics.

The Heritage Act makes provision for a place, building, work, relic, moveable object, precinct, or land to be listed on the State Heritage Register (SHR). If an item is the subject of an interim listing, or is listed on the SHR, a person must obtain approval under section 58 of the Heritage Act for works or activities that may impact on these items.

The proposal is located within the Newcastle City Centre Heritage Conservation Area (HCA) and about 10 metres west of the locality listed Former Gasworks Office (ID I507). Both of these items are listed under the in Schedule 5 of Newcastle LEP 2012.

Section 6.6 provides further discussion in relation to heritage.

4.2.7 National Parks and Wildlife Act 1974

The NPW Act governs the establishment, preservation and management of national parks, historic sites and certain other areas, and Aboriginal relics. Items of Aboriginal cultural heritage (Aboriginal objects) or Aboriginal places (declared under section 84) are protected and regulated under the NPW Act. Aboriginal objects are protected under section 86 of the Act. Under section 90(1) of the Act, the Chief Executive may issue an Aboriginal Heritage Impact Permit (AHIP) for an activity which would harm an Aboriginal object.

The proposal area has a low potential for areas containing or impacting on items of Aboriginal heritage, and therefore does not trigger the requirement for an AHIP, refer to **Section 6.7**.

4.2.8 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides that certain types of development and activities that have the potential to impact on a water resource are controlled activities which require approval from the Department of Planning and Environment – Water (DPE-Water).

While the proposed is located on waterfront land, as a public authority, Hunter Water is exempt from the requirement for a controlled activity approval (Section 91E(1)) under clause 41 of the

Water Management (General) Regulation 2018). Management of potential impacts to water quality in nearby waterbodies are discussed in **Section 6.2**.

Should groundwater extraction be required during construction a Works Activity Approval must be sought from Natural Resources Access Regulator (NRAR). Where greater that three megalitres (ML) in a financial year is taken a Water Access Licence (WAL) would also be required.

4.2.9 Waste Avoidance and Resource Recovery Act 2011

The *Waste Avoidance and Resource Recovery Act 2011* (WARR Act) aims to encourage the efficient use of resources and minimisation of waste generation through the minimisation of resources use, promotion of resource recovery and avoidance of disposal of wastes.

As detailed in **Section 6.11** the proposal would be constructed and operated in accordance with the principles of the waste hierarchy in order to promote the objective of the WARR Act.

4.2.10 Roads Act 1993

The *Roads Act 1993* (Roads Act) regulates the carrying out of certain activities on public roads, provides classification of roads and establishes procedures for opening and closing public roads.

Section 138 of the Roads Act requires consent to be obtained from the appropriate roads authority for the following works:

- Erect a structure or carry out a work in, on or over a public road, or
- Dig up or disturb the surface of a public road, or
- Remove or interfere with a structure, work or tree on a public road, or
- Pump water into a public road from any land adjoining the road, or
- Connect a road (whether public or private) to a classified road.

As the proposal involves construction work within the King Street access road, approval would be sought for a road occupancy licence from City of Newcastle for the temporary closure of part of this road during construction.

4.2.11 Fisheries Management Act 1994

The FM Act includes provisions to list threatened species of fish and marine vegetation, including endangered populations, ecological communities and key threatening processes. If the proposal is likely to significantly impact on the threatened species, populations or ecological communities, then a SIS is required.

Under Part 7 of the FM Act, a permit is required for dredging and reclamation, obstruction of fish passage, harm to marine vegetation and use of electrical or explosive devices in a waterway.

None of these activities would be undertaken for the proposal and as such a permit is not required.

4.2.12 Hunter Water Act 1991

The *Hunter Water Act 1991* (HW Act) establishes the legal framework for the operation of the Hunter Water Corporation and the requirement for licences for Hunter Water operations.

All Hunter Water operations including the site are operated in accordance with Hunter Water Corporation Operating Licence 2017 – 2022 (the Licence). The licence conditions include requirements for the management of Hunter Water assets and for maintaining service levels with minimal disruption. The proposal has a role in suppling wastewater management services to Hunter Water customers and is therefore integral to meeting its licence requirements. The proposal is therefore consistent with the requirements of the HW Act.

4.2.13 Coal Mine Subsidence Compensation Act 2017

The *Coal Mine Subsidence Compensation Act 2017* (CMSC Act) requires that certain development such as erection or alteration of an improvement, or subdivision, within mine subsidence districts must obtain approval from the Subsidence Advisory, to ensure new structures are built to an appropriate standard that reduces the risk of damage should subsidence occur.

A person must not carry out work, or cause work to be done, in connection with the erection or alteration of an improvement within a mine subsidence district, except in accordance with the approval of the Chief Executive. Mine subsidence districts are proclaimed in areas where there are potential subsidence risks from underground coal mining that has occurred or may take place in the future.

The proposal area is located within the Newcastle Mine Subsidence District. Excavation works would be required for the proposal, therefore consultation with Subsidence Advisory NSW would be required. The consultation carried out with Subsidence Advisory NSW and is summarised in **Section 5.1** and provided in **Appendix B**.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act a referral is required to the Australian Government Department of Agriculture, Water and the Environment (DAWE) for proposed actions that have the potential to significant impact on matters of national environmental significance (MNES) or the environment of Commonwealth land.

The EPBC Act lists the MNES that are to be considered when determining whether an activity is a controlled action which requires referral to the Commonwealth Minister for the Environment.

The likelihood of an impact from the proposal on any MNES matters, as listed under the EPBC Act, is discussed in **Section 6.3** and **Appendix C**. The proposal is unlikely to have a significant impact on MNES or the environment of Commonwealth land. Accordingly, the proposal has not been referred to DAWE.

4.4 Licences and approvals

Hunter Water is required to determine the proposal under Division 5.1 of the EP&A Act. A review of relevant legislation has been undertaken in preparation of this REF.

The following approvals may be required for the proposal:

- Works Activity Approval from NRAR for groundwater dewatering works if required
- Approval from Subsidence Advisory NSW for work within a mine subsistence district
- Council approval for work on local roads under Section 138 of the Roads Act.

5 STAKEHOLDER AND COMMUNITY CONSULTATION

5.1 Community consultation

Hunter Water will consult with local residents, commercial and private property owners that have the potential to be affected by the proposal.

During construction, consultation would occur with the community as part of the Construction Community Liaison Plan (CCLP) and in accordance with Hunter Water procedures for notifying out of hours works and road closures or traffic management. The CCLP would likely include:

- A letter notifying adjoining landholders and neighbours at the start of works

- A letter notifying adjoining landholders, directly/indirectly impacted neighbours about change of work, night works, project delays
- Door knocking, meetings, phone calls, emails for directly impacted neighbours as required.

The Section 171 (4) of the EP&A Regulation 2021 requires that an REF must be published on the determining authority's website or the NSW Planning Portal if:

- The project has a capital investment value of $5 million
- The project requires an approval or permit under:
  - Sections 144, 201, 205 or 219 of the FM Act
  - Section 57 of the Heritage Act
  - Section 90 of the NPW Act
  - Sections 47-49 of the POEO Act
- It is in the public interest to publish the REF.

The proposal may exceed the capital investment value of $5 million and be of public interest. Hence, this REF may need to be published on the Hunter Water website.

5.2 Government agency and other stakeholder consultation

5.2.1 T&ISEPP consultation

Chapter 2, Part 2.2 General, Division 1 of the T&ISEPP prescribes consultation to be undertaken by a public authority prior to the commencement of certain activities. A review of the T&ISEPP consultation requirements for the proposal is provided in **Table 5-1**.

Where consultation has been undertaken, the details of this have been provided in **Section 5.2.2**.

Table 5-1 T&ISEPP consultation requirements

Is consultation with Council required under clauses 2.10-2.12 and 2.14 of T&ISEPP?	Yes/No
Is the proposal likely to have a substantial impact on stormwater management services which are provided by council?	No
Is the proposal likely to generate traffic to an extent that will strain the capacity of the existing road system in a LGA?	No
Will the proposal involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of any part of the system?	No
Will the proposal involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	No
Will the proposal involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	Yes
Will the proposal involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No
Is the proposal likely to have a more than minor or inconsequential impact on a local heritage item (that is not also a State heritage item) or a heritage conservation area?	No
Is the proposal located on flood liable land? If so, will the works change flood patterns to more than a minor extent?	The proposal is not anticipated to alter flooding patterns more

Is consultation with Council required under clauses 2.10-2.12 and 2.14 of T&ISEPP?	Yes/No
	than to a minor extent.
Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No
Is consultation with a public authority other than Council required under clauses 2.13, 2.15 and 2.16 of T&ISEPP?	**Yes/No**
Is the proposal located on flood liable land and permissible without development consent under the following provision of Part 2.3 of the T&ISEPP?: (a) Division 1 (Air transport facilities), (b) Division 2 (Correctional centres and correctional complexes) (c) Division 6 (Emergency services facilities and bush fire hazard reduction) (d) Division 10 (Health services facilities) (e) Division 14 (Public administration buildings and buildings of the Crown) (f) Division 15 (Railways) (g) Division 16 (Research and monitoring stations) (h) Division 17 (Roads and traffic) (i) Division 20 (Stormwater management systems).	The proposal is located on flood prone. However the proposal would carried out without consent under Division 18 as such consultation under this clause is not required.
Is the proposal adjacent to a national park or nature reserve, or other area reserved under the NPW Act, or on land acquired under that Act?	No
Is the proposal on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No
Does the proposal consist of a fixed or floating structure in or over navigable waters?	No
Will proposal increase the amount of artificial light in the night sky and that is on land within the dark sky region map?	No
Will the proposal be located on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument?	No
Is the proposal on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*?	Yes
Is the proposal located bush fire prone land and for the purpose of a health services facilities, correctional centres, or residential accommodation?	No

5.2.2 Agency consultation

As the proposal is on flood prone land and would impact on roads, footpaths and reserves under the Council's control, as such consultation was carried out with City of Newcastle.

Consultation is also required as the proposal is within the Newcastle Mine Subsidence District, there for consultation is required with Subsidence Advisory NSW.

Letters were sent to City of Newcastle and Subsidence Advisory NSW in early July 2022The letters provided information on the proposal and invited responses with any issues or concerns.

A summary of consultation and responses is provided in **Table 5-2** and the letters and responses are provided in **Appendix B**.

Table 5-2 Agency consultation summary

Agency	Contact	Agency response
City of Newcastle	T&ISEPP letter provided via email on 21 July 2022	The City of Newcastle responded on the 22 July 2022 to advise that: • A plan will be required for any fencing or hording works in the road reserve and any proposed road closures. The plan will be provided to Council's traffic section for approval. This will also relate to any parking changes in the road reserve. The fencing will allow for single unit heavy vehicles to access the road and service the businesses who have their driveways access from King Street. • No Council Tree Assets will be damaged or impinged upon by the proposal • Any asset damage within the road reserve affected by proposed construction will be rectified in full to the discretion of the Public Utilities Officer • Maintenance of the area fenced off will be the responsibility of Hunter Water for the duration of the proposal • Asset information from must be sought from Council's Public Utilities Officer before your works proceed • Consent has been granted by the City of Newcastle for the proposal under s138 of the Roads Act noting the following: - The 'Standard Public Utility Response' provided in the City of Newcastle T&ISEPP response (refer to **Appendix B**) will be followed - Boring methods will be utilised where possible. Pit lids will need to be set flush, you will bore under driveways and within tree protection zone (TPZ). No pits will be located within a TPZ. - Care will be taken near Council street tree assets and the council's Urban Tree Guide will be followed - For all works, when working with the TPZ of a tree an arboricultural supervision will be employed (minimum AQF level 5) - The site compound, storage of vehicles equipment, machinery, materials, spoil, or any construction related material must be located outside the TPZ of trees - Where roots greater than 30mm or branches may require pruning on a public tree asset, please call the City of Newcastle for inspection - Any tree damage will be reported to City of Newcastle for inspection - Tree removal applications will contain a feasibility assessment of alternate options and include arboricultural advice (minimum AQF level 5) - Where tree removal has been accepted, replacement offsets will be calculated based on loss of canopy. This may require multiple compensatory replacement plantings for each tree removed - Any public notification will be provided to City of Newcastle to be held in the customer care centre, in the event of customer requests. This information may also appear on City of Newcastle's website - Drainage and asset information will need to be confirmed on site - Residents will be notified and consulted with prior to works commencing - The local TfNSW branch will be notified (road authority on main

Agency	Contact	Agency response
		roads) https://roads-waterways.transport.nsw.gov.au/classification/map/ - Road restoration will be carried out as directed by the Public Utility Officer - As the proposal is near survey marks which may be affected by your works, Hunter Water and its contractors will be held responsible if they are damaged. Refer to https://www.spatial.nsw.gov.au/__data/assets/pdf_file/0004/229945/Protecting_survey_marks_-_Information_Sheet.pdf, and https://www.spatial.nsw.gov.au/__data/assets/pdf_file/0005/217094/Direction_No._11.pdf - The contractor carrying out the works will submit a S138 type 1 application for restoration works - A minimum of 2 days' notice will be given to Council's Public Utilities Officer before works are to commence.
Subsidence Advisory		Subsidence Advisory responded on the 9 August 2021 to advise that the proposal is undermined by abandoned workings in the Borehole seam at approximately 65m depth. The stability of the workings has been analysed by Subsidence Advisory and the proposal does not require design to account for coal mine subsidence parameters.

6 ENVIRONMENTAL ASSESSMENT

6.1 Soils and geology

6.1.1 Existing environment

Geology and soils

The Newcastle 1:250000 Geological Series Sheet S1 56-2 (NSW Department of Mines, 1966 in Department of Regional NSW, 2021) indicates that the site area is predominantly underlain by undifferentiated alluvial deposits consisting of sand, silt, clay, and gravel.

Data gathered from historical drilling logs noted in the Lotsearch Report (Lotsearch Enviro Professional, 2022) indicated that soil within 500m of the site has been described as FILL to 50 metres below ground level (mbgl) consisting of sand and some sandy clay, overlying sand, 'mud' with sandy clay and minor silts.

The Soil Landscapes of Central and Eastern NSW (Office of Environment and Heritage, 2019) series indicated that the residual soils within the site area consist of the Hamilton (hm) landscape group. The geological features of the area are comprised of level to gently undulating well-drained plain on Quaternary deposits in the Hunter Plain region, deep well-drained weak Podzols (Podosols) with some deep well-drained Brown Podzolic Soils on fans.

Marketown to the west of the site is indicated to be an area of Disturbed Terrain, consisting of level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal, or burial of soil.

Acid Sulfate Soils Risk

Acid Sulfate Soils (ASS) are the common name given to naturally occurring sediments and soils containing iron sulfides (principally iron sulfide or iron disulfide or their precursors). The exposure of the sulfide in these soils to oxygen by drainage or excavation leads to the generation of sulfuric acid. Areas of ASS can typically be found in low lying and flat locations which are often swampy or prone to flooding.

With reference to ASS risk map in the Newcastle LEP 2012, the site is situated on Class 4 soils, where works more than 2mbgl present an environmental risk, as well as works by which the water table is likely to be lowered more than two metres below natural ground surface.

Contamination

Site History Summary

A historical aerial imagery review was undertaken. The surrounding area has changed since the 1950s, existing buildings to the west of the site have been demolished to allow for the development of the western portion of Marketown (Marketown West) and associated carparks, while the gasworks site and other industrial areas including sheds, silos, and an incinerator to the east (upgradient of the site) have been demolished to allow for the redevelopment of the eastern portion of Marketown (Marketown East) and associated car parks. High rise buildings have been constructed to the north, and some minor road alterations to King Street have occurred as well as other minor redevelopments within the surrounding industrial environment.

Contaminated land

A search of the EPA's Contaminated Sites Register and the public register of licenced and formerly licenced activities under the POEO Act were carried out in March 2022. The Contaminated Sites Register produced seven results within one kilometre of the site. The nearest of these sites are show on **Figure 6-1** sites and include:

- Reclaimed Land located about 230 metres to the northeast of the proposal

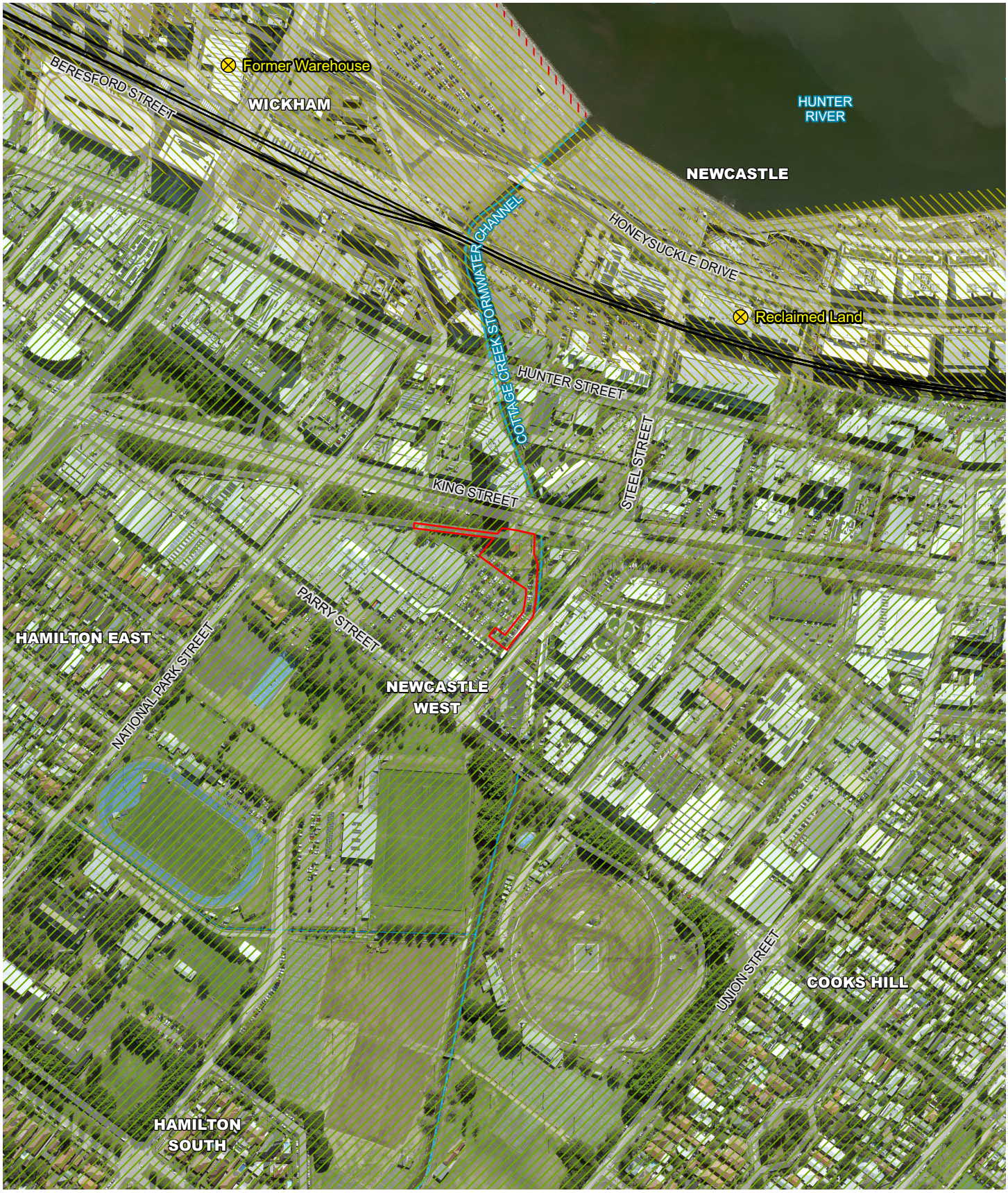
- Former warehouse located about 445 metres to the northwest of the proposal.

The consideration of the licenced and formerly licenced activities found that the historical application of herbicides on site indicates the potential for contamination on site.

A former gasworks site is located approximately 80 metres upgradient of the site. There is potential for contamination associated with the development and operation of onsite facilities, leaks of gas holding tanks and the decommission and redevelopment of the site into Marketown East in 2008-2009. Based on known site topography it is inferred that groundwater in the area flows north-northwest through the site towards the Hunter River, indicating the potential for contaminated groundwater to flow towards the site from the gasworks, impacting onsite groundwater and fill material. In the event of large rainfall there is potential that contaminated surface water flows from the gasworks site to Cottage Creek, potentially further impacting the proposal area.

Soil sampling in three potholes (Pothole 1, Pothole 2 and Pothole 4) as part of the geotechnical investigations for the proposal found that:

- The lead concentrations in across all three samples is above the Waste Classification Guidelines (EPA, 2014) for General Solid Waste
- The concentrations of Benzo(a)pyrene in one pothole (Pothole 2) were above the National Environment Protection Measures (NEPM) health investigation levels (HILs) for residential and recreational land uses. However this is within the commercial/ industrial HILs.



Proposal area

Contaminated sites notified to the EPA

Acid Sulfate Soil Risk
- Class 1
- Class 3
- Class 4

Railway
Road
Waterway

0 100 200 m

1:5,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Aerometrix 2021

Figure 6-1 Hazard

6.1.2 Impact assessment

Construction

Excavations would be required for the new OCU platform and to run vents/services which would all be buried less than a metre deep.

Construction activities would have the following impacts on soils and contamination:

- Soil erosion and loss of topsoil: Excavation would be required for construction of the proposal which may result in the mobilisation of sediment, particularly during wet weather. This may be further exacerbated by removal of trees and / or their roots that provide additional soil stability. Excavation and exposure of soil has potential to create erosion and sediment mobilisation that has the potential to impact Cottage Creek. Minimising the time that soil is exposed from trenches and excavations would reduce potential for erosion and sedimentation
- Spills of contamination materials: There would be potential for construction activities to result in contamination of soil and/or water due to leaks and spills of potentially contaminating materials. Spill kits would be to contain spills and spill response procedures would be followed. These impacts would generally be temporary
- Contaminated: The soils that are to be disturbed as a result of the proposal are likely to be fill material and may contain contaminated soils and materials. The contaminated soils within the proposal area are expected to be mitigated with appropriate controls in the CEMP, refer to **Section 6.1.3**. However if these contaminated soils if not managed appropriately, they would potentially impact upon sensitive receivers, sensitive receiving environments (such as Cottage Creek) and construction workers.
- ASS: As the excavation are less than one metre deep, ASS are not expected to be encountered.

Operation

There are no anticipated issues with soil disturbance or contamination risk during operation of the proposal.

6.1.3 Mitigation measures

The mitigation measures that would be implemented to minimise soils, geology and contamination impacts of the proposal are presented in **Table 6-1**.

Table 6-1 Mitigation measures – Soils, geology and contamination

Impact	Mitigation measure	Timing	Responsibility
Existing contamination at the site	The identification of elevated lead levels across the existing trunk main alignment may trigger a Notification Obligation to the EPA, under section 60 of the CLM Act. Hunter Water will advise the site owner of these results.	Prior to construction	Hunter Water
Erosion and sediment control	The CEMP prepared for the works is to include an erosion and sediment control plan (ESCP) which must include as a minimum the type and location of sediment/erosion controls to be used.	Prior to construction	Contractor
Erosion and sediment control	Erosion and sediment controls are to be implemented and maintained consistent with *Managing Urban Stormwater: Soils and Construction. Fourth Edition ed. Sydney* (NSW) (Landcom, 2004) (the Blue Book). Controls include:	Prior to construction/ construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	• Be installed prior to disturbance commencing • Prevent sediment moving off-site and sediment laden water entering any watercourse, drainage line, or drain inlets • Divert clean surface flow around exposed areas and stockpiles • Reduce water velocity and capture sediment • Minimise the amount of material tracked onto paved surfaces • Be cleaned out before 30% capacity of controls is reached.		
Contamination	The CEMP will include the following to manage contaminated soils • Identification of locations of known or potential contamination and preparation of a map showing these locations • Identification of classification, transport and disposal requirements of any contaminated soils/ materials • Procedures and disposal arrangements for unsuitable excavated material or contaminated material. • Measures to ensure the safety of site personnel and local communities during construction	Detailed design	Hunter Water
Erosion and sediment control	Disturbed areas will be stabilised as soon as practical after completion of works. Erosion and sediment controls will not be removed until suitable ground cover is achieved in accordance with the Blue Book.	Construction	Contractor
Unknown finds	If during construction activities, contaminated soils are uncovered or are suspected to have been uncovered due to odour or discolouration of soils works will cease immediately, the Hunter Water Project Manager will be contacted and the appropriate management requirements determined.	Construction	Contractor
Stockpile management	Any spoil storage areas or stockpiles will have appropriate erosion control devices installed to control runoff and prevent sedimentation.	Construction	Contractor

6.2 Hydrology

6.2.1 Existing environment

The Cottage Creek catchment covers an area of approximately 800 hectares of medium density residential and commercial development in the south-eastern section of Newcastle City.

The NW1 WWPS site is located on the western embankment of the concrete stormwater channel of Cottage Creek. There are several drains within Marketown which appear to flow towards the Hunter Water easement. It is likely that these drains discharge to Cottage Creek prior to NW1 WWPS.

The proposal area is subject to flooding as the Cottage Creek is intended to divert flows to the Hunter River during and after flood events.

Currently, flooding may impact the NW1 site due to floodwater and debris intrusion of the NW1 overflow discharge main that connects the WWPS inlet well to Cottage Creek. The discharge does not have a non-return valve to prevent backflow and is noted to be submerged under some tidal conditions, with flood events posing similar risks as tidal inundation to the operation of the WWPS and associated sewage discharge and overflow concerns.

A search of WaterNSW real time data shows that there are five groundwater bores within 500 metres of the proposal. These bores indicate that depth to ground water is between 1.5 to two metres. It should be noted that groundwater levels are variable over time and can be affected by such factors as soil permeability, recent weather conditions and tidal influences associated with water levels in the adjacent Cottage Creek.

6.2.2 Impact assessment

Construction

Construction activities next to waterways have the potential to impact water quality by disturbing sediments. These sediments may be transported offsite into receiving watercourses which may include Cottage Creek and eventually the Hunter River located about 380 metres away.

Activities that may increase erosion potential, resulting in an impact on local water quality through sedimentation includes:

- Removing vegetation
- Earthworks, including topsoil stripping, excavation and trenching
- Stockpiling of soils and vegetation
- Transporting cut and/or fill materials
- Moving heavy vehicles across exposed earth.

The potential impact of unmitigated construction activities on receiving surface waters include:

- Increased sedimentation. This may be due to increased erosion during rainfall events
- Increased turbidity from sedimentation, resulting in reduced oxygen levels, clarity of water and restricting light and photosynthesis
- Accidental spills of fuels, oils or other chemicals from construction vehicles or equipment
- Contamination from chemical, heavy metal, oil and grease, and petroleum hydrocarbon spills from construction machinery directly contaminating nearby waterways.

These potential impacts listed above can be readily mitigated with standard construction site mitigation measures. Water quality within the proposal area during construction would be managed with temporary water quality controls in accordance with the guidelines set out in the Soils and Construction – Managing Urban Stormwater Volume 1 (Landcom, 2004) and Volume 2D (DECCW, 2008) ‘the Blue Book’. With the implementation of the proposed mitigation measures, the proposal would result in a minimal residual risk to surface and ground water quality.

As the excavations required would be less than one metre deep, groundwater is not expected to be impacted and dewatering is not anticipated. However, should dewatering be required for the proposal a Works Activity Approval would be sought from NRAR and any dewatering of groundwater would be undertaken in accordance with an approved Dewatering Management Plan (DMP), which may include water quality requirements and discharge locations.

Operation

There are no anticipated issues with hydrology, flooding or water quality during operation of the proposal.

6.2.3 Mitigation measures

The mitigation measures that would be implemented to minimise hydrology, flooding and water quality impacts of the proposal are presented in **Table 6-2**.

Table 6-2 Mitigation measures – Hydrology, flooding and water quality

Impact	Mitigation measure	Timing	Responsibility
Flooding	The new OCU will be installed 600mm above the 1%AEP flood level (2.33 metres AHD) to mitigate flooding impacts.	Detailed design	Hunter Water
Incident management	An Incident Management Plan (IMP) will be prepared as part of the Contractor's CEMP and will include a contingency plan and emergency procedures for dealing with the potential spillage of fuel or other environmental incidents that may occur on the work site. The IMP should also contain procedures dealing with the unexpected onset of rainfall during the work period.	Prior to construction	Contractor
Contaminants entering receiving environments during construction	The storage and handling of fuels and chemicals will comply with Australian Standard AS1940. This includes the provision of a 'spill kit' to be kept on site at all times for potential chemical or fuel spills. All staff are to be made aware of the location of the spill kit and trained in its use.	Prior to construction/ construction	Contractor
	Where possible, no chemicals, fuels, and/or waste will be stored or collected for disposal within or adjacent to drainage lines or unsealed surfaces.	Construction	Contractor
	Refuelling, fuel decanting and vehicle maintenance work will take place in a designated area on an impermeable surface.	Construction	Contractor
	Daily checks of vehicles working on the construction works will be conducted to ensure that no oils or fuels are leaking.	Construction	Contractor
Dewatering	Should groundwater extraction be required during construction, a Works Activity Approval will be sought from NRAR. Where greater than three megalitres in a financial year, or greater than five megalitres over two financial years is taken, a WAL would also be required. Any dewatering of groundwater should be undertaken in accordance with an approved DMP, which may include water quality requirements and discharge locations.	Prior to dewatering during construction	Contractor / Hunter Water

6.3 Ecology

6.3.1 Existing environment

As described in **Section 1.2**, the proposal area is within an urban area. The proposal area is predominantly cleared of vegation and includes mowed grass, hard stands and a row of trees and shrubs along the site boundary with Cottage Creek.

There are few planted large trees and smaller shrubs within the proposal area. The majority of these trees and shrubs are along the fence line near Cottage Creek, refer to **Photo 1-2**.

The tree and shrub species within the proposal area include:

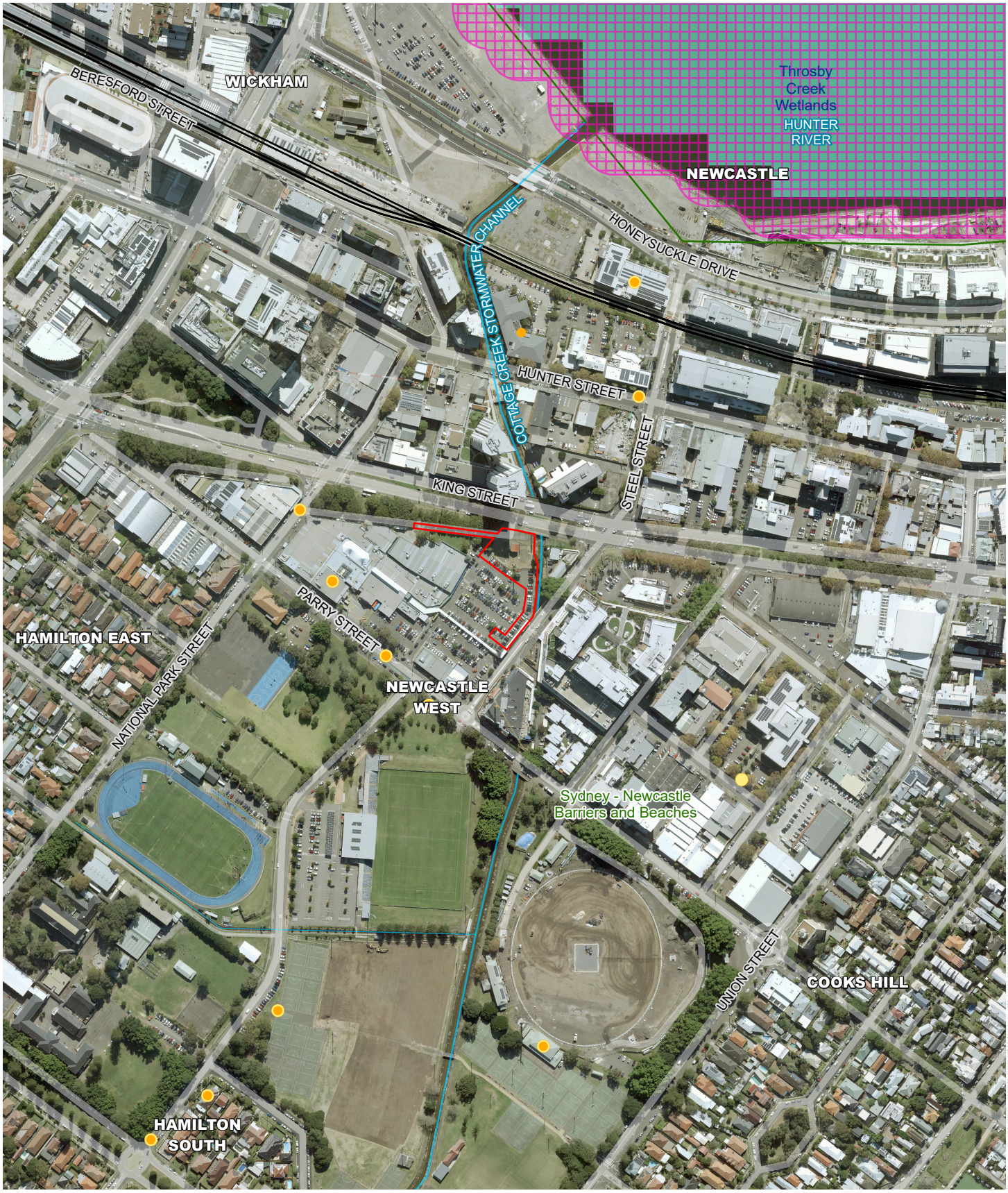
- *Corymbia maculata* (Spotted gum)
- *Livistona australis* (cabbage-tree palm)
- *Nerium oleander* (Oleander)
- *Phoenix canariensis* (Canary Island date palm or pineapple palm)
- *Cinnamomum camphora* (Camphor laurel).

None of these trees and shrubs are threatened species or are part of a Threatened Ecological Communities (TEC) listed under the BC Act or EPBC Act and it provides limited habit for flora and fauna species.

It is understood that a number of these trees at the NW1 WWPS site are diseased. *Cinnamomum camphora* (Camphor laurel) is listed on the DPI NSW WeedWise list and within Appendix 2.1 Additional species of concern in the Hunter LLS, 2017.

No important aquatic flora or habitat is not located within or immediately adjacent to the proposal. However Cottage Creek discharges into the southernmost and non-contiguous section of the Kooragang Nature Reserve (Throsby Creek/Hunter River) northeast of Honeysuckle Drive. Kooragang Nature Reserve is identified as a Nationally Important Wetland**.** The nearest Ramsar wetlands (Hunter estuary wetlands) are over six kilometres to the north.

Cottage Creek also discharges into Key fish habitat (KFH) area of Hunter River/Throsby Creek, refer to **Figure 6-2**.



Proposal area

Threatened species

BC Act listed

Fauna

EPBC Act listed

Fauna

Wetlands of NSW

Key Fish Habitat

Railway

Road

Waterway

0 100 200 m

1:5,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Regional NSW 2021
Department of Planning and Environment 2021
Department of Customer Service 2021
Aerometrex 2021

Figure 6-2 Biodiversity

6.3.2 Impact assessment

Construction

The proposal would require the removal of up to 12 trees in the southwest corner of the NW1 WWPS. These trees are not expected to provide important habit for threaten species.

The proposal is not expected to impact on Cottage Creek and or Kooragang Nature Reserve.

The proposal is not expected to impact on any threatened listed species or community under the BC Act or EPBC Act, nor is it is it expected to impact on any critical habitat under the FM Act.

Operation

Operation of the proposal would not be expected to impact biodiversity.

6.3.3 Mitigation measures

The mitigation measures that would be implemented to minimise biodiversity impacts of the proposal are presented in **Table 6-15**.

Table 6-3 Mitigation measures - Ecology

Impact	Mitigation measure	Timing	Responsibility
Impact to surrounding vegetation within and adjacent to the proposal area	The full extent of approved vegetation clearance will be clearly documented and mapped in site CEMP(s). All construction activities, including but not limited to vegetation clearing, is to be strictly confined to the disturbance area assessed in this REF.	Prior to construction	Contractor
	Prior to construction, the limits of the work zone, areas for parking and turning of vehicles, and plant equipment would be accurately signposted and delineated. Parking would be limited to the construction corridor, ancillary and laydown areas. These areas would be located so that vegetation disturbance is minimised as much as possible.	Prior to construction	Contractor
	If any damage occurs to vegetation outside of the nominated work area, the Hunter Water Project Manager and /or Environmental Representative will be notified so that appropriate remediation strategies can be developed.	Construction	Contractor
Site restoration	The sites will be restored in a manner consistent with the surrounding area where required (eg turf and vegetation plantings as required). The appropriate method of site restoration will be confirmed with the Hunter Water Environmental Planner and included in the CEMP.	Construction	Contractor
Works with Council owned roads	No Council Tree Assets will be damaged or impinged upon by the proposal, refer to the figure provided in the City of Newcastle T&ISEPP response (refer to **Appendix B**).	Construction	Contractor

6.4 Noise and vibration

A noise and vibration impact assessment (Jacobs, 2022) (NVIA) has been prepared for the proposal and is provided in **Appendix D**.

6.4.1 Methodology

The NVIA assessment included:

- Identification of noise sensitive receivers and background noise levels
- A construction and operational noise assessment to predict noise levels that may be generated by the proposal. Noise from the operation of the proposal was modelled using the SoundPLAN 8.2 acoustic modelling software
- Assessment of noise and vibration impacts, summarising the assessment results at sensitive receivers
- The identification of mitigation measures required to minimise impacts.

Noise monitoring was not carried out for the proposal. However, background noise monitoring was completed as part of the *42 Honeysuckle Drive, Newcastle Revised DA Acoustic Assessment* (Acoustic Logic, 2020) and the *Newcastle Grammar School – Park Campus Noise Impact Assessment* (SLR, 2021), which covers the noise study area. The noise study area and monitoring locations are shown on **Figure 6-3** and the results are summarised in **Table 6-4**.

6.4.2 Existing environment

The proposal area is located in an urban environment, with noise sources typical of such an area. These include traffic noise on King Street, King Street access road and Steel Street, construction noise, noise from nearby shops and offices, and general residential noise.

The land use in the immediate vicinity and to the north of the proposal area is predominantly commercial, also with a number of high-density residential receivers. To the south, the predominate receivers are passive recreation, while to the southwest receivers are primarily residential, refer to **Figure 6-3**.

The following sensitive receivers are located in proximity to the proposal:

- The apartment complex at 464-466 King Street, located 75 metres north-west of the proposal
- The residential towers located at 21 Steel Street, the nearest of which is located 43 metres southeast of the proposal
- The Travelodge Hotel, located about 65 metres north of the proposal
- The locally listed Former Gasworks Office (ID I507) located about 10 metres east of the proposal.

Based on the differing land usage and background noise between the northern and southern sections of the noise study area was divided into two separate noise catchment areas (NCAs) as shown on **Figure 6-3**.

Table 6-4 Honeysuckle Drive rating background levels (RBLs) for each NCA

Monitoring location	NCA	RBL ($L_{A90,\ 10th\ percentile}$ dB(A))		
		Day	Out of Hours (OOH): Evening	OOH: Night
42 Honeysuckle Drive, Newcastle	NCA 1	48	46	39
127 Union Street, Cooks Hill	NCA 2	43	41	36

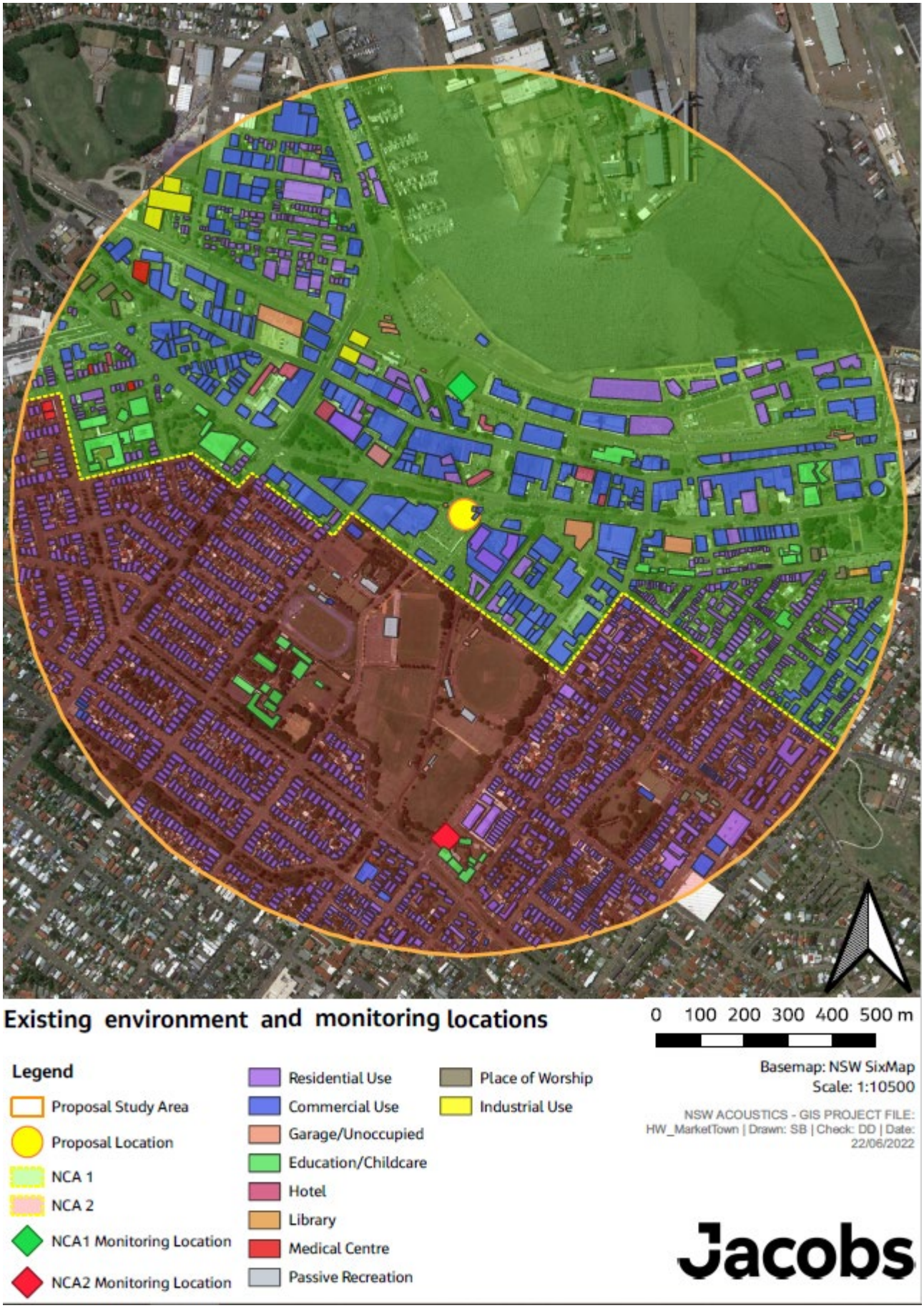


Figure 6-3 Sensitive receivers

6.4.3 Assessment criteria

Construction

Noise management levels

In NSW, noise impacts arising from construction activities are managed in accordance with the *Interim Construction Noise Guidelines (DECC, 2009)* (ICNG). The guideline has been developed to assist with the management of noise impacts, rather than to present strict numeric noise criteria for construction activities.

The ICNG recommends establishing noise management levels (NMLs) at receiver locations adjacent to the works, using information on the existing background noise level at these locations. Where the NML may be exceeded as a result of the proposed works and there is potential for adverse noise impacts to occur, appropriate management measures should be implemented.

Using the measured background noise levels and guidance from the ICNG, the NML in **Table 6-5** were developed to manage noise impacts at nearby residential receivers during construction.

Table 6-6: Construction NML (residential receivers)

NCA	NML ($L_{Aeq\ 15\text{-}minute}$ dB(A))			
	Standard hours	Out-of-hours		
	Day	OOH: Day *	OOH: Evening#	OOH: Night ^
NCA 1	58	53	51	44
NCA 2	53	48	46	41

*OOH: Day: 7am – 8am & 1pm – 6pm Saturdays, 8am – 6pm Sundays and Public Holidays
#OOH: Evening: 6pm-10pm Weekdays, 6pm – 10pm Saturdays
^OOH: Night: 10pm-7am Weekdays, 10pm – 8am Saturdays 6pm – 7am Sundays and Public Holidays.

The ICNG also provides NMLs for non-residential sensitive receivers. Recommended management levels for relevant receiver types within the vicinity of the proposal have been reproduced in **Table 6-7**.

Table 6-7: NMLs LAeq 15-minute dB(A) for surrounding non-residential receivers during construction

Non-residential receiver type	NML $L_{Aeq\ 15\text{-}minute}$ dB(A) (when in use)
Commercial	External noise level – 70 dB(A)
Industrial	External noise level – 75 dB(A)
Educational facilities	Internal noise level – 45 dB(A)
Hospital / medical	Internal noise level – 45 dB(A)
Library	Internal noise level – 45 dB(A)
Place of worship	Internal noise level – 45 dB(A)
Passive recreation	External noise level – 60 dB(A)
Active recreation	External noise level – 65 dB(A)
Hotel	External noise level – 50 dB(A)

As noted above in **Section 3.2.4**, works are generally planned to take place during standard hours (i.e., 7am to 6pm Monday to Friday and 8am to 1pm Saturday) although some works may be required to be completed outside these hours. Considering this, resulting noise levels at surrounding residential receivers have been evaluated against each of the four NMLs for standard

and non-standard hours listed above in **Table 6-8**. Additionally, the 75 dB(A) highly noise-affected criterion from the ICNG was also considered.

Given that the proposal may require some works be completed at night outside standard hours, there is also the potential for sleep disturbance impacts. Section 4.3 of the ICNG discusses the method for assessing and managing sleep disturbance.

Where noise levels from a construction (or industrial) source at a residential receptor at night exceeds the following, a maximum noise level event assessment should be undertaken:

- LAeq,15min 40 dB(A) or the RBL + 5 dB(A), whichever is greater, and/or
- LAFMax 52 dB(A) or the RBL + 15 dB(A), whichever is greater.

Based on this guidance, **Table 6-9** presents sleep disturbance screening criterion for the NCAs surrounding the proposal.

Table 6-9: Sleep disturbance criterion

NCA	$L_{eq\ 15\ min}$ dB(A)	L_{AFMax} dB(A)
NCA 1	44	54
NCA 2	41	52

Construction traffic noise

Noise resulting from additional traffic generated during construction also requires assessment in NSW. The ICNG refers to the 'NSW Road Noise Policy', (RNP) (Department of Environment, Climate Change & Water [DECCW], 2011) for the assessment of noise from construction traffic on public roads. Given the limited volumes of additional traffic expected to be generated during construction it is considered unlikely that the proposal would result in increases in overall road traffic noise levels at receivers around the proposal of more than 2 dB(A). As such this matter has not been considered further in the assessment.

Construction vibration

The Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016) gives minimum working distance for common vibratory construction machinery to avoid building cosmetic damage and human comfort impacts, as summarised in **Table 6-10**.

Table 6-10 Construction vibration setback distances

Equipment	Work phase	Cosmetic damage (Ref: BS7385-2:1993	Human response (Ref: DECC, 2006)	Heritage structure impact (Ref: DIN 4150-3, 2016)
Small Compactor	Phase 2, Phase 6	5m	15m	10m
Concrete Compactor	Phase 2	1m	2m	2m

Operational noise criteria

Operational noise criteria for the proposal were determined in accordance with the Noise Policy for Industry (EPA, 2017) (NPI). The NPI applies two separate noise levels: one aimed at limiting the intrusiveness of the project's noise against the prevailing level of background noise (Intrusiveness Criteria), and the other focused on achieving suitable acoustic amenity for the surrounding land uses from industry (Amenity Criteria).

Based on the intrusiveness and amenity criteria adopted for the proposal, the more stringent of the two is selected as the proposal noise criteria, as **Table 6-11.**

Table 6-11 NPI project noise criteria

Receiver type	Time of day	Proposal noise intrusiveness criteria L_{Aeq} dB(A)	Proposal amenity Noise Level L_{Aeq} 15 minute dB(A)	Proposal noise criteria L_{Aeq} dB(A)
Residential receivers	Day (7 am to 6 pm)	53	58	**53**
	Evening (6 pm to 10 pm)	51	48	**48**
	Night (10 pm to 7 am)	44	43	**43**

6.4.4 Impact assessment

Construction

Construction noise

A number of works activities during different phase of the proposal would be undertaken during the construction of the proposal. These activities and the overall sound power level (SWL) of for each phase have been summarised in **Table 6-12**. It has been indicated that due to the nature of the work location out of hours work would need to be carried out. As such, it has been assumed that these phases could be undertaken at any time of day.

Table 6-12Expected construction noise sources during the proposal

Construction phase	Description	Total SWL dB(A)
Phase 1	Site establishment and fencing	106
Phase 2	Vent stack construction	113
Phase 3	Temporary OCU bypass	121
Phase 4	Existing stack demolition	111
Phase 5A	Divert incoming sewers	107
Phase 5B	Divert incoming sewers (where road cutting is required)	118
Phase 6	OCU Installation	117
Phase 7A	Inlet well remediation	130
Phase 7B	Inlet well remediation (without jet blasting)	120
Phase 8	Remove sewer diversion	107
Phase 9	Demobilisation	109

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Noise levels from each phase of the proposal listed in **Table 6-12** were predicted at the two NCAs for standard and OOH hours. **Table 6-13** displays the highest noise levels predicted to occur in each phase as a result of the proposal. These predicted noise levels represent worst-case noise levels in the hypothetical case when all noise sources are operating simultaneously, based on 100 based on 100% utilisation.

Table 6-13Highest predicted construction noise level at residential receiver (worst-case maximum $L_{Aeq(15\ min)}$ and L_{Amax}, dB(A))

Phase	NCA	Predicted Noise Level (dB(A))	Noise Criteria (dB(A))						Exceedance of Noise Criteria					
			Standard Hours	OOH: Day	OOH: Evening	OOH: Night	Sleep Disturbance (L_{Aeq})	Sleep Disturbance (L_{AMax})	Standard Hours	OOH: Day	OOH: Evening	OOH: Night	Sleep Disturbance (L_{Aeq})	Sleep Disturbance (L_{AMax})
Phase 1	NCA 1	71	58	53	51	44	44	54	13	18	20	27	27	17
	NCA 2	52	53	48	46	41	41	52	-	4	6	11	11	0
Phase 2	NCA 1	72	58	53	51	44	44	54	14	19	21	28	28	18
	NCA 2	53	53	48	46	41	41	52	-	5	7	12	12	1
Phase 3	NCA 1	80	58	53	51	44	44	54	22	27	29	36	36	26
	NCA 2	61	53	48	46	41	41	52	8	13	15	20	20	9
Phase 4	NCA 1	68	58	53	51	44	44	54	10	15	17	24	24	14
	NCA 2	51	53	48	46	41	41	52	-	3	5	10	10	-
Phase 5A	NCA 1	71	58	53	51	44	44	54	13	18	20	27	27	17
	NCA 2	53	53	48	46	41	41	52	0	5	7	12	12	1
Phase 5B	NCA 1	82	58	53	51	44	44	54	24	29	31	38	38	28
	NCA 2	66	53	48	46	41	41	52	13	18	20	25	25	14
Phase 6	NCA 1	76	58	53	51	44	44	54	18	23	25	32	32	22
	NCA 2	58	53	48	46	41	41	52	5	10	12	17	17	6

Phase	NCA	Predicted Noise Level (dB(A))	Noise Criteria (dB(A))						Exceedance of Noise Criteria					
			Standard Hours	OOH: Day	OOH: Evening	OOH: Night	Sleep Disturbance (L_{Aeq})	Sleep Disturbance (L_{AMax})	Standard Hours	OOH: Day	OOH: Evening	OOH: Night	Sleep Disturbance (L_{Aeq})	Sleep Disturbance (L_{AMax})
Phase 7A	NCA 1	88	58	53	51	44	44	54	30	35	37	44	44	34
	NCA 2	70	53	48	46	41	41	52	17	22	24	29	29	18
Phase 7B	NCA 1	78	58	53	51	44	44	54	20	25	27	34	34	24
	NCA 2	60	53	48	46	41	41	52	7	12	14	19	19	8
Phase 8	NCA 1	71	58	53	51	44	44	54	13	18	20	27	27	17
	NCA 2	53	53	48	46	41	41	52	-	5	7	12	12	1
Phase 9	NCA 1	74	58	53	51	44	44	54	16	21	23	30	30	20
	NCA 2	55	53	48	46	41	41	52	2	7	9	14	14	3

The NVIA found that generally any phases where concrete cutting activities have been predicted to take place have resulted in the greatest noise levels, refer to **Noise levels** from each phase of the proposal listed in **Table 6-12** were predicted at the two NCAs for standard and OOH hours. **Table 6-13** displays the highest noise levels predicted to occur in each phase as a result of the proposal. These predicted noise levels represent worst-case noise levels in the hypothetical case when all noise sources are operating simultaneously, based on 100 based on 100% utilisation.

Table 6-13.

Phase 7A (inlet well remediation works) has been predicted to result in the highest noise levels at a residential receiver, primarily as a result of the inclusion of a jet blasting machine and concrete cutting. During standard hours, phase 7A has been predicted to result in up to 70 residential receivers in NCA 1 and 347 residential receivers in NCA 2. During night hours this has been predicted to increase to 404 residential receivers in NCA 1 and 1120 receivers in NCA 2. Additionally, up to nine receivers in NCA 1 have been predicted to become 'highly noise affected' during phase 7A.

A number of non-residential impacts have also been predicted from the works. Up to 32 educational/ child care receivers have been predicted to receiver noise levels greater than the NML during phase 7A, along with 28 commercial receivers and 10 hotels.

Within NCA1, 12 Steel Street was identified as the receivers which experienced the highest noise impacts, being the most affected receiver in NCA1 during all work phases. Within NCA 2, however, the most affected receiver varied between the work phases, with the majority of the most affected receivers being located along National Park Street. Noise resulting from traffic generated during construction

The anticipated construction vehicle movements are expected to be significantly lower than existing traffic volumes on all nearby roads, therefore noise from construction vehicles would not increase road traffic noise levels by more than 2 dB(A) on any road. Consequently, noise impact from construction traffic is expected to be negligible.

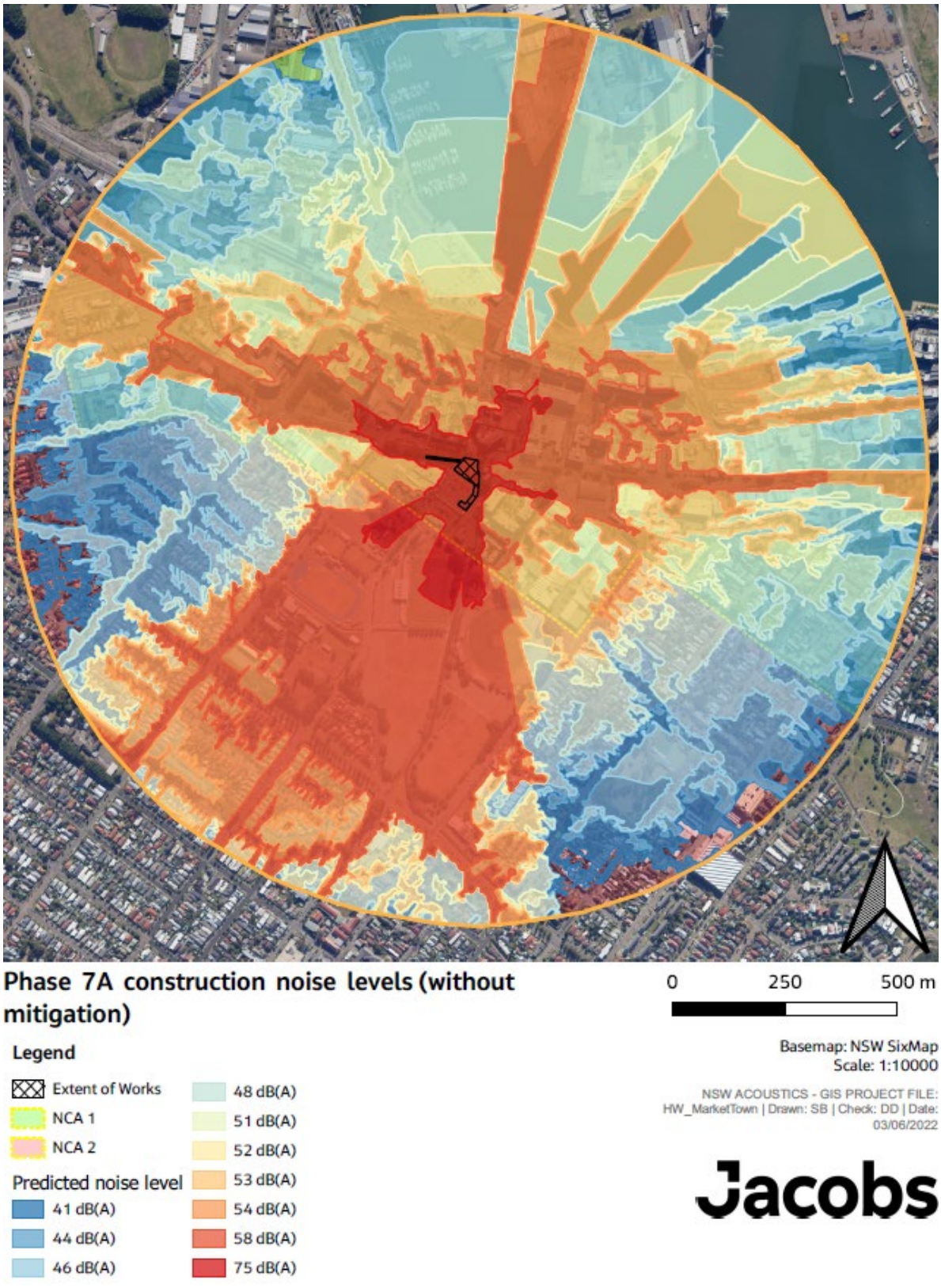

Figure 6-4 Noise contour map for the noisiest phase- Inlet well remediation works (Phase 7A)

Construction vibration

Some items of plant and equipment that would be used in construction such as compactors are considered to be vibration-generating. The recommended setback distances for these plant items and the vibration-sensitive receivers that fall within those setback distances are shown in **Table 6-14**. As shown in **Table 6-14**, there is the potential for heritage building and human comfort-related effects at distances of approximately 10 metres and two metres respectively. Measures to address associated vibration risks at this location are included below in **Section** Error! Reference source not found..

Table 6-14 Construction vibration impact assessment results

Equipment	Setback Distance (metres)		Number of Impacted Receivers within setback distance					
			Human Comfort			Cosmetic Building Damage		
	Human comfort	Cosmetic building damage	Heritage item	Residential Receiver	Non-Residential Receiver	Residential Receiver	Non-Residential Receiver	Heritage items
Small Compactor	15	5	10	0	1	0	0	1
Concrete Compactor	2	1	2	0	0	0	0	0

Operation

The noise modelling indicates that the predicted noise levels from the OCU would comply with the relevant noise criteria at all adjacent noise sensitive receivers with noise levels predicted to be below 40 dB(A), refer to **Figure 6-5.**

The noise assessment determined that none of the nearest receivers have been predicted to experience any tonal impacts and at the ground floor of the nearest three sensitive receivers low frequency is not deemed to be a concern and further assessment is not required.

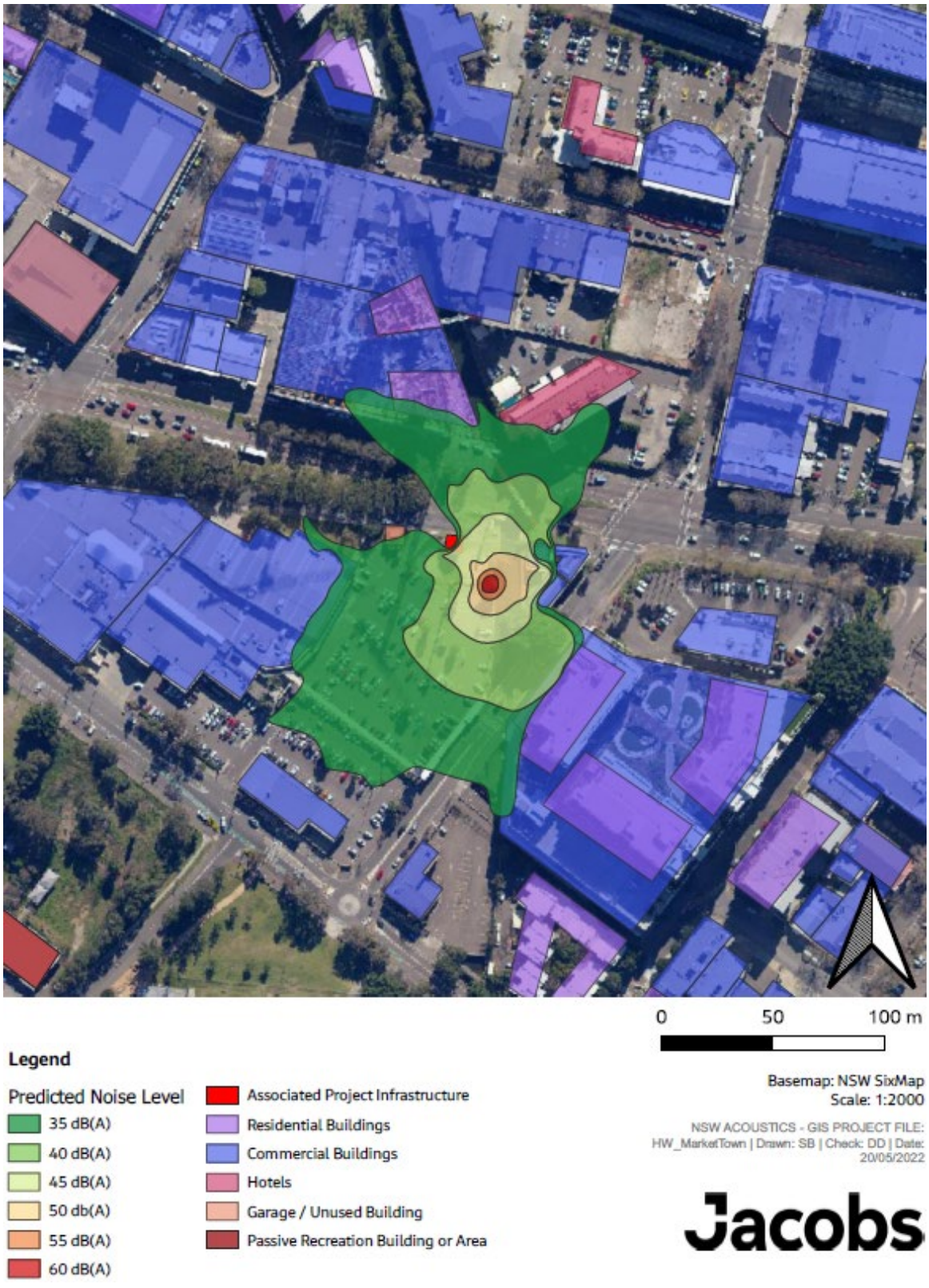

Figure 6-5 Predicted operational noise impacts

6.4.5 Mitigation measures

The mitigation measures that would be implemented to minimise the noise and vibration impacts of the proposal are presented in **Table 6-15**.

Table 6-15 Mitigation measures – Noise and vibration

Impact	Mitigation measure	Timing	Responsibility
Notification and verification monitoring	Provide at least seven days notice to the nearby potentially affected residential receivers prior to starting work.	Seven days prior to works commencing	Hunter Water
Work hours	• Wherever possible, works will be carried out during standard work hours (i.e. 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday). • Wherever possible and safe, limit works, particularly activities such as jet blasting and concrete cutting, to standard hours of construction • Where noisy activities cannot be scheduled to standard construction hours, noisy activities should be scheduled to take place earlier in the night, during less sensitive time periods	Prior to work commencing outside of standard work hours	Contractor
Noise and vibration	The following measures will be implemented during construction: • Personnel will be inducted and trained in noise control measures to reduce impacts on receivers during inductions and toolbox talks • All vehicles and plant will be turned off when not in use • Select low-noise plant and equipment • Use only the necessary size and powered equipment for tasks • All stationary and mobile equipment will be fitted mufflers and in serviceable condition. Generators, if used are to have sound proof enclosures • Where possible, concentrate noisy activities at one location and move to another as quickly as possible. • Construction vehicles including trucks will not be allowed to queue on local roads or if it is required for safety reasons, engines will be switched off • Where possible, all plant are to utilise a broad band reverse alarm and the need to reversing manoeuvres will be minimised.	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	• Deliveries will be scheduled during standard work hours only • No dropping of materials from height where practicable and no throwing of metal items • Switching off any equipment not in use for extended periods e.g. heavy vehicle engines would be switched off whilst being unloaded • Avoiding any unnecessary noise when carrying out manual operations and when operating plant • Consider the installation of temporary construction noise barriers for concentrated, noise-intensive activities • Where practicable, install enclosures around noisy mobile and stationary equipment as necessary • Where possible, avoid simultaneous operation of two or more noisy plant close to receivers • The offset distance between noisy plant and sensitive receivers should be maximised • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements • Complete routine monitoring to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision. • Implement 'additional noise measures' commensurate to the measured level of exceedance and period of the day as listed in Appendix B of the CNVG.		
Controlling vibration levels	• Choosing alternative, quieter and lower-impact equipment or methods wherever possible. • Scheduling the use of vibration-causing equipment at the least sensitive times of the day (wherever possible) • Locating high vibration sources as far away from sensitive receiver areas as possible • Sequencing operations so that vibration-causing activities do not occur simultaneously • Keeping equipment well maintained.	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	• Do not conduct vibration intensive works within the recommended safe setback distances • Where these setbacks can't be maintained, notify receiver(s), conduct inspections and monitoring to verify resulting levels, assess impacts and inform the need to modify works as necessary. • Where required attended vibration measurements will be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic and heritage building damage. • Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted maintaining the setback distances cannot be achieved.		
Complaints	A complaint management procedure will be developed. Community complaints will be allocated to a responsible contractor representative immediately to facilitate investigation, respond to the complainant, review noise mitigation measures and to implement any corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.	Construction	Hunter Water / Contractor
Construction traffic noise	• Switch off construction vehicles whenever not in-use. • Schedule the timing of vehicle movements to reduce hourly vehicle movements • Avoiding the use of compression brakes.	Construction	Contractor
Operational noise impacts of the OCU	When the final OCU is selected, the external noise performance of the unit will be verified and confirmed by the supplier to be able to achieve the 43 dB(A) residential night noise limit (or alternatively achieve a maximum external sound power level of 84 dB(A)), at all times.	Detailed design	Hunter Water

6.5 Air quality and odours

6.5.1 Existing environment

The sensitive receivers in the vicinity of the proposal area are summarised in **Section 6.4.1** and shown on **Figure 6-3**.

Air quality

Ambient air quality around the proposal area is influenced by local sources including traffic and construction, as well as regional influences arising from mining and extractive activities within the Upper Hunter. The main air pollutants from motor vehicles are carbon monoxide (CO), nitrogen dioxide (NO2) and fine particles (PM10, ie particulate matter with equivalent aerodynamic diameters of less than 10 microns), whereas deposited dust and particulate matter are the primary pollutants associated with regional influences.

Odour

As discussed in **Section 1.2** in recent years several multi-storey residential apartment buildings have been built in the vicinity of NW1 WWPS. The existing vent stack does not extend above the top of the new buildings, as shown in **Photo 6-1**. As such there have been odour complaints from tenants in the new buildings.

In the last 10 years, there have been over 15 odour complaints logged with Hunter Water in the vicinity of the proposal. A review of the complaint comments found that many of the complaints refer directly to the existing vent stack at NW1 WWPS as the perceived source of the odour, and most of the recent complaints were from residents living in the apartments above Marketown East or the Verve apartment block to the north of the proposal across King Street.

Photo 6-1. Nexsting NW1 WWPS wooden vent stack against high-rise buildings (source: Google, 2022)

In addition to the untreated vent stack discharging at the height of nearby buildings, other factors contributing to the odour risk from NW1 WWPS include turbulence generated by the sewers discharging into the inlet well and various gaps around access hatches and instrument ports allow

odours to leak out. As summarised in **Section 2.2**, in February 2021, Hunter Water carried out interim works to reduce to help reduce odour from NW1 WWPS.

Monitoring between 2018 and 2020 for H_2S, reduced sulphur compounds (RSC) and volatile organic compounds (VOC) have been conducted at NW1 WWPS and other nearby sewer manholes. The levels of H_2S, Dimethyl Sulphide (DMS) and Methyl Mercaptan (MM) were well above their odour thresholds.

6.5.2 Impact assessment

Construction

Air quality

During construction air quality impacts would potentially occur in the vicinity of the proposal and would be dependent upon atmospheric conditions. The proposal would have potential to generate dust from earthworks and stockpiles. Levels of air borne dust would be expected to be low level and unlikely to cause concern to sensitive receivers provided the mitigation measures provided in **Section 6.5.3** are implemented. Construction equipment and plant would emit exhaust fumes and would contribute to local air quality. However, in the context of the existing vehicular movements within the proposal area and given the short duration of the construction period, this is considered to be negligible.

Odour

During construction the existing vent stack and roof slab of the inlet well would be removed to facilitate the works. Prior to removing the roof slab of the inlet well, the inlet well would be emptied and cleaned out. Therefore, there would be a period where it would not be possible to capture and release the odours at the necessary height for atmospheric dispersion. As such it is expected that odour complaints would likely increase.

To control this risk, a temporary OCU could be installed to help reduce the release of odorous gases during construction. If required, a temporary OCU would be installed on the bypass line to treat air prior to discharge.

The generation and dispersion of odour emissions during the construction work would be influenced by the direction and strength of prevailing winds.

Operation

During operation the potential air quality impacts (dust) would be similar to those currently experienced.

The activated carbon filter as part of the OCU would treat odorous gases extracted from NW1 WWPS, specifically the inlet well and the two storage wells, to minimise odour impacts on surrounding areas and the risk of odour complaints from nearby receptors.

The proposal would help to minimise odour emissions to nearby residents and the general public around Marketown. In turn it is expected that the number of odor complaints received would reduce.

6.5.3 Mitigation measures

The environmental mitigation measures that would be implemented to minimise air quality and odour impacts of the proposal are presented in Table 6-16

Table 6-16 Mitigation measures - Air quality and odour

Impact	Mitigation measure	Timing	Responsibility
Odour	A risk assessment will carried out to determine if temporary odour mitigation works will be required during the construction and repair works. If required, a temporary OCU will be installed on the bypass line to treat air prior to discharge.	Detailed design/ Construction contractor	Hunter Water
Air quality and energy	During construction, the following measures will be considered and implemented where possible: • Machinery and vehicles will not be left running or idling when not in use • Equipment, machinery and vehicles used on site would be maintained to manufacturer's specifications to minimise potential emissions • Methods for management of emissions to be incorporated into project inductions, training and prestart talks	During construction	Contractor
Complaints	Odour or air pollutant emission complaints will be dealt with promptly and the source will be eliminated wherever practicable.	During construction	Contractor
Dust emissions	Visually monitor dust and where necessary: • Apply water (or alternate measures) to exposed surfaces that are generating dust • Appropriately cover loads on trucks transporting material to and from the construction site • Securely fix tailgates of road transport trucks prior to loading and immediately after unloading • Avoid dust generating works during strong winds Prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.	During construction	Contractor
Energy usage	Contractors are required to report in the 'Contract Environmental Management Report' monthly energy usage information to Hunter Water.	During construction (monthly)	Contractor

6.6 Non-Aboriginal heritage

6.6.1 Existing environment

Registered heritage items

The following database searches were undertaken in April 2022 determine the presence of heritage items in the existing environment:

- Australian Heritage Database
- State Heritage Inventory (which includes items listed on the SHR

- Newcastle LEP 2012
- Hunter Waters section 170 Heritage and Conservation Register (s170 Register).

No National, Commonwealth, State listed heritage items are located within 200 metres of the proposal. The nearest item listed on the s s170 Register, Newcastle West 2 WWPS is located about 750 metres to the south of the proposal. As shown in **Figure 6-6,** the proposal is located within the Newcastle City Centre HCA, about 10 metres west of the Former Gasworks Office (ID I507) and about 100 metres south of the Theatre Royale (I498). These three items are locally listed under the Newcastle LEP 2012.

Strategic planning

The Newcastle Development Control Plan 2012 (DCP), supplements the Newcastle LEP 2012 and provides additional information that should be taken into account when undertaking development

Section 5.05 and 6.02 of the DCP refers specifically to HCAs in the city and aims to ensure that all development has a positive effect on the character of HCAs. City of Newcastle's Heritage Technical Manual (2020) was produced to supplement Section 6.02 of the Newcastle DCP 2012 by providing detailed technical information to assist in the assessment of development applications within HCAs. The document describes the heritage significance of each area as a guide to the importance of each as well as identifying physical elements that contribute to their character and sense of place. The document has been designed to provide best practice guidelines to assist applicants in designing developments proposals that are sympathetic to the heritage significance of each conservation area.

The proposal area falls within a Non-contributory building area. Where 'non-contributory buildings' are buildings from a construction period which fall outside any Key Period of Significance for the heritage conservation area and that have scale or form that is not consistent with the key characteristics of the heritage conservation area. This ranking is assigned where the building is recent or late 20th century and is out of scale, ie, not consistent with the height, form and scale of buildings within the streetscape.

Summary Statement of Heritage Significance

The statement for significance for the Newcastle City Centre HCA states:

The Newcastle City Centre Heritage Conservation Area is significant on many levels. The mix of commercial, retail and civic buildings is a powerful reminder of the city's past, its economic and social history. Historic buildings provide the backdrop to a city of dramatic topography on the edge of the sea and the mouth of a harbour.

The pre-1840s buildings in the city are of state significance (Rose Cottage, c1830, Newcomen Club, 1830, parts of James Fletcher Hospital) and share associations with the city's convict origins. Newcastle has a rich archaeological record of national significance, with the potential to yield information about the early convict settlement and early industrial activities. The city area is known to have been a place of contact between colonists and the indigenous population. This evidence is available in historical accounts and in the archaeological record surviving beneath the modern city.

The high numbers of commercial and civic buildings of the 19th and 20th centuries gives the city a rich historic character which is notable and allows an understanding of the importance of the city as a place of commerce, governance and city building. The historical foundation of the city was the

discovery and exploitation of coal with good shipping access via a safe and navigable harbour. The town's layout by Surveyor General Henry Dangar in 1828 is still visible in the city's streets, and is an element of historical value, particularly in the vicinity of Thorn, Keightley, Hunter and Market Streets.

The significance of the Newcastle City Centre HCA is there for predominately derived from its convict period history that date from the early 1800s to the mid-1900s.

While the existing vent stack and WWPS dates from this period, the city's infrastructure is not specifically mentioned with the Newcastle City Centre HCA's statement for significance. The existing vent stack and WWPS have not previously been assessed to be suitable for individual heritage listing as is identified as a non-contributory element with the Newcastle City Centre HCA. As such the proposal is not considered to make a significant contribution to the wider Newcastle City Centre HCA's identified heritage significance.

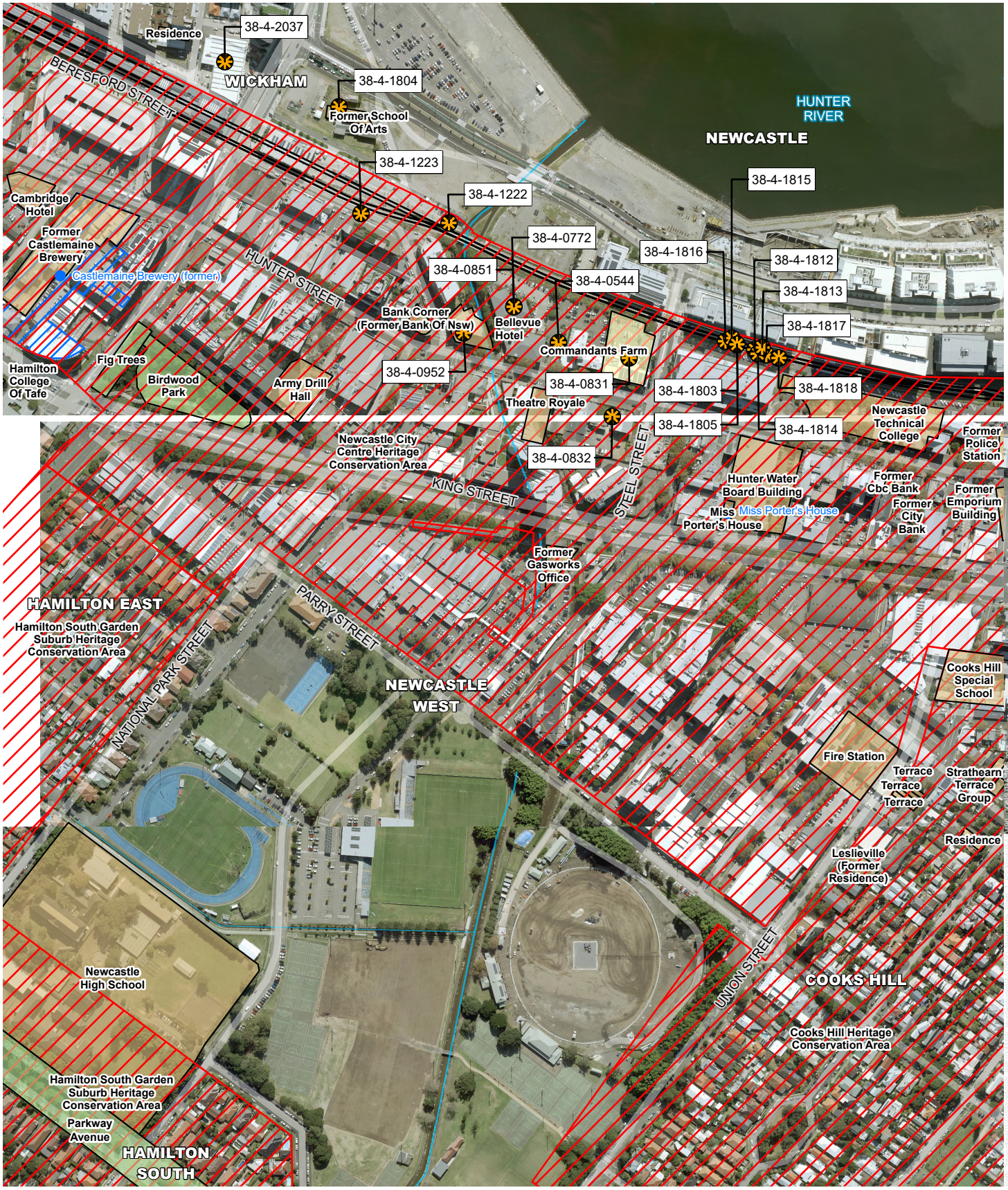

Figure 6-6 Heritage

Potential heritage items

A Heritage Impact Statement was prepared by Umwelt in 2020 for the proposed demolition of the NW1 WWPS. This assessment included the photographic archival recording the vent stack. The finding of this Heritage impact statement are summarised as follows.

The vent stack is located in associated with the NW1 WWPS building. The WWPS building is a brick built painted building which is a replacement of an earlier wastewater pumping station.

The vent stack is a timber constructed shaft that stands just over 27 meters in height. It stands on a concrete base with a steel foundation ring connection the existing vent stack to the concrete. The existing vent stack is anchored to four concrete pads at ground level by eight galvanised steel stabilising cables. The vent stack is construction of timber staves which are surround by metal hoop ties. The primary purpose of the vent is to ensure gases from the WWPS are released at a sufficient height to minimise odour pollution.

As state previously, the existing vent stack and wider NW1 WWPS are not subject to any local or State heritage listing, nor are they listed on the s170 Register.

The Heritage Impact Statement included a Significant Assessment for the NW1 WWPS vent stack. This assessment found that the vent stack does have a heritage significance on a local level for its historical, aesthetic, rarity and representative values, despite having been modified over time. The vent stack is the only surviving example of its type in the Newcastle LGA.

The vent stack has never been nominated for inclusion as a heritage time either on the Newcastle LEP 2012 or the SHR. It was also not assessed to warrant inclusion the s170 Register.

Continued modifications to enable the vent stack to function to a contemporary standard would however degrade this significance. Such works are also likely to be costly and are unlikely to improve the operation performance of the vent stack to a standard that is comparable to new equipment.

The Heritage Impact Statement concluded that the removal of vent stack is supportable albeit not preferred. The alternative would require substantial physical changes to the vent stack over time and may compromise the operation of the NW1 WWPS.

6.6.2 Impact assessment

Construction

The proposal is not anticipated to impact the locally listed Newcastle City Centre HCA (or the Theatre Royale (I498). However as described in **Section 6.4.4**, the Former Gasworks Office (ID I507) building maybe impacted by vibration impacts.

The proposal would however remove the vent stack which does have a heritage significance on a local level. Continued modifications to enable the vent stack to function to a contemporary standard would however degrade this significance. Such works are also likely to be costly and are unlikely to improve the operational performance and safety of the vent stack to a standard that is comparable to new equipment.

The Heritage Impact Statement concluded that the removal of vent stack is supportable albeit not preferred. The alternative would require substantial physical changes to the vent stack over time and may compromise the operation of the NW1 WWPS.

6.6.2.1 Operation

No impacts on non-Aboriginal heritage are expected as a result of operation of the proposal.

6.6.3 Mitigation measures

The mitigation measures that would be implemented to minimise non-Aboriginal heritage impacts of the proposal are presented in **Table 6-17**.

Table 6-17 Mitigation measures – Non-Aboriginal heritage

Impact	Mitigation measure	Timing	Responsibility
Unexpected heritage	If Non-Aboriginal heritage items are discovered during the course of the proposal, all work will cease in the area and the Contractor will inform the Hunter Water Project Manager and Archaeologist as soon as possible. Hunter Water will determine the preferred management approach and the local council and/or Heritage NSW will be notified via the Hunter Water Project Manager if required.	Construction	Contractor

6.7 Aboriginal heritage

6.7.1 Existing environment

As described in **Section 1.2**, the proposal area is within an urban area. The proposal area is predominantly cleared of vegation and includes mowed grass, hard stands and a row of trees and shrubs along the site boundary with Cottage Creek.

Prior to European settlement the proposal area was the traditional land of the Awabakal people neighboured by the Wonnaruah, Worimi and Guringai tribal groups (DoE 1985).

A search of the DPE Environment, Energy and Science EES Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 31 March 2022. This search did not identify any registered or known Aboriginal places within the proposal area. The nearest records AHIMS38-4-0832 is located over 200 metres to the north of the proposal, refer to **Figure 6-6**.

6.7.2 Impact assessment

As the construction would be carried out entirely within an area which is highly disturbed and modified, works would not be expected to impact on any potential Aboriginal heritage sites archaeological remains.

Operation

No impacts to Aboriginal heritage items would be expected during operation.

6.7.3 Mitigation measures

The environmental mitigation measures that will be implemented to minimise Aboriginal heritage impacts of the proposal are presented in **Table 6-18**.

Table 6-18 Mitigation measures –Aboriginal heritage

Impact	Mitigation measure	Timing	Responsibility
Unexpected finds	In the event that an Aboriginal object (or objects) is uncovered during the proposal, ground disturbance works would cease within 20 metres of the object(s) and the Hunter Water Archaeologist should be contacted. The Hunter Water Archaeologist would advise the Heritage Office and the relevant Aboriginal parties so that appropriate management strategies can be identified.	Construction	Contractor/ Hunter water
Unexpected finds	In the unlikely event that human skeletal material is uncovered during the construction works, all works should cease within 20 metres of the skeletal remains. Should the remains be verified as human, the NSW Police and the (former) Office of Environment and Heritage (OEH) will be contacted. No works will proceed within the vicinity of the skeletal remains until an appropriate course of action has been determined in consultation with NSW Police, OEH and Aboriginal parties (if the remains are identified as Aboriginal).	Construction	Contractor/ Hunter water

6.8 Visual amenity

6.8.1 Existing environment

As described in **Section 6.6.1**, the proposal is located with the Newcastle City Centre HCA and as such has an aesthetic significance. However the proposal area falls within a Non-contributory building area.

The existing landscape character of the proposal area is typical of an urban landscape including infrastructure land uses (arterial and local roads and exiting WWPS), commercial and urban residential land uses (including both residential properties and businesses). The proposal area is not located in visually sensitive location as it is situated between a carpark and King Street (and King Street access road).

The visual envelope of the proposal is limited due to the landform, vegetation and built elements (including high rise apartment buildings) around the proposal.

The main viewers of the proposal would be users of King Street, King Street access road, Marketown and the residents, workers and visitors of nearby properties and business.

6.8.2 Impact assessment

Construction

During construction, there would be impacts on visual amenity from the vegetation clearing and construction activities (such as earthworks, ancillary and laydown areas) with plant and equipment visible to receivers. These impacts would occur throughout the construction period.

Evening and nightworks may be required in order to expedite the proposal in order to avoid potential impacts on access and Marketown. Lighting would be required during these construction works for safety reasons but would be managed appropriately to minimise potential light spill. Appropriate notification would be provided to local residences in accordance with Hunter Water's procedure for out of hours works.

Overall the visual impacts associated with the construction of the proposal are considered to be minor.

Operation

During operation, the proposal would result in permanent visual changes to the NW1 WWPS site. The main visual changes would be those associated with the vegetation clearing, the introduction of new components such as OCU and 12 metre high vent stack into the landscape.

The visual impacts are not expected to be major as the new components are in keeping with the exiting land use of the NW1 WWPS.

Mitigation measures such as vegation retention where possible and screening would be considered to visually integrate the proposal within the surrounding landscape.

6.8.3 Mitigation measures

The environmental mitigation measures that would be implemented to minimise visual amenity of the proposal are presented in **Table 6-19**.

Table 6-19 Mitigation measures –Visual amenity

Impact	Mitigation measure	Timing	Responsibility
Visual impact during construction	• Restore work sites as close to their original condition as possible at completion of the works • On completion of the works, all vehicles, construction equipment, materials, and refuse relating to the works will be removed from the work site(s) and any adjacent affected areas • Work areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day • Where lighting is required, it is to be orientated to minimise glare and light spill impacts on adjacent receivers • Clear the minimum amount of vegetation necessary.	Construction	Contractor
Visual impact during operation	• Consideration will be given to the colour of the OCU. This may include the option of painting the OCU or choosing materials that will blend in with the existing infrastructure • Retention and enhancement of existing landscape features (areas of scrub, individual	Detailed design	Hunter Water

Impact	Mitigation measure	Timing	Responsibility
	trees) will be considered where feasible • Mitigation such as screening will be considered to visually integrate the proposal within the surrounding landscape.		

6.9 Traffic and access

6.9.1 Existing environment

The NW1 WWPS is located within the suburb of Newcastle West. The roads and access points, around the proposal include King Street, King Street access road, Steel Street and the Marketown northern driveway, as shown on **Figure 1-1**. The Marketown open space car park is located to the south of the proposal.

The closest bus stop is located on Steel Street about 90 metres to the southeast of the proposal.

6.9.2 Impact assessment

Construction

The proposal would require the use of the King Street access road, Marketown north driveway and a section of the Marketown carpark. Access for construction of the proposal would be via King Street, King Street access road and the Marketown north driveway. The use of the Marketown northern driveway and carpark would be in agreement with the landowner.

Majority of construction vehicles would be parked at the ancillary and laydown area within the proposal area.

It is expected that up to 50 carparking spaces would be impacted during construction. Of these about 17 of these carpark spaces would be impacted for the duration of the works. While up to another 33 of these carpark spaces would be impacted during the works associated with diverting the incoming sewers to Storage Well 2 to isolate the inlet well. This would include setting up temporary above ground pipework, submersible pumps and above ground diesel pumps to divert the sewer main. This sewer diversion would be in place for up to 26 weeks. The bypass pipeline for the main sewer to the storge wells would be located above ground and as close as the fence line as possible to reduce the impact on car parking spaces. The loss of cark parking spaces would be negotiated and agreed with Marketown. The loss of these carparks would impact on the number available cark parking spaces. This would have the biggest impact during Marketown peak hours and would need to be managed with Marketown.

During construction, the proposal is expected to generate the following additional vehicle movements on the local road network:

- Heavy vehicle movements for delivery of construction materials and removal of waste
- Delivery of plant (excavators, rollers) to site, which would remain on site during construction and moved around as the trenching works progress
- Light vehicle movements for construction workers during the construction period.

The number and nature of vehicle movements is dependent on how the contractors carry out the work and the source location of material, plant and construction workers.

Construction vehicles would access the site via arterial roads wherever possible. The most noticeable increase in traffic activity on the local roads in Newcastle west would be at the start and end of shifts when construction workers are travelling to/from site. This is expected to be a localised minor impact only, and the overall capacity of these roads are not expected to be compromised.

Operation

During operation of the proposal service vehicles would be required to access the NW1 WWPS site to carry out route maintenance and changing the OCU filter media. The vehicle movements associated with this activity are expected to have limited traffic or access impacts during operation of the proposal.

6.9.3 Mitigation measures

The mitigation measures that would be implemented to minimise traffic and access impacts of the proposal, along with the responsibility and timing for those measures are presented in **Table 6-20**.

Table 6-20 Mitigation measures – Traffic and access

Impact	Mitigation measure	Timing	Responsibility
Traffic	A TMP will be developed for the construction, including access, transport and timing of the proposal	Prior to construction	Contractor
Access	• The use of the Marketown northern driveway and carpark would be in agreement with Marketown • The bypass pipeline of the main sewer to the storge wells would be located above ground and as close as the fence line as possible to reduce the impact on car parking spaces. The loss of cark parking spaces would be negotiated and agreed with Marketown.	Prior to construction	Contractor
Traffic and transport	• Appropriate exclusion barriers, signage and site supervision will be employed at all times to ensure that the work site is controlled and that unauthorised vehicles and pedestrians are excluded from the works area • Movements of heavy vehicles would be restricted to standard work hours (i.e 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday) • Parking of light vehicles will be within the proposal area to minimise interference with vehicle movements of local residents and users of the Marketown.	Construction	Contractor
Works with Council owned roads	• A plan will be required for any fencing or hording works in the road reserve and any proposed road closures. The plan will be provided to Council's	Prior to construction	Hunter Water / Contractor

Impact	Mitigation measure	Timing	Responsibility
	traffic section for approval. This will also relate to any parking changes in the road reserve. The fencing will allow for single unit heavy vehicles to access the road and service the businesses who have their driveways access from King Street. • Any asset damage within the road reserve affected by proposed construction will be rectified in full to the discretion of the Public Utilities Officer • Maintenance of the area fenced off will be the responsibility of Hunter Water for the duration of the project • Asset information from must be sought from Council's Public Utilities Officer before your works proceed • The stipulations as part of the City of Newcastle consent under section 138 of the Roads Act will be followed, refer to **Table 5-2** and the City of Newcastle T&ISEPP response (**Appendix B**).		

6.10 Land uses and services

6.10.1 Existing environment

The NW1 WWPS is located within an existing Hunter Water easement. This existing easement is partially consumed by parking spaces in the Marketown carpark.

Existing infrastructure within and near the proposal area would include, but are not limited to:

- Existing Hunter Water assets including sewer and potable watermains
- Existing below ground utilities (in particular telecommunications cables and drainage)
- Existing 15 metre wide easement associated with the high voltage (HV) powerline that covers the northern portion of the NW1 WWPS site.
- Existing roads including King Street, King Street access road and Steel Street and the Marketown access driveway.
- Marketown
- Stormwater drains in and around Marketown.

6.10.2 Impact assessment

Construction

As discussed in **Section 3.2.6**, no property acquisitions would be required for the proposal, however, temporarily leases of portions of the King Street access road and Marketown carpark would be required for the construction area including the ancillary and laydown areas.

The details of temporary leases would be determined during detailed design in consultation with the landowners. Following construction, all leased land would be reinstated and returned to the landowner.

The proposal would also have a substantial impact on existing land uses during construction due to the use the King Street access road and a portion of Marketown carpark for construction access, sewer diversion and ancillary and laydown areas. The use of the Marketown carpark and access road would impact users this car park as discussed in **Section 6.9.2**.

The commercial and residential properties near the proposal area would have minor short-term disturbance including noise, odour, dust and traffic during construction of the proposal.

The proposal has been designed to avoid existing services such that no adjustments to utilities are required. A Dial Before You Dig would be undertaken prior to any works commencing in order to confirm the location of buried services. Where works are to be undertaken below power lines, the Ausgrid Guidelines NS 209 Operating Cranes and Plant in Proximity to Power Line would be referred to. If works are to be undertaken within the vicinity of Telstra pits refer to the Network Integrity Help Desk on 1800 653 935.

Operation

The proposal would result in negligible changes to land use during operation. The vent stack and OCU would be located within the existing Hunter Water easement.

Service vehicles would access the OCU via the gate to the south of the NW1 WWPS site. This would require the use of the Marketown carpark and driveway via King Street access road. Routine maintenance in the OCU would be carried out during off peak periods as such impacts on the use of the Marketown carpark would be minimal.

The proposal is likely to have a positive impact to the Hunter Water's existing service by improving the sewer service to help minimise odour emissions, improve safety and enable ongoing operation and maintenance of a critical Hunter Water asset.

6.10.3 Mitigation measures

The mitigation measures that would be implemented to minimise traffic and access impacts of the proposal are presented in **Table 6-20**.

Table 6-21 Mitigation measures – Land use and services

Impact	Mitigation measure	Timing	Responsibility
Impacts on private property	Land subject to temporary use for the proposal including the construction area which includes the ancillary and laydown area and access will be rehabilitated as soon as practicable to an appropriate condition in agreement with the landowner.	Prior to construction	Hunter Water
Consultation	Provide at least seven days' notice to affected receivers prior to starting work unless it is emergency works or it is discussed with the affected receivers face-to-face. Include the following information in notification letters: • A description of the works and why they are being undertaken	Seven days prior to works commencing	Contractor

Impact	Mitigation measure	Timing	Responsibility
	• Details of the works that will be noisy • Work hours and expected duration • What is being done to minimise the impacts (e.g. respite periods) • 24-hour contact number.		
Consultation	• Where entry to private properties is required, a notice of entry letter will be provided at least 14 days in advance. • Maintain a complaints register and respond to any complaints and notify the Hunter Water Project Manager as soon as possible within 24 hours. • The contractor will personally contact the occupant when they enter a private property to notify of their presence and what works are intended. • Any accidental damage to property occurred by the works must be immediately reported to the Hunter Water Project Manager and repaired in consultation with the owner. • Erect signage containing project information and contact details in a prominent location.	Prior to construction /	Contractor
Land uses and services	All services in the vicinity of the works will be located in the field and 'pegged-out' and noted in the Environmental Management Plan and/or work plans prior to excavation works - "dial 1100 before you dig".	Prior to ground penetrating work	Contractor

6.11 Waste generation

6.11.1 Existing environment

The existing NW1 WWPS and Hunter Water easement generates minimal waste.

6.11.2 Impact assessment

Construction

The construction of the proposal would potentially generate a range of waste streams including:

- Excess spoil generated during excavation activities.
- Building materials wastes including metals, plastic, concrete and redundant materials, electrical conduit and wiring waste
- Demolition and remediation waste including the vent stack and water from high pressure jet blasting of the internal walls and floors of the chambers to remove corroded material.
- Domestic waste including food scraps, aluminium cans, glass bottles, plastic and paper containers and putrescible waste generated by site construction personnel

- Weeds would be appropriately treated (spot sprayed) and manually removed (where applicable), bagged and disposed of at an appropriately licenced landfill facility.

All waste including excess spoil, the vent stack and jet blast water/sediment would be classified and disposed in accordance with Waste Classification Guidelines (NSW EPA, 2014) and disposed of at a registered waste management facility or reused for maintenance activities where there is suitable classification.

Operation

The 2.5 tonnes of activated carbon within the OCU is expected to be replaced annually. The activated carbon media replacement would be carried out via a sucker truck. The spent activated carbon media is expected to be treated as prescribed waste and would be disposed of to a suitably authorised or licensed treatment or disposal facility.

6.11.3 Mitigation measures

The environmental mitigation measures that would be implemented to minimise waste generation impacts of the proposal are presented in **Table 6-22**.

Table 6-22 Mitigation measures – Waste generation

Impact	Mitigation measure	Timing	Responsibility
Waste generation	The Contractor's recycling and reuse proposal will be detailed in the CEMP following the resource management hierarchy principles (in accordance with the WARR Act). • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort.	Prior to construction	Contractor
Waste generation	• Dispose of all excess material (that cannot be reused or recycled) as soon as practicable, to a facility licensed to accept the waste as per the waste classification results (tested by a suitably qualified person in accordance with the NSW Waste Classification Guidelines 2014) • Retain disposal receipts and provide to Hunter Water contract manager on request • All waste including the vent stack and spent activated carbon media would be classified and disposed in accordance with Waste Classification Guidelines (NSW EPA, 2014).	Construction	Contractor
Waste generation	Segregate and label waste to improve recycling opportunities, avoid cross contamination and reduce disposal costs.	Construction	Contractor
Waste generation	Any excess stockpile material would be disposed of at a licenced recycling or waste facility.	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
Waste generation	Cover waste receptacles and locate away from drainage lines.	Construction	Contractor
Waste generation	All vessels used for contaminated or hazardous waste should be sealed, labelled according to their contents, and stored within bunded areas until their removal from the work site.	Construction and Operation	Contractor
Waste generation	Any fuel, lubricant or hydraulic fluid spillages will be collected using absorbent material and the contaminated material disposed of at a licensed waste facility.	Construction	Contractor

6.12 Cumulative and Consequential impacts

The following websites were searched on 16 May April 2022 for recent or proposed developments that could interact with the proposal:

- NSW DPE Major Projects Register
- Transport for NSW (formerly Roads and Maritime Services)
- City of Newcastle.

As described in **Section 1.2**, the area around Newcastle West has and is undergoing substantial redevelopment and there are several high-rise apartment buildings currently been constructed. In addition, there are two State Significant Developments (SSD) approved about 400 metres to the north of proposal, including:

- Mixed Use Development including commercial/retail uses and hotel accommodation at 42 Honeysuckle Drive Newcastle (SSD-10378)
- Construction of two, eight storey mixed use buildings consisting of retail, residential, and basement carparking at 35 Honeysuckle Drive Newcastle (SSD-8999).

These two developments may have a potential cumulative construction noise impact with the proposal if they occur concurrently.

The NVIA considered a worst case comparison of the number of impacted receivers during the noisiest phase (Phase 7A (inlet well remediation works) of the proposal along with these two developments. This comparison showed that noise impacts increased quite substantially when the inlet well remediation works are undertaken at the same time as rock hammering and crushing at 42 Honeysuckle Drive. This would result in nearly doubling the number of receivers predicted to experience noise greater than the respective NMLs, as well as increasing the number of ‘highly noise affected’ receivers from nine to 14.

If works are scheduled for the proposed developments at a similar time to the proposal, then cumulative impacts would need to be considered and the measures outlined in **Table 6-23** would apply.

Hunter Water would contact the City of Newcastle to confirm timing of the above developments works. If other projects become known in the vicinity of the proposal area the mitigation measures in **Table 6-23** would apply.

6.12.1 Mitigation measures

The mitigation measures that would be implemented to minimise cumulative and consequential impacts of the proposal are presented in **Table 6-23**.

Table 6-23 Mitigation measures – Cumulative and consequential impacts

Impact	Mitigation measure	Timing	Responsibility
Cumulative if other projects occurring at the same time	Consult and coordinate with proponents of nearby projects to assess and manage cumulative impacts. Revise the CEMP to address these impacts as they become known.	Prior to and during construction	Contractor
Cumulative noise impacts	• Discuss works schedules and timings with the proponents of other works to gain an understanding of when noisy work surrounding the proposal will take place. Should respectively project schedules and work priorities change, proponents should commit to regular meetings to ensure all proponents are aware of the changes • Where possible, schedule works to occur at different times of the day to prevent multiple noisy activities from taking place at the same time • Where possible, schedule works to take place at different locations within the proposal area to prevent noisy activities from taking place in close proximity to one another which will limit the amplification of the noise.	Hunter Water / Construction	Contractor

7 SUMMARY OF MITIGATION MEASURES

Construction would occur in accordance with a site-specific Construction Environment Management Plan (CEMP) that would outline mitigation measures, roles and responsibilities, contact details, unexpected finds protocols and emergency and incident response. Mitigation measures presented in **Error! Reference source not found.** would be included in the CEMP.

Table 7-1 Mitigation measures – Soils, geology and contamination

Impact	Mitigation measure	Timing	Responsibility
Soils and geology	The identification of elevated lead levels across the existing trunk main alignment may trigger a Notification Obligation to the EPA, under section 60 of the CLM Act. Hunter Water will advise the site owner of these results.	Prior to construction	Hunter Water
	The CEMP prepared for the works is to include an ESCP which must include as a minimum the type and location of sediment/erosion controls to be used.	Prior to construction	Contractor
	Erosion and sediment controls are to be implemented and maintained consistent with *Managing Urban Stormwater: Soils and Construction. Fourth Edition ed. Sydney* (NSW) (Landcom, 2004) (the Blue Book). Controls include: • Be installed prior to disturbance commencing • Prevent sediment moving off-site and sediment laden water entering any watercourse, drainage line, or drain inlets • Divert clean surface flow around exposed areas and stockpiles • Reduce water velocity and capture sediment • Minimise the amount of material tracked onto paved surfaces • Be cleaned out before 30% capacity of controls is reached.	Prior to construction/ construction	Contractor
	The CEMP will include the following to manage contaminated soils • Identification of locations of known or potential contamination and preparation of a map showing these locations • Identification of classification, transport and disposal requirements of any contaminated soils/ materials • Procedures and disposal arrangements for unsuitable excavated material or contaminated material.	Detailed design	Hunter Water
	Disturbed areas will be stabilised as soon as practical after completion of works. Erosion and sediment controls will not be removed until suitable ground cover is achieved in accordance with the Blue Book.	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	If during construction activities, contaminated soils are uncovered or are suspected to have been uncovered due to odour or discolouration of soils works will cease immediately, the Hunter Water Project Manager will be contacted and the appropriate management requirements determined.	Construction	Contractor
	Any spoil storage areas or stockpiles will have appropriate erosion control devices installed to control runoff and prevent sedimentation.	Construction	Contractor
Hydrology	The new OCU will be installed 600mm above the 1%AEP flood level (2.33m AHD) to mitigate flooding impacts.	Detailed design	Hunter Water
	An IMP will be prepared as part of the Contractor's CEMP and will include a contingency plan and emergency procedures for dealing with the potential spillage of fuel or other environmental incidents that may occur on the work site. The IMP should also contain procedures dealing with the unexpected onset of rainfall during the work period.	Prior to construction	Contractor
	The storage and handling of fuels and chemicals will comply with Australian Standard AS1940. This includes the provision of a 'spill kit' to be kept on site at all times for potential chemical or fuel spills. All staff are to be made aware of the location of the spill kit and trained in its use.	Prior to construction/ construction	Contractor
	Where possible, no chemicals, fuels, and/or waste will be stored or collected for disposal within or adjacent to drainage lines or unsealed surfaces.	Construction	Contractor
	Refuelling, fuel decanting and vehicle maintenance work will take place in a designated area on an impermeable surface.	Construction	Contractor
	Daily checks of vehicles working on the construction works will be conducted to ensure that no oils or fuels are leaking.	Construction	Contractor
	Should groundwater extraction be required during construction, a Works Activity Approval will be sought from NRAR. Where greater than three megalitres in a financial year, or greater than five megalitres over two financial years is taken, a WAL would also be required. Any dewatering of groundwater should be undertaken in accordance with an approved DMP, which may include water quality requirements and discharge locations.	Prior to dewatering during construction	Contractor / Hunter Water
Ecology	The full extent of approved vegetation clearance will be clearly documented and mapped in site CEMP(s). All construction activities, including but not limited to vegetation clearing, is to be strictly confined to the disturbance area assessed in this REF.	Prior to construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	Prior to construction, the limits of the work zone, areas for parking and turning of vehicles, and plant equipment would be accurately signposted and delineated. Parking would be limited to the construction corridor, ancillary and laydown areas. These areas would be located so that vegetation disturbance is minimised as much as possible.	Prior to construction	Contractor
	If any damage occurs to vegetation outside of the nominated work area, the Hunter Water Project Manager and /or Environmental Representative will be notified so that appropriate remediation strategies can be developed.	Construction	Contractor
	The sites will be restored in a manner consistent with the surrounding area where required (eg turf and vegetation plantings as required). The appropriate method of site restoration will be confirmed with the Hunter Water Environmental Planner and included in the CEMP.	Construction	Contractor
	No Council Tree Assets will be damaged or impinged upon by the proposal, refer to the figure provided in the City of Newcastle T&ISEPP response (refer to **Appendix B**).	Construction	Contractor
Noise and vibration	Provide at least seven days notice to the potentially affected residential receivers prior to starting work.	Seven days prior to works commencing	Hunter Water
	• Wherever possible, works will be carried out during standard work hours (i.e. 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday) • Wherever possible and safe, limit works, particularly activities such as jet blasting and concrete cutting, to standard hours of construction • Where noisy activities cannot be scheduled to standard construction hours, noisy activities should be scheduled to take place earlier in the night, during less sensitive time periods.	Prior to work commencing outside of standard work hours	Contractor
	The following measures will be implemented during construction: • Personnel will be inducted and trained in noise control measures to reduce impacts on receivers during inductions and toolbox talks • All vehicles and plant will be turned off when not in use • Select low-noise plant and equipment • Use only the necessary size and powered equipment for tasks • All stationary and mobile equipment will be fitted mufflers and in serviceable condition. Generators, if	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	used are to have sound proof enclosures • Where possible, concentrate noisy activities at one location and move to another as quickly as possible • Construction vehicles including trucks will not be allowed to queue on local roads or if it is required for safety reasons, engines will be switched off • Where possible, all plant are to utilise a broad band reverse alarm and the need to reversing manoeuvres will be minimised. • Deliveries will be scheduled during standard work hours only • No dropping of materials from height where practicable and no throwing of metal items • Switching off any equipment not in use for extended periods e.g. heavy vehicle engines would be switched off whilst being unloaded • Avoiding any unnecessary noise when carrying out manual operations and when operating plant • Consider the installation of temporary construction noise barriers for concentrated, noise-intensive activities • Where practicable, install enclosures around noisy mobile and stationary equipment as necessary • Where possible, avoid simultaneous operation of two or more noisy plant close to receivers • The offset distance between noisy plant and sensitive receivers should be maximised • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements • Complete routine monitoring to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision. • Implement 'additional noise measures' commensurate to the measured level of exceedance and period of the day as listed in Appendix B of the CNVG.		
	• Choosing alternative, quieter lower-impact equipment or methods wherever possible. • Scheduling the use of vibration-causing equipment at the least sensitive times of the day (wherever possible) • Locating high vibration sources as far away from sensitive receiver areas as possible • Sequencing operations so that vibration-causing activities do not occur simultaneously • Keeping equipment well maintained. • Do not conduct vibration intensive works within the	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	recommended safe setback distances • Where these setbacks can't be maintained, notify receiver(s), conduct inspections and monitoring to verify resulting levels, assess impacts and inform the need to modify works as necessary • Where required attended vibration measurements will be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic and heritage building damage • Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted maintaining the setback distances cannot be achieved		
	A complaint management procedure will be developed. Community complaints will be allocated to a responsible contractor representative immediately to facilitate investigation, respond to the complainant, review noise mitigation measures and to implement any corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.	Construction	Hunter Water / Contractor
	• Switch off construction vehicles whenever not in-use. • Schedule the timing of vehicle movements to reduce hourly vehicle movements • Avoiding the use of compression brakes.	Construction	Contractor
	When the final OCU is selected, the external noise performance of the unit will be verified and confirmed by the supplier to be able to achieve the 43 dB(A) residential night noise limit (or alternatively achieve a maximum external sound power level of 84 dB(A)), at all times.	Detailed design	Hunter Water
Air quality and odour	A risk assessment will carried out to determine if temporary odour mitigation works will be required during the construction and repair works. If required, a temporary OCU will be installed on the bypass line to treat air prior to discharge.	Detailed design/ Construction contractor	Hunter Water
	During construction, the following measures will be considered and implemented where possible: • Machinery and vehicles will not be left running or idling when not in use • Equipment, machinery and vehicles used on site would be maintained to manufacturer's specifications to minimise potential emissions • Methods for management of emissions to be incorporated into project inductions, training and prestart talks	During construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	Odour or air pollutant emission complaints will be dealt with promptly and the source will be eliminated wherever practicable.	During construction	Contractor
	Visually monitor dust and where necessary: • Apply water (or alternate measures) to exposed surfaces that are generating dust • Appropriately cover loads on trucks transporting material to and from the construction site • Securely fix tailgates of road transport trucks prior to loading and immediately after unloading • Avoid dust generating works during strong winds • Prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.	During construction	Contractor
	Contractors are required to report in the 'Contract Environmental Management Report' monthly energy usage information to Hunter Water.	During construction (monthly)	Contractor
Non-Aboriginal heritage	If Non-Aboriginal heritage items are discovered during the course of the proposal, all work will cease in the area and the Contractor will inform the Hunter Water Project Manager and Archaeologist as soon as possible. Hunter Water will determine the preferred management approach and the local council and/or Heritage NSW will be notified via the Hunter Water Project Manager if required.	Construction	Contractor
Aboriginal heritage	In the event that an Aboriginal object (or objects) is uncovered during the proposal, ground disturbance works would cease within 20 metres of the object(s) and the Hunter Water Archaeologist should be contacted. The Hunter Water Archaeologist would advise the Heritage Office and the relevant Aboriginal parties so that appropriate management strategies can be identified.	Construction	Contractor/ Hunter water
	In the unlikely event that human skeletal material is uncovered during the construction works, all works should cease within 20 metres of the skeletal remains. Should the remains be verified as human, the NSW Police and OEH will be contacted. No works will proceed within the vicinity of the skeletal remains until an appropriate course of action has been determined in consultation with NSW Police, OEH and Aboriginal parties (if the remains are identified as Aboriginal).	Construction	Contractor/ Hunter water
Visual amenity	• Restore work sites as close to their original condition as possible at completion of the works • On completion of the works, all vehicles, construction equipment, materials, and refuse relating to the works will be removed from the work site(s) and any adjacent affected areas	Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	• Work areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day • Where lighting is required, it is to be orientated to minimise glare and light spill impacts on adjacent receivers • Clear the minimum amount of vegetation necessary.		
	• Consideration will be given to the colour of the OCU. This may include the option of painting the OCU or choosing materials that will blend in with the existing infrastructure • Retention and enhancement of existing landscape features (areas of scrub, individual trees) will be considered where feasible • Mitigation such as screening will be considered to visually integrate the proposal within the surrounding landscape.	Detailed design	Hunter Water
Traffic and access	A TMP will be developed for the construction, including access, transport and timing of the proposal	Prior to construction	Contractor
	• The use of the Marketown northern driveway and carpark would be in agreement with Marketown • The bypass pipeline of the main sewer to the storge wells would be located above ground and as close as the fence line as possible to reduce the impact on car parking spaces. The loss of cark parking spaces would be negotiated and agreed with Marketown.	Prior to construction	Contractor
	• Appropriate exclusion barriers, signage and site supervision will be employed at all times to ensure that the work site is controlled and that unauthorised vehicles and pedestrians are excluded from the works area • Movements of heavy vehicles would be restricted to standard work hours (i.e 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday) • Parking of light vehicles will be within the proposal area to minimise interference with vehicle movements of local residents and users of the Marketown.	Construction	Contractor
	• A plan will be required for any fencing or hording works in the road reserve and any proposed road closures. The plan will be provided to Council's traffic section for approval. This will also relate to any parking changes in the road reserve. The fencing will allow for single unit heavy vehicles to access the road and service the businesses who have their driveways access from King Street. • Any asset damage within the road reserve affected by proposed construction will be rectified in full to the		

Impact	Mitigation measure	Timing	Responsibility
	discretion of the Public Utilities Officer • Maintenance of the area fenced off will be the responsibility of Hunter Water for the duration of the project • Asset information from must be sought from Council's Public Utilities Officer before your works proceed • The stipulations as part of the City of Newcastle consent under section 138 of the Roads Act will be followed, refer to **Table 5-2** and the City of Newcastle T&ISEPP response (**Appendix B**).		
Land use and services	Land subject to temporary use for the proposal including the construction area which includes the ancillary and laydown area and access will be rehabilitated as soon as practicable to an appropriate condition in agreement with the landowner.	Prior to construction	Hunter Water
	Provide at least seven days' notice to affected receivers prior to starting work unless it is emergency works or it is discussed with the affected receivers face-to-face. Include the following information in notification letters: • A description of the works and why they are being undertaken • Details of the works that will be noisy • Work hours and expected duration • What is being done to minimise the impacts (eg respite periods) • 24 hour contact number.	Seven days prior to works commencing	Contractor
	• Where entry to private properties is required, a notice of entry letter will be provided at least 14 days in advance. • Maintain a complaints register and respond to any complaints and notify the Hunter Water Project Manager as soon as possible within 24 hours. • The contractor will personally contact the occupant when they enter a private property to notify of their presence and what works are intended. • Any accidental damage to property occurred by the works must be immediately reported to the Hunter Water Project Manager and repaired in consultation with the owner. • Erect signage containing project information and contact details in a prominent location.	Prior to construction /	Contractor
	All services in the vicinity of the works will be located in the field and 'pegged-out' and noted in the Environmental Management Plan and/or work plans prior to excavation works - "dial 1100 before you dig".	Prior to ground penetrating work	Contractor

Impact	Mitigation measure	Timing	Responsibility
Waste generation	The Contractor's recycling and reuse proposal will be detailed in the CEMP following the resource management hierarchy principles (in accordance with the WARR Act). • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort.	Prior to construction	Contractor
	• Dispose of all excess material (that cannot be reused or recycled) as soon as practicable, to a facility licensed to accept the waste as per the waste classification results (tested by a suitably qualified person in accordance with the NSW Waste Classification Guidelines 2014) • Retain disposal receipts and provide to Hunter Water contract manager on request • All waste including the vent stack and spent activated carbon media would be classified and disposed in accordance with Waste Classification Guidelines (NSW EPA, 2014).	Construction	Contractor
	Segregate and label waste to improve recycling opportunities, avoid cross contamination and reduce disposal costs.	Construction	Contractor
	Any excess stockpile material would be disposed of at a licenced recycling or waste facility.	Construction	Contractor
	Cover waste receptacles and locate away from drainage lines.	Construction	Contractor
	All vessels used for contaminated or hazardous waste should be sealed, labelled according to their contents, and stored within bunded areas until their removal from the work site.	Construction and operation	Contractor
	Any fuel, lubricant or hydraulic fluid spillages will be collected using absorbent material and the contaminated material disposed of at a licensed waste facility.	Construction	Contractor
Cumulative impacts	Consult and coordinate with proponents of nearby projects to assess and manage cumulative impacts. Revise the CEMP to address these impacts as they become known.	Prior to and during construction	Contractor
	• Discuss works schedules and timings with the proponents of other works to gain an understanding of when noisy work surrounding the proposal will take place. Should respectively project schedules and work priorities change, proponents should commit to regular meetings to ensure all proponents	Hunter Water / Construction	Contractor

Impact	Mitigation measure	Timing	Responsibility
	are aware of the changes • Where possible, schedule works to occur at different times of the day to prevent multiple noisy activities from taking place at the same time • Where possible, schedule works to take place at different locations within the proposal area to prevent noisy activities from taking place in close proximity to one another which will limit the amplification of the noise.		

8 CONCLUSION

8.1 Justification

The existing NW1 WWPS has been the subject of odour complaints over the last decade and recent assessments have identified that the vent stack and the inlet well and chambers require remediation and replacement work.

The proposal would remediate and replace infrastructure at NW1 WWPS to enable ongoing operation and maintenance of a critical Hunter Water asset. It would also help to minimise odour emissions and improve the liveability for nearby residents and the general public around Marketown.

The principles of ESD are discussed in **Section 8.2** and the social, biophysical and economic considerations are as follows:

- Social Factors: The proposal would require temporary leases on portions of the King Street access road and Marketown carpark to construct the proposal. In addition, there would be some short-term traffic and access impacts, as well and amenity (noise, dust, odour and visual) impacts during construction of the proposal. The use of the Marketown carpark to facilitate the works would impact on the total amount of available carparking spaces.

  Long-term positive social impacts would arise from the proposal. As the proposal would help to minimise odour emissions to assist in improving the liveability for nearby residents and the general public around Marketown. While the removal of the existing vent stack would also protect the general public from potentially critical consequences should it collapse, and the remediation of the inlet well would enable ongoing operation and maintenance of a critical Hunter Water asset

- Biophysical factors: Adverse biophysical impacts would mostly occur during the construction phase of the proposal due to the removal of up to 12 trees
- Economic Factors: The replacement of the vent stack and remediation of the inlet well would enable ongoing operation and maintenance of a critical Hunter Water asset. The workforce used to build the proposal would also contribute to the local and regional economy during construction that would see workers utilise local services and amenities
- Public interest: The public interest is best served through the equitable distribution of resources, and investment in public infrastructure that fulfils the needs of the majority. The proposal represents an investment in public water infrastructure that would increase the capacity for current and future planned growth.

  Although the proposal would result in some short-term impacts on amenity during construction, these impacts would be outweighed by the long-term benefits once the proposal is operational. As a result, the proposal is considered to be in the public interest.

8.1 Objects of the EP&A Act

Table 8-1 summarises the objects of the EP&A Act in relation to the proposal.

Table 8-1 EP&A objects

Object	Consistency
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal would improve the social and economic welfare of the community by improving the sewer service to help minimise odour emissions, improve safety and enable ongoing operation and maintenance of a critical Hunter Water asset.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in **Section 8.2** below.
1.3(c) To promote the orderly and economic use and development of land.	The proposal has considered and is responding to anticipated growth within the area.
1.3(d) To promote the delivery and maintenance of affordable housing.	The proposal would provide improved wastewater infrastructure for current and future populations.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The proposal would require the removal of up to 12 trees. None of these trees are a threatened species or part of a TEC. The proposal is unlikely to have a significant impact of biodiversity, refer to **Section 6.3**.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal is unlikely to have an impact on built and cultural heritage. Refer to **Section 6.6** and **Section 6.7**, respectively.
1.3(g) To promote good design and amenity of the built environment.	Not relevant to the proposal.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The community would be advised of proposed construction and timing.

8.2 Ecologically Sustainable Development

ESD is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD were an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD and how the project responds to these principles are discussed below.

Precautionary principle

The proposal has sought to take a precautionary approach to minimising environmental impact. This has been applied through the development of a range of environmental mitigation measures, as summarised in **Chapter 7**. These mitigation measures would be implemented during construction and operation of the proposal.

No mitigation measures have been postponed as a result of lack of scientific certainty or as a result of a lack of information. The selected construction contractor would be required to prepare a CEMP before commencing construction.

Intergenerational equity

The proposal would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations by improving the sewer service to help minimise odour emissions, improve safety and enable ongoing operation and maintenance of a critical Hunter Water asset. While the proposal would have some adverse impacts, they are not considered to be of a nature that would result in disadvantage to any specific section of the community or to future generations.

Conservation of biological diversity and ecological integrity

The proposal is generally located in an area that has previously been modified as a result of the construction of the existing WWPS development in the area. Conservation of biological diversity and ecological integrity has been considered during all stages of the proposal's development. Potential impacts have been avoided where possible and mitigation measures have been included where necessary. The proposal would not have a significant impact on any existing flora and fauna species, biodiversity communities or the overall biological integrity of the proposal and nearby areas.

Improved valuation, pricing and incentive mechanisms

Environmental and social issues were considered in the planning and establishment of the need for the proposal, and in consideration of various proposal options. The value placed on environmental resources is evident in the extent of the planning and environmental investigations, and in the design of the proposed mitigation measures. Implementation of these mitigation measures would result in an economic cost to Hunter Water, which would be included in both the capital and operating cost of the proposal.

8.3 Conclusion

The proposal is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the proposal objectives but would still result in some impacts on property, traffic and access as well as amenity (noise, air quality – including odour and visual).

Mitigation measures as detailed in this REF would mitigate or minimise these expected impacts and as such the proposal is not likely to have a significant environmental impact.

The proposal would improve the existing wastewater infrastructure for current and future populations.

Significance of impact under NSW legislation

The proposal is not likely to cause a significant impact on the environment. Therefore, it is not necessary for an EIS to be prepared and approval to be sought from the Minister for Planning and Homes under Division 5.2 of the EP&A Act. A BDAR or SIS is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from council is not required.

Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on MNES or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the DAWE is not required.

9 DECLARATION

This Review of Environmental Factors provides a true and fair review of the activity in relation to its likely impact on the environment. It addresses to the fullest extent possible, all the factors listed in Clause 171(2) of the EP&A Regulation (as amended) and the EPBC Act (as amended).

Signed:

Name: Tina Donovan

Position: Associated Environmental Scientist

Date: 28/07/2022

10 REFERENCES

Acoustic Logic, 2020. 42 Honeysuckle Drive, Newcastle Revised DA Acoustic Assessment. Acoustic Logic, Mascot, NSW.

Department of Environment and Climate Change (DECC), 2009. Interim Construction Noise Guideline

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Umwelt, 2020. Heritage impact statement for the proposed demolition of the Newcastle West WWPS Vent Shaft, Newcastle with accompany archival recording.

APPENDIX A. CLAUSE 171 (2) ENVIRONMENTAL FACTORS CHECKLIST

The table below demonstrates Hunter Water's consideration of the specific factors of clause 171(2) of the EP&A Regulation 2021 in determining whether the proposal would have a significant impact on the environment.

Has the REF considered the following points?	Positive	Negative
(a) the environmental impact on a community	Long term minor	Short term minor
(b) the transformation of a locality	Long term minor	Short term minor
(c) the environmental impact on the ecosystems of a locality	Nil	Nil
(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	Long term minor	Short term minor
(e) the effects on a locality, place or building that has – 1. aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or 2. other special value for present or future generations	Nil	Long term minor
(f) the impact on the habitat of protected animals *(within the meaning of the BC Act)*	Nil	Nil
(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air	Nil	Nil
(h) long-term effects on the environment	Long term minor	Short term minor
(i) degradation of the quality of the environment	Long term minor	Short term minor
(j) risk to the safety of the environment	Long term minor	Short term minor
(k) reduction in the range of beneficial uses of the environment	Nil	Nil
(l) pollution of the environment	Long term minor	Short term minor
(m) environmental problems associated with the disposal of waste	Nil	Short term minor

Has the REF considered the following points?	Positive	Negative
(n) increased demands on natural or other resources that are, or are likely to become, in short supply	Nil	Nil
(o) the cumulative environmental effect with other existing or likely future activities	Nil	Short term minor
(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions	Nil	Nil
(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	Nil	Nil
(r) other relevant environmental factors	Nil	Nil

APPENDIX B. AGENCY CONSULATION

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657
enquiries@hunterwater.com.au
hunterwater.com.au

21/07/2022

Our Ref: HW 2021-1308/4/3.040

The Manager
Newcastle City Council
PO Box 489
Newcastle NSW 2300

Email: mail@ncc.nsw.gov.au

Hello from Hunter Water

Consultation regarding the proposed upgrade of Newcastle West 1 Wastewater Pumping Station

Hunter Water owns and operates a large and complex wastewater network including pumping stations, wastewater treatment works and sewer mains.

To help minimise odour emissions, improve safety and enable ongoing operation and maintenance of the Newcastle West 1 Wastewater Pumping Station (NW1 WWPS), we're proposing to upgrade infrastructure at the site (the proposal). Appendix A and B have been provided for further information on this proposal.

A Review of Environmental Factors (REF) is currently being prepared by Jacobs on behalf of Hunter Water. The purpose of the REF is to assess the likely impacts associated with the proposal under Part 5 of the *Environmental Planning and Assessment Act 1979*.

Under the *State Environmental Planning Policy (Transport and Infrastructure) 2021*, Hunter Water is required to consult with Newcastle City Council under Chapter 2, Division 1, clause 2.10 and 2.12, as the proposal would impact on Council road infrastructure and is located within flood liable land.

Please provide any comments about this proposal within 21 calendar days from the date of this letter. Hunter Water will consider any response received from Newcastle City Council within this period in its assessment of the proposal.

If you require further information, please contact Johnny Landman on 0417 218 495 or email johnny.landman@hunterwater.com.au

Yours Sincerely,

Johnny Landman
Project Manager
Hunter Water Corporation

Appendix A: Proposal description

Background

Hunter Water proposes to upgrade infrastructure at the NW1 WWPS located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle West 1 WWPS (the proposal).

The proposal key elements include:

- Demolition and replacement of the existing 27 metre wooden vent stack
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the Inlet Well.

NW1 WWPS was initially constructed between 1909 and 1926 and has been the subject of odour complaints. Recent assessments of the NW1 WWPS have identified that the vent stack and the Inlet Well and chambers require remediation and replacement work.

The proposal is needed to upgrade infrastructure at NW1 WWPS to enable ongoing operation and maintenance of a critical Hunter Water asset and help to minimise odour emissions and to improving the liveability for nearby residents and the general public around Marketown.

Location

NW1 WWPS is located on an existing Hunter Water easement at the northeast corner of the Marketown carpark adjacent to the King Street access road within the Newcastle City Local Government Area (LGA) as shown in Appendix B.

The proposal area which includes two indicative locations for ancillary and laydown is also shown on Appendix B. These laydown areas may be used for the temporary storage of plant and materials.

Construction methodology

The proposal would include the following construction stages and activities.

- Site establishment/mobilisation:
  - Set up and implement environmental management plan which would include risks and mitigation measures for the activity sequence
  - Obtainment of all work permits and site approvals as necessary
  - Location of services and protect if necessary
  - Install site fencing
  - Mobilisation of temporary ancillary and laydown areas
  - Set up site amenities
  - Temporary closure of the left-hand lane of King Street access road
  - Temporary closure of Marketown carpark's north entry
  - Temporary relocation of the post storage box to east of King St access road
  - Sediment and erosion controls would be put in place
  - Vegetation clearing of up to 12 individual trees
- Construction of the new 12 metre high vent stack and temporary OCU bypass:
  - Earthworks
  - Pour new vent stack footing
  - Commission new vent stack
- Temporary OCU bypass pipework from storage wells to vent stack:
  - Penetrate Storage Well 1, Storage Well 2 and the Inlet Well to installation the temporary OCU bypass pipeline between the wets wells to new vent stack
  - Discharge the air flow from the existing stack through the OCU bypass pipeline and new stack. This would allow the decommissioning and removal of the existing stack

    - Risk assessment to determine if temporary odour mitigation works would be required during construction
    - Installation of a temporary OCU on the bypass line to treat air prior to discharge (if required).
- Demolish existing vent stack in sections and appropriate disposal.
- Divert incoming sewers (gravity, Oviform and pressure sewer) to Storage Well 2 to isolate the Inlet Well. This would include setting up temporary above ground pipework, submersible pumps and above ground diesel pumps to divert the sewers. The bypass of the main sewer to Storage Well 2 would be located above ground and as close to the fence line as possible to reduce the impact on car parking spaces
- Install new OCU and connect to vent pipework and vent stack
- Inlet Well remediation:
    - Cut and removal of the Inlet Well lid to facilitate the Inlet Well remediation
    - Pump out and blast clean inlet well
    - Secure inside of the Inlet well to allow access and emergency extraction
    - Carry out the Inlet well remediation
    - Install new roof
    - Commission Inlet Well
- Remove sewer diversion and reinstate sewage inflow to back into the Inlet Well
- Site disestablishment/demobilisation and site restoration:
    - Removal of temporary ancillary and laydown areas as well as clear up stockpiles
    - All construction material would be removed from site and the area would be rehabilitated
    - Erosion and sediment controls would be in place until the site is stabilised with grass groundcover.

Two sections of the King Street access road would need to be temporary closed to facilitate the construction of the proposal, refer to Appendix B.

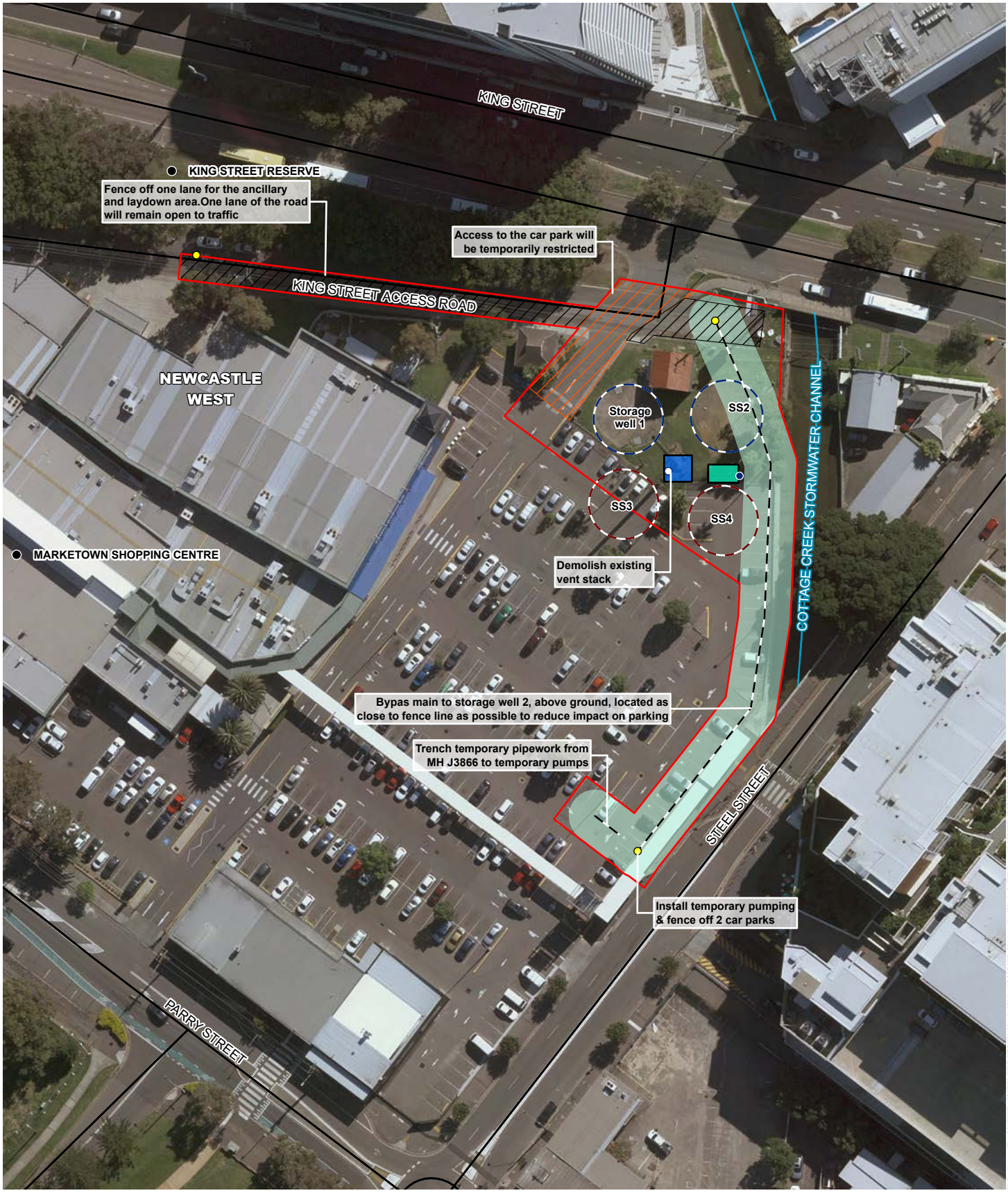
The new OCU which would operate 24 hours a day, 365 days of the year. It would be situated on a on a bunded concrete platform about 600 millimetres above the one per cent (%) Annual Exceedance Probability (AEP) flood level (2.33 metres AHD). The platform would be about 11.2 metres long and up to about 4.30 metres wide along the widest edge. The proposal is not anticipated to alter flooding patterns more than to a minor extent.

Timing

The detail design and construction of the proposal has been anticipated to commence in early 2023.

The proposal would generally be carried out during standard construction hours.

However, out of hours works may be required (night and weekends) to order to expedite the works in order to avoid potential impacts on access and Marketown. Stakeholders potentially impacted by the proposal, including local residents and businesses, would be contacted before work begins and any out of hours work in accordance with the Hunter Water out of hours work procedures.



Proposal area
Sewer main bypass
Sewer main bypass 5m buffer
Ancillary Site
Access temporarily restricted

Temporary pump
Demolish existing vent stack
New vent stack
Decommissioned storage well
Existing wet well
Inlet well
Odour control unit

Waterway

0 20 40 m

1:1,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Aerometrex 2021

Appendix B The proposal

Subject: FW: Correspondence - NCC- Consultation regarding the proposed upgrade of Newcastle West 1 Wastewater Pumping Station

Attachments: Letter - NW1 WWPS TISEPPletter_NCC 21-07-2022.pdf; IA410300_GIS_F010_v01 _Proposal_LR_Appendix B.PDF; marketown.jpg; CityofNewcastlePublicUtilityResponseDocument2020r.pdf

From: David Hough [redacted]
Sent: Friday, 22 July 2022 11:08 AM
To: Johnny Landman <[redacted]
Cc: [redacted]
Subject: Correspondence - NCC- Consultation regarding the proposed upgrade of Newcastle West 1 Wastewater Pumping Station

Thank you for your notification.
Any fencing or hording works will need a plan provided to Council's Traffic section for approval in the road reserve including any proposed road closures. This will also relate to any parking changes in the road reserve. The fencing will allow for single unit heavy vehicles to access the road and service the businesses who have their driveways access from King Street. No Council Tree Assets will be damaged or impinged upon by the proposal. Any asset damage within the road reserve affected by proposed construction will be rectified in full to the discretion of the Public Utilities officer. Maintenance of the area fenced off will be the responsibility of Hunter Water for the duration of the project.

COUNCIL IS NOT ON DIAL BEFORE YOU DIG – SO YOU NEED TO OBTAIN OUR ASSET INFORMATION BEFORE YOUR WORKS PROCEED

You must contact Council's Public Utilities Officer

Consent has been granted for the proposal under s138 of the Roads Act noting the following comments:

- Please read and follow The Standard Public Utility response
- Boring methods to be utilised where possible. Pit lids will need to be set flush, you will bore under driveways and within TPZ. No pits to be located within a TPZ.
- Care to be taken near Council Street tree assets, you will read and follow the urban tree guide.
- For all works, when working with the tree protection zone (TPZ) of a tree, arboricultural supervision is to be employed (minimum AQF level 5)
- Site compound, storage of vehicles equipment, machinery, materials, spoil, or any construction related material must be located outside the TPZ of trees.
- Where roots greater than 30mm or branches may require pruning on a public tree asset, please call CN for inspection, 4974 2000.
- Any tree damage must be reported to CN for inspection, 4974 2000.
- Tree removal applications must contain a feasibility assessment of alternate options and include arboricultural advice (minimum AQF level 5)
- Where tree removal has been accepted, replacement offsets will be calculated based on loss of canopy. This may require multiple compensatory replacement plantings for each tree removed.
- Any public notification shall also be provided to CN to be held in the customer care centre, in the event of customer requests. This information may also appear on CN's website.
- Drainage and asset information will need to be confirmed on site.
- You will notify and consult with residents prior to works commencing.

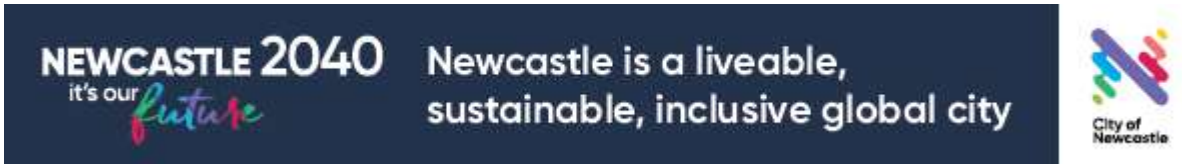
- You must notify the RMS (road authority on main roads) https://roads-waterways.transport.nsw.gov.au/classification/map/
- Road restoration will be undertaken as directed by the Public Utility Officer.
- Please note you are operating near survey marks which will be affected by your works. You will be held responsible if they are damaged and you may be prosecuted if they are disturbed or destroyed and charged for their reinstatement. https://www.spatial.nsw.gov.au/__data/assets/pdf_file/0004/229945/Protecting_survey_marks_-_Information_Sheet.pdf
- https://www.spatial.nsw.gov.au/__data/assets/pdf_file/0005/217094/Direction_No._11.pdf

- Whoever ends up doing the works will submit a S138 type 1 application for restoration works.
- A minimum of 2 days' notice must be given to Council's Public Utilities Officer Mr Rod Price (Ph: 4974 6031 or 0413 154 858) before works are to commence.

David Hough | Asset Project Officer
City of Newcastle | Infrastructure & Property
Assets & Projects | Asset Services
T: +61249742643 | M: 0477729469 | E: dhough@ncc.nsw.gov.au

Newcastle is a liveable, sustainable, inclusive global city.
Cooperation | Respect | Excellence | Wellbeing

City of Newcastle acknowledges the Traditional Custodians of the land of the Newcastle LGA, the Awabakal and Worimi peoples.



From: Johnny Landman <johnny.landman@hunterwater.com.au>
Sent: Thursday, 21 July 2022 1:28 PM
To: Official Mail <officialmail@ncc.nsw.gov.au>
Cc: [redacted]
Subject: NCC- Consultation regarding the proposed upgrade of Newcastle West 1 Wastewater Pumping Station

To whom it may concern

RE: REF - Consultation regarding proposed upgrade of Newcastle West 1 Wastewater Pumping Station

Hunter Water proposes to upgrade infrastructure at the Newcastle West 1 Wastewater Pumping Station (NW1 WWPS) located on the northern boundary of Marketown Shopping Centre (Marketown), to help minimise odour emissions, improve safety and enable ongoing operation and maintenance of the pumping station.

A Review of Environmental Factors (REF) is currently being prepared by Jacobs on behalf of Hunter Water. The purpose of the REF is to assess the likely impacts associated with the proposal under Part 5 of the *Environmental Planning and Assessment Act 1979*.

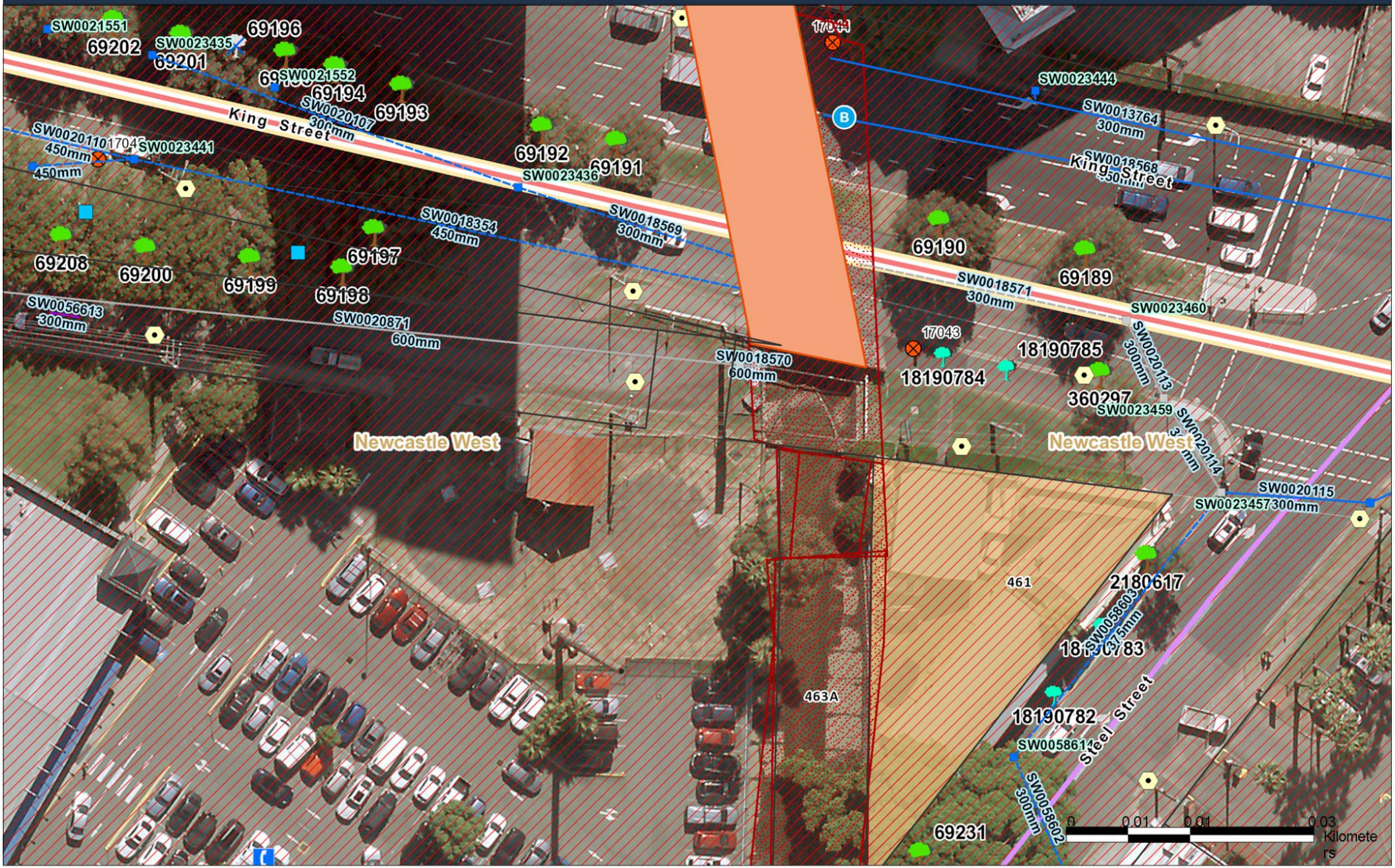
Please provide any comments about this proposal within 21 calendar days from the date of this letter. Hunter Water will consider any response received from Newcastle City Council within this period in its assessment of the proposal.

Regards

Johnny Landman

Senior Project Manager – Asset Solutions | Major Projects Group | Hunter Water Corporation
36 Honeysuckle Drive Newcastle NSW 2300 | PO BOX 5171 HRMC NSW 2310
| **M** 041 721 8495 | Twitter: @hunterwater
johnny.landman@hunterwater.com.au | hunterwater.com.au

Title



Created by CN Geospatial Information Services - Date:22/07/2022

Scale: 1500.00 at A4

Newcastle 500 Works and Restoration

Works Timing Exclusion

No physical construction works to occur between approximately second Friday in October and the end of December each year that motor racing is conducted in any areas east of Bolton Street Newcastle. During this time works will be affected by the Motor Racing (Sydney and Newcastle) Act 2008 and will require additional approval from the NSW Government. For futher information and assistance please contact the City's Major Events Team at events@ncc.nsw.gov.au.

Applicable Locations:

- Wharf Road between Nobbys Road and Watt Street Newcastle
- Watt Street between Wharf Road and Scott Street
- Watt Street Newcastle between Scott Street and Hunter Street
- Watt Street Newcastle between Hunter Street and King Street
- Watt Street Newcastle between King Street and Church Street
- Shortland Esplanade between Watt Street and Zaara Street
- Zaara Street between Shortland Esplanade and Scott Street
- Scott Street between Zaara Street and 50m of Parnell Place
- Parnell Place between Scott Street and Stevenson Place
- Nobbys Road from Stevenson Place to Wharf Road
- Park being all of Camp Shortland situated between Nobbys Beach, Wharf Road, Horseshoe Beach Access Road and Horseshoe Beach
- Park being of all Foreshore park between Watt Street and Nobbys Road and Newcastle Harbour

Road Restoration

- Longitudinal trenching along all road surfaces listed in applicable locations above.
- Cross trenching of road is not permitted at all of the following locations (no open trenching or asphalt disturbance):
    - Wharf Road between Nobbys Road and Watt Street (pit straight and Turn 1 and Turn 11)
    - Watt Street from Wharf Road south for 50m (exit Turn 1)
    - Watt Street from Church Street 50m north towards King Street (Turn 2)
    - Shortland Esplanade from Watt Street to 50m east of Zaara Street (Turn 2,3,4,5,6&7)
    - Zaara Street at Scott Street intersection (Turn 8)
    - Scott Street at Parnell Place intersection (Turn 9)

- Nobbys Road extended between Wharf Road and Horseshoe Beach car park (Turn 10)
- Pasha Way Full length
- Horseshoe Beach Access Road full length

- Restoration of roads shall containing minimum 500mm overlaps of subgrade, sub base and base and final wearing surface - refer to CN standard drawing *A1101 - Flexible Road Pavements Repair Details*.
- Asphalt restoration may consist of both final 50mm wearing surface and subsequent layers below where asphalt has been used in pavement layers.
- Minimum asphalt width across roads shall be the full width of the road and for a minimum length of 30m along the road.
- All asphalt works to confirm with RMS R116 Specification and Quality Assurance documentation.
- Final asphalt wearing shall be 50mm AC14 at all locations.
- Laying of asphalt shall only be undertaken by self-propelled paving machines.
- All road openings to be completed restored within four (4) weeks with asphalt.

Footpath Restoration

- All footpath restoration shall be **full width and length of the disturbance**

Comments and Conditions
Public Utility Works

1. The works being carried out in accordance with the relevant provisions of the Model Agreement for City of Newcastle's (CN) and Utility/Service Providers (1999) and Guide to Codes and Practices for Streets Opening (2009).

2. City of Newcastle being given a minimum of 2 days notice prior to the work commencing to arrange an on-site meeting with CN's Public Utilities Officer on (02) 4974 2000 regarding execution of the work. The Public Utilities officer also needs to be advised of any variations/alterations to the works listed in the proposal prior to the work being undertaken so he can arrange for comment.

3. If any archaeological relics are discovered during excavation, work must cease immediately in the affected area and the Heritage Council must be notified in writing in accordance with section 146 of the Heritage Act 1977. Depending on the nature of the discovery, assessment and possibly an excavation permit may be required by the Heritage Council prior to the recommencement of excavation in the affected area. The Heritage Council can be contacted on (02) 9873 8500 or at heritagemailbox@environment.nsw.gov.au.

   If any Aboriginal objects are discovered on the site, excavation or disturbance is to cease immediately and the Office of Environment & Heritage (OEH) is to be informed in accordance with section 89A of the National Parks and Wildlife Act 1974. More information is available at: *http://www.environment.nsw.gov.au/licences/ACHregulation.htm* or contact the Environment Line on 131 555.

4. **Protection of heritage assets**
   Sandstone kerb and gutter, heritage brick paving and ashlar paving must be preserved / retained in situ. Where it is anticipated that there is a risk of potential disturbance of such assets, timely discussion with CN's s Infrastructure Planning section must occur at the beginning of the project as temporary storage of the asset at CN's depot may be required. Please refer to the attached document identifying 'Heritage Road Assets' which may be encountered whilst working within CN's boundaries. NOTE: - see attached PDF. City of Newcastle's Infrastructure Planning section can be contacted on (02) 4974 2000 or at utilities@ncc.nsw.gov.au.

   Please refer to the following relevant statutory links concerning heritage items and sites:

   Newcastle LEP 2012 – Schedule 5 Environmental Heritage (Follow the link to schedule 5 which includes all heritage items, heritage conservation areas and archaeological sites that have statutory protection under the EP&A Act 1979 (as amended)

   http://www.legislation.nsw.gov.au/maintop/view/inforce/epi+255+2012+cd+0+N

   NSW State Heritage Register (The NSW SHR contains the items and sites that are statutorily protected under the NSW Heritage Act 1977 (as amended)

   http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx
   To carry out activities to a site within a Heritage Conservation Area, written endorsement must be gained from CN's Heritage Planner when making changes to these properties. City of Newcastle's written endorsement must be sought to confirm whether the proposed works are regarded under Clause 5.10(3) of the Newcastle Local Environmental Plan 2012 (LEP) as 'Minor work' or 'Maintenance' not likely to affect the heritage significance of the property within a heritage conservation area and that development consent is not required. Alternatively, if

CN is not satisfied you will be requested to submit additional information and/or lodge a development application under Clause 5.10(2) of the LEP. Submission requirements will depend on the nature of the proposed works. This may comprise a site plan, floor plans, elevations, photographs of the property and the surrounding streetscape, specifications, a brief statement describing the heritage attributes of the property, and/or other relevant documentation to explain the proposal. CN's Heritage Planner can be contacted on (02) 4974 2000 or at utilities@ncc.nsw.gov.au.

The Heritage Council should be contacted on ph. (02) 9873 8500 or at heritagemailbox@environment.nsw.gov.au for any proposed works to an identified archaeological site. Written approval must be gained from the Heritage Council when any excavations are proposed to an identified archaeological site.

Heritage items within CN's boundaries are designated within Schedule 5 of the Newcastle LEP 2012 as either of 'Local' or 'State' significance.

The Heritage Council should be contacted on ph. (02) 9873 8500 or at heritagemailbox@environment.nsw.gov.au for any proposed works to a heritage item of State significance. To carry out activities to a heritage item of State significance listed on the State Heritage register (SHR) or to which an interim heritage order (IHO) applies, written exemption or approval must be gained from the Heritage Council under the Heritage Act 1977 when making changes to these heritage items.

To carry out activities to a heritage item of Local significance listed on the State Heritage register (SHR), written endorsement must be gained from CN's Heritage Planner when making changes to these heritage items. CN's written endorsement must be sought to confirm whether the proposed works are regarded under Clause 5.10(3) of the Newcastle Local Environmental Plan 2012 (LEP) as 'Minor work' or 'Maintenance' not likely to affect the heritage significance of the heritage item and that development consent is not required. Alternatively, if CN is not satisfied you will be requested to submit additional information and/or lodge a development application under Clause 5.10(2) of the LEP. Submission requirements will depend on the nature of the proposed works. This may comprise a site plan, floor plans, elevations, photographs of the heritage item and the surrounding streetscape, specifications, a brief statement describing the heritage attributes of the item, and/or other relevant documentation to explain the proposal. CN's Heritage Planner can be contacted on (02) 4974 2000 or at utilities@ncc.nsw.gov.au."

5. Proposed pits nominated for installation at street corners must not be placed at the centre of the corner. Placement should be around the corner in one or other of the streets.

6. Where public street trees are located along a proposed route, CN recommends that boring methods be used to install any conduit / pipelines at a minimum depth of 800mm to minimise the impact on the trees. Please refer to the attached document on managing and protecting public tree assets and CNs' Urban Forest Technical Manual

7. The location of all public utility services in proximity to the proposed works is the responsibility of the applicant/contractor who must contact the Dial-Before-You-Dig Service prior to commencement of work.

8. The Roads and Maritime Services (RMS) are to be notified of any proposal if any of their controlled State Roads are affected. You must seek RMS approval, or permission to access the RMS Corridor. This request must be referred to: RMS Hunter Region Asset Officer; **Email:** Hunter_Road_Asset@rms.nsw.gov.au or mail - Roads & Maritime Services - Locked Bag 30, Newcastle NSW 2300

Hunter and Scott Streets are now within the control of Transport for NSW and the RMS and Keolis Downer. You will need permission to undertake works within this zone. City of Newcastle does not have WAE drawings for the area, you will need to seek these from Transport for NSW to ascertain utility and other asset locations within the footway.

You must contact the RMS and Keolis Downer with your proposal

Keolis Downer Hunter (KDH)		
Operations Control Centre (OCC)	24 hour number	02 49 286 333
Operations Manager	Darren Carey	0459 082 130
Operations Coordinator	Cameron Waugh	0411 666 116

https://www.newcastletransport.info/uploads/files/working_around_light_rail/SiteAccessPermitDetermination(003).pdf

https://www.newcastletransport.info/uploads/files/working_around_light_rail/09523-HazardZoneDLAPRIL19(V6).pdf

Roads and Maritime Services (RMS)		
Field Traffic Manager	Bruce Kimber	0411 406 845
Infrastructure Services Manager	Joe Krsul	0411 111 946
Traffic Signals Manager	Khan Pussegoda	0413 008 690
Traffic Signals Supervisor	Kyle Saunders	0411 264 282

You will need to obtain:

1. If the works are allowed by the RMS and Keolis Downer then you will need a road occupancy permit for footway works issued by CN (utilities@ncc.nsw.gov.au) – reserved rights for access and you will make application and contact the Public Utilities Officer with a minimum of 2 days' notice given to CN's Public Utilities Officer Mr Rod Price (Ph: 4974 6031 or 0413 154 858) before works are to commence. You will submit a S138 type 1 application for restoration works prior to works being undertaken. Road restoration will be undertaken as directed by the Public Utility Officer.
2. Road Occupancy licence (RMS) if in front of face of Kerb (confirmation with RMS if ROL is required for works adjacent to the road.) – a copy will be supplied to CN.
3. Notification and approval from Keolis Downer Hunter Operations Control Centre (KHD OCC) - a copy will be supplied to CN.
4. Dial before you dig

As the works are new there are no accurate Dial Before you dig documentation. You will need to obtain from the RMS work as executed plans for the area.

9. Please refer to the attached document *Conditions for works on telecommunication pits and pipelines* regarding works on existing telecommunication infrastructure which may contain hazardous substances.

10. The work is to be undertaken on weekdays Monday to Friday between the hours of 7.00AM and 6.00PM and Saturday 8.00AM TO 1.00PM only. No work to occur outside these times. Every effort should be made to complete the work quickly to minimise noise and disruption.

11. Excavated material that is to be reused may be stored in the immediate vicinity of the works within appropriate fencing. Erosion and sediment control measures at the site are to be undertaken in accordance with CN's "Erosion and Sediment Control Policy for Urban Development." Spoil from the works is not permitted to be stored on any CN's land which includes footways and parks.

12. Ensure that safe pedestrian access is maintained at all times along the footway and in public reserves in the vicinity of the works. The provision of controls for the safety and protection of the public must be to the satisfaction of CN's Public Utilities Officer and in accordance with the company's TCP approved by CN's Transport and Traffic Section.

    Where lane closures are proposed the applicant is to provide a Traffic Management Plan for vehicular traffic movements and for the safe passage of pedestrians/cyclists in the vicinity the works. The form 'LANE/ROAD CLOSURE / CRANE APPLICATION FORM' is to be completed and submitted prior to the commencement of work. This can be downloaded from http://www.newcastle.nsw.gov.au/Living/Transport/Roads (select permit type), or by contacting CN's Transport and Traffic Coordinator on 4974 2000. Any proposal to direct pedestrians onto the roadway around the work should be detailed showing how the works are to be staged, all barriers, lights, warning signage, sequence of lane closures etc. It is recommended the Traffic Management Plan be prepared by a person accredited in the Roads and Traffic Authority's "Introduction to Worksite Traffic Control" training course (the persons qualifications are to be provided on the plan).

    The Traffic Management Plan is to be submitted to CN's before work commences. Traffic Controllers if required need to submit evidence of their certification. Traffic control is to comply with AS 1742.3.

    Any enquiries regarding road closures and traffic matters should be directed to CN's Transport and Traffic Coordinator on (02) 4974 2000.

13. Open trenching should be limited to only that which is necessary, and backfilled and compacted immediately. Any damage to the kerb and gutter or drainage system is to be reinstated to CN's specification at no cost to CN. CN's preference is for road carriageways and driveways to be under-bored to minimise disruptions to traffic flow and damage to the road pavement. Please refer to Newcastle City Council's Standard Drawing A 1103 for Road Crossing details.

14. **Road Pavement Restoration**

Road pavement restoration must be constructed to CN requirements as follows:

Local Roads excluding Bus Routes
Subgrade: Trimmed and compacted to 100% Standard.

Base: Minimum 300mm DGB20 (RTA Specification 3051 Table 3051.1 or Natural Gravels in ARRB SR 41 1989 section 5.2) compacted to 98% modified compaction.

Wearing Surface: Minimum 40 mm of LT 10 asphalt laid in accordance with RTA R117. The paver must be set to "float" to achieve to achieve a variation no greater than 3mm per 10m run. The asphalt wearing surface should extend at least 300 mm beyond the maximum extent of the excavation or as required by NCC's Public Utilities Officer to cater for appropriate compaction. All joins with the existing asphalt surface should be sawcut and joints sealed with a suitable bituminous joint sealant.

Laneways
Subgrade: Trimmed and compacted to 100% Standard.
Base: Minimum 200 mm DGB 20 or approved recycled material to comply with RMS 3051 compacted to 98% modified compaction.
Wearing Surface: Minimum 30 mm of LT 10 asphalt laid in accordance with RTA R117. The paver must be set to "float" to achieve to achieve a variation no greater than 3mm per 10m run. The road base replacement shall extend 0.5m beyond the maximum extent of the excavation to cater for appropriate compaction. The asphalt wearing surface should extend at least 1.0m beyond the maximum extent of the excavation (0.5m beyond the base restoration) to cater for appropriate compaction. All joins with the existing asphalt surface should be sawcut and joints sealed with a suitable bituminous joint sealant

Regional Roads/Bus Routes/Heavy Vehicle Routes
Subgrade: Trimmed and compacted to 100% Standard.
Base: Minimum 350 mm DGB20 (RTA Specification 3051 Table 3051.1 or Natural Gravels in ARRB SR 41 1989 section 5.2) compacted to 98% modified compaction.
Wearing Surface: Minimum 50 mm of AC 14 asphalt laid in accordance with RTA R117. The paver must be set to "float" to achieve to achieve a variation no greater than 3mm per 10m run. The asphalt wearing surface should extend at least 300 mm beyond the maximum extent of the excavation to cater for appropriate compaction. All joins with the existing asphalt surface should be saw cut and joints sealed with a suitable bituminous joint sealant.

Any enquires regarding road pavement restoration please contact CN's Program Development Coordinator – Roads on (02) 4974 2000.

15. **Concrete Footway Restoration**
Open excavation on concrete footway is to be saw cut, with the location of the saw cut to follow existing expansion joints. Where existing concrete paving is constructed in panels with tooled joints and the panels are disturbed or damaged by the works, the applicant will remove

and replace whole panels. Concrete footway paving is to be constructed in accordance with Newcastle City Council's Standard Drawings A 1400 Pathways Series.

16. **Bitumen Footway Restoration**
Open excavation of bitumen footway is to be saw cut and restored to pre construction condition. Where brick paver bordering is present the brick pavers are to be uplifted prior to excavation and replaced once trench is backfilled. All areas affected by construction are to be restored to the pre-construction condition. The extent of restoration is to be determined by CN's Public Utilities Officer.

17. **Brick Pavers Restoration**
Works along footways constructed with brick pavers are to be uplifted and stored prior to excavation and replaced once trench is backfilled. All areas affected by construction are to be restored to the pre-construction condition. Please contact CN's Management Systems and Depot Coordinator (02) 4974 2000 (24 hours prior) should you have excess pavers to return to CN's Turton Road Depot.

18. **Grass Footway Restoration**
Open excavation along grass footways is to be levelled, top soiled and turf laid to match pre-construction conditions.

19. Where existing infrastructure is removed the area is to be restored with concrete / asphalt / brick pavers or topsoil and turf to match the surrounding footway conditions to the satisfaction of CN's Public Utilities Officer.

20. The Location of above ground facilities is to comply with the requirements of the Disability Discrimination Act 1992 and associated guidelines.

21. Survey Marks

Survey marks are placed principally to locate street and property boundaries and their destruction or covering over results in inconvenience and unnecessary work and expense in subsequent re-surveys.

Consequently, care should be taken to avoid damage to or covering over of survey pegs, bench marks and permanent marks such as galvanised iron pipes, concrete blocks, drill holes and wings in concrete, survey co-ordination permanent marks (PM) and State Survey Marks (SSM). Please refer to attached document identifying significant survey marks.

(Note: The Surveying Act 2002 No 83 prohibits the removal, damage or destruction of survey marks and anyone who so destroys a survey mark is liable to a fine plus re-establishment costs).

22. All areas affected by construction are to be restored to the pre-construction condition. A joint meeting of CN's Public Utilities Officer and a representative from the Public Utility Authority undertaking the works is to be arranged for 12 months after construction is completed to identify any maintenance issues, particularly regarding consolidation of trenches or subsidence due to trenching.

23. These conditions are valid for a period of twelve months from the date of this letter. A copy of these conditions is to be sent to all contractors and kept on site and produced to CN's Public Utilities Officer or Private Works Officer upon request.

LINKS AND NOTES

Specific individualised responses will be sent with our Standard Public Utility Response which will include any other site specific restoration requirements. The other item to note is that no drainage information is available through Dial before you Dig, you have to contact City of Newcastle (CN) in order to obtain this information.

CN requests that all the utilities emails be directed to utilities@ncc.nsw.gov.au .

Before any restoration works are undertaken you will need to contact CN's Public Utilities officer (02) 4974 2000.

We utilise the NSW streets opening guide -
http://www.streetsopening.com.au/data/files/70/00/00/00/SOC_Guide_2009.pdf

Our standard drawings are located here:
http://www.newcastle.nsw.gov.au/Development/Land-Use-Planning/Standard-Drawings

LEP

http://www.newcastle.nsw.gov.au/Development/Land-Use-Planning/Local-environmental-plans

DCP

http://www.newcastle.nsw.gov.au/Development/Land-Use-Planning/Development-control-plans

Technical manuals

http://www.newcastle.nsw.gov.au/Development/Land-Use-Planning/Development-control-plans

Conditions for Works on Telecommunication Pits and Pipes

Any works involving demolition of structures (including but not limited to pits or pipes) are required to be undertaken with Australian Standard AS 2601-2001. The demolition of structures (the standard).

The demolition works must be undertaken in accordance with all requirements of the standard and all other relevant legislation, guidelines and standards however in the interests of protecting public health and the environment Council draws your attention to the following requirements in particular;

Audit

A competent person shall determine the presence of hazardous substances (including asbestos) or conditions in the structure, and all parts of the site, which may be hazardous to the site personnel or the public if disturbed by the stripping or demolition. The nature and location of each hazard shall be recorded and both the record and proposed method of controlling the hazards shall be recorded in a Hazardous Substances Management Plan. The Plan must be provided to persons undertaking the demolition works.

Removal of Asbestos

Removal of asbestos or materials containing asbestos fibre shall be in accordance with the NOHSC (WorkSafe Australia), Code of practice for the safe removal of asbestos 2nd Edition [NOHSC:2002(2005)].

The removal, handling and disposal of any asbestos material is to be undertaken only by an asbestos removal contractor who holds the appropriate class of Asbestos Licence, issued by the WorkCover Authority of NSW.

On sites where asbestos materials are to be removed, a standard commercially manufactured sign containing the words “DANGER ASBESTOS REMOVAL IN PROGRESS” measuring not less than 400mm x 300mm is to be erected in a prominent position during asbestos removal works.

If asbestos contamination of the land occurs as a result of the works, the site must be remediated, and a clearance certificate issued by an appropriately qualified occupational hygienist and forwarded to the City of Newcastle (CN) on completion of the works and associated clearance certificate.

General

People walking or driving past any demolition work shall be protected from falling objects, projections, dust, noise mechanical plant, including trucks entering and leaving the site, and welding and cutting sparks, at all times while work is in progress. Undue noise during extended working hours shall be avoided.

Throughout the demolition operations, safety shall be maintained in public places adjoining the site. Safety of the public shall be maintained by providing street closures, hoardings, scaffolding and other types of overhead protection, either singly or in combination, in accordance with the requirements of this standard.

In addition to the requirements of the standard CN also advises that:

Notification of the demolition works must be provided in writing to the occupants of neighbouring premises,

The demolition works must not cause pollution breaches of the Protection of the Environment Operations Act 1997 (NSW). Enforcement action may be taken by CN against those responsible for causing pollution as defined by the Act.

MANAGING AND PROTECTING PUBLIC TREE ASSETS

City of Newcastle (CN) recognises the significant contribution and community benefits that accrue from a healthy and appropriately structured public tree resource and has adopted an asset management approach to the management of all public trees. Private works and utility works likely to impact public trees should be designed and undertaken so as to minimise the removal or injury of public trees. Any work in the vicinity of public trees must be in accordance with "AS4970-2009 Protection of Trees on Development Sites" (# see note). Where public trees have to be removed for private works CN requires compensatory contributions to restock the public tree resource.

a) Public trees are community assets under the control of the CN, are held within a digital asset layer and are to be protected from damage and injury during execution of works.

b) The unauthorised injury, root pruning, general pruning or removal of public trees may lead to enforcement action including:
Prosecution under the EPA Act (1979) or
Issue of a Penalty Infringement Notice under the Local Government Act (1993).

c) The protection of public trees from damage and injury is the responsibility of the person responsible for the private works and the responsibility of all contractors and subcontractors to the works.

d) Pruning (meaning the removal of foliage, and/or branches or trunk section) of public trees is prohibited unless undertaken in accordance with a prior written approval of CN's City Green Team.

e) Site sheds, concrete wash-outs, construction materials, chemicals, fuel and the like shall not be located, stored or disposed of within the distances specified in f) of any public tree.

f) Trenching or Root pruning involving roots greater than 50mm diameter is not to occur within:
3 metres of the trunk of any small public tree (eg Callistemon) is prohibited unless undertaken in accordance with a prior written approval of CN's City Greening Team.
5 metres of the trunk of any medium public tree (eg Brushbox) is prohibited unless undertaken in accordance with a prior written approval of CN's City Greening Team.
10 metres of the trunk of any large public tree (eg Melaleuca, Eucalypt or Ficus) is prohibited unless undertaken in accordance with a prior written approval of CN's City Greening Team

An experienced project Arborist (Min AQF 5) should be engaged on larger projects to assist with interpretation of this document.

g) Where underboring is to pass within the root structure of a public tree, the minimum bore depth is to be 700mm.

h) Any proposed trenching adjacent to established trees is to be undertaken with hand tools only to ensure protection of the root structures unless otherwise authorised by CN's City Greening Team.

i) An application for work(s) on a public tree is to be submitted to the attention of the Urban Trees Coordinator using CN's FORM 40 Application for Tree Work on Public Land available from CNl's City Greening Team.

j) Where CN approves the removal of a public tree for private works the applicant is to pay the full cost of the removal, the disposal of the stump, and waste, and site reinstatement, and is to pay the full cost of planting and establishing two standard trees at the rate of $1000 per standard tree. The removal and planting fee is to be paid in full to a CN nominated account prior to CN issuing an approval. ## Refer to explanatory note.

k) Where the removal of a significant public tree is the preferred option in order to avoid the costs incurred by retaining the tree and using alternative means of undertaking a private works, CN will value the tree(s) using an industry Tree Valuation method. The resulting tree monetary value is to be considered when comparing the cost of the various options. CN may require the applicant to pay all or a proportion of the valuation sum prior to approving an application if a suitable alternative to tree removal is practical but unacceptable to the applicant.

l) Where the removal or pruning of a public tree is approved by CN the work is to be undertaken only by CN or its nominated contractor unless CN's City Greening Team expressly authorises otherwise.

Explanatory notes

 # AS 4970 – 2009 Protection of Trees on Development Sites
This TPZ and SRZ distances within this Standard are developed on the basis of a mostly radial root system found in open space on development sites. Street trees generally have a restricted root system restricted by hard infrastructure such as compacted roads. This places greater importance on the root system within the footway for both tree health and stability. Based on our extensive case history of tree root development and tree failure, the CN uses the TPZ as a modified SRZ (that is 12 x trunk diameter at 1.4m above ground level) as a starting point to ensure tree stability. This is more critical the larger the tree the distance provided in f) is guidance and may need to be larger in some circumstances.

Clause k
This clause is based on the understanding that the planting of a single small tree is not adequate compensation for the loss of benefits following the removal of an established mature tree. CN is obligated to ensure the quality and planting standards for all planting in the public domain and therefore requires monetary contribution in lieu of planting by others followed by handover for CN to fund establishment.

The cost of a standard tree is based on:

- the purchase price of a 75 litre tree (containerised trees are priced according to container volume)
- the cost of planting, supporting and protecting the tree
- the cost of establishing the tree including water, pest control, formative pruning and mulching

The requirement for two trees for each tree removed is to account for the very high incidence of vandalism of new trees planted in the public domain and the long time frame before the new tree reinstates the benefits provided by the mature tree removed.

SURVEY MARKS

There are various types of Survey Marks used throughout the city for various circumstances.

Some of the common types are boundary pegs and marks, construction setout marks, State Survey Coordination Marks, Permanent Marks, Reference Marks and Alignment Marks.

Survey marks are valuable resources whether it is for a private property to define boundaries or Permanent/ Reference Marks for boundary fixation or State Survey Coordination Marks for total State coordination.

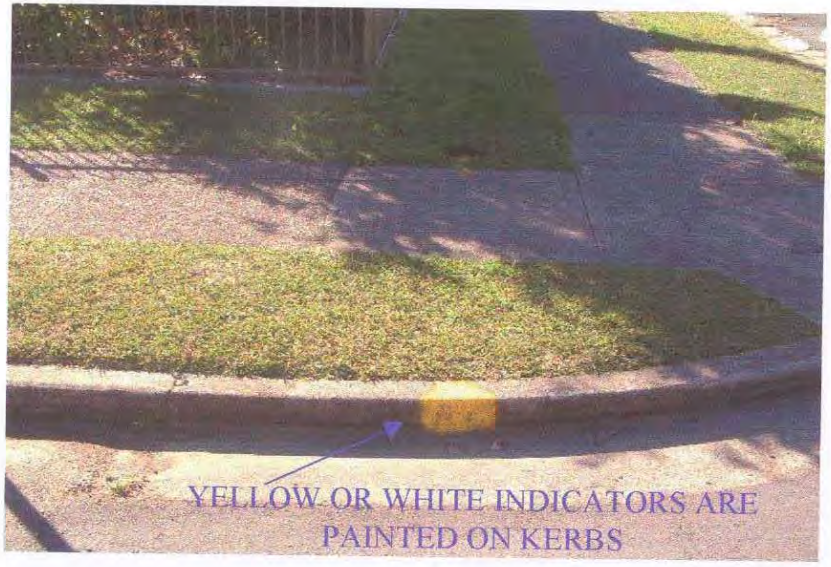
Under the Surveyors Act and the State Survey Coordination Act it is an offence to destroy or disturb Permanent/ Reference Marks or State Survey Coordination Marks. There are stipulated fines and costs of re-establishing these marks under the Acts. Individuals and organisations can be liable. Also under the State Survey Coordination Act, Council is responsible for the care and maintenance of State Survey Coordination Marks. Council's Survey Services charges between $600 - $1000 to re- establish State Survey Coordination Marks (this is on top of any fines that may be issued).

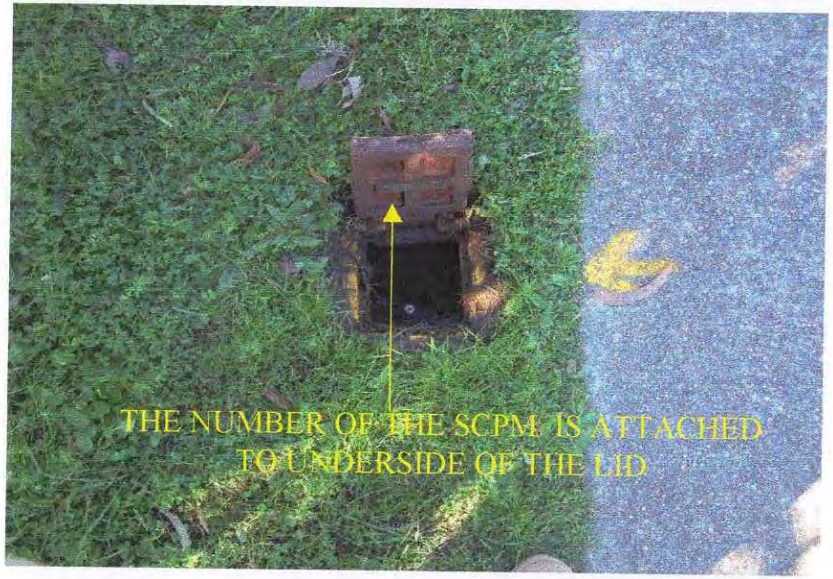
It is in Council's and the City's best interests to maintain and protect the network of fixation marks throughout the city.

If you are working or planning work within the City please be aware of the location of these marks. This can be done by contacting Survey Services in the planning stages of proposed work or prior to commencing work. Survey Services will respond quickly to requests to have marks relocated or recovered prior to work commencing at no cost to the project (a minimum of two days notice is usually required depending on the size of the project). However if marks are destroyed or disturbed by works, re-establishment costs will be charged.

The following PowerPoint may help you identify significant marks. But the safe way would be to add to your pre-construction checklist a request for Survey Services to check all marks within your project area.

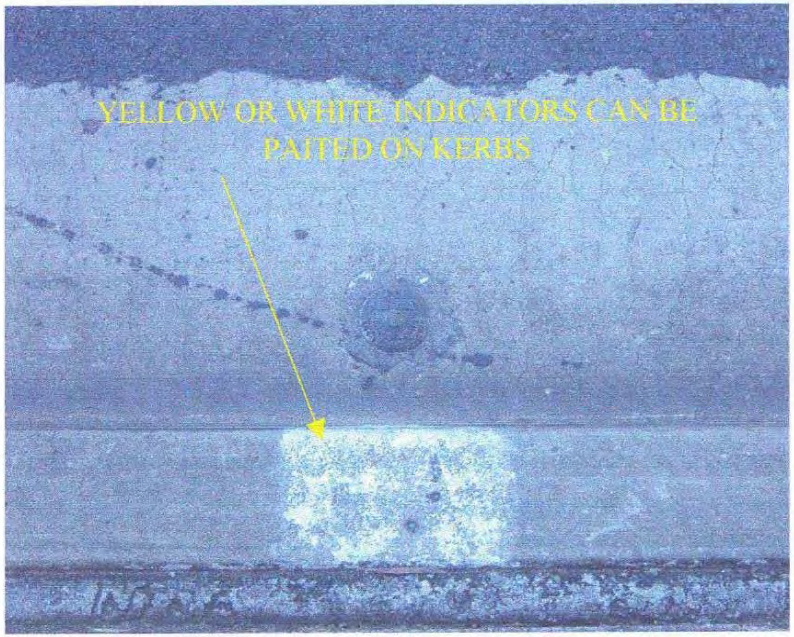
SURVEY COORDINATION PERMANENT MARK (SCPM)

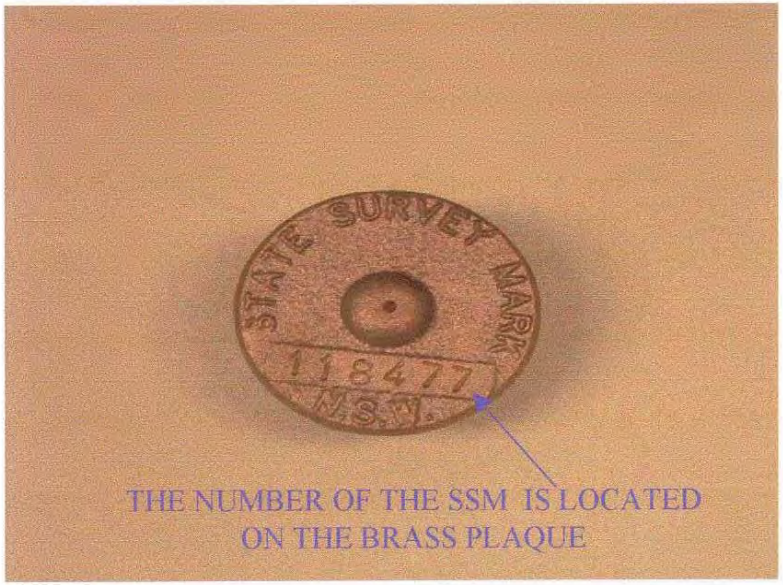




SURVEY COORDINATION PERMANENT MARKS ARE PART OF THE THE STATE SURVEY COORDINATION NETWORK. THEY ARE CONCRETE BLOCKS WITH A STEEL BOX (WITH HINGED LID). THEY CAN BE LOCATED IN FOOTWAYS, ROADS OR PRIVATE PROPERTY. COUNCIL HAS RESPONSIBILTY TO MAINTAIN THESE MARKS THROUGHOUT THE CITY.

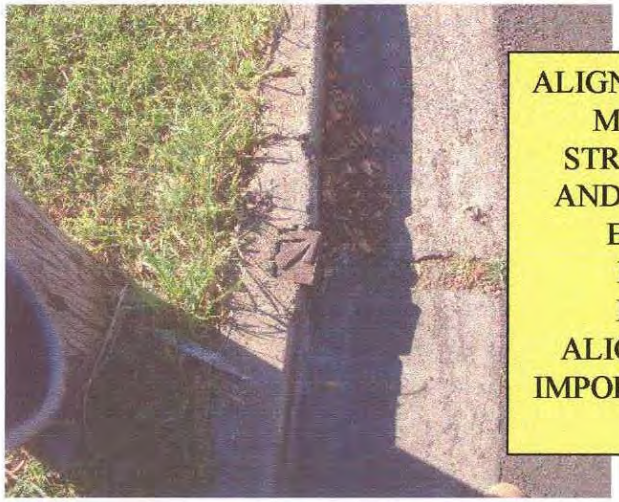
STATE SURVEY MARK (SSM)



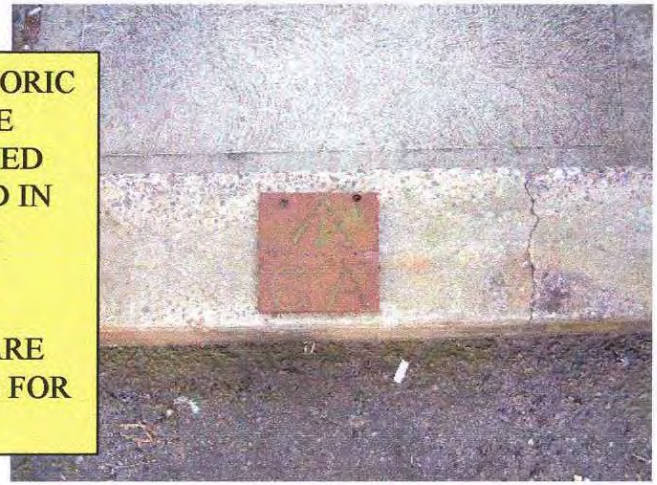


STATE SURVEY MARKS ARE PART OF THE STATE SURVEY COORDINATION NETWORK. THEY ARE BRASS PLAQUES USUALLY LOCATED IN KERBS, GUTTERS, FOOTWAYS OR OTHER CONCRETE FEATURES. COUNCIL HAS RESPONSIBILITY TO MAINTAIN THESE MARKS THROUGHOUT THE CITY.

ALIGNMENT PLATES (AP)



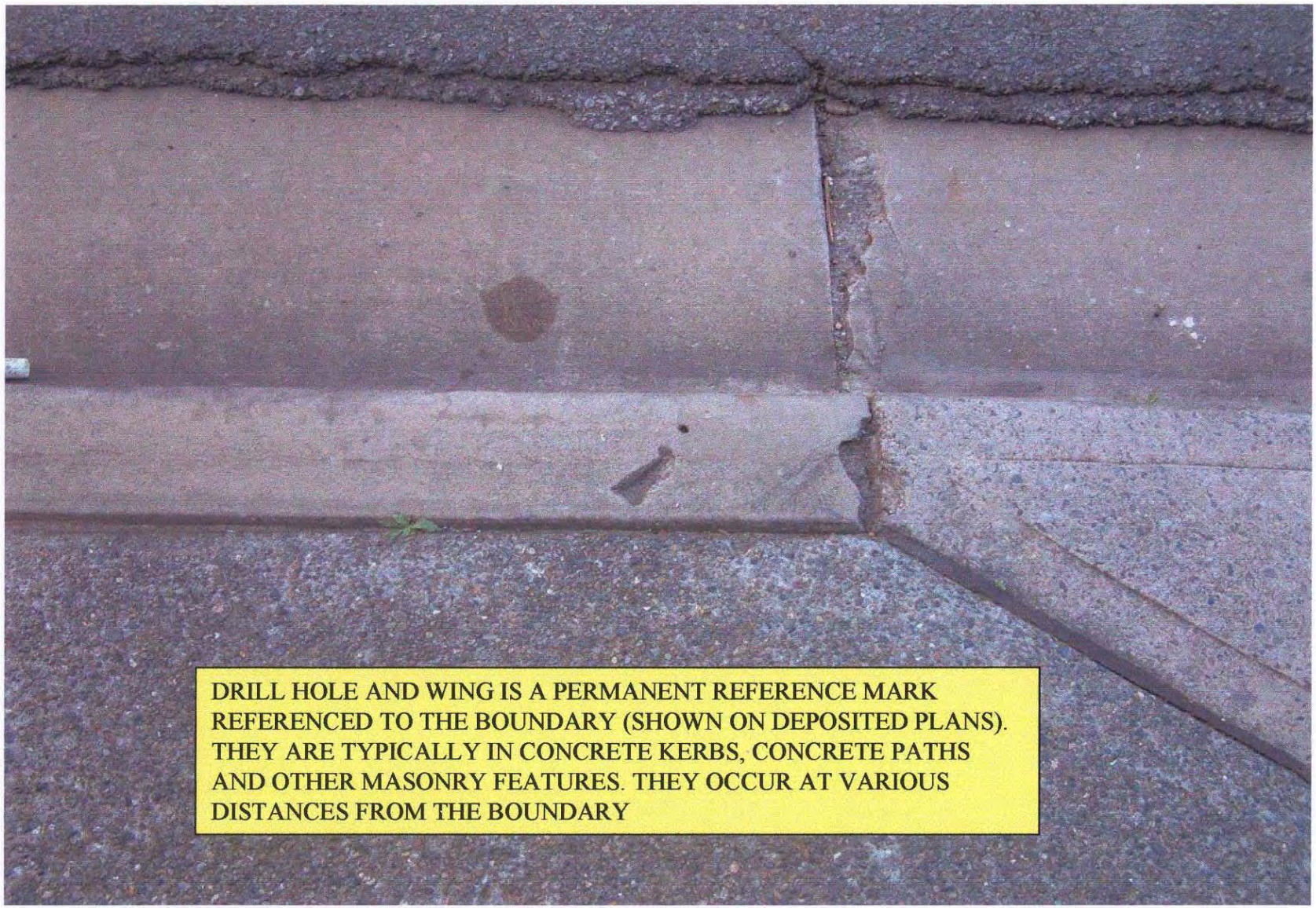
ALIGNMENT PLATES ARE HISTORIC MARKS PLACED WHEN THE STREETS WERE FIRST ALIGNED AND USUALLY ARE LOCATED IN EXISTING KERBS ON THE PROLONGATION OF THE BOUNDARY (SHOWN ON ALIGNMENT PLANS). THEY ARE IMPORTANT FIXATION MARKS FOR BOUNDARIES



ALIGNMENT STONES (AS)

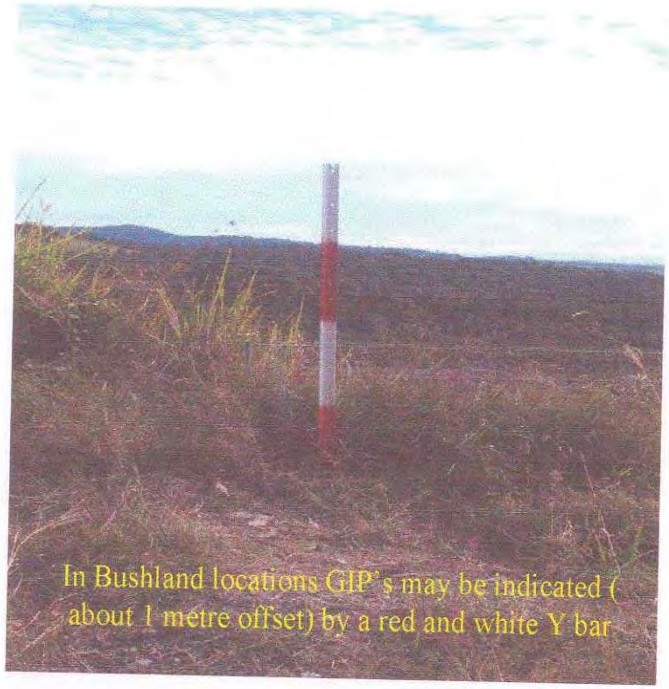
ALIGNMENT STONES ARE HISTORIC MARKS THAT WERE PLACED WHEN THE STREETS WERE FIRST ALIGNED. THEY ARE LOCATED ON THE PROLONGATION OF THE BOUNDARY AT THE KERB LINE (SHOWN ON ALIGNMENT PLANS). THEY ARE IMPORTANT BOUNDARY FIXATION MARKS

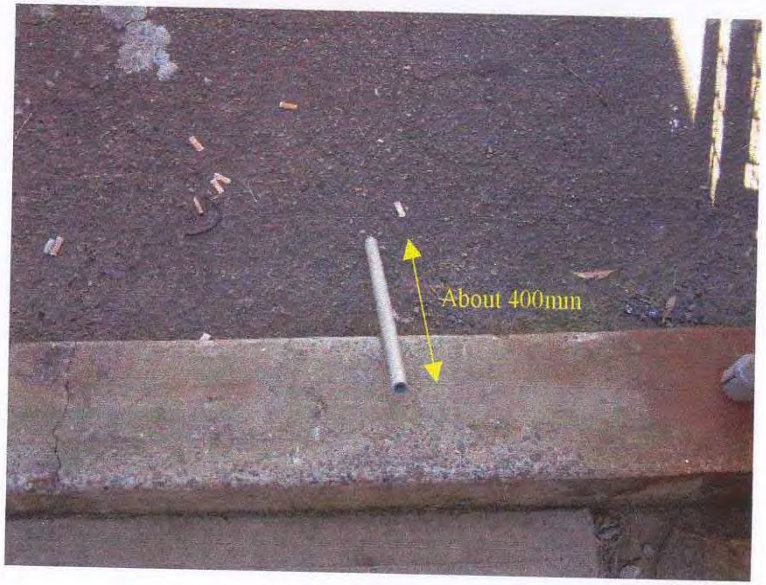
DRILL HOLE AND WING (DH&W)



DRILL HOLE AND WING IS A PERMANENT REFERENCE MARK REFERENCED TO THE BOUNDARY (SHOWN ON DEPOSITED PLANS). THEY ARE TYPICALLY IN CONCRETE KERBS, CONCRETE PATHS AND OTHER MASONRY FEATURES. THEY OCCUR AT VARIOUS DISTANCES FROM THE BOUNDARY

GALVANISED IRON PIPE (GIP)

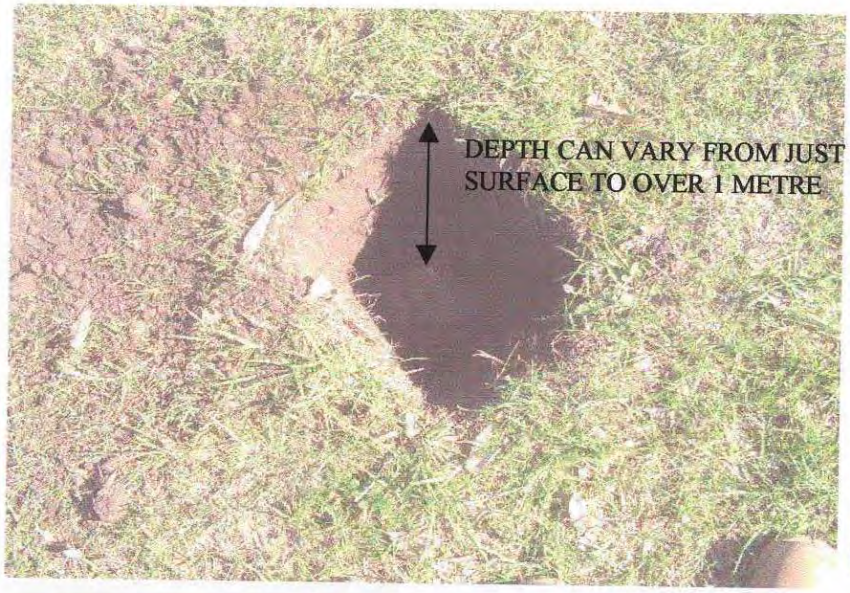


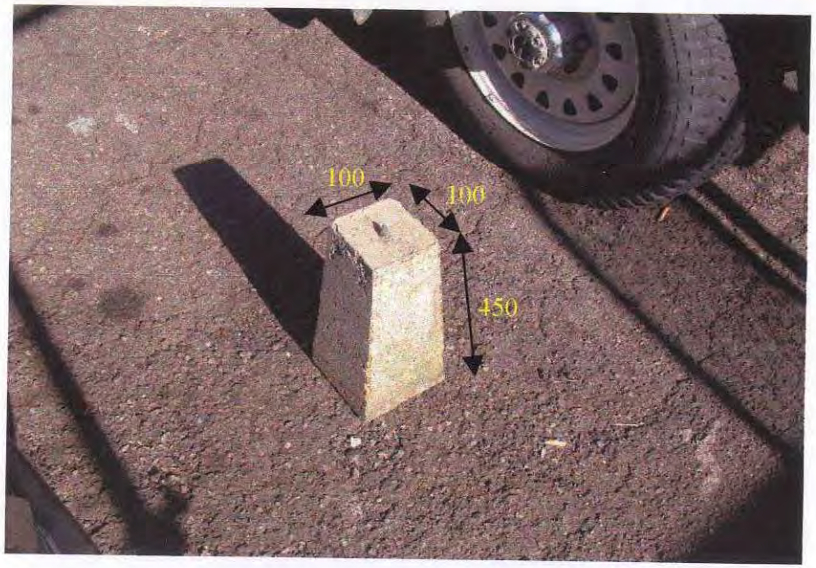


GALVANISED IRON PIPES ARE PERMANENT REFERENCE MARKS REFERENCED TO THE BOUNDARY (SHOWN ON DEPOSITED PLANS).

THEY CAN BE LOCATED IN FOOTWAYS OR BUSHLAND LOCATIONS. THEY ARE USUALLY LOCATED BETWEEN 450mm AND 1000mm FROM THE BOUNDARY.

PERMANENT MARK CONCRETE BLOCK





PERMANENT MARKS CONCRETE BLOCKS ARE MARKS REFERENCED TO THE BOUNDARY (SHOWN ON DEPOSITED PLANS) AND USUALLY IN FOOTWAYS BETWEEN 450mm AND 1000mm FROM THE BOUNDARY

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657
enquiries@hunterwater.com.au
hunterwater.com.au

17/06/2022

The Manager
Subsidence Advisory NSW
117 Bull Street
Newcastle West
NSW, 2300

Hello from Hunter Water

Consultation regarding the proposed upgrade of Newcastle West 1 wastewater pumping station

Hunter Water owns and operates a large and complex wastewater network including pumping stations, wastewater treatment works and sewer mains.

To help minimise odour emissions, improve safety and enable ongoing operation and maintenance of the Newcastle West 1 wastewater pumping station (NW1 WWPS), we're proposing to remediate and replace infrastructure at the site (the proposal). Appendix A and B have been provided for further information on this proposal.

A Review of Environmental Factors (REF) is currently being prepared by Jacobs on behalf of Hunter Water. The purpose of the REF is to assess the likely impacts associated with the proposal under Part 5 of the *Environmental Planning and Assessment Act 1979*.

Under the *State Environmental Planning Policy (Transport and Infrastructure) 2021*, Hunter Water is required to consult with Subsidence Advisory NSW (previously known as the Mine Subsidence Board) under Chapter 2, Division 1, clause 2.15, as the proposal is to be located within the Newcastle Mine Subsidence District.

Please provide any comments about this proposal within 21 calendar days from the date of this letter. Hunter Water will consider any response received from Subsidence Advisory NSW within this period in its assessment of the proposal.

If you require further information, please contact Johnny Landman on 0417 218 495 or email johnny.landman@hunterwater.com.au

Yours Sincerely,

Johnny Landman
Project Manager
Hunter Water Corporation

Appendix A: Proposal description

Background

Hunter Water proposes to remediate and replace infrastructure at the NW1 WWPS located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle (the proposal).

The proposal key elements include:

- Demolition and replacement of the existing 27 metre wooden vent stack
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the Inlet Well.

NW1 WWPS was initially constructed between 1909 and 1926 and has been the subject of odour complaints over the last decade. In addition, recent assessments of the NW1 WWPS have identified that the vent stack and the Inlet Well and chambers require remediation and replacement work.

The proposal is needed to remediate and replace infrastructure at NW1 WWPS enable ongoing operation and maintenance of a critical Hunter Water asset and help to minimise odour emissions and to improving the liveability for nearby residents and the general public around Marketown.

Location

NW1 WWPS is located on an existing Hunter Water easement at the northeast corner of the Marketown carpark adjacent to the King Street access road within the Newcastle City Local Government Area (LGA) as shown in Appendix B.

The proposal area which includes two indicative locations for ancillary and laydown is also shown on Appendix B. These laydown areas may be used for the temporary storage of plant and materials.

Construction methodology

The proposal would include the following construction stages and activities.

- Site establishment/mobilisation:
  - Set up and implement environmental management plan which would include risks and mitigation measures for the activity sequence
  - Obtainment of all work permits and site approvals as necessary
  - Location of services and protect if necessary
  - Install site fencing
  - Mobilisation of temporary ancillary and laydown areas
  - Set up site amenities
  - Temporary closure of the left-hand lane of King Street access road
  - Temporary closure of Marketown carpark's north entry
  - Temporary relocation of the post storage box to east of King St access road
  - Sediment and erosion controls would be put in place
  - Vegetation clearing of up to 12 individual trees
- Construction of the new 12 metre high vent stack and temporary OCU bypass:
  - Earthworks
  - Pour new vent stack footing
  - Commission new vent stack
- Temporary OCU bypass pipework from storage wells to vent stack:
  - Penetrate Storage Well 1, Storage Well 2 and the Inlet Well to installation the temporary OCU bypass pipeline between the wets wells to new vent stack
  - Discharge the air flow from the existing stack through the OCU bypass pipe line and new stack. This would allow the decommissioning and removal of the existing stack

  - Risk assessment to determine if temporary odour mitigation works would be required during construction
  - Installation of a temporary OCU on the bypass line to treat air prior to discharge (if required).
- Demolish existing vent stack in sections and appropriate disposal.
- Divert incoming sewers (gravity, Oviform and pressure sewer) to Storage Well 2 to isolate the Inlet Well. This would include setting up temporary above ground pipework, submersible pumps and above ground diesel pumps to divert the sewers. The bypass of the main sewer to Storge Well 2 would be located above ground and as close as the fence line as possible to reduce the impact on car parking spaces
- Install new OCU and connect to vent pipework and vent stack
- Inlet Well remediation:
  - Cut and removal of the Inlet Well lid to facilitate the Inlet Well remediation
  - Pump out and blast clean inlet well
  - Secure inside of the Inlet well to allow access and emergency extraction
  - Carry out the Inlet well remediation
  - Install new roof
  - Commission Inlet Well
- Remove sewer diversion and reinstate sewage inflow to back into the Inlet Well
- Site disestablishment/Demobilisation and site restoration:
  - Removal of temporary ancillary and laydown areas as well as clear up stockpiles
  - All construction material would be removed from site and the area would be rehabilitated
  - Erosion and sediment controls would be in place until the site is stabilised with grass groundcover.

Two sections of the King Street access road would need to be temporary closured to facilitate the construction of the proposal, refer to Appendix B.

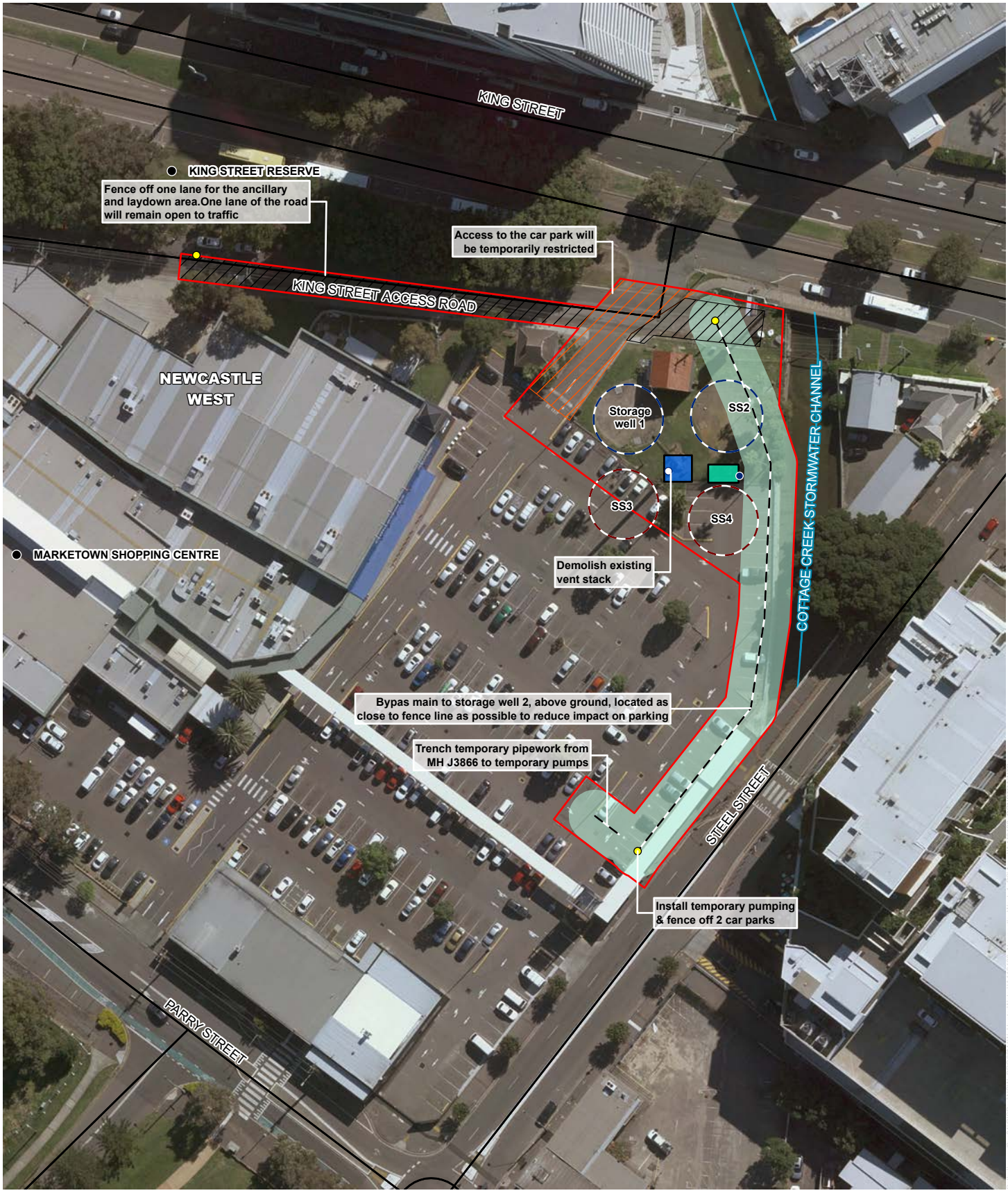
The new OCU which would operate 24 hours a day, 365 days of the year. It would be situated on a on a bunded concrete platform about 600 millimetres above the one per cent (%) Annual Exceedance Probability (AEP) flood level (2.33 metres AHD) to mitigate flooding impacts. The platform would be about 11.2 metres long and up to about 4.30 metres wide along the widest edge.

Timing

The construction of the proposal has been anticipated to commence in mid-2023 and would take around six to nine months to complete.

The proposal would generally be carried out during standard construction hours. However, out of hours works may be required (night and weekends) to order to expedite the proposal in order to avoid potential impacts on access and Marketown.

Stakeholders potentially impacted by the proposal, including local residents and businesses, would be contacted before work begins in accordance with the Hunter Water out of hours work procedures.



Proposal area
Sewer main bypass
Sewer main bypass 5m buffer
Ancillary Site
Access temporarily restricted

Temporary pump
Demolish existing vent stack
New vent stack
Decommissioned storage well
Existing wet well
Inlet well
Odour control unit

Waterway

0 20 40 m

1:1,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2022
Department of Customer Service 2021
Aerometrex 2021

Appendix B The proposal

NSW GOVERNMENT

Subsidence Advisory

117 Bull Street, Newcastle West, NSW, 2302
T: (02) 4908 4300 | **24 Hour Emergency Service:** 1800 248 083 (Free Call)

Hunter Water Corporation
Proposed Upgrade of Newcastle West 1 Wastewater Pumping Station
Email: johnny.landman@hunterwater.com.au
Attn: Johnny Landman (Project Manager)

Dear Johnny,

Consultation Regarding the Proposed Upgrade of Newcastle West 1 Wastewater Pumping Station – EOTH22-00237

Thank you for your letter (Your Ref. HW2021-1308/4/3.042 dated 21 July 2022), giving Subsidence Advisory NSW the opportunity to comment on the proposed upgrade of the Newcastle West 1 pumping station.

In accordance with the Mine Subsidence Compensation Act (2017), Subsidence Advisory NSW regulates development within mine subsidence districts to help protect homes, buildings and infrastructure from potential subsidence damage.

The proposed works are undermined by abandoned workings in the Borehole seam at approximately 65m depth. The stability of the workings has been analysed and the proposed works do not require design to account for coal mine subsidence parameters.

If you would like more information, please contact Subsidence Advisory NSW on 4908 4300 or subsidencedevelopment@customerservice.nsw.gov.au.

Yours sincerely

Melanie Fityus
Senior Risk Engineer

9 August 2022

APPENDIX C. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE (MNES) CHECKLIST

Under the environmental assessment provisions of the EPBC Act, the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the DAWE

A referral is not required for proposed actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government's significant impact criteria and taking into account relevant guidelines and policies.

Significance matter	Yes / No	Relevant details
Listed threatened species and communities	No	The proposal would not impact any nationally threatened species, ecological communities or listed migratory species.
Listed migratory species	Yes	
Ramsar wetlands of international importance	Yes	The nearest Ramsar wetlands (Hunter estuary wetlands) are over six kilometres to the north.
Commonwealth marine environment	No	Not relevant to the proposal
World heritage properties	No	Not relevant to the proposal
National heritage places	No	Not relevant to the proposal
The Great Barrier Reef Marine Park	No	Not relevant to the proposal
Nuclear actions	No	Not relevant to the proposal
A water resource, in relation to coal seam gas development and large coal mining development	No	Not relevant to the proposal

APPENDIX D NOISE AND VIBRATION ASSESSEMENT

Noise and Vibration Impact Assessment

Document no: Rev02
Revision no: 2

Hunter Water

Newcastle West 1 Wastewater Pumping Station Remediation Works
6 July 2022

Noise and Vibration Impact Assessment

Client name:	Hunter Water		
Project name:	Newcastle West 1 Wastewater Pumping Station Remediation Works		
		Project no:	IA410490
Document no:	Rev02	**Project manager:**	Justin JB Bailey
Revision no:	2	**Prepared by:**	Sean Brennan
Date:	6 July 2022	**File name:**	IA410490_NVIA_Rev02 20220706

Document history and status

Revision	Date	Description	Author	Reviewed	Approved
Rev1	24/06/2022	Draft for client review	SB	DD	TD
Rev2	06/07/2022	Addressing client comments	SB	DD	TD

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

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F +61 2 4979 2666
www.jacobs.com

Executive summary

Introduction

Hunter Water Corporation (Hunter Water) are proposing to remediate and replace infrastructure at the Newcastle West 1 (NW1) wastewater pumping station (WWPS) located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle (the proposal).

NW1 WWPS was initially constructed between 1908 and 1926 and has been the subject of odour complaints over the last decade. In addition, recent assessments of the NW1 WWPS have identified that the existing vent stack and the inlet well and chambers require remediation and replacement work.

The proposal would help to minimise odour emissions and improve safety to assist in improving the liveability for nearby residents and the general public around Marketown. The proposal would also enable ongoing operation and maintenance of a critical Hunter Water asset.

The proposal key elements include:

- Demolition and replacement of the existing 27 metre (m) wooden vent stack (existing vent stack)
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the inlet well.

The proposed works would take place within a proposal area which includes the full construction footprint of the works including the ancillary and laydowns areas and areas that would be under temporary traffic control.

The construction of the proposal would be expected to start in mid-2023 and take between six to nine months (weather permitting) to complete.

Existing environment

A number of sensitive receivers have been identified in the proposal study area. In the immediate vicinity of the proposal, the predominant land use is commercial, with a number of high density residential receivers also in the vicinity. Further north of the proposal site the building mix remains as primarily commercial with some residential receivers. To the south, in the sports grounds, the predominant receivers are passive recreation, while to the southwest of the proposal receivers are primarily suburban residential.

Based on the differing land usage and background noise between the northern and southern sections of the proposal study area was divided into two separate noise catchment areas (NCAs) which will be used in the assessment of noise impacts.

The following sensitive receivers are located in proximity to the proposal. Key noise sensitive receivers of consideration include:

- The apartment complex at 464-466 King Street, located 75 ms north-west of the proposed noise source
- The residential towers located at 21 Steel Street, the nearest of which is located 43 m southeast of the proposal
- The Travelodge Hotel, located about 65 m north of the proposed noise source.

Technical inputs

A number of construction activities will need to be undertaken to facilitate the proposal. These include but are not limited to the construction of a new stack, the diversion of sewer mains, remediation works of the inlet well and the construction of the OCU itself.

Some out of hours work may be required (night and weekends) to order to expedite the proposal in order to avoid potential impacts on access and Marketown. As such, it has been assumed that these phases could be undertaken at any time of day.

The key operational noise source from the proposal was identified as the OCU fan and motor, which forms part of the greater unit. The silencer and vent shafts have been identified as producing negligible noise in relation to the fan.

It is noted that the fan and motor will remain operational 24 hours a day and may sporadically feature greater noise levels as a result of the motor being a variable frequency (VF) drive. It should be noted that the sound power levels of the proposed noise sources used in this assessment are indicative and were based on in-duct measurements of a similar fan. To account for the sound power level of the fan being specified In-Duct, an attenuation factor has been applied to estimate the external sound emissions of the fan and motor.

Assessment of impacts

Construction impacts

It was found that the construction works required by the proposal would lead to construction noise impacts. Noise levels of up to 30dB(A) greater than the standard hours noise management levels (NMLs) have been predicted at the nearest residential receivers to the works from worst-case construction noise emissions. Generally, any phases where concrete cutting activities have been predicted to take place have resulted in the greatest noise levels.

The inlet well remediation works (Phase 7A) has been predicted to result in the highest noise levels at a residential receiver, primarily as a result of the inclusion of a jet blasting machine and concrete cutting. During standard hours, these works have been predicted to result in noise impacts up to 70 residential receivers in NCA 1 and 347 residential receivers in NCA 2. Additionally, up to nine receivers in NCA 1 have been predicted to become 'highly noise affected' during these works. During night hours the predicted number of exceedances above the NMLs are 404 residential receivers in NCA 1 and 1120 receivers in NCA 2. The potential worst-case exceedances of the night time period $L_{Aeq(15\ min)}$ NMLs are 44 dB(A) in NCA 1 and 29 dB(A) in NCA 2. The potential worst-case exceedances of the night time period L_{Amax} sleep disturbance NMLs are 34 dB(A) in NCA 1 and 18 dB(A) in NCA 2.

Construction vibration was predicted to have a minor impact on the nearest receiver, the adjacent 461 King Street, during the use of the compactor.

Two particular developments, at 35 and 42 Honeysuckle Drive were identified in particular as having a potential cumulative construction noise impact with the proposal. A comparison of the number of impacted receivers between the phase 7A and 7B works alone, along with the cumulative impact between these phases and developments within NCA 1 showed that noise impacts increased quite significantly when both phase 7A and 7B are undertaken at the same time as rock hammering and crushing at 42 Honeysuckle Drive, nearly doubling the number of receivers predicted to experience noise greater than the respective NMLs, as well as increasing the number of 'highly noise affected' receivers from nine to 14.

Operation impacts

Noise was assessed from the OCU fan and motor at all nearby noise sensitive receivers. As the source will operate 24 hours a day, for residential receivers and hotels the noise has been assessed against the most sensitive time period (night).

The noise modelling predicted that the fan and motor noise levels will comply with the relevant noise criteria at all noise sensitive receivers. Additionally, the proposal was predicted to not produce any tonal or low frequency impacts which could incur a noise penalty.

Mitigation and further considerations

Due to the extent of noise impacts during the construction stage, a number of noise mitigation measures have been provided. These noise impacts will need to be carefully managed, particularly during out of hours periods, in order to reduce the noise impacts of the works.

While only a single receiver, 461 King Street, has been predicted to experience vibration impacts, the structure is a heritage item, vibration should be managed to prevent any damage to the structure.

Though the proposal was predicted to produce noise compliant with the relevant noise criteria, it should be noted that the noise levels adopted for the fan and motor unit was indicative and based on sound power

levels of a similar fan and motor setup. Likewise, the impact of the VF drive on noise variance could not be determined. As such, Jacobs recommends that when the final fan and motor model is selected, the noise performance of the unit should be verified and confirmed by the supplier to be able to comply with the 43 dB(A) residential noise limit. Likewise, the supplier should also demonstrate that the unit can comply with the noise criteria without producing tonal and low frequency noise impacts.

It has been identified that noise from rock hammering and crushing activities at 42 Honeysuckle Drive may result in a cumulative construction noise impact. As such, works from the two developments will have to be carefully managed by the proponents to prevent or mitigate the potential cumulative noise impacts when works coincide.

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs Group (Australia) Pty Ltd (Jacobs) is to undertake a construction noise and vibration assessment for the Newcastle West OCU in accordance with the scope of services set out in the contract between Jacobs and Hunter Water. That scope of services, as described in this report, was developed with Hunter Water.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by Hunter Water and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from Hunter Water (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the Project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of Hunter Water, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and Hunter Water. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Contents

Appendices

1. Introduction

1.1 Proposal background

Hunter Water Corporation (Hunter Water) are proposing to remediate and replace infrastructure at the Newcastle West 1 (NW1) wastewater pumping station (WWPS) located on the northern boundary of Marketown Shopping Centre (Marketown), Newcastle (the proposal).

NW1 WWPS was initially constructed between 1908 and 1926 and has been the subject of odour complaints over the last decade. In addition, recent assessments of the NW1 WWPS have identified that the existing vent stack and the inlet well and chambers require remediation and replacement work.

The proposal would help to minimise odour emissions and improve safety to assist in improving the liveability for nearby residents and the general public around Marketown. The proposal would also enable ongoing operation and maintenance of a critical Hunter Water asset.

1.2 Proposal location

NW1 WWPS is located on an existing Hunter Water easement (the site) at the northeast corner of the Marketown carpark adjacent to the King Street access road.

The proposal is located on a land zoned as B4 – Mixed Use. In the immediate vicinity of the works, the north is predominantly zoned as B3 – Commercial Core, with land to the east zoned as R4 – High Density Residential. To the south of the proposal site is the Newcastle sports grounds, zoned as RE1 – Public recreation. Further to the east and west is land zoned as R3 – Medium Density Residential, while land further to the southwest – beyond The Newcastle sports grounds – is zoned as R2 – Low Density Residential.

1.3 Report structure

The report structure is as follows:

- **Section 2: Proposal description** – describes the proposal setting, details and potential noise and vibration related risks
- **Section 3: Existing environment** – outlines key features of the existing environment including surrounding receivers and background noise levels
- **Section 4: Policy setting and criteria** – establishes suitable assessment criteria
- **Section 5 Technical Inputs** – details the modelling settings adopted for the assessment and details the noise and vibration sources used to perform the assessment
- **Section 6: Assessment of impacts –** predicts the potential for noise related impacts at the identified surrounding receivers
- **Section 7: Mitigation measures** – recommends mitigation measures based on the impacts predicted.

2. Proposal description

2.1 Proposal overview

Hunter Water are proposing to remediate and replace infrastructure at the NW1WWPS located on the northern boundary of Marketown.

The proposal key elements include:

- Demolition and replacement of the existing 27 metre (m) wooden vent stack (existing vent stack)
- The installation of a new fan-assisted activated carbon Odour Control Unit (OCU)
- Remediation of the inlet well.

The proposed works would take place within a proposal area which includes the full construction footprint of the works including the ancillary and laydowns areas and areas that would be under temporary traffic control.

The construction of the proposal would be expected to start in mid-2023 and take between six to nine months (weather permitting) to complete.

The key objectives of the proposal are to:

- Address current odour complaints regarding air extracted from the WWPS
- Reduce the possibility of increased complaints as further residential development occurs
- Reduce risk of non-compliance with the Environment Protection Licence (EPL) in relation to the emission of offensive odours
- Eliminate the risk to public safety by removing and replacing the vent stack and rehabilitating the inlet chamber
- Enabling ongoing operation and maintenance of a critical Hunter Water Asset.

2.2 Primary noise and vibration related risks

Noise and vibration related impacts can arise when levels from industry or construction activities result in unacceptable levels at surrounding sensitive receivers. Within this proposal, noise has the potential to be generated throughout the construction, with vibration-generating equipment also intended to be used during construction. The key construction activities with the potential to generate noise and vibration during the Proposal include:

- Remediation works and the installation of the OCU
- Construction traffic on roads in and around the proposal area
- Cumulative impacts with the construction of nearby developments
- Operation of the proposal.

3. Existing environment

3.1.1 Sensitive receivers

A number of sensitive receivers have been identified in the proposal study area, refer to **Figure 3.1**. In the immediate vicinity of the proposal, the predominant land use is commercial, with a number of high density residential receivers also in the vicinity. Further north of the proposal the building mix remains as primarily commercial with some residential receivers. To the south, in the sports grounds, the predominant receivers are passive recreation, while receivers further south, southwest and southeast of the proposal are primarily suburban residential receivers. A breakdown of the number of receivers identified in the study area is displayed in **Table 3.1**.

Table 3.1 Receivers identified in study area

Receiver	
Residential Use	1612
Education/Childcare	42
Medical Centre	5
Hotel	11
Place of Worship	12
Passive Recreation	8
Library	1
Commercial Use	314
Industrial Use	5
Garage/Unoccupied	23

The following sensitive receivers are located in close proximity to the proposal. These key noise sensitive receivers of consideration include:

- The apartment complex at 464-466 King Street, located 75 m north-west of the proposal
- The residential towers located at 21 Steel Street, the nearest of which is located 43 m southeast of the proposal
- The Travelodge Hotel, located about 65 m north of the proposal.

Figure 3.1 Existing environment and monitoring locations

Legend

- Proposal Study Area
- Proposal Location
- NCA 1
- NCA 2
- NCA1 Monitoring Location
- NCA2 Monitoring Location
- Residential Use
- Commercial Use
- Garage/Unoccupied
- Education/Childcare
- Hotel
- Library
- Medical Centre
- Passive Recreation
- Place of Worship
- Industrial Use

0 100 200 300 400 500 m

Basemap: NSW SixMap
Scale: 1:10500

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 22/06/2022

Jacobs

3.1.2 Background Noise and Noise Catchment Areas

The proposal is located within an urban environment, with noise sources typical of such an area. These include traffic noise on King Street and Steel Street, construction noise, noise from nearby shops and offices, and general residential noise. Further to the south, in the suburban residential areas, the urban noise sources wane, and instead residential noise and traffic are the primary noise sources.

Noise monitoring was not carried out for the proposal. However, background noise monitoring was completed as part of the *42 Honeysuckle Drive, Newcastle Revised DA Acoustic Assessment* (Acoustic Logic, 2020) and the *Newcastle Grammar School – Park Campus Noise Impact Assessment* (SLR, 2021), which cover the northern and southern sections of the proposal study area. The results of this monitoring are displayed in **Table 3.1** and the noise monitoring locations are shown on **Figure 3.1**.

It should be noted that Honeysuckle is located to the north of the proposal and would likely experience less traffic noise than the proposal location. As such, the rating background noise levels (RBLs) derived from the measured noise levels at the nearby location on Honeysuckle Drive can be seen as conservative compared to what would likely be monitored near the proposal. Likewise, the monitoring location selected at the Park Campus was positioned adjacent to Newcastle sports grounds and featured notably lower RBLs than the other monitoring locations, and hence was adopted to assure a conservative assessment.

Based on the differing land usage and background noise between the northern and southern sections of the proposal study area was divided into two separate noise catchment areas (NCAs) as shown on **Figure 3.1.** **Table 3.1** provides the applicable RBL for each NCA.

Table 3.2 Adopted rating background levels

Monitoring location	NCA	RBL ($L_{A90,\ 10th\ percentile}$ dB(A))		
		Day (7:00am to 6:00pm)	Evening (6:00pm to 10.00pm)	Night (10:00pm to 7:00am)
42 Honeysuckle Drive, Newcastle	NCA 1	48	46	39
127 Union Street, Cooks Hill	NCA 2	43	41	36

3.1.3 Vibration Sensitive Receivers

Certain receivers and structures, such as medical centres, precision industry and heritage structures are typically more susceptible to vibration and are subject to more stringent criteria. The nearest medical centre to the proposal is Marketown Health which is located approximately 50 m south-east of the site. No precision industries have been identified within a one kilometre radius of the proposal. At these distances, no vibration impacts from the proposal have been predicted.

The proposal is located within the Newcastle City Centre Conservation Area. Two heritage items are located 100m from the works – The Former Gasworks Office, located approximately 10 m east of the proposal, and the Theatre Royale, located 96 m from the proposal.

4. Policy setting and criteria

4.1 Construction noise

4.1.1 Noise management levels

The *Interim Construction Noise Guideline (*ICNG) (Department of Environment and Climate Change [DECC], 2009) provides guidance for assessing noise from construction activities in NSW. It establishes noise management levels (NMLs) for recommended standard construction hours and for outside of the recommended standard hours. Construction is considered to have the potential to cause a noise impact if the predicted noise exceeds the applicable noise management level. **Table 4.1** lists ICNG guidance for establishing construction NMLs at residential receivers.

Table 4.1: ICNG guidance for establishing construction NMLs at residential receivers

Time of day	Management level $L_{Aeq(15min)}$	How to apply
Recommended standard hours (SH): Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected: Rating Background Level (RBL) + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. 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.
	Highly noise affected: 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours (OOH) - All other times including public holidays	Noise affected: RBL + 5 dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Considering the adopted RBLs presented in **Table 4.1**, the NMLs for the identified surrounding residential receivers are presented in **Table 4.2**.

Table 4.2: Construction noise management levels (residential receivers)

NCA	NML $L_{eq\ 15\ min}$ dB(A)			
	Day (during standard hours) 7am – 6pm Weekdays, 8am – 1pm Saturdays	Day (outside standard hours) 7am – 8am & 1pm – 6pm Saturdays 8am – 6pm Sundays and Public Holidays	Evening 6pm-10pm Weekdays 6pm – 10pm Saturdays	Night 10pm-7am Weekdays, 10pm – 8am Saturdays 6pm – 7am Sundays and Public Holidays
NCA 1	58	53	51	44
NCA 2	53	48	46	41

The ICNG also provides construction NMLs for non-residential land uses. These are presented in **Table 4.3**.

Table 4.3: ICNG NMLs for non-residential receivers

Non-residential receiver type	Noise management level, $L_{Aeq(15min)}$ (applies when properties are being used)
Commercial	External noise level – 70 dB(A)
Industrial	External noise level – 75 dB(A)
Educational facilities	Internal noise level – 45 dB(A)
Hospital / medical	Internal noise level – 45 dB(A)
Library	Internal noise level – 45 dB(A)
Place of worship	Internal noise level – 45 dB(A)
Passive recreation	External noise level – 60 dB(A)
Active recreation	External noise level – 65 dB(A)
Hotel	External noise level – 50 dB(A)

It should be noted that the NSW EPA is developing a new construction noise guideline, the *Construction Noise Guideline*, which is currently in-draft. When released, the *Construction Noise Guideline* will replace the ICNG.

4.1.2 Sleep disturbance

For premises where night construction (and operations) occurs, the potential for noise levels to lead to sleep disturbance should be considered. Section 4.3 of the ICNG discusses the method for assessing and managing sleep disturbance. This guidance references further information in the *NSW Road Noise Policy* (RNP) (NSW EPA, 2013) that discusses criteria for the assessment of sleep disturbance.

Where noise levels from a construction (or industrial) source at a residential receptor at night exceeds the following, a maximum noise level event assessment should be undertaken:

- $L_{Aeq,15min}$ 40 dB(A) or the RBL + 5 dB(A), whichever is greater, and/or
- L_{AFMax} 52 dB(A) or the RBL +15 dB(A), whichever is greater.

Based on this guidance, **Table 4.4** presents the resultant sleep disturbance screening criterion (SDSC) for the NCAs surrounding the proposal.

Table 4.4: Sleep disturbance criterion

NCA	SDSC	
	$L_{eq\ 15\ min}$ dB(A)	L_{AFMax} dB(A)
NCA 1	44	54
NCA 2	41	52

4.1.3 Annoying noise characteristics

Equipment that has the potential to produce a tonal noise, an impulsive noise or any other type of noise defined by the ICNG as 'particularly annoying', the noise level for that particular equipment will receive a + 5 dB(A) penalty.

As per guidance from the Noise Policy for Industry (Environmental Protection Agency, 2017) (NPI) , the penalty for intermittent noise (e.g., the hammers, packers and compactors) would only be applied during night periods. The penalty for tonal noise (e.g., road saws and grinders) will apply for all periods.

4.2 Operational noise

4.2.1 Overview

Operational noise criteria for the proposal are determined in accordance with the NPI, which seeks to regulate noise impact from 'industrial activity' pertaining to noise from fixed industry and mechanical plant rather than from road, rail or construction sources. To achieve this, the NPI applies two separate noise levels: one aimed at limiting the intrusiveness of the proposal's noise against the prevailing level of background noise (Intrusiveness Criteria), and the other focused on achieving suitable acoustic amenity for the surrounding land uses from industry (Amenity Criteria). The more stringent of these is used to define the operational noise criteria for the proposal.

4.2.2 Intrusiveness noise level

A noise source will be deemed to be non-intrusive if the monitored $L_{Aeq\ (period)}$ noise level of the proposal does not exceed the RBL by more than 5 dB(A). Based on the RBLs adopted in **Table 4.5** the following noise intrusiveness criteria would apply.

Table 4.5 Proposal noise Intrusiveness level

Receiver type	Time of day	RBL (L_{90} dB (A))	Allowance	Noise intrusiveness criteria (L_{Aeq} dB(A))
Residential receivers	Day (7 am to 6 pm)	48	+5 dB(A)	53
	Evening (6 pm to 10 pm)	46		51
	Night (10 pm to 7 am)	39		44

4.2.3 Amenity noise level

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the proposal amenity noise level represents the objective for noise from a single industrial development at a receiver location. To ensure that industrial noise levels remain within the recommended amenity noise levels for an area, the proposal amenity noise levels detailed in **Table 4.6** would apply.

Table 4.6 NPI amenity noise criteria, urban residential receivers

Receiver type	Time of day	Recommended noise level ($L_{Aeq\ (period)}$ dB(A))	Proposal amenity noise level ($L_{Aeq\ 15\ minute}$ dB(A))
Urban Residential receivers	Day (7 am to 6 pm)	60	58
	Evening (6 pm to 10 pm)	50	48
	Night (10 pm to 7 am)	45	43

The NPI also presents amenity noise levels for non-residential receivers. These have been reproduced below in **Table 4.7**.

Table 4.7 Amenity noise criteria, non-residential receivers

Receiver type	Time of day	Recommended amenity $L_{Aeq\ 15\ minute}$ noise level (dB(A))	Proposal amenity noise level $L_{Aeq\ 15\ minute}$ (dB(A))
Hotels, motels, holiday accommodation, permanent resident caravan parks	Day (7 am to 6 pm)	60	58
	Evening (6 pm to 10 pm)	50	48
	Night (10 pm to 7 am)	45	43
Commercial premises	When in use	65	63
Industrial premises	When in use	70	68
School classroom	When in use	45	43
Place of Worship	When in use	50	48
Hospital ward	Noisiest 1-hour	50	48
Industrial premises	When in use	70	68
Passive recreational area	When in use	50	48

4.2.4 Proposal noise trigger level

Based on the development of the proposal intrusiveness and proposal amenity criterion, the more stringent of the two is selected as the proposal noise trigger level. These criteria are displayed in **Table 4.8**.

Table 4.8 NPI Project Noise Criteria

Receiver type	Time of day	Proposal noise intrusiveness criteria (L_{Aeq} dB(A))	Proposal amenity noise level ($L_{Aeq\ 15\ minute}$ dB(A))	Proposal noise trigger level ($L_{Aeq\ 15\ minute}$ dB(A))
Residential Receivers	Day (7 am to 6 pm)	53	58	53
	Evening (6 pm to 10 pm)	51	48	48
	Night (10 pm to 7 am)	44	43	43

4.2.5 'Annoying' noise characteristics

'Annoying' noise characteristics associated with the operation of industrial facilities are addressed in Fact Sheet C of the NPI. Where an 'annoying' noise characteristic is identified, a positive correction will be applied to the noise levels to account for it. For this assessment, the two most likely 'annoying' noise characteristics are tonality and low frequency noise.

Where a tonal noise is predicted to be generated from a noise source, a one-third octave analysis should be performed using the methodology detailed in *ISO 1996-2:2007 Annex D: Objective Method for Assessing the Audibility of Tones in Noise*. Where the level of one-third octave band exceeds the level of the adjacent bands on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 hertz (Hz)
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.

Then a correction of 5 dB should be applied to the noise source.

Low frequency noise is accounted for using a two-step assessment of the A-weighted and C-weighted noise levels. A correction for low frequency noise will be applied where:

- The C-weighted noise contribution is 15 dB greater than the A-weighted noise source contribution at a noise receiver, **AND**
- Any of the third octave noise levels presented in Table C2 of Fact Sheet C are exceeded at the noise receiver.

Where the exceedance of the third octave noise levels is less than or equal to 5 dB, a correction of 2 dB is applied during the evening and night periods, and where the exceedance of the third octave noise levels is greater than 5 dB, a correction of 5 dB is applied during the evening and night periods.

4.3 Vibration

4.3.1 Overview

Vibration arising from construction activities can result in impacts on human comfort or the damage of physical structures such as dwellings. These two outcomes have different criterion, with the effects of vibration on human comfort having a lower threshold.

4.3.2 Human comfort

With respect to human comfort, vibration arising from construction activities must comply with criteria presented in *Assessing Vibration: a technical guideline*(DECC, 2006). The guideline identifies three different forms of vibration associated with construction activities:

- Continuous: uninterrupted vibration occurring over a defined period
- Impulsive: short-term (typically less than two seconds) bursts of vibration which occurs up to three times over an assessment period
- Intermittent: interrupted periods of continuous or repeated impulsive vibration, or continuous vibration that varies significantly in magnitude.

Continuous vibration may result from steady road traffic or steady use of construction equipment (e.g., generator). Impulsive vibration may arise during the loading or unloading of heavy equipment or materials or infrequent use of hammering equipment. Intermittent vibration may arise from the varied use of construction equipment (i.e., a dump truck moving around a site, idling while being loaded with materials, and then dumping the materials) or repeated high-noise activities such as hammering, piling or cutting.

Preferred and maximum values of human exposure for continuous and impulsive vibrations for the proposal are listed in **Table 4.9** . As per the guideline, daytime is between 7 am and 10 pm, and night is between 10 pm and 7 am.

Table 4.9: Preferred and maximum weighted root mean square values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis[2]	x and y axis[2]	z-axis	x and y axis
Continuous vibration					
Residences	Day	0.010	0.0071	0.020	0.014
	Night	0.007	0.005	0.014	0.010
Impulsive vibration					
Residences	Day	0.30	0.21	0.60	0.42
	Night	0.10	0.071	0.20	0.14

[1] Daytime is 7am to 10pm. Night-time is 10 pm to 7 am

[2] z-axis refers to vertical vibration, while the x and y axes refer to horizontal vibration.

Intermittent vibration is assessed differently using vibration dose values (VDV). Preferred and maximum VDVs for different types of receivers have been reproduced in **Table 4.10** for relative receivers in this assessment.

Table 4.10: Preferred and maximum VDVs for intermittent vibration (m/s$^{1.75}$), (DECC, 2006)

Location	Day time (7 am to 10 pm)		Night-time (10 pm to 7 am)	
	Preferred VDV	Maximum VDV	Preferred VDV	Maximum VDV
Residences	0.20	0.40	0.13	0.26

4.3.3 Buildings and structures

Section J4.4.3 of *Australian Standard AS2187.2 – 2006 Explosives – Storage and use Part 2: Use of explosives* provides frequency-dependent guide levels for cosmetic damage to structures arising from vibration. These levels are adopted from *British Standard BS7385: 1990 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundborne vibration* [BS7385-2:1993] and are presented in **Table 4.11**.

Table 4.11: Transient vibration guideline values for cosmetic damage

Type of building	Peak particle velocity (PPV) mm/s		
	4 to 15 Hz	15 to 40 Hz	40 Hz and above
Reinforced or framed structures industrial and heavy commercial buildings	50		
Un-reinforced or light-framed structures residential or light commercial type buildings	15 to 20	20 to 50	50

Guidance for more sensitive structures is presented in the German standard, *DIN 4150-3 Vibrations in buildings – Part 3: Effects on structures* (DIN 4150-3: 2016). Vibration velocities not exceeding three (millimetres per second (mm/s) at 1 to 10 Hz are recommended in this standard.

4.3.4 Construction noise and vibration guideline

Section 7 of the *Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016) (CNVG) provides guidance for safe working distances to achieve human comfort (*Assessing Vibration: a technical guideline* (DECC, 2006) and cosmetic building damage (BS7385-2:1993) criteria for a range of different plant and equipment. These safe working distances are relevant for some plant and equipment that may be

used during construction of the proposal, and so this guidance (presented below in **Table 4.12**) was considered.

Table 4.12: Recommended safe setback distances

Plant	Rating / description	Safe working distance (m)	
		Cosmetic damage (Ref: BS7385-2: 1993)	Human response (Ref: DECC, 2006)
Vibratory Roller	<50 kN (typically 1-2 tonne) <100 kN (typically 2-4 tonne) <200 kN (typically 4-6 tonne) <300 kN (typically 7-13 tonne) >300 kN (typically 13-18 tonne) >300 kN (> 18 tonne)	5 m 6 m 12 m 15 m 20 m 25 m	15 m to 20 m 20 m 40 m 100 m 100 m 100 m
Small hydraulic hammer	300 kg – 5 to 12 tonne excavator	2 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18 tonne excavator	7 m	23 m
Large hydraulic hammer	1600 kg – 18 to 34 tonne excavator	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤800 mm	2 m (nominal)	4 m
Jackhammer	Handheld	1 m (nominal)	2 m
Profiler	Wirtgen W210	4 m	
Asphalt Paver	Vogele Super 1800-3	1 m	
Steel Drum Roller	Hamm HD70 (Oscillating Mode)	2 m	
Steel Drum Roller	Hamm HD70 (Static Mode)	1 m	

5. Technical inputs

5.1 Model setup

Noise from the operation of the Proposal was modelled using the SoundPLAN 8.2 acoustic modelling software. Within the noise modelling software, the CONCAWE noise propagation calculation was applied for dB(A) noise calculations. The CONCAWE calculation was selected due to its reliability in assessing industrial noise impacts. CONCAWE considers noise propagation and attenuation by:

- Geometrical spreading
- Atmospheric absorption
- Ground effects
- Meteorological conditions conducive of the propagation of noise
- Barriers
- Topography and distance between the source and receptor.

A number of inputs were used to create the model. These are detailed in **Table 5.1**.

Table 5.1: Noise model input details

Model Input	Details
Topography	Terrain data were derived from NSW Land Property Information (LPI) 10 m resolution bare earth Digital Elevation Model (DEM). The DEM was produced from a standard LiDAR survey conducted by LPI.
Buildings	Footprints for receptor and other buildings in the area surrounding works was determined from aerial photography. Heights and floor numbers were ascertained from Google Street view, or otherwise, assuming a building height of 3 m per floor plus 2 m for the roof.
Ground absorption factor	Urban location: 0.00 Water: 0.00 Residential area: 0.50 Parks: 0.60
Noise sources	Operational SWLs were set as outlined in Table 5.3.
Meteorology	'Noise-Enhancing' Meteorological conditions, as defined by the *Noise Policy for Industry* (EPA, 2017): Air temperature: 10°C Humidity: 70% Air pressure: 1013.3 millibar (mbar) Wind speed: 2 (metres per second (m/s) Wind direction: Source to receiver Pasquill stability class: F

5.2 Construction emissions

5.2.1 Construction noise

A number of works activities will be undertaken during the construction of the proposal. These activities, the equipment involved and the overall sound power level (SWL) of the works have been detailed in **Table 5.2**. It has been indicated that due to the nature of the work location out of hours work will have to be undertaken. As such, it has been assumed that these phases could be undertaken at any time of day.

Table 5.2 Construction noise inventory

Work phase	Works undertaken	Equipment used	Individual SWL (dB(A))	Phase SWL (dB(A))
Phase 1	Site establishment and fencing	Light vehicles	98	106
		Trucks	103	
		Generators	95	
		Small tools	94	
		Franna	100	
Phase 2	Vent stack construction	Excavator	104	113
		Generator	95	
		Trucks	103	
		Franna	100	
		Compactor	108	
		Small tools	94	
		Welding equipment	97	
		Concrete truck	106	
		Concrete compactor	102	
Phase 3	Temporary OCU bypass	Franna	100	121
		Concrete saw	120	
		Excavator	104	
		Trencher	112	
		Welding equipment	97	
		Vacuum truck	100	
		Dewater pumps	96	
		Diesel pump	100	
		Trucks	103	
		Small tools	94	
		Generator	95	
Phase 4	Existing stack demolition	Franna crane	100	111
		Grader	108	
		Excavator	104	
		Truck	103	
		Generator	95	
		Small tools	94	
Phase 5A	Divert incoming sewers	Dewater pumps	96	107
		Diesel pumps	100	
		Franna	100	
		Small tools	94	
		Welding equipment	97	
		Trucks	103	
		Generator	95	
Phase 5B	Divert incoming sewers (where road cutting is required)	Dewater pumps	96	118
		Diesel pumps	100	

Work phase	Works undertaken	Equipment used	Individual SWL (dB(A))	Phase SWL (dB(A))
		Excavator	104	
		Concrete cutting equipment (Limited use)	117	
		Franna	100	
		Small tools	94	
		Welding equipment	97	
		Trucks	103	
		Generator	95	
Phase 6	OCU Installation	Excavator	104	117
		Compactor	108	
		Grader	108	
		Trencher	112	
		Dozer	110	
		Welding equipment	97	
		Trucks	103	
		Generators	95	
		Small Tools	94	
		Franna	100	
		Concrete truck	106	
Phase 7A	Inlet well remediation	Concrete saw	120	130
		Dewater pump	96	
		Diesel pump	100	
		Jet blasting equipment	129	
		Welding equipment	97	
		Franna	100	
		Small tools	94	
		Generator	95	
Phase 7B	Inlet well remediation (without jet blasting)	Concrete saw	120	120
		Dewater pump	96	
		Diesel pump	100	
		Welding equipment	97	
		Franna	100	
		Small tools	94	
		Generator	95	
Phase 8	Remove sewer diversion	Franna	100	107
		Welding equipment	97	
		Dewater pumps	96	
		Diesel pumps	100	
		Trucks	103	
		Small tools	94	
		Generator	95	

Work phase	Works undertaken	Equipment used	Individual SWL (dB(A))	Phase SWL (dB(A))
Phase 9	Demobilisation	Light vehicles	98	109
		Trucks	103	
		Spray painting equipment	98	
		Generators	95	
		Hand tools	94	
		Franna	100	
		Excavator	104	

5.2.2 Construction traffic noise

The anticipated construction vehicle movements are expected to be significantly lower than existing traffic volumes on all nearby roads, therefore noise from construction vehicles would not increase road traffic noise levels by more than 2dB(A) on any road. Consequently, noise impact from construction traffic is expected to be negligible.

5.3 Operational emissions

The key noise source during the operation of the proposal was identified as the OCU fan and motor, which forms part of the greater unit. The silencer and vent shafts have been identified as producing negligible noise in relation to the fan. The noise associated with the fan and motor setup is displayed in **Table 5.3**.

It is noted that the fan and motor will remain operational 24 hours a day and may sporadically feature greater noise levels as a result of the motor being a variable frequency (VF) drive. It should be noted that these levels are indicative and were based on in-duct measurements of a similar fan. To account for the noise measurements being In-Duct, an attenuation factor has been applied to determine an 'external' noise level which would be measured against.

Table 5.3 OCU fan and motor noise emissions (sound power levels), dB re 10^{-12}W

Noise source	SWL (dB(A))	1/1 Octave spectra (dB(Z))							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
OCU fan and motor (in duct)	91 dB(A)	85	90	88	89	87	79	74	70
OCU fan and motor (external – modelled source)	80 dB(A)	80	82	78	79	77	64	58	55

5.4 Construction vibration emissions

From the plant and equipment expected to be used during the construction of the Proposal, the equipment identified as producing a potential vibration impact have been identified. These items of equipment, along with their setback distances, have been displayed in **Table 5.4**.

It should be noted, that as the nearest heritage item (The Former Gasworks Office) is in close proximity to the proposal, therefore setback distances related to heritage risk will also be assessed against.

Table 5.4 Construction vibration setback distances

Equipment	Work phase	Cosmetic damage (Ref: BS7385-2:1993)	Human response (Ref: DECC, 2006)	Heritage structure impact (Ref: DIN 4150-3, 2016)
Small Compactor	Phase 2, Phase 6	5m	15m	10m
Concrete Compactor	Phase 2	1m	2m	2m

5.5 Cumulative noise

The area around Newcastle West has and is undergoing substantial redevelopment and there are a number of high-rise apartment buildings currently been constructed.

As part of the REF development, the following websites were searched on 16 May April 2022 for recent or proposed developments that could interact with the proposal:

- NSW DPE Major Projects Register
- Transport for NSW (formerly Roads and Maritime Services)
- City of Newcastle.

From this search, two State Significant Developments (SSD) approved about 400 m to the north of proposal, including:

- Mixed Use Development including commercial/retail uses and hotel accommodation at 42 Honeysuckle Drive Newcastle (SSD-10378)
- Construction of two, eight storey mixed use buildings consisting of retail, residential, and basement carparking at 35 Honeysuckle Drive Newcastle (SSD-8999).

Noise from the two developments was determined via the 42 Honeysuckle Drive, Newcastle Revised DA Acoustic Assessment (Acoustic Logic, 2020), and 35 Honeysuckle Drive, Newcastle, NSW Noise Assessment (Muller Acoustic Consulting, 2018). The Acoustic Logic, 2020 report did not provide specific construction noise levels from the development, however did indicate the use of particularly noise intensive equipment (rock hammers and rock crushers) which were used to develop a worst case noise level. The Muller Acoustic Consulting, 2018 report provided predicted noise levels at adjacent receivers, which were used to develop predicted sound power levels for the development.

To assess worst case cumulative noise impacts with the proposal, noise from these developments were modelled alongside phases 7A (worst case proposal noise) and phase 7B (representative of the phases utilising concrete cutting). A summary of cumulative noise to be modelled is displayed in **Table 5.5**.

Table 5.5 Cumulative noise impact modelling inputs

Scenario	Proposal works		Cumulative works	
	Phase	Phase SWL (dB(A))	Development	Development SWL (dB(A))
Scenario 1	Phase 7A	130	42 Honeysuckle Drive	126
Scenario 2	Phase 7B	120	42 Honeysuckle Drive	126
Scenario 3	Phase 7A	130	35 Honeysuckle Drive	103
Scenario 4	Phase 7B	120	35 Honeysuckle Drive	103

6. Impact assessment

6.1 Construction noise

6.1.1 Construction works

Construction noise levels have been developed based on the construction phases provided in **Table 5.2**.

The predicted noise levels represent worst-case $L_{Aeq\ (15\ minute)}$ noise levels in the hypothetical case when all noise sources are operating simultaneously, based on 100% utilisation. Consequently, these predictions represent the worst possible $L_{Aeq(15\ minute)}$ noise emissions which in practice would be a rare occurrence but is still valid for the purposes of assessing the worst case $L_{Aeq(15\ minute)}$ noise impact. In practical terms, the worst-case $L_{Aeq(15\ minute)}$ noise level with all noise sources operating simultaneously also represents an approximate L_{Amax} noise emission level. Therefore, the predicted noise levels shown below are suitable for comparison and assessment against both the $L_{Aeq(15\ minute)}$ and L_{Amax} noise level criteria for all time periods including night time for potential sleep disturbance.

Table 6.1 displays the highest noise levels predicted to occur as a result of the proposal. Generally, any phases where concrete cutting activities have been predicted to take place have resulted in the greatest noise levels. Phase 7A (inlet well remediation works) has been predicted to result in the highest noise levels at a residential receiver, primarily as a result of the inclusion of a jet blasting machine and concrete cutting equipment.

Within NCA1, 12 Steel Street was identified as the receivers which experienced the highest noise impacts, being the most affected receiver in NCA1 during all work phases. Within NCA 2, however, the most affected receiver varied between the work phases, with the majority of the most affected receivers being located along National Park Street.

Table 6.2 displays the predicted number of receivers which have been predicted to receive noise levels greater than the respective NMLs. As displayed in the table, the same phases which involve the use of concrete cutting and/or jet blasting will result in the greatest number of receivers with noise levels greater than the NML. During standard hours, phase 7A has been predicted to result in up to 70 residential receivers in NCA 1 and 347 residential receivers in NCA 2. During night hours this has been predicted to increase to 404 residential receivers in NCA 1 and 1120 receivers in NCA 2. Additionally, up to nine receivers in NCA 1 have been predicted to become 'highly noise affected' during phase 7A.

A number of non-residential impacts have also been predicted from the works. Up to 32 educational/childcare receivers have been predicted to receiver noise levels greater than the NML during phase 7A, along with 28 commercial receivers and 10 hotels.

Maps displaying the spatial extend of construction noise have been provided in **Appendix A.1**.

Table 6.1 Highest predicted construction noise level at residential receiver (worst-case maximum $L_{Aeq(15\ min)}$ and L_{Amax}, dB(A))

Works Phase	NCA	Address	Predicted Noise Level [maximum $L_{Aeq(15\ min)}$ and L_{Amax}] (dB(A))	Noise Criteria (dB(A))						Exceedance of Noise Criteria					
				SH	OOH Day	OOH Evening	OOH Night	SDSC (L_{Aeq})	SDSC (L_{AMax})	SH	OOH Day	OOH Evening	OOH Night	SDSC (L_{Aeq})	SDSC (L_{AMax})
Phase 1	NCA 1	12 Steel Street, Newcastle West	71	58	53	51	44	44	54	13	18	20	27	27	17
	NCA 2	40 National Park Street, Hamilton South	52	53	48	46	41	41	52	-	4	6	11	11	0
Phase 2	NCA 1	12 Steel Street, Newcastle West	72	58	53	51	44	44	54	14	19	21	28	28	18
	NCA 2	58 National Park Street, Hamilton South	53	53	48	46	41	41	52	0	5	7	12	12	1
Phase 3	NCA 1	12 Steel Street, Newcastle West	80	58	53	51	44	44	54	22	27	29	36	36	26
	NCA 2	58 National Park Street, Hamilton South	61	53	48	46	41	41	52	8	13	15	20	20	9
Phase 4	NCA 1	12 Steel Street, Newcastle West	68	58	53	51	44	44	54	10	15	17	24	24	14
	NCA 2	1 Smith Street, Hamilton South	51	53	48	46	41	41	52	-	3	5	10	10	-
Phase 5A	NCA 1	12 Steel Street, Newcastle West	71	58	53	51	44	44	54	13	18	20	27	27	17
	NCA 2	40 National Park Street, Hamilton South	53	53	48	46	41	41	52	0	5	7	12	12	1
Phase 5B	NCA 1	12 Steel Street, Newcastle West	82	58	53	51	44	44	54	24	29	31	38	38	28
	NCA 2	40 National Park Street, Hamilton South	66	53	48	46	41	41	52	13	18	20	25	25	14
Phase 6	NCA 1	12 Steel Street, Newcastle West	76	58	53	51	44	44	54	18	23	25	32	32	22
	NCA 2	56 National Park Street, Hamilton South	58	53	48	46	41	41	52	5	10	12	17	17	6
Phase 7A	NCA 1	12 Steel Street, Newcastle West	88	58	53	51	44	44	54	30	35	37	44	44	34
	NCA 2	60 National Park Street, Hamilton South	70	53	48	46	41	41	52	17	22	24	29	29	18
Phase 7B	NCA 1	12 Steel Street, Newcastle West	78	58	53	51	44	44	54	20	25	27	34	34	24
	NCA 2	60 National Park Street, Hamilton South	60	53	48	46	41	41	52	7	12	14	19	19	8
Phase 8	NCA 1	12 Steel Street, Newcastle West	71	58	53	51	44	44	54	13	18	20	27	27	17

Works Phase	NCA	Address	Predicted Noise Level [maximum $L_{Aeq(15\ min)}$ and L_{Amax}] (dB(A))	Noise Criteria (dB(A))						Exceedance of Noise Criteria					
				SH	OOH Day	OOH Evening	OOH Night	SDSC (L_{Aeq})	SDSC (L_{AMax})	SH	OOH Day	OOH Evening	OOH Night	SDSC (L_{Aeq})	SDSC (L_{AMax})
	NCA 2	40 National Park Street, Hamilton South	53	53	48	46	41	41	52	-	5	7	12	12	1
Phase 9	NCA 1	12 Steel Street, Newcastle West	74	58	53	51	44	44	54	16	21	23	30	30	20
	NCA 2	40 National Park Street, Hamilton South	55	53	48	46	41	41	52	2	7	9	14	14	3

Table 6.2 Count of residential receivers where predicted construction noise levels are greater than NMLs

Works Phase	NCA	Count of receivers during SH			Count of receivers during OOH Day		Count of receivers during OOH Evening		Count of receivers during OOH Night		Count of receivers - L_{Aeq} SDSC		Count of receivers - L_{AMax} SDSC	
		Below NMLs	Above NMLs	Highly Noise Affected	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below SDCs	Above SDCs	Below SDCs	Above SDCs
Phase 1	NCA 1	422	9	0	415	16	414	17	362	69	362	69	416	15
	NCA 2	1181	0	0	1172	9	1149	32	920	261	920	261	1181	0
Phase 2	NCA 1	424	7	0	422	9	421	10	394	37	394	37	422	9
	NCA 2	1181	0	0	1146	35	1096	85	973	208	973	208	1179	2
Phase 3	NCA 1	395	36	2	335	96	315	116	201	230	201	230	340	91
	NCA 2	983	198	0	836	345	773	408	406	775	406	775	944	237
Phase 4	NCA 1	427	4	0	421	10	419	12	398	33	398	33	422	9
	NCA 2	1181	0	0	1170	11	1137	44	1013	168	1013	168	1181	0
Phase 5A	NCA 1	426	5	0	419	12	416	15	396	35	396	35	420	11
	NCA 2	1181	0	0	1174	7	1163	18	979	202	979	202	1177	4
Phase 5B	NCA 1	416	15	3	410	21	408	23	365	66	365	66	412	19

Works Phase	NCA	Count of receivers during SH			Count of receivers during OOH Day		Count of receivers during OOH Evening		Count of receivers during OOH Night		Count of receivers - L_{Aeq} SDSC		Count of receivers - L_{AMax} SDSC	
		Below NMLs	Above NMLs	Highly Noise Affected	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below SDCs	Above SDCs	Below SDCs	Above SDCs
	NCA 2	992	189	0	750	431	664	517	381	800	381	800	941	240
Phase 6	NCA 1	417	14	1	400	31	383	48	296	135	296	135	408	23
	NCA 2	1151	30	0	981	200	946	235	794	387	794	387	1124	57
Phase 7A	NCA 1	361	70	9	274	157	206	225	27	404	27	404	288	143
	NCA 2	834	347	0	486	695	307	874	61	1120	61	1120	785	396
Phase 7B	NCA 1	415	16	2	397	34	389	42	288	143	288	143	406	25
	NCA 2	1082	99	0	967	214	935	246	735	446	735	446	1058	123
Phase 8	NCA 1	426	5	0	419	12	416	15	396	35	396	35	420	11
	NCA 2	1181	0	0	1174	7	1163	18	971	210	971	210	1177	4
Phase 9	NCA 1	416	15	0	413	18	405	26	323	108	323	108	414	17
	NCA 2	1175	6	0	1130	51	1054	127	692	489	692	489	1174	7

Table 6.3 Count of non-residential receivers where predicted construction noise levels are greater than NMLs

Works phase	Type of receiver	Count of non-residential receivers	
		Below NMLs	Above NMLs
Phase 1	Commercial	308	6
	Industrial	5	0
	Educational/Childcare	42	0
	Hotel	6	5
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0
Phase 2	Commercial	310	4
	Industrial	5	0
	Educational/Childcare	41	1
	Hotel	6	5
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0
Phase 3	Commercial	295	19
	Industrial	5	0
	Educational/Childcare	19	23
	Hotel	3	8
	Library	1	0
	Medical	1	4
	Passive Recreation	3	5
	Place of Worship	8	4
Phase 4	Commercial	312	2
	Industrial	5	0
	Educational/Childcare	42	0
	Hotel	7	4
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0

Works phase	Type of receiver	Count of non-residential receivers	
		Below NMLs	Above NMLs
Phase 5A	Commercial	311	3
	Industrial	5	0
	Educational/Childcare	42	0
	Hotel	6	5
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0
Phase 5B	Commercial	306	8
	Industrial	5	0
	Educational/Childcare	35	7
	Hotel	7	4
	Library	1	0
	Medical	5	0
	Passive Recreation	3	5
	Place of Worship	11	1
Phase 6	Commercial	304	10
	Industrial	5	0
	Educational/Childcare	32	10
	Hotel	4	7
	Library	1	0
	Medical	5	0
	Passive Recreation	5	3
	Place of Worship	12	0
Phase 7A	Commercial	286	28
	Industrial	5	0
	Educational/Childcare	10	32
	Hotel	1	10
	Library	0	1
	Medical	3	2
	Passive Recreation	0	8
	Place of Worship	8	4
Phase 7B	Commercial	303	11
	Industrial	5	0
	Educational/Childcare	28	14
	Hotel	3	8
	Library	1	0
	Medical	5	0
	Passive Recreation	5	3

Works phase	Type of receiver	Count of non-residential receivers	
		Below NMLs	Above NMLs
	Place of Worship	11	1
Phase 8	Commercial	311	3
	Industrial	5	0
	Educational/Childcare	42	0
	Hotel	6	5
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0
Phase 9	Commercial	307	7
	Industrial	5	0
	Educational/Childcare	42	0
	Hotel	6	5
	Library	1	0
	Medical	5	0
	Passive Recreation	8	0
	Place of Worship	12	0

6.1.2 Construction traffic noise

The anticipated construction vehicle movements are expected to be significantly lower than existing traffic volumes on all nearby roads, therefore noise from construction vehicles would not increase road traffic noise levels by more than 2 dB(A) on any road. Consequently, noise impact from construction traffic is expected to be negligible.

6.2 Operational noise

6.2.1 Comparison of predicted noise levels against criteria

Noise was assessed from the OCU fan and motor at all nearby noise sensitive receivers. As the noise source will operate 24 hours per day, for residential receivers and hotels the noise has been assessed against the most sensitive time period (night).

The noise modelling indicates that the predicted noise levels from the fan and motor will comply with the relevant noise criteria at all adjacent noise sensitive receivers. For reference, noise level measurements at the three nearest noise sensitive receivers (up to the tenth floor) have been displayed in **Table 6.4**.

A map displaying the spatial extent of the proposal's operational noise levels is provided in **Section A.2**.

Table 6.4 Predicted noise levels at nearest noise sensitive receivers

Receiver	Floor	Noise level (no fan enclosure)	Noise limit	Compliance?
12 Steel Street, Newcastle West	GF	39	43	Yes
	F1	39		Yes
	F2	39		Yes
	F3	39		Yes
	F4	39		Yes

Receiver	Floor	Noise level (no fan enclosure)	Noise limit	Compliance?
	F5	39		Yes
	F6	38		Yes
	F7	38		Yes
	F8	38		Yes
	F9	38		Yes
	F10	38		Yes
Travelodge Newcastle West	GF	38	43	Yes
	F1	38		Yes
	F2	39		Yes
	F3	39		Yes
	F4	40		Yes
	F5	38		Yes
	F6	38		Yes
464-466 King Street, Newcastle West	GF	36	43	Yes
	F1	36		Yes
	F2	36		Yes
	F3	36		Yes
	F4	36		Yes
	F5	34		Yes
	F6	34		Yes
	F7	32		Yes
	F8	32		Yes
	F9	32		Yes
	F10	32		Yes

6.2.2 Tonality and low frequency noise

As per **Section 4.2.5**, industrial noise can feature tones and low frequency noise, which can be more annoying or impactful to the amenity of an area than regular industrial noise.

6.2.2.1 Tonality

As per **Section 4.2.5**, where a tonal noise is predicted to be generated from a noise source, a one-third octave analysis should be performed using the methodology detailed in *ISO 1996-2:2007 Annex D: Objective Method for Assessing the Audibility of Tones in Noise*. Where the level of one-third octave band exceeds the level of the adjacent bands on both sides by:

- 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz
- 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz
- 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.

Then a correction of 5 dB should be applied to the noise source.

1/3 Octave band sound pressure levels have been predicted at the ground floors of the three nearest receivers and assessed against the above criteria. This is displayed in **Table 6.5**. As displayed in the table, none of the nearest receivers have been predicted to experience any tonal impacts which would require a tonal noise penalty.

Table 6.5 OCU fan tonal noise assessment

Receiver	Measurement	⅓ Octave band frequencies (dB(Z))																						
		50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	40Hz	500Hz	640Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
12 Steel Street, Newcastle West	Predicted SPL	37.9	33.9	30.2	39.1	36	33.3	34.3	32	30	34.6	33	31.7	31.6	30.8	30.2	19.9	19.7	19.7	12.5	12.7	13.2	9.1	10.1	11.4
	Level above left neighbour	N/A	-4	-3.7	8.9	-3.1	-2.7	1	-2.3	-2	4.6	-1.6	-1.3	-0.1	-0.8	-0.6	-10.3	-0.2	0	-7.2	0.2	0.5	-4.1	1	1.3
	Level above right neighbour	4	3.7	-8.9	3.1	2.7	-1	2.3	2	-4.6	1.6	1.3	0.1	0.8	0.6	10.3	0.2	0	7.2	-0.2	-0.5	4.1	-1	-1.3	N/A
	Penalty Triggered?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Travelodge Newcastle West	Predicted SPL	35.1	31.1	27.4	36.3	33.2	30.5	33.6	31.4	29.4	34	32.4	31.1	30.9	30.1	29.5	19.2	19	18.9	11.5	11.7	12.2	5.1	6.1	7.5
	Level above left neighbour	N/A	-4	-3.7	8.9	-3.1	-2.7	3.1	-2.2	-2	4.6	-1.6	-1.3	-0.2	-0.8	-0.6	-10.3	-0.2	-0.1	-7.4	0.2	0.5	-7.1	1	1.4
	Level above right neighbour	4	3.7	-8.9	3.1	2.7	-3.1	2.2	2	-4.6	1.6	1.3	0.2	0.8	0.6	10.3	0.2	0.1	7.4	-0.2	-0.5	7.1	-1	-1.4	N/A
	Penalty Triggered?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
464-466 King Street, Newcastle West	Predicted SPL	31.9	27.9	24.2	32.7	29.7	26.9	27.3	25.1	23.1	31.8	30.3	28.9	29	28.2	27.6	16.9	16.7	16.6	9.2	9.5	9.9	2	3	4.4
	Level above left neighbour	N/A	-4	-3.7	8.5	-3	-2.8	0.4	-2.2	-2	8.7	-1.5	-1.4	0.1	-0.8	-0.6	-10.7	-0.2	-0.1	-7.4	0.3	0.4	-7.9	1	1.4
	Level above right neighbour	4	3.7	-8.5	3	2.8	-0.4	2.2	2	-8.7	1.5	1.4	-0.1	0.8	0.6	10.7	0.2	0.1	7.4	-0.3	-0.4	7.9	-1	-1.4	N/A
	Penalty Triggered?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

6.2.2.2 Low frequency noise

As per **Section 4.2.5**, low frequency noise is accounted for using a two-step assessment of the A-weighted and C-weighted noise levels. A correction for low frequency noise will be applied where:

1) The C-weighted noise contribution is 15 dB greater than the A-weighted noise source contribution at a noise receiver, **AND**
2) Any of the third octave noise levels presented in Table C2 of Fact Sheet C are exceeded at the noise receiver.

Where the exceedance of the third octave noise levels is less than or equal to 5 dB, a correction of 2 dB is applied during the evening and night periods, and where the exceedance of the third octave noise levels is greater than 5 dB, a correction of 5 dB is applied during the evening and night periods.

The comparison between the predicted dB(A) and dB(C) noise levels are detailed in **Table 6.6**. As displayed in the table, at the ground floor of the nearest three receivers, the C-weighted noise level is not greater than the A-weighted noise level by more than 15 dB. As such, low frequency is not deemed to be a concern and further assessment is not required.

Table 6.6 A-weighted and C-weighted noise level comparison

Noise sensitive receiver	Difference between C and A weighted predicted noise levels $L_{eq,15min}$ dB		
	A-weighted noise level	C-weighted noise level	Requires assessment at the octave band level to determine the level of adjustment due to LFN?
12 Steel Street, Newcastle West	39	45	No
Travelodge Newcastle West	38	44	No
464-466 King Street, Newcastle West	36	40	No

6.3 Construction vibration

As identified in **Table 5.4**, some items of plant that are expected to be used in construction (i.e;. the compactor and concrete compactor) are considered to be vibration-generating. The recommended setback distances for these plant items and the number of vibration-sensitive receivers that fall within those setback distances are shown in **Table 6.7,** with maps displaying the spatial extent of the vibration setbacks have been provided in **Appendix B**.

As shown in the **Table 6.7,**and **Appendix B**, while the small compactor is in use, vibration which could reach the commercial receivers on 461 King Street. The Former Gasworks Office heritage structure (i.e. the 461 King Street building itself) may also be impacted by vibration impacts greater than the recommended levels of DIN 4150-3.

Table 6.7 Construction vibration impact assessment results

Equipment	Setback Distance (m)			Number of Impacted Receivers within setback distance				
				Human Comfort		Cosmetic Building Damage		Heritage items
	Human comfort	Cosmetic building damage	Heritage item	Residential Receiver	Non-Residential Receiver	Residential Receiver	Non-Residential Receiver	
Small Compactor	15m	5m	10m	0	1	0	0	1
Concrete Compactor	2m	1m	2m	0	0	0	0	0

6.4 Cumulative impacts

The area around Newcastle West has and is undergoing substantial redevelopment and there are a number of high rise apartment buildings currently been constructed. As such, construction noise currently forms a part of Newcastle West's noise environment, and the construction works undertaken for this proposal may pose a cumulative impact with these works. Conversely, the surrounding construction works may also drown out some of the proposal's construction noise, particularly when further away from the proposal and during the proposal's quieter work phases.

Two particular developments, at 35 and 42 Honeysuckle Drive were identified in particular as having a potential cumulative construction noise impact. A comparison of the number of impacted receivers between the phase 7A and 7B works alone, along with the cumulative impact between these phases and developments within NCA 1 has been presented below in **Table 6.8** and **Table 6.9**. As shown in the tables, the works at 35 Honeysuckle Drive have been predicted to have a generally low level of cumulative noise impacts, particularly as a result of the phase 7A and 7B works having much greater sound power levels than 35 Honeysuckle Drive. However, the noise impacts increase quite significantly when both phase 7A and 7B are undertaken at the same time as rock hammering and crushing at 42 Honeysuckle Drive, nearly doubling the number of receivers predicted to experience noise greater than the respective NMLs, as well as increasing the number of 'highly noise affected' receivers from nine to 14. As such, cumulative noise impacts between these works will have to be carefully managed.

Maps displaying the spatial extend of cumulative construction noise have been provided in **Section A.3**.

Table 6.8 Count of residential receivers where predicted cumulative construction noise levels are greater than NMLs

Works Phase	Cumulative Works	Count of receivers during Standard Hours			Count of receivers during OOH Day		Count of receivers during OOH Evening		Count of receivers during OOH Night		Count of receivers - LAeq sleep disturbance		Count of receivers - LAMax sleep disturbance	
		Below NMLs	Above NMLs	Highly Noise Affected	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below NMLs	Above NMLs	Below SDCs	Above SDCs	Below SDCs	Above SDCs
Phase 7A	None	361	70	9	274	157	206	225	27	404	27	404	288	143
	35 Honeysuckle Drive	361	70	10	274	157	206	225	27	404	27	404	288	143
	42 Honeysuckle Drive	286	145	13	147	284	87	344	6	425	6	425	176	255
Phase 7B	None	415	16	2	397	34	389	42	288	143	288	143	406	25
	35 Honeysuckle Drive	415	16	3	397	34	388	43	273	158	273	158	406	25
	42 Honeysuckle Drive	325	106	7	229	202	176	255	23	408	23	408	261	170

Table 6.9 Count of non-residential receivers where predicted cumulative construction noise levels are greater than NMLs

Works phase	Cumulative works	Type of receiver	Count of non-residential receivers	
			Below NMLs	Above NMLs
Phase 7A	None	Commercial	271	28
		Industrial	5	0
		Educational/Childcare	10	15
		Hotel	97	195
		Library	0	1
		Medical	1	2
		Place of Worship	3	4
	35 Honeysuckle Drive	Commercial	271	28
		Industrial	5	0
		Educational/Childcare	10	15
		Hotel	97	195
		Library	0	1
		Medical	1	2
		Place of Worship	3	4
	42 Honeysuckle Drive	Commercial	252	47
		Industrial	4	1
		Educational/Childcare	7	18
		Hotel	29	263
		Library	0	1
		Medical	1	2
		Place of Worship	2	5
Phase 7B	None	Commercial	288	11
		Industrial	5	0
		Educational/Childcare	19	6
		Hotel	219	73
		Library	1	0
		Medical	3	0
		Place of Worship	6	1
	35 Honeysuckle Drive	Commercial	288	11
		Industrial	5	0
		Educational/Childcare	19	6
		Hotel	216	76
		Library	1	0
		Medical	3	0
		Place of Worship	6	1

Works phase	Cumulative works	Type of receiver	Count of non-residential receivers	
			Below NMLs	Above NMLs
	42 Honeysuckle Drive	Commercial	261	38
		Industrial	4	1
		Educational/Childcare	8	17
		Hotel	69	223
		Library	0	1
		Medical	3	0
		Place of Worship	4	3

7. Mitigation and management

7.1 Construction

7.1.1 Noise

A number of construction noise impacts have been predicted at the nearest residential receivers, in worst cases up to 30 dB(A) greater than the standard hours NMLs. Mitigation measures adopted from the CNVG to address these impacts and assure that construction noise levels remain below relevant criterion have been provided in **Table 7.1** and should be applied where reasonable and feasible.

Table 7.1 Noise mitigation measures during construction

Reference	Mitigation measure	Timing
NVIA1	Wherever possible and safe, limit works, particularly activities such as jet blasting and concrete cutting, to standard hours of construction.	During construction
NVIA2	Where noisy activities cannot be scheduled to standard construction hours, noisy activities should be scheduled to take place earlier in the night, during less sensitive time periods.	During construction
NVIA3	Notification within seven days prior to works detailing proposed dates, alternative dates for wet weather and hourly activity plan for night works.	Prior to and during construction
NVIA4	Select low-noise plant and equipment. Ensure equipment mufflers operate in a proper and efficient manner.	Prior to and during construction
NVIA5	Where possible, use quieter and less vibration emitting construction methods.	During construction
NVIA6	Only have necessary equipment on-site and turn off when not in use.	During construction
NVIA7	Where possible, concentrate noisy activities at one location and move to another as quickly as possible.	During construction
NVIA8	Vehicle movements, including deliveries outside standard hours, should be minimised and avoided where possible.	During construction
NVIA9	All plant and equipment is to be well maintained and where possible, fitted with silencing devices.	Prior to and during construction
NVIA10	Use only the necessary size and powered equipment for tasks.	During construction
NVIA11	Implement training to induct staff on noise sensitivities	Prior to and during construction
NVIA12	Where possible, consider the application of less intrusive alternatives to reverse beepers such as 'squawker' or 'broadband' alarms.	During construction
NVIA13	Consider the installation of temporary construction noise barriers for concentrated, noise-intensive activities.	During construction
NVIA14	Where practicable, install enclosures around noisy mobile and stationary equipment as necessary.	During construction
NVIA15	Where possible, avoid simultaneous operation of two or more noisy plant close to receivers. The offset distance between noisy plant and sensitive receivers should be maximised.	During construction

Reference	Mitigation measure	Timing
NVIA16	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements.	Prior to and during construction
NVIA17	Complete routine monitoring to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision.	During construction

7.1.2 Vibration

Minor vibration impacts have been predicted to result from the use of a compactor. As such, mitigation measures should be adopted to address these impacts.

Assessing Vibration: a technical guideline, (DECC, 2006) provides general guidance for limiting vibration impacts during construction. These measures could be adopted where reasonable and feasible to further control vibration impacts. These are displayed in **Table 7.2**.

Table 7.2 Vibration mitigation measures during construction

Reference	Mitigation measure	Timing
NVIA16	Choosing alternative, lower-impact equipment or methods wherever possible.	Prior to and during construction
NVIA17	Scheduling the use of vibration-causing equipment at the least sensitive times of the day (wherever possible).	Prior to and during construction
NVIA18	Locating high vibration sources as far away from sensitive receiver areas as possible.	During construction
NVIA19	Sequencing operations so that vibration-causing activities do not occur simultaneously.	During construction
NVIA20	Keeping equipment well maintained	During construction
NVIA21	Do not conduct vibration intensive works within the recommended safe setback distances.	During construction
NVIA22	Informing nearby receivers about the nature of construction phases and the vibration-generating activities.	Prior to and during construction
NVIA23	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic and heritage building damage.	Prior to and during construction
NVIA24	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted maintaining the setback distances cannot be achieved.	Prior to and during construction

7.2 Operational noise mitigation

As displayed in **Section 6.2**, the operational noise impacts from the OCU fan and motor have not been predicted to result in noise impacts greater than the proposal noise trigger levels at any of the nearby receivers during the most noise sensitive time periods. However, it is noted the fan may sporadically feature greater noise levels as a result of the motor being a VF drive. Due to the fact that noise from the fan may reach greater noise levels than those models due to the VF drive, it is recommended that when the final fan and motor model is selected, the external noise performance of the unit should be verified and confirmed by the supplier to be able to achieve the 43 dB(A) residential noise limit (or alternatively achieve a maximum external sound power level of 84 dB(A)), with the VF drive noise variance accounted for.

Table 7.3 Noise mitigation measures for the OCU fan

Reference	Mitigation measure	Timing
NVIA25	Seek from the supplier demonstrated evidence that the selected OCU fan and motor can achieve the 43 $L_{Aeq\ 15\ minute}$ dB(A) night noise limit ((or alternatively achieve a maximum external SWL of 84 dB(A)) at all times, factoring in the noise variation as a result of the VF drive.	Design stage

7.3 Cumulative noise impacts

It has been identified that noise from rock hammering and crushing activities at 42 Honeysuckle Drive may result in a cumulative construction noise impact. As such, works from the two developments will have to be carefully managed by the proponents to prevent or mitigate the potential cumulative noise impacts when works coincide. Measures to address the cumulative construction noise impacts have been displayed in **Table 7.4**.

Table 7.4 Cumulative noise mitigation measures during construction

Reference	Mitigation measure	Timing
NVIA26	Discuss works schedules and timings with the proponents of other works to gain an understanding of when noisy work surrounding the Proposal will take place. Should respectively project schedules and work priorities change, proponents should commit to regular meetings to ensure all proponents are aware of the changes.	Prior to and during construction
NVIA27	Where possible, schedule works to occur at different times of the day to prevent multiple noisy activities from taking place at the same time.	During construction
NVIA28	Where possible, schedule works to take place at different locations within the proposal area to prevent noisy activities from taking place in close proximity to one another which will limit the amplification of the noise.	During construction

8. Conclusion and considerations

A noise and vibration impact assessment has been undertaken for the proposal in accordance with the NSW ICNG, the NPI and other relevant policies and guidelines.

8.1 Construction

It was found that the construction works required by the proposal would lead to construction noise impacts. Noise levels of up to 30dB(A) greater than the standard hours NMLs have been predicted at the nearest residential receivers. Generally, any phases where concrete cutting activities have been predicted to take place have resulted in the greatest noise levels.

The inlet well remediation works (Phase 7A) has been predicted to result in the highest noise levels at a residential receiver, primarily as a result of the inclusion of a jet blasting machine and concrete cutting. During standard hours, phase 7A has been predicted to result in up to 70 residential receivers in NCA 1 and 347 residential receivers in NCA 2. During night hours this has been predicted to increase to 404 residential receivers in NCA 1 and 1120 receivers in NCA 2. Additionally, up to nine receivers in NCA 1 have been predicted to become 'highly noise affected' during phase 7A.

Construction vibration was predicted to have a minor impact on the nearest receiver, the adjacent 461 King Street, during the use of the compactor. As this structure is a heritage item, vibration should be managed to prevent any damage to the structure.

8.2 Operation

It was determined that the noise produced by the fan and motor associated with the proposal will not produce operational noise levels greater than the noise limits defined by the NPI, nor will the proposal pose any tonal or low frequency noise risks.

It should be noted that the noise levels adopted for the fan and motor unit was indicative and based on sound power levels of a similar fan and motor setup. Likewise, the impact of the VF drive on noise variance could not be determined. As such, Jacobs recommends that when the final fan and motor model is selected, the external noise performance of the unit should be verified and confirmed by the supplier to be able to achieve the 43 dB(A) residential noise limit (or alternatively achieve a maximum external sound power level of 84 dB(A)). Likewise, the supplier should also demonstrate that the unit can achieve the noise limit without producing tonal and low frequency noise impacts.

8.3 Cumulative

Two particular developments, at 35 and 42 Honeysuckle Drive were identified in particular as having a potential cumulative construction noise impact. A comparison of the number of impacted receivers between the phase 7A and 7B works alone, along with the cumulative impact between these phases and developments within NCA 1 showed that noise impacts increased quite significantly when both phase 7A and 7B are undertaken at the same time as rock hammering and crushing at 42 Honeysuckle Drive, nearly doubling the number of receivers predicted to experience noise greater than the respective NMLs, as well as increasing the number of 'highly noise affected' receivers from nine to 14. As such, cumulative noise impacts between these works will have to be carefully managed.

9. References

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Appendix A. Noise contour maps

A.1 Construction noise maps

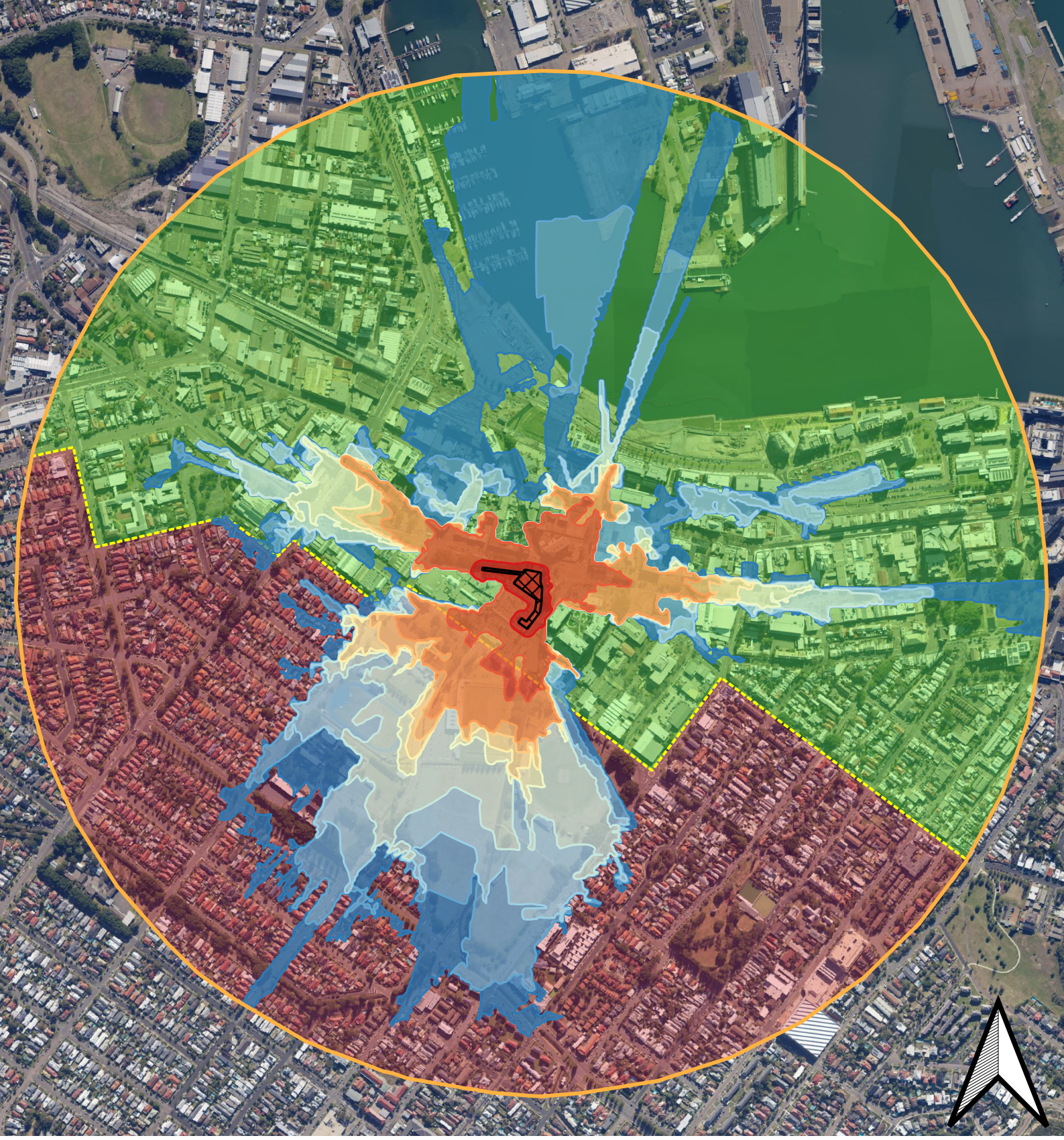

Figure A.1.1 - Phase 1 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
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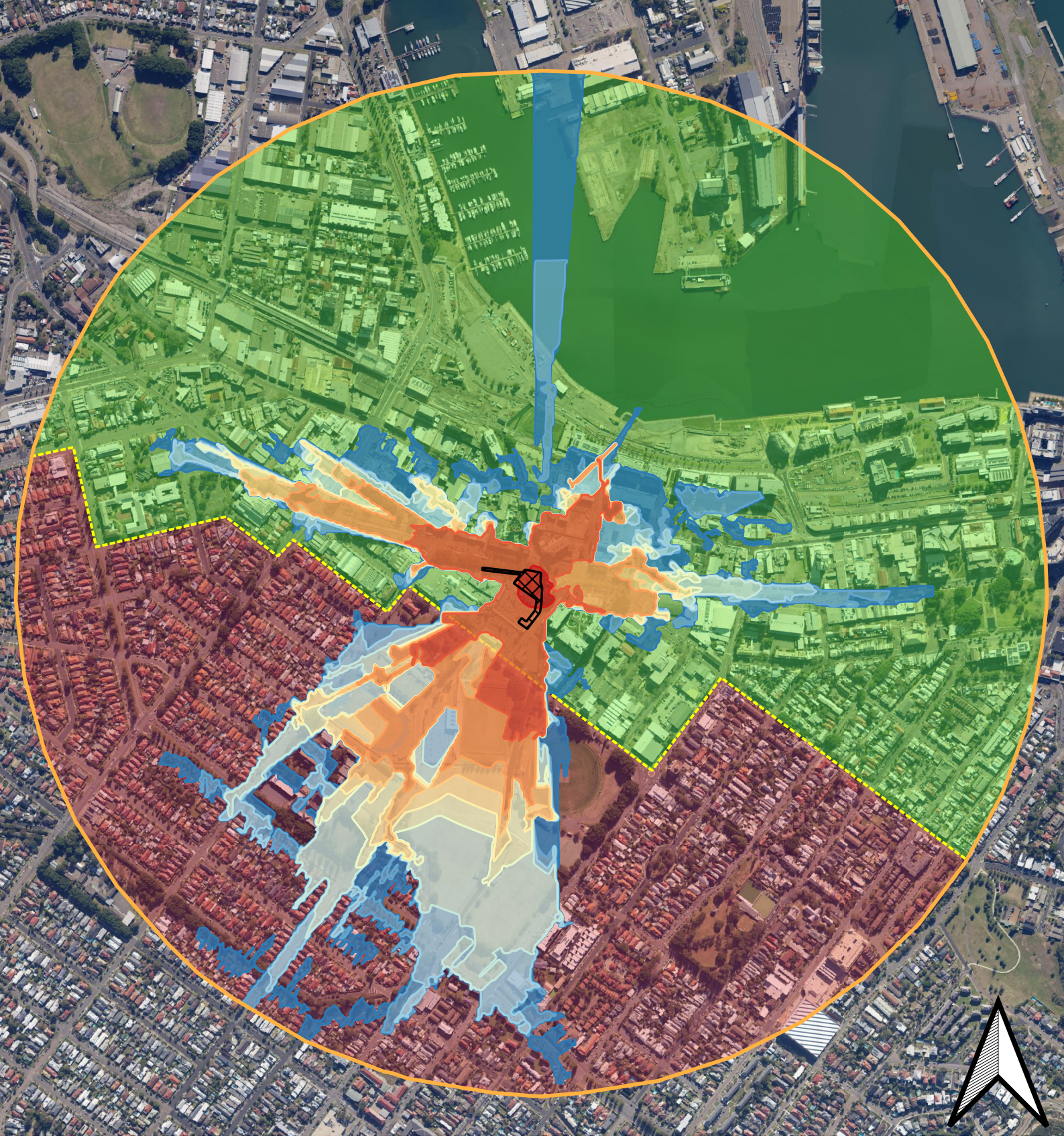

Figure A.1.2 - Phase 2 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

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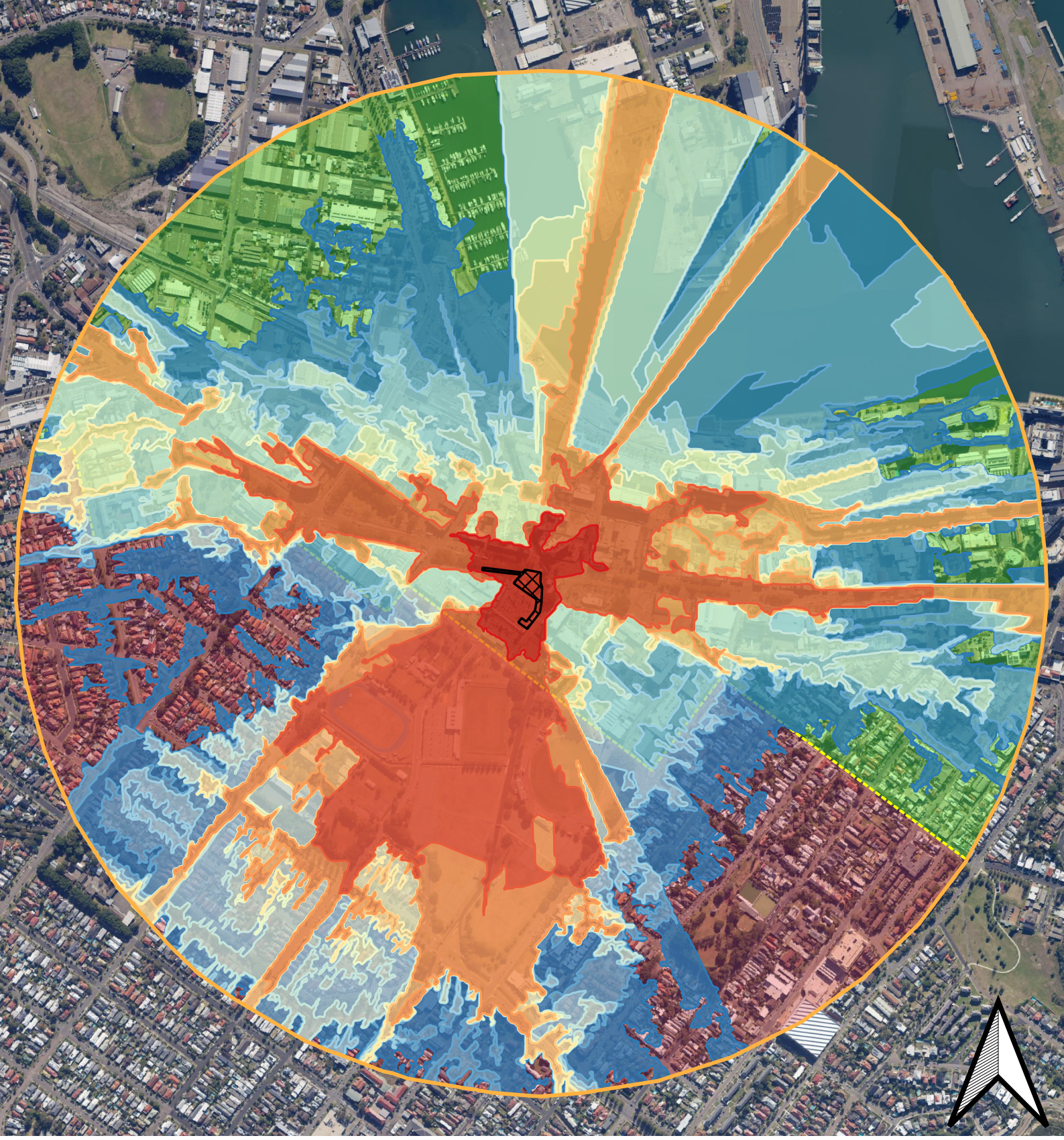

Figure A.1.3 - Phase 3 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

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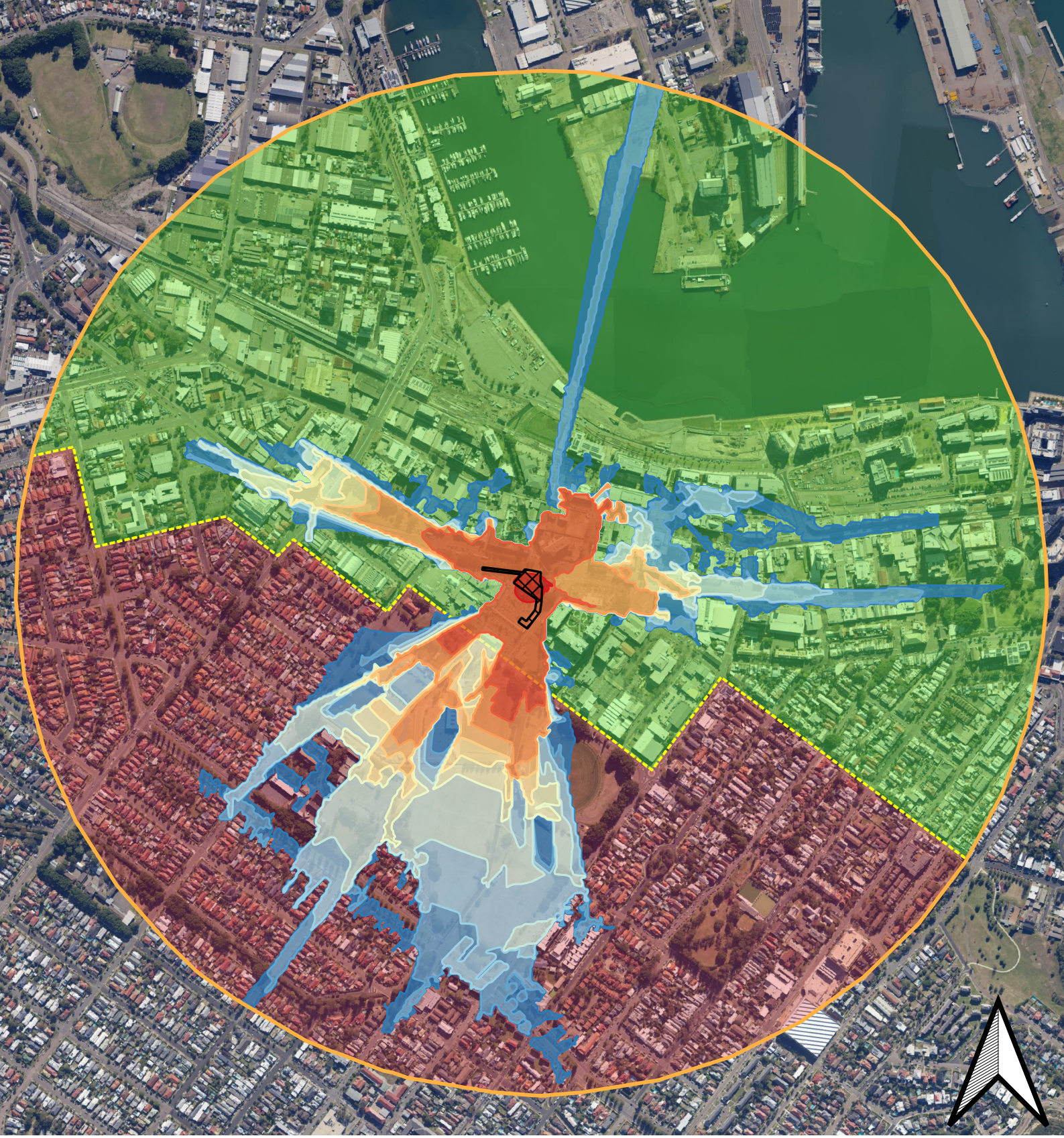

Figure A.1.4 - Phase 4 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

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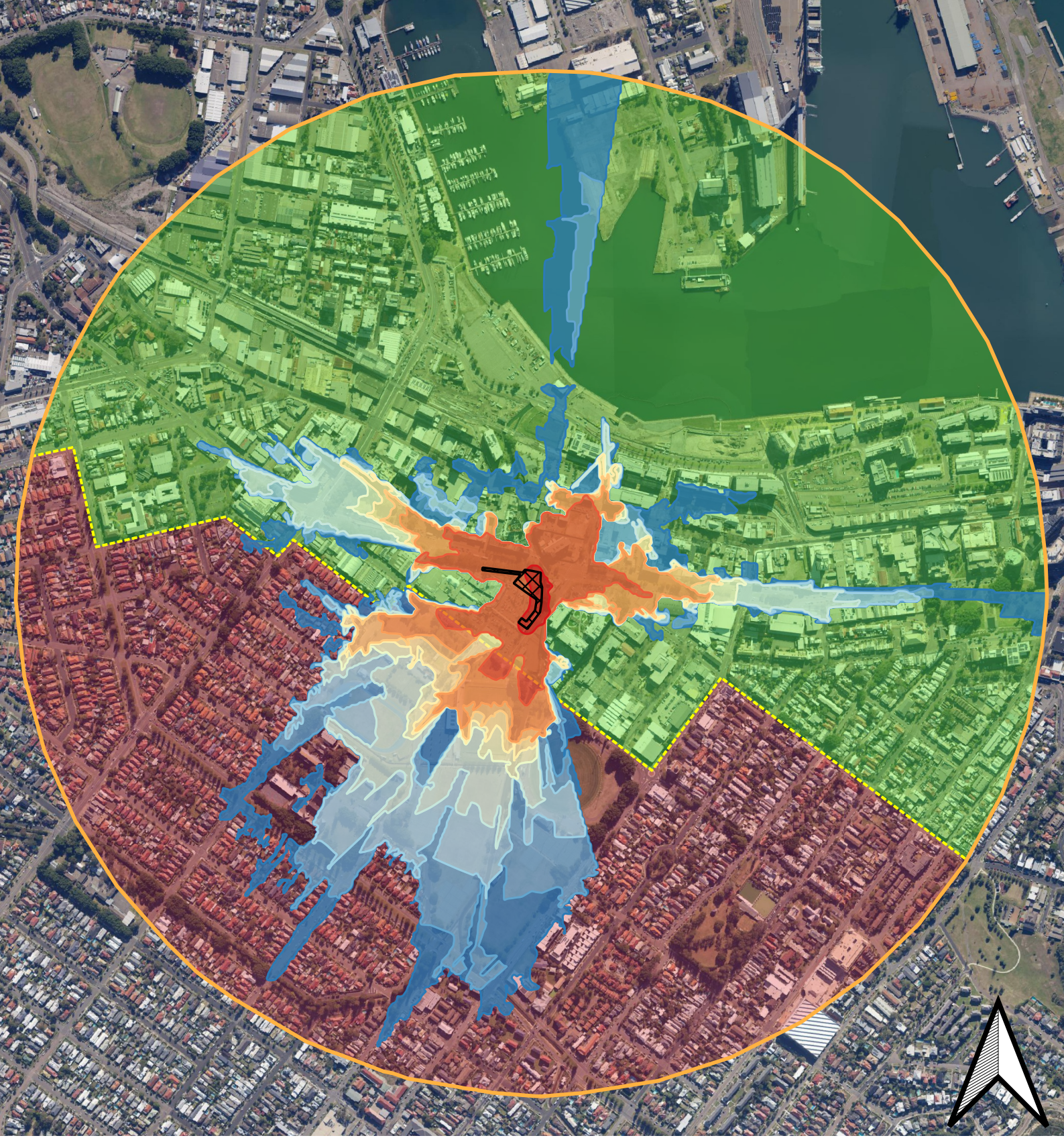

Figure A.1.5 - Phase 5A construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

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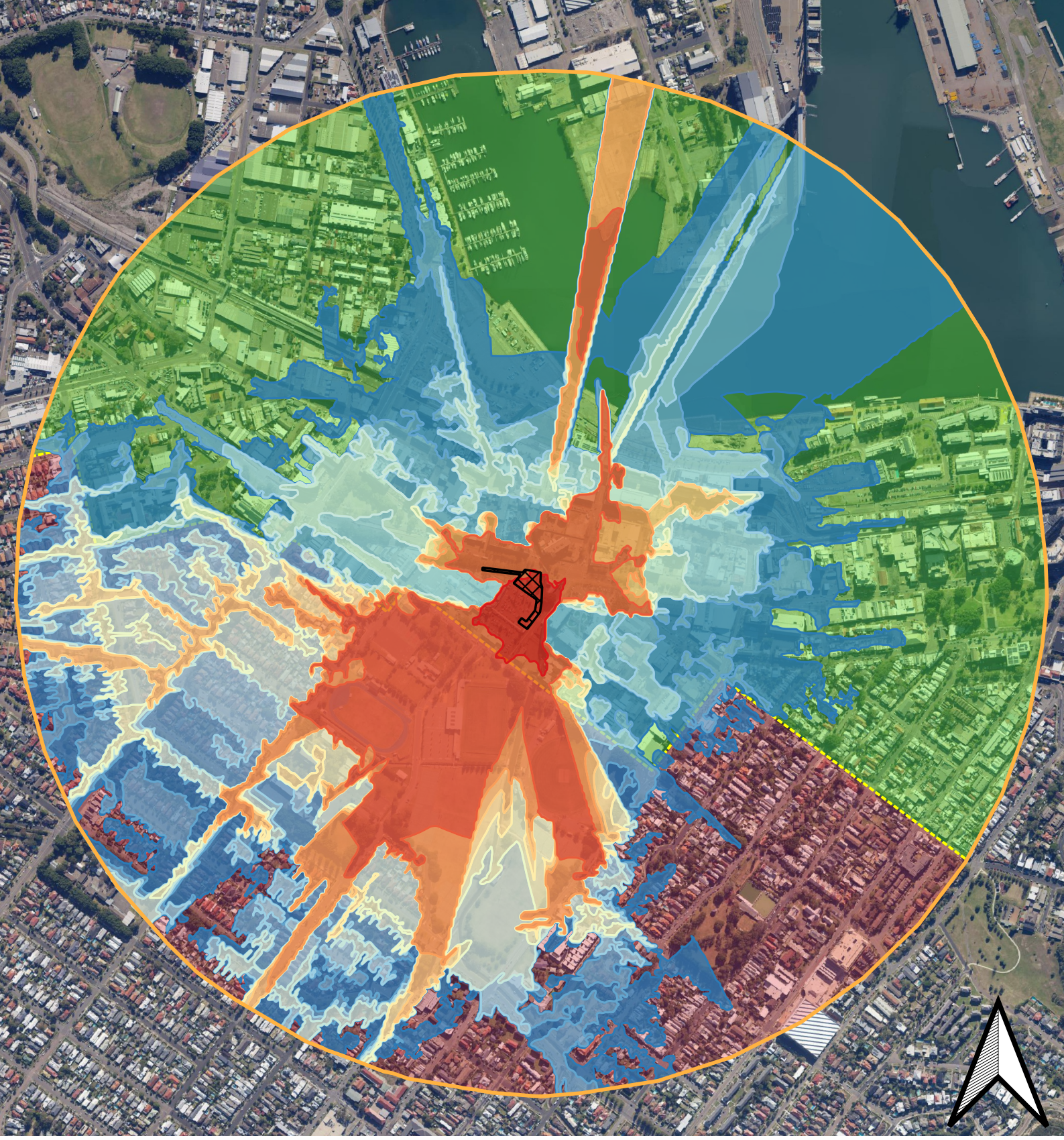

Figure A.1.6 - Phase 5B construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

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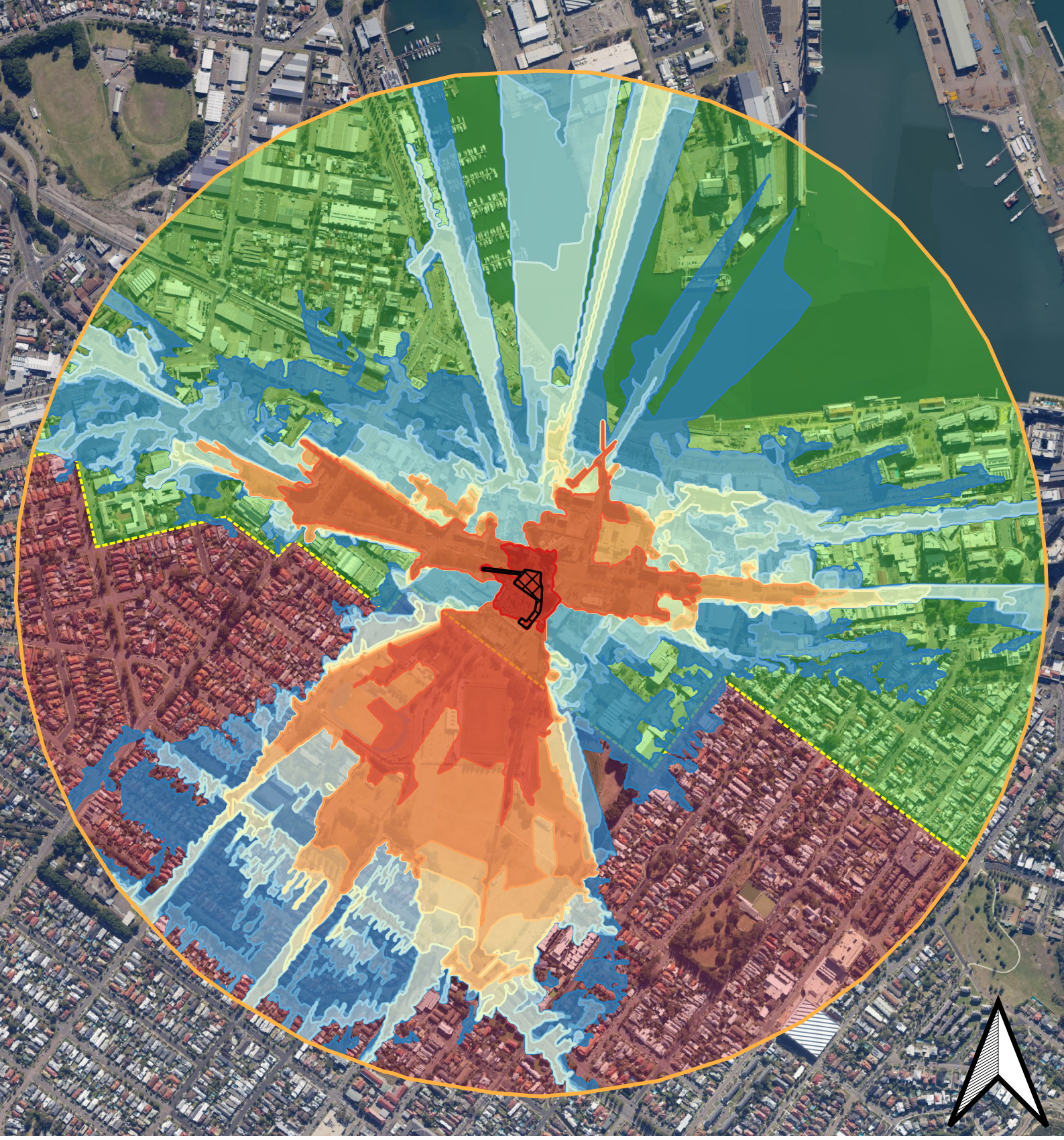

Figure A.1.7 - Phase 6 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
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Jacobs

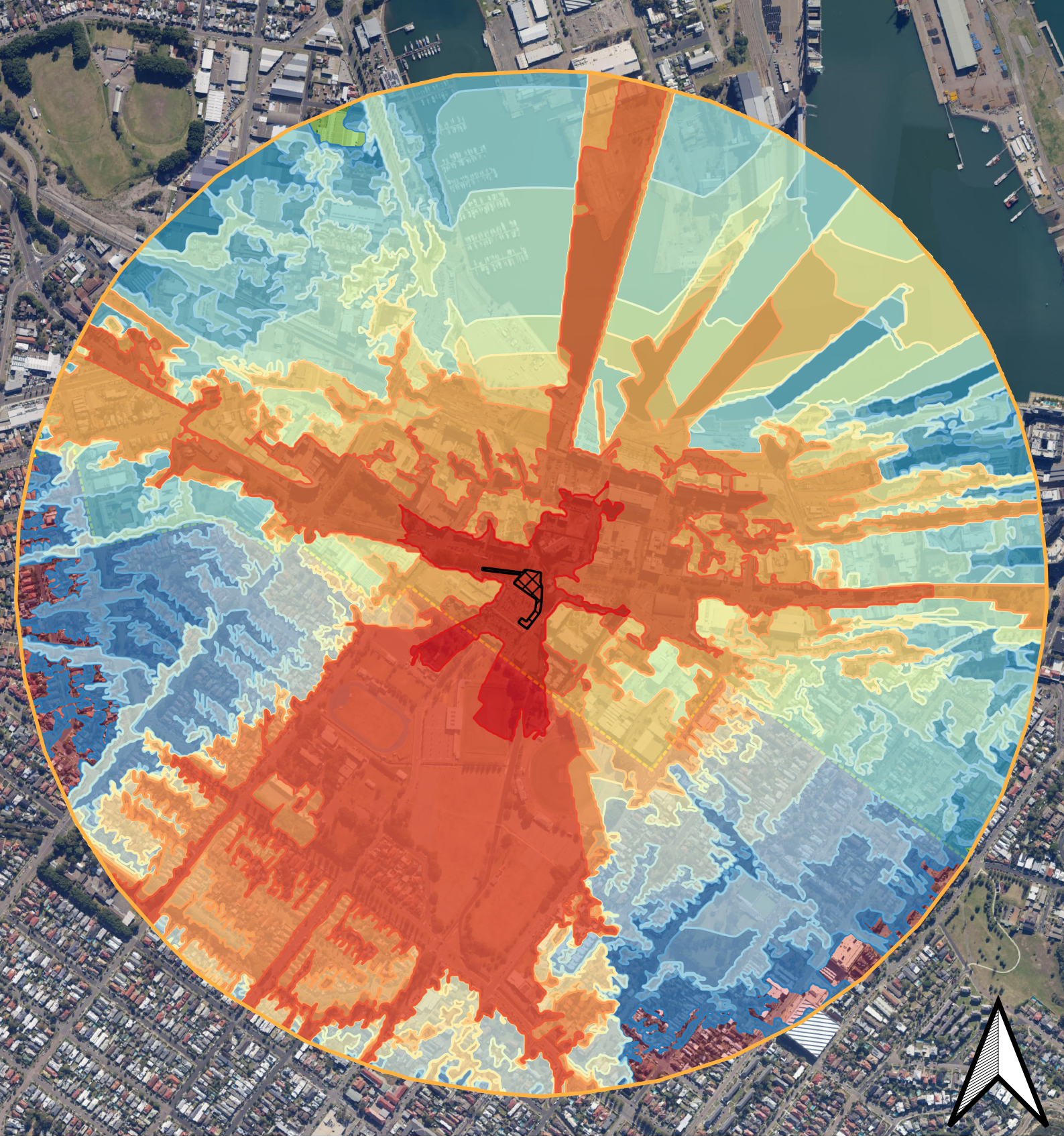

Figure A.1.8 - Phase 7A construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

Jacobs

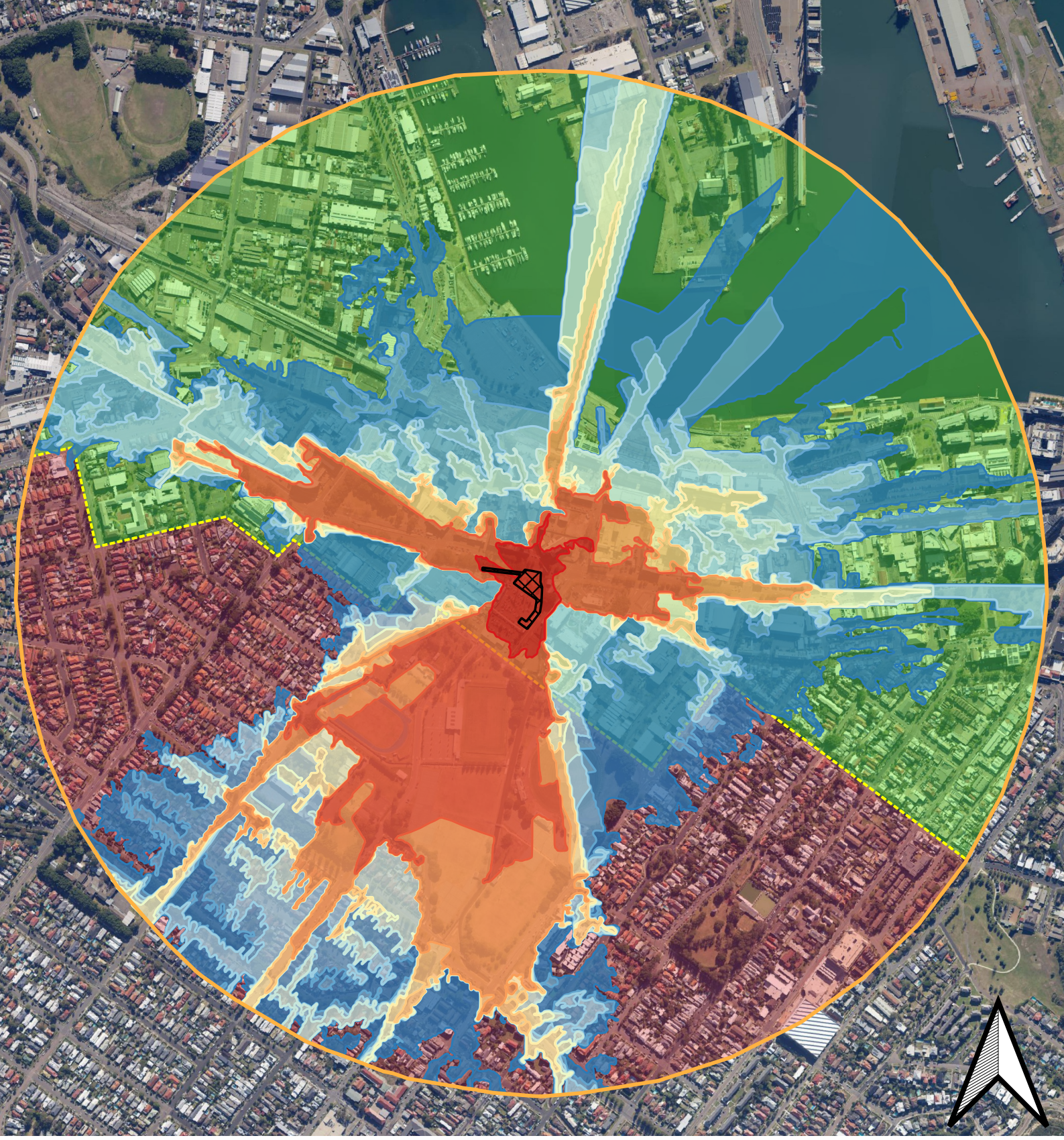

Figure A.1.9 - Phase 7B construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

Jacobs

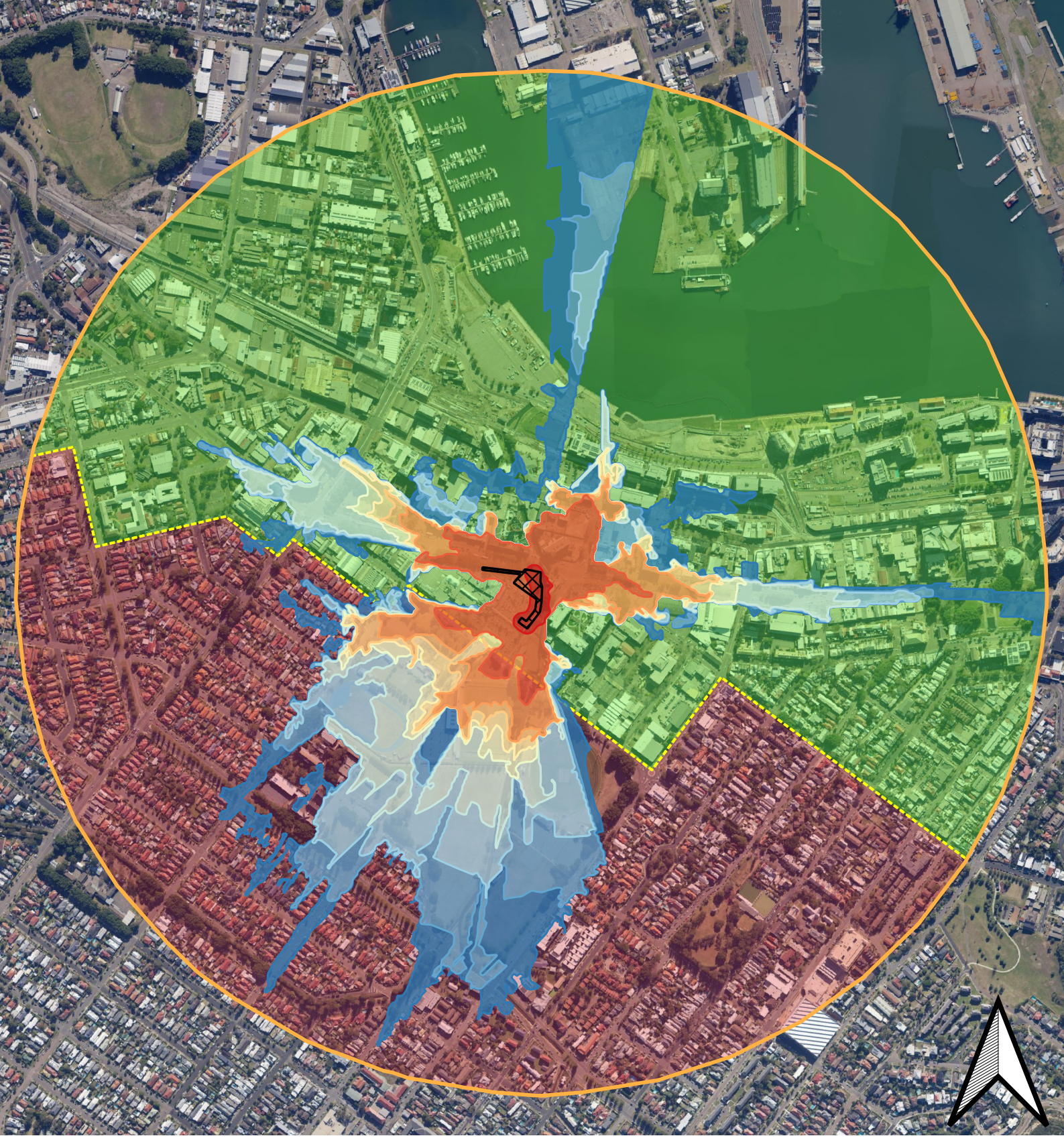

Figure A.1.10 - Phase 8 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

Jacobs

Figure A.1.11 - Phase 9 construction noise levels (without mitigation)

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

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A.2 Operational noise maps

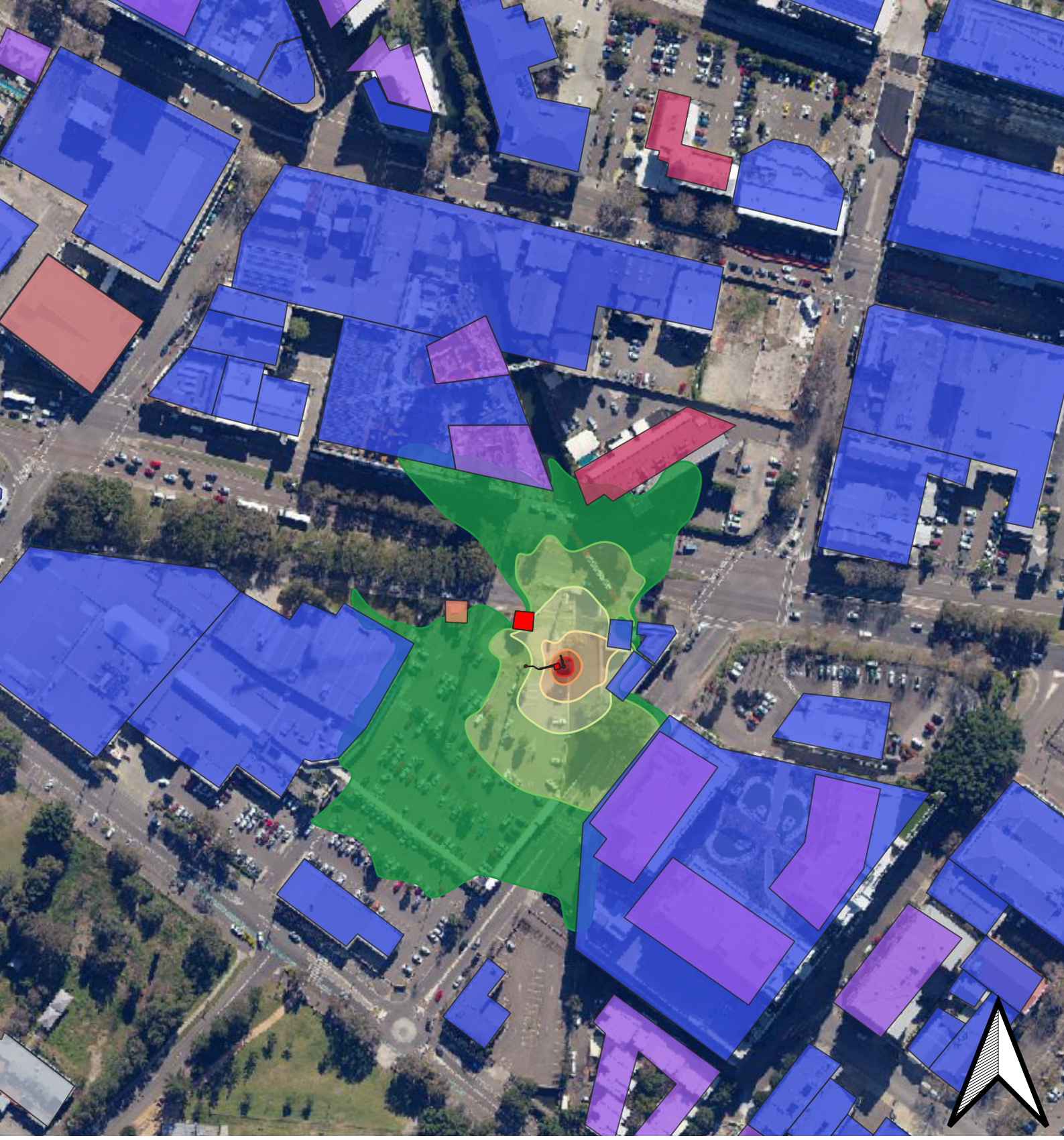

Figure A.2.1 - Predicted operational noise levels

0 50 100 m

Legend

Predicted Noise Level
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 db(A)
- 55 dB(A)
- 60 dB(A)

- Proposed OCU Layout
- Residential Buildings
- Commercial Buildings
- Hotels
- Garage / Unused Building
- Passive Recreation Building or Area

Basemap: NSW SixMap
Scale: 1:2000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

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A.3 Cumulative construction noise maps

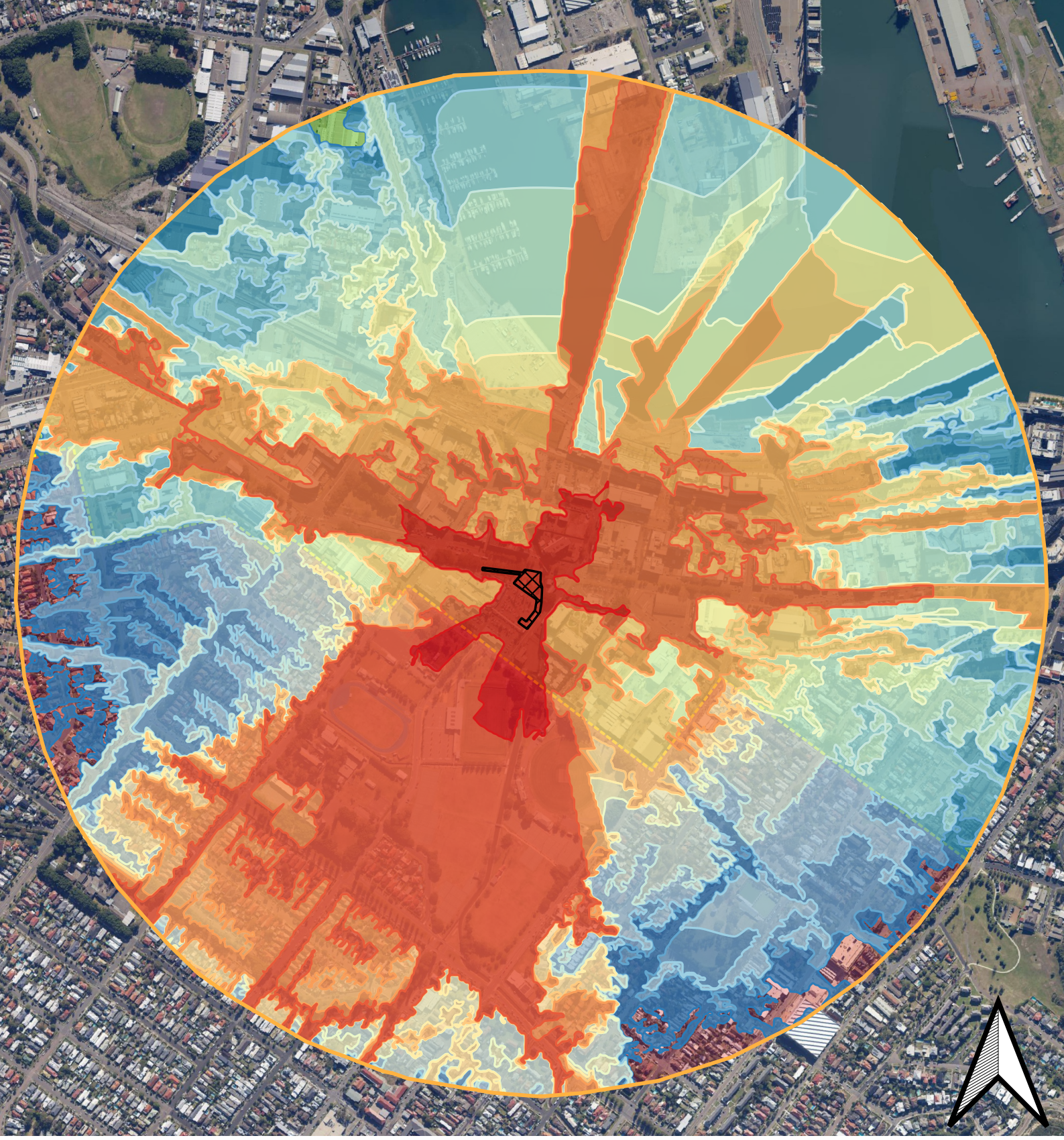

Figure A.3.1 - Phase 7A construction noise levels

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

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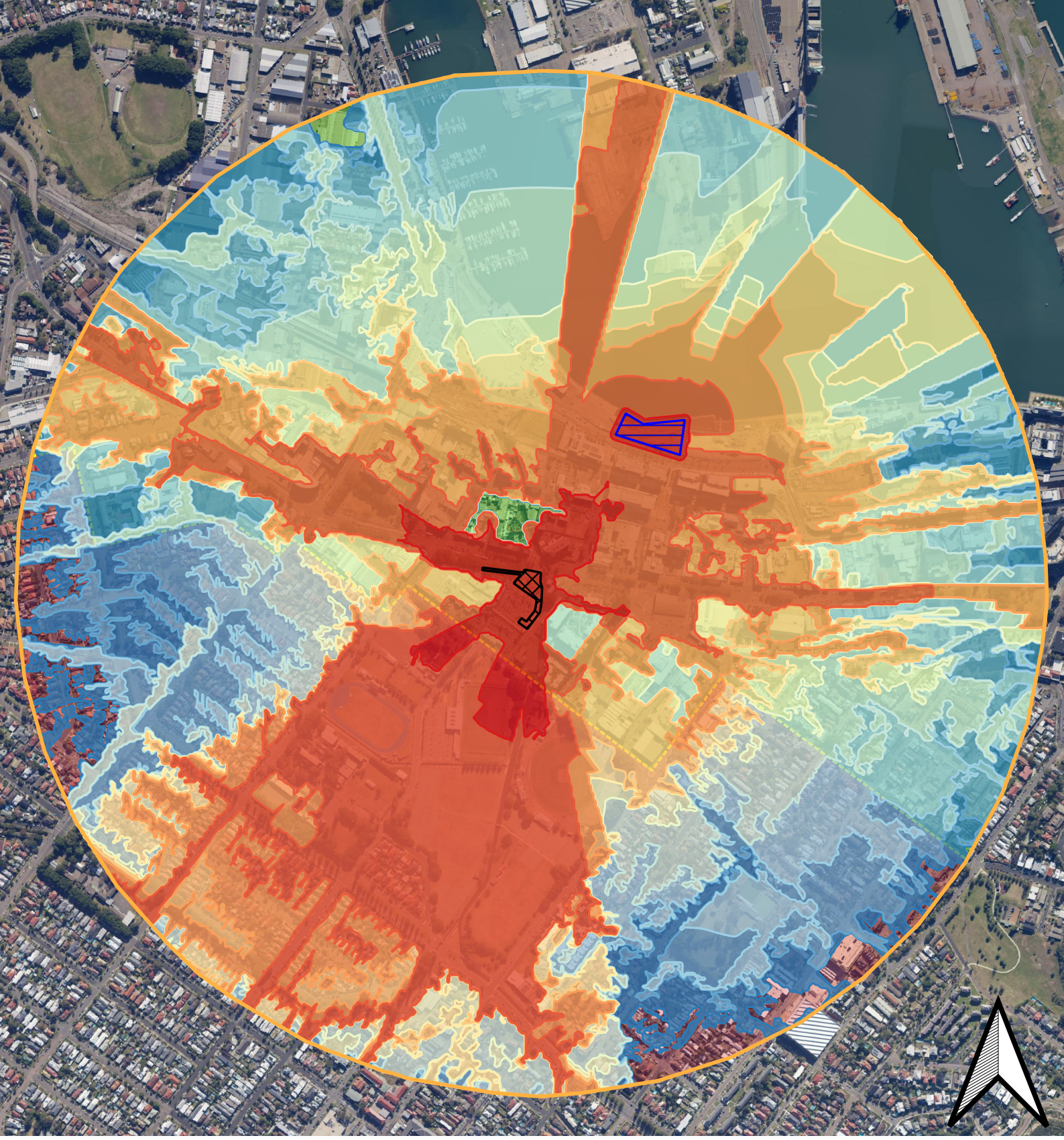

Figure A.3.2 - Phase 7A and 35 Honeysuckle Drive construction noise levels

0 250 500 m

Legend

- Extent of Works
- 35 Honeysuckle Drive
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

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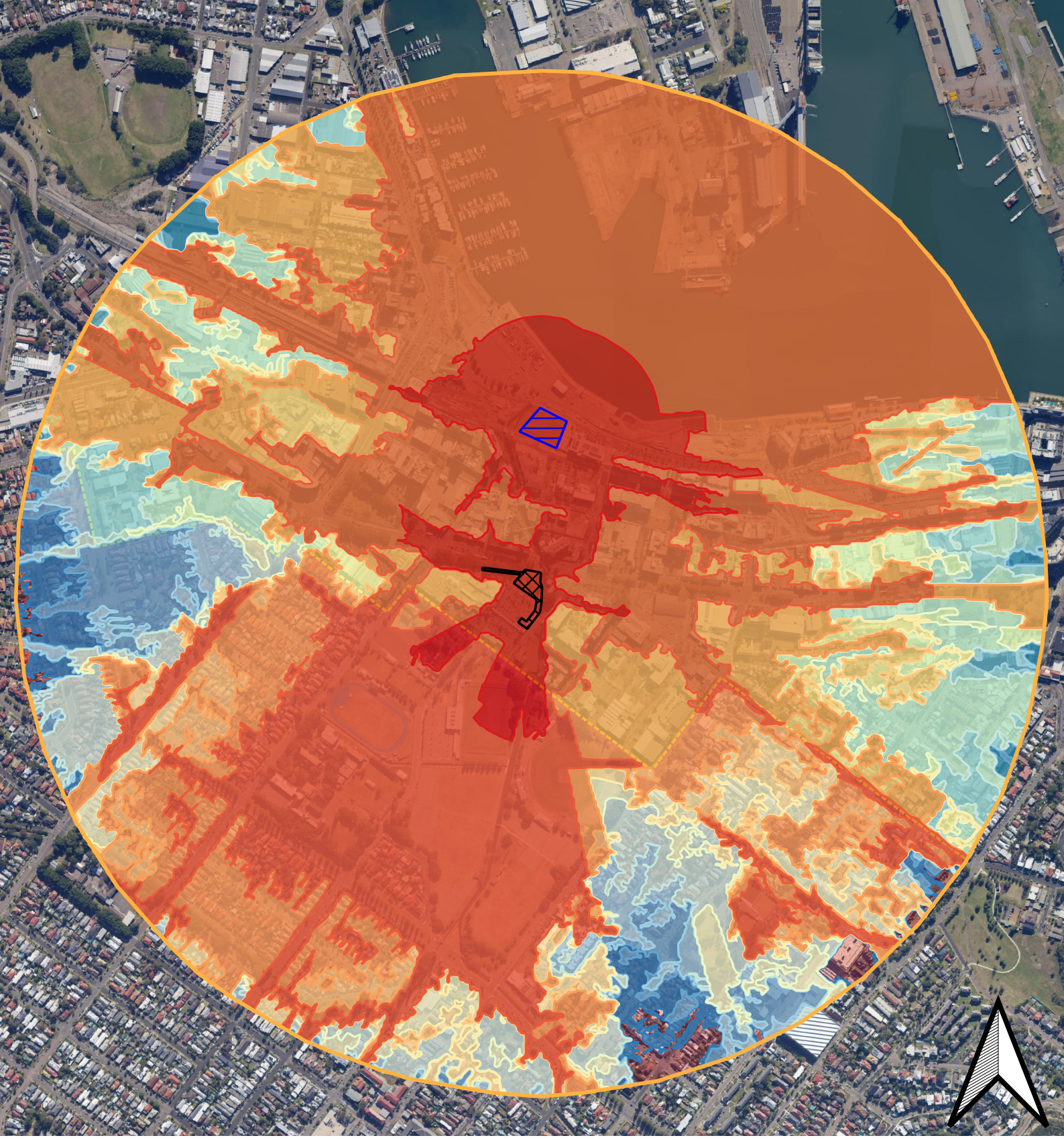

Figure A.3.3 - Phase 7A and 42 Honeysuckle Drive construction noise levels

0 250 500 m

Legend

- Extent of Works
- 42 Honeysuckle Drive
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

Jacobs

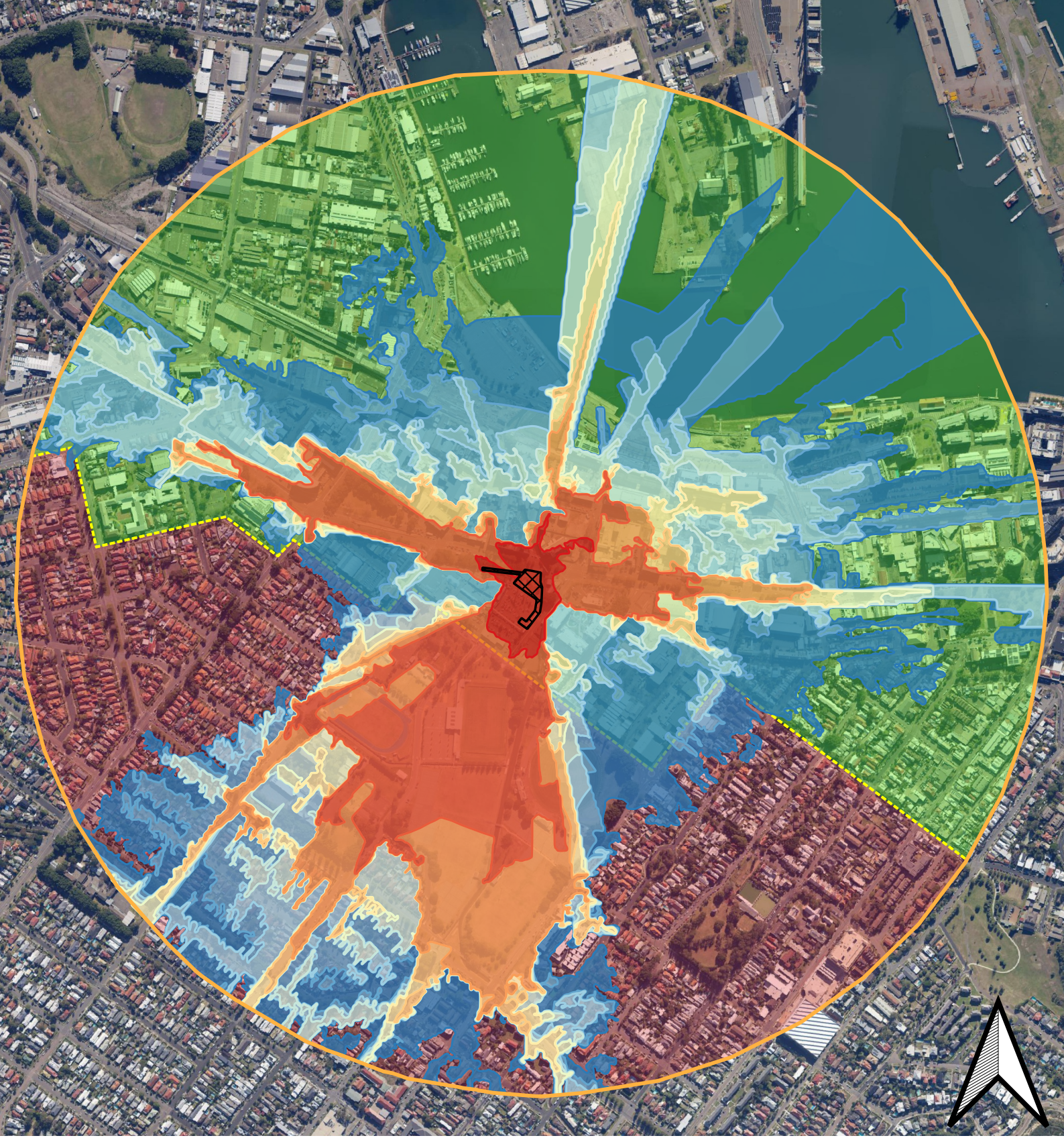

Figure A.3.4 - Phase 7B construction noise levels

0 250 500 m

Legend

- Extent of Works
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE:
HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

Jacobs

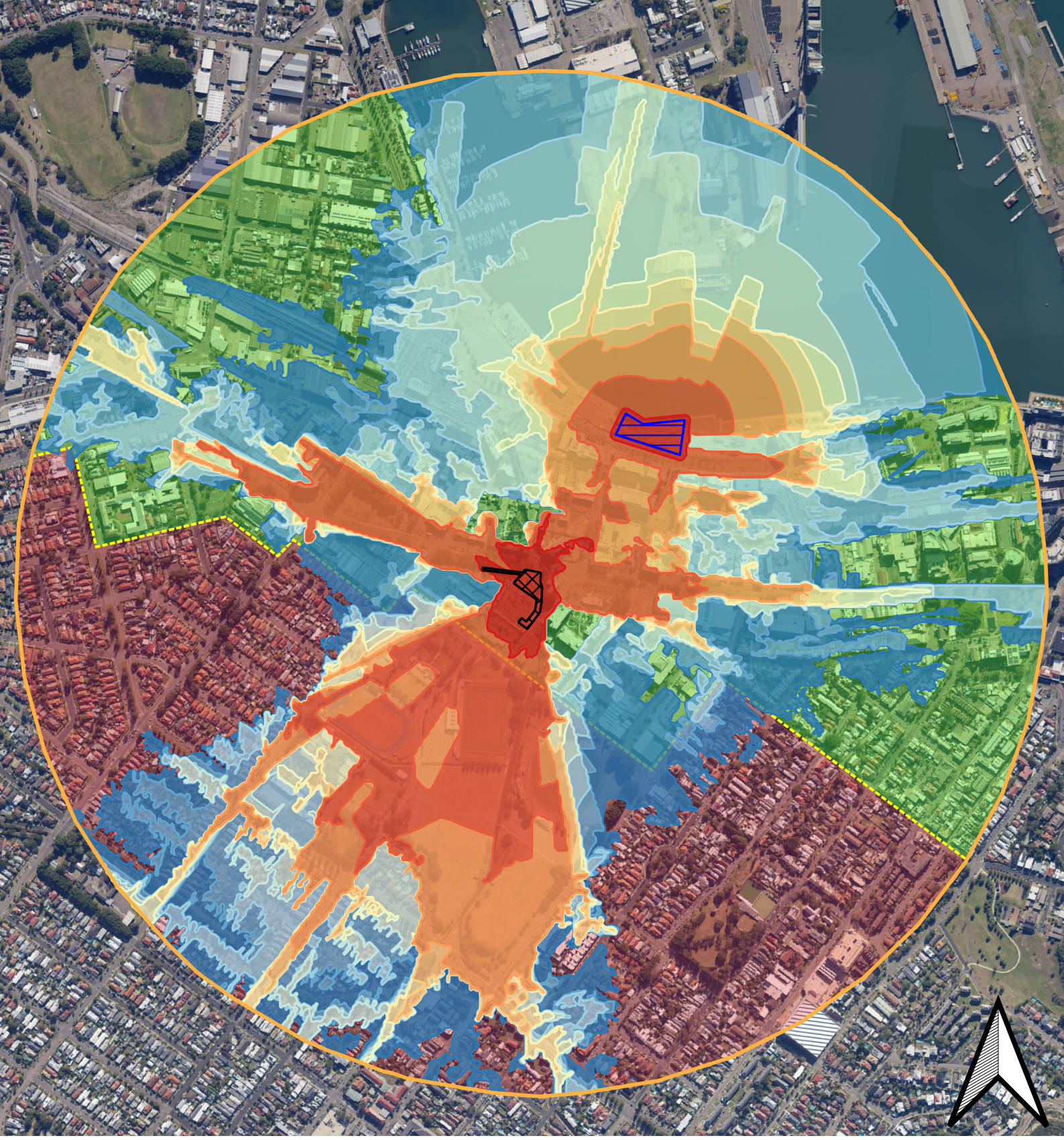

Figure A.3.5 - Phase 7B and 35 Honeysuckle Drive construction noise levels

0 250 500 m

Legend

- Extent of Works
- 35 Honeysuckle Drive
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

Jacobs

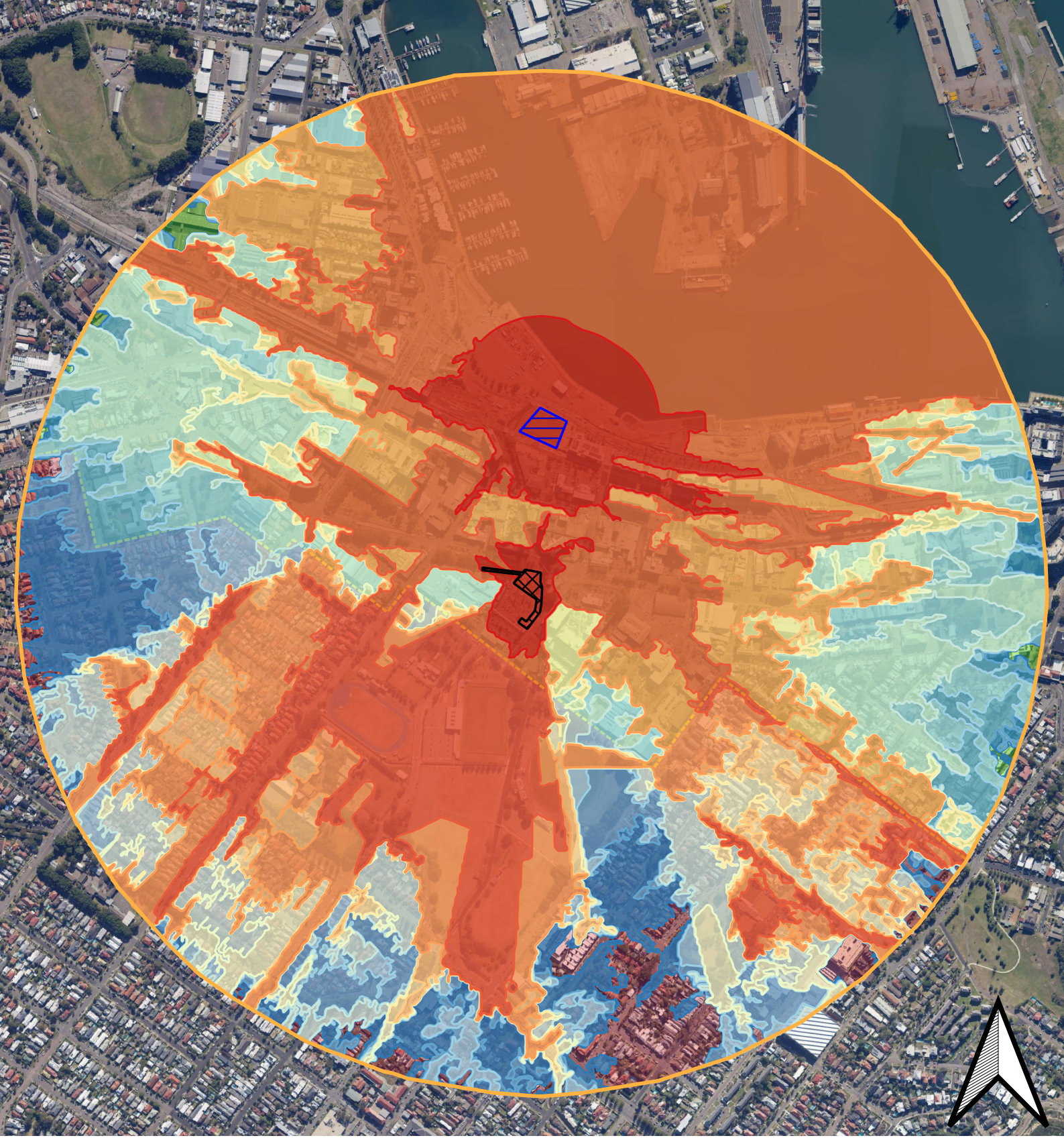

Figure A.3.6 - Phase 7B and 42 Honeysuckle Drive construction noise levels

0 250 500 m

Legend

- Extent of Works
- 42 Honeysuckle Drive
- NCA 1
- NCA 2

Predicted noise level

- 41 dB(A)
- 44 dB(A)
- 46 dB(A)
- 48 dB(A)
- 51 dB(A)
- 52 dB(A)
- 53 dB(A)
- 54 dB(A)
- 58 dB(A)
- 75 dB(A)

Basemap: NSW SixMap
Scale: 1:10000

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 02/06/2022

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Appendix B. Vibration setback maps

Figure B.1: Small compactor vibration setback distances

0 5 10 15 20 m

Basemap: Google Satellite
Scale: 1:500

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

Legend

- Potential extent of compactor usage
- Heritage structures
- 5m - CNVG cosmetic damage setback distance
- 10m - DIN 4150 vibration sensitive receiver setback distance
- 15m - CNVG human comfort setback distance

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Figure B.2: Concrete compactor vibration setback distances

0 5 10 15 20 m

Legend

- Potential extent of concretecompactor usage
- Heritage structures
- 2m - CNVG cosmetic damage setback distance
- 4m - CNVG human comfort and DIN 4150 sensitive receivers setback distance

Basemap: Google Satellits
Scale: 1:400

NSW ACOUSTICS - GIS PROJECT FILE: HW_MarketTown | Drawn: SB | Check: DD | Date: 03/06/2022

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