Scoping Report

Jemena – Western Sydney Green Gas Trial

Jemena Gas Networks (NSW) Ltd

GPA Document No: 18667-REP-003

Rev	Date	By	Checked	QA	Description
1	17/04/2019	BOS	DJK	IIK	For Jemena use
2	08/05/2019	BOS	DJK	IIK	Project title updated
					

EXECUTIVE SUMMARY

Jemena Gas Networks (NSW) Ltd (Jemena or JGN) is the asset owner of the Horsley Park high pressure gas facility, comprising of a number of pressure let down and pipeline pigging facilities, for the Eastern Gas Pipeline (EGP), JGN Trunkline, Sydney Primary Loop and local secondary network, located at 194 - 202 Chandos Road in Horsley Park, NSW.

Jemena propose to undertake a Power to Gas, or P2G, project, at the Horsley Park site to transform electrical energy into a combustible gas, hydrogen, which is injected into the Sydney secondary gas distribution network or supplied to an adjacent hydrogen bus refuelling facility. The proposal is referred to as the Western Sydney Green Gas Trial (WSGGT).

The objective of the WSGGT is to test and demonstrate P2G technology to obtain key learnings to enable later development of commercially viable systems.

The WSGGT facility will perform the following key functions:

- Convert tap water and grid electricity into hydrogen gas through an Electrolyser package.
- Store hydrogen gas in an underground onsite pipeline for buffer storage and injection management.
- Control and safely manage hydrogen gas pressures, temperatures and flowrates for injection into Jemena's secondary network and connect to a hydrogen refuelling station.
- Metering and regulation for a hydrogen generator set to convert excess hydrogen back to electrical energy at times of peak energy demand.

The purpose of this document is to provide relevant details about WSGGT, including the scale and nature of the project; outline key aspects of the project relevant to assessing further requirements for environmental assessments to be undertaken for the project; and to outline Jemena's proposed approach to undertaking assessments and community engagement for the project.

Key environmental and planning legislation of potential relevance to the WSGGT includes the following:

- *Biodiversity Conservation Act 2016* (BC Act)
- *Western Sydney Parklands Act 2006* (WSP Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)*
- *State Environmental Planning Policy (Western Sydney Parklands) 2009* (WSP SEPP)
- *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP)
- *State Environmental Planning Policy No 33-Hazardous and Offensive Development* (SEPP 33)
- *Fairfield Local Environment Plan 2013* (LEP)

The WSGGT is to be located on land within the Western Sydney Parklands (WSP) within the Fairfield City Council (FCC) area. Development consent for the WSGGT is to be sought under the *Environmental Planning and Assessment Act 1979* (the Act). Within the framework provided by the Act, the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) identifies projects with a capital investment value (CIV) of over $10 million within the WSP as State significant development (SSD). Given the proposed development does fall within the WSP zone, and has a CIV of over $10 million; as such, the WSGGT requires development consent as a SSD.

A review of State Environmental Planning Policy No 33-Hazardous and Offensive Development (SEPP 33) and the Protection of the Environment Operations Act 1997 (POEO Act) has identified that the WSGGT is unlikely to be considered a potentially hazardous or offensive development under SEPP 33. Similarly, none of the activities for the proposed development are likely to be considered scheduled

activities under the POEO Act.

The *Biodiversity Conservation Act 2016* (BC Act) (Section 7.9) requires that an application for development consent under Part 4 of the EPA Act for State significant development be accompanied by a biodiversity development assessment report (BDAR).

The Horsley Park facility was subject to an EIS in 2014 for the Jemena EGP Horsley Park Meter Station Upgrade (SSI 6681). The Biodiversity Assessment undertaken for the 2014 EIS covered the site immediately adjacent to the lot on which the WSGGT facilities are to be constructed, and considered impacts in the vicinity of the site, including on the proposed WSGGT site. The 2014 Biodiversity Assessment did not identify any threatened species or important potential habitat for threatened species in the immediate area. As a result, Jemena propose to submit a BDAR waiver request for the WSGGT.

The key matters and impacts of the project identified for inclusion in the EIS are:

- Hazards and risks associated with hydrogen; and
- Safe design and operation of the hydrogen bus refuelling facility.

To comprehensively address the risks and hazards associated with hydrogen, a Comparative Risk Study will be undertaken as part of the EIS. The study will address key concerns about the risks and hazards of hydrogen in relation to other fuels, and will outline any risk management or mitigation requirements to be addressed during detailed design. The hydrogen production facility will be operated under Jemena's existing Safety and Operating Plan (SAOP) for the JGN facility.

In addition to the application of all applicable Australian Standards, where relevant the hydrogen refuelling facility will be built in consultation with a number of international hydrogen specific standards addressing hydrogen refuelling and the safe handling of hydrogen. Additionally, the full WSGGT scope will be subject to a Human Factors Review and/or Hazard Identification Study (HAZID), which is a qualitative technique to assess human and other factors that can affect the safe operation of the facility. The entire project, including the refuelling facility, will also undergo a Hazard and Operability Study (HAZOP) once the design is progressed to a sufficient level of detail. The HAZOP is based on the piping and instrumentation diagrams (P&IDs) for the system and covers in detail all process interactions. All actions arising from the HAZOP must be tracked and managed to ensure closeout.

As a result of extensive studies undertaken during the 2014 EIS, the scope of which covered the whole Jemena Horsley Park facility, many environmental aspects of the WSGGT have already been studied. Consequently, a number of issues that might otherwise have been deemed worthy of further assessment as part of the EIS to be undertaken for the WSGGT are already well understood. The 2014 EIS studies have since been reviewed to ensure their relevance and to confirm that the findings remain current and applicable to the WSGGT facility.

Other issues identified for inclusion in the WSGGT EIS are:

- Traffic and transport impacts introduced during construction and the ongoing operation of the facility;
- Management of soil, water, hydrology and flooding potential impacts;
- Waste management;
- Management of noise impacts; and
- Cultural Heritage considerations.

A detailed traffic and access assessment will be undertaken as part of the EIS. The traffic management plan will consider traffic associated with construction activities and the potential impact of the buses using the WSGGT refuelling facility on an ongoing basis.

Appropriate mitigation and management measures will be outlined in the EIS and implemented during

construction to address potential soil, water and waste impacts of the project. As part of the 2014 EIS a Due Diligence Archaeological Assessment was carried out in accordance with the requirements of Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010). No features of aboriginal archaeological or cultural heritage significance were identified that would be impacted by the meter station upgrade or by the proposed WSGGT.

Jemena consider it unlikely that the WSGGT proposal would have any impact on features of aboriginal archaeological or cultural heritage significance. It is, however recognised that part of the vehicle turning circle to be constructed for the WSGGT encroaches slightly (approximately 20m) outside of the Jemena EGP Horsley Park Meter Station facility, and outside the area on which a site survey was conducted during the 2014 Archaeological Assessment. Jemena will therefore consult the local Aboriginal Land Council as part of the EIS.

Jemena has engaged extensively with key stakeholders during the scoping phase of the project approvals process, including detailed pre-approvals meetings with relevant organisations to outline the project and seek valuable feedback on and endorsement of the project proposal and the intended approvals pathway.

Jemena has developed a detailed Stakeholder Management Plan (SMP) specific to the WSGGT, a dynamic document intended to evolve as the project progresses. The SMP is intended to define how stakeholder engagement is to be managed throughout all phases of the project.

It is recognised that the construction of the WSGGT will be visible in the community and region in which it will be constructed. Jemena recognises the potential sensitivities associated with the project and has allocated sufficient resources to ensure best practice stakeholder engagement.

Jemena proposes a multi-faceted approach to engaging with stakeholders that are directly and indirectly affected by the construction of the WSGGT.

During the planning, construction and commissioning of construction projects, it is recognised that from time to time, issues may arise with stakeholders. Jemena has well-established issues management protocols in place and will work with affected stakeholders to understand, manage and find resolutions to issues. Management of issues will be in accordance with predetermined response requirements.

CONTENTS

1 INTRODUCTION

Jemena Gas Networks (NSW) Ltd (Jemena or JGN) is the asset owner of the Horsley Park high pressure gas facility, comprising of a number of pressure let down and pipeline pigging facilities, for the EGP pipeline, JGN Trunk, Sydney Primary Loop and local secondary network, located at 194 - 202 Chandos Road in Horsley Park, NSW.

Jemena propose to undertake the WSGGT, a Power to Gas project, at the Horsley Park site to transform electrical energy into a combustible gas; hydrogen, which can then be either injected into the Sydney secondary gas distribution network or supplied to an adjacent hydrogen bus refuelling facility. The proposal is referred to as the WSGGT.

1.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide relevant details about WSGGT, including the scale and nature of the project; outline key aspects of the project relevant to determining further requirements for environmental assessments to be undertaken for the project; and to outline Jemena's proposed approach to undertaking assessment and community engagement for the project.

Specifically, this Scoping Report aims to:

- Clearly describe the WSGGT and its objectives;
- Identify the relevant strategic and statutory context for the project;
- Outline early community engagement undertaken in relation to WSGGT, and summarise proposed further engagement;
- Identify the scale and nature of impacts of the project, and plans to address them; and
- Outline Jemena's proposed approach to assessment of specific matters and ongoing community engagement.

1.2 PROPONENT DETAILS

Jemena is the sole proponent for the WSGGT. The following table outlines key details relevant to the WSGGT.

Proponent full name	Jemena Gas Networks (NSW) Limited
Postal Address	Level 16, 567 Collins St Melbourne, Victoria
ABN	95 052 167 405
Nominated Contact	Russell Brooks Senior Approvals and Stakeholder Manager
Contact details	Russell.Brooks@jemena.com.au
Name and qualification of person preparing Scoping Report	Briony O'Shea BEng (Chem), LLM (Hons)
Site Owners	Jemena Gas Networks (NSW) Ltd Jemena Eastern Gas Pipeline (1) Pty Ltd and Jemena Eastern Gas Pipeline (2) Pty Ltd Western Sydney Parklands Trust*

*Western Sydney Parklands Trust (WSPT) is owner of the lot adjacent to the Jemena high pressure gas facility, upon which a turning circle associated with the hydrogen refuelling facility will be partially located. Details of engagement with WSPT in relation to utilisation of this land and of the proposed refuelling facility and turning circle are outlined in this report.

2 PROJECT DETAILS

2.1 BACKGROUND

The uptake in renewable power generation, coupled with growing demand for decarbonising of energy sectors in Australia, presents a series of challenges and opportunities for the gas transmission and distribution networks in NSW.

Jemena, as the owner of the gas distribution network servicing the Sydney metropolitan area and surrounding regions, seeks to understand and develop technologies that have potential to allow for a transition to a low or zero carbon gas network, whilst delivering a competitive and sustainable consumer product. Jemena believes that multiple technologies will be required, one of which is known as Power to Gas (P2G).

P2G technology is an energy conversion technology that transforms electrical energy into a combustible gas. The WSGGT proposes to use electrical energy to convert into hydrogen. The produced hydrogen can then be either injected into the gas distribution network, converted back to electrical energy by a hydrogen-powered generator, or used to supply a hydrogen refuelling facility for hydrogen powered vehicles.

Commercially this technology is currently considered non-viable, as typical natural gas prices per unit of energy are an order of magnitude lower than power prices. However, the uptake in renewable power generation creates a significant imbalance between grid supply and demand, which can be addressed through the uptake of many technologies, including batteries, pumped hydro, Internet of Things, and P2G; each exhibiting their own advantages and disadvantages, but together working to reduce the overall installed renewable capacity required and cost as well as ensuring reliability of supply.

2.2 DESCRIPTION

The objective of the WSGGT is to test and demonstrate P2G technology to obtain key learnings to enable later development of commercially viable systems.

The project comprises the construction of a P2G facility at Jemena's Horsley Park High Pressure Gas Facility, primarily for supply of hydrogen gas to the natural gas network. The P2G facility will perform the following key functions:

- Convert tap water and grid electricity into hydrogen gas through an Electrolyser package.
- Store hydrogen gas in an underground onsite pipeline for buffer storage and injection management.
- Control and safely manage hydrogen gas pressures, temperatures and flowrates for injection into Jemena's secondary network and connect to a hydrogen refuelling station.
- Metering and regulation for a hydrogen generator set to convert excess hydrogen back to electrical energy at times of peak energy demand.

The project is also considering a hydrogen bus refuelling facility. This will include a hydrogen dispenser (on Jemena land) and turning circle to be located primarily on Jemena land but which will extend approximately 20m into the Western Sydney Parklands Trust (WSPT) lot adjacent to the Jemena Horsley Park gas facility. The bus refuelling component of the project is contingent on securing a suitable contractual arrangement with the NSW Government for refuelling of hydrogen buses to be deployed in NSW. The refuelling facility is included in the scope of Jemena's development application for the WSGGT.

Further details of the proposed project are shown in the site layout drawings and site map of the Horsley Park Compound attached as Appendix 1.

2.2.1 Capital Investment Value

The expected capital investment value (CIV) of the project is over AUD $10million.

2.3 RATIONALE FOR THE PROJECT

The WSGGT is a trial, to test and demonstrate P2G technology and possibly complementary technology to obtain key learnings to enable later development of commercially viable systems, as well as to introduce potential product offerings to gauge public interest.

Jemena aims to achieve a series of outcomes through testing and operating a P2G plant:

- **Reduce Cost** - Develop a business case for renewable hydrogen applications leveraging an existing gas network (whether developed in the future by Jemena or third parties):
    - Model, test and develop different control modes for operation of an electrolyser to identify most commercially viable modes of operation
    - Understand, test and develop value chain for hydrogen production, storage, transportation, delivery and use
    - Explore, develop and trial market opportunities for customer products

- **Reduce Risk** - Develop understanding and solutions to technical and regulatory barriers to implementation
    - Understand, test and verify impacts of hydrogen gas blended into a natural gas stream
    - Understand, test and develop control methodology of gas injection into a natural gas stream
    - Assist with development of safety standards and requirements for relevant applications in Australia (to the extent these are not already provided for in existing laws and standards)

- **Promote Renewables** - Test and showcase alternatives to conventional energy supply
    - Demonstrate production and applications for renewable gas
    - Connect with existing and potential customers of renewable gas products and solicit consumer feedback
    - Gauge appetite and market size for renewable gas applications

2.4 ALTERNATIVES AND OPTIONS CONSIDERED

As outlined above, the WSGGT is a demonstration project (trial) to obtain key learnings to enable future development of a commercially viable system. The life of the trial project is currently anticipated at five years. Alternatives to the proposal include:

1. Do nothing
2. Full scale development of a permanent P2G facility, with a renewable energy source supplying power to the plant

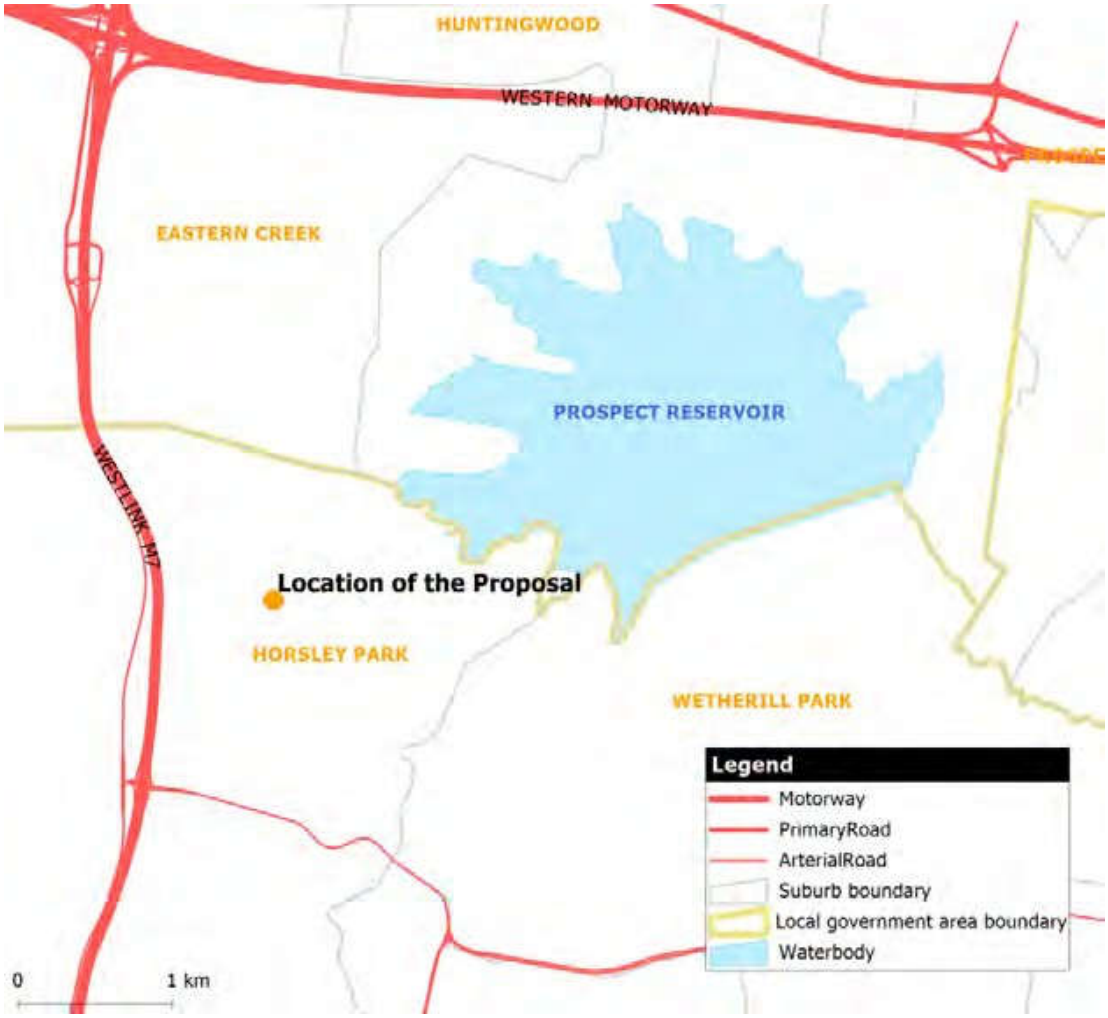
A key driver of the WSGGT is to derive learnings that can be shared publicly, to benefit the sector more broadly and encourage future commercial development of hydrogen facilities. Whilst there is no immediate economic benefit to the WSGGT demonstration project, the do nothing case provides no benefit in assessing ways to progress the technology under demonstration, and does nothing to address the potential for future stranded gas distribution assets in a decarbonised society. The do nothing case is therefore not a favourable alternative to the proposed project.

Conversely, Jemena recognises that demonstration of the technology and its applicability, benefits and potential limitations is required first, before any full-scale development might be considered, in order to properly assess installation and operational functionality, risks and issues. The progression of a demonstration project in preference to full-scale deployment of the technology is therefore the preferred option at this stage.

2.5 LOCATION OF THE PROPOSAL

The Project is proposed to be undertaken on the following land:

- Jemena's Horsley Park facility, which is located at 194 – 202 Chandos Road, Horsley Park, within the Fairfield local government area. The existing JGN facility is located on Lot 1 in Deposited Plan 499001, and
- The hydrogen dispenser and bus turning circle will be located on land adjacent to the Jemena Horsley Park facility. The turning circle would extend across the narrow access route on Lot 3 in Deposited Plan 1002746 (land owned by Jemena Eastern Gas Pipeline (1) Pty Ltd and Jemena Eastern Gas Pipeline (2) Pty Ltd (EGP)), and extend slightly into Lot 4 in Deposited Plan 1002746, which is owned by the Western Sydney Parklands Trust.



Data: Land and Property Information

Figure 2-1 Location of the proposal

Data: Land and Property Information. Imagery: Jemena

Figure 2-2 Location of property: Lot 1 in Deposited Plan 499001

2.6 BASELINE INFORMATION

The Horsley Park facility was subject to an EIS in 2014 for the Jemena EGP Horsley Park Meter Station Upgrade (SSI 6681). Many of the studies undertaken for that project and their findings are applicable to the WSGGT, and – where applicable – pertinent details are provided in the following sections.

2.6.1 Traffic and Access

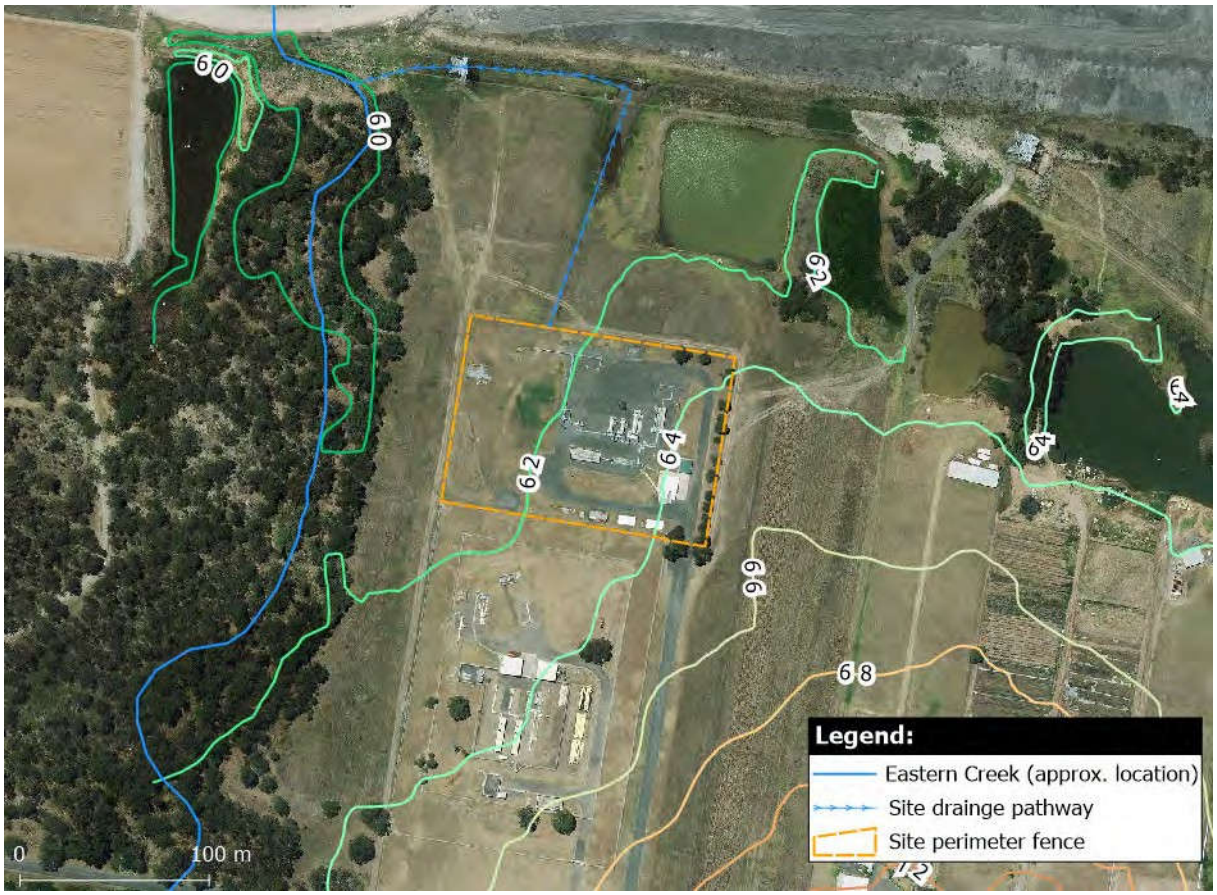
The Horsley Park facility is located on Chandos Road, a local road through a semi-rural area of Western Sydney. Chandos Road does, however, provide an east to west link between Wallgrove Road and Wetherill Park and is subject to reasonable traffic volumes during morning and afternoon peak times consisting of both light and heavy vehicle movements. At other times, Chandos Road is subject to low traffic volumes.

Chandos Road intersects with Wallgrove Road approximately one kilometre to the west of the Horsley Park facility. Wallgrove Road is an important arterial road and is subject to high a volume of light and heavy vehicle movements. Wallgrove Road also connects to the Westlink M7 Motorway and the M4

Western Motorway which are heavily trafficked by both light vehicles and heavy vehicles and provide fast and efficient road-based access to the wider Sydney region and beyond.

2.6.2 Topography

The topography of the location in which the proposal would occur is gently undulating. The land on which the existing facility is located generally declines to the northwest. The average slope across the site is around three to four percent. The surface of the facility features local variations due to excavations that have occurred to create a level bench on which the existing facility is constructed. The general topography of the location of the proposal is shown in Figure 2-3.



Data: Land and Property Information (LPI). Imagery: Jacobs Pty Ltd

Figure 2-3 Site topography

The proposal is located within the upper catchment of Eastern Creek. The catchment has been subjected to significant disturbance associated with past vegetation clearing and agricultural practices. Numerous agricultural dams have been constructed along the drainage lines in the vicinity of the site.

Observations from site during the previous EIS development indicated that the site drains to a low point on the northern side of the existing facility, as shown in Figure 2-3. From this location, runoff from site flows along a small grassed drainage line northwards to a small depression. The landforms in this location have been significantly altered from the original contours, likely through past agricultural practices, construction of the electricity transmission lines and the establishment of the quarry and tile manufacturing activities that occur to the north. Water ponds in the depression, which connects to a swampy area orientated east to west under the electricity transmission lines. The swampy area drains overland to the west and into Eastern Creek when water levels are sufficiently high.

The ground surfaces at the existing facility upslope and the proposed work location feature continuous

and dense grass cover. The site driveway, internal access road and the hardstand area around the existing facility are constructed from blue metal rock.

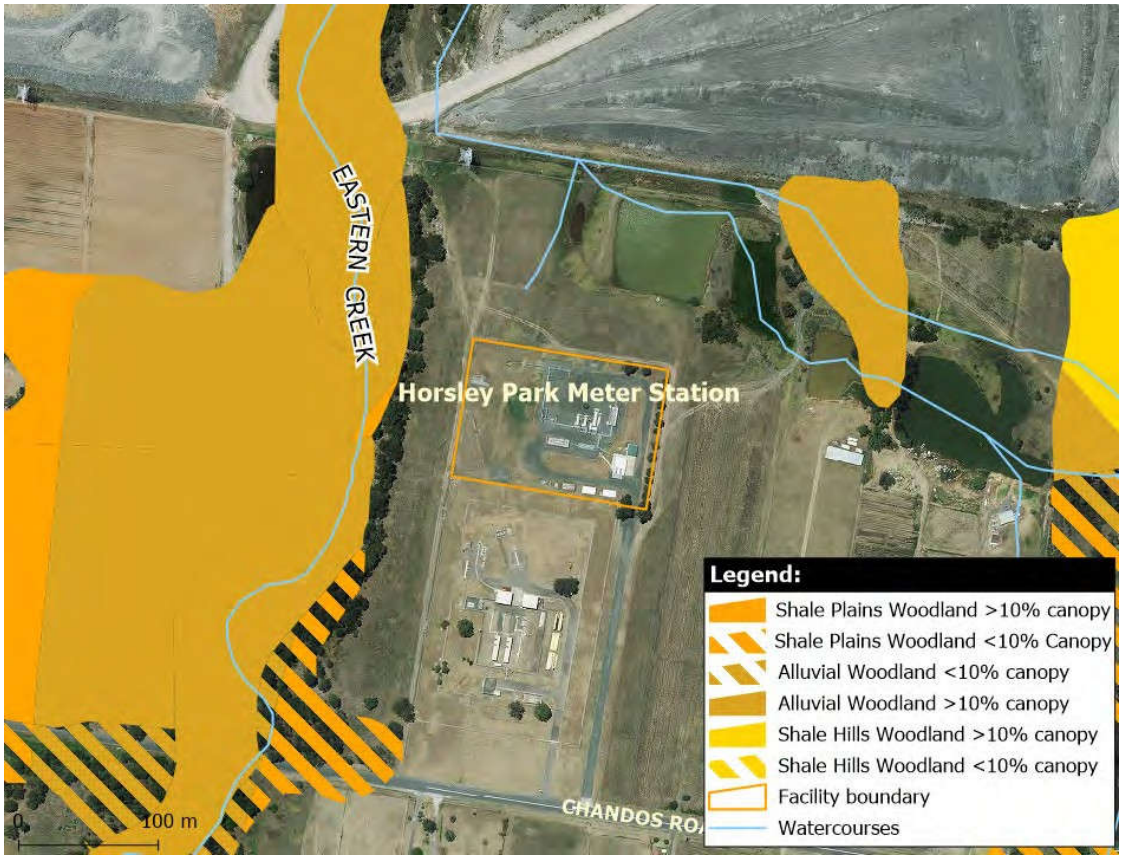
Jemena is unaware of any soil contamination within the site. Prior to the construction of the existing facility anecdotal evidence suggests that the property was used as a market garden. None of the records held by Jemena from the construction of the Eastern Gas Pipeline at this location or the facility suggest that contaminated soil was previously encountered or that any residual soil contamination persists. A search of the NSW EPA contaminated land register was carried out during the previous EIS. There are no sites on this register located in Horsley Park. There is no evidence to suggest that the soils present within the existing facility are contaminated.

2.6.3 Biodiversity

The Horsley Park facility site is mostly covered with exotic pasture grasses and areas of gravel hardstand. The native vegetation in the vicinity, but outside of the existing facility, is mapped as ecological communities considered part of either:

(a) River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions, an endangered ecological community (EEC) under NSW Threatened Species Conservation Act 1995 (TSC Act); or
(b) Cumberland Plain Woodland in the Sydney Basin Bioregion, which is critically endangered ecological community (CEEC) under the TSC Act and Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (the EPBC Act).

The closest mapped native vegetation is around 40 metres to the west of the fence of the existing facility as shown in Figure 2-4.



Data: NSW Office of Environment and Heritage. Imagery: Jemena Limited

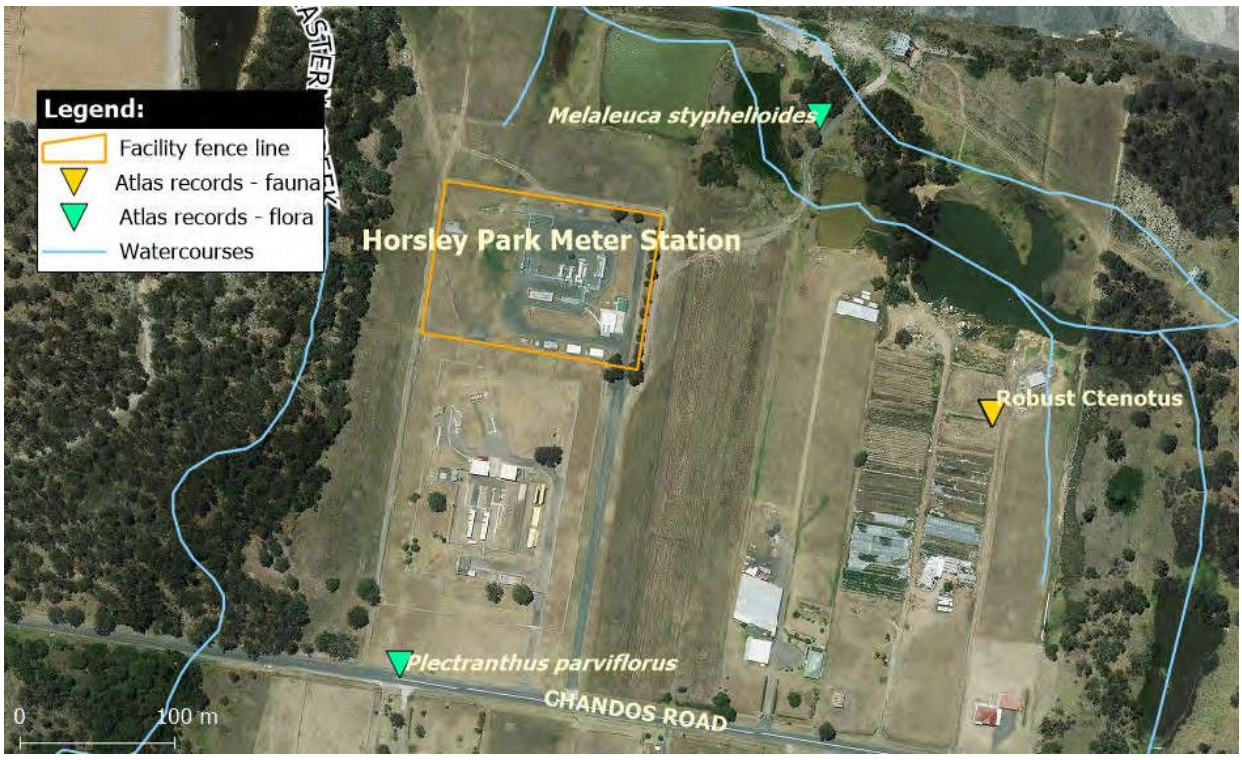
Figure 2-4 Mapped ecological communities in the vicinity of the location of the Horsley Park facilities

Various publicly available databases containing ecological information were searched during the preparation of the Biodiversity Impact Assessment completed as part of the previous EIS. All threatened biota protected under relevant State and Federal legislation within 5 km of the location of the proposal were identified. The NSW Wildlife Atlas was searched in the vicinity of the location of the proposal. The search identified observations of a number of threatened flora and fauna, the closest of which is around 125 metres northeast of the facility fence, as shown in Figure 2-5.

Site observations indicate that stormwater runoff from the facility flows north along a grassed drainage line and ponds in a depression formed to the west of an existing farm dam. The depression was likely formed as part of significant earthworks and surface alterations that occurred as part of the quarrying and tile manufacturing operation that occur to the north of the facility. During times of significant rainfall the pond would overtop and flow westwards along a depression on the electricity transmission easement and overland into Eastern Creek. Eastern Creek is generally ephemeral at this location; it would only contain water during periods of significant rainfall or depression ponding.

The water quality in the pond and Eastern Creek is affected by urban and agricultural runoff. To the north of the site, Eastern Creek passes between significantly disturbed areas associated with two large quarrying and associated with brick and tile manufacturing activities. The pond, swampy areas and Eastern Creek in the vicinity of the location of the proposal do not represent high quality or important habitat for aquatic or amphibian species.

The Biodiversity Impact Assessment did not identify any threatened species or important potential habitat for threatened species within the site boundary.



Data: Office of Environment and Heritage and Land and Property Information. Imagery: Jacobs Pty Ltd

Figure 2-5 NSW Wildlife Atlas records in the vicinity of the location of the Jemena facilities

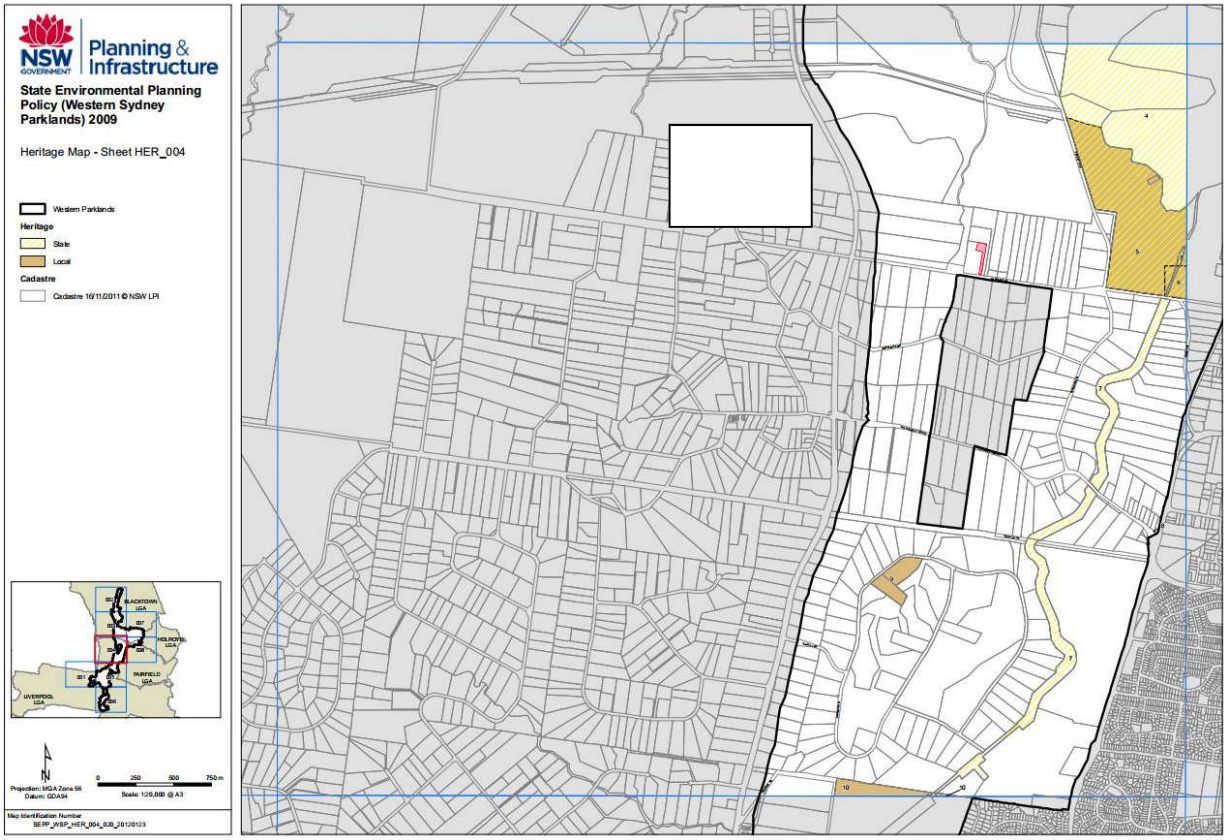
3 STATUTORY AND STRATEGIC CONTEXT

The WSGGT is located in the Western Sydney Parklands (WSP) within the Fairfield City Council (FCC) area. The relevant planning and environmental legislation identified for the project are outlined as follows.

3.1 PRIMARY ENVIRONMENTAL AND PLANNING LEGISLATION

The WSGGT requires development consent under the *Environmental Planning and Assessment Act 1979* (the Act).

Under the Act, the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) identifies projects with a capital investment value (CIV) of over $10 million within the WSP as State significant development (SSD). The proposed development does fall within the WSP zone, as identified on the Heritage Map below.



Data: NSW Government – Planning and Infrastructure

Figure 3-1 Location of WSGGT within the SEPP (Western Sydney Parklands) 2009 Area

Given that the WSGGT's CIV is greater than $10 million and its location within the WSP, under Schedule 2 (State significant development—identified sites), section 5 of the SEPP, approval is required for WSGGT as a SSD, requiring an application to be made to the NSW Department of Planning and Environment (DPE) for a Major Project approval.

Jemena's EGP Horsley Park Meter Station, located on adjacent Lot 3 in Deposited Plan 1002746 is currently subject to approvals granted by the Minister for Planning as State Significant Infrastructure (SSI 6681).

3.2 SECONDARY ENVIRONMENTAL AND PLANNING LEGISLATION

Key environmental and planning legislation of potential relevance to the WSGGT include the following:

- *Biodiversity Conservation Act 2016* (BC Act)
- *Western Sydney Parklands Act 2006* (WSP Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)*
- *State Environmental Planning Policy (Western Sydney Parklands) 2009* (WSP SEPP)
- *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP)
- *State Environmental Planning Policy No 33-Hazardous and Offensive Development* (SEPP 33)
- *Fairfield Local Environment Plan 2013* (LEP)

3.2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) (Section 7.9) requires that an application for development consent under Part 4 of the EPA Act for State significant development be accompanied by a biodiversity development assessment report (BDAR).

As outlined in section 2.6, the Horsley Park facility was subject to an EIS in 2014 for the Jemena EGP Horsley Park Meter Station Upgrade (SSI 6681). The Biodiversity Assessment undertaken for the 2014 EIS covered the site immediately adjacent to the lot on which the WSGGT facilities are to be constructed, and considered impacts in the vicinity of the site, including on the proposed WSGGT site. The complete Biodiversity Assessment is included in this scoping report as Appendix 2. Given that the 2014 Biodiversity Assessment did not identify any threatened species or important potential habitat for threatened species in the immediate area, Jemena propose to submit a BDAR waiver request for the WSGGT.

However if required, the BDAR will be undertaken by a suitably accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

3.2.2 State Environmental Planning Policy (Western Sydney Parklands) 2009

The *Western Sydney Parklands Act 2006* (WSP Act) identifies the Western Sydney Parklands Trust (WSPT) as the NSW Government agency with authority for the management of the Western Sydney Parklands. As such, WSPT is a key stakeholder in the approval of developments within the WSP. The Western Sydney Parklands Plan of Management has been developed by WSPT under that Act.

The State Environmental Planning Policy (Western Sydney Parklands) 2009 (WSP SEPP) provides the environmental planning framework for development of (or within) the Parklands. A review of maps referenced in the WSP SEPP indicates that the location of the proposal falls within the area covered by the Western Parklands. Under clause 9 of WSP SEPP, this land is considered to be unzoned.

The WSP SEPP aims to put in place planning controls that enable the WSPT to develop the Western Sydney Parklands into a multi-use, urban parkland, including by allowing for a range of commercial and industrial uses that will deliver beneficial social and economic outcomes to Western Sydney.

The WSP SEPP outlines general matters to be considered by the consent authority (clause 12), and outlines considerations of matters relating specifically to development on private land (clause 17), including whether the development will impede or contribute to implementation of the aim of the SEPP.

The Horsley Park precinct is a multi-use area, with a masterplan recently administered by WSPT. Planned use for the area is urban farmland; WSPT have advised that zoning for the area includes infrastructure such as that utilised for the WSGGT. Early consultation meetings with WSPT concluded

that WSGGT appears to be a good fit for the WSPT plan of use for the area, and the project location in terms of the adjacent land use is generally suitable.

3.2.3 State Environmental Planning Policy No 33 - Hazardous and Offensive Development

State Environment Planning Policy No 33 – Hazardous and Offensive Development (SEPP 33) aims to ensure that, in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.

A screening procedure is applied to assess the applicability of SEPP 33[1], and outlines the information required to enable the consent authority to determine whether a development proposal falls within the requirements of SEPP 33.

Appendix 5 outlines the information required to identify SEPP 33 development. Based on an assessment of the checklist of information required to identify a SEPP 33 development, it is not anticipated that SEPP 33 will apply to the WSGGT. Risk and hazard assessments will however be undertaken for the project, as outlined in section 4.1.

3.2.4 Protection of the Environment Operations Act

The object of the POEO Act is to protect, restore and enhance the quality of the environment in New South Wales. The Act is designed to simplify and strengthen the regulatory framework for environmental protection. As part of this preliminary scoping report, a review of the facility and pipeline was completed with consideration of whether and how the POEO Act applies to the WSGGT as scheduled premises for a scheduled activity. Details of this review are outlined in section 4.1.1. Based on this review, it is not anticipated that any of the activities proposed for the WSGGT would be considered scheduled activities under the POEO Act.

3.2.5 Fairfield Local Environment Plan 2013

The Fairfield City Council is the consent authority for development within the Fairfield local government area. The Fairfield Local Environment Plan 2013 (Fairfield LEP) is the primary environmental planning instrument that informs FCC decisions on development approvals. A review of the zoning maps for Fairfield local government area confirms that the location of the proposal is within an area covered by the WSP SEPP. Accordingly, the land is not zoned under the LEP. In accordance with clause 6 of the WSP SEPP, the Fairfield LEP does not apply to the location of the proposal.

3.3 GAS SUPPLY ACT 1996

As the owner/operator of the NSW gas distribution network, JGN holds a reticulator's authorisation under the Gas Supply Act 1996 (GSA). The authority to grant Jemena's reticulator's authorisation rests with the Minister for Energy – as per sections 9, 11 and 12 of the GSA.

The GSA sets out a regime under which the holder of a reticulator's authorisation may construct and operate a gas distribution network. The GSA framework includes comprehensive requirements for authorisation holders to comply with applicable Australian standards for gas distribution, and to prepare and implement a comprehensive safety and operating plan (SAOP) for the network, which is periodically reviewed and revised. The technical regulator, who may request performance audits, and can require

[1] NSW Department of Planning 2011 'Applying SEPP 33', State of NSW, p15.

amendment where appropriate, assesses performance against this plan. This requirement is set out in some detail in the Gas Supply (Safety and Network Management) Regulation.

As such, JGN must have in place an SAOP for its network. Jemena's network-related works and activities, including network extensions and new projects and related activities, are all assessed within, and occur under this framework – particularly the SAOP (safety/hazard assessment system) and AS 4645 and AS2885 (for higher pressure facilities). In this context, Jemena liaises as necessary with the technical regulator.

Jemena will treat all of the new equipment connected to the gas network within the current operating regimes of the network. This will be delivered through existing SAOP, which will ensure the new assets will be only operated in a safe manner and not present a risk to the operators or public; this includes the impacts of blended gas containing hydrogen on appliances downstream of the injection point.

3.4 COMMONWEALTH LEGISLATION

3.4.1 Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) regulates actions with the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. Any actions that have the potential to result in such impacts must be referred to the Commonwealth Department of the Environment.

No matters of national environmental significance have been identified that would potentially be impacted by the proposal. Accordingly, it is unlikely that the proposal would need to be referred to the Commonwealth Department of the Environment.

4 MATTERS AND IMPACTS

4.1 KEY ISSUES

The following sections outline the key issues to be addressed in the EIS, and the proposed assessment approach for each issue. The proposed mitigation and management approaches for these key issues take into consideration the requirements to demonstrate whether and how SEPP 33 and/or the POEO Act applies to the WSGGT.

4.1.1 Hazards and Risks Associated with Hydrogen

Feedback received during the project scoping phase has indicated that the unknown element to the community of hazards and risks associated with hydrogen is of potential concern and should be further assessed and articulated in the EIS. Further, a December 2018 report on the Australian public's perception of hydrogen for energy, funded by ARENA and undertaken by the University of Queensland[2] found that whilst there is general positive support for *hydrogen as a possible solution for energy and environmental challenges*, public concerns about safety and for environmental protection were also considerable.

To comprehensively address the potential risks associated with hydrogen, a Comparative Risk Study will be undertaken as part of the EIS. The study will address key concerns about the risks and hazards of hydrogen in relation to other fuels, and will outline any risk management or mitigation requirements to

[2] Lambert, V and Ashworth, P 2018 'The Australian public's perception of hydrogen for energy', School of Chemical Engineering, University of Queensland, p5.

be addressed during detailed design.

As outlined in section 3.2.3, it is anticipated that the proposed actions to mitigate potential impacts of hydrogen in relation to the proposed development will be adequately addressed by Jemena's existing SAOP for the Horsley Park facility, with only minor modification. However, communication of the study outcomes will be important in ensuring community confidence in the safe operation of the facility.

4.1.1.1 Hydrogen Production Facility

The facility is designed for a maximum production of twenty (20) kilograms of hydrogen per hour and will be operated intermittently depending on the hydrogen demand. Hydrogen at the WSGGT facility will be produced via electrolysis. This method uses distilled water as a feedstock and uses electrical energy to separate the hydrogen ions through a membrane. The moisture and excess oxygen are removed from the produced hydrogen through the purification process. The hydrogen is transferred to the buffer storage where it can be used in refuelling, injected into the network or used in the gas generators.

The physical connection of the hydrogen production facility to the network will be via a pressure reducing gas control panel, which will ensure the correct pressure and flow rate is maintained from the hydrogen pipeline blending into the natural gas secondary main. Further features on this panel will include automatic isolation valve and interlocks with the existing facilities on site to ensure complete isolation from the network in the event of any parameters being outside those specified for the purposes of testing.

4.1.1.2 Underground Buffer Storage

The WSGGT facility includes hydrogen buffer storage in the form of an underground pipeline. The purpose of this storage is to allow for daily fluctuations in demand and to ensure that there is adequate supply of hydrogen available for refuelling. Table 1 outlines the design details of the buffer storage.

Design Parameter	Value
Maximum Buffer Storage Capacity	100 kg H2
Maximum Allowable Operating Pressure (MAOP)	3,000 kPag
Material	Carbon Steel, X52, Grade B
Diameter	DN500
Wall Thickness	9.53mm
Length	200 metres

Table 4-1 Buffer storage design details

Schedule 1 of the POEO gives a list of the scheduled activities that are applicable as part of the POEO Act. Review of the maximum production levels expected at the facility against current volumes in the POEO Act show that there are no activities in Schedule 1 that are applicable at the WSGGT facility.

Activity	Value	Basis	POEO Schedule Related Activity
Maximum Hydrogen Production	170 tonnes per year	Maximum production of Hydrogenics HyLYZER 1MW Electrolyser of 20kg /hr.	POEO Act Schedule 1 Section 8 (1) Table 1 "Dangerous goods production"
Maximum Electrical	130 kW	Capstone C65 gas Microturbine	POEO Act Schedule 1 Section

Energy Generations		generators. Nameplate generation capacity: 65 kW each. Number of units: 2	17 (1) Table 1 “General Electricity Works”
Maximum amount stored reject water	4,600L of liquid waste (brine)	Waste Water Tank (T-H01001).	POEO Act Schedule 1 Section 42 (3) (a)
Maximum chemical Storage	500L	Chemical requirements listed in Appendix 5	POEO Act Schedule 1 Section 9 (1) Table 1 “General Chemical Storage”

Table 4-2 Overall plant capacity and design for key activities

In addition to the application of all of the applicable Australian Standards, where relevant, the hydrogen production facility will be constructed in consultation with the following international hydrogen specific standards:

- ISO 22734-1 Hydrogen Generator (a technical standard published by the International Organisation for Standardisation)
- ASME B31.12 Hydrogen Piping and Pipelines (a technical standard published by the American Society of Mechanical Engineers)

Additionally, classification and design of hazardous areas will be in accordance with the requirements of AS/NZS 60079.10.1 (Classification of areas – Explosive gas atmospheres).

4.1.2 Bus Refuelling Facility

Per the requirements of SEPP 33, a screening assessment was undertaken to determine whether the WSGGT might be considered hazardous or offensive development. Appendix 5 outlines the key parameters relevant to the determination that the requirements of SEPP 33 do not apply to the WSGGT. As such, a Preliminary Hazard Assessment for the purposes of SEPP 33 is not planned as part of the EIS, however details of further planned risk and hazard assessments are outlined below.

In addition to the application of all of the applicable Australian Standards, where relevant the hydrogen refuelling facility will be built in consultation with the following international hydrogen specific standards:

- EIGA 15/96 Gaseous Hydrogen Stations (a code of practice published by the European Industrial Gases Association);
- ISO 19880 Gaseous hydrogen fuelling stations (a technical standard published by the International Organisation for Standardisation); and
- AIGA 087/14 Standard for Hydrogen Piping Systems at User Locations (a standard published by the Asia Industrial Gases Association).

Additionally, classification and design of hazardous areas will be in accordance with the requirements of AS/NZS 60079.10.1 (Classification of areas – Explosive gas atmospheres). For further guidance in relation to separation distances and the safe handling of hydrogen, reference may also be made to NFPA 2 – Hydrogen Technologies Code (NFPA 2), published by the (American) National Fire Protection Association. NFPA 2 provides fundamental safeguards for the generation, installation, storage, piping, use and handling of hydrogen in compressed gas or cryogenic liquid form.

Further to the application of relevant design standards, the full WSGGT scope will be subject to a Human Factors Review and/or Hazard Identification Study (HAZID), which is a qualitative technique to assess human and other factors that can affect the safe operation of the facility.

Finally, the entire facility will undergo a Hazard and Operability Study (HAZOP) once the design is progressed to a sufficient level of detail. The HAZOP is based on the piping and instrumentation diagrams (P&IDs) for the system and covers in detail all process interactions. All actions arising from the HAZOP must be tracked and managed to ensure close-out.

4.2 OTHER ISSUES

The following sections outline other issues to be addressed in the EIS, and the proposed mitigation and management approach for each issue.

4.2.1 Traffic and Transport

As previously outlined, the Horsley Park facility is located on Chandos Road; a local road through a semi-rural area of Western Sydney. Chandos Road does, however, provide an east to west link between Wallgrove Road and Wetherill Park and is subject to reasonable traffic volumes during morning and afternoon peak times consisting of both light and heavy vehicle movements. At other times, Chandos Road is subject to low traffic volumes.

Under normal operating conditions, the existing Jemena facility is unmanned and requires only infrequent vehicular access, with increased access required during facility maintenance activities. The WSGGT will require increased vehicle access during construction activity, and during on-site hydrogen bus refuelling at the proposed hydrogen refuelling point. The expected number of buses utilising the refuelling facility is in the order of three buses per day, to a maximum of seven per day.

Trucking for wastewater removal will increase traffic to the facility by up to three trucks per month.

Due to low traffic volumes on Chandos Road, the limited numbers of vehicles that would access the site during maintenance activities and the temporary nature of the construction activity, the proposal is not anticipated to result in any significant temporary or long term traffic or property access related impacts.

The residual impact of the WSGGT on traffic volumes would be in the order of 3 – 7 additional vehicles per day accessing the site.

The following mitigation and management measures would be implemented during the proposal to manage and avoid potential traffic and access impacts:

- A Traffic Control Plan (TCP) would be developed for the proposal in accordance with the relevant Australian Standards. The TCP would specify controls, such as signage and reduced vehicle speeds, that would be implemented along Chandos Road in the vicinity of the facility during the construction of the proposal
- A reduced speed limit would be adopted along Chandos Road for all heavy vehicles associated with the proposal
- Details of the TCP and safety awareness training would be included in the Project Induction delivered to all personnel associated with the proposal prior to involvement, and
- All parking and associated with the proposal would occur within that Jemena owned land. No parking would occur along Chandos Road associated with the proposal.

4.2.2 Soil and Water, Hydrology and Flooding

As concluded by the 2014 EIS, there is no evidence to suggest that soils present are contaminated. The WSGGT proposal is not anticipated to result in any significant soil and water impacts or adverse changes to site hydrology and flooding.

As the facility is on raised ground relative to Eastern Creek and located near the top of the catchment, it is unlikely that it would be subject to significant flood levels affecting the whole site and inundating the

pipework and equipment. Site observations and communications with Jemena operational personnel during the previous EIS development indicated that the lower (western) portion of the site is subject to inundation during significant rainfall events. To the northwest of the site Eastern Creek passes through a culvert under an access road associated with the quarry and tile manufacturing facility to the north of the proposal location. The culvert and access road would act as a flow restriction during times of significant water flow along the creek. The inundation of the lower portion of the existing facility would likely be a result of ponding above the flow restriction created by the road and culvert. As the floodwaters pond rather than flow, the site would not be exposed to significant flow velocities.

Only minor earthworks and changes to the existing surface topography would occur as a result of the proposal. Construction activity, including burial of the hydrogen storage pipe, will be undertaken as per the relevant standards.

Existing site water supply will be utilised for the project. Wastewater production of up to a maximum of 500L/day will be generated from the process. This wastewater will be collected and transported to a wastewater treatment facility at a rate of approximately one tanker every ten days.

The following mitigation and management measures would be implemented to address potential soil and water impacts:

- The area of disturbance associated with the project would be limited to the greatest extent practicable to minimise the potential for erosion from site
- An Erosion and Sediment Control Plan (ESCP) would be prepared for the project in accordance with the requirements of Managing Urban Stormwater: Soils and Construction (Landcom, 2004) (the 'Blue Book'). The ESCP would include as a minimum filtration devices installed immediately inside the fence at the low point on the northern perimeter of the facility
- All site stormwater control features would be identified prior to construction and appropriate controls and protection measures developed, documented in the ESCP and implemented during all works
- Onsite stockpiling of excavated material would be minimised
- All stockpiles of loose and erodible materials would be provided with suitable controls, for example sediment fencing or filter socks, to prevent erosion
- Store and handle any hydrocarbons and other chemicals required to carry out the proposal in accordance with the relevant Safety Data Sheet (SDS) and product label to reduce the potential for spillage and potential spill volumes
- Refuel construction plant and equipment offsite at a suitable location wherever practicable to avoid the potential for soil contamination in work location and associated contamination of runoff water from site
- Use appropriate task-specific equipment during any onsite refuelling to minimise the potential for spillage and potential spill volumes, and
- Clean up any spills immediately, isolate and contain any potential contaminated material and dispose of at an appropriately licensed waste facility
- If any visual or olfactory evidence of potentially contaminated soils or other materials is uncovered all excavation work at that location would cease until the nature and extent of any potential issues were quantified and appropriate management and mitigations measures developed and implemented to protect the environmental and personnel health safety in accordance with relevant legislation and guidelines
- All surfaces disturbed as part of the project would be rehabilitated at the completion of construction to reinstate ground surface stability and reduce the potential for ongoing erosion from site, and
- The effectiveness of site restoration and rehabilitation activities would be monitored during routine facility visits by operational personnel. Corrective actions would be

carried out to address any ground instability and erosion issues as required.

4.2.3 Waste

The existing Horsley Park facility does not generate significant amounts of waste. With the exception of wastewater identified above, the majority of waste generation due to the WSGGT will occur during the construction phase.

The electrolyser water treatment system selected to treat the inlet water for the electrolyser is Reverse Osmosis. The technology removes particles, ions and molecules from mains water to produce pure demineralised water. Replacement of the membrane cartridges is undertaken on an as required basis. This replacement typically occurs after production of approximately 100,000L of treated water. The membranes are removed and replaced by a third party contractor. Once spent the membrane cartridges are reconditioned off site by the contractor.

The electrolyser water treatment system has a reject water rate of up to 50%. For every one (1) litre of de-ionized water produced one (1) litre of waste water is produced. At maximum hydrogen production of the electrolyser, the amount of rejected water daily is approximately five hundred (500) litres. No sewer connection is available at the Horsley Park facility so the reject water must be manually loaded out and trucked off-site for water treatment.

As part of the design process Jemena are exploring options for on-site recycling which would reduce the wastewater down to 0%. An identified solution is solar desalination. This method uses solar irradiation to purify the reject water produced by the water treatment system. Jemena are limited by the amount of roof space currently available at the Horsley Park Facility.

In the absence of options for on-site recycling of wastewater, Jemena will manage the daily wastewater production of approximately 500L/day via onsite storage, with trucking at a frequency of approximately two tanker loads per month.

The following mitigation and management measures would be implemented during the project to minimise potential impacts associated with waste generation and resource use:

- The volumes of wastes generated would be minimised to the greatest extent practicable;
- The use of recycled and reclaimed material would be investigated and such materials would be sourced for use where appropriate;
- Potential recycling and reuse options would be considered for all waste streams likely to be generated by the proposal;
- Where potential reuse and recycling options are identified, suitable receptacles would be provided for all waste streams that could be diverted for recycling and reuse;
- All wastes generated by the proposal would be classified in accordance with the NSW *Waste Classification Guidelines Part 1: Classifying Waste* (DECCW, 2008) and disposed of at a suitably licensed waste facility, and
- HAZMAT bins would be provided on site for any potentially contaminated wastes that might be generated by the proposal.

Once construction of the project is complete, waste from the upgraded facility would be managed in accordance with existing facility waste management practices.

4.2.4 Surrounding Natural and Built Environment

The Environmental Impact Assessment (RP_0029_01) undertaken in 2014 to support the SSI application for the Jemena EGP Horsley Park Meter Station (SSI 6681) included a noise assessment.

The EIA concluded the following:

> *The existing facility generates noise but is generally inaudible at the nearest noise sensitive receivers. The proposed upgrade includes the installation of additional noise generating apparatus. The nearest residences to the existing facility are around 300 metres to the south and south-east. A conservative quantitative assessment of operational and construction noise associated with the upgrade indicates that any potential noise increases would not adversely affect the residents in the vicinity of the existing facility. No significant noise impacts would occur as a result of the proposal.*

The closest sensitive receivers to the location of the proposal are residences located along either side of Chandos Road, as shown below. No new noise sensitive receivers have been identified in close proximity in addition to those identified during the 2014 study. The closest residences to the location of the proposal, Residences 1, 6 and 7, are located around 200 metres to southeast. Background noise levels are in the vicinity of the proposal are very low. With the exception of occasional blow downs, the existing facility is not audible at the closest residences.

A summary of the average noise levels and noise level ranges for each new piece of major equipment to be installed as part of the WSGGT is provided in Table 1.

Equipment	Average Noise Level (dBA)
Electrolyser	77 dBA @ 1m
Electrolyser Cooler	63 dBA @ 10m
Microturbine Generator	70 dBA @ 10m

Table 4-3 WSGGT **facility main equipment noise levels**

The noise levels for the new equipment to be installed as part of the WSGGT are less than the existing equipment at the Horsley Park Meter Station. It is expected that the WSGGT will not alter the noise profile of the site.

The complete Noise Impact Assessment undertaken for the 2014 EIS is included in Appendix 3.

Cadastral data: Land and Property Information. Imagery: Jemena Limited

Figure 4-2 Noise sensitive receivers in the vicinity of the location of the proposal

The mitigation and management measures that would be implemented during construction to minimise potential noise impacts of the proposal are outlined below:

- Construction activities would be limited to between 7am and 6pm Monday to Friday and 8am to 1pm on Saturdays. No activities likely to generate noise would be carried out on Sundays or Public Holidays or outside standard construction hours
- Machinery would be switched off when not in use wherever practicable
- The potentially affected residents would be notified prior to commencement of construction. The contact details of an appropriate site person would be provided for community queries and complaints
- Any complaints received from the community regarding noise impacts would be entered into Jemena's Incident Management System, investigated and addressed promptly
- Compression braking would be banned in the vicinity of the facility for all heavy vehicles associated with the proposal. The need to avoid compression braking would be included in a Project Induction that would be delivered to all personnel (including drivers) prior to their involvement in the proposal, and
- If necessitated by the design, a qualitative assessment of potential operational noise levels due to the upgraded facility would be carried out by a specialist noise or acoustic consultant in accordance with the requirements of NSW *Noise Policy for Industry* (NSW EPA, 2017) to confirm the findings of the preliminary assessment of operational noise described in this document. If the assessment indicates operational noise levels would not comply with the relevant noise goals from policy, the consultant would specify additional controls required to ensure compliance with relevant operational noise criteria.

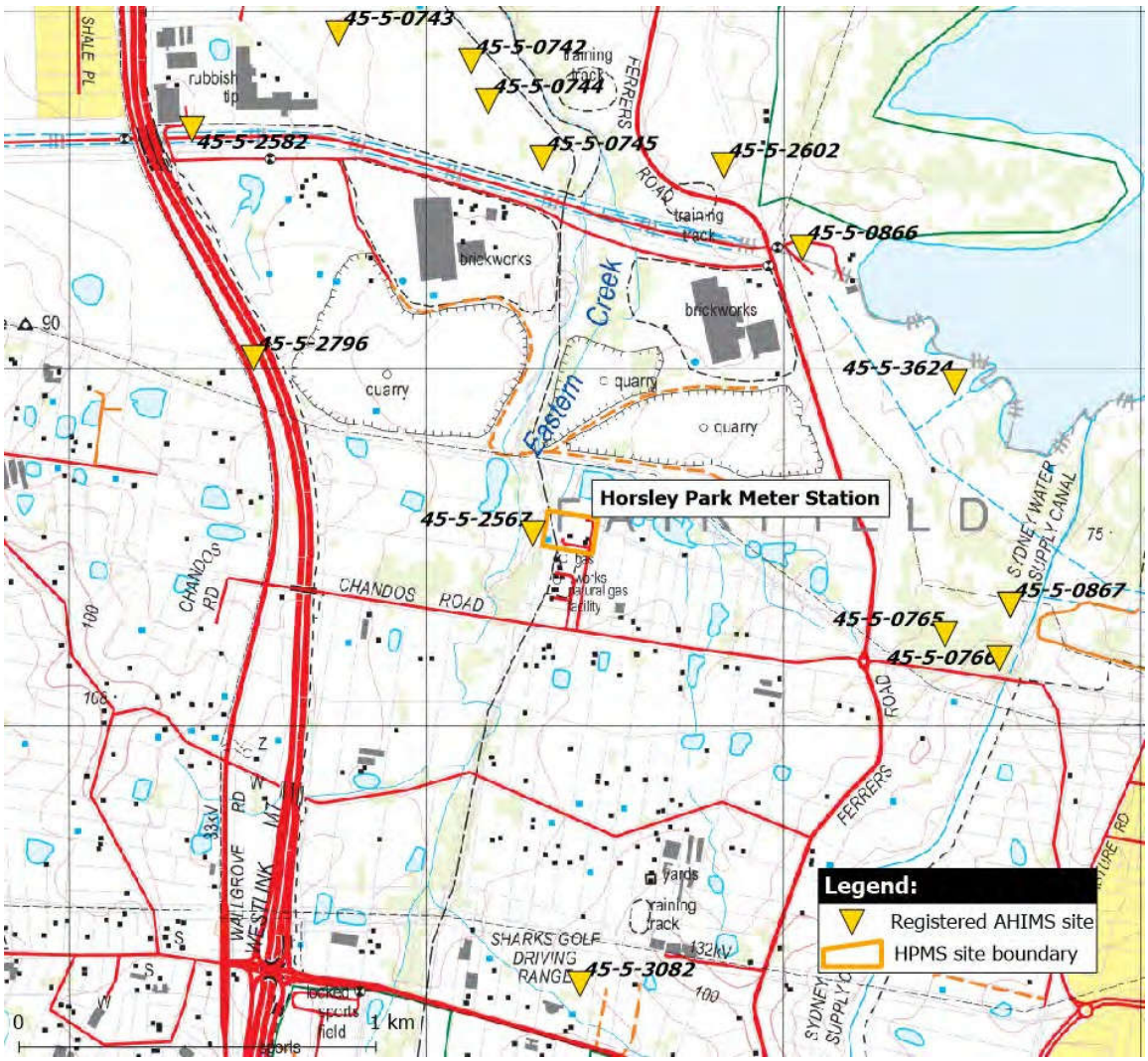
As no vibration impacts are anticipated due to proposal, no mitigation and management measures are proposed for vibration.

4.2.5 Cultural Heritage

The Western Sydney Parklands are situated within the boundaries of the Deerubbin and Gandangara Local Aboriginal Land Councils. The Deerubbin, Gandangara and Darug peoples are the Traditional Owners of this land.

As part of the EIS completed in 2014 for the Jemena EGP Horsley Park Meter Station Upgrade Project, an Archaeological Assessment was carried accordance with the requirements of Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010). The assessment was completed by a suitably qualified archaeologist with the involvement of a representative from the Deerubbin Local Aboriginal Land Council (LALC).

The complete Archaeological Assessment undertaken for the 2014 EIS is included as Attachment 4. No features of aboriginal archaeological or cultural heritage significance were identified that would be impacted by the meter station upgrade.



Map Source: Land and Property Information. Aboriginal data source: NSW Office of Environment and Heritage

Figure 4-1 Registered Aboriginal sites in the vicinity of the location of the proposal

The closest site of cultural heritage significance to the facility, Site 45-5-2561 is an artefact scatter that is located around 20 to 30 metres to the west of the western boundary of the Jemena EGP Horsley Park meter station. This will not be impacted by the proposed location of the WSGGT facilities, which are to the south of the meter station.

The assessment concluded in the 2014 report that although the project area is located in an area of generally high potential for aboriginal sites, due to level of past ground disturbance associated with agricultural activities and the construction of the existing facility, the likelihood of encountering any intact features of archaeological significance is minimal.

It is therefore considered unlikely that the WSGGT proposal would have any impact on features of aboriginal archaeological or cultural heritage significance. It is, however recognised that part of the vehicle turning circle to be constructed for the WSGGT encroaches slightly (approximately 20m) outside of the Jemena EGP Horsley Park Meter Station facility, and outside the area on which a site survey was conducted during the 2014 Archaeological Assessment. It is therefore proposed that the local Aboriginal Land Council be consulted as part of the EIS.

4.3 SCOPING ONLY ISSUES

4.3.1 Land Tenure and Access

The Western Sydney Parklands Trust (WSPT), the NSW Government agency with authority for the management of the Western Sydney Parklands, has been engaged by Jemena and briefed on the project objectives. Ongoing engagement with WSPT is planned throughout the approvals process and the duration of the project.

Preliminary discussions with WSPT have identified the need for WSPT approval to utilise WSP land for the location of the turning circle adjacent to the facility. Requirements for access to this land will be further defined with WSPT, and will likely be established under a temporary tenure agreement between Jemena and WSPT for the duration of the project.

WSPT have identified an area of land suitable for the proposed turning circle, and raised a number of queries in relation to the utilisation, maintenance and access to the land proposed to be utilised for the turning circle, which Jemena are working with WSPT to address. Jemena will continue to work with WSPT regarding use of land adjacent to the Horsley Park facility, and will continue to engage with WSPT to ensure that the project aligns with the development guidelines outlined in the WSP Plan of Management.

4.3.2 Biodiversity

The 2014 EIS included a Biodiversity Impact Assessment, and concluded that no significant environmental impacts would occur as a result of the proposal. The WSGGT is contained within the area assessed during the previous EIS, with the exception of the turning circle to be located on adjacent WSP land. As such, no additional environmental impacts are anticipated as a result of the proposal.

The vegetation present within the facility consists of exotic pasture grasses and planted native trees. No features of high biodiversity conservation significance would be affected by the WSGGT.

4.4 CUMULATIVE IMPACTS

The Horsley Park precinct is a multi-use area, with a master plan recently completed by WSPT for the area to the north. Planned use for the area is urban farmland; WSPT have advised that zoning for the area includes infrastructure such as that utilised for the WSGGT. During consultation meetings with WSPT, it was agreed that WSGGT appears to be a good fit for the WSPT plan of use for the area, and the project location in terms of the adjacent land use is generally suitable.

With the addition of infrastructure proposed for the WSGGT, site security will be addressed by the addition of a fence along the facility boundary, extended around the outside of the turning circle.

Given the previously disturbed nature of the area, the general fit of the facility with the intended land use, and the plan to address risks associated with hydrogen in the EIS, no further cumulative impacts have been contemplated.

5 COMMUNITY AND OTHER STAKEHOLDER ENGAGEMENT

Jemena has been consulting with FCC and DPE during the scoping phase of the project approvals process, including detailed pre-approvals meetings with both organisations to outline the project and seeking feedback on and endorsement of the project proposal and the intended approvals pathway. Whilst development approval via FCC has since been determined not applicable to the project, consultation with FCC provided useful insight into areas of potential concern to FCC, for consideration during project development and to be addressed in the EIS.

Several discussions have also been held with WSPT over the course of the project development phase. Ongoing engagement with WSPT is planned for the duration of the project development.

5.1 STAKEHOLDER MANAGEMENT PLANNING

Jemena has developed a detailed Stakeholder Management Plan (SMP) specific to the WSGGT, a dynamic document intended to evolve as the project progresses. The purpose of the SMP is to define, for Jemena and the WSGGT team, how stakeholder engagement is to be managed throughout all phases of the project.

Jemena recognises that the construction of the WSGGT will be visible in the community in which it will be constructed. It also recognises the potential sensitivities associated with the project and has allocated sufficient resources and budget to ensure best practice stakeholder engagement. Jemena is determined to leave a positive legacy within the communities in which we operate.

5.1.1 Stakeholder Management Objectives

The objectives of stakeholder management are:

1. To inform stakeholders of the project's progress.
2. To work with stakeholders constructively so as to successfully manage their varying interests in the project.
3. To ensure any issues raised by stakeholders are considered and managed appropriately.
4. To avoid project delay or denial through stakeholder mismanagement.
5. To protect and enhance Jemena's reputation in New South Wales and throughout Australia.

This will be achieved through:

1. The implementation of a strategic project Stakeholder Management Plan.
2. Clear and regular communication with stakeholders about the Project.
3. Coordinated and consistent messaging.

5.1.2 Engagement

Jemena proposes a multi-faceted approach to engaging with stakeholders that are directly and indirectly affected by the construction of the WSGGT. This may include:

- Face to face discussions and meetings
- Letters, emails, phone calls, and text messages
- Webpage communication
- 1300 community feedback line
- Fact sheets
- Media

5.1.3 Issues Management

Jemena recognises that during the planning, construction and commissioning of construction projects, from time to time, issues may arise with stakeholders. Jemena has well-established issues management protocols in place and will work with affected stakeholders to understand, manage and find resolutions to issues. Management of issues will be escalated in accordance with predetermined response requirements, as outlined in Jemena's SMP.

5.2 SOCIAL AND ECOMONIC IMPACTS

The WSGGT is being co-funded by ARENA on behalf of the Australian Government. The project aims to support the long-term decarbonisation of Australia's energy market by demonstrating the ability to convert excess energy from renewables into hydrogen that can be safely stored and distributed in the existing gas network, or used as a clean fuel for hydrogen fuel-cell vehicles.

As outlined in ARENA's press release on the topic[3] the WSGGT *"will produce hydrogen to be stored in the natural gas network to demonstrate and address the technical, regulatory, environmental and economic barriers to the production and use of hydrogen in various Australian conditions."*

As the largest project of its kind in Australia, the WSGGT aims to demonstrate the potential of renewable hydrogen production for domestic gas use and for storage in Australia's gas networks.

The press release highlights that hydrogen has the potential to become an important contributor to providing energy storage opportunities, and *"also has the effect of decarbonising the gas network with 'green' gas".*

Further, ARENA recognises that "*there is significant potential in the power-to-gas value chain including the ability to stabilise the grid as well as pairing renewable energy with electrolysers to soak up and store surplus electricity*".

The proposal is not expected to have any positive or negative socio-economic impacts in the short term, but has the potential to foster long-term positive socio-economic impacts via its demonstration of the potential of hydrogen production for domestic gas use and for storage in Australia's gas networks.

As there are no adverse socio-economic impacts anticipated as a result of the project, no mitigation or management measure are proposed.

[3] ARENA, (2018) *Media Release: Hydrogen to be trialled in NSW gas networks*. [online] Available at: https://arena.gov.au/news/hydrogen-to-be-trialled-in-nsw-gas-networks/ [Accessed 18/03/2019]

6 REFERENCES

NSW DPE (2017) *Scoping an Environmental Impact Statement*

NSW DPE (2011) Applying SEPP 33

NSW DPE (2011) *HIPAP 3: Risk Assessment*

NSW DPE (2011) *HIPAP 8: HAZOP Guidelines*

NSW DPE (2011) *Hazardous Industry Planning and Assessment Guideline Summary*

DECCW (2010) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*

DEC NSW (2006) *A Resource Guide for Councils: Erosion and Sediment Control*

DECCW (2008) NSW Waste Classification Guidelines Part 1: Classifying Waste

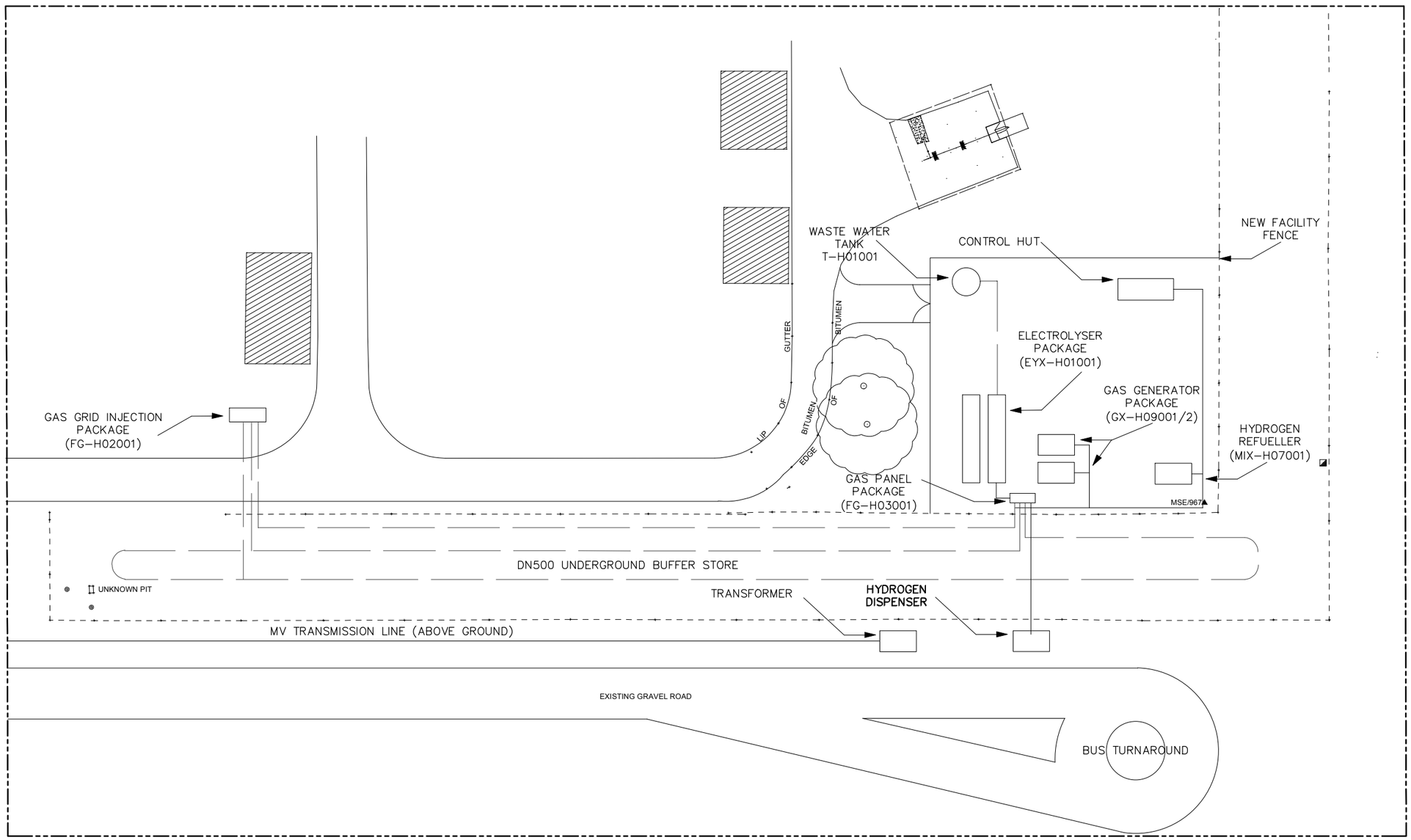
NSW EPA (2017) *Noise Policy for Industry*

APPENDIX 1 SITE LAYOUT AND CONCEPT PLAN

211761 CONTROL TABLE					
No.	Easting (MGA)	Northing (MGA)	Level (AHD)	Description/Name	Mark
502	302,381.140	6,254,455.362	63.558	MSP/966	STAR PICKET
503	302,425.404	6,254,472.147	63.842	MSE/967	SPIKE

LEGEND

- ▲ CONTROL POINT
- ◎ MONITORING STATION
- ◪ COMMUNICATIONS PIT
- — — FENCE (VARIOUS MATERIALS)
- — — TOP OF BANK
- - - - BOTTOM OF BANK



NOTES

1. DEPTH OF COVER 1200mm MINIMUM.
2. ALL WATER LINES 400 COVER U.N.O.
3. PVC DRAIN FOR FUTURE COMPRESSORS. THIS WILL BE ROUTED NEAR PILES, TO ENSURE MECHANICAL PROTECTION PRIOR TO COMPRESSOR INSTALLATION.
4. DETAILS SHOWN ON GAS–446–DW–CV–024.
5. FOR CABLE PIT AND CONDUIT LAYOUT DETAILS REFER GAS –446–DW–EL–002.
6. FOR BURIED EARTH GRID LAYOUT DETAILS REFER GAS–446–DW–EL–004.

0 5 10 15 20
SCALE 1:200 METRES

DRAWING No. | REFERENCE DRAWINGS

ASSET MANAGER
Jemena
Produced by Jemena Asset Management (6) Pty Ltd ABN 52 104 352 650

ASSET OWNER
Jemena
Jemena DDP(1) P/L ABN 52 072 109 865
Jemena DDP(2) P/L ABN 93 125 873 869
Jemena DDP(3) P/L ABN 83 127 059 152

REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENG CHK	APPRV
D	10/04/19	ISSUED FOR BUDGET CONSTRUCTION PRICING	GPA	SH	JW	IIK

GPA ENGINEERING
www.gpaeng.com.au

POWER TO GAS PROJECT
OVERALL SITE LAYOUT

DRAWN	GPA		
DESIGN	GPA	SCALE	N.T.S
CHECKED	NK	SUPERSEDES	A1
APPROVED	JW	DRAWING NUMBER	REV
DATE	09/04/2019	P2G-2099-DW-CV-001	C

PRELIMINARY

SCALE 1:200 — 0 5 10 15 20 METRES

ASSET MANAGER

Jemena

Produced by
Jemena Asset Management (6) Pty Ltd
ABN 52 104 352 650

ASSET OWNER

Jemena

Jemena DDP(1) P/L
ABN 52 072 109 865
Jemena DDP(2) P/L
ABN 93 125 873 869
Jemena DDP(3) P/L
ABN 83 127 059 152

REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENG CHK	APPRV
D	10/04/19	ISSUED FOR BUDGET CONSTRUCTION PRICING	GPA	SH	JW	IIK

DRAWING No.	REFERENCE DRAWINGS

GPA ENGINEERING

www.gpaeng.com.au

POWER TO GAS PROJECT OVERALL SITE LAYOUT

DRAWN	GPA		
DESIGN	GPA	SCALE	N.T.S
CHECKED	NK	SUPERSEDES	A1
APPROVED	JW	DRAWING NUMBER	REV C
DATE	09/04/2019	P2G-2099-DW-CV-001	

APPENDIX 2 BIODIVERSITY ASSESSMENT – 2014 EIS

21 August 2014

John Fisher
Principal Consultant
EnviroPlan Pty Ltd
john.fisher@enviroplan.com.au

Dear John,

Re: Biodiversity Impact Assessment for Horsley Park Meter Station upgrade
Our Ref: Job# 18687

Jemena Limited (Jemena) proposes to upgrade to the existing natural gas facility at Horsley Park, New South Wales (the Horsley Park Meter Station). Biosis Pty Ltd was engaged by Jemena via EnviroPlan Pty Ltd to undertake a biodiversity impact assessment for the proposed upgrade works. This letter documents the findings and recommendations with regard to ecological values found within the Horsley Park Meter Station (study area).

A field investigation was undertaken on 5 August 2014 by Jane Murray, Principal Ecologist (Botanist) of Biosis and guided by John Fisher of EnviroPlan Pty Ltd. This assessment has been written by Amy Nelson and reviewed by Jane Murray (Biosis Pty Ltd).

Study Area Context and Proposed Impacts

Horsley Park is located approximately 16 kilometres (km) west of the Sydney Central Business District in the Fairfield Local Government Area (LGA). The Horsley Park Meter Station is located at 194-202 Chandos Road, Horsley Park, on Lot 3 DP 1002746 (Appendix 1, Figure 1). The study area is defined as the area to be directly and indirectly impacted by the proposed works. The study area is located within a semi-rural area surrounded by paddocks, patches of vegetation, exotic grasses and roads. Immediately to the north and adjacent to the study area features two dams (Appendix 2) both of which feature fringing vegetation. To the west lies Eastern Creek which flows parallel to the M7 Motorway and is lined with forest and woodland vegetation. Prospect Reservoir is also located a little over one kilometre to the east (Appendix 2, Figure 1).

The Horsley Park Meter Station was constructed in 2000. The existing facility requires an upgrade which includes increasing the capacity of the facility through the installation of a new gas regulator, metering equipment, gas heating and filter equipment, and associated pipework. The study area falls under the State Environmental Planning Policy (Western Sydney Parklands) 2009. The State Environmental Planning Policy (State and Regional Development) 2011 is applicable and the proposed works will be assessed as State Significant Infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This letter report will form part of the supporting documentation for a Preliminary Environmental Impact Assessment as part of the approvals process.

Specifically, the proposal would include the following:

- Removal of the existing oil separator and associated pipework.

- Installation of two new gas filters.
- Installation of new gas heat exchangers.
- Installation of hot water heaters and associated building.
- Installation of a new gas metering unit.
- Installation of a new gas regulator and noise attenuating enclosure.
- Associated above and belowground connecting pipework.

Disturbances to the ground surface would be undertaken in order to:

- Create trenches for belowground pipework.
- Create trenches for belowground service and telemetry conduits.
- Create concrete pad foundation for gas conveyance control equipment.
- Create footings and foundations for plinths to support aboveground pipework.

Typical plant and equipment required to carry out the proposal includes, but is not limited to, excavators, back hoes, skid loaders, delivery trucks, dump trucks, mobile cranes, concrete trucks and concrete pumps.

Background research

Prior to completing the field investigation, documentation provided by EnviroPlan as well as other key information was reviewed, including:

- Office of Environment and Heritage (OEH) BioNet Atlas of NSW Wildlife for *Threatened Species Conservation Act 1995* (TSC Act) listed threatened biota.
- Department of Environment (DoE) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool.
- NSW Department of Primary Industries (DPI) Threatened and protected species - records viewer for species listed under the *Fisheries Management Act 1994* (FM Act).
- NSW Department of Primary Industries (DPI) *Noxious Weeds Act, 1993* (NW Act) listed weeds for the Fairfield LGA.
- OEH VIS Mapping through the Six Viewer portal.

Field Investigation

Jane Murray of the Biosis Sydney office visited the study area (Appendix 1, Figure 1) at Horsley Park on 5 August 2014 to determine whether there is any TSC Act and/or EPBC Act listed ecological constraints likely to be impacted by the proposed works. The study area was traversed on foot and the flora and fauna composition and condition was noted and threatened biota habitat searched for.

Findings

The study area was found to be in fairly poor condition ecologically, with a high prevalence of exotic grasses and weeds in the immediate vicinity (Appendix 1, Figure 2; Appendix 2, Plate 1). The exotic grasses and weeds community comprised such exotics as; Cape Weed *Arctotheca calendula, Kikuyu Pennisetum clandestinum* and

Large Plaintain *Plantago major.* The exotic grasses and weeds community was found to provide foraging material for birds such as; Red-browed Finches *Neochmia temporalis* and Welcome Swallow *Hirundo neoxena* (Appendix 3, Table 2).

The second vegetation community present on site is Planted Eucalypts Over Exotic (Appendix 1, Figure 2, Plate 2). Due to the age of the trees present it is likely that this vegetation was planted in 2000 when the Meter Station was constructed. The main canopy species observed in this community included a row of; Spotted Gum *Corymbia maculata,* Narrow-leaved Ironbark *Eucalyptus crebra*, Grey Box *Eucalyptus moluccana*, Grey Ironbark *Eucalyptus paniculata* and Forest Red Gum *Eucalyptus tereticornis* (Appendix 2: Table 1). The mid-storey contained a few native species; White Sally *Acacia floribunda* and Prickly-leaved Tea Tree *Melaleuca styphelioides* (Appendix 3, Table 1). The understorey contained a few native grasses such as Common Couch *Cynodon datylon* and Windmill Grass *Microlaena stipoides* but had largely been colonised by exotic grasses, forbs and herbs such as Kikuyu Grass *Pennisetum clandestinum,* Dandelion *Taraxacum offincinale* and Capeweed *Arctotheca calendula* (Appendix 3, Table 1). None of the observed exotic species have been declared as noxious weeds within the Fairfield LGA (NSW DPI, 2014). This community provides foraging resources for avifanua such as Lorikeets *Trichoglossus haematodus* and Gallah's *Eolophus roseicapillus*.

Prior to the site inspection, Biosis confirmed that the vegetation communities surrounding Eastern Creek and Prospect reservoir have previously been mapped as either *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (Endangered Ecological Community, TSC Act) or *Cumberland Plain Woodland in the Sydney Basin Bioregion* (Critically Endangered Ecological Community under the TSC Act and EPBC Act)(Cumberland V2 2008 VIS map 3785). As the works will be confined to the immediate vicinity of the Horsley Park Meter Station these communities will not be directly or indirectly impacted by the proposed works.

The field investigation indicated that the site drains, via a vegetated trench, northward to a pond in a depression just to the west of one of the dams. Based on preliminary observations it would be likely that the water quality in the pond is influenced by a range of surrounding land use patterns and was considered to be of relatively poor quality, given a high abundance of weeds surrounding the pond, and little habitat for aquatic and amphibious species.

During the desktop and field based survey, all threatened biota protected under the TSC Act, FM Act and/or EPBC Act (excluding migratory species) that have a likelihood of occurring within 5 kilometres were assessed as to their likely presence within or usage of (foraging or dwelling) the study area (Appendix 4). However it should be noted that of these threatened biota, all were deemed to have a low likelihood of occurrence, or were not likely to be directly impacted upon by the proposed works.

Concluding Advice and Recommendations

Given that no threatened biota, nor suitable habitat for such have not been found within the immediate vicinity of the study area the main focus of the associated works would be to limit the impacts of the work to within the perimeter of the existing facility. Therefore the following recommendations have been made with regard to the proposed upgrade:

- Erosion and sediment controls to be implemented around the works area and any associated stockpiles so to avoid run off and associated stormwater related impacts on surrounding lands, including the pond to the north of the study area and Eastern Creek to the west.
- Ensure machinery is free of weed material before entering and exiting the study area for the proposed works.

- Ensure appropriate procedural of physical controls are implemented to limit potential impacts to the planted native trees and shrubs within the existing facility.

Please contact me on 0421 013 061 if you would like to discuss further.

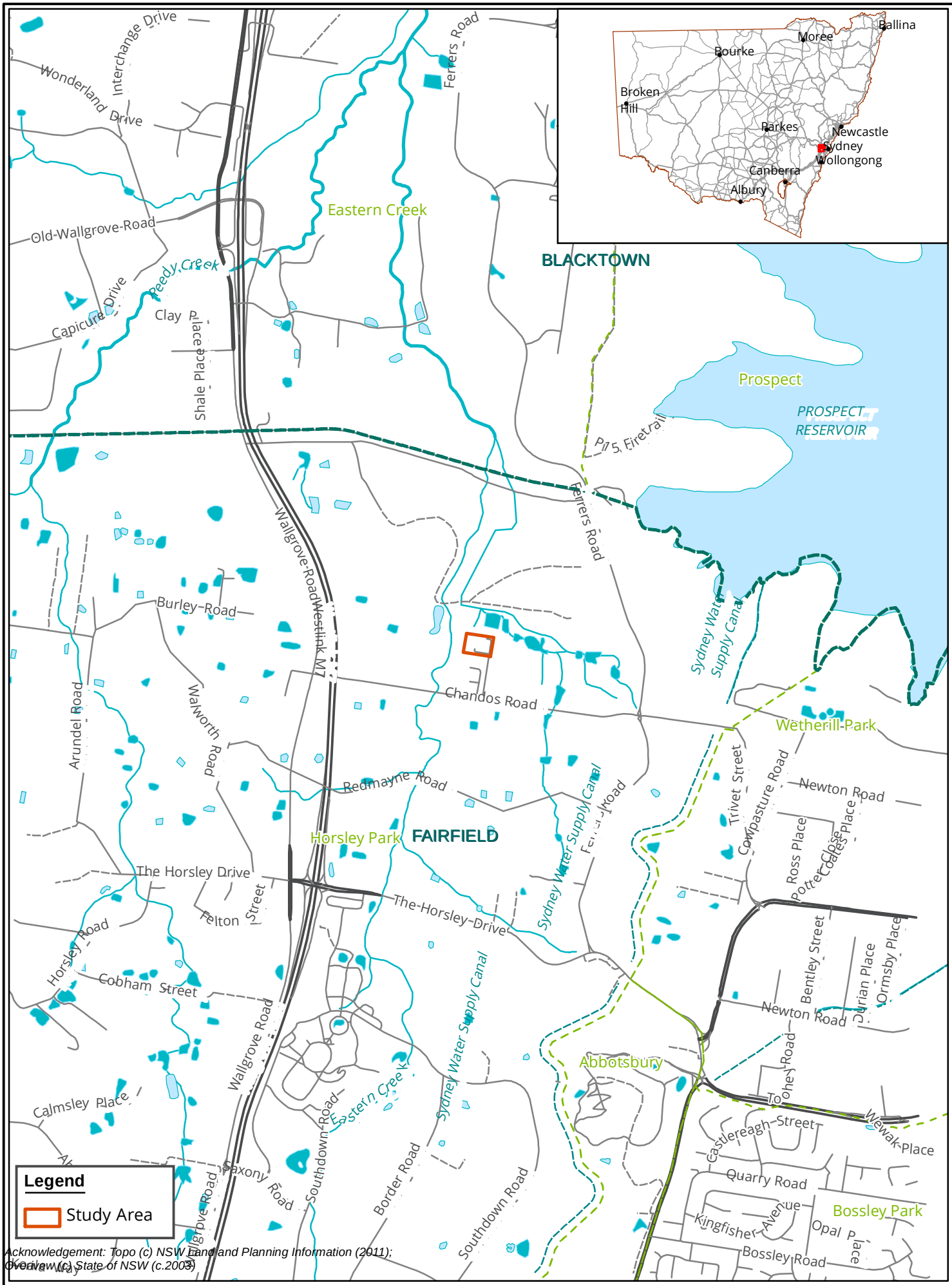
Yours sincerely

Jane Murray
Principal Ecologist

Bibliography

- DECC, 2008, Vegetation Condition Benchmarks for the Sydney Metro Catchment Management Area, Department of Environment and Climate Change.
- DoE, 2013, Protected Matters Search Tool. Accessed August 2014.
- NSW DPI, 2014, Noxious Weed Declarations: Fairfield City Council. Accessed August 2014.
- OEH, 2014, BioNet Atlas of NSW Wildlife for *Threatened Species Conservation Act 1995* (TSC Act) listed threatened biota. Accessed August 2014.
- OEH, 2014, VIS Mapping through the Six Viewer portal. Accessed August 2014.
- *Tozer et. al., 2006, South Coast-Illawarra Vegetation Integration (SCIVI),* vegetation mapping.

Appendix 1: Figures



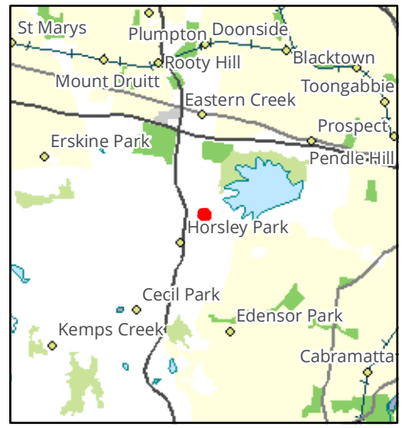
Acknowledgement: Topo (c) NSW Land and Planning Information (2011); Overview (c) State of NSW (c.2003)

biosis

Biosis Pty Ltd
Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Figure 1: Location of the Project Area – New South Wales

Matter: 18669
Date: 12 August 2014,
Checked by: SJG, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18669\Mapping\



Legend

Study area

Vegetation communities

Exotic grasses and weeds

Planted Eucalyptus over exotic

Figure 2: Vegetation

0 5 10 15 20 25

Metres

Scale: 1:500 @ A3

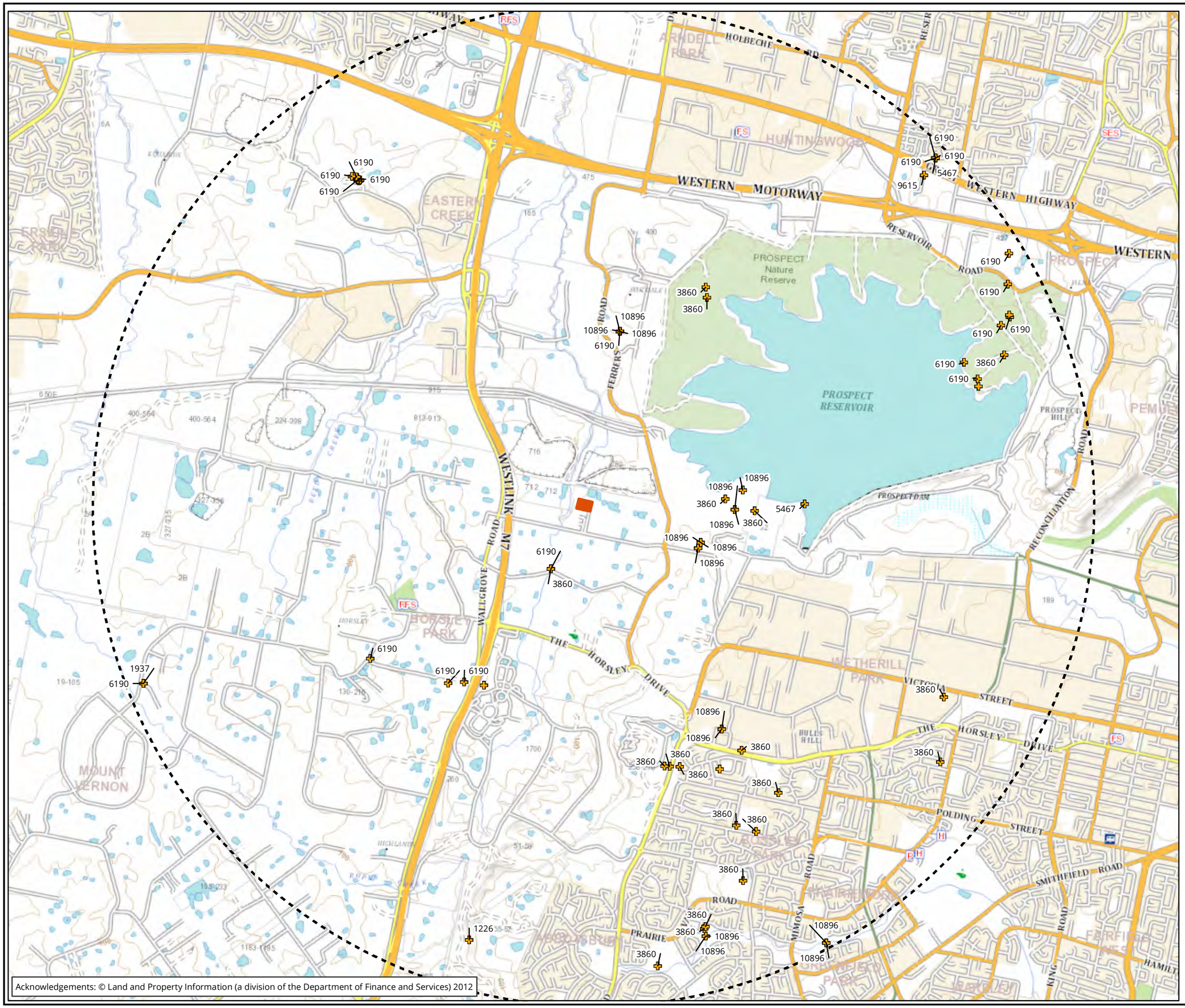
Coordinate System: GDA 1994 MGA Zone 56

N

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 18687
Date: 13 August 2014,
Checked by: JMM, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18687\Mapping
18687_F2_Vegetation



Legend

- Study Area
- Search area

Threatened flora

- 10896; Marsdenia viridiflora subsp. viridiflora
- 1226; Cynanchum elegans
- 1937; Wahlenbergia multicaulis
- 3860; Acacia pubescens
- 5467; Persoonia nutans
- 6190; Pimelea spicata
- 9615; Pterostylis saxicola

Figure 3: Threatened Flora within 5km of the study area

0 350 700 1,050 1,400 1,750

Metres

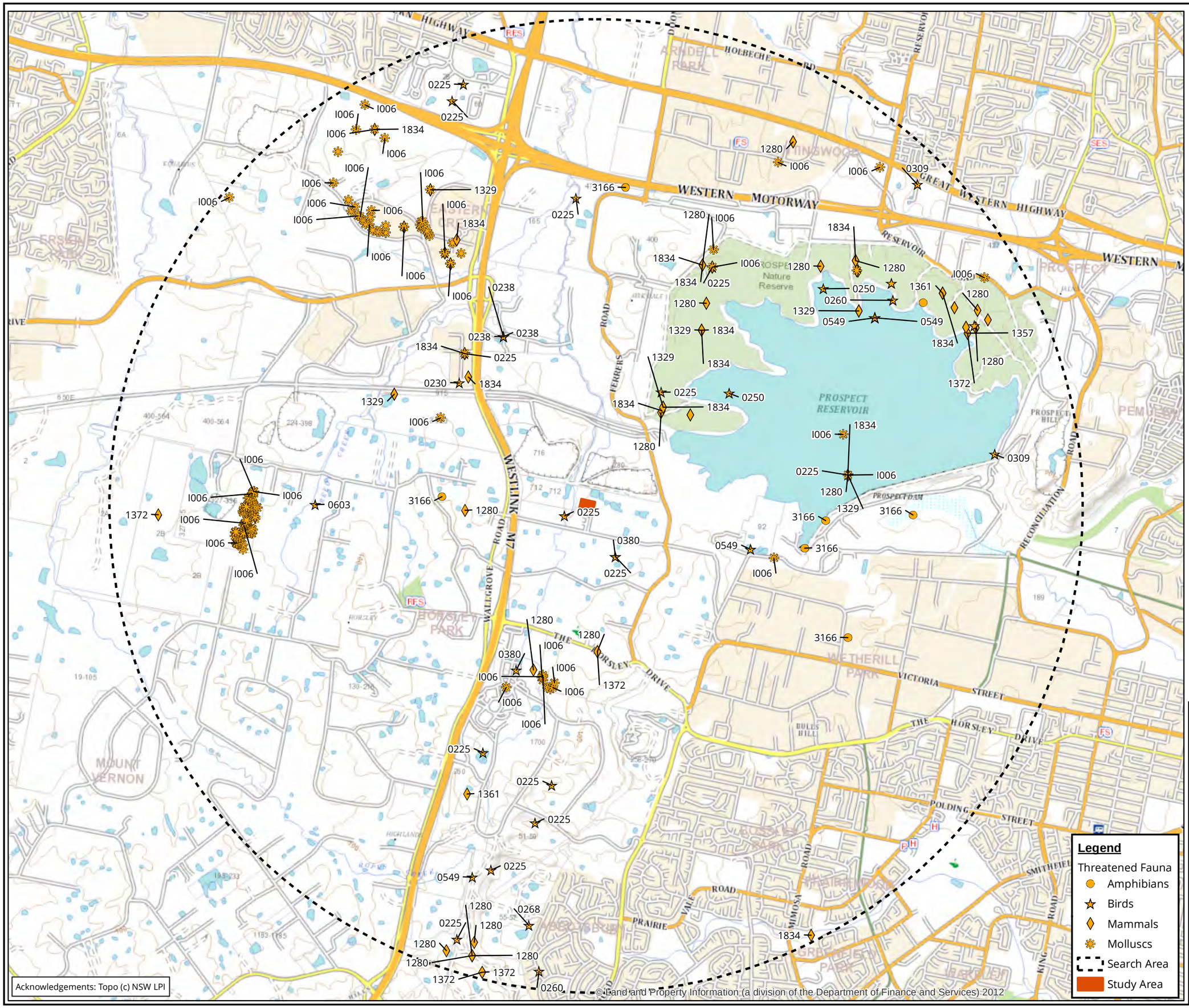
Scale: 1:35,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne, Sydney,Wangaratta & Wollongong

Matter: 18687
Date: 13 August 2014,
Checked by: JKH, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18687\Mapping
18687_F3_ThrFlora



Species list

Amphibians

3166 - Green and Golden Bell Frog

Birds

0225 - Little Eagle
0230 - Square-tailed Kite
0238 - Black Falcon
0250 - Masked Owl
0260 - Little Lorikeet
0268 - Gang-gang Cockatoo
0309 - Swift Parrot
0380 - Scarlet Robin
0549 - Varied Sittella
0603 - Regent Honeyeater

Mammals

1280 - Grey-headed Flying-fox
1329 - Eastern Freetail-bat
1357 - Southern Myotis
1361 - Greater Broad-nosed Bat
1372 - Eastern False Pipistrelle
1834 - Eastern Bentwing-bat

Molluscs

I006 - Cumberland Plain Land Snail

Legend

Threatened Fauna
- Amphibians
- Birds
- Mammals
- Molluscs
- Search Area
- Study Area

Figure 4: Threatened Fauna within 5km of the Study Area

0 360 720 1,080 1,440 1,800

Metres

Scale: 1:36,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

biosis

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne, Sydney,Wangaratta & Wollongong

Matter: 15743
Date: 13 August 2014,
Checked by: , Drawn by: SMV, Last edited by: jshepherd
Location:P:\18600s\18687\Mapping\18687_F4_ThrFauna

Appendix 2: Plates

Plate 1: Exotic Grasses and Weeds

Plate 2: Planted Eucalypts

Plate 3: Nearby Dam to the North

Appendix 3: Flora and fauna recorded within the study area

Table 1: Flora species recorded by Biosis, 05.08.2014

Status	Family	Scientific Name	Common Name
	Native species		
	Fabaceae (Mimosoideae)	*Acacia floribunda*	White Sally
	Geraniaceae	*Pelargonium australe*	Native Storksbill
	Myrtaceae	*Corymbia maculata*	Spotted Gum
	Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark
	Myrtaceae	*Eucalyptus moluccana*	Grey Box
	Myrtaceae	*Eucalyptus paniculata*	Grey Ironbark
	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
	Myrtaceae	*Kunzea ambigua*	Tick Bush
	Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree
	Poaceae	*Chloris truncata*	Windmill Grass
	Poaceae	*Cynodon dactylon*	Common Couch
	Poaceae	*Eragrostis brownii*	Brown's Lovegrass
	Poaceae	*Microlaena stipoides*	Weeping Grass
	Introduced species		
	Asteraceae	*Arctotheca calendula*	Capeweed
	Asteraceae	*Soliva sessilis*	Bindi
	Asteraceae	*Sonchus oleraceus*	Common Sowthistle
	Asteraceae	*Taraxacum officinale*	Dandelion
	Fabaceae (Faboideae)	*Trifolium repens*	White Clover
	Fabaceae (Faboideae)	*Trifolium sp*	Berseem Clover
	Malvaceae	*Malva spp.*	Mallow
	Myrsinaceae	*Anagallis arvensis*	Scarlet Pimpernel
	Plantaginaceae	*Plantago major*	Large Plantain
	Poaceae	*Pennisetum clandestinum*	Kikuyu Grass
	Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel

Table 2: Fauna species recorded by Biosis, 05.08.2014

Scientific Name	Common Name	Observation Type
Anthochaera chrysoptera	Little Wattlebird	O
Egretta novaehollandiae	White-faced Heron	O
	Lorikeet	
Eolophus roseicapillus	Galah	O
Eopsaltria australis	Eastern Yellow Robin	O
Grallina cyanoleuca	Magpie-lark	O
Hirundo neoxena	Welcome Swallow	O
Malurus cyaneus	Superb Fairy-wren	O
Manorina melanocephala	Noisy Miner	O
Neochmia temporalis	Red-browed Finch	O
Rhipidura leucophrys	Willie Wagtail	O

Appendix 4: Likelihood of Occurrence - Threatened Biota

Table 3: Threatened fauna likelihood of occurrence

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
Birds							
Botaurus poiciloptilus	Australasian Bittern	EN	E1	#	Low	No foraging material or habitat present within study area.	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including *Typha spp*. and *Eleoacharis spp*.. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.
Callocephalon fimbriatum	Gang-gang Cockatoo		V, E2	2007	Low	No foraging material or habitat present within study area.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.
Daphoenositta chrysoptera	Varied Sittella		V	2011	Low	No suitable habitat present within study	The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands,

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
						area.	usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbarks, but also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.
Dasyornis brachypterus	Eastern Bristlebird	EN	E1	#	Low	No suitable habitat present within study area.	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.
Falco subniger	Black Falcon		V	2003	Low	No suitable habitat present within study area.	Mainly occur in woodlands and open country where can hunt. Often associated with swamps, rivers and wetlands. Nest in tall trees along watercourses.
Glossopsitta pusilla	Little Lorikeet		V	2007	Low	No suitable habitat present within study area.	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.
Hieraaetus morphnoides	Little Eagle		V	2012	Low	No suitable habitat present within study	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
						area.	species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.
Lathamus discolor	Swift Parrot	EN	E1	2004/#	Low	No suitable habitat, some foraging material present, however not to be impacted within study area.	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.
Lophoictinia isura	Square-tailed Kite		V	2008	Low	No suitable habitat present within study area.	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by *Eucalyptus longifolia*, *Corymbia maculata*, *E. elata*, or *E. smithii*. Individuals appear to occupy large hunting ranges of more than 100 km2. They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
Petroica boodang	Scarlet Robin		V	2004	Low	No suitable habitat present within study area.	During the breeding season the Scarlet Robin is found in eucalypt forests and temperate woodlands, often on ridges and slopes. During autumn and winter it moves to more open and cleared areas. It has dispersive or locally migratory seasonal movements. The Scarlet Robin forages amongst logs and woody debris for insects which make up the majority of its diet. The nest is an open cup of plant fibres and cobwebs, sited in the fork of a tree (often a dead branch in a live tree, or in a dead tree or shrub) which is usually more than 2 m above the ground. It is conspicuous in open and suburban habitats.
Tyto novaehollandiae	Masked Owl		V	2011	Low	No suitable habitat present within study area.	The Masked Owl may be found across a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. It has mostly been recorded in open forests and woodlands adjacent to cleared lands. They nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. The nest hollows are usually located within dense forests or woodlands. Masked Owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet. It has a large home range of between 500 to 1000 ha.
Mammals							
Chalinolobus dwyeri	Large-eared Pied Bat	VU	V	#	Low	No suitable habitat present within study area.	Occurs from the Queensland border to Ulladulla, with largest numbers from the sandstone escarpment country in the Sydney Basin and Hunter Valley. Primarily found in

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							dry sclerophyll forests and woodlands, but also found in rainforest fringes and subalpine woodlands. Forages on small, flying insects below the forest canopy. Roosts in colonies of between three and 80 in caves, Fairy Martin nests and mines, and beneath rock overhangs, but usually less than 10 individuals. Likely that it hibernates during the cooler months. The only known existing maternity roost is in a sandstone cave near Coonabarabran.
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	EN	V	2004	Low	No suitable habitat present within study area.	Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.
Falsistrellus tasmaniensis	Eastern False Pipistrelle		V	2005	Low	No suitable habitat present within study area.	Distribution extending east of the Great Dividing Range throughout the coastal regions of NSW, from the Queensland border to the Victorian border. Prefers wet high-altitude sclerophyll and coastal mallee habitat, preferring wet forests with a dense understorey but being

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							found in open forests at lower altitudes. Apparently hibernates in winter. Roosts in tree hollows and sometimes in buildings in colonies of between 3 and 80 individuals. Often change roosts every night. Forages for beetles, bugs and moths below or near the canopy in forests with an open structure, or along trails. Has a large foraging range, up to 136 ha. Records show movements of up to 12 km between roosting and foraging sites.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat		V	2013	Low	No suitable habitat present within study area.	Occurs from Victoria to Queensland, on both sides of the Great Dividing Range. Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways.
Mormopterus norfolkensis	Eastern Freetail-bat		V	2011	Low	No suitable habitat present within study area.	Distribution extends east of the Great Dividing Range from southern Queensland to south of Sydney. Most records are from dry eucalypt forests and woodland. Individuals tend to forage in natural and artificial openings in forests, although it has also been caught foraging low over a rocky river within rainforest and wet sclerophyll forest habitats. The species generally roosts in hollow spouts of large mature eucalypts (including paddock trees), although individuals have been recorded roosting

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							in the roof of a hut, in wall cavities, and under metal caps of telegraph poles. Foraging generally occurs within a few kilometres of roosting sites.
Myotis macropus	Southern Myotis		V	2013	Low	No suitable habitat present within study area.	Scattered, mainly coastal distribution extending to South Australia along the Murray River. Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects.
Phascolarctos cinereus	Koala	VU	V	#	Low	No suitable habitat present within study area.	Pittwater LGA and Hawks nest: In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include *Eucalyptus robusta, E. tereticornis, E. punctata, E. haemostoma* and *E. signata*. They are solitary with varying home ranges. In high quality habitat home ranges may be 1-2 ha and overlap, while in semi-arid country they are usually discrete and around 100 ha.
Pseudomys novaehollandiae	New Holland Mouse	VU		#	Low	No suitable habitat present within study area.	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. The home range of the New Holland Mouse can range from 0.44 ha to 1.4

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							ha. The New Holland Mouse is a social animal, living predominantly in burrows shared with other individuals. The species is nocturnal and omnivorous, feeding on seeds, insects, leaves, flowers and fungi, and is therefore likely to play an important role in seed dispersal and fungal spore dispersal. It is likely that the species spends considerable time foraging above-ground for food, predisposing it to predation by native predators and introduced species. Breeding typically occurs between August and January, but can extend into autumn.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	V	2011/#	Low	No suitable habitat present within study area.	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large colonies (camps), commonly in dense riparian vegetation. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.
Scoteanax rueppellii	Greater Broad-nosed Bat		V	2013	Low	No suitable habitat present within study area.	Occurs along the Great Dividing Range, generally at 500 m but up to 1200 m, and in coastal areas. Occurs in woodland and rainforest, but prefers open habitats or natural or human-made openings in wetter forests. Often hunts along creeks or river corridors. Flies slowly and directly at a height of 30 m or so to catch beetles and other large, flying insects. Also known to eat other bats and spiders. Roosts in hollow tree trunks and branches.
Reptiles							

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
Hoplocephalus bungaroides	Broad-headed Snake	VU	E1	#	Low	No suitable habitat present within study area.	Mainly occurs in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they generally use rock crevices and exfoliating rock during the cooler months and tree hollows during summer.
Amphibians							
Heleioporus australiacus	Giant Burrowing Frog	VU	V	#	Low	No suitable habitat present within study area.	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks. Can also occur within shale outcrops within sandstone formations. Known from wet and dry forests and montane woodland in the southern part range. Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water. Spends the majority of its time in non-breeding habitat 20-250m from breeding sites.
Litoria aurea	Green and Golden Bell Frog	VU	E1	1969/#	Low	No suitable habitat present within study area, potential dispersal habitat to the north and west of the site.	Most existing locations for the species occur as small, coastal, or near coastal populations, with records occurring between south of Grafton and northern VIC. The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks , although the species has also been

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land. Breeding usually occurs in summer. Tadpoles, which take approximately 10-12 weeks to develop , feed on algae and other vegetative matter. Adults eat insects as well as other frogs, including juveniles of their own species.
Litoria raniformis	Southern Bell Frog	VU	E1	#	Low	No suitable habitat present within study area.	In NSW the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.
Fish							
Macquaria australasica	Macquarie perch	EN		#	Low	No suitable habitat present within study area.	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries
Prototroctes	Australian	VU		#	Low	No suitable habitat	The Australian Grayling occurs in streams and rivers on

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
maraena	Grayling					present within study area.	the eastern and southern flanks of the Great Dividing Range from Sydney southwards to the Otway Ranges in Victoria, and Tasmania. Australian grayling do not occur in the inland Murray–Darling Basin system. Grayling is a diadromous species; migrating between freshwater streams and the ocean. This species has been found in clear, gravel-bottomed streams with alternating pools and riffles, and granite outcrops, and also in muddy-bottomed, heavily silted habitats.
Invertebrates							
Meridolum corneovirens	Cumberland Plain Land Snail		E1	2013	Low	No suitable habitat present within study area.	Most likely restricted to Cumberland Plain, Castlereagh Woodlands and boundaries between River-flat Forest and Cumberland Plain Woodland. It is normally found beneath logs, debris and amongst accumulated leaf and bark particularly at the base of trees. May also use soil cracks for refuge.

Table 4: Threatened flora likelihood of occurrence

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
Acacia pubescens	Downy Wattle	VU	V	2013/#	Low	A range of records nearby, however no species present or suitable habitat within study area.	Acacia pubescens is found in Sydney Metropolitan, and Hawkesbury/Nepean Catchment Management Region, with concentrated populations around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. It occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. The species occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Flowers from August to October. The pods mature in October to December.
Allocasuarina glareicola		EN	E1	#	Low	Associated vegetation community not present within study area.	Found in the Hawkesbury/Nepean and Sydney Metropolitan Catchment Authority Regions. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Also found in Dry Sclerophyll forest/Woodland. Associated species include *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora*. Common associated understorey species include *Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia*

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							elongata, Acacia brownei, Themeda australis and *Xanthorrhoea minor*.
Cynanchum elegans	White-flowered Wax Plant	EN	E1	1993/#	Low	One record to the south of the site approximately 4 kilometers away, associated vegetation community not present.	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. Catchment Management Regions include Hawkesbury/Nepean , Hunter/Central Rivers, Northern Rivers, Southern Rivers and Sydney Metropolitan. *Cynanchum elegans* usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; *Leptospermum laevigatum, Banksia integrifolia subsp. integrifolia*; *Eucalyptus tereticornis* open forest and woodland; *Eucalyptus maculata* open forest and woodland; and *Melaleuca armillaris* scrub to open scrub. Flowering occurs between August and May, with a peak in November. Flower abundance on individual plants varies from sparse to prolific.
Genoplesium baueri	Bauer's Midge Orchid		V	#	Low	Associated vegetation community not present within study area.	This terrestrial orchid species grows in open sclerophyll forest or moss gardens on sandstone. Typically the habitat is a drier heathy forest. The species has been recorded from locations between Nowra and Pit
Haloragis exalata subsp. exalata	Square Raspwort	VU	V	#	Low	Associated vegetation community and moisture not present within study area.	Square Raspwort is known from a few scattered locations in south-eastern NSW including the Nepean River (near Sydney), Lake Illawarra, the Wallaga Lake - Tilba area and the Geehi Valley in Kosciuszko National Park. There are isolated records from northern NSW (Mt Kaputar National

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							Park and Tuggolo State Forest). It also occurs in Victoria. Square Raspwort occurs in damp places near watercourses. It regenerates only from seed. The species appears to be favoured by soil disturbance.
Marsdenia viridiflora subsp. viridiflora	Native Pear		E2	2007	Low	Associated vegetation community not present within study area and not recorded on site.	This species has a wide distribution in subcoastal and southern Queensland but has been recorded rarely in NSW and from a disjunct occurrence near Sydney where it occurs as very scattered plants in areas of remnant vegetation. Grows in woodland and scrub and is typically found in Sydney Turpentine Ironbark Forest. Grows in vine thickets and open shale woodland. Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range.
Persoonia nutans	Nodding Geebung	EN	E1	1802/#	Low	Associated vegetation community not present within study area, not recorded on site.	Occurs in Hawkesbury/Nepean and Sydney Metropolitan Catchment. Restricted to the Cumberland Plain between Richmond in the north and Macquarie Fields in the south. Core distribution occurs within the Penrith LGA, and to a lesser extent, Hawkesbury LGA. Small populations also occur in the Liverpool, Campbelltown, Bankstown and Blacktown LGAs. Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland. *P. nutans* also occurs on Shale/Gravel Transition Forest and Cooks River Castlereagh Ironbark Forest. In Castlereagh Scribbly Gum Woodlands it is found in open woodland with dominant

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							overstorey species being *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*. The Agnes Banks Woodlands have a similar array of tree species, with the addition of *Banksia serrata* and *Banksia aemula*. *Persoonia nutans* is found on the Agnes Banks and Berkshire Park soil landscapes. Drainage appears to influence the distribution of *P. nutans* as the species is more common on the deeper sands at Agnes Banks. At other locations on the Cumberland Plain it occurs on low rises as opposed to swales or other low lying areas.
Pimelea curviflora var. curviflora		VU	V	#	Low	Associated vegetation community not present within study area and not recorded on site.	Occurring in Hawkesbury/Nepean and Sydney Metropolitan Catchment Authority Areas. Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Occurs on lateritic soils and shale-sandstone transition soils on ridge tops in woodland. Associated with Dry Sclerophyll forests and Coastal valley grassy woodlands. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots. Flowers October to May.
Pimelea spicata	Spiked Rice-flower	EN	E1	2013/#	Low	Associated vegetation community not present within study area and not recorded on site.	Once widespread on the Cumberland Plain, *Pimelea spicata* occurs in two disjunct areas, the Cumberland Plain and the Illawarra. Catchment areas are Hawkesbury/Nepean, Southern Rivers, and Sydney Metropolitan Catchment.

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							In western Sydney, *P. spicata* occurs on an undulating topography of substrates derived from Wianamatta Shale in areas supporting, or that previously supported, the Cumberland Plain Woodland Vegetation Community. Associated species include: *Eucalyptus moluccana, E. tereticornis, E.crebra, Bursaria spinosa*, and *Themeda australis*. *Pimelea spicata* flowers sporadically throughout the year, with flowering likely to depend upon climatic conditions, particularly rainfall. Flowering times recorded for *P. spicata* vary. Rye (1990) noted flowering period as May - January; Benson and McDougall (2001) noted peak flowering period as March/ April.
Pomaderris brunnea	Brown Pomaderris	VU	V	#	Low	Associated vegetation community not present within study area and not recorded on site.	*Pomaderris brunnea* is found in a very limited area around the Nepean and Hawkesbury Rivers, including the Bargo area. Occurs in the Central West, Hawkesbury/Nepean, Hunter/Central Rivers Catchments. Occurs on clay & alluvial soils. In the Hawkesbury/Nepean region, the species is known to be associated with Dry sclerophyll forests (Cumberland, Upper Riverina, Sydney Coastal, Sydney Hinterland, Sydney Sand Flats), Coastal Floodplain Wetlands and Coastal Valley Grassy Woodlands. Flowers appear in September and October.
Pterostylis gibbosa	Illawarra Greenhood	EN	E1	#	Low	Associated vegetation community not present within study area and not recorded on site.	Known from a small number of populations in the Hunter region, the Illawarra region and the Shoalhaven region. It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland,

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by *Eucalyptus tereticornis, E. longifolia* and *Melaleuca decora*. Near Nowra, the species grows in an open forest of *Corymbia maculata, E.tereticornis* and *E. paniculata*. In the Hunter region, the species grows in open woodland dominated by *E. crebra*, Forest Red Gum and *Callitris endlicherii*. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.
Pterostylis saxicola	Sydney Plains Greenhood	EN	E1	1804/#	Low	Associated vegetation community not present within study area and not recorded on site.	Restricted to western Sydney between Freemans Reach in the north and Picton in the south (Hawkesbury/Nepean and Sydney Metropolitan Catchment). Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. All species of *Pterostylis* are deciduous and die back to fleshy, rounded underground tuberoids. The time of emergence and withering has not been

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
							recorded for this species, however flowering occurs from October to December and may vary due to climatic conditions. The above ground parts of the plant whither and die following seed dispersal and the plant persists as a tuberoid until the next year.
Pultenaea parviflora		VU	E1	#	Low	Associated vegetation community not present within study area and not recorded on site.	*Pultenaea parviflora* is endemic to the Cumberland Plain, with a core distribution from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce. *P. parviflora* may be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. Often found in association with other threatened species such as *Dillwynia tenuifolia, Dodonaea falcata, Grevillea juniperina, Micromyrtus minutiflora, Persoonia nutans* and *Styphelia laeta*. Flowering may occur between August and November depending on environmental conditions.
Streblus pendulinus	Whalebone Tree	EN		#	Low	Associated vegetation community not present within study area and not recorded on site.	The species is found in warmer rainforests, chiefly along watercourses. The altitudinal range is from near sea level to 800 m above sea level. The species grows in well developed rainforest, gallery forest and drier, more seasonal rainforest).
Wahlenbergia multicaulis	Tadgell's Bluebell		E2	1998	Low	Associated vegetation community not present within study area and	Grows in forest, woodland and grassland, chiefly in coastal and tablelands districts south from Sydney and the Blue Mountains, west along the Murray River to Mathoura. This

Scientific name	Common name	EPBC Act	TSC Act	Most recent record	Likelihood of occurrence	Rationale for likelihood	Habitat description
						not recorded on site.	listing covers 13 known sites, two of which are in northern Sydney on the Hawkesbury soil landscape with the remainder in inner-western Sydney on the Villawood soil landscape (Rookwood, Chullora, Bass Hill, Bankstown, Georges Hall, Campsie, South Granville and Greenacre). Found in damp, disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. In Hornsby LGA it occurs in or adjacent to sandstone gully forest. In Western Sydney it is found in remnants of Cooks River/ Castlereagh Ironbark Forest.

APPENDIX 3 NOISE IMPACT SURVEY – 2014 EIS

GTS-590-RP-EV-002

HORSLEY PARK GAS METERING STATION

Noise Impact Assessment

Rp 001 2014338SY

01 October 2014

6 Gipps Street
Collingwood 3066 Victoria Australia
T: +613 9416 1855 F: +613 9416 1231
A.C.N. 006 675 403
www.marshallday.com

Project: **HORSLEY PARK GAS METERING STATION**

Prepared for: **Jemena Asset Management Pty Ltd**
Level 2, 321 Ferntree Gully Road
Mount Waverley Victoria 3149

Attention: **Mr David Robertson**

Report No.: **Rp 001 2014341SY**

Document control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
First issue			01/10/14	SJM	AC

TABLE OF CONTENTS

1.0 INTRODUCTION

The Eastern Gas Pipeline (EGP) is a DN450, class 900 gas transmission pipeline which runs from the Longford Compressor Station in South Gippsland, Victoria to Horsley Park in New South Wales. An opportunity has arisen to construct a new gas delivery facility within the existing Jemena facility in Horsley Park.

Jemena Asset Management Pty Ltd has engaged Marshall Day Acoustics to investigate potential noise impacts due to the construction and operation of the new facility and, if necessary, propose an operational noise mitigation strategy.

Acoustic terminology used in this report is described in Appendix A.

2.0 SITE AND PROJECT DESCRIPTION

The proposed development site is within an existing Jemena facility on Chandos Road. The land surrounding the site is predominantly bush with widely spaced residential properties in the immediate environs. The nearest residential dwelling is understood to be 187-201 Chandos Road which is approximately 90m from the existing site boundary.

The location of the site in relation to the nearest residential receptor is presented in Figure 1.

Figure 1: Site location relative to nearest residential receptor

2.1 Site plan

A layout of the proposed gas delivery facility is shown below in Figure 2.

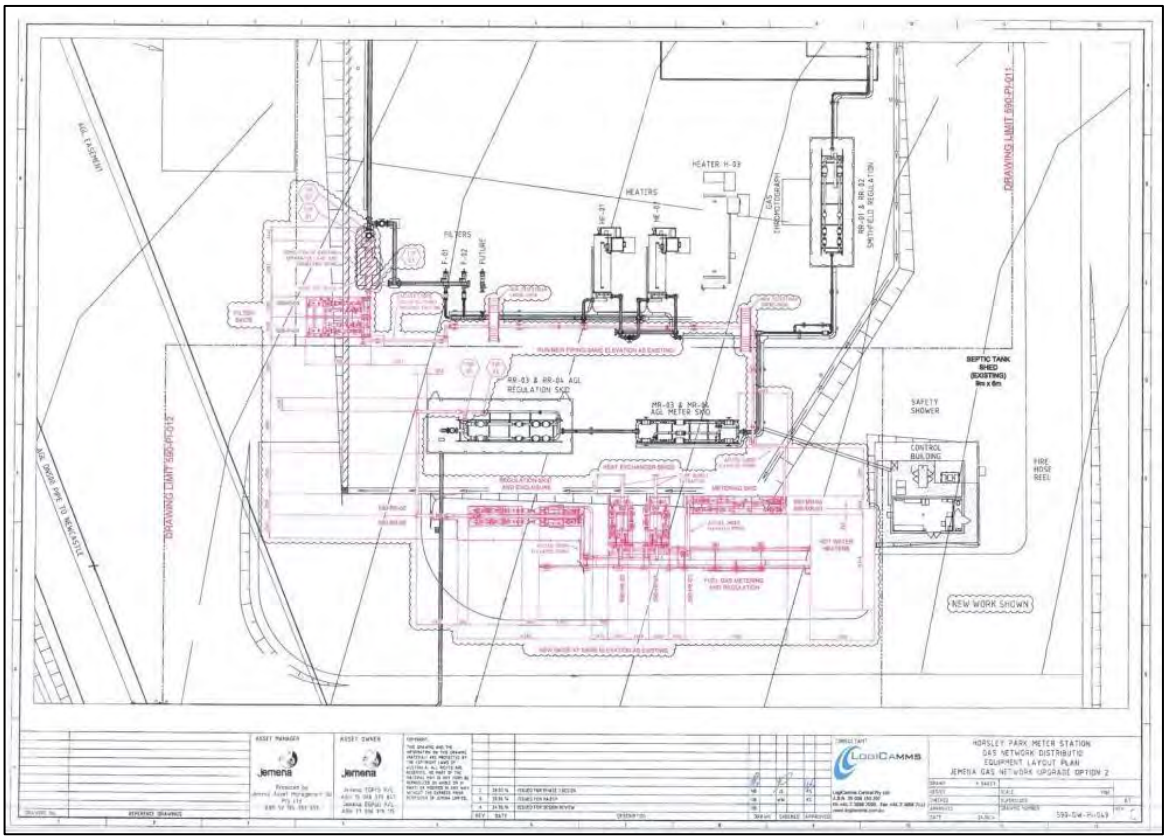


Figure 2: Site Plan

2.2 Noise sources

It is understood, from a preliminary Jemena noise investigation (Document No. GTS-563-RP-EV-001, dated 19 August 2014) which was undertaken for a similar site in NSW, that the following items of noisy equipment are anticipated to be required as part of the proposed gas delivery facility:

- Active Pressure Control Valves (PCVs) on the Pressure Reduction Skid
- One duty Boiler on the Heater Package
- Two duty Water Pumps on the Heater Package

2.3 Working hours – Construction

It is understood that construction of the facility will be undertaken as follows:

- 0700 – 1800hrs Monday – Friday
- 0800 – 1300hrs Saturday

3.0 UNATTENDED NOISE MEASUREMENTS

Ambient and background noise levels at the site were measured using ARL EL - 316 precision integrating sound level meters fitted with weatherproof windshields.

The microphones were mounted on poles at a height of approximately 1.5m above local ground level under freefield conditions. The measurement locations are shown in Appendix D.

Measurements were obtained using the 'F' response time and A-weighting frequency network. The equipment was calibrated before and after the survey and no significant calibration drifts were observed.

3.1 Southern site boundary

Consecutive 15 minute measurements of background and ambient noise levels were obtained at the southern boundary of the existing site between 1215hrs on Wednesday 27 August and 1800hrs on Sunday 9 September 2014.

It was observed that the prevailing noise environment was typical of a rural location with occasional distant road traffic audible along with intermittent road traffic on Chandos Road. A photograph of the noise monitor in situ is presented as Figure 3. Measured background and ambient noise levels are presented in Table 1 and Table 2.

Table 1: Measured background noise levels – Southern site boundary

Period	Average Background Noise Level, $L_{A90\ 15mins}$ dB		
	Day	Evening	Night
Wednesday, 27 Aug 2014	-**	52*	49*
Thursday, 28 Aug 2014	52*	53*	53*
Friday, 29 Aug 2014	52	51	47*
Saturday, 30 Aug 2014	50*	49*	46*
Sunday, 31 Aug 2014	47	50	49
Monday, 01 Sep 2014	51	53	49
Tuesday, 02 Sep 2014	52	52	49*
Wednesday, 03 Sep 2014	53*	52	50
Thursday, 04 Sep 2014	52	52	52
Friday, 05 Sep 2014	51*	51*	48*
Saturday, 06 Sep 2014	49*	49*	46*
Sunday, 07 Sep 2014	48*	-	-
Minimum	47	49	46

*- Weather affected measurement (rain or strong winds) or no weather data available

** - Incomplete period

Table 2: Measured ambient noise levels – Southern site boundary

Period	Average Ambient Noise Level, $L_{Aeq\ 15mins}$ dB		
	Day	Evening	Night
Wednesday, 27 Aug 2014	-**	54*	54*
Thursday, 28 Aug 2014	57*	55*	54*
Friday, 29 Aug 2014	56	54	50*
Saturday, 30 Aug 2014	53*	51*	49*
Sunday, 31 Aug 2014	51	52	52
Monday, 01 Sep 2014	56	55	53
Tuesday, 02 Sep 2014	56	54	53*
Wednesday, 03 Sep 2014	57*	54	54
Thursday, 04 Sep 2014	57	54	53*
Friday, 05 Sep 2014	56*	54*	51*
Saturday, 06 Sep 2014	53*	51*	48*
Sunday, 07 Sep 2014	53*	-	-
Minimum	51	51	48

* - Weather affected measurement (rain or strong winds) or no weather data available

** - Incomplete period

Figure 3: Noise monitoring location – Southern site boundary

3.2 Chandos Road

Consecutive 15 minute measurements of background and ambient noise levels were obtained on Chandos Road between 1345hrs on Wednesday 27 August and 1845hrs on Sunday 9 September 2014.

The measurement location was selected, in the absence of available access to local residential properties, so as to be representative of the prevailing noise environment in the area.

It was observed that the prevailing noise environment was typical of a rural location with occasional distant road traffic audible along with intermittent road traffic on Chandos Road. A photograph of the noise monitor in situ is presented as Figure 4. Measured background and ambient noise levels are presented in Table 1.

Table 3: Measured background noise levels – Chandos Road

Period	Average Background Noise Level, $L_{A90\ 15mins}$ dB		
	Day	Evening	Night
Wednesday, 27 Aug 2014	-**	58*	59*
Thursday, 28 Aug 2014	54*	59*	65*
Friday, 29 Aug 2014	53	54	53*
Saturday, 30 Aug 2014	50*	51*	53*
Sunday, 31 Aug 2014	45*	49	48
Monday, 01 Sep 2014	48	50	45
Tuesday, 02 Sep 2014	52	50	48*
Wednesday, 03 Sep 2014	54*	49	46
Thursday, 04 Sep 2014	52	49	60*
Friday, 05 Sep 2014	52*	49*	44*
Saturday, 06 Sep 2014	47*	44*	40*
Sunday, 07 Sep 2014	42*	-	-
Minimum	45	44	40

* - Weather affected measurement (rain or strong winds) or no weather data available

** - Incomplete period

Table 4: Measured ambient noise levels – Chandos Road

Period	Average Ambient Noise Level, $L_{Aeq\ 15mins}$ dB		
	Day	Evening	Night
Wednesday, 27 Aug 2014	-**	67*	66*
Thursday, 28 Aug 2014	69*	67*	65*
Friday, 29 Aug 2014	68	66	63*
Saturday, 30 Aug 2014	64*	63*	62*
Sunday, 31 Aug 2014	61*	62	63
Monday, 01 Sep 2014	68	64	62
Tuesday, 02 Sep 2014	68	64	63*
Wednesday, 03 Sep 2014	68*	64	62
Thursday, 04 Sep 2014	68	64	62
Friday, 05 Sep 2014	68*	65*	60*
Saturday, 06 Sep 2014	64*	61*	56*
Sunday, 07 Sep 2014	61*	-	-
Minimum	61	61	56

* - Weather affected measurement (rain or strong winds) or no weather data available

** - Incomplete period

Figure 4: Noise monitoring location – Chandos Road

3.3 Weather conditions

All measured noise levels have been correlated to weather data taken from the Horsley Park Equestrian Centre Bureau of Meteorology (BOM) weather station which is located approximately 5km to the south of the subject site.

Significant periods of the measurement survey were affected by rainfall or strong winds and therefore any noise data collected during these periods are highlighted in the Tables. Noise measurements taken during periods in which weather data was not available from the BOM have been discarded.

The periods of inclement weather, or absent weather data, are highlighted in the graphical representations of the noise measurements which are presented in Appendix C and Appendix D.

It should be noted that BOM weather data is supplied in 30 minute intervals. Therefore the noise measurements presented in Appendix C and Appendix D have been re-calculated into the same for the purposes of correlating the two data sets.

3.4 Discussion

Analysis of the measured noise data at the Chandos Road noise monitor, which is presented graphically in Appendix D, seems to indicate the presence of a cyclical noise source in close proximity to the monitoring location.

This can be seen by the shape of the time trace which displays a similar pattern each day. It is considered that this is unusual for a rural setting such as this.

However, observations made on-site when the noise monitor was installed and collected did not highlight any obvious noise sources and therefore the source of the pattern is unknown.

Furthermore, the noise levels measured at Chandos Road are generally higher than those taken at the site boundary which would tend to indicate that the pattern to the noise levels is not influenced by the existing industrial installation.

It can also be seen that the pattern does not occur over the first measurement weekend and that the noise levels over night-time during this period did not fall to levels that would be expected in a rural location. Night-time noise levels during the week and over the second measurement weekend do display a pattern that would be representative of a rural location.

For these reasons, the decision has been taken to discard the measurement data taken at the Chandos Road noise monitor and undertake the assessment based upon the data taken at the southern site boundary.

Therefore, subsequent sections of this report do not reference the Chandos Road data.

4.0 NSW INDUSTRIAL NOISE POLICY

In NSW, the EPA *Industrial Noise Policy* (INP) is the standard for assessing noise emissions from industrial facilities and other developments with noise sources that may be considered to be industrial in nature. The INP sets out a procedure where an industrial facility can be assessed against a series of noise level criteria. In the INP, these criteria are called the project specific noise levels and are derived from an involved analysis of the ambient noise environment and zoning information. The derivation of the project specific noise levels for this development is summarised in Table 5, Table 6 and Table 7 with full description set out in Figure 5 below.

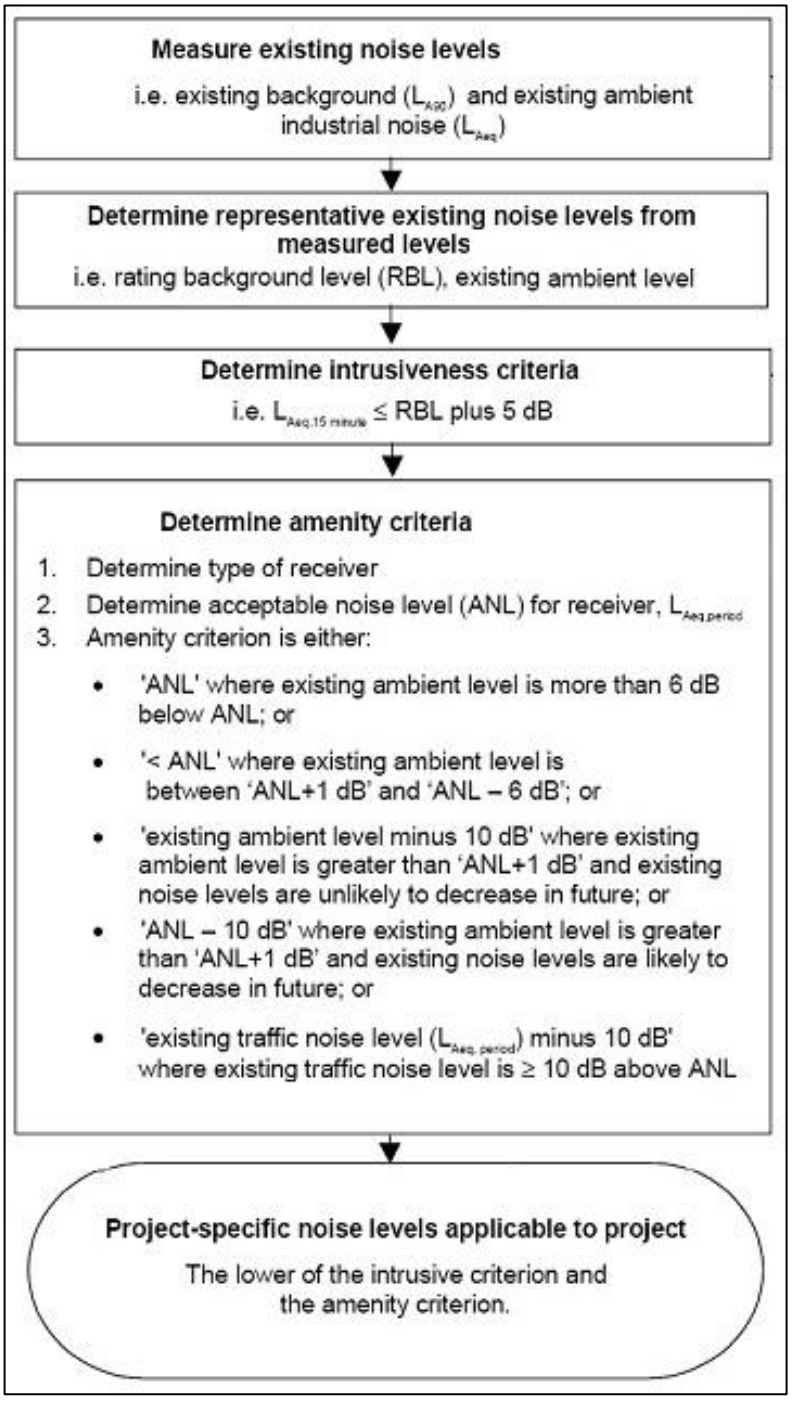


Figure 5: Industrial noise policy process

4.1 Intrusiveness Criteria

The intrusiveness noise assessment is based on knowledge of the background noise level at the receiver locations. The intrusiveness criterion is the background noise level at the nearest noise sensitive location plus 5 dB. Therefore the noise emissions from the industrial premises are considered to be intrusive if the A-weighted source noise level ($L_{Aeq,15mins}$) is greater than the background noise level (L_{A90}) plus 5 dB. In the INP the background noise level is referred to as the Rating Background Level (RBL).

Table 5: INP time periods against measured background and ambient noise levels

		Southern site boundary	
Period	**Time period**	**RBL L_{A90} dB**	**L_{Aeq} dB**
Day	0700-1800hrs	47	51
Evening	1800-2200hrs	49	51
Night	2200-0700hrs	46	48

It should be noted that on Sundays and public holidays, daytime is considered to be from 0800hrs 1800hrs.

Based upon the data summarised in Table 5, noise limits for intrusiveness have been calculated in accordance with the INP and are presented in Table 6.

Table 6: Calculated Intrusiveness Criteria

	Southern site boundary	
Period	**RBL L_{A90} dB**	**Intrusiveness Criteria (RBL +5dB)**
Day	47	52
Evening	49	54
Night	46	51

4.2 Amenity Criteria

The Amenity Criteria are designed to prevent industrial noise continually increasing above an acceptable level. The initial stage in determining the Amenity Criteria is to correct the acceptable noise levels provided for the appropriate amenity area with the baseline noise monitoring. The area surrounding the proposed development is considered Rural. The acceptable and recommended maximum levels for residences in a rural area are detailed in Table 7 below.

Table 7: Recommended noise levels from industrial noise sources in a rural area

Time of Day	Recommended Noise Level L_{Aeq} dBA	
	Acceptable	**Recommended Maximum**
Day	50	55
Evening	45	50
Night	40	45

Based on the acceptable level presented in Table 7 the L_{Aeq} values from Table 5 are adjusted using INP Table 2.2 to determine the Amenity Criteria.

The derivation of the Amenity Criteria is a function of the measured existing ambient noise conditions on-site. The corrections which are applicable to the measured ambient noise levels (taken from INP Table2.2) are detailed below in Table 8.

Table 8: Corrections to Acceptable noise level based on the measured ambient noise level

Total existing L_{Aeq} noise levels from industrial noise sources, dB	**Maximum L_{Aeq} noise level from new sources alone, dB**
> Acceptable noise level plus 2dB	If existing noise level is likely to decrease in future: Acceptable noise level minus 10dB If existing noise level is unlikely to decrease in future: Existing noise level minus 10dB
Acceptable noise level plus 1dB	Acceptable noise level minus 8dB
Acceptable noise level	Acceptable noise level minus 8dB
Acceptable noise level minus 1dB	Acceptable noise level minus 6dB
Acceptable noise level minus 2dB	Acceptable noise level minus 4dB
Acceptable noise level minus 3dB	Acceptable noise level minus 3dB
Acceptable noise level minus 4dB	Acceptable noise level minus 2dB
Acceptable noise level minus 5dB	Acceptable noise level minus 2dB
Acceptable noise level minus 6dB	Acceptable noise level minus 1dB
< Acceptable noise level minus 6dB	Acceptable noise level

The Amenity Criteria for each time period are presented below.

Table 9: Calculated Amenity Criteria

	Southern site boundary	
Period	**L_{Aeq} dB**	**Amenity Criteria**
Day	51	41
Evening	51	41
Night	48	38

4.3 Determination of Project Specific Noise Levels

The final process in determining the operational noise limits for the development, called the project specific noise levels, is to take the more stringent of either the Intrusiveness or Amenity Criteria that have been calculated.

Therefore, the appropriate noise limits for this development are both the amenity and intrusiveness noise levels.

Table 10 summarises the noise level criteria for Southern site boundary.

Table 10: Noise level criteria for Southern site boundary

Time of day	Intrusiveness Criteria, $L_{Aeq,15mins}$ dB	Amenity Criteria, $L_{Aeq,\ period}$ dB	Criteria selected, $L_{Aeq,\ period}$ dB
Day	52	41	41
Evening	54	41	41
Night	51	38	38

In this case the Intrusiveness Criteria is not considered to be applicable and therefore the Amenity Criteria has been taken for all periods.

5.0 NSW INTERIM CONSTRUCTION NOISE GUIDELINE

The NSW Interim Construction Noise Guideline (CNG) provides guidance for assessing noise associated with construction activities. The CNG sets out noise management levels above which there may be community reaction to construction noise. The management levels are applied during the standard hours of construction set out in the CNG, which are as follows:

- Monday to Friday 0700-1800hrs
- Saturday 0800-1300hrs

The noise management levels for residential receivers affected by construction noise are derived from the Rating Background Level (as determined by the requirements of the NSW INP) and adding 10dB, for construction that will take place during the recommended hours set out in the CNG. For construction taking place outside of the recommended standard hours, 5dB is added to the Rating Background Level (RBL) to determine the noise management level.

The construction noise management levels for the residential receivers affected by this development are provided in Table 11 below.

Table 11: Construction noise management levels for residential receivers

Day of week	Time period	RBL, L_{A90} dB	Management level, $L_{Aeq, 15mins}$ dB
Chandos Road - Residential			
Monday to Friday	0700-1800hrs	47	57
Saturday	0800-1300hrs	47	57

In applying the management level, the CNG requires that all feasible and reasonable work practices be employed. Where the management level is exceeded, all potentially impacted residents should be informed. The CNG also sets out that where noise levels exceed 75dBA at residential receivers, there will be a requirement for community consultation and negotiation.

6.0 NOISE MODELLING PROCEDURE

To predict the noise level from the proposed facility to the adjacent residential areas, the following items must be considered:

- The amount of noise being generated by the various noise sources, expressed in terms of the sound power level
- The distance between the sources and receivers
- The presence of obstacles such as hills, buildings, screens or barriers in the propagation path
- The hardness of the ground between the source and receiver
- Absorption of sound by the air over long distances
- Meteorological influences such as wind or temperature gradients.

A 3-dimensional computer model has been created in the environmental noise emission modelling program, *SoundPlan V7.2*, which utilises the methodology defined in International Standard *ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*.

With regard to calculation conditions, ISO 9613 states that:

"The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions favourable to propagation from sources of known sound emission."

The conditions used by the standard that are favourable to sound propagation are as follows:

- wind blowing from source to receiver within an angle of ±45° of the direction connecting the dominant sound source to the specified receiver region
- wind speed between 1m/s and 5m/s.

This environmental noise prediction method is an internationally recognised standard that has been used extensively throughout Australia, New Zealand, and Europe since its publication in 1996. This model is considered to provide a suitable methodology for the purposes of predicting environmental noise levels from industry and other sources and has been adopted for this assessment.

6.1 Locations modelled

187-201 Chandos Road is considered to be the nearest residential location to the proposed facility. Therefore compliance with the INP noise limits is likely to be driven by the predicted noise levels at this location and it is considered that compliance at the nearest affected receiver implies compliance at other receiver locations.

6.2 Receptor location

With regard to receptor locations in the noise model, page 14 of the INP states the following:

"This is to be assessed at the most-affected point on or within the residential property boundary - or, if that is more than 30m from the residence, at the most-affected point within 30m of the residence."

The distance between the nearest boundary fence of 187-201 Chandos Road and the dwelling itself is less than 30m. Therefore the receptor location in the noise model has been placed at the nearest point on the fence line at a distance of approximately 30m from the façade of the dwelling. The noise modelling location is illustrated in Figure 6.

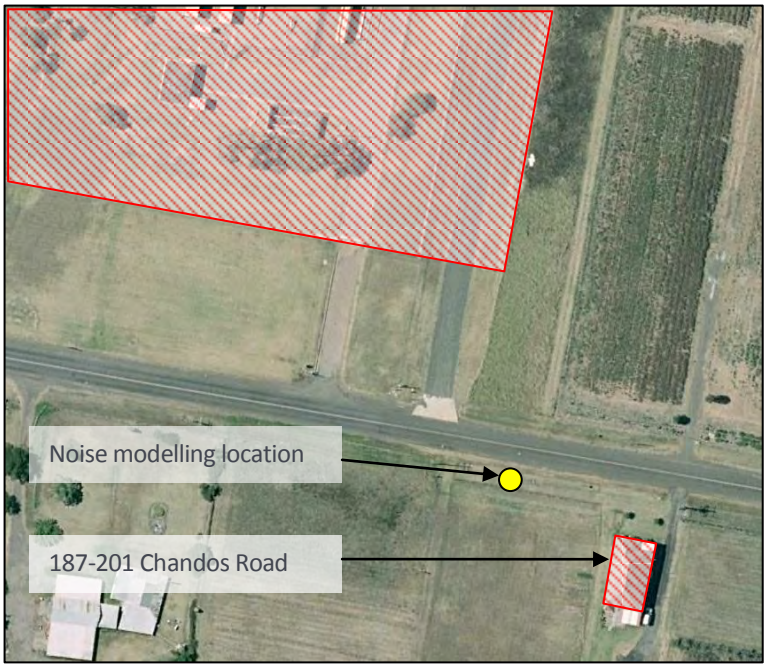


Figure 6: Noise modelling location

6.3 Noise level data sources

Table A1 of Australian Standard 2436 – 2010 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*" presents single figure sound power levels for some typical equipment items.

This data is sourced from octave band noise level data given in Tables C.1 – C.11 of BS 5228-1:2009 "*Code of practice for noise and vibration control on construction and open sites – Part 1: noise*".

The proposed facility will operate during the night-time period and as such it is considered that the frequency content of the noise sources on site is an important component of the assessment. Furthermore, the design of noise mitigation measures will be highly dependent on the frequency content of the noise received at the nearest noise sensitive receptor.

6.4 Operational noise sources

Input noise levels for the operation of the facility have been taken from BS 5228, information from past MDA projects and information held within our in-house noise database.

Anticipated overall noise levels for various equipment items were detailed in previous work undertaken by Jemena (Document No. GTS-563-RP-EV-001, dated 19 August 2014). The report was prepared for a similar site in NSW and the anticipated equipment for the Horsley site is understood to be comparable. Therefore octave band data taken from BS5228 and previous MDA projects has been adjusted to match the overall noise levels presented previously.

Overall input noise levels are presented in Table 12 and the octave band data is presented in Appendix E.

Table 12: Input Sound Power level data

Location	No(s)	Equipment	Source Reference	Activity L_w dB
Inside walled enclosure	1	Active PCV on APA PRS	MDA database (4257)	93
Inside building	1	Boiler	MDA database	91
Inside building	1	Water pump	BS 5228-1:2009 Table C.2:45	93

6.5 Construction noise sources

Input noise levels for the construction of the facility have been taken from BS 5228.

The extent of plant that is likely to be required for the construction of the facility was provided by Jemena.

Overall input noise levels are presented in Table 12 and the octave band data is presented in Appendix E.

Table 13: Input Sound Power level data

Activity	No(s)	Equipment	Source Reference	Activity L_w dB
Site excavation	2	Tracked excavator (20t)	BS 5228-1:2009 Table C.6:11	103
	1	Tipper lorry	BS 5228-1:2009 Table C.8:20	107
	1	Wheeled backhoe loader	BS 5228-1:2009 Table C.4:66	97
Concrete pours	1	Concrete mixer truck (discharging) & concrete pump (pumping)	BS 5228-1:2009 Table C.4:28	103
Site deliveries	1	Semi-trailer	BS 5228-1:2009 Table C.11:11	114
	1	Telescopic crane (10t)	BS 5228-1:2009 Table C.2:35	99
	1	Telescopic handler (4t)	BS 5228-1:2009 Table C.4:54	107

Table 13: Input Sound Power level data

Activity	No(s)	Equipment	Source Reference	Activity L_w dB
Mechanical installation	1	Mobile telescopic crane (100t)	BS 5228-1:2009 Table C.4:41	99
	1	Telescopic handler (4t)	BS 5228-1:2009 Table C.4:54	107
	1	Tracked excavator (20t)	BS 5228-1:2009 Table C.6:11	103
	1	Compressor	BS 5228-1:2009 Table C.3:19	103

6.6 Assumptions

The following assumptions have been made in the course of the noise modelling:

- Receptor heights have been set at 1.5m
- Building heights have been taken from aerial photographs
- Noise radiating from doors of buildings has been modelled as area sources
- The sound power level of the area sources has been derived from the sources detailed above in Table 12
- Buildings have been assumed to be of masonry construction with light-weight roofs
- External equipment has been modelled as point sources
- The sound power level of the point sources has been derived from the sources detailed above in Table 12

6.7 Building construction

Information provided by Jemena indicates that the majority of equipment to the proposed site will be housed within structures.

It is understood that the pressure reduction skid will be housed within a walled enclosure. The enclosure will not have a roof.

The building in which the boiler will be housed has been modelled based on the construction presented in Jemena drawing 552-CS-010_3 which shows a similar building on a previous project. The construction is summarised as follows:

- Masonry walls
- 2 layers of 9mm Villa board, 300mm air gap and 0.48mm BMT Trimdeck sheeting to the roof
- Two roller shutter doors to the north façade of the boiler house.

Calculations of the likely sound insulation performance of the above structure have been carried out using Insul and indicate that the structure is likely to provide a weighted sound insulation performance of 42dB R_w.

This performance is likely to be undermined, in the boiler house, by the presence of a pair of roller shutter doors. Previous MDA project data indicates that roller shutter doors can reliably provide a sound insulation performance of up to 13dB $R_{w.}$

Therefore it has been assumed that the roller shutters will be B&D Envir-a-shutters, or similar. MDA has tested these door sets in situ and found that they provide a sound insulation performance of up to 20dB $R_{w.}$ In particular these up rated roller door sets provide a higher performance at low frequency.

6.8 Summary of modelled activities - Operation

The noise modelling has assumed a worst case for the operation of the proposed facility over a 15 minute period, as follows:

- All duty equipment operating at full capacity
- All stand-by equipment operating at full capacity.

6.9 Summary of modelled activities – Construction

The noise modelling has assumed a worst case for the construction of the proposed facility over a 15 minute period, as follows:

- All specified equipment for an activity will operate simultaneously and at full capacity
- Each activity has been assumed to be carried out discretely and sequentially.

7.0 NOISE IMPACT ASSESSMENT

7.1 Operational noise

Predictions of the typical noise emission from the site have been calculated based on the assumptions outlined in Section 6.5 and are presented below in Table 14.

Table 14: Predicted operational noise levels – 187-201 Chandos Road

Activity	Predicted noise level, L_{Aeq} dB	INP noise limit			Compliance
		Day	Evening	Night	
Operation	29	41	31	38	✓

The predicted noise levels show that the proposed facility will be compliant with the applicable noise limit during all periods of the day.

7.2 Construction noise

Predictions of the typical noise emission from the site have been calculated based on the assumptions outlined in Section 6.5 and are presented below in Table 14.

Table 15: Predicted construction noise levels – 187-201 Chandos Road

Receiver	Predicted noise level, L_{Aeq} dB	Construction noise limit			Compliance
		Day	Evening	Night	
Site Excavation	43	56	N/a	N/a	✓
Concrete pours	39	56	N/a	N/a	✓
Deliveries	63	56	N/a	N/a	×
Mechanical Installation	47	56	N/a	N/a	✓

The predicted noise levels show that, with the exception of deliveries, construction of the proposed facility will be compliant with the applicable noise limit during all of the proposed activities.

8.0 CONCLUSION

Jemena Asset Management Pty Ltd has engaged Marshall Day Acoustics to investigate potential noise impacts due to the development of a gas metering facility within an existing site at Chandos Road in Horsley Park NSW.

A series of unattended noise monitoring surveys have been undertaken at residential dwellings in the vicinity of the facility and a proposed gas pipeline.

Two monitoring locations were selected, however there was significant uncertainty surrounding one of the locations, and the data taken for this position was therefore discarded.

Operational and construction noise limits have been calculated at four residential dwellings in the area.

The nearest residential dwelling to the proposed site is located at 187-201 Chandos Road. A noise model of the site has been created in order to predict noise levels from the construction and operational phases of the project.

Calculations have shown that, based on the construction assumptions detailed in Section 6.7, the operation of the facility can comply with the relevant INP noise limit during every period of the day.

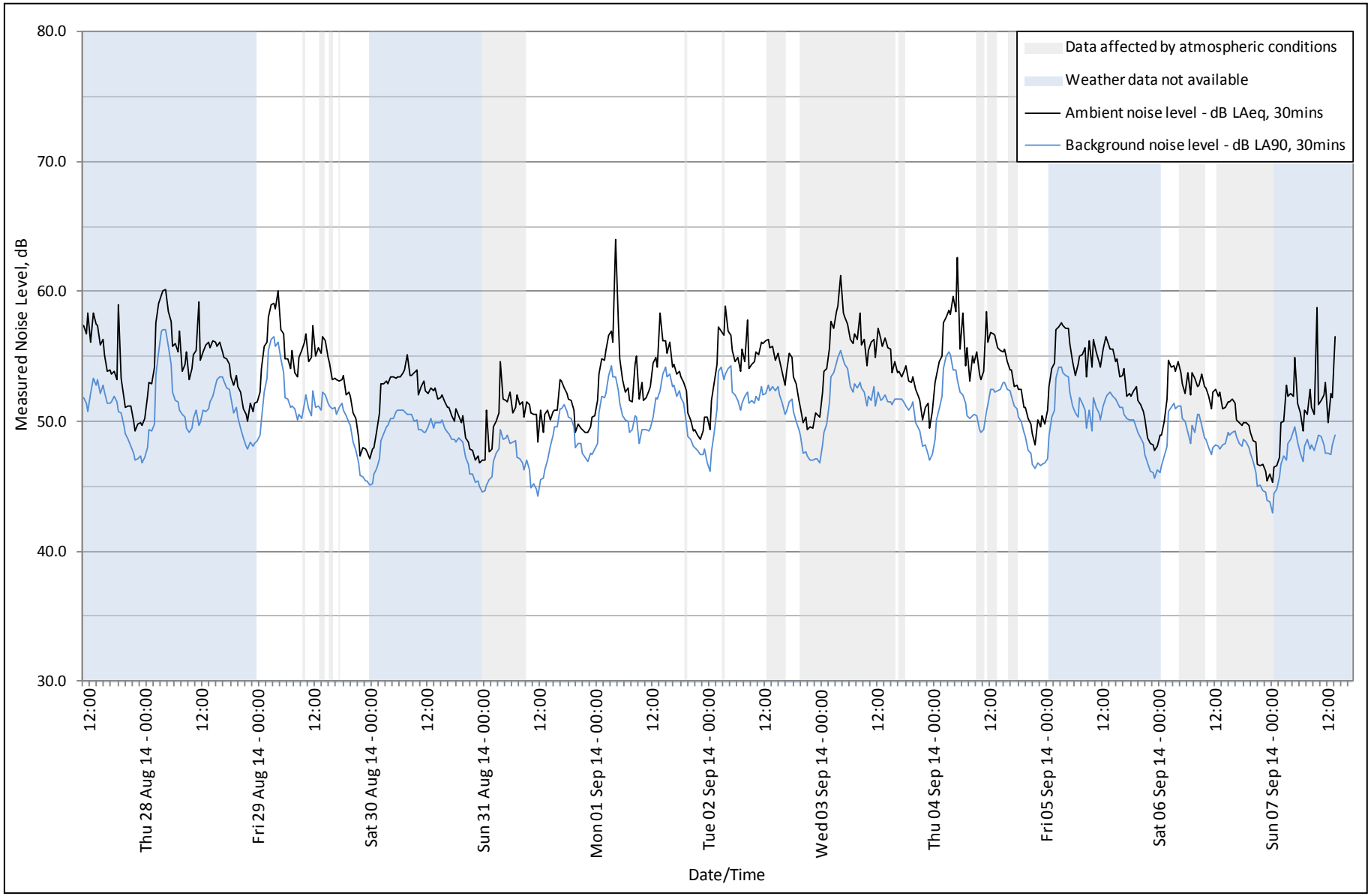
Further calculations have shown that the construction activities detailed in Section 6.5, with the exception of deliveries, can comply with the relevant noise limit.

APPENDIX A GLOSSARY OF TERMINOLOGY

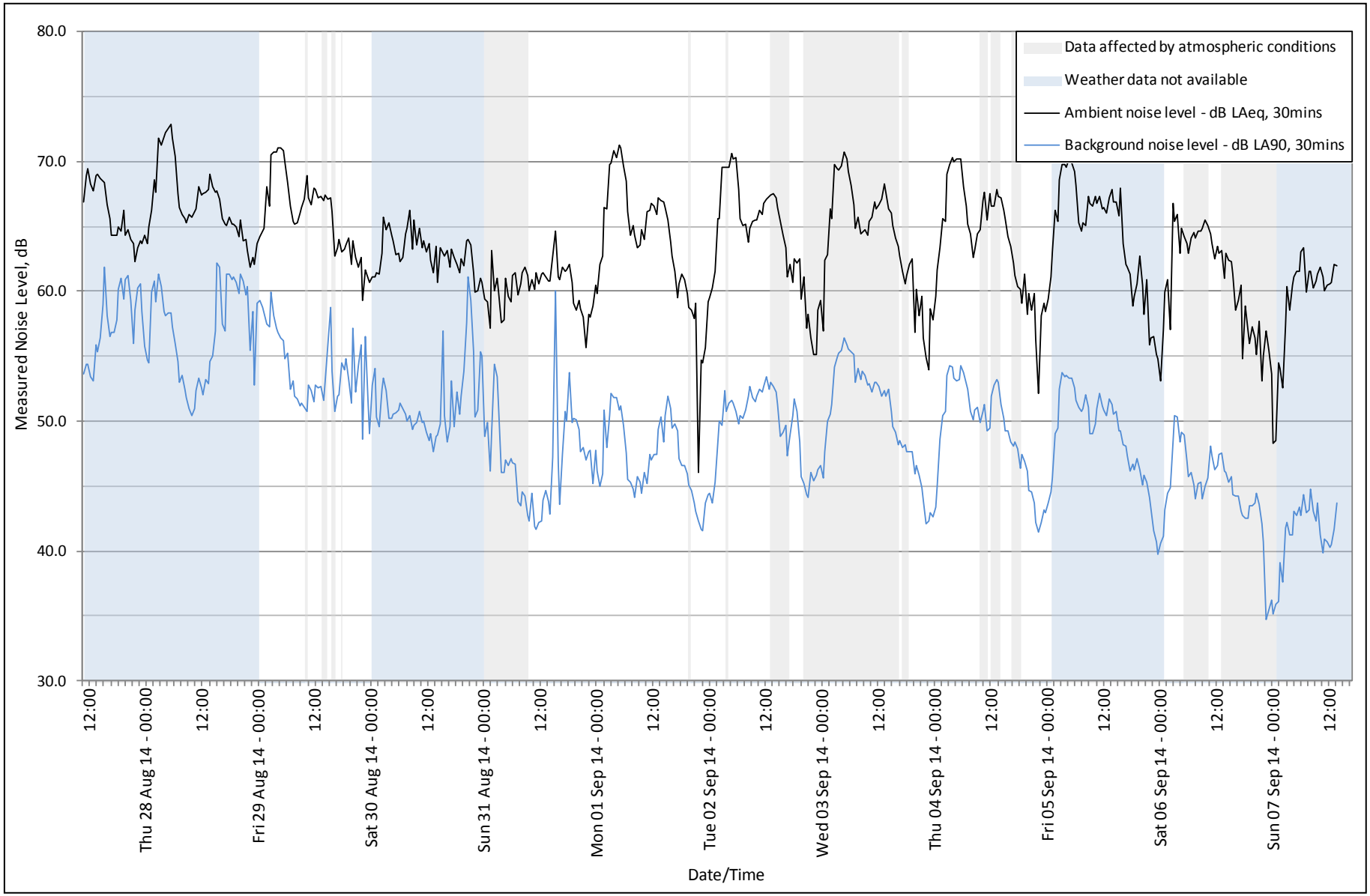
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
dB	Decibel The unit of sound level.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{Aeq}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{A90}	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source
Octave Band	A range of frequencies where the highest frequency included is twice the lowest frequency. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the audible range of sound.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.
R_w	Weighted Sound Reduction Index A single number rating of the sound insulation performance of a specific building element. Rw is measured in a laboratory. Rw is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.

APPENDIX B UNATTENDED NOISE MONITORING LOCATIONS

APPENDIX C UNATTENDED NOISE MONITORING RESULTS – SOUTHERN SITE BOUNDARY


Data affected by atmospheric conditions
Weather data not available
Ambient noise level - dB LAeq, 30mins
Background noise level - dB LA90, 30mins
Measured Noise Level, dB
80.0
70.0
60.0
50.0
40.0
30.0
12:00
Thu 28 Aug 14 - 00:00
Fri 29 Aug 14 - 00:00
Sat 30 Aug 14 - 00:00
Sun 31 Aug 14 - 00:00
Mon 01 Sep 14 - 00:00
Tue 02 Sep 14 - 00:00
Wed 03 Sep 14 - 00:00
Thu 04 Sep 14 - 00:00
Fri 05 Sep 14 - 00:00
Sat 06 Sep 14 - 00:00
Sun 07 Sep 14 - 00:00
Date/Time

APPENDIX D UNATTENDED NOISE MONITORING RESULTS – CHANDOS ROAD


Data affected by atmospheric conditions
Weather data not available
Ambient noise level - dB LAeq, 30mins
Background noise level - dB LA90, 30mins
Measured Noise Level, dB
80.0
70.0
60.0
50.0
40.0
30.0
12:00
Thu 28 Aug 14 - 00:00
Fri 29 Aug 14 - 00:00
Sat 30 Aug 14 - 00:00
Sun 31 Aug 14 - 00:00
Mon 01 Sep 14 - 00:00
Tue 02 Sep 14 - 00:00
Wed 03 Sep 14 - 00:00
Thu 04 Sep 14 - 00:00
Fri 05 Sep 14 - 00:00
Sat 06 Sep 14 - 00:00
Sun 07 Sep 14 - 00:00
Date/Time

APPENDIX E OCTAVE BAND INPUT NOISE DATA

Table H.1: Octave band input sound power level data - Operation

Category	Notes	Source	f63	f125	f250	f500	f1k	f2k	f4k	f8k	Calculated Lw dB
Active PCV on PRS		MDA database (4257)	-	83	81	86	85	87	86	86	93
Boiler	Data taken from Longford GCP	MDA database	91	91	92	90	82	81	81	79	91
Water pump		BS 5228-1:2009 Table C.2:45	101	96	90	90	89	84	81	69	93

Table H.2: Octave band input sound power level data – Construction

Activity	Equipment	Source	f63	f125	f250	f500	f1k	f2k	f4k	f8k	Calculated Lw dB
Site excavation	Tracked excavator (20t)	BS 5228-1:2009 Table C.6:11	110	112	103	97	97	95	90	85	103
	Tipper lorry	BS 5228-1:2009 Table C.8:20	116	110	102	102	102	101	98	95	107
	Wheeled backhoe loader	BS 5228-1:2009 Table C.4:66	100	91	95	95	91	90	84	78	97
Concrete pours	Concrete mixer truck (discharging) & concrete pump (pumping)	BS 5228-1:2009 Table C.4:28	107	108	101	100	97	96	87	81	103
Site deliveries	Lorry ж	BS 5228-1:2009 Table C.11:11	124	107	103	107	110	108	100	95	114
	Telescopic crane (10t)	BS 5228-1:2009 Table C.2:35	113	107	97	95	92	90	84	75	99
	Telescopic handler (4t)	BS 5228-1:2009 Table C.4:54	107	101	94	93	106	94	82	75	107
Mechanical installation	Mobile telescopic crane (100t)	BS 5228-1:2009 Table C.4:41	101	99	96	98	94	91	82	77	99
	Telescopic handler (4t)	BS 5228-1:2009 Table C.4:54	107	101	94	93	106	94	82	75	107
	Tracked excavator (20t)	BS 5228-1:2009 Table C.6:11	110	112	103	97	97	95	90	85	103
	Compressor	BS 5228-1:2009 Table C.3:19	103	99	93	98	99	97	90	85	103

APPENDIX 4 ARCHAEOLOGICAL ASSESSMENT – 2014 EIS

20 August 2014

John Fisher
Principal Consultant
EnviroPlan Pty Ltd
john.fisher@enviroplan.com.au

Dear John

Re: Due Diligence Advice for Aboriginal archaeological heritage for the Horsley Park Meter Station upgrade – FINAL
Our Ref: Matter # 18669

Jemena Limited (Jemena) proposes to upgrade to the existing natural gas facility at Horsley Park, New South Wales (the Horsley Park Meter Station). This letter documents Aboriginal heritage due diligence advice for the proposed works. It has been prepared under the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) and fulfils Jemena's due diligence obligations under this code. This assessment has been written by Samantha Gibbins and reviewed by Lyn O'Brien (Biosis Pty Ltd).

Project Area

The Horsley Park Meter Station is located at 194-202 Chandos Road, Horsley Park, on Lot 3 DP 1002746 (Figure 1). The Project Area encompasses the boundaries of the existing Horsley Park Meter Station, as shown in Figure 2**,** and is located within the Fairfield Local Government Area (LGA). The Project Area falls under the State Environmental Planning Policy (Western Sydney Parklands) 2009.

Project Background and Proposed Impacts

The Horsley Park Meter Station was constructed in 2000. Required upgrades include increasing the capacity of the facility through the installation of a new gas regulator, metering equipment, gas heating and filter equipment, and associated pipework. The State Environmental Planning Policy (State and Regional Development) 2011 is applicable and the proposed works will be assessed as State Significant Infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This letter report will form part of the supporting documentation for a Preliminary Environmental Impact Assessment as part of the approvals process.

Specifically, the proposal would include the following:

- Removal of the existing oil separator and associated pipework;
- Installation of two new gas filters;
- Installation of new gas heat exchangers;
- Installation of hot water heaters and associated building;

- Installation of a new gas metering unit;
- Installation of a new gas regulator and noise attenuating enclosure; and
- Associated above and belowground connecting pipework.

Disturbances to the ground surface would be undertaken in order to:

- Create trenches for belowground pipework;
- Create trenches for belowground service and telemetry conduits;
- Create concrete pad foundation for gas conveyance control equipment; and
- Create footings and foundations for plinths to support aboveground pipework.

Typical plant and equipment required to carry out the proposal includes, but is not limited to, excavators, back hoes, skid loaders, delivery trucks, dump trucks, mobile cranes, concrete trucks and concrete pumps.

Project Objectives

The following is the summary of the major objectives of the due diligence investigation:

- Identify Aboriginal objects and Places known to exist within the Project Area through a search of the Aboriginal Heritage Information Management System (AHIMS) register, maintained by the Office of Environment and Heritage (OEH);
- Consult with the Deerubbin Local Aboriginal Land Council (LALC);
- Undertake a field inspection to relocate any previously recorded sites and to assess previous disturbance and the potential for Aboriginal heritage to be present;
- Record and assess sites identified during the field inspection in compliance with the guidelines issued by the OEH;
- Identify potential impacts to all identified Aboriginal sites and Places based on potential ground disturbance from the works; and
- Make recommendations to minimise or mitigate potential impacts to cultural heritage values within the Project area.

Legislation

The investigation has been carried out under the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010). The code sets out steps which individuals and organisations need to take to determine if:

- Aboriginal objects are, or are likely to be present in the area; and
- The proposed activity will harm Aboriginal objects.

If it is determined through the due diligence assessment that Aboriginal objects are present, or are likely to be present, and the proposed activity will harm Aboriginal objects, the code specifies that:

- Further investigation and consultation under the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) and the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010) is required; and

- An Aboriginal Heritage Impact Permit (AHIP) application is also required if Aboriginal objects or Places are present and will be harmed.

Investigation Methodology & Results

Community Consultation

Consultation with the Aboriginal community is not a formal requirement of the Due Diligence process, however it is recognised in NSW that Aboriginal people are the primary determinants of the significance of their cultural heritage. A landscape may hold intangible values that can be assessed only by the Aboriginal community.

The Project Area falls within the boundaries of the Deerubbin LALC. Steve Randall, Site Officer at Deerubbin LALC, attended the field inspection on 4 August 2014. The draft report was sent to Deerubbin LALC for comment on 19 August 2014. Deerubbin LALC advised Biosis that they have no objections to the proposed upgrade of the Horsley Park Meter Station on the grounds of Aboriginal cultural heritage (a copy of their report is attached at Appendix 2). A copy of this final report will be provided to Deerubbin LALC for their records.

AHIMS Search

The OEH maintains a database of Aboriginal sites within NSW under Part 6 of the NSW *National Parks and Wildlife Act 1974*. Aboriginal objects and places in NSW are legally required to be registered on the AHIMS register.

A search of the OEH AHIMS register was conducted on 1 August 2014 (Client Service ID 143393). The search identified six previously recorded Aboriginal archaeological sites within the vicinity of the Project Area. Details of these sites are provided in Table 1 and their locations are shown in Figure 2 (site 45-5-2567) and Figure 3. These figures contain sensitive cultural information and should not be made public.

Table 1: AHIMS sites present within the vicinity of the Project Area.

AHIMS Site No.	Site Name	Site Features
45-5-2567	DLC1	Artefact (Open Camp Site)
45-5-0866	TPP 1; Prospect Reservoir	Artefact (Open Camp Site)
45-5-0745	WDD 6	Artefact (Open Camp Site)
45-5-2796	WSO-IF-2	Artefact (Isolated Find)
45-5-3082	Horsley Dr PAD	Potential Archaeological Deposit (PAD)
45-5-3624	EC132KV4	Artefact (Open Camp Site)

The predominant site types registered in the search area are Artefact scatters (n=5). One instance of PAD has also been recorded. No previously recorded sites are located within the Project Area.

Site 45-5-2567 is an artefact scatter that is located 20-30 metres to the west of the western boundary of the Project Area (Figure 2). The site was recorded in 1999 during a survey of the proposed Eastern Gas Pipeline Route. As recorded on the site card, the site comprised two silcrete artefacts (one flake and one core) located on a vehicle track in a heavily disturbed market garden area. It was determined to be unlikely that other archaeological material was present due to the high level of disturbance. It is noted on the site card that Consent to Destroy with salvage was applied for; however, the site is currently recorded on the AHIMS

register with a status of 'valid'. A copy of site card 45-5-2567 is attached to this report. This site card contains sensitive cultural information and should not be made public.

No other previously recorded sites are located within the immediate vicinity of the Project Area. The next nearest site (45-5-3624) is an artefact scatter that is located approximately 900 metres to the east of the Project Area.

Field Inspection

An inspection of the Project Area was undertaken on 4 August 2014, attended by Samantha Gibbins (Biosis) and Steve Randall (Deerubbin LALC). John Fisher (EnviroPlan) also attended the field inspection and provided information about the proposed works.

The objectives of the field inspection were to:

- Assess the previous disturbance to the Project Area;
- Assess the potential of the Project Area to possess intact Aboriginal heritage; and
- Locate any Aboriginal objects or Places present within the Project Area.

Results of the site survey

Survey Coverage and Visibility

The accessible sections of the Project Area were surveyed. Ground surface visibility was generally very low due to dense grass cover and the presence of paved surfaces, buildings and meter station infrastructure (Plate 1 and Plate 2). Odd exposures were evident around the bases of trees and along fencelines, and these were all inspected.

Plate 1: Dense grass cover through the Project Area, restricting ground surface visibility. View to west.

Plate 2: Paved surfaces, buildings and infrastructure within the Project Area. View to SW.

Landform

The Project Area is located on a very gently undulating creek flat, approximately 70 metres to the east of Eastern Creek. The land slopes very gently downwards from south to north, and also westwards towards the creek.

Sites Located

No Aboriginal objects were located within the Project Area.

Disturbance

The entire Project Area has been highly disturbed through the installation of the existing gas meter station and associated infrastructure, including buildings; paved roads and surfaces; fences; and underground pipelines and cables (Plate 3 and Plate 4). It is evident that extensive excavation and earth movement has taken place across the whole area, with the main facility located on a levelled artificial terrace (Plate 5 and Plate 6). The original vegetation has been completely cleared from within the Project Area.

Plate 3: Buildings and paved roads within the Project Area. View to south.

Plate 4: Underground cables and pipelines within the Project Area. View to west.

Plate 5: Previous excavation and earth movement within the Project Area (south-west corner). View to NW.

Plate 6: Main facility within the Project Area located on a levelled artificial terrace. View to SE.

Archaeological Potential

The proposed works are located in an area of generally high potential for Aboriginal sites, less than 100 metres from Eastern Creek. A previously recorded Aboriginal site (45-5-2567) is located 20-30 metres to the west of the western boundary of the Project Area. However, at the time of recording it was determined to be unlikely that other archaeological material was present due to the high level of disturbance. No Aboriginal objects were detected during the current field inspection. The current Project Area has been subject to high levels of ground surface disturbance through the installation of the existing gas meter

station and associated infrastructure. There is a correspondingly low potential for intact Aboriginal archaeology to be present within the Project Area.

Impact Assessment

- The proposed works will involve disturbances to the ground surface in order to create trenches for belowground pipework; create trenches for belowground service and telemetry conduits; create concrete pad foundations for gas conveyance control equipment; and create footings and foundations for plinths to support aboveground pipework.
- No known Aboriginal objects or Places will be impacted by the proposed works.
- The Project Area has been subject to high levels of disturbance through previous activity (see above discussion on disturbances).

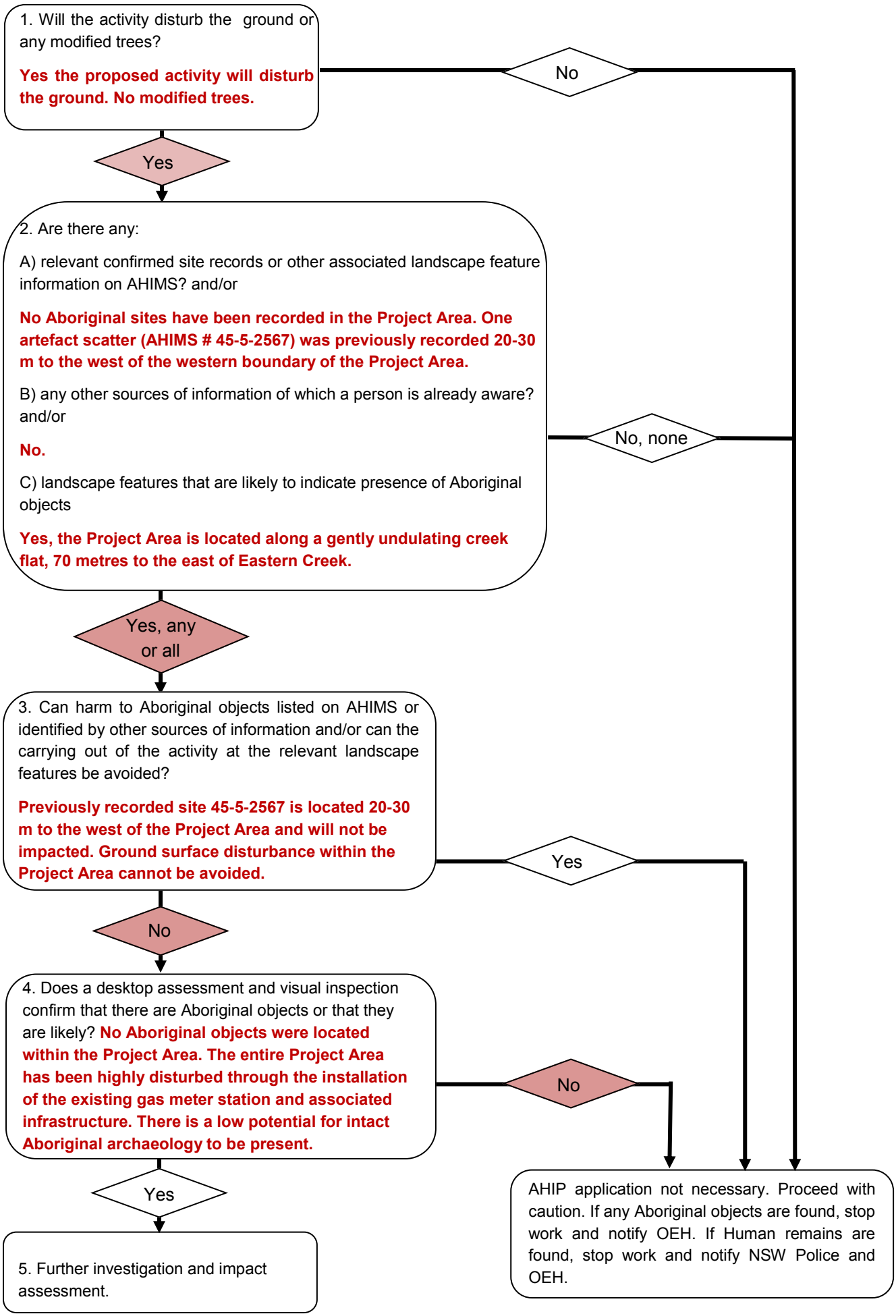
The Code provides a flowchart composed of six questions to identify the presence of, and potential harm to Aboriginal objects within the Project Area. These questions were applied to the investigation methodology (Chart 1).

Discussion

Although the Project Area is located in an area of generally high potential for Aboriginal sites, the high levels of previous ground surface disturbance mean that there is a low potential for intact Aboriginal archaeology to be present within the Project Area. No Aboriginal objects or areas of archaeological potential were identified within the Project Area.

Work can proceed with caution, with the understanding that all Aboriginal objects and Places are protected under the NSW *National Parks and Wildlife Act 1974*, even if in a disturbed or partially damaged state. If any Aboriginal objects are uncovered during any project activity, work must stop immediately and reference should be made to the recommendations listed below.

Chart 1: Due Diligence Process



Recommendations

Based on this investigation, it is recommended that:

Recommendation 1: Proposal to proceed without further archaeological input

The work described in this report can proceed without further assessment or approval from the NSW *National Parks and Wildlife Act 1974* as no Aboriginal objects or Places have been identified as occurring within the Project Area and the potential of locating them during the proposed works is assessed as low. This recommendation is conditional upon recommendations 2, 3, and 4.

Recommendation 2: Discovery of unanticipated Aboriginal cultural material

All Aboriginal Places and objects are protected under the NSW *National Parks and Wildlife Act 1974*. This protection extends to Aboriginal objects and Places that have not been identified but might be unearthed during construction. The following contingency plan describes the actions that must be taken in instances where Aboriginal cultural material is encountered. Any such discovery at the activity area must follow these steps:

1. **Discovery:** Should unanticipated Aboriginal cultural material be identified during any works, works must cease in the vicinity of the find.
2. **Notification:** OEH must be notified of the find.
3. **Management:** In consultation with OEH, Deerubbin LALC and a qualified archaeologist, a management strategy should be developed to manage the identified Aboriginal cultural material. This may include the requirement to apply for an Aboriginal Heritage Impact Permit.
4. **Recording:** The find will be recorded in accordance with the requirements of the NSW *National Parks and Wildlife Act 1974* and OEH guidelines.

Recommendation 3: Discovery of Unanticipated Human Remains

The following contingency plan describes the actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the activity area must follow these steps:

1. **Discovery:** If suspected human remains are discovered all activity in the vicinity of the human remains must stop to ensure minimal damage is caused to the remains. The remains must be left in place and protected from harm or damage.
2. **Notification:** Once suspected human skeletal remains have been found, the Coroners Office and the NSW Police must be notified immediately. Following this, the find must be reported to OEH and it is recommended that it is also reported to Deerubbin LALC.
3. **Management:** If the human remains are of Aboriginal ancestral origin an appropriate management strategy will be developed in consultation with Aboriginal Stakeholders and OEH.
4. **Recording:** The find will be recorded in accordance with the requirements of the NSW *National Parks and Wildlife Act 1974* and OEH guidelines.

Recommendation 4: Report to Deerubbin Local Aboriginal Land Council

A copy of this final report should be distributed to Deerubbin LALC for their records.

Please contact me on (02) 9101 8707 if you require further information.

Yours sincerely,

Samantha Gibbins

Consultant Archaeologist

Appendices

Appendix 1: Figures

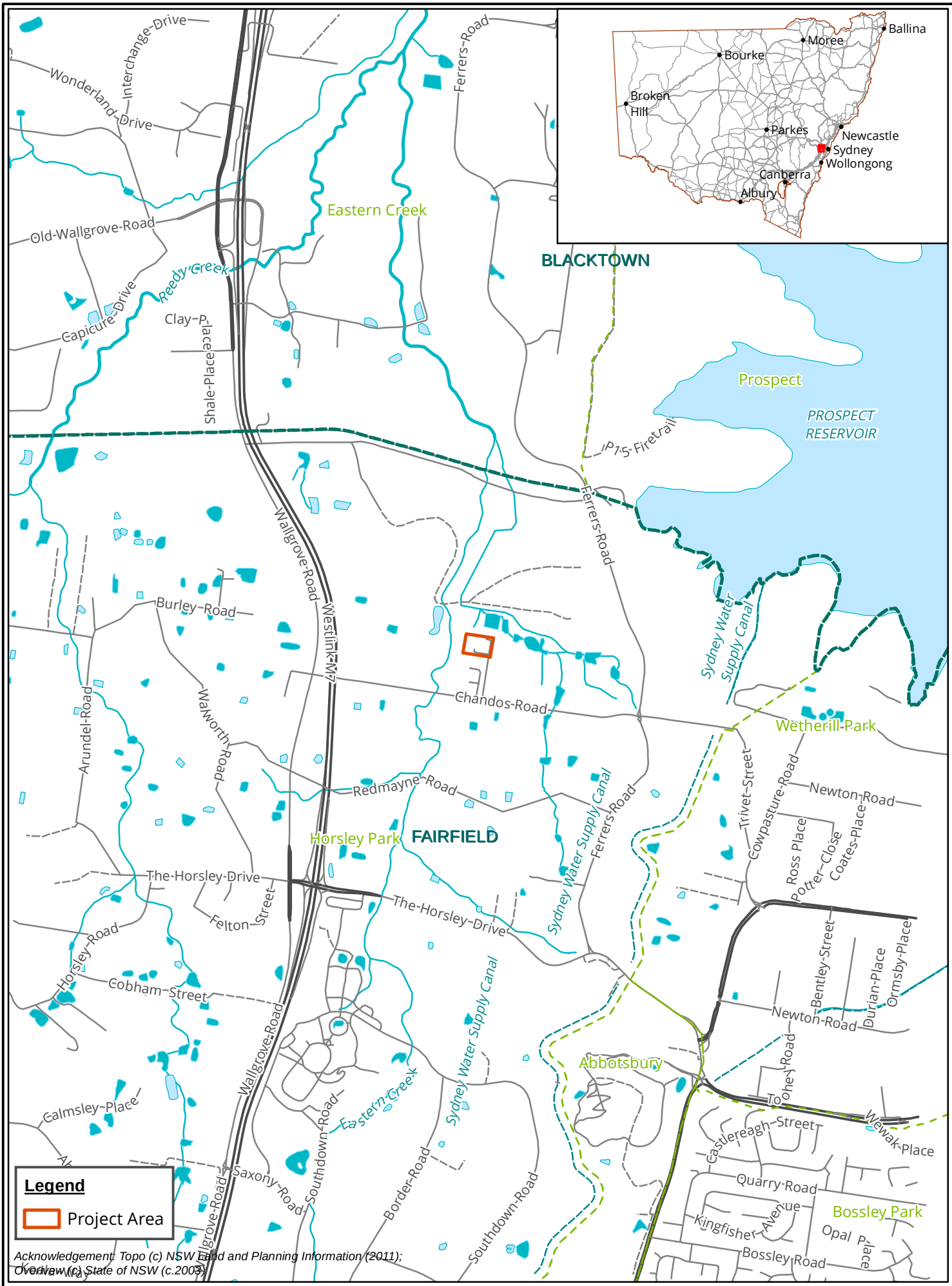


Figure 1: Location of the Project Area – New South Wales

Matter: 18669
Date: 12 August 2014,
Checked by: SJG, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18669\Mapping\

Scale 1:25,000 @ A4, GDA 1994 MGA Zone 56

Biosis Pty Ltd
Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Legend

- Project Area
- AHIMS sites

Figure 2: Project Area Detail

0 10 20 30 40 50

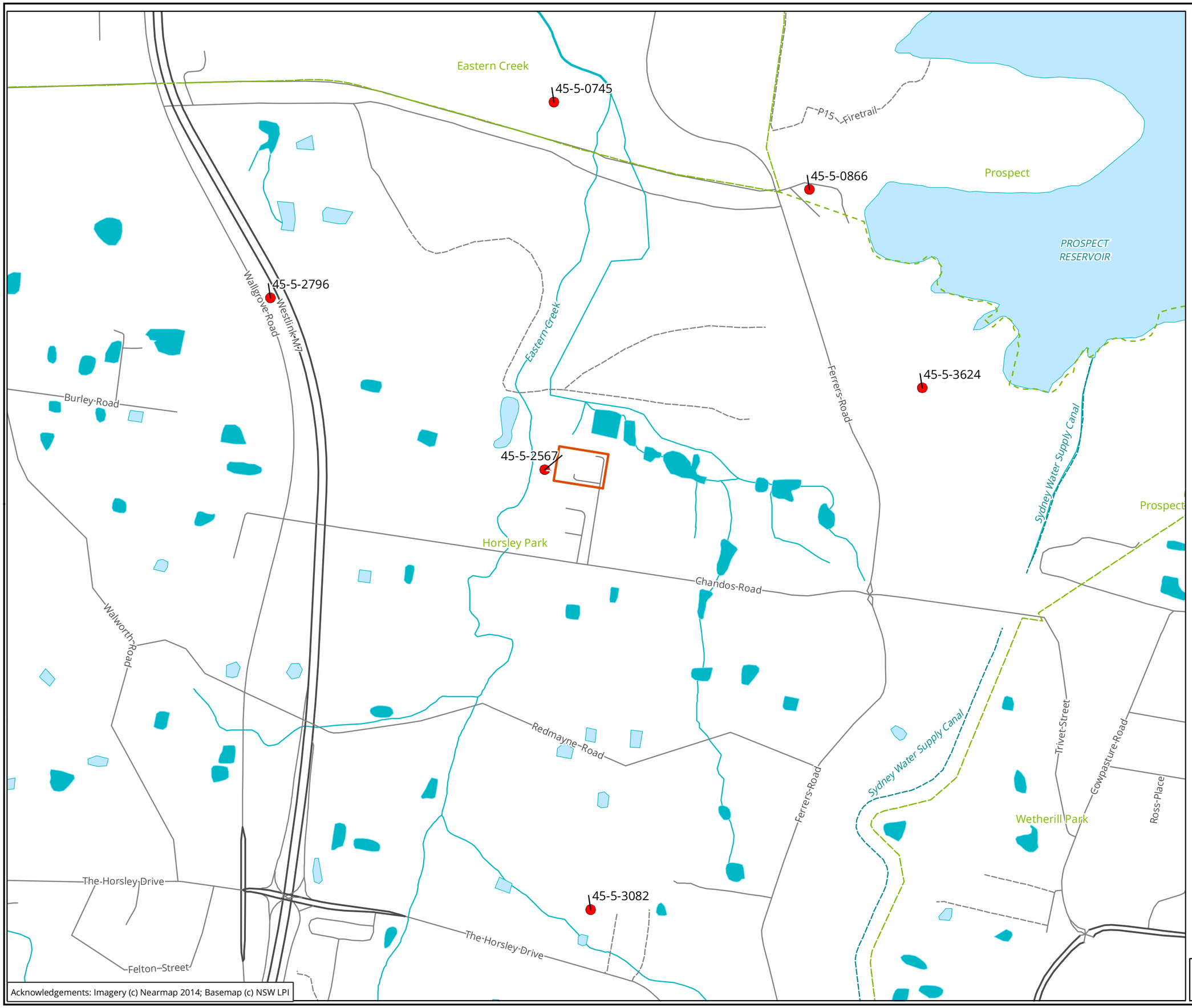
Metres
Scale: 1:1,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56

N

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 18669
Date: 12 August 2014,
Checked by: SJG, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18669\Mapping
18669_F2_ProjectArea



Legend

- Project Area
- AHIMS sites

Figure 3: AHIMS Records near the Project Area

0 100 200 300 400 500

Metres
Scale: 1:10,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56

N

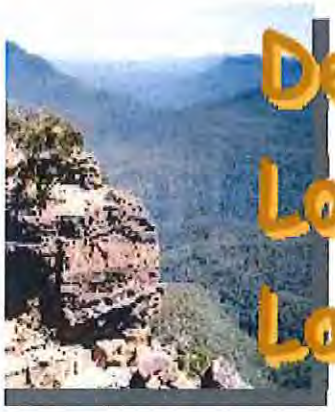
biosis

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Matter: 18669
Date: 12 August 2014,
Checked by: SJG, Drawn by: JMS, Last edited by: jshepherd
Location:P:\18600s\18669\Mapping
18669_F3_AHIMS

Appendix 2: Aboriginal Consultation Documentation



Deerubbin Local Aboriginal Land Council

Level 1, Suite3
291-295 High Street
PENRITH NSW 2750

PO Box 40
Penrith BC
NSW 2751 AUSTRALIA

ABN: 41 303 129 586
T: (02) 4724 5600
F: (02) 4722 9713
E: reception@deerubbin.org.au
W: http://www.deerubbin.org.au

EnviroPlan Pty Ltd

C/- Biosis Pty Ltd

Unit 14, 17-27 Power Avenue

ALEXANDRIA NSW 2015

Our Ref: 2463

Your Ref: Matter # 18669

19 August 2014

PROTECTION OF ABORIGINAL CULTURAL HERITAGE

Horsley Park Meter Station Upgrade

194-202 Chandos Road, Horsley Park

Attention: Samantha Gibbins,

A representative of Deerubbin Local Aboriginal Land Council inspected the proposed upgrade of Gas Meter Station, Horsley Park on 4 August 2014. An Aboriginal cultural heritage assessment was undertaken to evaluate the likely impact the proposed development has on the cultural heritage of the land.

The station had been inspected in 1999 it has no intact soils then and no Aboriginal cultural material (in the form of stone artefacts, for example) were found during the inspection.

Deerubbin Local Aboriginal Land Council therefore has no objections to the proposed upgrade of the Horsley Park Meter Station on the grounds of Aboriginal cultural heritage.

Yours Faithfully,

S Randall

(Steven Randall

Aboriginal Cultural Heritage Officer)

C.c. Miranda Morton – Office of Environment & Heritage

Appendix 3: Site Card 45-5-2567

[x] New recording [ ] Additional Info

National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

45-5-2567

NPWS Code

1:250,000 map sheet: Sydney 14.5

AMG Grid reference 302194 mE 62543410 mN
Full reference - please include leading digits

Scale of map used for grid reference [x] 25K, 50K (preferred) [ ] 100K [ ] 250K
Please use largest scale available GPS

1:25K, 50K, 100K map name: Prospect

HEAD OFFICE USE ONLY:
NPWS Site no: 455-2567
Site types:
Accessioned by: Date:
Data entered by: [illegible] Date: 26/7(CD)

Owner/Manager: Department of Urban Affairs and Planning
Address: PO Box 404 Parramatta 2150

Site name: DLC1
Locality/property name: Prospect Reservoir
NPWS District: South Metro
Region: Central

Reason for investigation
Survey of proposed Eastern Gas Pipeline Route: Wilton to Horsley Park section.

Portion no: Lot 6, DP 408890
Parish: ?

Photos taken? Yes
How many attached?

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. (Draw diagram on separate sheet.)
Access to the site is via Chandos Road, off Walgrove Rd. Site is located on northern side of Chandos Road, 800m to east of Walgrove Rd junction. Site is located 100m north of road.

Other sites in locality? Yes
Are sites in NPWS Register? Yes
Site Types include: Artefact scatters, scarred trees, rockshelters with art + deposit.

Have artefacts been removed from site? No
By whom?
When?
Deposited where?

Is site important to local Aborigines? Deerubbin Local Aboriginal Land Council
Give contact(s) name(s) + address(es) Site Officer, Luke Hickey, PO Box V184, Mt Druitt Village NSW 2770
Contacted for this recording? Yes, Site officer conducted field inspection during which site was recorded.
(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report)
Report for this section of study to be produced by AASC (Australian Archaeological Survey Consultants) based on summary of results provided by Nicholson. Report on previous work on this section of the route - AASC 1998.

NPWS Report Catalogue #

Checklist: surface visibility, damage/disturbance/ threat to site

Condition of site: Two artefacts located in heavily disturbed market garden area. Found adjacent to existing AGL installation fence + in middle of vehicle track.

Recommendations for management & protection (attach separate sheet if necessary)
Recommended that site (2 artefacts) be salvaged. They were identified in middle of access to Horsley Park proposed gas meter station. Unlikely that other material remains due to disturbance - Consent to Destroy with salvage applied for.

Site recorded by: Annie Nicholson
Date: 8/10/99
Address/institution: PO Box 1773, Port Lincoln 5606 SA

X

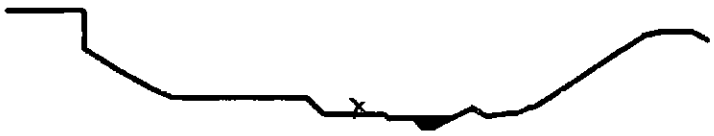
SITE POSITION & ENVIRONMENT

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach / hill slope / ridge top, etc:

b. site aspect: — c. slope: —

d. mark on diagram provided *or* on your own sketch the position of the site:



e. Describe briefly:

On flats south of Prospect Reservoir, 80m from creekline on track in market garden area.

f. Local rock type: shale

g. Land use/effect: market garden

2. Distance from drinking water: 80m Source: creek

3. Resource Zone associated with site (estuarine, riverine, forest etc): estuarine

4. Vegetation: wooded

5. Edible plants noted: —

6. Faunal resources (include shellfish): —

7. Other exploitable resources (river pebbles, ochre, etc): —

Site type: Artefact scatter

DESCRIPTION OF SITE & CONTENTS.

Note state of preservation of site & contents. Do **NOT** dig, disturb, damage site or contents.

Pink silcrete unmodified flake 14 × 18 × 4mm

Red silcrete core 14 × 20 × 18mm

CHECKLIST TO HELP:
length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock.

DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types.

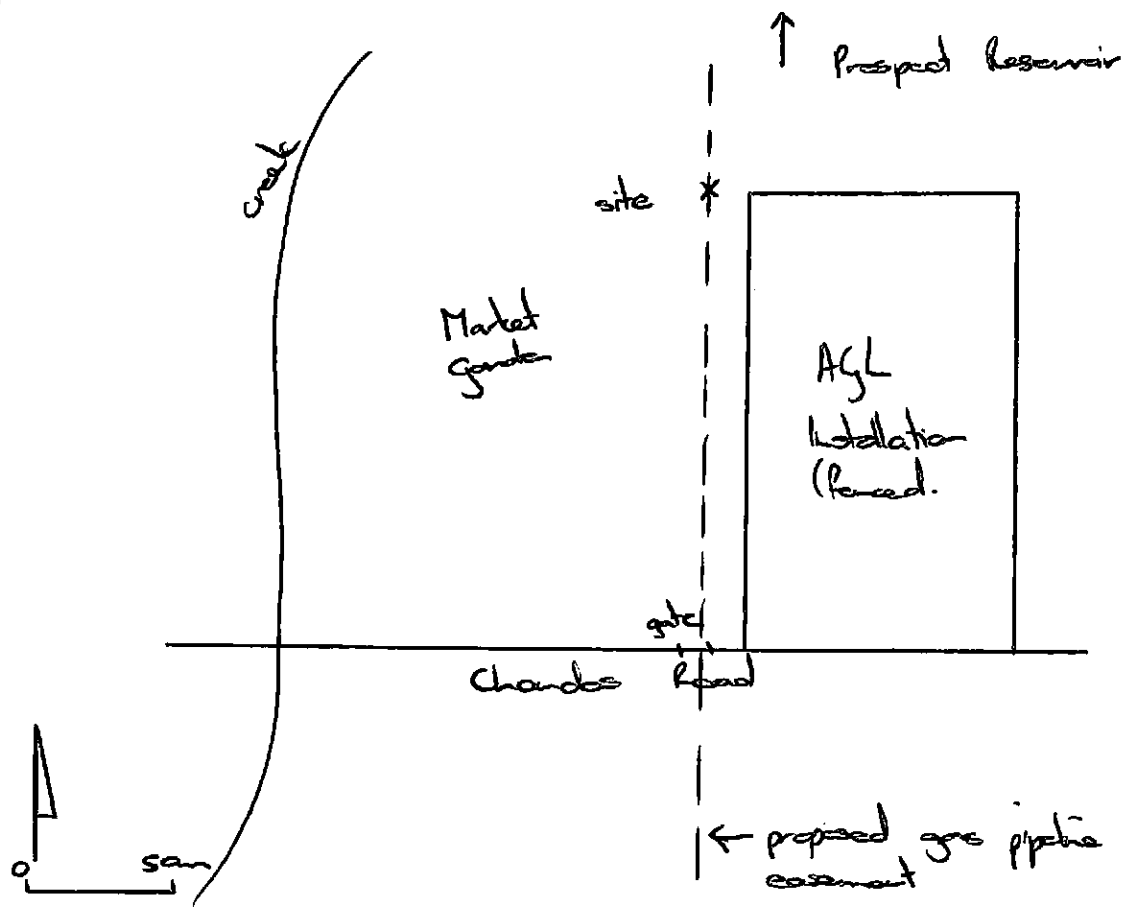
ART: area of surface decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.

BURIALS: number & condition of bone, position, age, sex, associated artefacts.

TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth.

QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.

OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, ma mas), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate



Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.

Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

APPENDIX 5 SUMMARY INFORMATION FOR SEPP 33 RISK SCREENING

WSGGT Facility Chemical Requirements

Name and Description	UN Number	Class	Subsidiary Risk	Packing Group	Application	Quantity	Pressure	Storage Conditions	Above or Below Ground	Distance from Facility Boundary	Weekly/Annual Deliveries and Quantities
Ethylene Glycol	-	Not classified under ADG Code	-	-	Coolant in electrolyser cooling system	200L	<1 MPa	Closed loop cooling system. Typical materials are steel and aluminium.	Above	30m	Approximately 2 deliveries of <500L annually
Nitrogen, Compressed	1066	2.2	-	-	Purging of the electrolyser when internal pressure is below 15 kPa	$3.6m^2$	16.3 MPa	Cylinders used for storage of compressed gases are manufactured in accordance with relevant Australian specifications.	Above	30m	-
Oxygen, Compressed	1072	2.2	5.1	-	By-product as part of the hydrogen production process	180kg per hour	~3 MPa	Vented to the atmosphere after separation from hydrogen	Above	30m	-
Demineralised Water	-	-	-	-	Feedstock for electrolysis	~20L per 1kg of H_2	.25 MPa	Mains water is fed through water treatment system on “as required” basis.	Above	30m	-
Hydrogen, Compressed	1049	2.1	-	-	Injection into the network, refuelling facility or generators	100kg/ 20kg per hour	3 MPa	Underground Carbon Steel pipeline See 4.1.2 for details	Below	15m	-

Existing Facility Summary

The existing facility on the Horsley Park site transfers gas from the licenced (Licence 1) pipeline into the Jemena Gas Distribution network, transferring around 18PJ of gas per year at a typical flow rate of 56,000 m^3/hr. Peak flow rates through the facility equate to just over 160,000m^3/hr or 100T/hr. This site is operated under Jemena's distribution licence, and in accordance with Jemena's Safety and Operating Plan (SAOP). Gas pressures on site range from 1MPa to a maximum of 7MPa. No other substances are utilised or stored on site.

Current site operations produce negligible volumes of waste, dust, or other emissions other than fugitive emissions, which are typically so low they cannot be measured through standard leak testing. Process gas temperature throughout the existing facility is always between 0 and 40 degrees Celsius.

There have been no reportable near misses or incidents at this site. There have been multiple major incidents globally associated with Natural Gas infrastructure; these are well documented. The most significant incident in Australia was the Longford gas explosion in 1998 resulting in two fatalities; this was an upstream processing facility, which is much more complex in operation to a distribution network, however learnings from this incident have been adopted into Jemena design and operational practices. The most significant threat to gas networks is damage from external parties carrying out un-authorised excavation activities near a pipeline. This risk is also very low on this site as only Jemena staff can access the compound. Jemena and its contractors will however, still follow the 'Dial Before You Dig' process prior to any construction work commencing.

Some small quantities of natural gas are vented or flared during pipe "pigging" activities, a process during which cleaning and measurement devices are run through the pipeline. Pigging only takes place once every ten years for each of the three licenced pipelines connected to the site, as well as during regulator overhauls which happens every five years across the ten operational regulators, but again only small volumes are released, typically less than 10m^3 per event. Routine maintenance, conducted every 6 months on five pressure reducing runs results in release of small volumes of Natural Gas, up to 2m^3 per run. Jemena has procedures in place to ensure these activities release the smallest volume of natural gas possible. Jemena's network has one of the lowest rates of fugitive emissions of all Australian gas networks.

All activities relating to the existing and future assets on the site will be covered under the Jemena SAOP, which in turn references additional procedures and practices followed.