Appendix E – Noise assessment

SITA Australia Pty Ltd

Lucas Heights Resource Recovery Park Project

Noise Assessment

August 2015

Executive summary

SITA Australia (SITA) is proposing a number of activities at the Lucas Heights Resource Recovery Park in Lucas Heights. This report has been prepared by GHD Pty Ltd to provide an assessment of noise impacts associated with this proposal as an input to the environmental impact statement.

Background noise levels were provided by SITA. Additional background measurements were undertaken at two locations by GHD. The background measurements were used to derive operational and construction noise criteria for the proposal.

Attended noise monitoring was undertaken by GHD to quantify existing noise sources on the site. Noise modelling was undertaken in Cadna-A for the construction and operation of the proposal.

The predicted operational noise levels at all surrounding residential sensitive receivers are below the recommended maximum operational noise criteria. Therefore there is not expected to be any significant operational noise impact associated with the proposal.

The additional traffic generation is predicted to increase road traffic noise emission levels by less than 2 dB(A). Therefore, road traffic noise levels are predicted to comply with the noise criteria at sensitive receivers along the traffic routes.

Construction activities are predicted to comply with the construction noise management levels at all residential and sensitive receivers during standard recommended hours. Since construction works are anticipated to occur during standard construction hours, no construction mitigation measures are considered necessary.

The proposal should be acceptable from an acoustic perspective.

This report addresses the Secretary's Environmental Assessment requirements and concludes that the proposal would meet the following objectives:

- No significant impact on the community or environment
- Prevent the degradation of local amenity
- Prevent noise pollution.

Table of contents

Executive summary i

1. Introduction 1
   - 1.1 Purpose of this report 1
   - 1.2 Objectives 1
   - 1.3 Proposal overview 1
   - 1.4 Definitions 5
   - 1.5 Location of the proposal 5
   - 1.6 Secretary's Environmental Assessment Requirements and agency requirements 9
   - 1.7 Scope and structure of the report 9
2. Existing environment 11
   - 2.1 Location and surrounding existing and proposed land uses 11
   - 2.2 Sensitive receivers 11
   - 2.1 Noise monitoring 12
3. Noise criteria 16
   - 3.1 Construction noise criteria 16
   - 3.2 Operational noise criteria 18
   - 3.3 Traffic noise criteria 21
4. Construction noise impact assessment 22
   - 4.1 Construction schedule and methodology 22
   - 4.2 Construction assessment methodology 22
   - 4.3 Predicted construction noise levels 23
   - 4.1 Construction vibration 24
5. Operational noise impact assessment 25
   - 5.1 Operational activities 25
   - 5.2 Noise modelling assumptions 26
   - 5.3 Noise modelling results 28
   - 5.4 Operational traffic noise assessment 32
6. Noise mitigation 33
7. Conclusion 34
8. References 35
9. Limitations 36

Table index

Table 1.1 Secretary's Environmental Assessment Requirements and agency requirements 9

Table 2.1 Nearby sensitive receivers 12
Table 2.2 Summary of measured noise levels, dB(A) 12
Table 2.3 Attended noise monitoring summary 14
Table 3.1 Construction noise management levels at sensitive land uses 16
Table 3.2 Construction noise management levels at residences 17
Table 3.3 Project construction noise management levels, dB(A) 18
Table 3.4 INP modifying factor adjustments 19
Table 3.5 Project operational noise criteria 21
Table 3.6 Traffic Noise Target Levels, $L_{Aeq(period)}$, dB(A) 21
Table 4.1 Construction equipment sound power levels, dB(A) 23
Table 4.2 Predicted construction noise levels at surrounding receivers, dB(A) 24
Table 5.1 Proposed site operational hours 25
Table 5.2 Noise model parameters 26
Table 5.3 Equipment in Landfill Area 27
Table 5.4 Equipment in ARRT facility area 27
Table 5.5 Equipment in GO facility area 28
Table 5.6 Predicted operational noise levels 28
Table 5.7 Existing traffic volumes 32
Table 5.8 Estimated traffic from LHRRP in 2027* 32

Figure index

Figure 1.1 Key existing infrastructure and proposed facilities layout 3
Figure 1.2 Proposed parkland master plan 4
Figure 1.3 The proposal site 7
Figure 1.4 Surrounding land uses 8
Figure 2.1 Noise sensitive receivers and background noise monitoring locations 13
Figure 2.2 Attended noise monitoring locations 15
Figure 5.1 Predicted LHRRP night-time operational noise levels – current landform 29
Figure 5.2 Predicted LHRRP night-time operational noise levels – future landform (northern area profiling works) 30
Figure 5.3 Predicted LHRRP night-time operational noise levels – future landform (southern area profiling works) 31

Appendices

Appendix A – Background monitoring charts

Glossary

Term	Definition
ANSTO	Australian Nuclear Science and Technology Organisation
Ambient noise	The all-encompassing noise associated with a given environment.
ARRT facility	Advanced Resource Recovery Technology facility
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor.
EIS	Environmental Impact Statement
EPA	New South Wales Environment Protection Authority and any successor body.
EP&A Act	*Environmental Planning and Assessment Act 1979*
Currently approved landform	The currently approved landform heights and contours outlined in the 1999 EIS
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dB(A)	Decibel expressed with the frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at low and high frequencies.
DECC	Department of Environment and Climate Change NSW
DECCW	Department of Environment, Climate Change and Water NSW
EPA	Environment Protection Authority
Feasible and reasonable (Office of Environment and Heritage definition)	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: Noise mitigation benefits (amount of noise reduction provided, number of people protected). Cost of mitigation (cost of mitigation versus benefit provided). Community views (aesthetics impacts and community wishes). Noise level for affected land use (existing and future levels, and changes in noise levels).
GIS	Geographic Information Systems
GO facility	The Garden Organics facility at LHRRP, that undertakes composting of waste including green and garden waste, but excluding waste types such as food waste and biosolids
GLALC	Gandangara Local Aboriginal Land Council
Landform reprofiling	Proposed changes to currently approved landform at the LHRRP.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A90(period)}$	The sound pressure level exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.
LHRRP	Lucas Heights Resource Recovery Park
Mitigation	The application of techniques to reduce environmental impacts arising from the proposal
Noise sensitive receiver	An area or place potentially affected by noise which includes: • A residential dwelling • An educational institution, library, childcare centre or kindergarten • A hospital, surgery or other medical institution

Term	Definition
	• An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area • Commercial or industrial premises • A place of worship
OEMP	Operational Environment Management Plan and all relevant future documents, these will be provided for the landfill, GO and ARRT facilities and will detail how these projects can be managed to meet the environmental outcomes for the site
PCYC Mini-Bike Club	The mini-bike club operated by the Police and Community Youth Clubs NSW Limited (PCYC).
Rating background level	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. This is the level used for assessment purposes.
SSC	Sutherland Shire Council
SEAR	Secretary's Environmental Assessment Requirements (formerly known as Director-General's Requirements or DGRs)
SICTA	Sydney International Clay Target Association and any successor body
SITA	SembSITA Australia Pty Ltd (SembSITA) is the holding company for the SITA Australia (SITA) group of companies in Australia. SembSITA is the parent company of both SITA and WSN Environmental Solutions Pty Ltd (WSN). WSN owns part of the land on which the LHRRP is situated, and leases the remainder from ANSTO. SITA holds the environmental protection licence (EPL), and so is the operator of the facilities at LHRRP. For simplicity, the term 'SITA' is used to refer to all of these organisations in this report.

1. Introduction

1.1 Purpose of this report

SITA Australia (SITA)[1] is proposing a number of activities at the Lucas Heights Resource Recovery Park (LHRRP) in Lucas Heights (referred to in this report as 'the proposal'). This report has been prepared by GHD Pty Ltd on behalf of SITA to provide an assessment of noise impacts associated with the proposal as an input to the environmental impact statement. Due to the existing operational arrangements at LHRRP, Sutherland Shire Council (SSC) is a joint applicant for the proposal. SITA is the proponent of the proposal and the environmental impact statement is being prepared by GHD in accordance with the requirements of Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (the EP&A Act).

The report addresses the requirements of the Secretary of the NSW Department of Planning and Environment (the Secretary's Environmental Assessment Requirements (SEARs No SSD-6835) dated 3 February 2015.

In addition to addressing the SEARs requirements, this report provides an assessment of how well the design meets SITA's objectives of having no significant impacts on the community or environment. Environmental management and mitigation measures related to noise are proposed (where necessary) to mitigate potential impacts and ensure that they are managed in accordance with statutory requirements, regulations and community expectations.

1.2 Objectives

The following objectives have been identified:

- No significant impacts on the community or environment
- Prevent the degradation of local amenity
- Prevent noise pollution

1.3 Proposal overview

The LHRRP consists of approximately 205 hectares (ha) in two ownerships. 89 ha is owned by SITA and 116 ha owned by Australian Nuclear Science and Technology Organisation (ANSTO) and leased to SITA for waste management or other agreed purposes. The following activities are proposed at the LHRRP and are collectively referred to as 'the proposal'. The proposal would not have a significant impact on the community. In addition to the proposal detailed below, SITA are committed to better environmental outcomes by the application of best practice prevention, mitigation and rectification measures:

- **Reprofiling of existing landfill areas to provide up to 8.3 million cubic metres of additional landfill airspace capacity.** This is equivalent to approximately 8.3 million tonnes of waste, assuming 1 tonne of waste utilises 1 cubic metre of waste disposal airspace. As the process of reprofiling would include removal and replacement of capping material over previously landfilled waste and augmentation of gas and leachate collection systems, the environmental performance of the site would be ultimately

[1] SembSITA Australia Pty Ltd (SembSITA) is the holding company for the SITA Australia (SITA) group of companies in Australia. SembSITA is the parent company of both SITA and WSN Environmental Solutions Pty Ltd (WSN). WSN owns part of the land on which the LHRRP is situated, and leases the remainder from ANSTO. SITA holds the environmental protection licence (EPL), and so is the operator of the facilities at LHRRP. For simplicity, the term 'SITA' is used to refer to all of these organisations in this report.

improved by reducing the infiltration of stormwater into the landfill (resulting in reduced landfill leachate in the longer term) and increase the overall amount of landfill gas recovered from the site.

As part of the proposal, SITA is seeking permission to increase the approved quantity of waste landfilled at the site from 575,000 to 850,000 tonnes per year. This would enable the reprofiling of the site to be completed in 2037.

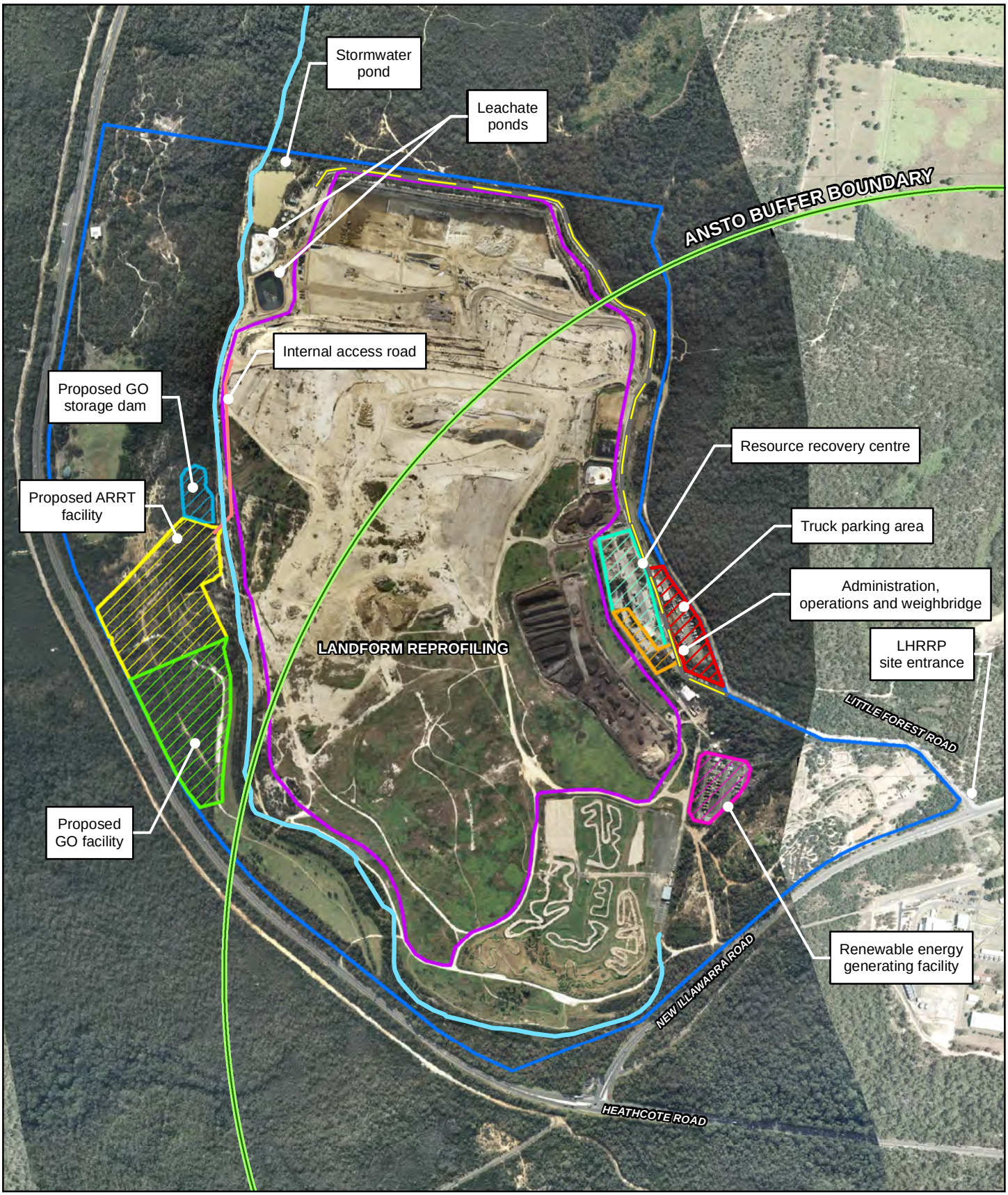
- **Relocation and expansion of the existing garden organics (GO) facility**. The existing garden organics facility would be relocated to the western side of the site adjacent to Heathcote Road. Approval is being sought to increase the approved capacity from 55,000 to 80,000 tonnes of green waste and garden waste received per year at the facility. The new facility would include the partial enclosure, active aeration and covering of the first four weeks of the active composting process, which coincides with the period of highest potential for odour generation, to enable more effective control of odour . Relocation of the facility would result in increased separation distances from the current nearest occupied land at ANSTO, existing residential areas and the proposed new residential area at West Menai.
- **Construction and operation of a fully enclosed advanced resource recovery technology (ARRT) facility**. The ARRT would be located on the western side of the site adjacent to the GO facility and would process and recover valuable resources from up to 200,000 tonnes of general solid waste per year, reducing the amount of waste disposed to landfill to approximately 60,000 tonnes per year. This would divert up to 140,000 tonnes of waste per year from landfill. SSC and other councils would have the opportunity to have their municipal waste processed by the ARRT facility.
- **Community parkland**. The landfill reprofiling would increase the area available for future passive recreation following site closure from 124 ha (existing approved parkland) to a total of 149 ha, an increase of approximately 25 ha. Landfilling would cease in 2037 after which time the site would be rehabilitated and converted to a community parkland, with capping and landscaping to be completed and the site made available for community use in 2039.

As part of the proposal SITA has committed to entering into an agreement with SCC in the form of a Voluntary Planning Agreement which includes ‘environmental undertakings’. In addition operational environmental management plans have been prepared for the landfill, GO facility, ARRT facility and post closure measures to manage potential environmental impacts, reflect regulatory requirements and provide guidance for site operators to undertake activities in an environmentally sound manner.

A Planning Proposal is being submitted in parallel with this State Significant Development Application. The Planning Proposal seeks to include new local provisions on the LHRRP site within the Sutherland Local Environmental Plan 2015 (SLEP), which would allow the proposal (a waste or resource management facility) to be undertaken on the proposal site.

The expansion of the LHRRP which is outlined in this EIS would permit the proposed future use of the land for recreational purposes, which is currently approved and would occur when the existing facility ceases operation in 2025. The proposal would however extend the timeframe for which the land would be unavailable for recreational purposes until 2037, due to the extension of operations at the proposed LHRRP.

These key components of the proposal are shown on Figure 1.1. The proposed final landform and preliminary masterplan for the parkland is shown in Figure 1.2.



LEGEND

- ANSTO buffer boundary
- Mill Creek
- Internal access road
- Existing access road
- Proposed GO facility
- Proposed ARRT facility
- Resource Recovery Centre
- Administration, operations and weighbridge
- Renewable energy generating facility
- Lucas Heights Resource Recovery Park boundary
- Landform reprofiling boundary
- Truck parking area

Paper Size A4

0 100 200 400

Metres

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

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GHD

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 28 May 2015

Key existing infrastructure and proposed facility layout

Figure 1.1

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z046_KeyProposedInfrastructure.mxd 15/133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:jrichardson

Paper Size A4

NOT TO SCALE

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Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 24 June 2015

Proposed parkland master plan **Figure 1.2**

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z058_Parkland_Master.mxd

Data source: Taylor Brammer Landscape Architects Pty Ltd. Created by:jrichardson

1.4 Definitions

The following terms are used within this report when referring to the proposal site and surrounding areas:

The 'LHRRP' refers to the entire Lucas Heights Resource Recovery Park. The boundary of the LHRRP is shown as the blue line on Figure 1.3.

The 'proposal site' refers to the areas where the activities described in Section 1.3 would be located. The boundary of the proposal site is shown as the red line on Figure 1.3.

1.5 Location of the proposal

1.5.1 Existing

The proposal would be located within the boundary of the existing LHRRP. The LHRRP is located within the Sutherland local government area, approximately 30 kilometres (km) south west of the Sydney city centre. The site is bound to the west by Heathcote Road and New Illawarra Road to the south.

Specifically, the proposal would be located on:

- Lot 101 DP 1009354
- Lot 3 DP 1032102
- Lot 2 DP 605077

It is noted that the proposal directly affects only a portion of each of these lots. There is minimal encroachment into the SICTA leased land (part of Lot 3 DP 1032102).

The proposal site, within the boundary of the LHRRP, is shown on Figure 1.4.

The site is currently accessed from Little Forest Road, off New Illawarra Road.

Current facilities at the LHRRP include:

- Landfill
- Resource recovery centre and waste collection point
- GO facility for processing garden organics
- Renewable energy production (operated by Energy Developments Ltd)
- Truck parking area
- Community use areas (mini bike area at the southern extent of the site run by the Sutherland Police Citizens Youth Club and the Sydney International Clay Target Association (SICTA) leased land on the north western side of the site)

There are also several ancillary buildings and structures (e.g. weighbridge, machinery workshop, administration offices, stormwater and leachate dams).

The following land uses are located in the immediate vicinity of the LHRRP:

- Bushland areas that form part of ANSTO's exclusion zone (to the east and south)
- ANSTO's facilities (to the east on the opposite side of New Illawarra Road)

Land uses in the surrounding area include:

- Holsworthy Military Reserve (to the west, northwest and southwest)

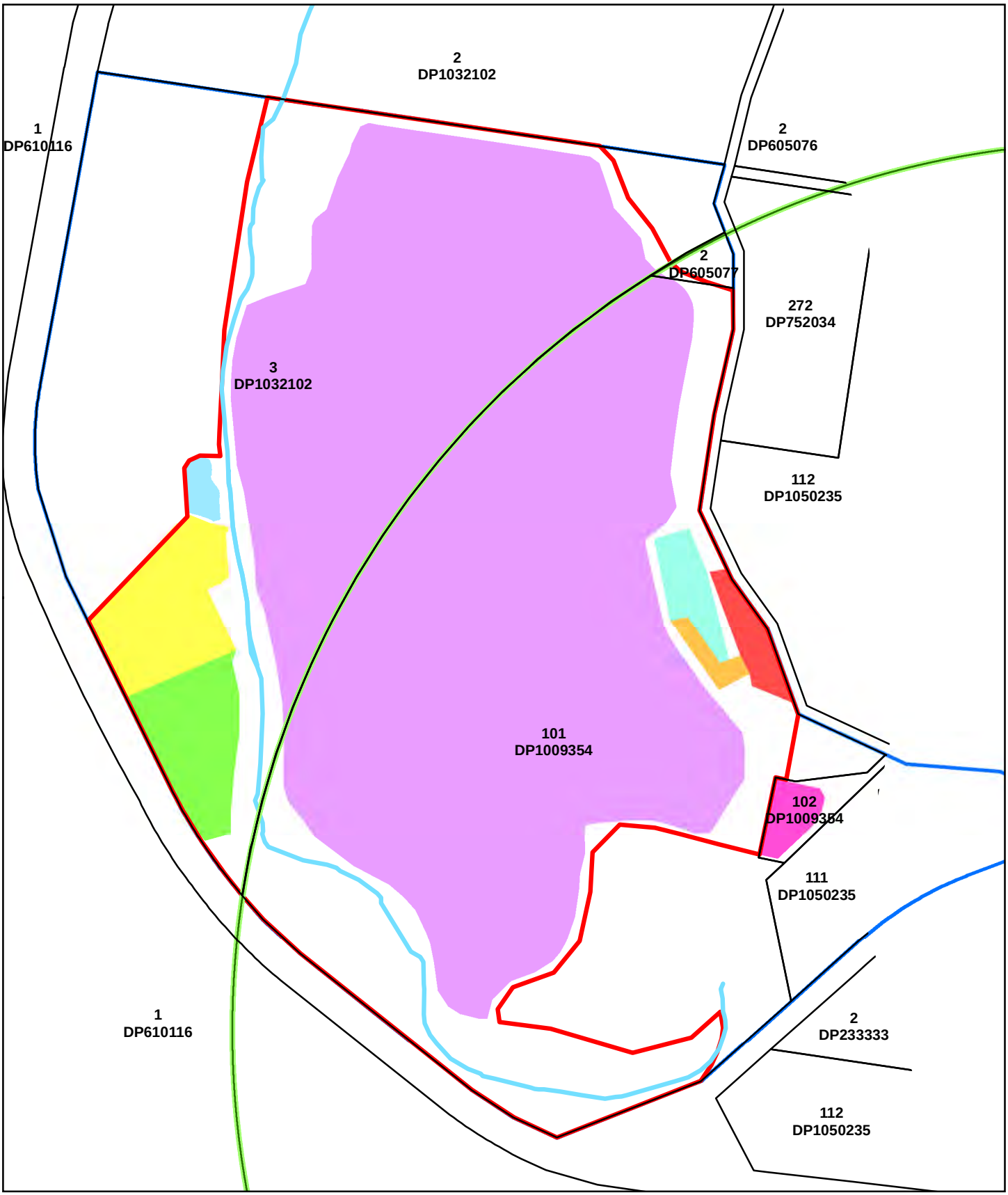
- The Ridge Sports Complex, a major regional sporting facility being developed on the site of the former Lucas Heights Waste and Recycling Centre (approximately 2.5 km to the north east)
- Lucas Heights Conservation Area (immediately to the north of the LHRRP)
- The suburbs of North Engadine (approximately 2 km to the east) and Barden Ridge (approximately 3 km to the north east)

Figure 1.4 shows these key areas.

1.5.2 Potential future surrounding land uses

The Gandangara Local Aboriginal Land Council (GALC) is proposing a development in the West Menai area. The West Menai State Significant Site contains 849 ha of mostly undeveloped land, covering parts of Menai, Barden Ridge and Lucas Heights.

The western boundary of the proposed development is Heathcote Road and the site extends east across Mill Creek to the edge of the existing Menai residential area close to New Illawarra Road. The location of the proposed West Menai State Significant Site is shown on Figure 1.4.



LEGEND

- ANSTO buffer boundary
- Mill Creek
- Cadastre
- Proposal site boundary
- Lucas Heights Resource Recovery Park boundary
- Truck parking area
- Proposed GO facility
- Proposed ARRT facility
- Resource Recovery Centre
- Administration, operations and weighbridge
- Renewable energy generating facility
- Landform reprofiling boundary

Paper Size A4

0 45 90 180 270 360

Metres

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

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GHD

SITA Australia
Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	A
Date	25 Jun 2015

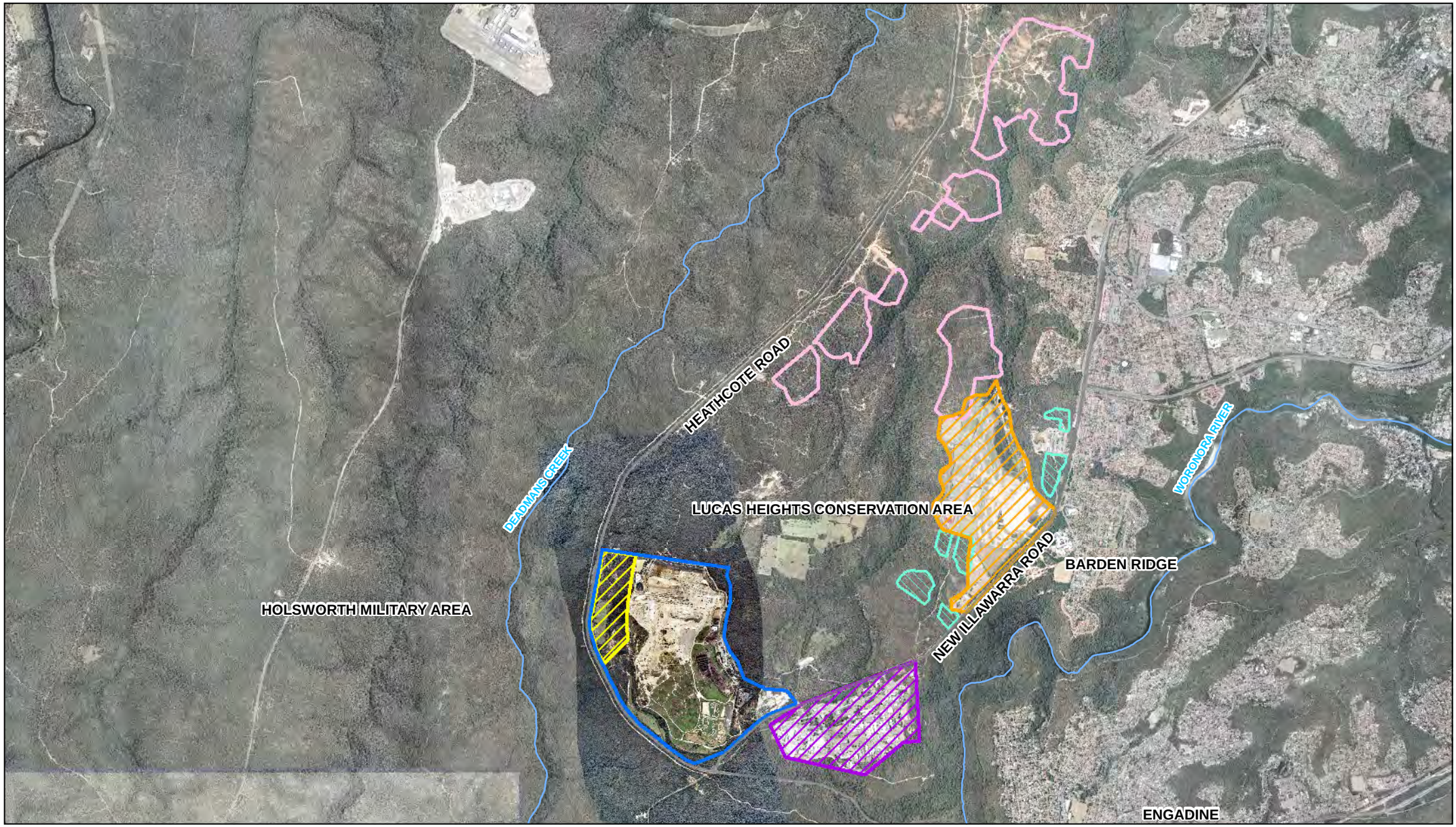
The proposal site

Figure 1.3

G:\21\23482\GIS\Maps\MXD\21-23482-Z059_TheProposalSite.mxd

15/133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:afoddy



Paper Size A4

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Metres

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

N

Legend

- LHRRP boundary
- SICTA boundary
- ANSTO
- Barden Ridge Sports Complex
- Potential future receptors
- Future receptors – Residential

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision B
Date 14 Aug 2015

Surrounding landuses

Figure 1.4

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z063_SurroundingLandUses_Fig4-3.mxd

15/133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Aerial Imagery: SITA, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:apmiller

1.6 Secretary's Environmental Assessment Requirements and agency requirements

The specific SEARs and agency requirements addressed in this report are summarised in Table 1.1.

Table 1.1 Secretary's Environmental Assessment Requirements and agency requirements

Assessment requirements	Where addressed in report
A description of all potential noise sources, including construction, operational and transport sources	Chapters 4 and 5
A quantitative assessment of construction, operational and transport noise and vibration impacts to surrounding receivers from on site and off site activities in accordance with the relevant EPA guidelines	Chapters 4 and 5
Details of the proposed management, mitigation and monitoring measures	Chapter 6
Agency requirements	
NSW EPA	
Identify all noise sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.	Chapters 4 and 5
Specify times of operation for all phases of the development and for all noise producing activities.	Chapters 4 and 5
For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.	Not applicable

1.7 Scope and structure of the report

1.7.1 Scope of report

This report provides an assessment of the potential noise impacts of the proposal. The assessment has been undertaken in accordance with the requirements of Secretary's Environmental Assessment Requirements which specify that the noise and vibration assessment include:

- A description of all potential noise sources, including construction, operational and transport sources
- A quantitative assessment of construction, operational and transport noise and vibration impacts to surrounding receivers from on site and off site activities in accordance with the relevant EPA guidelines
- Details of the proposed management, mitigation and monitoring measures.

1.7.2 Structure of report

- **Chapter 1 – Introduction** – This chapter introduces the proposal, the proponent and describes the proposal area
- **Chapter 2 – Existing environment** – This chapter describes the existing environmental values of the proposal site relevant to noise and vibration and the assessment

- **Chapter 3 – Noise criteria** – This chapter identifies the criteria for assessment
- **Chapter 4 – Construction noise impact assessment** – This chapter examines the potential noise impacts associated with construction of the proposal
- **Chapter 5 – Operational noise impact assessment** – This chapter examines the potential noise impacts associated with operation of the proposal
- **Chapter 6 – Noise mitigation** – This chapter identifies mitigation measure relating to noise
- **Chapter 7 – Conclusions** – This chapter provides a summary of assessment conclusions
- **Chapter 8 – References** – This chapter provides a reference list

2. Existing environment

2.1 Location and surrounding existing and proposed land uses

The land on which the LHRRP is situated is owned by SITA and ANSTO and surrounded by predominately vegetated areas.

Key adjacent existing land uses include:

- ANSTO Research Establishment (to the east and south)
- Holsworthy Military Reserve (to the north, west and south)
- The Ridge Sports Complex, a major regional sporting facility being developed on the site of the former Lucas Heights 1 (approximately 2 km to the north east)
- Lucas Heights Conservation Area (approximately 2 km to the north west)
- The suburbs of North Engadine (approximately 2 km to the east) and Barden Ridge (approximately 3 km to the north east).

The proposal location is shown in Figure 1.1. The LHRRP site also contains a mini-bike area at the southern extent of the site and the SICTA area on the north-western side of the site. The proposal would be contained entirely within the existing LHRRP site which includes a portion of the land currently leased to SICTA.

2.2 Sensitive receivers

Noise and vibration sensitive receivers are defined based on the type of occupancy and the activities performed in the land use. Sensitive noise and vibration receivers could include:

- residences
- educational institutes
- hospitals and medical facilities
- places of worship
- passive and active recreational areas such as parks, sporting fields, golf courses (Note that these recreational areas are only considered sensitive when they are in use or occupied)
- commercial or industrial premises.

The nearest sensitive receivers are identified to be at ANSTO Motel and ANSTO (R4 and R5). The nearest residential receivers are the suburbs of Engadine, R1 (approximately 2 km to the east), Barden Ridge R2 (approximately 3 km to the northeast) and Menai R3 (approximately 3.3 km northeast).

In addition, the Gandangara Local Aboriginal Land Council (GALC) is proposing a development in the West Menai area. The West Menai State Significant Site contains 849 ha of mostly undeveloped land, covering parts of Menai, Barden Ridge and Lucas Heights. The site is currently zoned 1(b) Rural (Future Urban) under the Sutherland Shire LEP 2000.

The western boundary of the proposed development is Heathcote Road and the site extends east across Mill Creek to the edge of the existing Menai residential area close to New Illawarra Road. The proposed development consists of discrete pockets of housing which limits the population size in each area.

The sensitive receivers are summarised in Table 2.1. The location of the sensitive receivers is shown in Figure 2.1.

Table 2.1 Nearby sensitive receivers

Sensitive receiver	Approximate distance to the LHRRP (km)
R1 Engadine	2
R2 Barden Ridge	3
R3 Menai	3.3
R4 ANSTO	0.3
R5 ANTSO Motel	0.5
R6 Gandangara	1.5
R7 Gandangara North	1.6
R8 The Ridge Sports Complex	2

2.1 Noise monitoring

2.1.1 Background noise

Background noise levels have been provided by SITA (*Lucas Heights Alternative Waste Technology Facility Noise Assessment 10-6701 Revision 2 December 2008)*. The noise measurements were undertaken in 2008 and are considered representative of current conditions. The noise levels are typical of a suburban residential area.

Additional background measurements were undertaken at two locations within ANSTO by GHD (refer to Figure 2.1). Both sets of data are summarised in Table 2.2.

Background monitoring charts for the monitoring undertaken in 2014 are provided in Appendix A. A detailed description of the acoustic terms can be found in the glossary at the start of this report.

Table 2.2 Summary of measured noise levels, dB(A)

Noise monitoring locations	Rating background level, L_{A90}			Ambient level, $L_{Aeq(period)}$		
	Day	Evening	Night	Day	Evening	Night
	7 am to 6 pm	6 pm to 10 pm	7 am to 6 pm	7 am to 6 pm	6 pm to 10 pm	7 am to 6 pm
67 Thomas Mitchell Drive, Barden Ridge	42	38	33	54	51	46
22 Mountain Street, North Engadine	40	36	32	54	47	49
ANSTO Motel (Location 1)	41	38	36	57	45	48
ANSTO (Location 2)	48	47	41	58	54	53

LEGEND

- Noise sensitive receiver
- Background noise monitoring location
- LHRRP boundary

Paper Size A4

0 125 250 500 750 1,000

Metres

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

N

GHD

SITA Australia
Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	Draft
Date	31 Mar 2015

Noise sensitive receivers and background noise monitoring locations **Figure 2.1**

G:\21\23482\GIS\Maps\MXD\21-23482-Z047_SensitiveReceptors.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:ppandey

2.1.2 Attended noise monitoring

Attended noise monitoring was undertaken at the LHRRP and surrounds to quantify existing noise levels on site. The attended monitoring results for different areas and equipment are summarised in Table 2.3. The attended monitoring locations 1 to 11 are shown in Figure 2.2. Monitoring locations 12 and 13 correspond to sensitive receiver R8.

Table 2.3 Attended noise monitoring summary

Location	Duration (min)	L_{Aeq}	L_{A90}	Notes
1	01:00	89.3	72.1	10 to 15 m from CAT 950G, loading/unloading of scrap metal. Measurement near bins near site office.
	01:00	76.8	66.4	15 to 20 m from CAT 950G, loading/unloading of scrap metal. Measurement near bins near site office.
2	01:00	73.8	66.3	15 m from edge of tip face, CAT 836 G.
	01:00	75.7	66.3	Dozer moving sideways along tip face, approximately 7 to 10 m from logger.
	01:00	76.5	69.4	
	01:00	76.1	69.4	
	01:00	80.7	76.5	
3	01:00	78	70.7	Lifts filling into trucks at 7 m.
	01:00	81.1	71.2	
4	01:00	63.9	62.8	Aerators on, approximately 25 m from aerators at edge of pond.
	01:00	53.9	52.3	Aerators off.
5	00:11	90.5	89	3 m from pump MCO6 Godwin Pumps
6	01:00	77	76.4	1 m from electric leachate pump (height 0.4 m). Shed on 3 sides (2.8 m height). 63 dB(A) outside shed on sides, 65-66 dB(A) back of shed.
7	00:38	81	79.5	Measurements around trommel Doppstadt SM 620. 5 to 7 m from trommel.
	00:19	80.1	78.6	
	01:00	79	78.2	
	01:00	78.3	76.2	
	01:00	88.9	88	2 m from trommel intake, CAT 950H Loading/Unloading from piles in background
	01:00	80	75.7	Trommel and screen. Measurement at 15.6 m from source.
	01:00	84.9	84.3	2.57 m from back of Komtech trommel
8	01:00	79.5	67.6	36 m from water truck (57 m from CAT 740 dump truck)
	00:30	81.2	74.1	Terex TA40 Water truck at 5 m
9	01:00	70.4	65.9	Loading from stockpile to dump truck (5 m height-on top of stockpile), 25 m from source, Also: VOLVO WEX CO12 Excavator
10	01:00	69.7	69.3	Power station transformer hum, constant noise source.
11	00:19	72.2	67.9	Truck passbys on road leading into LHRRP.
	00:20	73	64.6	
	00:26	68.6	60.6	
	00:14	72.8	63.4	
	00:14	70.9	63.9	
	00:16	69.7	63.4	
	00:30	69.3	62.5	
12	15:00	46.7	39.9	Strong wind, Menai sand and soil equipment audible in distance, Birds, transmission line, Wind through trees, Plane-passbys, Landfill inaudible.
13	15:00	45.5	41.9	Birds, road traffic noise hum. Noise from landfill not audible.

LEGEND

Attended noise monitoring location

Paper Size A4

0 25 50 100 150 200

Metres

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

N

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Lucas Heights Resource Recovery Park

Attended noise monitoring locations

Job Number 21-23482
Revision Draft
Date 31 Mar 2015

Figure 2.2

\\ghdnet\ghd\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z048_NoiseMonLocations.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:ppandey

3. Noise criteria

3.1 Construction noise criteria

The *Interim Construction Noise Guideline* (DECC 2009) is used to assess noise impacts associated with construction works.

The guideline recommends standard hours for construction activities as Monday to Friday: 7 am to 6 pm, Saturday: 8 am to 1 pm and no work on Sundays or public holidays.

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

- The delivery of oversized plant or structures that police or other authorities require special arrangements to transport along public roads.
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm.
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours.
- Works which maintain noise levels at receivers to below the noise management levels outside of the recommended standard construction hours.

Table 3.1 and Table 3.2 detail the *Interim Construction Noise Guideline* (DECC 2009) construction noise management levels at sensitive land uses and residences respectively.

Table 3.1 Construction noise management levels at sensitive land uses

Land use	Management level, $L_{Aeq(15min)}$ (applies when the land use is being used)
Classrooms at schools and other educational institutions	Internal noise level 45 dBA
Hospital wards and operating theatres	Internal noise level 45 dBA
Places of worship	Internal noise level 45 dBA
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dBA
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dBA
Industrial premises	External noise level 75 dBA
Offices and retail outlets	External noise level 70 dBA

Table 3.2 Construction noise management levels at residences

Time of day	Management level $L_{Aeq(15min)}$	How to apply
Recommended standard hours: • Monday to Friday 7 am to 6 pm • Saturday 8 am to 1 pm • No work on Sundays or public holidays	Noise affected Rating background level + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected Rating background level + 5 dBA	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

A summary of the noise management levels for the proposed construction works are provided in Table 3.3 for each sensitive receiver area.

Table 3.3 Project construction noise management levels, dB(A)

Receiver	Noise management levels, $L_{Aeq(15min)}$	
	Recommended standard hours	Outside recommended standard hours
R1 Engadine	50	37
R2 Barden Ridge	52	38
R3 Menai[2]	50	37
R4 ANSTO	70	-
R5 ANTSO Motel[1]	70	41
R6 Gandangara[2]	50	37
R7 Gandangara North[2]	50	37
R8 The Ridge Sports Complex	65	-

Note 1: Assumed to be a residential receiver out of hours and a commercial receiver during standard construction hours.

Note 2: The noise criteria are based on the North Engadine noise monitoring location.

3.2 Operational noise criteria

The *Industrial Noise Policy* (INP) (EPA 2000) provides guidance on the assessment of operational noise impacts. The guideline includes both intrusive and amenity criteria that are designed to protect receivers from noise significantly louder than the background level, and to limit the total noise level from all sources near a receiver.

The INP noise criteria are planning levels and are not mandatory limits required by legislation, however the noise criteria assist the regulatory authorities to establish licensing conditions. Where noise criteria are predicted to be exceeded, feasible and reasonable noise mitigation strategies should be considered. In circumstances where noise criteria cannot be achieved, negotiation is required between the regulatory authority to evaluate the economic, social and environmental costs and benefits of the development against the noise impacts. The regulatory authority then sets statutory compliance levels that reflect the achievable and agreed noise limits from the development.

The intrusive noise criteria controls the relative audibility of operational noise compared to the background level at residential receivers. The amenity criteria limit the total level of extraneous noise for all receiver types. Both sets of criteria are calculated and, in the case of steady noise sources, the more stringent of the two in each time period normally apply. For noise sources with intermittent characteristics, both noise criteria should be assessed independently.

3.2.1 Intrusive Criteria

The intrusive criteria are determined by a 5 dB addition to the measured (or adopted) background level with a minimum of 35 dB(A). The INP recommends that the intrusive noise criteria for the evening period should not exceed the daytime period and the night-time period should not exceed the evening period. The intrusive noise criteria are only applicable to residential receivers.

3.2.2 Amenity Criteria

The amenity criteria are determined based on the overall acoustic characteristics of the receiver area and the existing level of noise, excluding other noises that are uncharacteristic of the usual noise environment.

Residential receiver areas are characterised into ‘urban’, ‘suburban’, ‘rural’ or other categories based on land uses and the existing level of noise from industry, commerce, and road traffic. With consideration to the INP ‘Noise Amenity Area’ classification, the residential receivers identified in this assessment have been classified as ‘suburban.

3.2.3 Meteorological conditions

Noise propagation can be enhanced by particular wind conditions and temperature inversions. The INP states:

“Where inversion conditions are predicted for at least 30% (or approximately 2 nights per week) of the total night time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment.

Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source-to-receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 per cent of the time or more in any assessment period (day, evening, night) in any season.”

A well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or ‘downwind’ conditions which are favourable to sound propagation, have been included in the noise predictions.

3.2.4 Modifying factor adjustments

The INP requires that modifying factor adjustments are applied if the noise sources contain tonal, intermittent or low frequency characteristics, which have the potential to increase annoyance. The modifying factor adjustments are detailed in Table 3.4.

Table 3.4 INP modifying factor adjustments

Factor	Assessment/ measurement	When to apply	Correction[1,2]
Tonal noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is above 400 Hz • 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive • 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz.	5 dB(A)[2]
Low frequency noise	Measurement of C-weighted and A-weighted level	Measure/assess C and A weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more.	5 dB(A)[2]
Intermittent noise	Subjectively assessed	When the night-time noise level drops to that of the background	5 dB(A)

Factor	Assessment/ measurement	When to apply	Correction[1,2]
		noise level with a noticeable change in noise level of at least 5 dB(A).	
Impulsive noise	A-weighted fast response and impulse response	If the difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB.	Apply the difference in measured noise levels as the correction up to a maximum of 5 dB(A)

Note 1: Where two or more modifying factors are present the maximum correction is limited to 10 dB(A).

Note 2: Where a source emits a tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low frequency range.

3.2.5 Sleep disturbance

The INP application notes regarding sleep disturbance recommend that where the $L_{A1(1min)}$ or L_{Amax} exceeds the $L_{A90(15min)}$ by more than 15 dB(A) outside the bedroom window, a more detailed analysis is required.

The *Road Noise Policy* (DECCW 2011) provides further guidance, which indicates that:

- Maximum internal noise levels below 50–55 dB(A) are unlikely to cause awakening reactions.
- One or two noise events per night with maximum internal noise levels of 65–70 dB(A) are not likely to significantly affect health and wellbeing.

3.2.6 Project noise criteria

The project-specific operational noise criteria are summarised in Table 3.5.

The project noise criteria reflect the most stringent noise criteria derived from the intrusive and amenity criteria. Note that the intrusive criteria is assessed over a 15-minute period whereas the amenity criteria is assessed over the entire day, evening or night-time period.

Table 3.5 Project operational noise criteria

Receiver	Time period	Amenity criteria (acceptable noise level)[1] $L_{Aeq(period)}$	RBL, $L_{Aeq(15min)}$	Intrusive criteria, $L_{Aeq(15min)}$	Proposal specific noise criteria (external)	Sleep disturbance criteria L_{Amax} (external)
Residential (R1, R3, R6, R7)	Day	55	40	45	**45 $L_{Aeq(15min)}$**	-
	Evening	45	36	41	**41 $L_{Aeq(15min)}$**	-
	Night	40	32	37	**37 $L_{Aeq(15min)}$**	**47 L_{Amax}**
Residential (R2)	Day	55	42	47	**47 $L_{Aeq(15min)}$**	**-**
	Evening	45	38	43	**43 $L_{Aeq(15min)}$**	**-**
	Night	40	33	38	**38 $L_{Aeq(15min)}$**	**48 L_{Amax}**
R4 ANSTO	When in use	65	-	-	**65 $L_{Aeq(when\ in\ use)}$**	**-**
R5 ANSTO Motel[2]	Day	65	-	-	**65 $L_{Aeq(when\ in\ use)}$**	**-**
	Night	40	36	41	**40 $L_{Aeq(15min)}$**	**51 L_{Amax}**
R8 The Ridge Sports Complex	55	-	-	-	**55 $L_{Aeq(when\ in\ use)}$**	**-**

Note 1: With consideration to the INP 'noise amenity area' classification, the residential receivers surrounding the site have been classified as 'suburban'.

Note 2: Assumed to be a residential receiver during the night-time period and a commercial receiver during the day-time period.

3.3 Traffic noise criteria

The NSW Road Noise Policy (RNP) (DECCW 2011) provides traffic noise target levels for residential receivers in the vicinity of existing roads (Table 3.6).

The application notes[2] for the RNP state that "*for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.*"

If road traffic noise increases from the development and is within 2 dB(A) of current levels, then the objectives of the RNP are met.

Table 3.6 Traffic Noise Target Levels, $L_{Aeq(period)}$, dB(A)

Type of Development	Day 7 am – 10 pm	Night 10 pm – 7 am
Existing residence affected by additional traffic on arterial roads generated by land use developments	60 $L_{eq(15hr)}$	55 $L_{eq(9hr)}$
Existing residence affected by additional traffic on local roads generated by land use developments	55 $L_{eq(1hr)}$	50 $L_{eq(1hr)}$

[2] http://www.environment.nsw.gov.au/noise/roadnoiseappnotes.htm 12 December 2012

4. Construction noise impact assessment

4.1 Construction schedule and methodology

The following activities were included as part of the construction noise impact assessment. Owing to the longer term nature of the re-profiling works and the similarity of equipment relative to the operation of the landfill, the reprofiling works are considered in the operational impact assessment.

Relocation of GO facility

Construction works for the relocation of the GO facility would include the following:

- Earthworks and civil infrastructure: Site preparation, vegetation clearing, construction of temporary drainage works, bulk earthworks, pavement construction, installation of utility services and other miscellaneous civil construction activities
- Construction of building infrastructure and concrete bunkers: Onsite buildings would be constructed and pre-fabricated concrete bunkers would be installed
- Installation of equipment and services including covers and the aeration system
- Commissioning

It is anticipated that the construction works for the GO facility would be undertaken over a 6 month period. Construction would be undertaken during recommended standard construction hours of Monday to Friday: 7 am to 6 pm, Saturday: 8 am to 1 pm and no work on Sundays or public holidays.

Construction of ARRT facility

Construction works for the ARRT facility would include the following:

- Earthworks and civil infrastructure works including site preparation, vegetation clearing, construction of temporary drainage works, bulk earthworks, pavement construction, installation of utility services and other miscellaneous civil construction activities
- Building infrastructure construction: concrete would be delivered to site pre-mixed and items formed and constructed on site
- Installation of mechanical equipment and large plant and services
- Internal fit-out of the ARRT facility
- Commissioning

It is anticipated that the construction works for the ARRT facility would be undertaken over a 12 month period. Construction would be undertaken during recommended standard construction hours of Monday to Friday: 7 am to 6 pm, Saturday: 8 am to 1 pm and no work on Sundays or public holidays.

4.2 Construction assessment methodology

The noise emissions from construction activities have been assessed at the surrounding potentially affected sensitive receivers. A quantitative assessment has been undertaken with consideration to the *Interim Construction Noise Guideline* (DECC 2009).

The magnitude of off-site noise impact associated with construction would be dependent on a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing background noise levels
- Intervening terrain and structures and
- The prevailing weather conditions.

The typical construction equipment likely to generate significant noise is shown in Table 4.1 with the corresponding noise level. Noise levels of construction equipment have been obtained from Australian Standard, *AS 2436 – 2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites"* unless otherwise specified.

Table 4.1 Construction equipment sound power levels, dB(A)

Construction stage	Equipment	Sound power level (typical)
GO and ARRT facility construction	Compactor	113
	Bulldozer	108
	Excavator	107
	Dump truck	117
	Mobile crane	104
	Grader	110
	Roller	108
	Truck/ Water cart	107
	Road sweeper	104

The construction assessment utilised the above sound power levels and a number of conservative assumptions in order to arrive at a likely 'worst case' prediction scenario. The predictions assume that all equipment operates continuously over the construction site area whereas in reality, construction machinery will move around the project area altering noise patterns with respect to individual receivers.

Also, the prediction assumption was that during any given period, the machinery to be used would operate at maximum power levels whereas it is more likely that machinery will produce lower noise levels while carrying out activities not requiring full power. It is therefore highly unlikely that all construction equipment would be operating at maximum power levels at any one time and also certain types of construction machinery would be present in the study area for only brief periods. For these reasons, the construction noise predictions are considered to be conservative.

Based on the equipment sound power levels in Table 4.1, noise levels were predicted at sensitive receivers using *ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors*. Propagation calculations take into account sound intensity losses due to hemispherical spreading, atmospheric absorption[3], ground absorption (0.5) and adverse meteorological conditions (moderate temperature inversion), shielding objects and terrain.

4.3 Predicted construction noise levels

A summary of the predicted noise levels are shown in Table 4.2. Construction activities are predicted to comply with the *Interim Construction Noise Guideline* (DECC 2009) construction noise management levels at all sensitive receivers during standard and outside of standard

[3] *ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors (1996)* based on a temperature of 10 ^{o}C and a humidity of 70 %.

recommended hours. Specific construction mitigation measures are therefore not necessary to be recommended.

Table 4.2 Predicted construction noise levels at surrounding receivers, dB(A)

Receiver	Criteria, $L_{Aeq(15min)}$		Predicted noise level, $L_{Aeq(15min)}$
	Recommended standard hours	Outside recommended standard hours	GO/ARRT facility construction
R1 Engadine	50	37	27
R2 Barden Ridge	52	38	25
R3 Menai	50	37	22
R4 ANSTO	70	-	37
R5 ANTSO Motel	70	41	32
R6 Gandangara	50	37	31
R7 Gandangara North	50	37	30
R8 The Ridge Sports Complex	65	-	28

4.1 Construction vibration

The nearest sensitive receivers are over 300 m from the site. Due to the distance from the site, construction vibration impacts are not anticipated at any sensitive receivers. Hence, specific vibration mitigation measures are not considered necessary.

5. Operational noise impact assessment

5.1 Operational activities

Operational hours

The current and proposed site operational hours are shown Table 5.1.

Table 5.1 Proposed site operational hours

Activity	Day	Current hours	Proposed hours
Waste receival	Monday - Friday Saturday and Sunday	6 am – 4 pm 8 am – 5 pm	6 am – 5 pm 8 am – 5 pm
Construction & landfilling operations	Monday - Friday Saturday and Sunday	6 am – 4 pm 8 am – 5 pm	6 am – 6 pm 8 am – 6 pm
Other activities	Monday - Sunday	Anytime	Anytime
GO facility operations	Monday - Sunday	Anytime	Anytime
ARRT facility operations	Monday - Sunday	N/A	Anytime

As the waste receival and construction and landfilling operations are proposed to commence at 6 am, the most stringent night time operational noise criteria would apply for the operational noise assessment.

Reprofiling of existing landfill areas

Landfilling and reprofiling the landfill would commence in the central areas of the site and then move on to the southern areas and the existing garden organics facility area. The landfill cap would be progressively constructed as soon as practicable after reaching final landform levels.

The existing landfill equipment would be used for reprofiling/landfilling operations as part of the proposal. This includes landfill compactors, dozers, excavators, dump trucks, grader, roller, water cart and road sweeper. The construction of the reprofiled areas is proposed to be undertaken within the proposed operating hours of the landfill.

As the landform would settle over time, the operational noise modelling has been conservatively undertaken for the worst-case pre-settlement landform terrain.

GO facility

Operational plant and equipment currently used at the existing GO facility would be relocated and continue to be used at the new facility. This includes existing loaders, excavator, shredder, trommel, grader and screen. However the expanded facility would require some additional plant and equipment including:

- Loader
- Tipper truck
- Excavator
- Fans (for aeration).

The proposed location of the GO facility is shown in Figure 1.1.

ARRT facility

Resource recovery would be undertaken in two separate processing lines within the ARRT facility processing building. One processing line would be used for the mixed waste feedstock

and the other for source-separated organics. Material would be passed through a series of mechanical separation equipment including:

- Trommel screens to separate waste streams by size
- Manual sorting stations to recover recyclable items and remove hazardous materials such as car batteries
- Magnetic separators to recover ferrous metals
- Eddie current separators to recover aluminium and other non-ferrous metals
- Shredding equipment to size reduce and prepare material for composting
- Mixing equipment to prepare material for composting

Multiple aeration piping systems and fans would be used to allow independent control of different floor segments, and therefore differential control of the compost as it is moved across the reactor.

The following equipment would be required for operation of the ARRT facility:

- 2 x forklifts
- 1 x truck and dog
- 2 x wheel loaders

The proposed location of the ARRT facility is shown in Figure 1.1.

5.2 Noise modelling assumptions

Acoustic modelling was undertaken using CadnaA V4.4 noise modelling software to predict the effects of industrial noise generated by the proposed operations. CadnaA is a computer program for the calculation, assessment and prognosis of noise propagation. CadnaA calculates environmental noise propagation according to *ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors*. Noise modelling was undertaken for the following operational scenarios:

- Existing case, using the current landform contours and the current location of the GO facility.
- Future case, using the worst-case pre-settlement landform contours and the proposed locations of the GO and ARRT facilities. As the equipment within the landfill would move through the site during profiling operations, noise modelling has been undertaken for both the northern and southern area profiling works.

The noise model parameters used to calculate noise levels at sensitive receivers are summarised in Table 5.2.

Table 5.2 Noise model parameters

Variable	Parameter used
Calculation method	ISO 9613-2
Meteorology	Well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or ‘downwind’ conditions which are favourable to sound propagation.
Topography	Site – 1 m resolution
	Greater extent – 2 m resolution
Ground absorption	0.5 (mix of soft and hard ground)
Receiver height	1.5 m

The following tables show the equipment anticipated to be used on site with the corresponding noise levels. The equipment noise levels have been estimated based on measurements undertaken on site, information provided and from AS 2436 – 2010, *Guide to noise and vibration control on construction, demolition and maintenance sites* as well as BSI British Standards BS 5228-1:2009. Measurements on site during 2014 confirmed that the assumed sound power levels are conservative.

Other equipment may also be used in addition to that assumed however it is anticipated that the additional contribution to the overall noise emissions would be negligible.

Landform

The noise sources that were modelled in the landfill area are summarised in Table 5.3.

Table 5.3 Equipment in Landfill Area

Item	Number	Status	Sound Power Level L_{Aeq} dB(A)
Landfill compactor	2	Existing	113
Bulldozer	2	Existing	108
Terex 40-tonne dump truck	3	Existing	106
Caterpillar 30-tonne excavator	2	Existing	107
Caterpillar 20-tonne excavator	1	Existing	110
Terex 40-tonne water cart	1	Existing	107
10-tonne water cart	1	Existing	107
Road Sweeper	1	Existing	104
Caterpillar 140 grader	1	Existing	110
Roller	1	Existing	108

ARRT facility

The noise sources that were modelled in the proposed ARRT area are summarised in Table 5.4.

Table 5.4 Equipment in ARRT facility area

Item	Number	Status	Sound Power Level LAeq dB(A)
Apron feeder	1	Proposed	86
Trommel	1	Proposed	104
Separating Screen	1	Proposed	112
Densimetric table	1	Proposed	88
Baghouse and Fans	1	Proposed	94
Compost Windrow Turner	1	Proposed	95
Biofilter extraction fan	1	Proposed	105
Forklift	1	Proposed	85
Truck	1	Proposed	107
Forklift	2	Proposed	109
Wheel Loader	2	Proposed	110
Mobile refining line	1	Proposed	88
Truck	1	Proposed	107
Conveyor	1	Proposed	75

GO facility

The noise sources that were modelled in the GO facility are summarised in Table 5.5.

Table 5.5 Equipment in GO facility area

Item	Number	Status	Sound Power Level L_{Aeq} dB(A)
Loader	4	Existing	107
20-tonne excavator	1	Existing	102
Shredder	1	Existing	110
Trommel	4	Existing	104
Grader	1	Existing	110
Screen	1	Existing	112
Loader	1	Proposed	107
Tipper truck	1	Proposed	107
30-tonne excavator	1	Proposed	104
Aeration fan[1]	10	Proposed	92

Note 1: Typical aeration fan noise levels have been sourced from *Kimbriki Resource Recovery Centre Vegetation Processing Facility Improvement Works Noise Assessment* (GHD 2014).

5.3 Noise modelling results

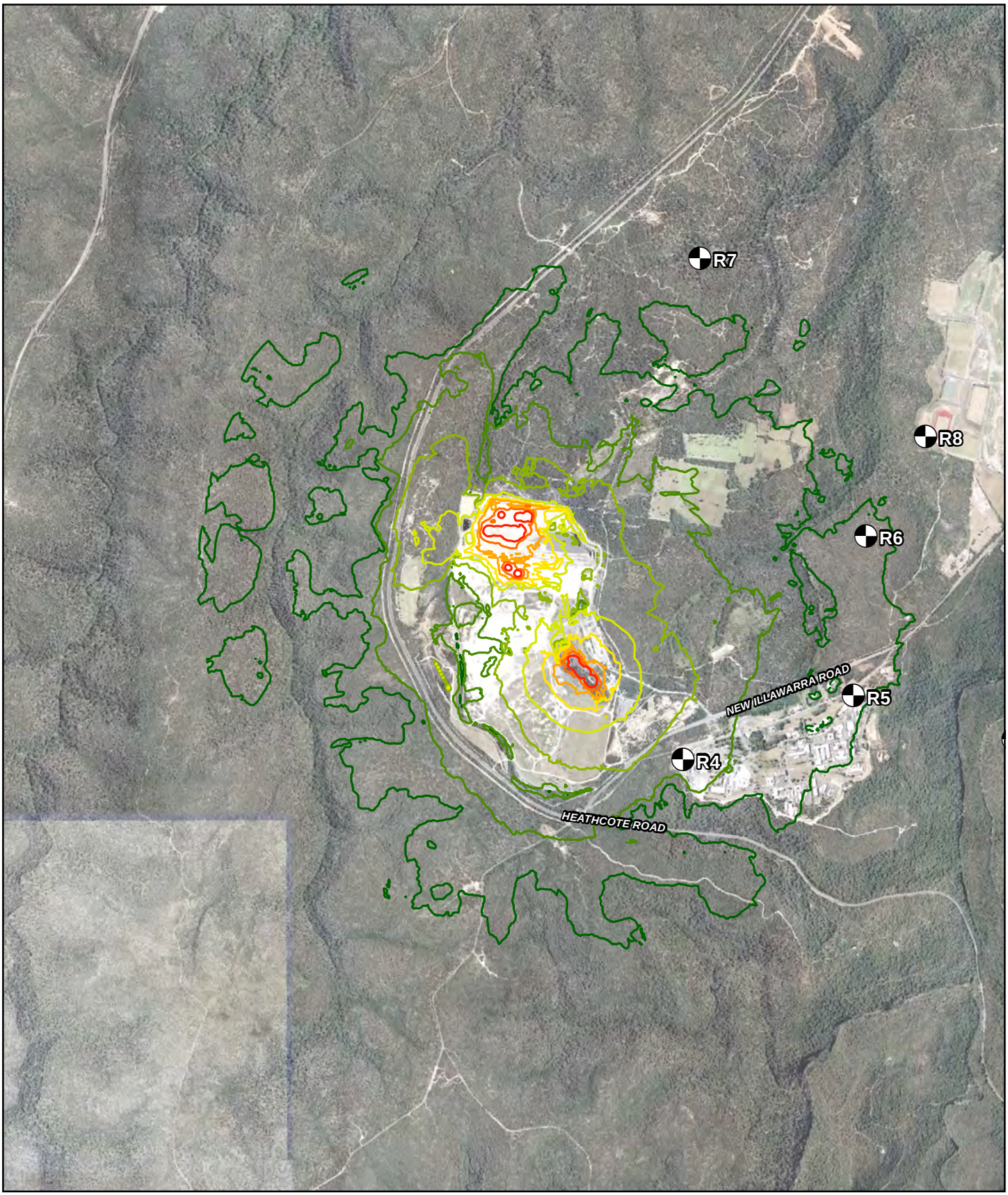
Predicted noise levels for the existing and future operational scenarios are provided below in Table 5.6. Noise contour maps for the existing and future scenarios are shown in Figure 5.1, Figure 5.2 and Figure 5.3.

As site operations are proposed to commence at 6 am, the most stringent night time operational noise criteria would apply for the operational noise assessment. The results show that the predicted noise levels during operation will comply with the most stringent night-time criteria, assuming all equipment to be operational in the landfill, GO and ARRT areas.

Hence, specific operational noise mitigation measures are not required at the LHRRP.

Table 5.6 Predicted operational noise levels

Receiver	Noise Criteria dB(A)		Existing noise level, $LA_{eq(15min)}$ dB(A)	Predicted noise level, $LA_{eq(15min)}$ dB(A)
	Day	Night		
R1 Engadine	45	37	30	31-32
R2 Barden Ridge	47	38	27	29
R3 Menai	45	37	26	26-27
R4 ANSTO	65	-	42	40-48
R5 ANSTO Motel	65	40	36	36-40
R6 Gandangara	45	37	36	37
R7 Gandangara North	45	37	27	31-34
R8 The Ridge Sports Complex	55	-	34	35



LEGEND

Noise sensitive receiver

Sound pressure level, dB(A)

35
40
45
50
55
60
65
70

Paper Size A4

0 125 250 500 750 1,000

Metres

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

N

GHD

SITA Australia
Lucas Heights Resource Recovery Park
Predicted LHRRP night-time operational noise levels - current landform

Job Number 21-23482
Revision Draft
Date 31 Mar 2015

Figure 5.1

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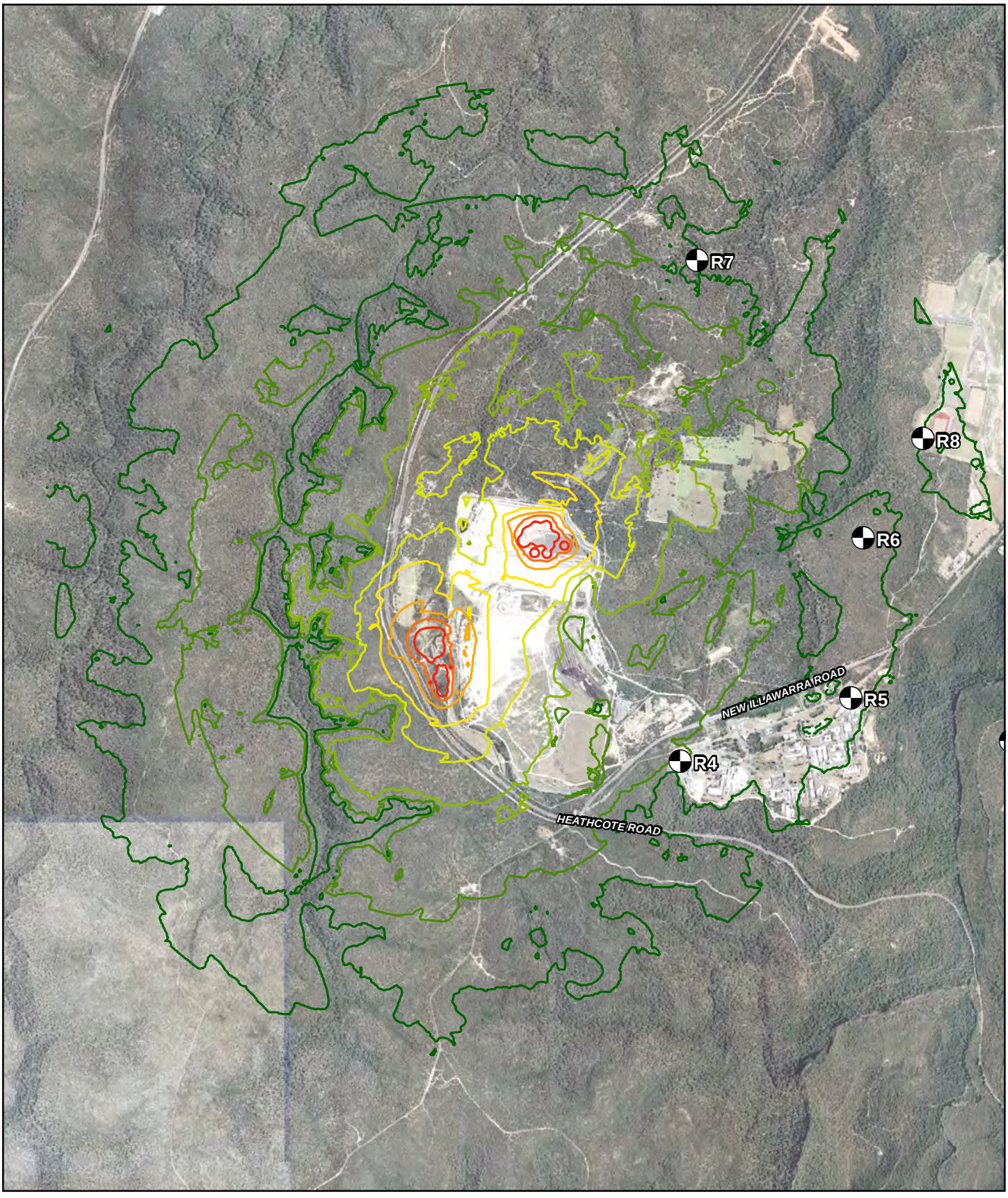
Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:ppandey



LEGEND

Noise sensitive receiver

Noise contours (dB(A))

35
40
45
50
55
60
65
70

Paper Size A4

0 125 250 500 750 1,000

Metres

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

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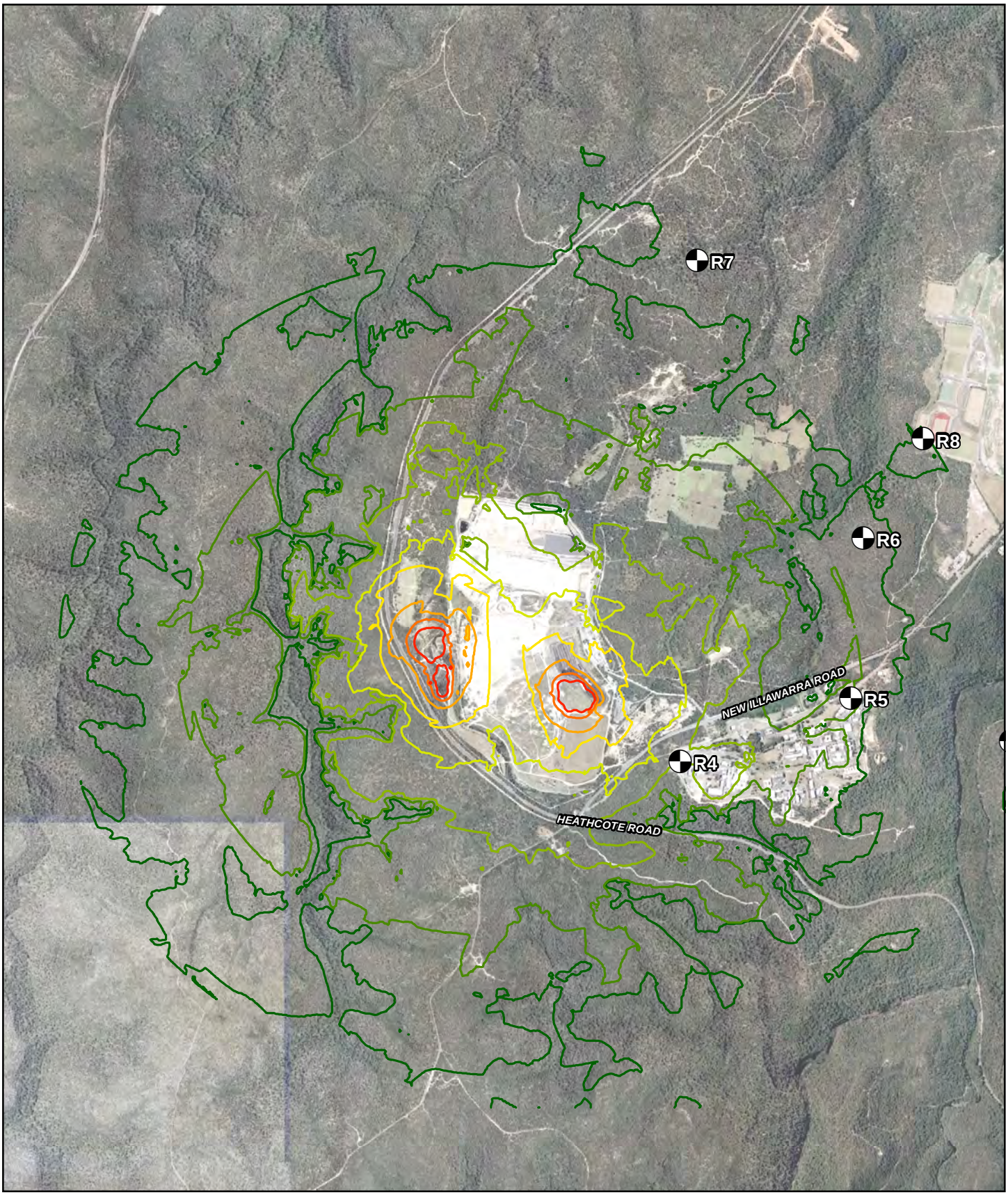
SITA Australia
Lucas Heights Resource Recovery Park
Predicted LHRRP operational noise levels - future landform
(northern area profiling works)

Job Number 21-23482
Revision Draft
Date 31 Mar 2015

Figure 5.2

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:ppandey



LEGEND

Noise sensitive receiver

Noise contours (dB(A))

- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

Paper Size A4

0 125 250 500 750 1,000

Metres

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

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SITA Australia
Lucas Heights Resource Recovery Park
Predicted LHRRP operational noise levels - future landform (southern area profiling works)

Job Number 21-23482
Revision Draft
Date 31 Mar 2015

Figure 5.3

\\ghdnet\ghd\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z050_FutureNoiseLevels_Level15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Aerial Imagery: ESRI, 2014. Works: GHD/SITA, 2014. Roads: NSW LPMA, 2012. Created by:ppandey

5.4 Operational traffic noise assessment

5.4.1 Existing traffic volumes

Traffic volume information has been provided by Roads and Maritime Services for the years 2002, 2005, 2009 and 2011. This historical data has been used with a 3.4% growth rate to determine the estimated existing 2014 traffic volumes shown in Table 5.7.

Table 5.7 Existing traffic volumes

Road	Average Daily Traffic 2014	Road Type
New Illawarra Road	23,294	Arterial
Heathcote Road	19,864	Arterial

5.4.2 Traffic generation

The additional traffic generation from the proposed LHRRP modification in 2027 has been estimated in Table 5.8 **as approximately 432 vehicles per day**. Consistent with the assumptions of the traffic impact assessment, the split has been assumed at 50/50 between the two main road routes; New Illawarra Road and Heathcote Road.

Table 5.8 Estimated traffic from LHRRP in 2027*

Road	Additional vehicle trips per day
New Illawarra Road	216
Heathcote Road	216

Note: the estimated traffic daily volumes in the above table includes contributions from the reprofiling works, GO and ARRT.

As can be seen, the relative proportion of additional traffic from the proposal relative to existing traffic volumes, and by extrapolation, in 2027, is very low. Based on the United Kingdom Department of Transport Calculation of Road Traffic Noise (CoRTN) algorithm, the increase in traffic noise emissions from the proposal is not predicted to be noticeable (<0.1 dB(A)). Since the additional traffic generation from the proposal is predicted to increase road traffic noise emission levels by less than 2 dB(A), the road traffic noise levels from the proposal are predicted to comply with the RNP noise criteria at sensitive receivers along the traffic routes.

6. Noise mitigation

A comprehensive list of prevention, mitigation and rectification measures have been identified and are detailed in the LHRRP OEMP (SITA Australia 2014a), ARRT Facility (SITA Australia 2014b) and GO Facility OEMP (SITA Australia 2014c). The identified mitigation and rectification measures would be implemented as required and their exact details would be based on a case by case situation depending on the issue and technical solutions available at the time.

The prevention, mitigation and rectification measures are detailed in the LHRRP OEMP (SITA Australia 2014a). Examples of key measures that are included in the OEMPs are provided in the sections below.

LHRRP

- Limit waste receival hours
- Select plant and equipment to minimise noise emissions where possible whist maintaining efficiency of function. Fit residential grade silencers and maintain all noise control equipment in good order
- Maintain all machinery and equipment in proper working order in accordance with manufacturer's requirements
- No activities of heavy machinery outside site operating hours
- Site inductions will include a noise component

GO facility

- Select plant and equipment to minimise noise emissions where possible whist maintaining efficiency of function. Fit residential grade silencers and maintain all noise control equipment in good order
- Restrict operations to designated areas
- Restrict noisy activities to daylight hours
- Use reverse quackers with a low decibel output rather than beepers for excavators and wheel loaders
- Utilise favourable routes for accessing and exiting the facility to ensure avoidance of residential areas where possible

ARRT faciity

- Conduct all operations within buildings
- Use reverse quackers rather than alarms with a low decibel output for excavators and wheel loaders
- Utilise favourable routes for accessing and exiting the facility to ensure avoidance of residential areas where possible

Noise reduction measures fitted within the buildings

7. Conclusion

The predicted operational noise levels at all surrounding residential sensitive receivers are below the recommended maximum operational noise criteria. Therefore there is not expected to be any significant operational noise impact associated with the proposal.

The additional traffic generation is predicted to increase road traffic noise emission levels by less than 2 dB(A). Therefore, road traffic noise levels are predicted to comply with the noise criteria at sensitive receivers along the traffic routes.

Construction activities are predicted to comply with the construction noise management levels at all residential and sensitive receivers during standard recommended hours. Since construction works are anticipated to occur during standard construction hours, no construction mitigation measures are considered necessary.

The proposal should be acceptable from an acoustic perspective.

This report addresses the SEARs requirements (section 1.6) and concludes that the proposal would meet the following objectives as identified in section 1.2:

- No significant impact on the community or environment
- Prevent the degradation of local amenity
- Prevent noise pollution

8. References

Australian Standards 2010, *AS 2436 - 2010 Guide to noise and vibration control on construction, demolition and maintenance sites*

British Standards 2009, *BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites – part 1: noise*

Department of Environment and Climate Change 2009, *Interim Construction Noise Guideline*

Environmental Protection Authority 2000, *Industrial Noise Policy*

GHD 2014, *Kimbriki Resource Recovery Centre Vegetation Processing Facility Improvement Works Noise Assessment*

International Standards Organisation 1996, *ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors*

Office of Environment and Heritage 2011, *Road Noise Policy*

9. Limitations

This report: has been prepared by GHD for SITA Australia Pty Ltd and may only be used and relied on by SITA Australia Pty Ltd for the purpose agreed between GHD and the SITA Australia Pty Ltd as set out in section 1.7 of this report.

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

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

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

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

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

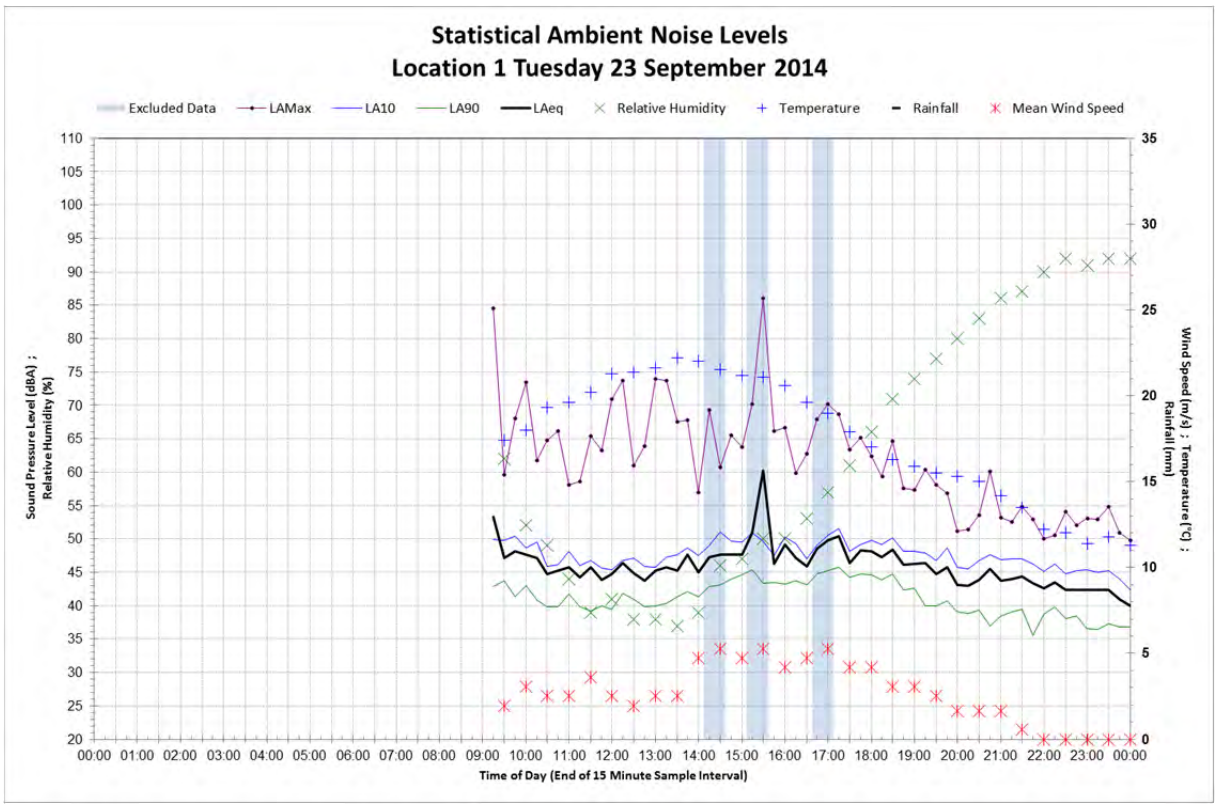
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendices

Appendix A – Background monitoring charts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LA90
LAeq
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Temperature
Rainfall
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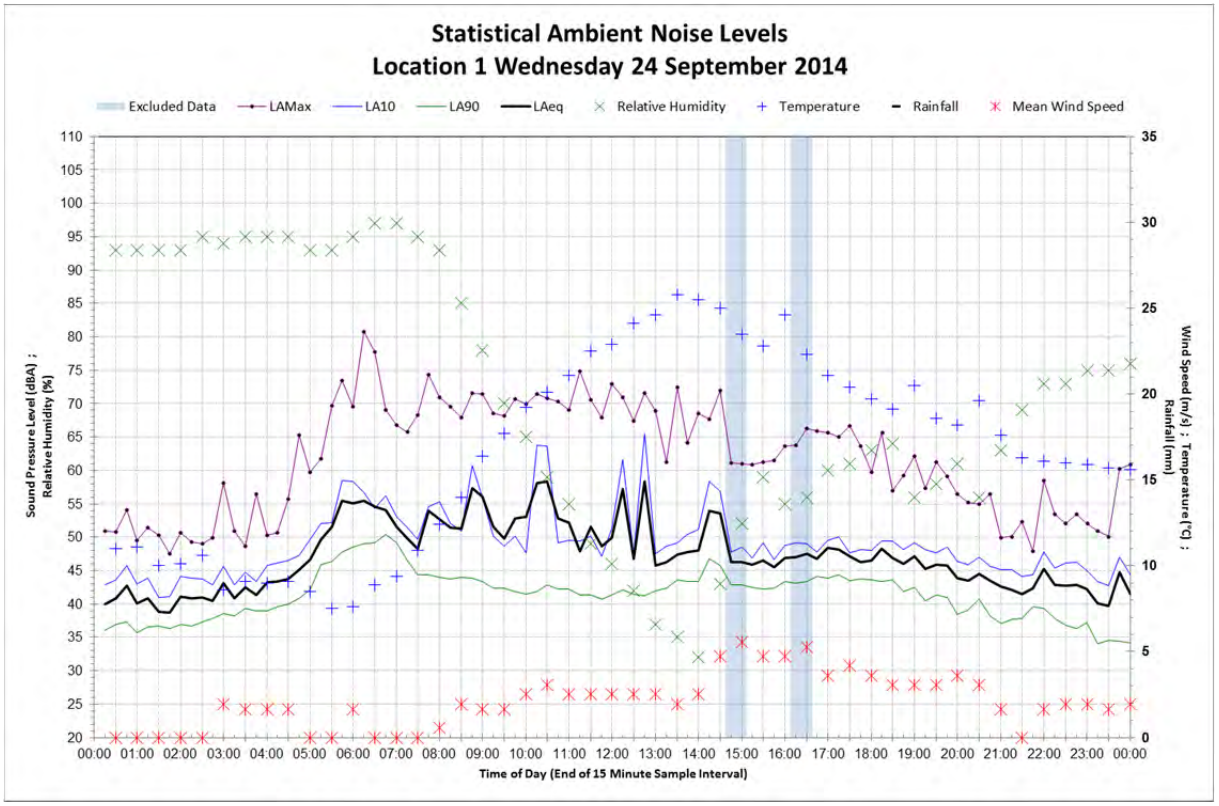
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
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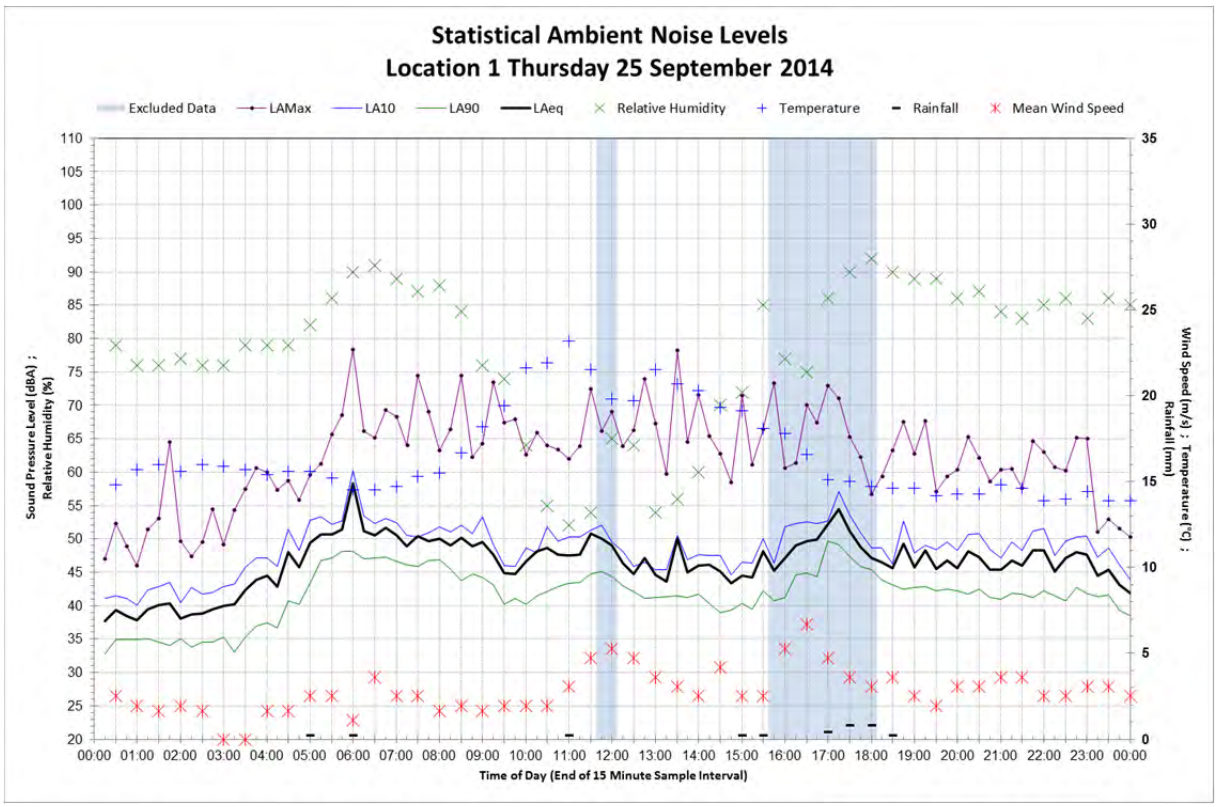
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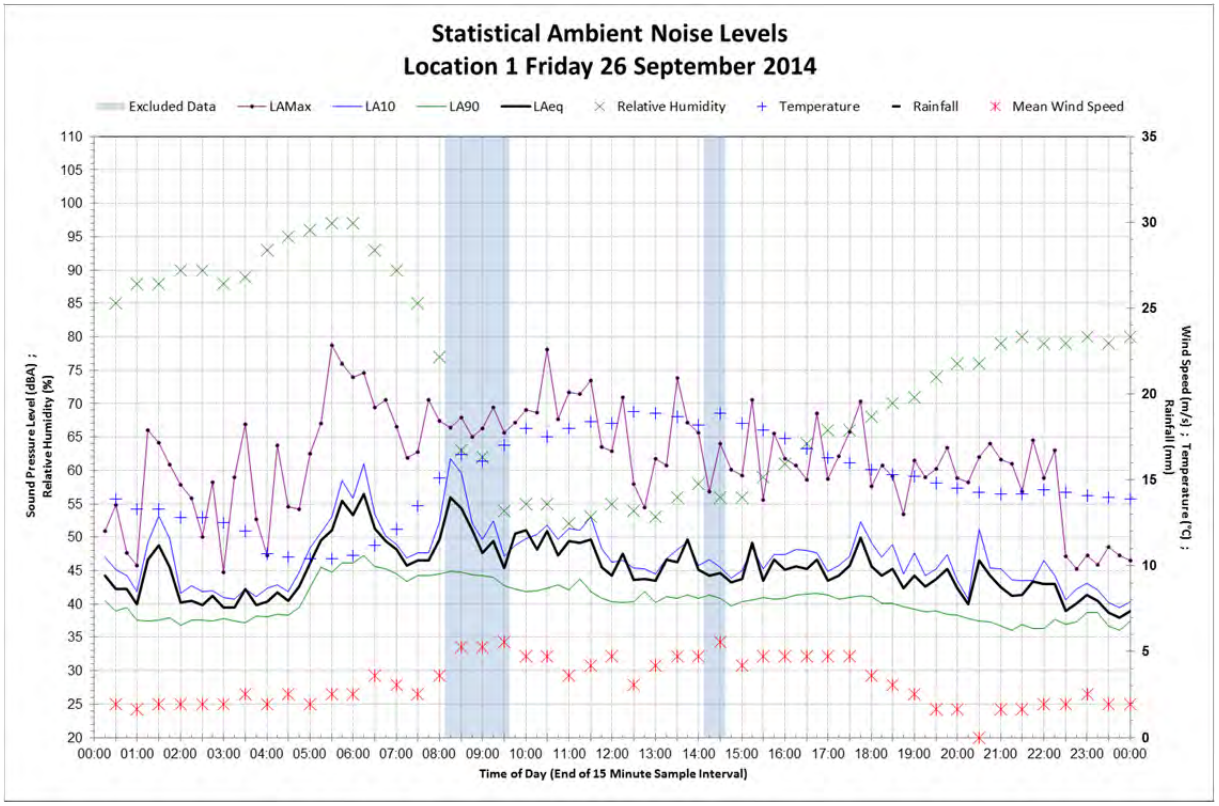
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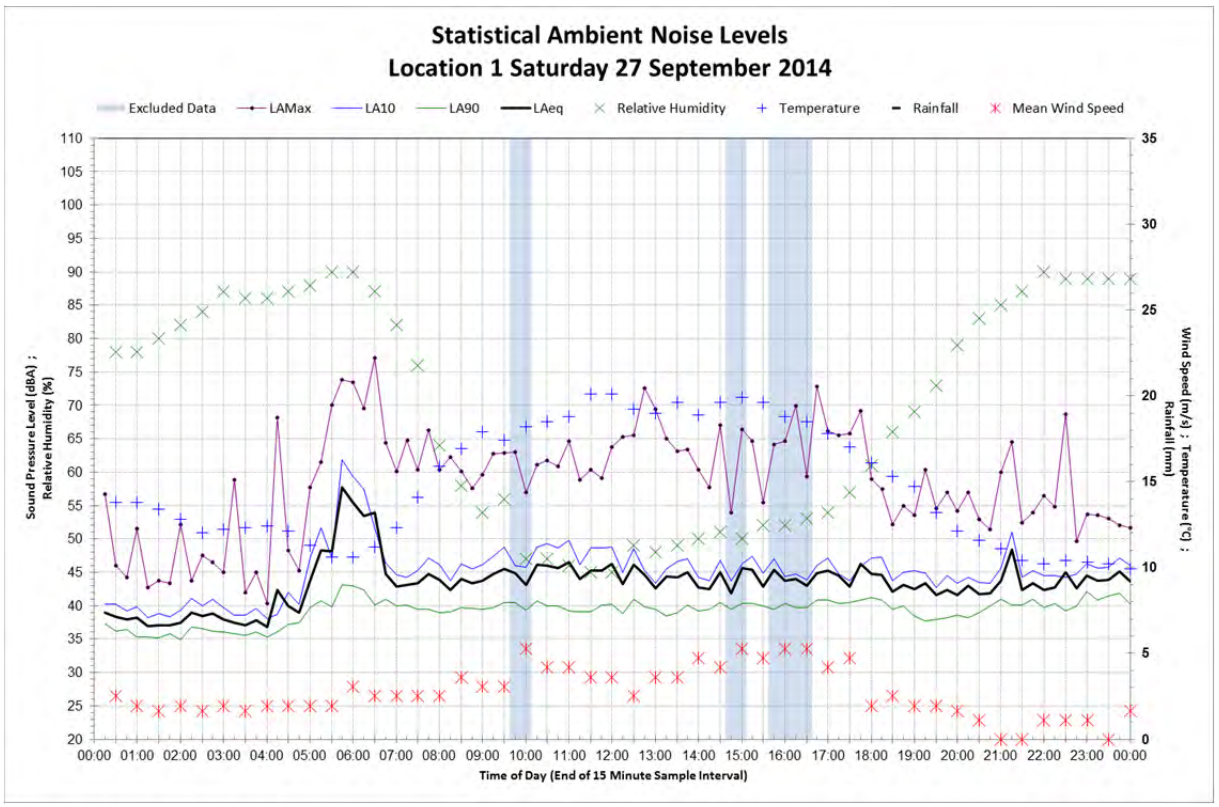
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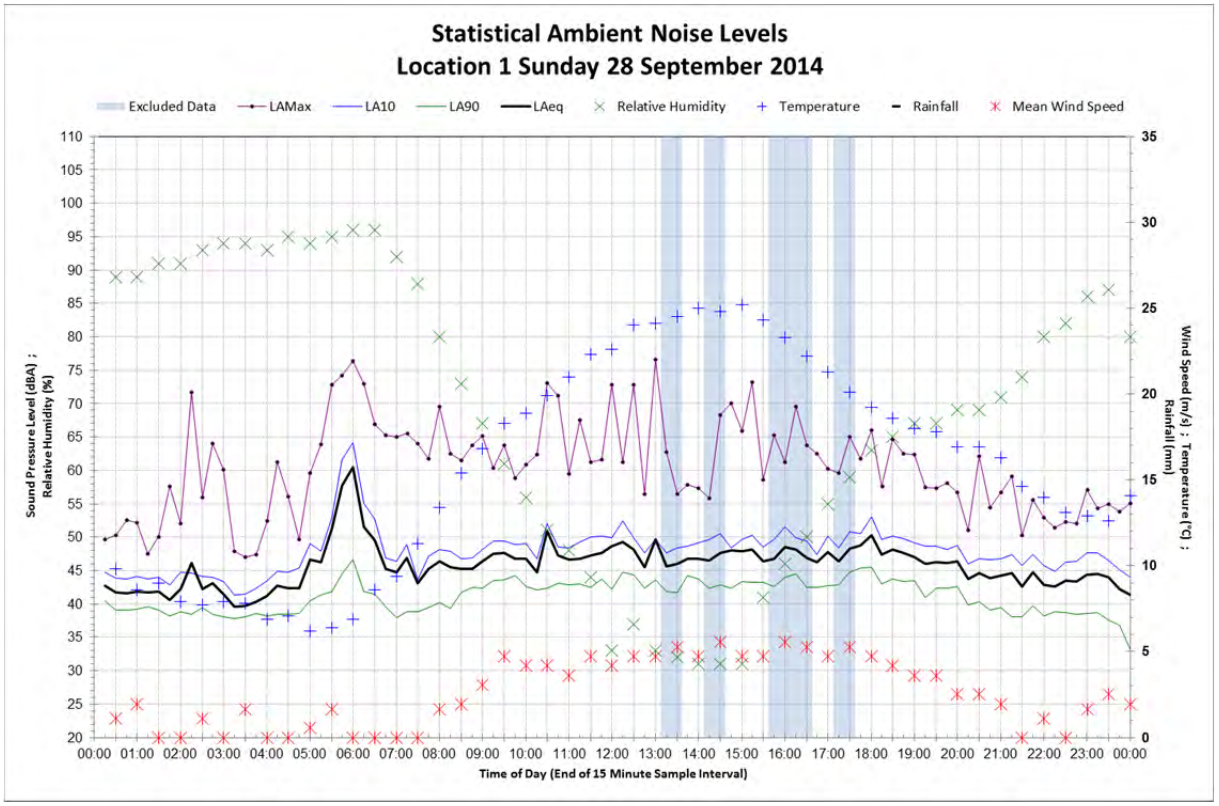
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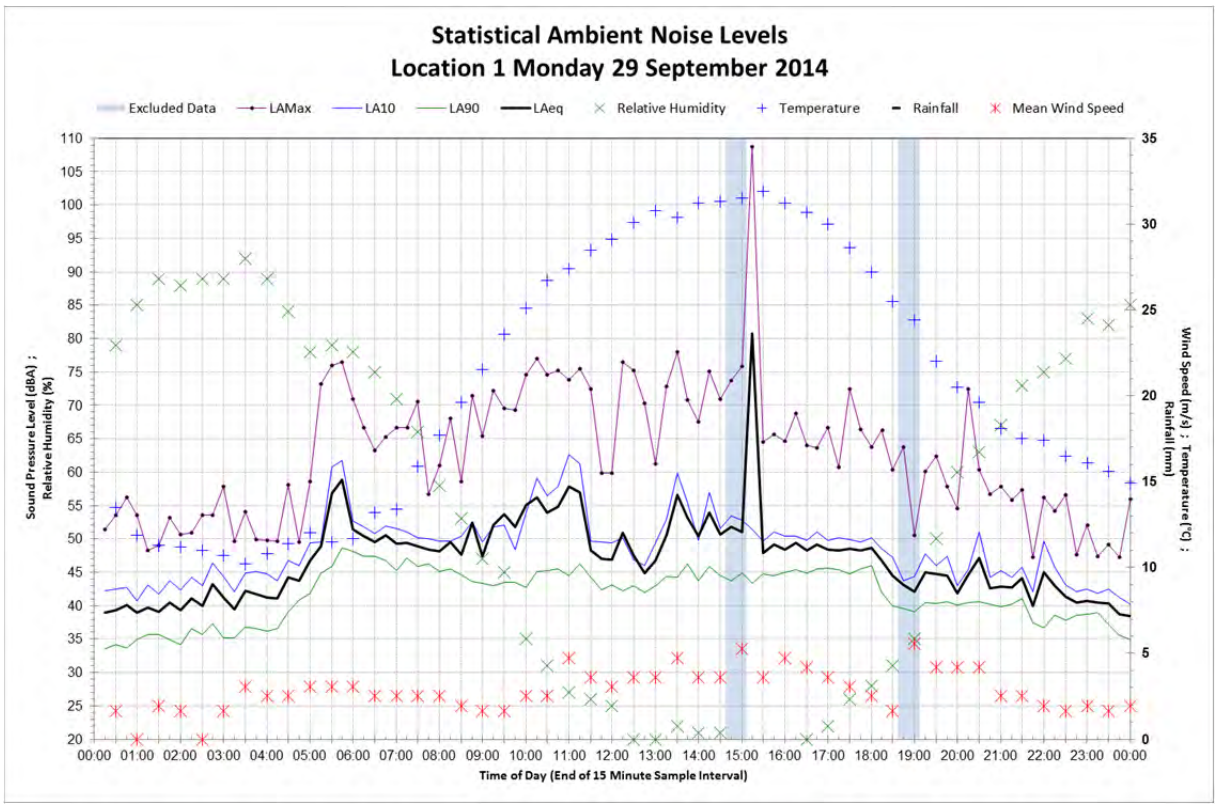
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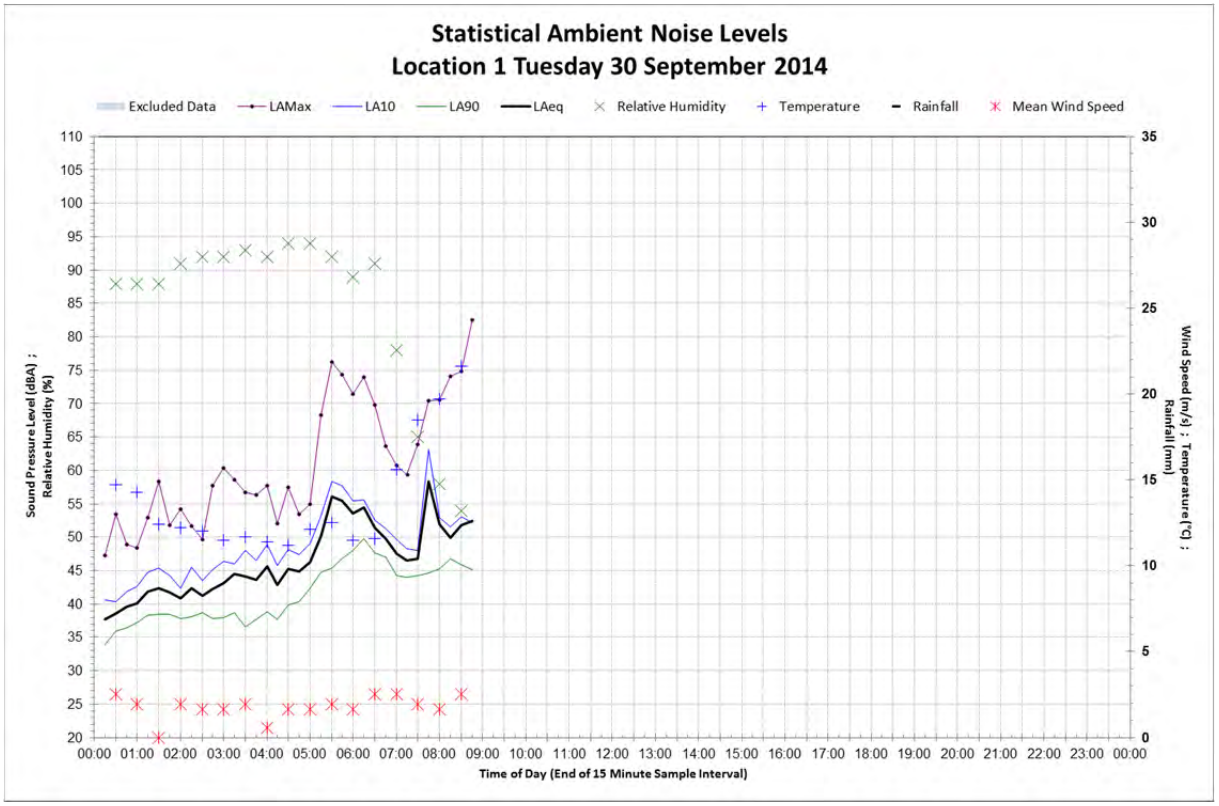
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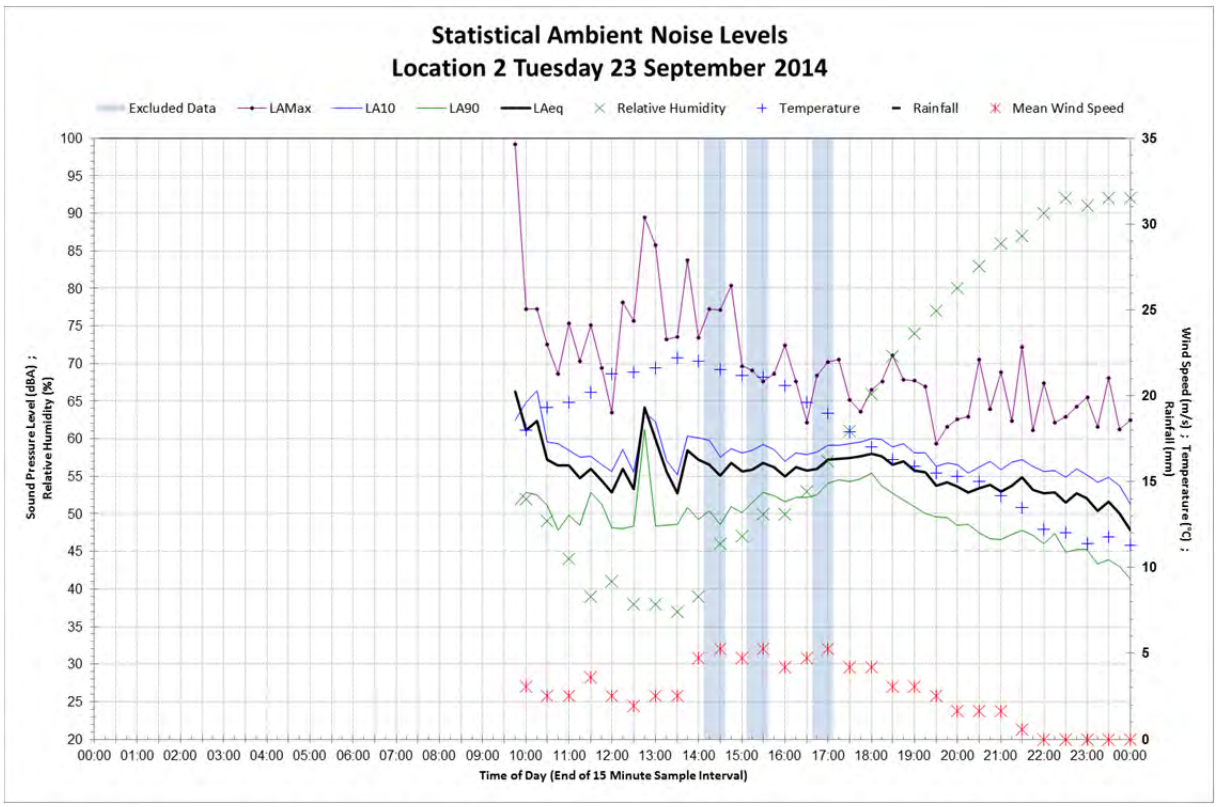
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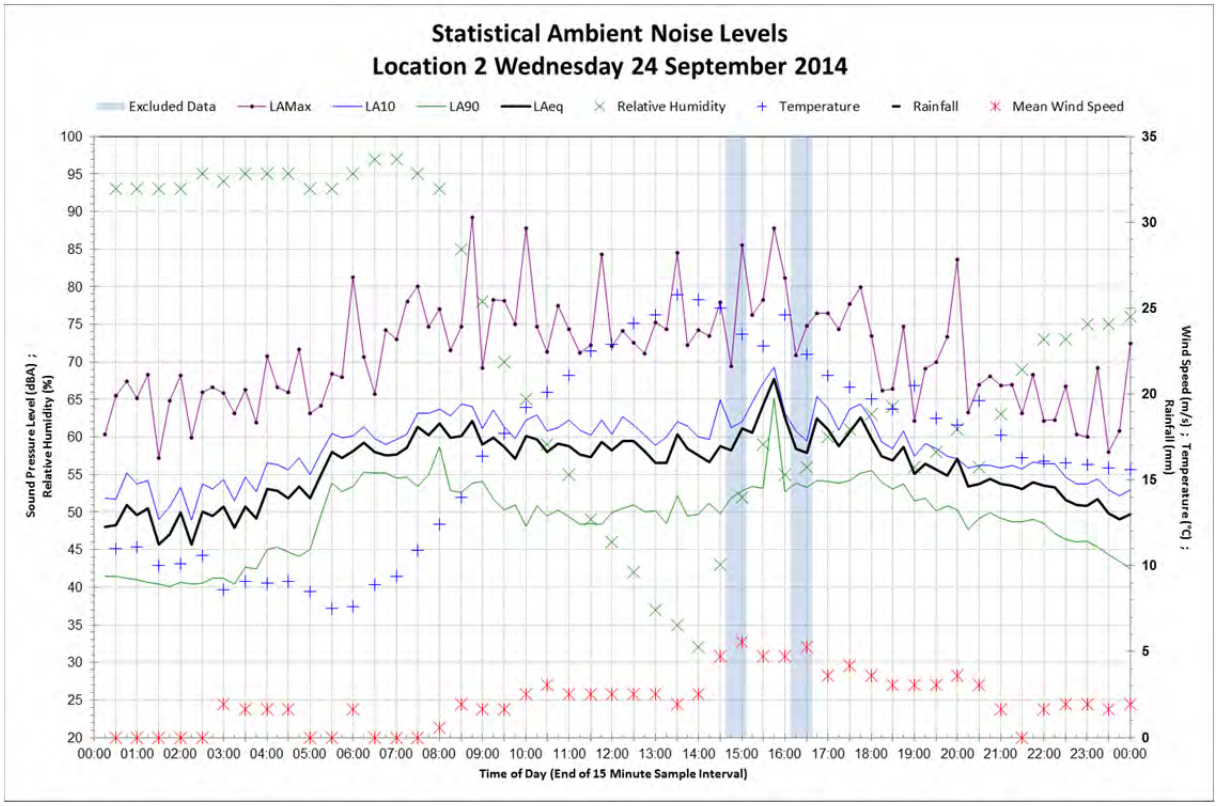
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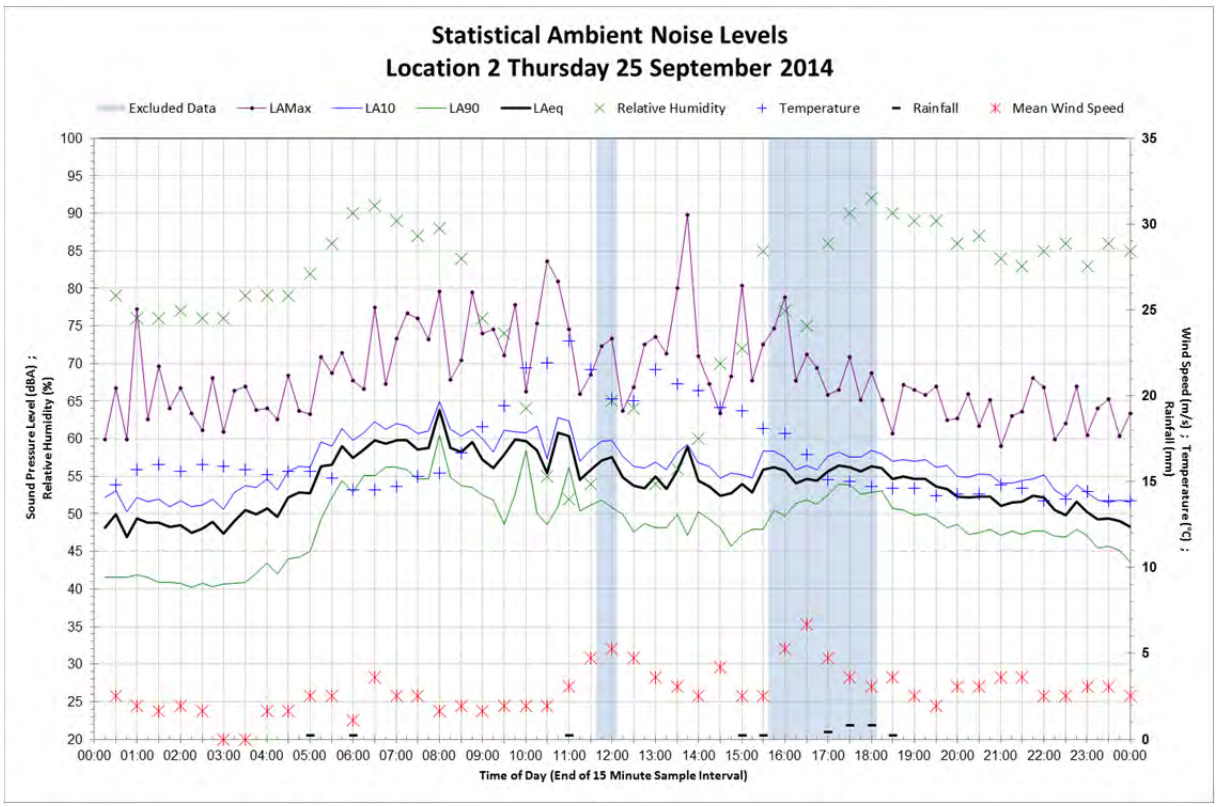
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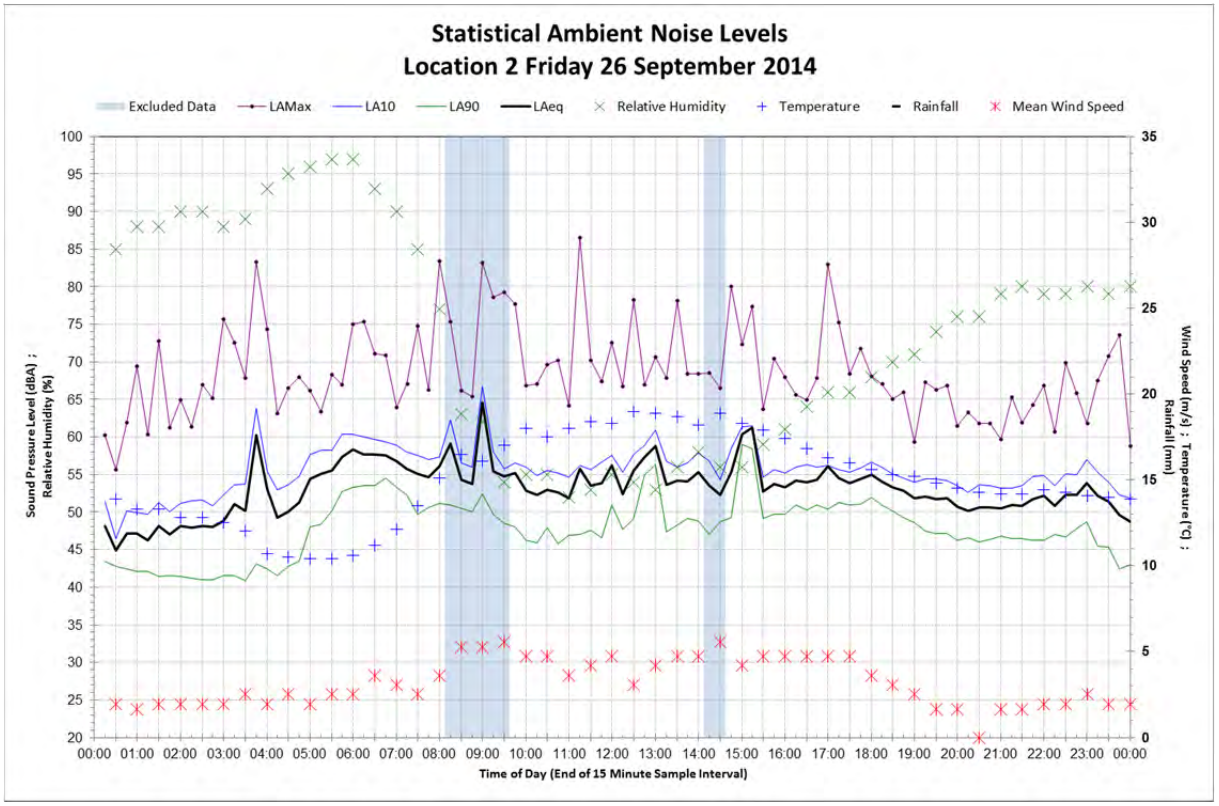
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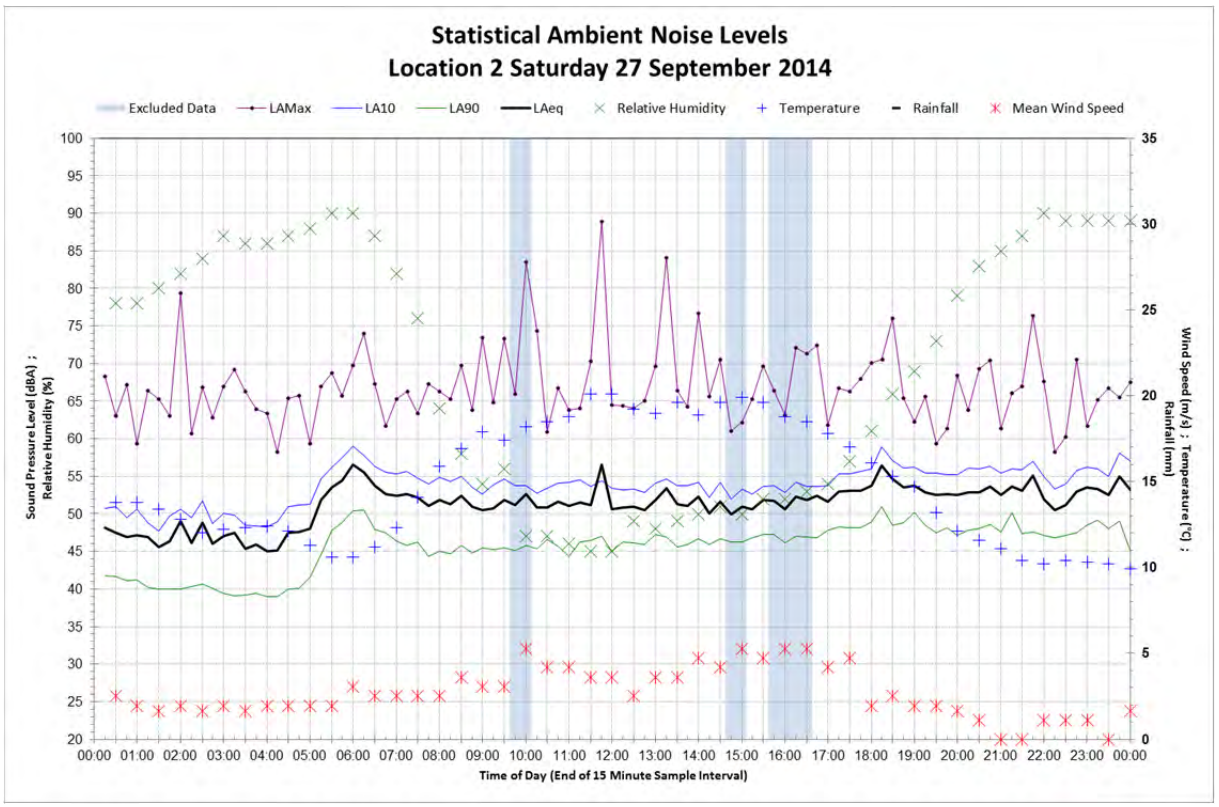
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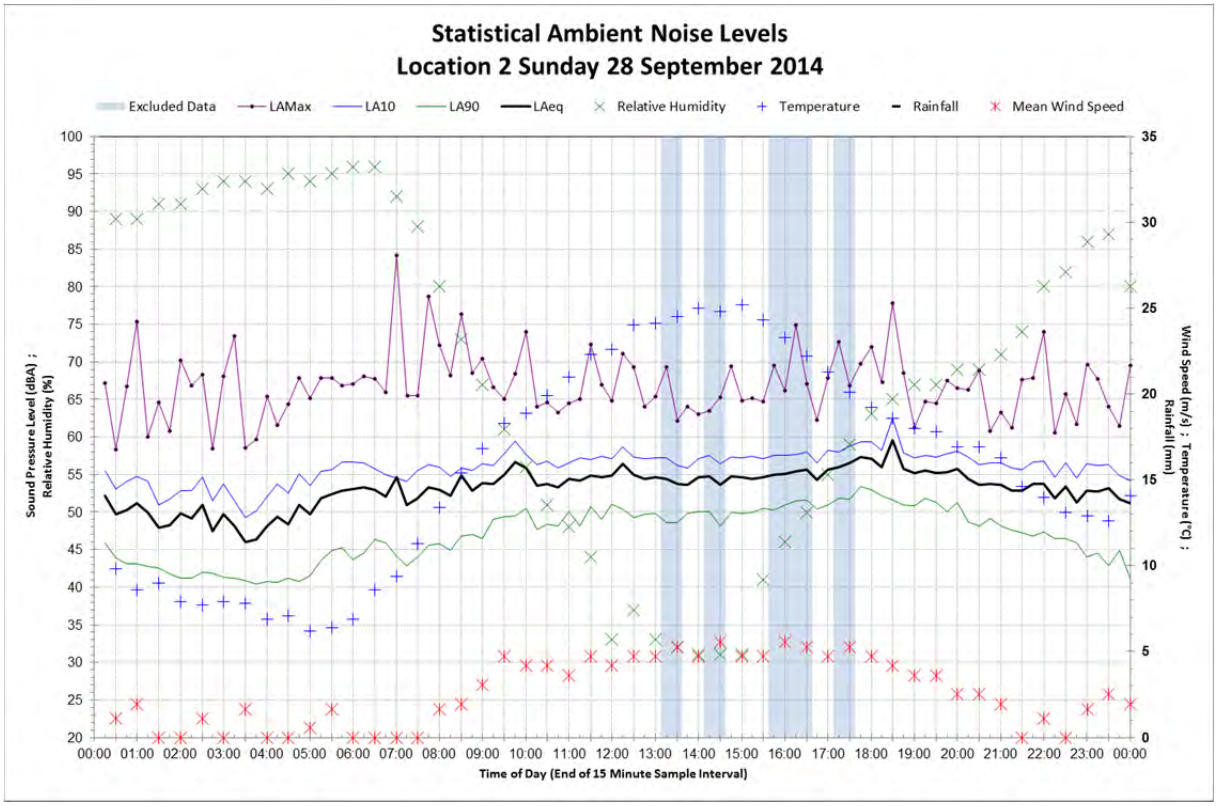
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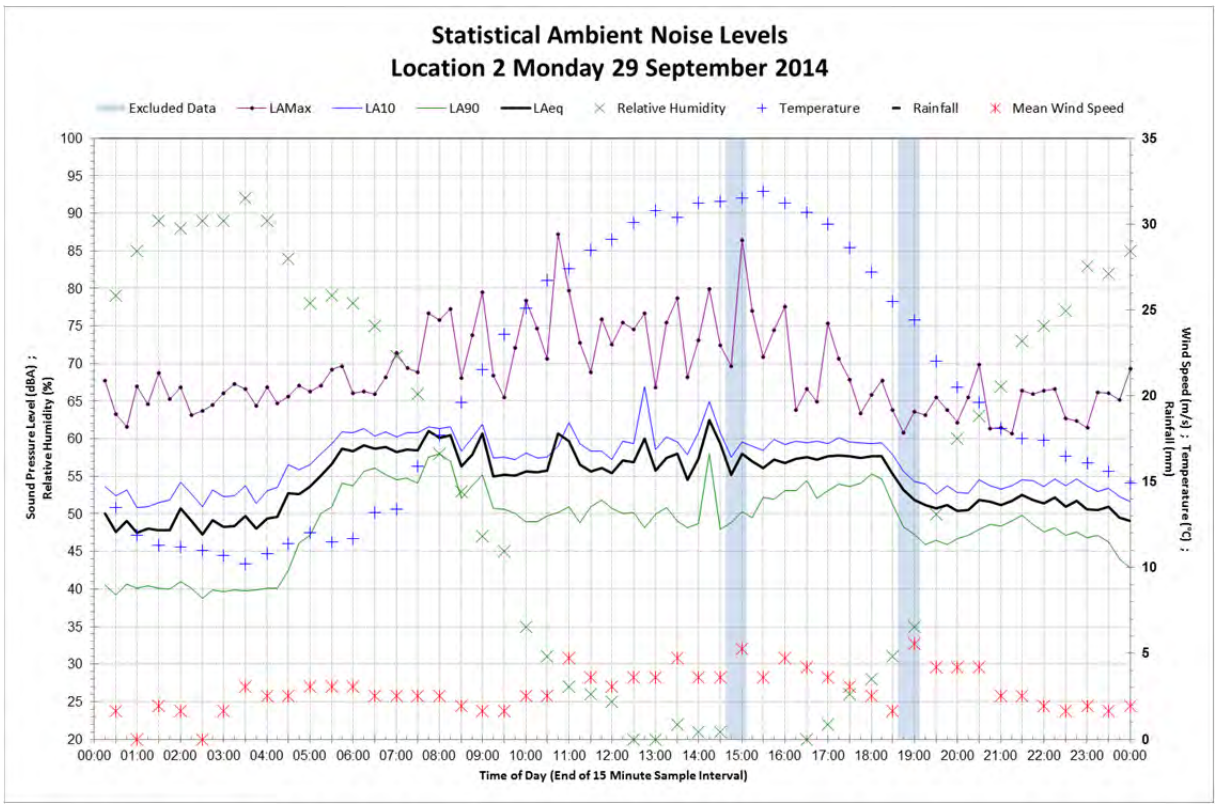
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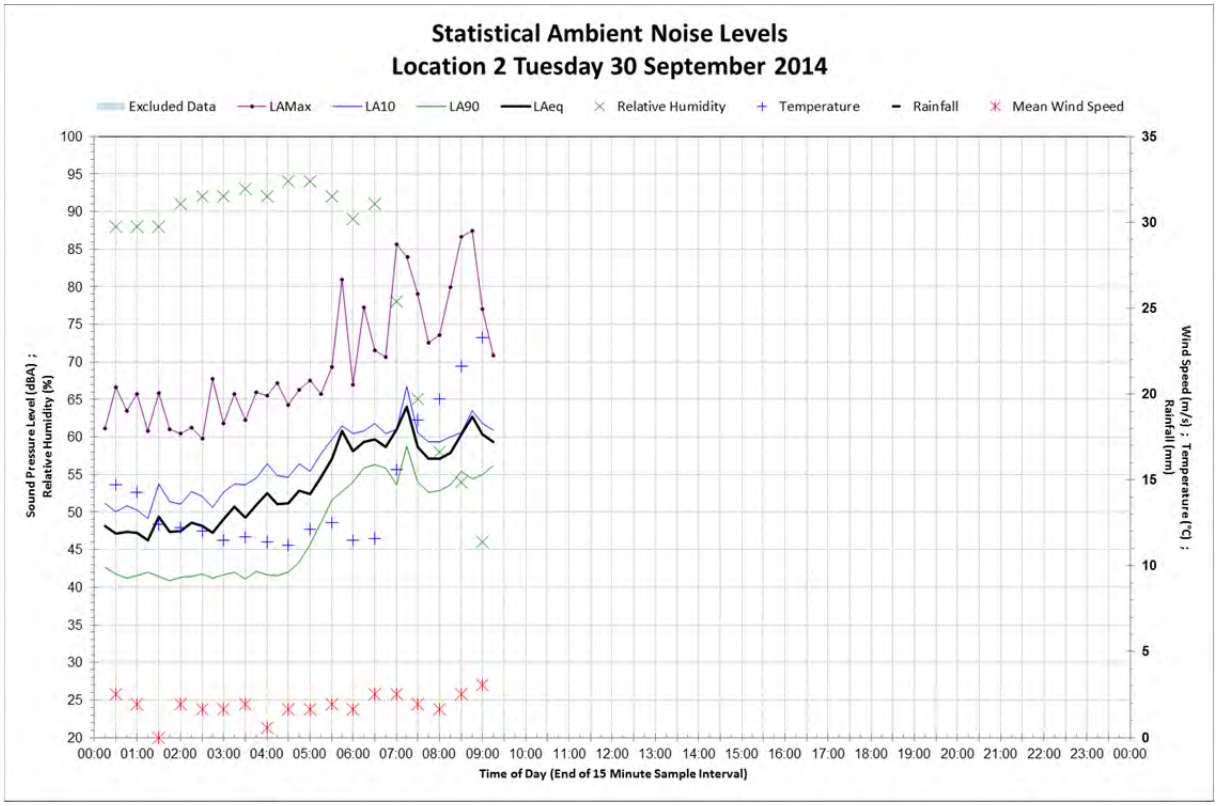
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Time of Day (End of 15 Minute Sample Interval)

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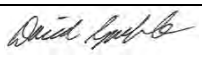
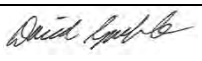
8	A Montgomery	D Gamble		D Gamble		3/08/2015

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