SITA Australia

Lucas Heights Resource Recovery Park Project

Environmental Impact Statement

VOLUME 3 – APPENDICES

October 2015

SITA Australia is changing brand to SUEZ

Table of contents

VOLUME 3 – APPENDICES

Appendix F – Visual impact assessment

SITA Australia Pty Ltd

Lucas Heights Resource Recovery Park Project

Visual Impact Assessment

September 2015

Executive summary

This report has been prepared by GHD Pty Ltd (GHD) to provide an assessment of visual impacts associated with this proposal as an input to the Environmental Impact Statement (EIS). This report is intended to address relevant parts of the New South Wales Department of Planning & Environment Secretary's Environmental Assessment Requirements (SEARs) which require an assessment of the potential visual impacts of the proposal on the amenity of the surrounding area.

The following methodology was used:

- describing and rating sensitivity of key receptors
- assessing the magnitude of impacts on those receptors
- determining the subsequent sensitivity of impacts
- where appropriate or necessary, recommend mitigation measures

The assessment considered impacts on nine groups of receptors, including residential receptors, travellers on main roads, and users of nearby industrial and recreational facilities. It also considered the proposal's impact at different points in time in order to provide an assessment on the likely 'worst case'. All of the receptor groups were determined to have a sensitivity of moderate or less. This was largely due to limited outlooks, limited quality of views, limited interest in views towards the LHRRP, or distance from the LHRRP site which reduces its prominence in the view (compared to other elements). The magnitude of impacts on each of the identified receptor groups was also determined to be moderate or less, largely due to interim topography or vegetation which limits visual accessibility of the proposal elements. Significant distance from receptors also reduces the visibility of the proposal. In addition, as the proposed changes would be incremental over a long time scale rather than occurring rapidly over a short timeframe.

To ensure no significant visual impacts to the community, SITA would also implement initial rehabilitation and maintenance measures. These include perimeter screening of the LHRRP by understory planting in targeted areas. Screening would occur progressively and be finalised prior to 2025. Once the proposed plantings are completed, the operations including the landfill, GO facility and ARRT facility are not likely to be visible from the adjacent New Illawarra Road and Heathcote Road. The LHRRP would also ultimately be rehabilitated to an attractive landscape that would be made available for community use as a public parkland in 2039.

The consequent assessment of impact significance found that all the identified receptors would be exposed to impacts of moderate, low, or negligible significance. By implementing the proposed mitigation measures, the proposal would not have any significant impacts on the community.

This report addresses the Secretary's Environmental Assessment Requirements and concludes that the proposal would meet the objective of having no significant visual impact on the community.

Table of contents

Table index

Figure index

Appendices

Glossary

Terms	Definition
ANSTO	Australian Nuclear Science and Technology Organisation
AHD	Australian Height Datum
ARRT facility	Advanced Resource Recovery Technology facility
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
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
Landscape	Human perception of the land conditioned by knowledge and identity with place (Landscape Institute and Institute for Environmental Management and Assessment, 2002).
Landscape feature	A component, part or feature of the landscape that is prominent or eye-catching, e.g. hills, buildings, vegetation
Mitigation	Limit the intensity, frequency or duration of impacts or prevent impacts.
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
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.
PCYC Mini-Bike Club	The mini-bike club operated by the Police and Community Youth Clubs NSW Limited (PCYC).
Viewing location *or* vantage point	Viewing locations are used in this report to typify the views experienced by sensitive visual receptors throughout the visual catchment of the Project. Viewing locations in this report often represent a viewing area, rather than one exact point.
Visual amenity	The value of a particular area or view in terms of what is seen

Terms	Definition
Visual exposure	The visibility of parts of the landscape to sensitive receptors and viewpoints.
Visual catchment	Extent of potential visibility to or from a specific area, feature or proposal
Visual impact	Changes in the appearance of the landscape or in the composition of available views as a result of development; and people's responses to these changes and the overall impact to visual amenity. This can be positive (i.e. beneficial or an improvement), negative (i.e. adverse or a detraction) or neutral (neither enhance nor detract)
Visual receptor	Person and/or viewer group that has the potential to experience an impact

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 visual 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. 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 proposal design meets SITA's objectives of having no significant impacts on the community or environment. Environmental management and mitigation measures related to visual 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 main identified objective for the proposal is to have no significant visual impacts on the community.

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 is 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 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.

[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.

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.

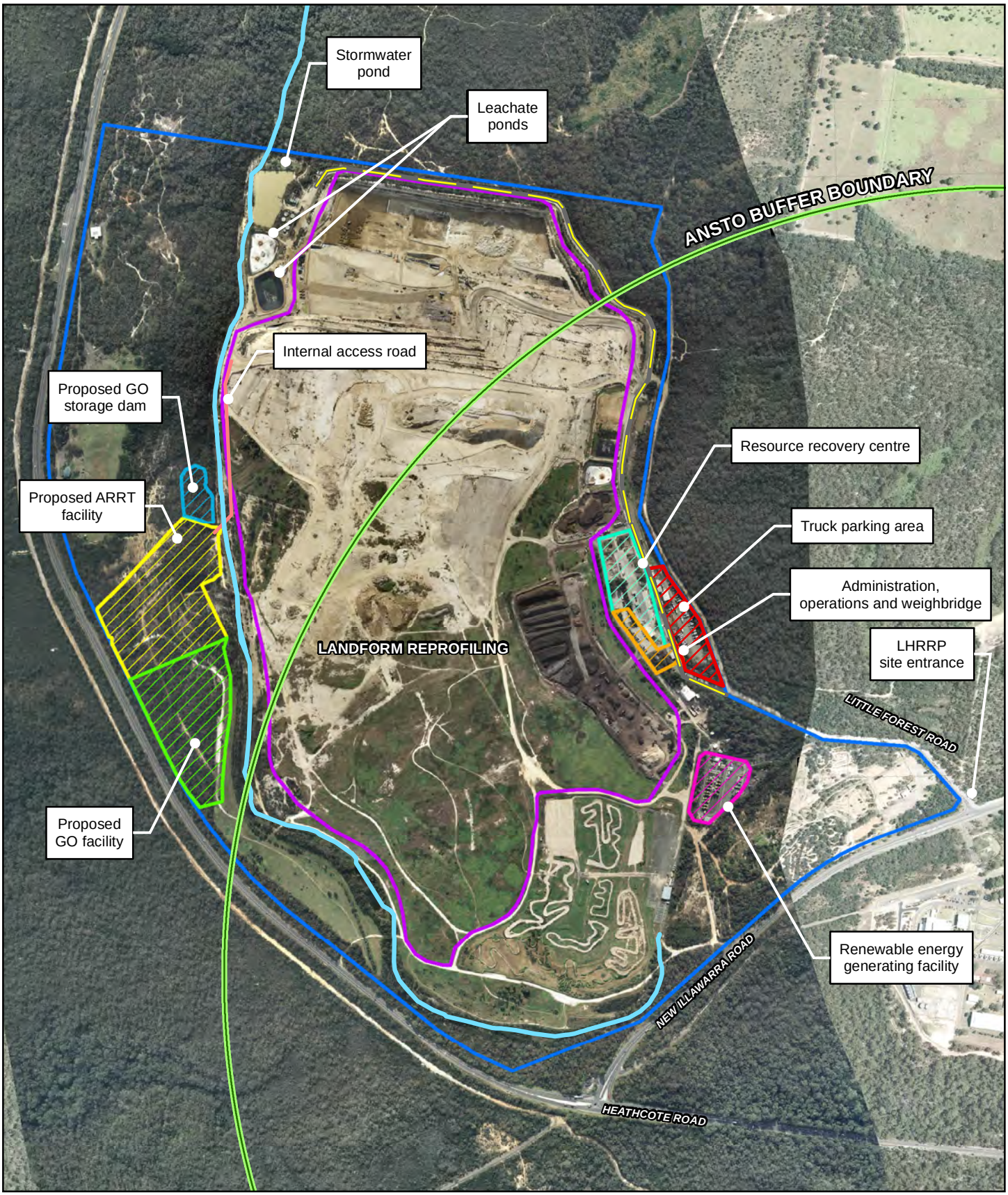
- **Relocation and expansion of the existing garden organics (GO) facility**. The existing garden organics facility would be relocated to the western side of the site adjacent to Heathcote Road. Approval is being sought to increase the approved capacity from 55,000 to 80,000 tonnes of green waste and 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 SSC 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

N

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

N

GHD

SITA Australia
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 1.2 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 LHRRP 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 1.3.

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)

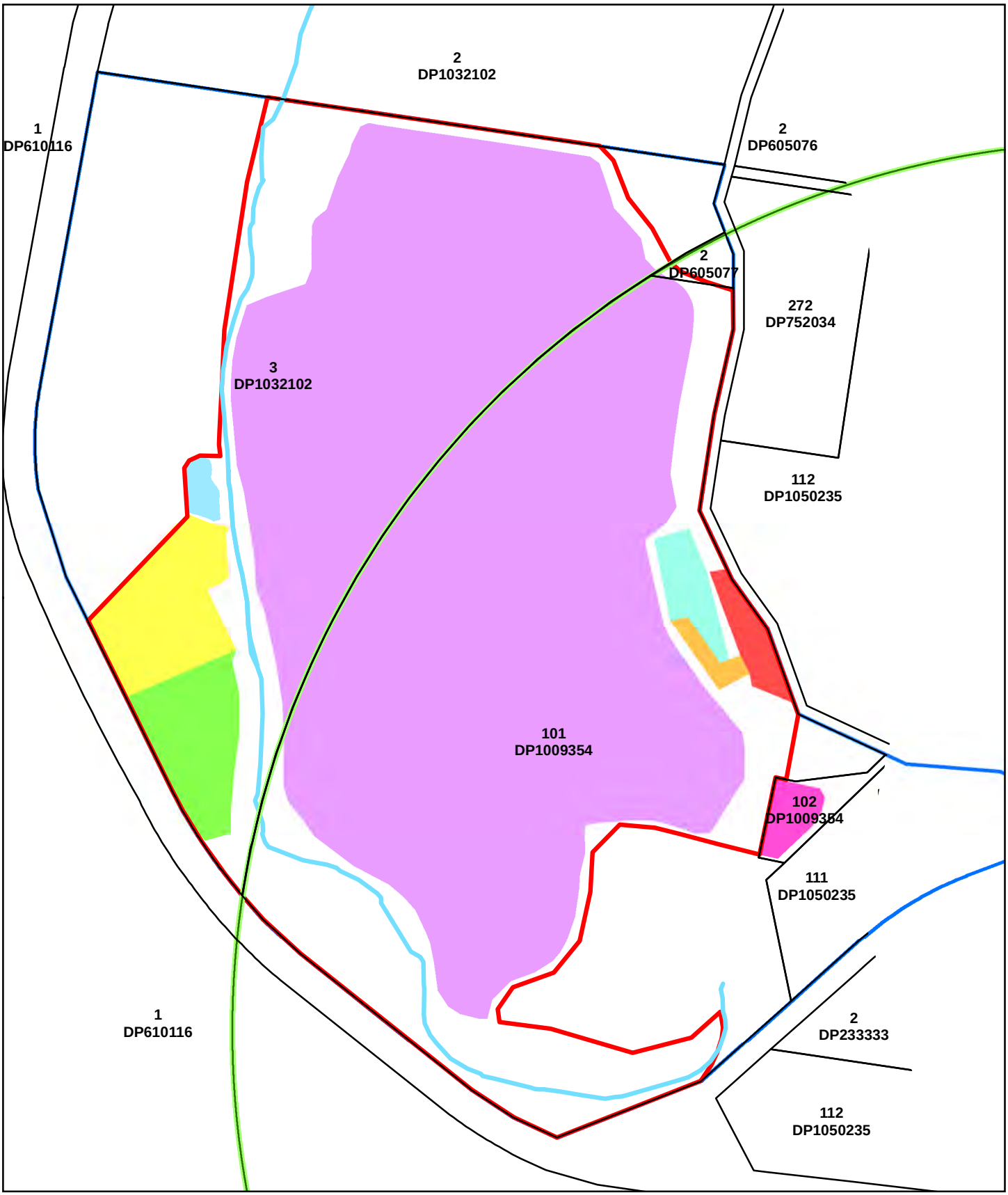
- The Ridge Sports Complex, a major regional sporting facility being developed on the site of the former Lucas Heights Waste and Recycling Centre (approximately 2.5 km to the north east)
- Lucas Heights Conservation Area (immediately to the north of the LHRRP)
- The suburbs of North Engadine (approximately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

N

GHD

SITA Australia
Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	A
Date	25 Jun 2015

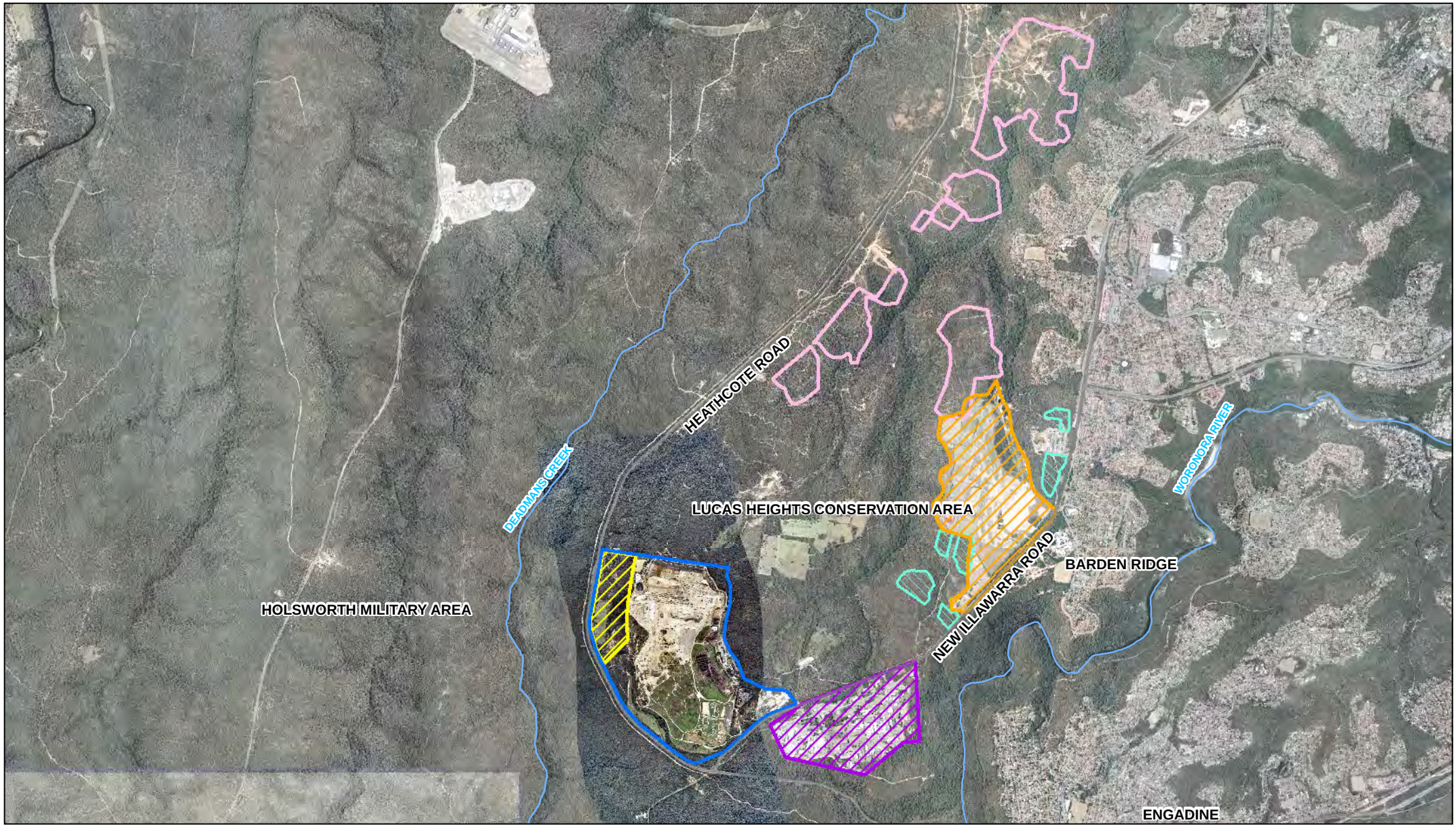
The proposal site

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

0 250 500 1,000 1,500

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
Including an assessment of the potential visual impacts of the development on the amenity of the surrounding area	Chapter 4

1.7 Scope and structure of the report

1.7.1 Scope of report

This report provides an assessment of the proposal's potential impacts on the visual environment.

The area of study for the assessment takes in the site and a broader study area within which the proposed development may influence visual amenity (an area extending approximately 4 km from the subject site in each direction). While the proposal may be visible from locations beyond this study area, from such distances it is unlikely that the proposal would be sufficiently prominent to affect visual amenity. This is confirmed in the analysis following, with the site often difficult to identify for viewpoints more than 2 km away.

The proposal is likely to be visible from a number of receptors. As it was not practical to properly assess all potential receptors, representative viewpoints have been identified and assessed. These viewpoints represent the types of views and potential impacts that are likely to be experienced from other receptors.

Both publicly and privately accessible receptors were considered, but for this assessment greater consideration is given to publicly accessible receptors to reflect the fact that they are typically frequented by a higher number of viewers.

Private properties, which are typically exposed to changes in the visual environment for extended periods of time, were not able to be accessed. As such, assessment of impacts on private properties was made by initial desktop analysis investigations and then further informed based on site observations from the closest accessible public place.

This report has not included any assessment or findings of potential impacts the proposal may have on heritage values within the proposal site or the surrounding areas.

This report is only concerned with assessment of impacts on the visual environment. Impacts on the landscape (including character) have been considered but have not been separately assessed.

The assessment process aims to be objective and describe any changes factually. Potential changes as a result of the proposal have been defined, however the significance of these changes requires qualitative (subjective) judgements to be made. The conclusions of this assessment therefore combine objective measurement and subjective professional interpretation. It is recognised that:

- Some viewing locations, views and areas visible in views will be considered more important than others by those experiencing the landscape
- Some viewers will be more aware of the landscape and more concerned about its appearance, depending on their reasons for being in the landscape

Because the aggregation of the proposed landform occurs over a long time scale, there is likely to be a level of impact normalisation occurring – the visible changes will be minor and incremental over time, as opposed to a sudden change in the view, and so receptors are likely to not notice the change, or will be used to the ongoing change.

Three photomontages have been prepared to assist with illustrating potential visibility of the proposal. They are included at Appendix D. The process for preparing the photomontages ensures a reasonable level of accuracy. However, due to degrees of accuracy typical of GIS devices and digital models, the photomontages are not absolutely accurate. They are however suitable for the purposes of illustrating visibility and appearance of the proposal. Further assumptions and limitations in relation to the preparation of photomontages have been identified in the relevant sections of this report.

Where the potential future development of the site and study area have been considered it has been assumed that any future development would be consistent with applicable planning intents and provisions, and with the community's reasonable expectations.

A large existing stockpile of excavated material from ongoing landfill operations has been considered as part of the baseline conditions for this visual assessment; however the presence of this stockpile has not been specifically assessed as part of the proposed development. The existence of the stockpile and the ongoing maintenance (adding or removing material) is the subject of a previous approval and therefore not part of the current proposal.

It has been assumed that lighting of the facilities will be limited to low impact utility lighting which would only be used if someone is accessing the facility during the evening or for emergency purposes. Impacts on lighting have therefore not been assessed.

It has been assumed that dust generation will be sufficiently controlled across the site such that it will not generate significant visual impacts for the identified receptors. Impacts from dust generation have therefore not been assessed.

It has been assumed that the proposal will implement early tree planting works on the southern site boundary, subject to further investigations, in order to screen and reduce potential viewpoints of the proposal from nearby visual receptors.

Cumulative impacts have not been specifically considered as part of this report, but there are no known projects of a similar nature that may contribute to cumulative impacts on the visual environment.

It has been assumed that stages of completed landfill will be capped and rehabilitated with low, large-scale vegetation cover such as hydroseeding or similar.

1.8 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 and the existing planning context
- **Chapter 3 – Assessment process** – This chapter identifies the assessment process
- **Chapter 4 – Impact assessment** – This chapter examines the potential visual impacts associated with the proposal
- **Chapter 6 – Mitigation** – This chapter identifies mitigation measure relating to visual
- **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 Overview

This section is not intended to provide a comprehensive description of the proposal, but rather identify aspects of the proposal and its context which are relevant to the consideration of visual impacts.

2.2 The site and context

The LHRRP (refer Figure 2.1) consists of approximately 205 hectares in two ownerships - 89 hectares owned by SITA and 116 hectares owned by the Australian Nuclear Science and Technology Organisation (ANSTO) and leased to SITA for waste management or other agreed purposes.

The LHRRP site is largely defined by the following components

- A large landfill cut at the northern extent of the LHRRP used for ongoing landfill operations
- A large stockpile of excavated sandstone material. The overall size and shape of the stockpile changes, as a result of material being added or removed. These changes, although constant, are not discernible on a daily basis
- Approximately half of the designated landfill area which has previously been completed, capped and grassed

As mentioned, as well as the landfill operations and waste management facilities on site, a number of other community facilities and uses exist within the overall site boundary (refer Figure 2.2), including:

- SICTA and other recreational shooting clubs operating in the north-western corner of the site
- Police Citizens Youth Club (PCYC) mini-bike track facility at the southern extent of the site
- Community plant nursery run by volunteer groups to propagate revegetation and rehabilitation plant stocks for the Local Government Area (LGA). The nursery operations are in a central location on site adjacent to existing waste management facilities

Significant land uses in close proximity to the LHRRP site include:

- The residential areas of North Engadine (approximately 2 km to the south-east), Barden Ridge (approximately 3 km to the north-east), Menai and Bangor (approximately 4-5km north-east), Heathcote (approximately 5km to the south)
- Holsworthy Military Reserve (to the north, west and south)
- Lucas Heights Conservation Area (to the north-east) – densely vegetated land immediately north of the landfill
- Heathcote National Park (to the south) which borders the military reserve and extends for a significant distance to the south of the proposal
- ANSTO's Lucas Heights Reactor (to the south of New Illawarra Road). This facility has a 1.6 km buffer zone, within which approximately 116 ha of the LHRRP is located
- The Ridge Sports Complex (to the north east), a major regional sporting facility on the site of the former Lucas Heights Waste and Recycling Centre

West Menai State Significant Site Development, a potential large-scale future residential and commercial development, also known as Heathcote Ridge. The development proposal had been previously approved within the existing Lucas Heights Conservation Area, however an updated planning proposal has recently been submitted and is currently under assessment.

The landscape surrounding the LHRRP facility is a predominantly a natural landscape defined by reasonably dense vegetation and dramatic topography. These natural landscapes are interrupted by the LHRRP and the ANSTO facility, and the reasonably busy New Illawarra Road and Heathcote Road.

The undulating landscape provides reasonably expansive views from a number of vantage points, but access to such vantage points are limited.

2.3 Existing operations

The LHRRP operates between 6.00 am and 4.00 pm Monday to Friday and 8.00 am to 4.00 pm Saturday and Sunday. Existing waste management facilities and significant site features of the LHRRP include the following:

- Ongoing landfill operations (approved to receive up to 575,000 tonnes per year of Sydney's waste)
- An approximate area of 23,175 m^2 of stockpiled sandstone fill at a maximum elevation of 179.9 m AHD, excavated and used in landfill operations
- Waste receiver facility – allowing users to deposit household waste materials and organic/inorganic recyclable materials
- Existing garden organics area for processing garden organics and green waste
- Biogas infrastructure and power plant facilities (operated by EDL)
- Several ancillary buildings and structures (e.g. weighbridge, machinery workshop, administration offices, stormwater and leachate dams)
- Leachate pipeline and treatment plant (located at Lucas Heights 1)
- Consistent traffic movement throughout the site and entering/exiting onto New Illawarra Road

LEGEND

Lucas Heights Resource Recovery Park boundary

Roads

Paper Size A4

0 250 500 1,000

Metres

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

N

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 27 Apr 2015

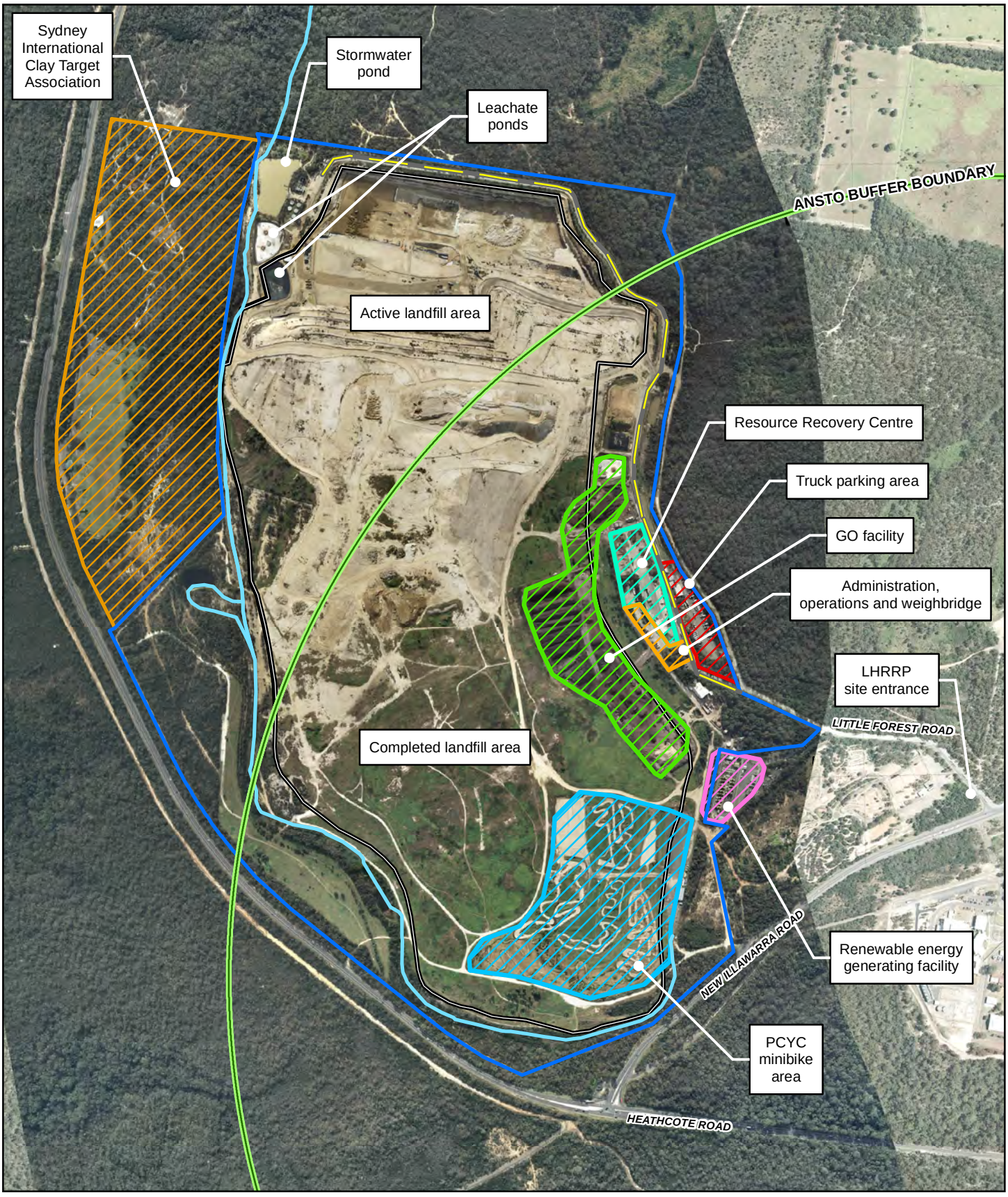
Site context

Figure 2.1

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

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21_23482_z058_SiteContext.mxd

Aerial Imagery: Google, 2014. LHRRP Boundary: GHD, 2014. Roads/Suburbs: NSW LPMA 2012. Location Data: GEOSCIENCE AU 2014. Created by:jrichardson



LEGEND

- ANSTO buffer boundary
- Internal access road
- Approved landfill footprint
- Site boundary
- Sydney International Clay Target Association
- GO facility
- Resource Recovery Centre
- Administration, operations and weighbridge
- Renewable energy generating facility
- PCYC minibike area
- Truck parking area

Paper Size A4

0 75 150 300

Metres

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

N

GHD

SITA Australia
Lucas Heights Resource Recovery Park

Existing key infrastructure and facilities

Job Number 21-23482
Revision A
Date 27 Apr 2015

Figure 2.2

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

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21-23482-Z012_ExistingKeyInfrastructure6.mxd

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

2.4 The proposal

Aspects of the proposal are described in section 1 and shown on Figure 1.1.

The reprofiling of the site would be completed by 31 December 2037. The final landform profiles would then be rehabilitated in 2038 as per the current design proposals, with the completed public parkland land use commencing in 2039.

The following sections provide a more detailed overview of each of the aspects of the proposal.

2.4.1 Landform re-profiling

The final landform is the shape that the landfill will achieve after completion of landfill operations, including reprofiling and capping works. Due to the decomposition of the waste and compression of the waste from the weight above, the landform will settle over time, where it eventually establishes a final shape. Figure 2.3 provides an illustration of the final landform contours after settlement.

Improvements to the 1999 final landform

The final landform was developed after a review of the original landform developed in 1999. Through the review, it was established that there were insufficient grades to provide appropriate drainage of stormwater off the landfilled areas. This has a range of undesirable consequences such as allowing water to pond on the landfill surface which results in excess leachate generation. A revised landform was developed in order to meet the NSW EPA's Environmental Guidelines: Solid Waste Landfills which provides guidance on final landform design, specifically in Benchmark Technique 28 (site capping and revegetation) where, it states:

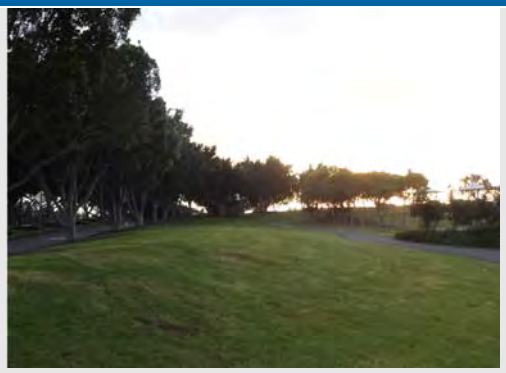
"The final settlement of the seal bearing surface should leave a gradient of greater than 5% to defined drainage points"

A slope analysis for the proposed final landform was undertaken and demonstrates that the post-settlement final landform achieves the minimum 5% design criteria as outlined above. The slope analysis is included in the final landform design basis and settlement analysis report (GHD, 2015).

A maximum grade of 1V:4H is established to allow maintenance of vegetation on the final landform. Most parts of the site would be constructed with slopes between 5% and 10% (1V:10H). The final landform provides grades which are appropriate for the proposed passive recreation uses. A discussion of the grades and examples of equivalent slopes in existing parklands is provided in Table 2.1.

Table 2.1 Reprofiling area slope analysis

Grade range	Park area	Portion of park area	Example of equivalent slope
5 – 10%	52.4 hectares	 35%	 Barden Ridge Sporting Complex

Grade range	Park area	Portion of park area	Example of equivalent slope
10 – 18%	35.6 hectares	 24%	 Bicentennial Park
18 – 25%	4.6 hectares	 3%	 Cronulla Park

Comparison with existing heights

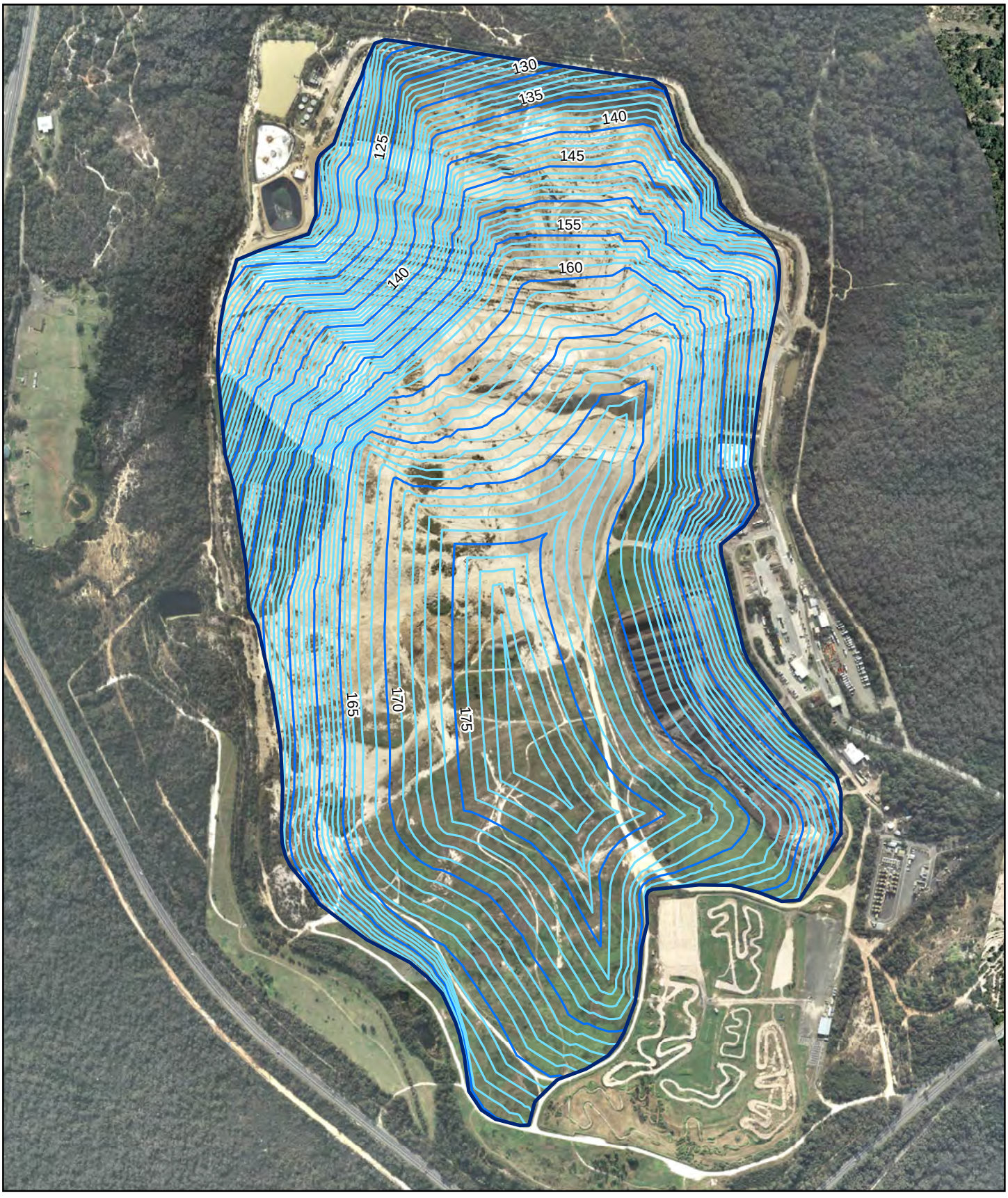
At its highest, the landform profiles would be approximately 12.9 metres higher than the currently approved profiles granted in 1999. The waste would be placed to a level which will result in a landform with maximum height of RL 179.9 m AHD after settlement (includes waste and final cap). This is approximately 8 m above the level which is currently approved. Table 2.2 shows a summary of the different proposed heights

The maximum height of the constructed surface at the highest point of the reprofiled landfill would not exceed RL 184.9 m AHD (includes waste and final cap). This means that the highest point of the reprofiled landform, located near the centre of the site, would be approximately 2 m above the height of the existing stockpile (2015) which is located towards the northern end of the site.

Table 2.2 Proposed heights for final landform

Landform	Height (m AHD)
Approved landform	172
Proposed landform (pre-settled)	184.9
Proposed landform (post-settled)	179.9

It is important to note that the landform re-profiling is a progressive and incremental operation. At no point will a casual observer see an instantaneous landform profile which is 12.9 metres higher than existing profiles



LEGEND

- Post settlement 5m contours
- Post settlement 1m contours
- Proposed landfill footprint boundary

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

GHD

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 05 May 2015

Proposed final landform
Post-settlement

Figure 2.3

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-Z021_ProposedFinalLandform_Post-Settlement.mxd

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

2.4.2 Garden Organics facility

The proposal seeks to expand and relocate the existing Garden Organics (GO) operations, to enable an additional 25,000 tonnes per year of material to be received and processed.

This component of the proposal would include the following (refer Figure 2.4):

- Relocation and partial enclosure of facilities and storage areas from the eastern extent of LHRRP to the western extent, adjacent to Heathcote Road and the newly proposed ARRT facility
- Expansion of the overall footprint, including an additional 2.6 ha across two new areas on previously landfilled ground
- Construction of aerated concrete bunkers to improve the environmental performance of the composting process
- Transporting of additional materials imported to site to enable blending of GO outputs to produce saleable products and meeting AS 4453 requirements
- Development of a new dam for overflow capacity and minor changes to stormwater management

LEGEND

- Lucas Heights Resource Recovery Park boundary
- Internal access road
- Creek
- Landfill area

1. Waste reception/sorting/preparation
2. Active composting
3. Maturation
4. Finished compost storage
5. Mulch storage
6. Leachate pond
7. Reception
8. Blending
9. Hardstand
10. GO sump
11. Amenities office

Paper Size A4

0 10 20 40 60 80

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 A
Date 03 Jun 2015

GO facility layout

Figure 2.4

G:\21\23482\GIS\Maps\MXD\21-23482-Z014_GOFacility.mxd

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

Aerial Imagery: SITA, 2014. GO&ARRT: GHD/SITA Australia, 2014. Roads/Suburb: NSW LPMA, 2012. Created by:apmiller

2.4.3 The Advanced Resource Recovery Technology (ARRT) Facility

The ARRT facility (refer Figure 2.6) involves the construction and operation of an Advanced Waste Technology ('AWT') facility, enabling around 200,000 tonnes of municipal solid waste to be received and processed. This facility would require approximately 8 ha of land and operate three shifts per day, 7 days per week for a period of up to 20 years. Figure 2.3 shows a conceptual image of a similarly sized facility.

An existing planning approval exists (development consent DA No 11-01-99 consent ref R97/00029) for the operation of an AWT facility in the south-east corner of the LHRRP, however this proposal will seek to relocate a similar facility to the western extent of the site and increase the input to 200,000 tonnes.

This component of the proposal would include the following:

- One or more 20 m high biofilter ventilation air discharge portals.
- Waste receiving and processing building.
- Detention pond and diversion of existing creekline.
- Access road, car park and associated hardstand infrastructure.

Figure 2.5 Concept image of a similar ARRT facility

LEGEND

- Creek
- Lucas Heights Resource Recovery Park boundary
- Internal access road
- Landfill area

Paper Size A4

0 15 30 60 90 120

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 A
Date 03 Jun 2015

ARRT facility layout

Figure 2.6

G:\21\23482\GIS\Maps\MXD\21-23482-Z017_ARRTFacility.mxd

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

Aerial Imagery: SITA/GHD. 2014. GO&ARRT: GHD/SITA, 2014. Roads/Suburb: NSW LPMA, 2012. Created by:apmiller

2.4.4 Traffic activity

The traffic impact assessment (GHD 2015) undertaken as part of the EIS identified that the increase in traffic volumes associated with the proposal along New Illawarra Road and Heathcote Road would be marginal. The forecast increase in traffic during 2027 AM peak is 1.4% and 1.7% on New Illawarra Road and Heathcote Road respectively. The forecast increase in traffic during the 2027 PM peak is 1.8% and 2.1% on New Illawarra Road and Heathcote Road respectively. The proposal is therefore unlikely to result in noticeable visual impacts. The traffic impact assessment report (GHD, 2015) contains additional information about anticipated traffic generation and impacts on the roads.

2.4.5 Litter and illegal dumping

Combating litter and illegal waste dumping is a major priority for both the NSW Government. Goal 22 (Protect our Natural Environment) in NSW 2021 identifies the reduction in illegal dumping as a priority and the NSW EPA has a strategic waste enforcement and compliance program. The program also supports and provides assistance to public land managers and councils to help them combat litter and illegal dumping.

Transportation of waste to the LHRRP has the potential to generate litter via improper containment of loads. It is also possible for wind-blown material from the landfill to escape from the site.

Litter and illegal dumping may affect the visual amenity. It is SITA's goal to prevent litter from entering Mill Creek, spreading off the site into bushland (environmental buffer area and the Lucas Heights Conservation Area) and other areas adjacent to the site including sections of Little Forest Road, Heathcote Road and New Illawarra Road.

Specific actions undertaken by SITA to manage litter and illegal dumping are described in the LHRRP Operations Environmental Management Plan (SITA, 2014). In addition, a joint litter campaign between SITA and SSC will also contribute towards the achievement of the above goal. The NSW EPA and Roads and Maritime Services also have programs and responsibilities for managing litter and illegal dumping external to the site.

Control of litter and illegal dumping is described in Chapter 22 of the EIS.

2.4.6 Site operational hours

Under the proposal, ARRT and GO facilities would operate 24 hours/day, 7 days/week, although waste receival activities would be restricted to between 6 am and 5 pm on weekdays and 8 am to 5 pm on weekends.

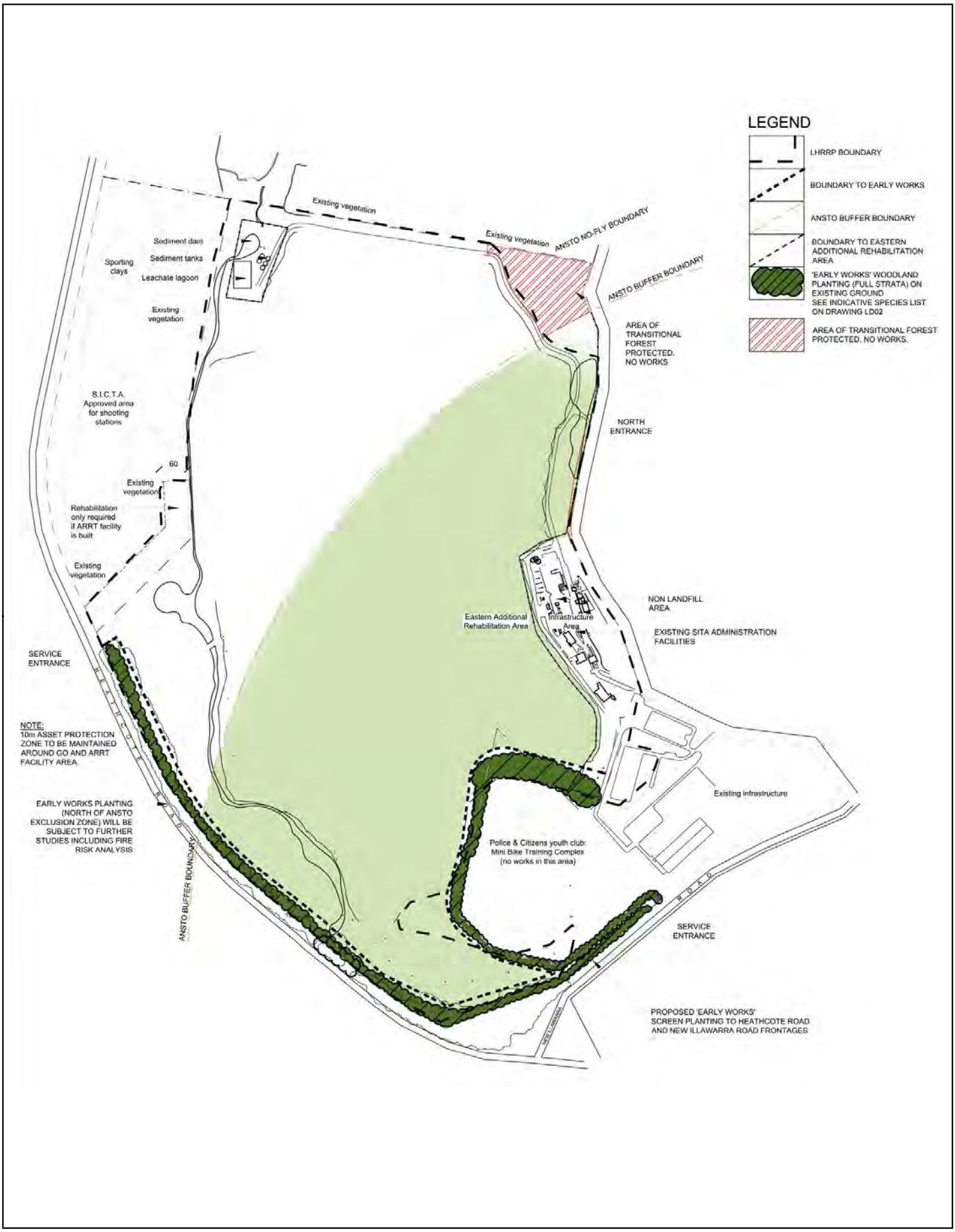
Waste receival and landfill operation would be extended by one hour in comparison to the existing hours of operation under the current approval. These estimates are considered minor and are unlikely to result in noticeable visual impacts.

2.4.7 Initial rehabilitation and maintenance measures

The proposal would also incorporate new areas of woodland and understory planting in targeted areas before the completion of landfill operations in order to screen landfill, garden organics processing and ARRT activities from ANSTO land, adjacent roads and adjacent land uses including the boundary of the existing PCYC area where feasible (refer Figure 2.7). These initial woodland plantings would be subject to further design investigations and confirmations such as bush fire risk analysis and ANSTO approval to undertake works. Screening would occur progressively and be finalised by 2025. It is assumed that the proposed planting would take 3-5 years to form an effective visual screen. The operations including the landfill, GO facility and

ARRT facility are not likely to be visible from the adjacent New Illawarra Road and Heathcote Road once the proposed plantings are completed.

The proposal includes planned capping and rehabilitation of landfill areas progressively as they are completed. The revegetation would comprise low level grass and groundcover re-vegetation.



Paper Size A4

NOT TO SCALE

N

SITA Australia

Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 18 May 2015

Proposed screening extents of LHRRP infrastructure

Figure 2.7

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_left.mxd

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

2.4.8 Future regional parkland

Under the current approval, once landfill operations have been completed a progressive rehabilitation would be undertaken to convert the landfill into regional public parkland, approximately 124 ha in size (refer Figure 1.2).

Under the above proposal, once landfill operations have ceased in 2037, the proposed parkland would be constructed and extended across the GO and ARRT facilities (which will be decommissioned), creating approximately 25 ha of extra public park. Construction of the parkland would commence in 2037, with completion expected in 2039.

The rehabilitation would consist of the following key stages:

1. Decommissioning and removal of the GO and ARRT facilities
2. Establishment of Mill Pond and water features
3. Development of surface water management infrastructure on the landfill
4. Thickening of the revegetation layer over parts of the reprofiled area to support larger plants
5. Tree and shrub planting
6. Development of access tracks and pathways
7. Construction of amenities such as carparking, composting toilets and picnic shelters

Once the GO facility and ARRT facility have been decommissioned and the parklands facilities established by 2039 SITA will maintain the landscaping of the landfill area for two years (2040 and 2041) prior to the transferal of maintenance responsibilities to SSC.

SITA will maintain the rehabilitation of the landfill area in accordance with the landscape drawings, as included in the Parkland, Future Use and Post Closure Management report (GHD 2015).

GO and ARRT facilities

The GO and ARRT facilities will be decommissioned. This will include the removal of any buildings, hardstand, services and ponds. The area will be returned to its natural topography.

The vehicular access to the GO and ARRT facilities will be included as part of the parkland road network wherever possible.

Mill Pond & Duck Pond

Mill Pond will be established. This will include establishment of the Mill Creek connection to the pond and the indigenous plant life to provide additional habitat opportunities.

Duck Pond, located in the south west corner of the site, will be constructed as previously committed (1999 EIS).

These are illustrated in the Parkland, Future Use and Post Closure Management report (GHD 2015).

Surface water management

The following description of the parkland surface water requirements is based on the Lucas Heights Resource Recovery Park Project, Surface Water Assessment (GHD, 2015).

The main sediment and water reuse dams would remain, functioning as water management dams. These would be cleared of sediment and landscaped before the parkland's availability

Drainage channels would collect surface water runoff. The channel locations have been proposed such that the areas draining to the main sediment and reuse basin is approximately equal to the maximum catchment draining to the dam during the operational phase of the project.

This would provide the maximum volume of water available for re-use (if needed) over the parkland site, whilst not significantly decreasing environmental flows to Mill Creek compared to during the operational phase of the project. Detailed design of the drainage channels would be required prior to construction of the channels before the commencement of each landfill stage in consideration of potential for scour, including rock protection, energy dissipation or stepping where required.

An indicative design has been undertaken and the design methodology, basis and results are contained in the Surface Water Assessment (GHD, 2015). This indicative design takes into account the post-closure surface water drainage requirements.

The capacity of the perimeter drainage (Mill Creek and drainage around the east and north of the site) was also reviewed and confirms the peak 100-year Average Recurrence Interval (ARI) event could be conveyed in the drainage lines and outer perimeter drains.

The existing dimensions are therefore considered to be adequate and are therefore proposed to be retained post-closure of the LHRRP.

The selection of lining type should consider the velocities likely to be experienced in the channels during a 20 year ARI design storm event in order to prevent excessive soil erosion.

Different lining types provide protection for flows within certain velocity range. Lining materials would include rock, mesh reinforced turf, grass, jute or coin mesh.

Suggested channel lining treatments based on the expected channel velocities included in the Surface Water Assessment (GHD, 2015). The most suitable channel lining type would be determined during detail design with consideration of critical flows velocities and final drain locations

Revegetation

The revegetation/landscaping of the final landform would be in accordance with the landscape drawings provided in the Parkland, Future Use and Post Closure Management report (GHD 2015).

An extensive planting program would be undertaken using a range of trees and shrubs to create a pleasant setting for passive recreational uses. Thickening of revegetation layer would be required over parts of the reprofiled area to support larger plants. This will be applied to almost a quarter of the reprofiled area where the layer will be thickened from 250 mm to 1000 mm and the topsoil re-established. In addition, pedestrian, cycle pathways and water features, combined with lawn areas and toilet facilities are proposed. The landscape plans have been developed utilising the proposed final landform surface discussed in Section 2.4.1.

Roads and cycle paths

A light-duty vehicular road system would be constructed throughout the proposed park allowing movements of vehicles within the entire park environment. These are provided in the Parkland, Future Use and Post Closure Management report (GHD 2015).

Composting toilets

Above ground composting toilet facilities will be established to support the use of public space. These are illustrated on the landscape drawings as included in the Parkland, Future Use and

Post Closure Management report (GHD 2015). Toilets connected to sewer are not appropriate for areas containing landfilled waste.

The design of the toilets will need to include ventilation to prevent potential gas build-up, consider the impacts of settlement and allow for disabled access. Solar lights (if required) and rainwater tanks would be provided to service the toilets.

Retained existing infrastructure

The leachate and surface water management infrastructure located in the north west corner of the site and the landfill gas power generation facility in the south east of the site will be retained for ongoing environmental management. The existing resource recovery facility, administration buildings, PCYC minibike club and SICTA area do not form part of the parkland area.

2.5 Planning context

In in order to understand the reasonable expectations of the community it is useful to understand the planning intent and processes for the site and surrounding area. The following sections provide a brief overview of planning intents and approvals.

2.5.1 Sutherland Local Environmental Plan 2015

The proposal is located within the Sutherland local government area and therefore the Sutherland Local Environmental Plan 2015 (SLEP) applies to the proposal site. The proposal site is located in the following zones:

- SP1 – Special activities (Waste Recycling)
- RE1 – Public Recreation

The proposed reprofiling of the landfill is located on all of the above zones. The use of this land for waste disposal is not permissible under the SLEP. The proposed ARRT and GO facilities are located on land zoned RE1. Under these zones, the development of these two facilities is not permissible.

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 SLEP, which would allow the proposal (a waste or resource management facility) to be undertaken on the proposal site

The expansion of the LHRRP would not prevent the future use of the land for recreation purposes, as is currently planned when the existing facility was to cease operation. The proposal would change the timeframes in which the land would be able to be used for recreational purposes, however the proposal would ensure that the land is suitable for use for recreation purposes as the landfill area would be compacted to meet the EPA Benchmark technique requirements which call for a minimum airspace utilisation of 850 kilograms per cubic metre. Once capped, the final landfill surface would be capable of supporting future recreation land uses.

2.5.2 Existing LHRRP planning approvals

In 1985, SSC granted approval for operation of the LHRRP (Consent No. 5482/85).

From 1999 onwards, the Minister for Planning was the determining authority for development applications and granted approval in November 1999 for an expansion of the waste facility and the inclusion of additional resource recovery related operations at the LHRRP (development consent DA No 11-01-99 consent ref R97/00029).

A number of modifications have since been granted for the above consent including:

- Increasing the excavation depth of stages of the landfill and associated increased stockpile size.

A separate approval for an Advanced Waste Technology (AWT) facility to process up to 100,000 tonnes of municipal solid waste per year in the south-eastern area of the site was also granted. The location of this approved facility is no longer considered suitable – and as a result this proposal is seeking the relocation and construction of the ARRT facility, as detailed in section 5. It is expected that the proposed ARRT facility will be of a similar scale and design as the previously approved AWT facility.

2.5.3 Surrounding planning approvals

A significant planning approval is currently being assessed for an 850 ha (approximately) master planned development, north of the proposal site – known as Heathcote Ridge.

The proposed master plan development includes approximately 185 ha land for residential and associated purposes across a number of discrete development areas set within the natural bushland setting, as well as commercial, business and community designations including open space and recreational land uses.

2.6 Potential impact generators

Based on the understanding of the proposal and the visual environment within which the proposal will be sited, the following components are considered to be potential impact generators:

- Changes to landform profiles and materials stockpiles
- Visibility of the proposed ARRT facility building and relocation of the GO facility

Based on desktop and site investigations – landform profile increases are likely to be greatest impact generator for the majority of identified receptors.

As noted however, these changes will be incremental over the life of the project and would be subsequently rehabilitated to attractive landscapes.

The construction and operation of the ARRT and GO facilities are likely to only affect identified receptors to the western extent of the LHRRP site (gun club, road users) as the existing topography surrounding the LHRRP and associated increased landform of the proposal would screen the presence of the proposed facilities for all receptors to the east of the site.

3. Assessment process

3.1 Overview

This assessment draws on the *Guidelines for Landscape and Visual Impact Assessment, Third Edition*, (2013) published by The Landscape Institute and the Institute for Environmental Management and Assessment in the UK (refer Figure 3.1). The assessment included:

- Review of the various aspects of the proposal, primarily in terms of scale, bulk earthwork requirements, technical specifications, and landscaping.
- Analysis of the subject site, particularly with regard to visual qualities, visual exposure, landscape values and characteristics.
- Identification of a theoretical visual catchment and potential visual receptors, and the subsequent identification of key sensitive receptor groups.
- Rating of sensitivity of representative receptors groups.
- Identification of potential impacts on identified key receptor groups and rating of magnitude of impacts for each receptor group.
- Rating of impact significance on each receptor group. The significance of impacts has been evaluated as a product of:
  - the sensitivity or value of the receptor being affected; and
  - the magnitude of impacts on the identified receptor.
- Identification of potential mitigation measures for any impacts seen to exceed community expectations or planning intents for the site and for this type of development.

The assessment included extensive desktop analysis as well as a number of site investigations during September and October 2014. The desktop analysis included a review of: GIS data sets; aerial photography; and models of the local topography and the proposal (prepared by GHD). During the site investigations, the weather was fair, with some haze but this was regarded as typical weather for the locality.

A number of photomontages (three in total) were also prepared by GHD to inform the assessment (refer Appendix D). The methods for preparing the model and photomontages are described further below.

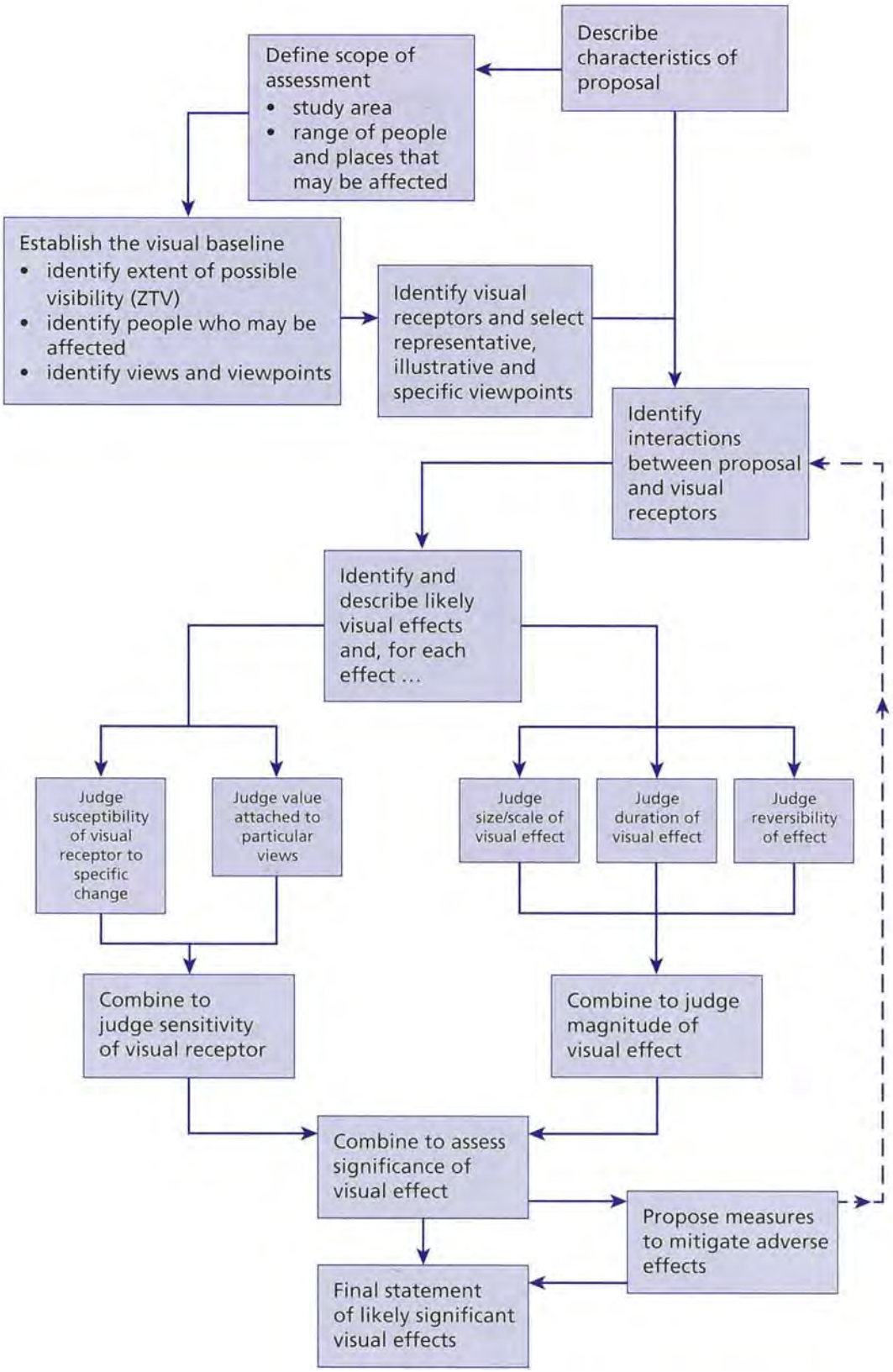


Figure 3.1 Steps in assessing visual impacts (from Guidelines for Landscape and Visual Impact Assessment, 2013)

3.2 Identifying sensitive receptors

Sensitive visual receptors are defined as a person and/or viewer group that would experience a potential impact. They are considered in terms of viewing locations where the proposal may be visible to residents, or areas where visitors spend extended amounts of time. Sensitive receptors include houses as well as areas from which fixed or transient views would be possible, but where the time of stay is shorter, such as roads, lookouts, or recreational areas.

Visual receptors were initially identified through desktop assessment, including review of aerial photography and GIS datasets, as well as preparation of a visual catchment map for the proposal (refer Appendices A to C).

Three specific points were identified to define the visual catchment maps:

- A point which represents the highest point of the ARRT facility which is the biofilter ventilation air discharge portals, at approximately 20 m above ground level (i.e. AHD 165 m)
- A point which represents the highest potential point of the landform and the highest, most visible point for the entire proposal (i.e. AHD 184.9 m)
- A point which represents the predicted upper limit of the settled landform (post settlement) at approximately 7.9 m above the existing approved landform point on site (i.e. AHD 179.9 m)

These points were analysed through GIS processes to present a theoretical map of all the areas from which either of these points will be visible.

It is important to note that visual catchment mapping only takes into account the terrain of the area. It does not take account of buildings or vegetation and hence reflects a ‘bare-earth landscape’, which for the visual impact assessment process represents the "worst case scenario". The visual catchment map illustrates visibility of the identified points only. From this, assumptions can be made about the visibility of other parts of the proposal.

In this instance, the catchment mapping showed that the proposal would have a reasonably extensive visual catchment, but that much of the catchment is void of receptors. Further desktop analysis and site surveys revealed that there is also a significance difference between the theoretical visual catchment (based solely on terrain) and the actual catchment, which is significantly limited by extensive vegetation throughout the catchment, particularly along roadsides.

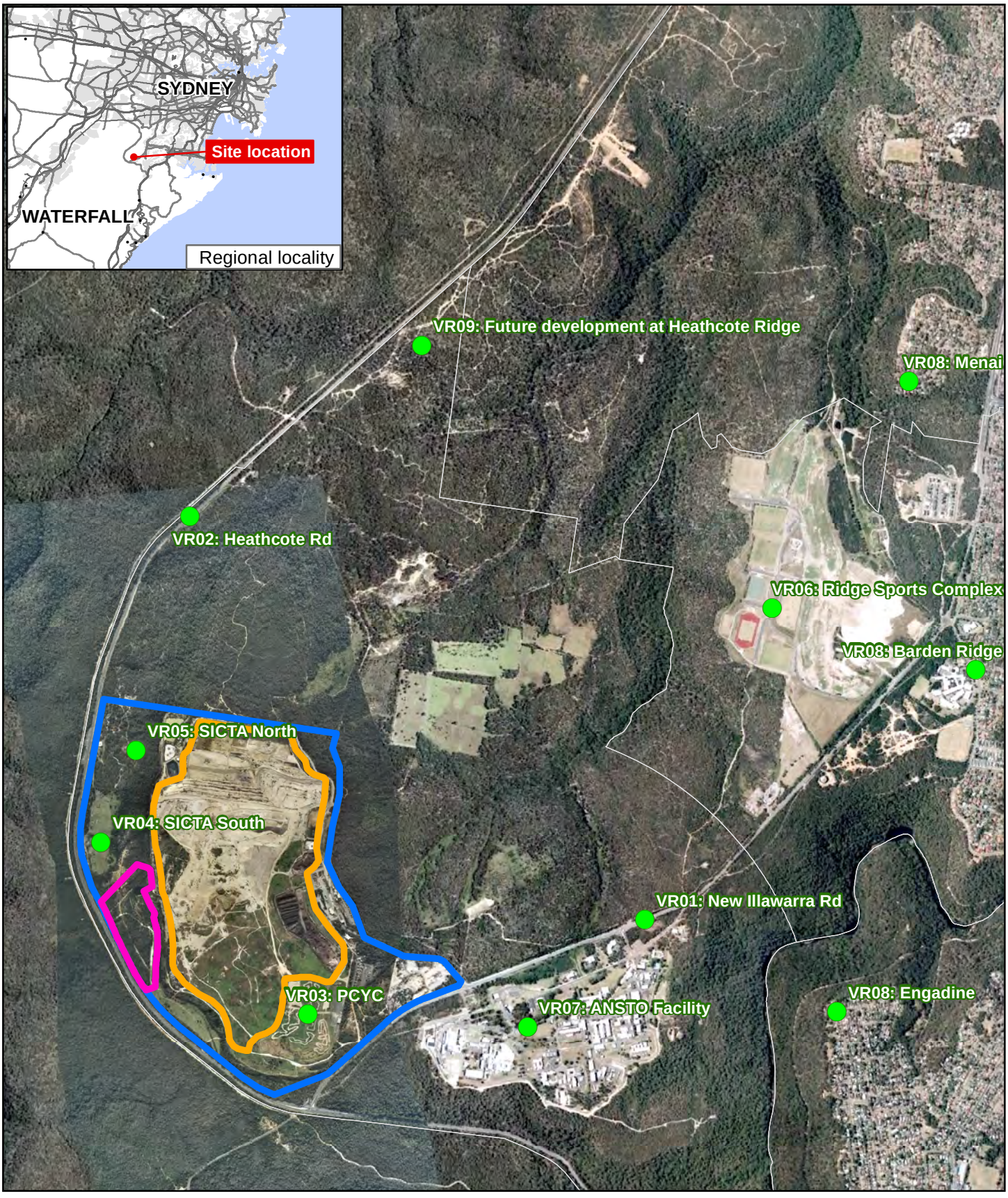
The catchment mapping also revealed that there are no identified views towards the proposal that are recognised as regionally or locally important, but there are a number of views which currently either contribute to a recreational activities in the surrounding areas or views that contribute to positive visual amenity of the surrounding residential areas.

Following the identification of the visual catchment, a number of potential receptor groups were identified. The receptor groups represented groups of receptors that experienced a similar visual environment, and were expected to be similarly affected by the proposal. Grouping of receptors enables representative assessment of the range of visual experiences present in the study area.

From the range of identified receptors groups, nine representative viewpoints were identified (refer Figure 3.2):

- VR01 – Travellers along New Illawarra Road
- VR02 – Travellers along Heathcote Road
- VR03 – Receptors at the PCYC

- VR04 – Receptors at the southern part of the SICTA Gun Club
- VR05 - Receptors at the northern part of the SICTA Gun Club
- VR06 - Receptors at the Ridge Sporting Complex
- VR07 – Receptors at the ANSTO Facility
- VR08 – Existing residents to the north and east of the site (Engadine, Barden Ridge, and Menai)
- VR09 – Future residents to the north-west of the site (Heathcote Ridge)



LEGEND

- Lucas Heights Resource Recovery Park boundary
- Proposed ARRT/GO facilities
- Landform re-profiling extents
- Visual receptors

Paper Size A4

0 250 500 1,000

Metres

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

N

SITA Australia
Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	A
Date	05 May 2015

Locations of receptor groups

Figure 3.2

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

N:\AU\Sydney\Projects\21\23482\GIS\Maps\MXD\21_23482_Z059_LocationsOfReceptorGroups.mxd

Aerial Imagery: Google 2015 and ESRI 2015. LHRRP Boundary: GHD, 2014. Roads/Suburbs: NSW LPMA 2012. Location Data: GEOSCIENCE AU 2014. Created by:jrichardson

3.3 Assessing receptor sensitivity

The nature and sensitivity of each receptor group was then determined. Visual sensitivity is affected by the susceptibility of the receptors to change in views and visual amenity, and the value that the receptor places on the view and visual environment.

Visual sensitivity is typically derived from a combination of factors including:

- receptors' interest in the visual environment i.e. high, medium or low interest in their everyday visual environment, and the duration of the effect
- receptors' viewing opportunity i.e. prolonged, regular viewing opportunities
- the number of viewers and their distance / angle of view from the source of the effect, extent of screening / filtering of the view, where relevant

To enable consistency and comparability of the rating, the sensitivity of each receptor has been determined based on the ratings set out in Table 3.1. Whilst assessment of visual values and effects is largely a qualitative matter, assessment against a scale enables more relevant and reproducible evaluation and comparison of sensitivity of receptors and magnitude of effects.

Table 3.1 Assessment of receptor sensitivity

Sensitivity	Definition
High	Viewing locations which are rare or of regional significance, with limited potential for substitution. Receptors that are highly vulnerable to change.
Moderate	Viewing locations which are vulnerable, difficult to substitute at a local level, and are not well represented at a regional level. Receptors that are moderately vulnerable to change.
Low	Viewing locations which are locally important, difficult to substitute at a local level, but well represented at a regional level. Receptors that are slightly vulnerable to change.
Negligible	Viewing locations of limited importance or value, which are readily replaceable. Receptors that are not vulnerable to change.

Some of the identified receptors were inaccessible at the time of the field study, including Holsworthy Military Reserve, Australian Nuclear Science and Technology Organisation (ANSTO) and the northern portion of the clay target gun club site. The assessment for these inaccessible receptors was primarily based on desktop studies and, where possible, additional field studies were conducted from the nearest publically accessible area.

3.4 Assessing impact magnitude

Impact magnitude was evaluated based on variables such as: the extent of the proposal that would be visible, the proportion of the visible parts of the proposal to the entire view, the nature and intensity of the impacts, whether key features were obscured or affected, the geographic extent of the impacts, the duration and reversibility of particular impacts, and the likelihood of occurrence of impacts.

As for receptor sensitivity, the nature and the magnitude of impacts was rated. Table 3.2 below describes impacts that constitute each rating.

Table 3.2 Impact Magnitude Description

Rating	Descriptor
High	Severe consequences, significant at a regional level, likely to be unacceptable at a regional level. Large number of people measurably affected. Substantial / obvious changes due to total loss of, or change to, elements, features or characteristics of the landscape which are regionally significant.
Moderate	Moderate consequences, significant at a local level and likely to be unsatisfactory at a local level. Discernible changes due to partial loss of, or change to the several elements, features or characteristics of the landscape which are locally significant.
Low	Low consequences, significant at a local level, likely to a satisfactory at a local level providing appropriate mitigation measures are implemented. Minor change in the landscape due to loss or change to one or two elements, features, or characteristics of the landscape which are locally significant.
Negligible	No consequences or significance. Almost imperceptible or no change to the landscape as there is little or no loss of / or change to the elements, features or characteristics of the landscape.

3.5 Determining impact significance

The significance of impacts is evaluated as a product of:

- the sensitivity or value of the environment or receptor being affected; and
- the magnitude of impact on that environment or receptor.

Again a rating is assigned, based on the matrix presented at Table 3.3. The ratings themselves are not a determination of the acceptability of the proposal, they are simply a means of comparing impacts on different receptors, and with consideration of different impacts.

The process of assessment and the use of ratings tables reflects typical outcomes for visual impacts, particularly:

- Impacts on receptors that are particularly sensitive to changes in views and visual amenity are more likely to be significant.
- Impacts on receptors at scenic routes or lookouts are more likely to be significant.
- Impacts that constitute a substantial change to the visual environment a likely to be more significant than impacts that do not cause substantial change.

Determining receptor sensitivity, impact magnitude, and significance of potential impacts requires qualitative (subjective) judgements to be made. The conclusions of this assessment therefore combine objective measurement and subjective professional interpretation.

Table 3.3 Impact Significance Rating

Receptor Sensitivity	Impact Magnitude			
	High	**Moderate**	**Low**	**Negligible**
High	High	Moderate-High	Moderate	Low
Moderate	Moderate-High	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Low	Negligible	Negligible	Negligible

Typically, impacts with a significance rating of moderate or higher pose some concern and flag the need for mitigation measures. However, no rating is intended to indicate the acceptability or unacceptability of the proposal.

3.6 Photomontages

3.6.1 For final landform (in 2037)

As explained above, three photomontages of the final landform (in 2037) were prepared by GHD for receptor locations VR01, VR02, and VR06 (refer Appendix D) to illustrate the most likely visual impacts at these locations. The photomontages were prepared in accordance with the following method:

1. A series of viewing locations were selected for the production of photomontage images. These photomontages were used to represent the views available from the selected locations following the completion of the proposal
2. To the extent practical, photographic images were captured using a 50 millimetre (mm) fixed focal length lens on a 35 mm format (digital equivalent) camera at a camera height of 1.7 m as recommended in the IEMA guidelines (IEMA 2002)
3. Autodesk 3D Studio Max software was utilised for modelling and rendering the photomontages.. In order to achieve an accurate photomontage of the structure and surrounding landscape, 1 m contours were used to model the surrounding landform
4. Once the 3D model encapsulating both the landscape and new Proposal elements was created, a virtual camera was placed in the software at the same location that the photographs have been taken from. The film (35 mm), focal lens (50 mm) and height (1.7 m) of the virtual camera is intended to match the real camera used to take the photos
5. The photos of the site were imported into in 3D Studio Max as a background to match the 3D model showing the proposal to the perspective of the photos
6. From the virtual camera, rendered images of the Proposal were produced to match the daylight exposure of the photographs. The rendered images were imported into Adobe Photoshop for post-production editing and collation of the photomontages. The final result is the 3D model of the Proposal shown in the correct 3D location in the photographs. The final images were produced to a high resolution, suitable for printing
7. The proposed layout of the project was prepared by GHD based on information provided by SITA

The photomontages are intended to represent the expected change in view that would be incurred for the proposal, when viewed from the identified view location. The photomontages

presented are based on a 3 dimensional model of the site incorporating data sourced from SITA, the NSW Department of Lands, and a site visit undertaken by GHD on 7 Sept 2012.

The photomontages are not absolutely accurate as reference points were not surveyed to enable survey accurate superimposition of the model. However, they are considered to be sufficiently accurate to enable comprehensive visualisation and testing of likely impacts on a number of the more sensitive receptors.

3.6.2 For intermediate landform (2020 - 2021)

While the photomontages provide a representation of the likely visual impacts upon completion of the proposal in 2037, some additional photomontages were prepared to provide a representation of some intermediate visual impressions that may occur during the life of the proposal.

Upon consideration of the staging plans for landfilling of the site (Appendix E), the period between Phase 5 to Phase 6 (refer Figure 3.3 and Figure 3.4) is considered to represent a possible ‘worst case’ scenario as this is the time period for which the largest area of landfill batter would be exposed towards the eastern catchment (which is where majority of the receptor groups are located (refer Figure 3.2)). Therefore a series of overlays were prepared to simulate what the view from VR06 Ridge Sporting Complex might be over this period. They are provided in section 4.10.

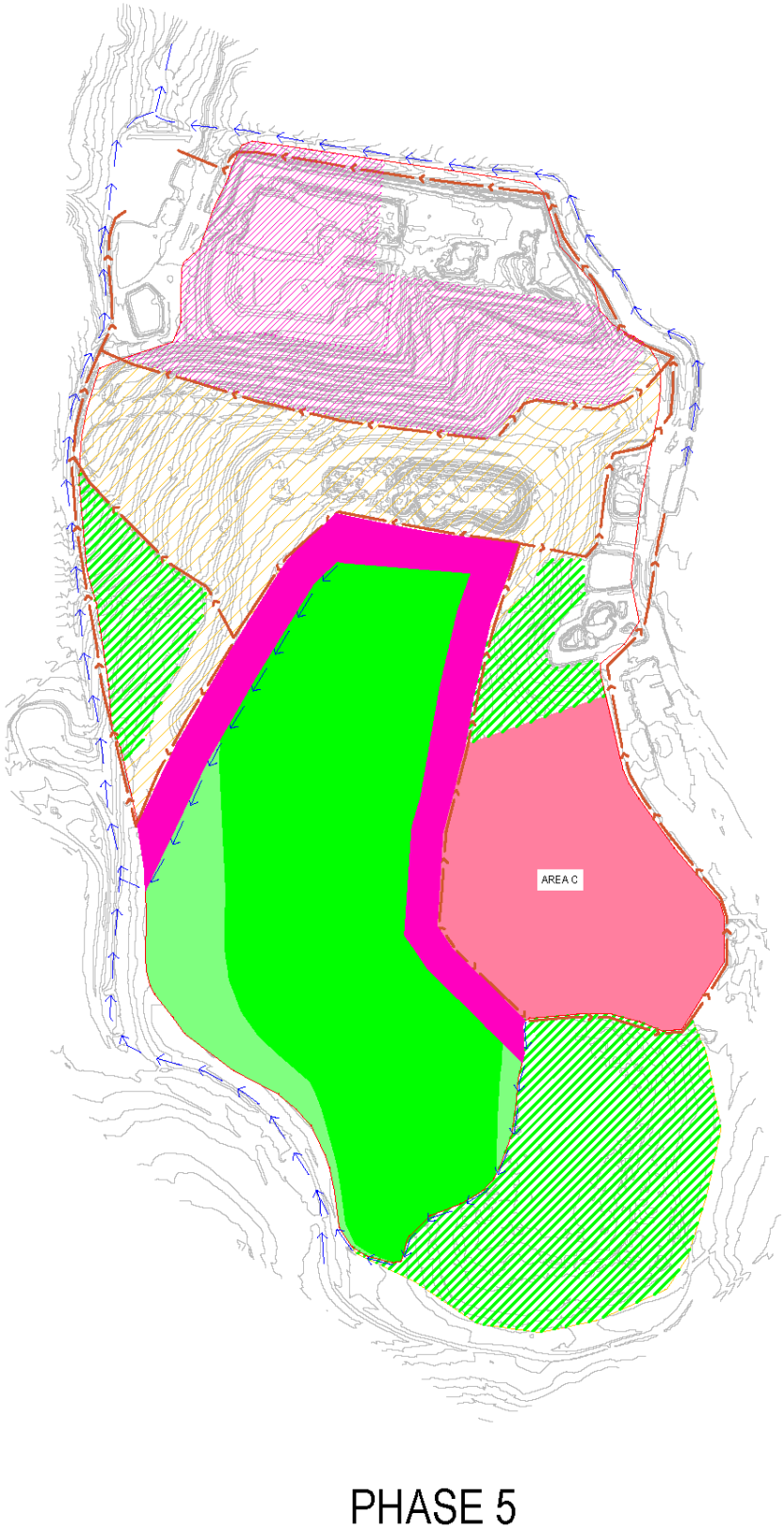


Figure 3.3 Staging – phase 5

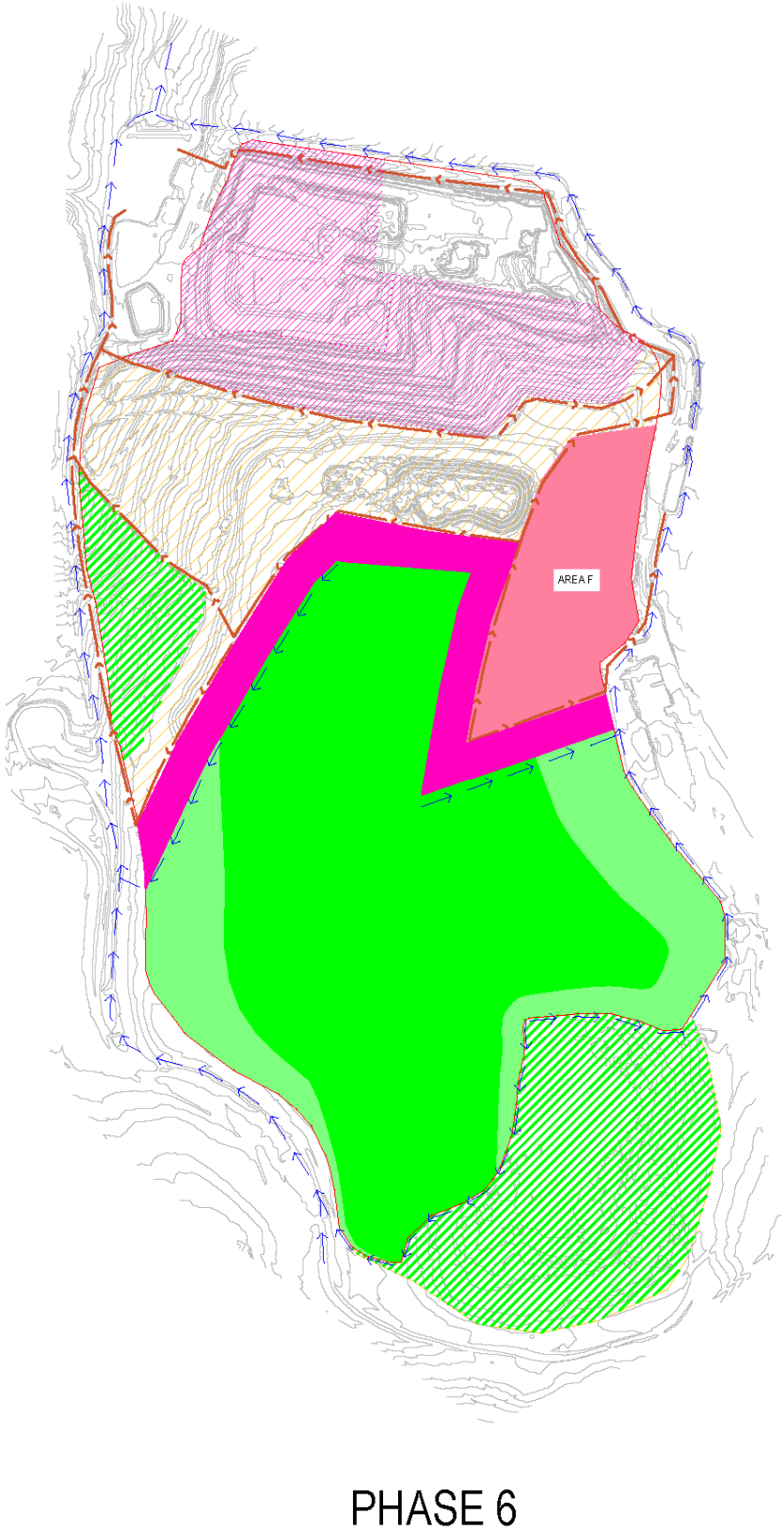


Figure 3.4 Staging – phase 6

4. Impact assessment

4.1 Overview

The following sections summarise the assessment of impacts on each of the identified visual receptor groups. As explained earlier, nine representative viewpoints were identified. The viewpoints were selected to provide a representative range of views of the existing site and the proposal for the study area (i.e. views from the road, views from recreation areas, views from elevated residential areas to the north-west, north-east, and east). The selected viewpoints of the existing site are described below and shown on Figure 3.2:

- VR01 – Travellers along New Illawarra Road
- VR02 – Travellers along Heathcote Road
- VR03 – Receptors at the PCYC
- VR04 – Receptors at the southern part of the SICTA Gun Club
- VR05 - Receptors at the northern part of the SICTA Gun Club
- VR06 - Receptors at the Ridge Sporting Complex
- VR07 – Receptors at the ANSTO Facility
- VR08 – Existing residents to the north and east of the site (Engadine, Barden Ridge, and Menai)
- VR09 – Future residents to the north-west of the site (Heathcote Ridge)

For VR01 and VR02, the visual assessments (section 4.1 and section 4.2) were undertaken with consideration of the entire road section that may be subject to visual impacts. Figure 3.2 shows where the photographs in the sections below were taken from. As both Illawarra Road and Heathcote Road are high speed roads, it was not considered safe to stop and take a photo at where the 'worst impact' could be experienced. The assessments however discuss the impact that may be experienced for travellers driving along the roads.

The following sections describe and rate the sensitivity of each receptor, the nature and magnitude of impacts likely to result from the proposal, and the subsequent significance of impacts for each receptor.

Photos from each receptor location are provided at the beginning of each section. Where an assessment of the visibility of the existing landfill indicated that the proposal (which involves a higher landform) would be visible, photomontages (refer Appendix D). were prepared for particular receptors (VR01, VR02, and VR06) and are discussed. Additional photomontages of intermediate landforms for VR06 only (as this is the only receptor location where the existing landform is visible) are also included in section 4.10.

4.1 VR01 – Travellers along New Illawarra Road

Figure 4.1 Representative view from receptor group

New Illawarra Road, bordering the eastern extent of the LHRRP, traverses a distinctive transition in landscape character from the peri-urban landscape of the south-west extent of Sydney into the more remote and natural landscape character associated with the heavily vegetated extents of Lucas Heights Conservation Area, Holsworthy Military Reserve and the northern extents of Heathcote National Park.

As the road users travel southbound through the Old Illawarra Road intersection and past the ridge sporting complex, this landscape character transition is most apparent, with little to no sign of residential or commercial/industrial development, other than the ANSTO facility which becomes visible as users approach the LHRRP.

The undulating topography of the road presents a series of crests and depressions. For the most part, views from the road are restricted by roadside vegetation. However, some ridges offer fleeting views to the distance. Where views beyond the immediate road corridor are achieved, the extended view is of vegetation canopy only – reinforcing the natural and remote character of the surroundings.

Consequently, as the road users approach the LHRRP from the north, even when in close physical proximity to the site, there is little visual sign of the existing landfill activities. If the user was travelling the route for the first time, they would only become aware of the LHRRP once passing the entrance or viewing the road signage adjacent to the entrance.

Table 4.1 VR01 Impact assessment

Consideration	Rating and comment
Sensitivity	**Low** The sensitivity of the road users to change on the subject site would be low. Although the overall landscape character south of Menai and Barden Ridge could be described as attractive natural landscape, road users

Consideration	Rating and comment
	aren't subject to any existing significant views of regional or even local significance due to the constraints of existing roadside vegetation and the existing topography of the area.
Magnitude	**Negligible** The only elements of the proposal which are likely to be visible are the landform re-profiling. The proposal is unlikely to be visible from the majority of the road corridor due to the existing topography and roadside vegetation. The proposal may be visible from some locations along the road but where it is visible, views would be fleeting. Once the proposed plantings (refer to section 2.4.7) are completed, the operations including the landfill, GO facility and ARRT facility are not likely to be visible from the adjacent New Illawarra Road and Heathcote Road. Where the re-profiled landform is visible, it will only be the upper limits of the landform profile that will be visible, and the change to the view would be incremental and difficult to discern. Appendix D, Viewpoint 3 includes a photomontage of the proposal from a vantage point on New Illawarra Road.
Impact Significance	**Negligible**

4.2 VR02 – Travellers along Heathcote Road

Figure 4.2 Representative view from receptor group

Heathcote Road continues past the southern and western boundaries of the LHRRP, and, like New Illawarra Road, accommodates significant volumes of traffic.

Also like New Illawarra Road, the visual experience of Heathcote Road is largely defined by the existing roadside vegetation. There are however, fleeting glimpses to elevated topography within the Holsworthy Military Reserve to the west of the road.

Specifically, as users travel north on Heathcote Road, along the western edge of the LHRRP from the south-western corner, elevated topography affords expansive views out of the immediate road corridor – over the considerable extents of Holsworthy Military Reserve and further north. The prevailing experience is defined by views of the natural landscape.

As users continue north along the western extent of the LHRRP, views are largely constrained by the roadside vegetation. In selected locations, gaps in roadside vegetation allow views to the east over the landfill extents and stockpile of the LHRRP. The very brief duration and extents of these views substantially limits the perceived presence of the LHRRP and would limit the potential for noticeable impacts arising from changes on the site.

Similarly to New Illawarra Road, if a road user was to travel along Heathcote Road for the first time, there would be almost no visible indication of the LHRRP – it is likely the road user would only become aware of the LHRRP once passing the entrance or viewing the road signage adjacent to the entrance.

Table 4.2 VR02 Impact assessment

Consideration	Rating and comment
Sensitivity	**Moderate** The sensitivity of the road users to change would be moderate. The overall landscape and visual context of the road can be described as predominantly natural, with little sign of development. The majority of the road corridor views are constrained by the adjacent roadside vegetation, however the road users are subject to some existing views of regional significance, over the surrounding natural context including the Holsworthy Military Reserve.
Magnitude	**Low** The elements of the proposal which are likely to be visible from the road are the re-profiled landform, components of the ARRT and GO facilities, such as the ARRT column and large buildings of the facilities The proposal is unlikely to be visible from the majority of the road corridor immediately adjacent to the LHRRP due to the existing topography and roadside vegetation. The proposal may be visible from some locations along the road but where it is visible, views would be fleeting. Once the proposed plantings (refer to section 2.4.7) are completed, the operations including the landfill, GO facility and ARRT facility are not likely to be visible from the adjacent New Illawarra Road and Heathcote Road. Where the re-profiled landform is visible, it will only be the upper limits of the landform profile that will be visible, and the change to the view would be incremental and difficult to discern. Appendix D, Viewpoint 1 includes a photomontage of the proposal from a vantage point on New Illawarra Road.
Impact Significance Rating	**Moderate-Low**

4.3 VR03 – Receptors at the PCYC

Figure 4.3 Representative view from receptor group

As the PCYC falls within the overall site boundary of the LHRRP, the primary outlook is to the north, and is dominated by the existing landfill operations and activities.

PCYC users are however also afforded expansive views to the south and west across the densely vegetated surroundings of the Holsworthy Military Reserve. To the east, the ridge on the eastern side of the Woronora River restricts views, and is largely characterised by the prominent industrial development of the ANSTO site.

Table 4.3 VR03 Impact assessment

Consideration	Rating and comment
Sensitivity	**Low** Given the existing outlook on to the LHRRP site, and considering the nature of activity undertaken by the users, the receptors of the PCYC facility would be likely to have a low level of vulnerability to change. The PCYC is afforded attractive views to the east and south of the area towards the Holsworthy Military Reserve and the distant silhouette of the central business district skyline to the north-east – however these views are marginalised by the imposing visual presence of the landfill surroundings.
Magnitude	**Low** The elements of the proposal which are likely to be visible are the landform re-profiling, and components of the ARRT and GO facilities, such as the ARRT column and major built structures. The proposal will create a visual impact for the PCYC users, as the landform re-profiling and associated activities will take place in closer proximity to the PCYC than the existing operations of the site, but the ultimate magnitude of change to the nature or quality of the views is unlikely to be significant. It is relevant to note however, that it would be possible to improve the current and future outlook for these receptors through screen planting between the facility and the proposed development.

Consideration	Rating and comment
Impact Significance Rating	**Low**

4.4 VR04 – Receptors at the southern part of the SICTA Gun Club

Figure 4.4 Representative view from receptor group

The southern portion of the gun club site is separated from Heathcote Road by a dense band of roadside buffer vegetation – providing the backdrop to an open, expansive and exposed east facing shooting range. The lack of mature vegetation across this area and the existing topography of the LHRRP ensure this portion of the site has an expansive outlook which is largely defined by the western extent of existing LHRRP landfill areas as well as the stockpile location.

Table 4.4 VR04 Impact assessment

Consideration	Rating and comment
Sensitivity	**Low** Given the existing outlook on to the LHRRP site, the users of the southern part of the gun club would be likely to have a low level of vulnerability to change.
Magnitude	**Moderate** The elements of the proposal which are likely to be visible are the landform re-profiling, and the majority of the ARRT and GO facilities. The magnitude of change from the construction and operation of the ARRT and GO facilities would be moderate, due to the close physical and visual proximity to the southern extent of the gun club area and a lack of existing vegetation to separate and screen the proposed facilities. The magnitude of change associated with the landform height increases would occur incrementally over time, and as such the overall impacts associated with the increased landform would be low. Overall the magnitude of change would be moderate. The proposal will create a visual impact for the gun club users at the southern part of the club, but the ultimate magnitude of change to the nature or quality of the views is unlikely to be significant. It is relevant to note however, that it would be possible to improve the current and future outlook for these receptors through screen planting between the facility and the proposed development.
Impact Significance Rating	**Moderate-Low**

4.5 VR05 - Receptors at the northern part of the SICTA Gun Club

Figure 4.5 Representative view from sandstone stockpile

(Photo taken from top of sandstone stockpile)

The northern portion of the gun club site is much less visually exposed to the LHRRP due to the siting further north and the extent of existing mature vegetation across the majority of the northern portion of the site – as shown in the above photo.

Where views to the LHRRP facility are achieved the landfill and sandstone stockpile are prominent. However, even when these elements are visible, the visual character of this location is still largely defined by the natural landscape, rather than the LHRRP.

Table 4.5 VR05 Impact assessment

Consideration	Rating and comment
Sensitivity	**Moderate** The sensitivity of the northern gun club receptors would be higher than the sensitivity of the users within the southern portion of the site – despite the increased distance from the site, the views from this vantage points are better quality and more susceptible to change.
Magnitude	**Low** The main element of the proposal which is likely to be visible is the re-profiled landform. Overall, however, the proposal will cause a limited magnitude of change to existing views, even those that take in the stockpile. This is largely due to the extensive vegetative screening around most aspects of the proposal.
Impact Significance Rating	**Moderate-Low**

4.6 VR06 - Receptors at the Ridge Sporting Complex

Figure 4.6 Representative view from receptor group

Users of the various recreational facilities at the Ridge Sporting Complex are afforded expansive views into the surrounding landscape to the south, west and north from various locations throughout the complex. These views are often limited by the topographic ridges and extensive existing vegetation on the ridgelines.

As users enter the site and travel along the southern perimeter road, views are confined by internal vegetation screening and landform to the south-west of the site. Once the landform rises to the top of the crest, the site topography falls towards the western boundary and expansive views to the south-west are afforded. Although the surrounding ridges to the south-west screen views of the existing landfill areas and operations, the existing large sandstone stockpile is clearly visible above the ridge line as a contrasting landscape element of the existing vegetated surroundings.

This view is present for a number of vantage points within the western half of the sporting complex, including the parts of the golf course and driving range – unless screened by internal landform, buildings or structures. Towards the southern extent of the site, the site landform falls away and internal vegetation extents screen this view.

Table 4.6 VR06 Impact assessment

Consideration	Rating and comment
Sensitivity	**Moderate** The sensitivity of the sport complex users will be low to moderate, depending on the specific recreational activity. For activities such as athletics and team sports, the overall visual environment is less of a factor in the overall experience compared with activities such as golf or clay target shooting – where the surrounding visual landscape makes a much greater contribution to the user's overall experience.
Magnitude	**Moderate**

Consideration	Rating and comment
	The only elements of the proposal which are likely to be visible are the re-profiled landform. The magnitude of change associated with the landform height increases would occur incrementally over time, and as such the overall impacts associated with the increased landform would be low. Appendix D, Viewpoint 3 includes a photomontage of the proposal from a vantage point on New Illawarra Road.
Impact Significance Rating	**Moderate**

4.7 VR07 – Receptors at the ANSTO Facility

Figure 4.7 Representative view from receptor group

(Taken from boundary of ANSTO facility on New Illawarra Rd)

As the majority of the ANSTO facility is inaccessible to the general public, existing views from this location could only be analysed from nearby, publicly-accessible locations (such as from New Illawarra Road, at the entry point to the ANSTO facility). In addition, views to the ANSTO site from the LHRRP site were also considered as a means of checking the potential visibility of the proposal (i.e. reverse visibility analysis).

The existing topography and vegetation are likely to prevent any substantial views of the LHRRP from the ANSTO facilities. The reverse visibility analysis from the highpoints of the landfill areas within the LHRRP only show the upper parts of the ANSTO facilities – such as chimney stacks and pipework etc.

The stockpile may be visible from some of the eastern-most ANSTO facilities and areas, but it is likely that any views of the stockpile will be of the upper limits only, as the majority of the stockpile extents will be screened by existing mid-ground vegetation.

Table 4.7 VR07 Impact assessment

Consideration	Rating and comment
Sensitivity	**Negligible** The sensitivity of receptors at the ANSTO facility is negligible as any existing views towards the LHRRP aren't likely to be appealing or significant. As employees at an industrial facility, most receptors would be unlikely to place particular importance or value on the surrounding visual environment.
Magnitude	**Low** The elements of the proposal which are likely to be visible are the landform re-profiling. The proposal will create a negligible magnitude of change for the ANSTO receptors due to the extents of screening vegetation between the LHRRP and the ANSTO site. The increased landform profile may become visible from the ANSTO site – however the extent of the landform visible is unlikely to create a significant magnitude of change to those existing views.
Impact Significance Rating	**Negligible**

4.8 VR08 – Existing residents to the north and east of the site (Engadine, Barden Ridge, and Menai)

Figure 4.8 Representative view from receptor group

The analysis of potentially affected residential areas was conducted from roadsides and publically accessible areas only. Assumptions about the extent and quality of views from private residences have been made from these publically accessible locations.

Receptors in residential areas of Menai, Barden Ridge, and Engadine have been grouped together as the visual environment, outlook, and quality of views is largely the same for all.

A number of suburbs adjacent to the site have residential pockets with easterly and south-easterly outlooks across the Lucas Heights Conservation Area. The vast majority of these outlooks are constrained, and screened by the ridgelines, valleys, and vegetation of the conservation area. It is relevant to note that these residential areas are a significant distance from the LHRRP site (2.5 km or more) and as such, the visibility and potential visual impacts of the proposal will be substantially diminished.

For these reasons, the majority of the residential areas are not subjected to views of any obvious landfill activities or facilities, with the exception of the excavation stockpile. The mass and height of the stockpile makes it a visible (although not prominent) landscape feature that clearly contrasts with the densely vegetated surrounding landscapes.

Table 4.8 VR08 Impact assessment

Consideration	Rating and comment
Sensitivity	**Low** The sensitivity of the surrounding residential suburbs is low-moderate depending on the physical proximity and the existing viewpoints of the relevant residential areas. Several residential areas with potential views to the proposal also enjoy expansive views over semi-rural, vegetated surroundings. The majority of the receptors with potential views to the proposal are more than 3 km away – which lessens the overall visual sensitivity to the proposal.
Magnitude	**Low-Moderate** The elements of the proposal which are likely to be visible are the re-profiled landform and the taller components of the ARRT and GO facilities such as the ARRT column and major built structures. Existing views of the LHRRP are mostly only identified by the large stockpile of sandstone. The re-profiled landform of the proposal will occupy a larger physical area compared with the existing stockpile, but at a lower maximum height and with a more natural profile. In addition, this increased landform profile will occur incrementally over time and once completed will be vegetated to assist in the visual integration with its natural surroundings. These factors all contribute to reducing the overall magnitude of change for the residential receptors with views of the proposal.
Impact Significance Rating	**Moderate-Low**

4.9 VR09 – Future residents to the north-west of the site (Heathcote Ridge)

The proposed Heathcote Ridge master planned community will be the closest residential development to the LHRRP (with the nearest houses approximately 2 km from the LHRRP site). The proposed scheme for this area appears to contemplate residential development within a bushland setting. As such, it is likely that existing and future vegetation will significantly affect views from future housing.

As the areas proposed for residential development are currently conservation areas and publically inaccessible – it is not possible to assess the potential visibility of LHRRP activities from these areas. As such, assumptions largely based on available contour information and

vegetation densities and heights have been made about the potential views of the proposal from these areas.

Due to existing topography and significant extent of vegetation separating the future development areas and the LHRRP, it is unlikely that any significant views of the LHRRP will be present from the future residential pockets. It is noted that the proposed development at Barden Trigg is located at a high point and may be exposed to the views of the LHRRP. Representative views from Barden Trigg are expected to be similar to views from the Ridge Sporting Complex (VR06).

Further, it is reasonable to expect that any potential viewpoints of the LHRRP are achieved from future residential, commercial and recreational areas of Heathcote Ridge, the ongoing concept and detailed design phases would be likely to minimise the visual exposure of urban spaces within the master plan to the existing and proposed operations of the LHRRP.

Table 4.9 VR09 Impact assessment

Consideration	Rating and comment
Sensitivity	**Low** The sensitivity of the future Heathcote residential receptors will be low-moderate – the type of development appears to promote a high level of visual amenity, but would also be likely to focus views away from the existing LHRRP facility. Further, the development is a significant distance from the LHRRP site, which would diminish the visibility of the proposal. Also, the proposed landform re-profiling will most likely be substantially progressed by the time the potential first Heathcote Ridge development areas are developed – reducing the potential sensitivity of the residential areas to the further changes the proposal will create.
Magnitude	**Low** The only element of the proposal which are likely to be visible are the re-profiled landform. The landform will create a low magnitude of change to views from the future Heathcote ridge development. It is unlikely that unobstructed, significant views of the landfill operations will be commonly available from residential or recreational areas of the development given the significant extent of dense screening vegetation cover and existing topography visually separating the LHRRP from the future development. The magnitude of any potential impacts or views of the proposal from the future Heathcote Ridge development are also likely to be significantly reduced through the appropriate planning, siting and additional screening of the relevant residential, recreational and commercial land uses of Heathcote Ridge through the concept and detailed design phases of the master planning project.
Impact Significance Rating	**Low**

4.10 Intermediate photomontages

Figure 4.9 shows the view from VR06, the Ridge Sporting Complex taken by GHD on 7 September 2012. Figure 4.10 to Figure 4.12 show additional photomontages which provide an impression of the probable views from VR06, the Ridge Sporting Complex from the start of Phase 5 to the end of Phase 6 of landfilling.

- Figure 4.10 shows the entire exposed batter on the western side of the landfill. As the batter would be hydromulched, it would appear as green in colour once the grass has established itself.
- Figure 4.11 shows the end of Phase 5, where the reprofiled landfill sections move gradually towards the east in front of the green batter and therefore appear as light brown/ white, until they too are hydromulched and grassed
- Figure 4.12 shows the end of Phase 6, where the area associated with Phase 5 reprofiling has been capped and the Phase 6 reprofiling area rises above the batter and appears light brown/ white.

Existing modelling suggests that this 'worst case' visual scenario of start of phase 5 to the end of phase 6 will occur over a period of 23 months from 2020 - 2021. SITA could also grass the intermediate covers as the reprofiling works occur to further minimise visual impacts.

Figure 4.9 View taken on 7 September 2012

Figure 4.10 Impression of start of Phase 5

Figure 4.11 Impression of end of Phase 5

Figure 4.12 Impression of end of phase 6

5. Mitigation

A comprehensive list of prevention, mitigation and rectification measures has been identified and they are detailed in the LHRRP Operations Environmental Management Plan (SITA Australia, 2014a). 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.

Based on the results of this assessment, mitigation of visual impacts could be achieved through:

- Implement 'early works' rehabilitation and maintenance measures – this involves substantial woodland and understory planting to screen the LHRRP from ANSTO land and adjacent roads including along Heathcote Road and around the boundary of the existing PCYC area
- Applying hydromulch on exposed batter areas
- Grassing the final capping layer as the reprofiling works occur to further minimise visual impacts
- Ensure filling does not exceed proposed final landform heights
- Maintenance of fences and other site infrastructure
- Maintenance of Little Forest Road
- Screening and screen maintenance
- Progressive rehabilitation and revegetation

6. Conclusions

6.1 Summary of key findings

The assessment considered impacts on nine groups of receptors, including residential receptors, travellers on main roads, and users of nearby industrial and recreational facilities. It also considered the proposal's impact at different points in time in order to provide an assessment on the likely 'worst case'. All of the receptor groups were determined to have a sensitivity of moderate or less. This was largely due to limited outlooks, limited quality of views, limited interest in views towards the LHRRP, or distance from the LHRRP site which reduces its prominence in the view (compared to other elements). The magnitude of impacts on each of the identified receptor groups was also determined to be moderate or less, largely due to interim topography or vegetation which limits visual accessibility of the proposal elements. Significant distance from receptors also reduces the visibility of the proposal. In addition, as the proposed changes would be incremental over a long time scale rather than occurring rapidly over a short timeframe.

To ensure no significant visual impacts to the community, SITA would also implement initial rehabilitation and maintenance measures. These include perimeter screening of the LHRRP by understory planting in targeted areas. Screening would occur progressively and be finalised prior to 2025. Once the proposed plantings are completed, the operations including the landfill, GO facility and ARRT facility are not likely to be visible from the adjacent New Illawarra Road and Heathcote Road. The LHRRP would also ultimately be rehabilitated to an attractive landscape that would be made available for community use as a public parkland in 2039.

The consequent assessment of impact significance found that all the identified receptors would be exposed to impacts of moderate, low, or negligible significance. By implementing the proposed mitigation measures, the proposal would not have any significant impacts on the community.

6.2 Meets identified objectives

This report addresses the Secretary's Environmental Assessment Requirements (Section 1.6) and concludes that the proposal would meet the objective of having no significant visual impact on the community (as identified in Section 1.2).

7. References

- GHD, 2015. Lucas Heights Resource Recovery Park: Traffic Impact Assessment
- SITA, 2014. LHRRP Operations Environmental Management Plan
- The Landscape Institute and the Institute for Environmental Management and Assessment, 2013. Guidelines for Landscape and Visual Impact Assessment, Third Edition.

8. 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 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.

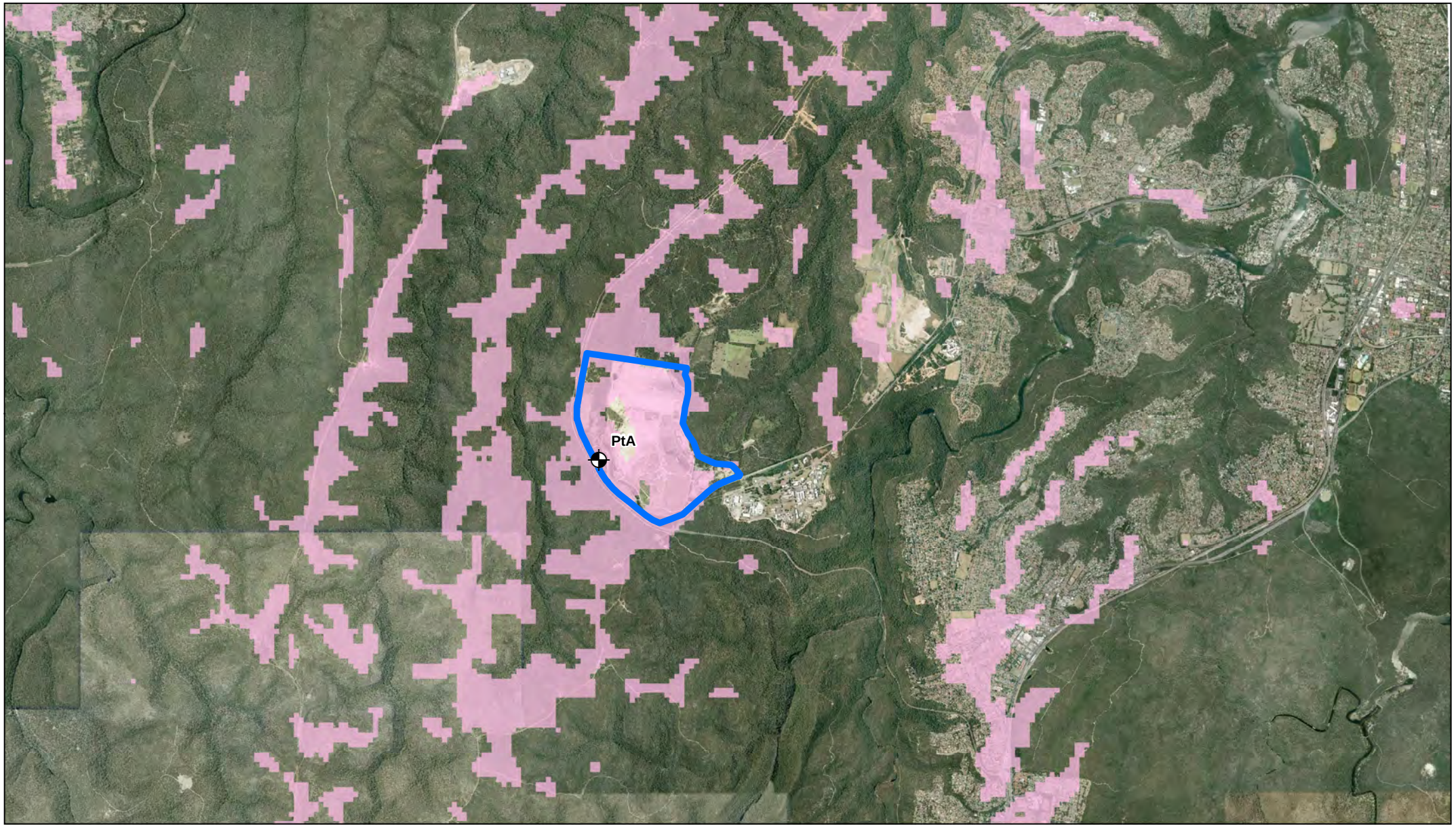
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that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

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

GHD has prepared this report on the basis of information provided by 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.

Appendices

Appendix A – Visual Catchment 165 AHD



Paper Size A4

0 250 500 1,000 1,500 2,000

Metres

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

N

LEGEND

Visibilty Point (165mAHD)

LHRRP boundary

Visible

SITA Australia

Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 10 Mar 2015

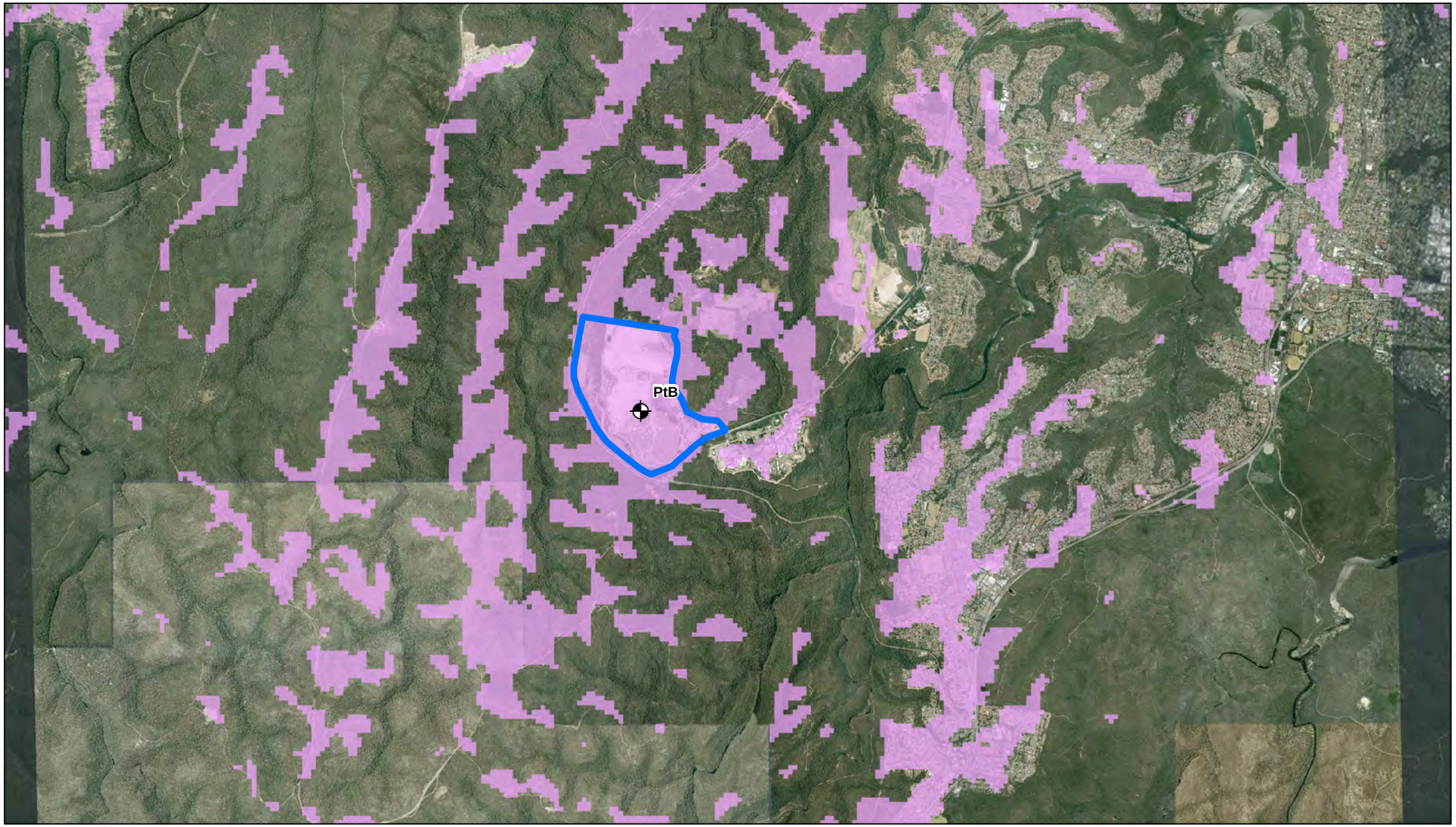
Proposed biofilter ventilation air discharge portal, 165mAHD

G:\21\23482\GIS\Maps\MXD\21-23482-Z056_Visual_165mAHD.mxd

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

Data source: Aerial Imagery: ESRI/GOOGLE 2014. Topography: NSW LPMA 2012. Created by:bahambly

Appendix B – Visual Catchment 179.9 AHD



Paper Size A4

0 225 450 900 1,350 1,800

Metres

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

N

LEGEND

Visibilty Point (179.9mAHD)

LHRRP boundary

Visible

SITA Australia

Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	A
Date	05 Mar 2015

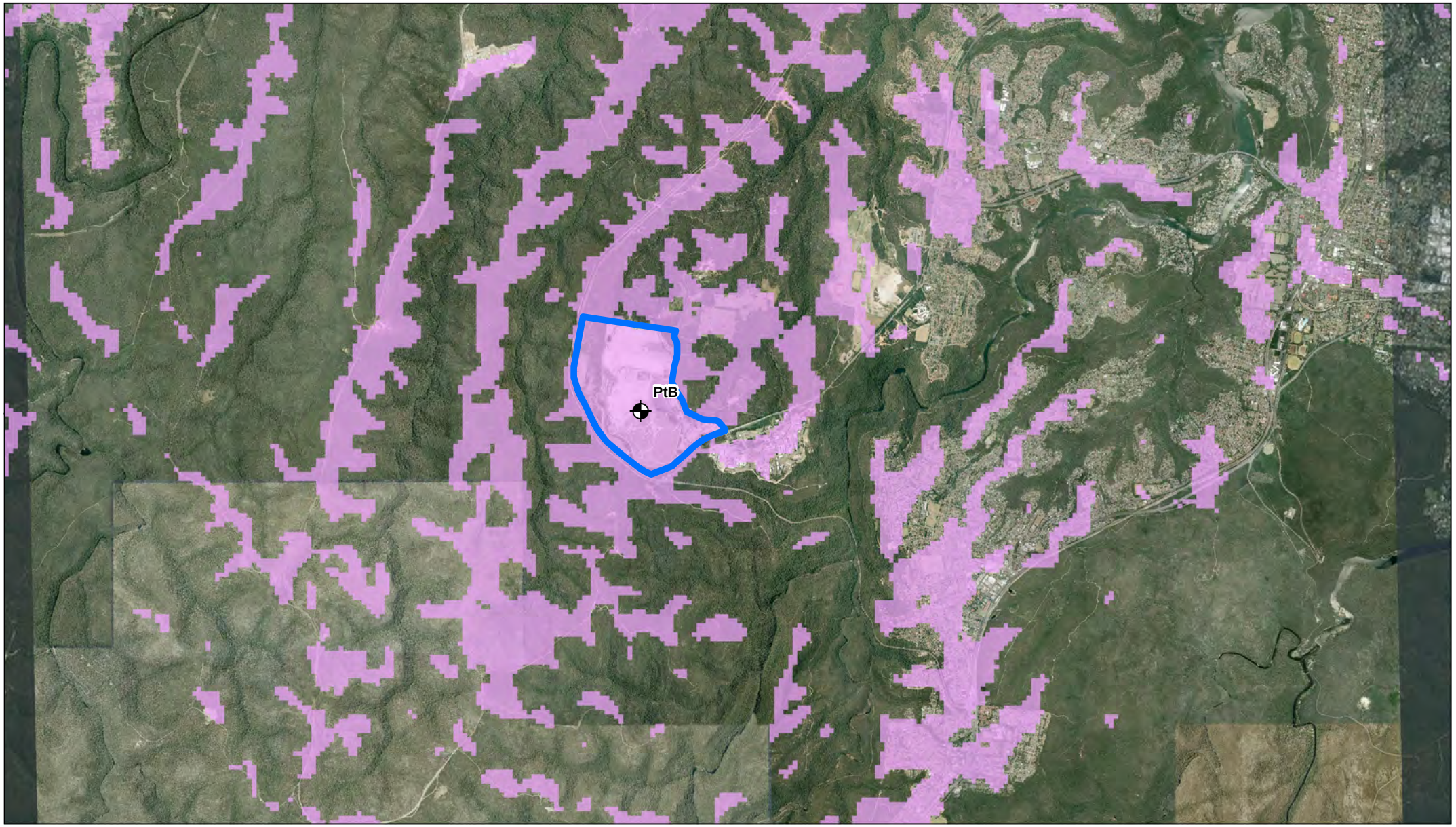
Proposed landform, post-settled 179.9mAHD

G:\21\23482\GIS\Maps\MXD\21-23482-Z055_Visual_179mAHD.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com

Data source: Aerial Imagery: ESRI/GOOGLE 2014. Topography: NSW LPMA 2012. Created by:afoddy

Appendix C – Visual Catchment 184.9 AHD



Paper Size A4

0 225 450 900 1,350 1,800

Metres

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

N

LEGEND

Visibilty Point (184.9mAHD)

LHRRP boundary

Visible

SITA Australia

Lucas Heights Resource Recovery Park

Job Number	21-23482
Revision	A
Date	05 Mar 2015

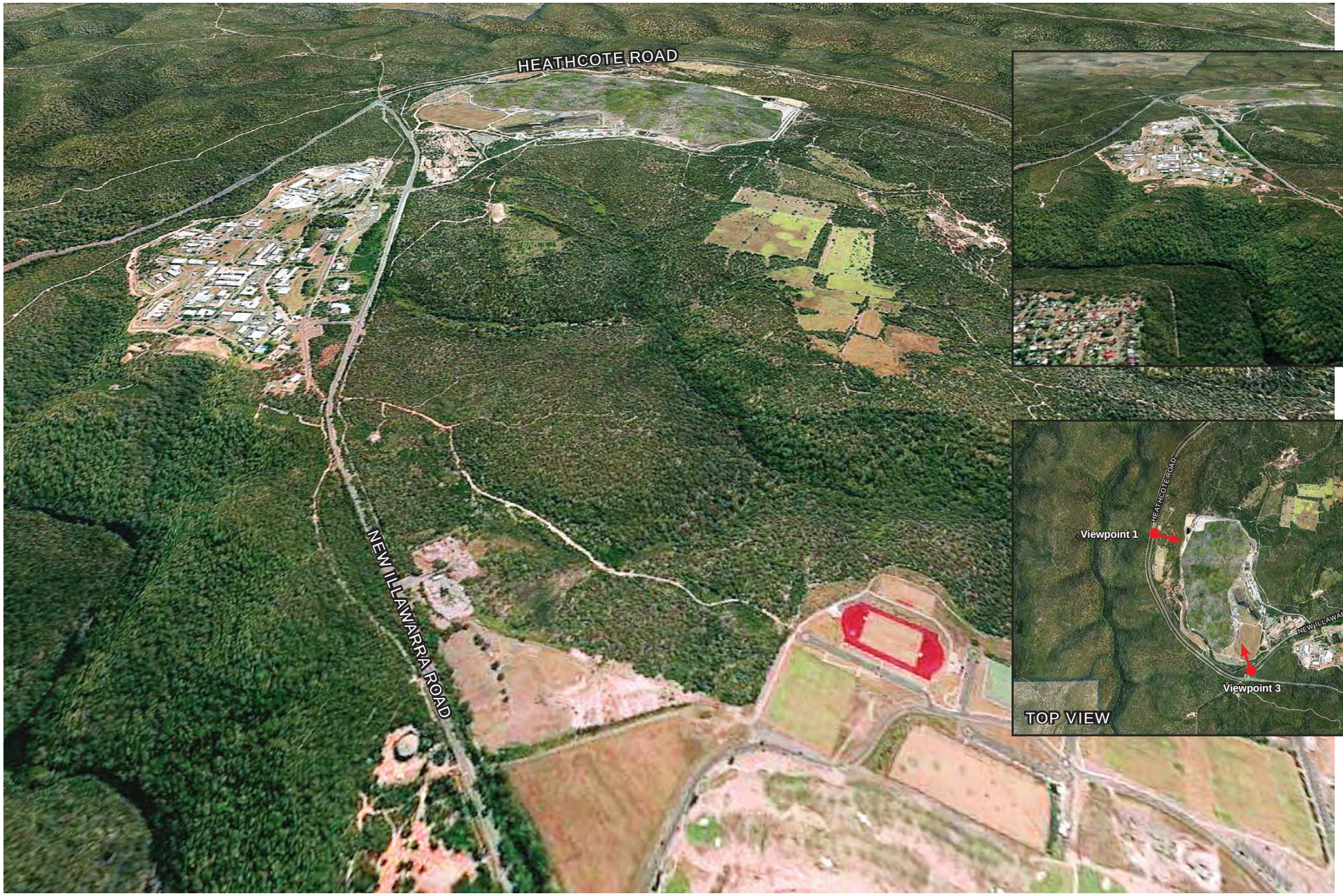
Proposed landform, baseline 184.9mAHD

G:\21\23482\GIS\Maps\MXD\21-23482-Z055_Visual_184mAHD.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia **T** 61 3 8687 8000 **F** 61 3 8687 8111 **E** melmail@ghd.com **W** www.ghd.com

Data source: Aerial Imagery: ESRI/GOOGLE 2014. Topography: NSW LPMA 2012. Created by:afoddy

Appendix D – Photomontages



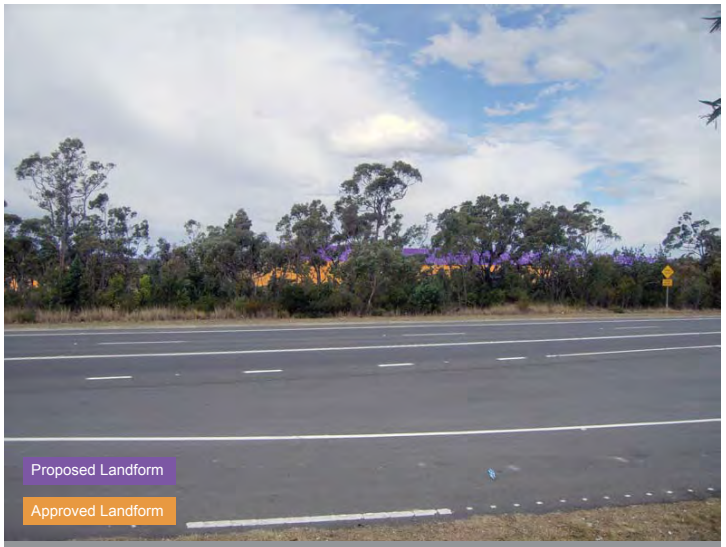
SITA
Lucas Heights Visibility Analysis

Viewpoint Locations & Aerial Oblique View

Job Number	21-20508
Revision	A
Date	20 Sep 2012

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

Existing View



Modelled view highlighting the comparison between approved landform and proposed landform

Modelled view showing proposed landform with realistic textures illustrating final landform with representative vegetation

VIEWPOINT 1

SITA
Lucas Heights Visibility Analysis

Viewpoint 1:
Truck stop far side of Heathcote Road

Job Number	21-20508
Revision	A
Date	20 Sep 2012

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

Existing View

Modelled view highlighting the comparison between approved landform and proposed landform

Modelled view showing proposed landform with realistic textures illustrating final landform with representative vegetation

VIEWPOINT 2

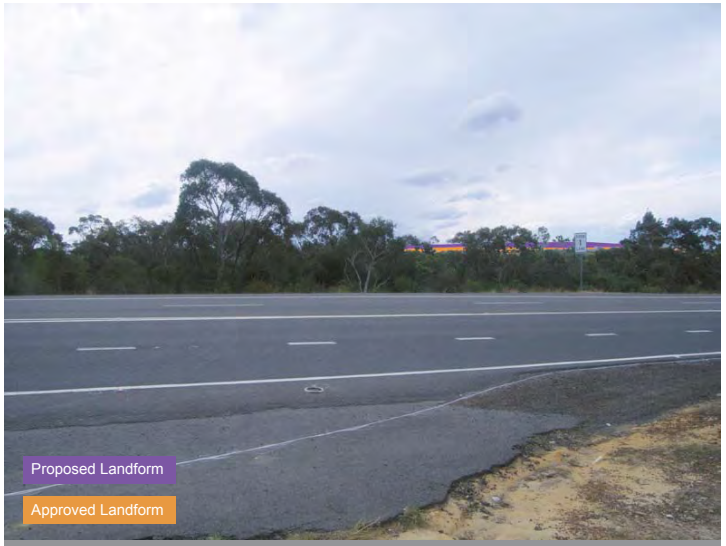
SITA
Lucas Heights Visibility Analysis

Viewpoint 2:
Public recreation facility

Job Number	21-20508
Revision	A
Date	20 Sep 2012

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

Existing View



Modelled view highlighting the comparison between approved landform and proposed landform

Modelled view showing proposed landform with realistic textures illustrating final landform with representative vegetation

VIEWPOINT 3

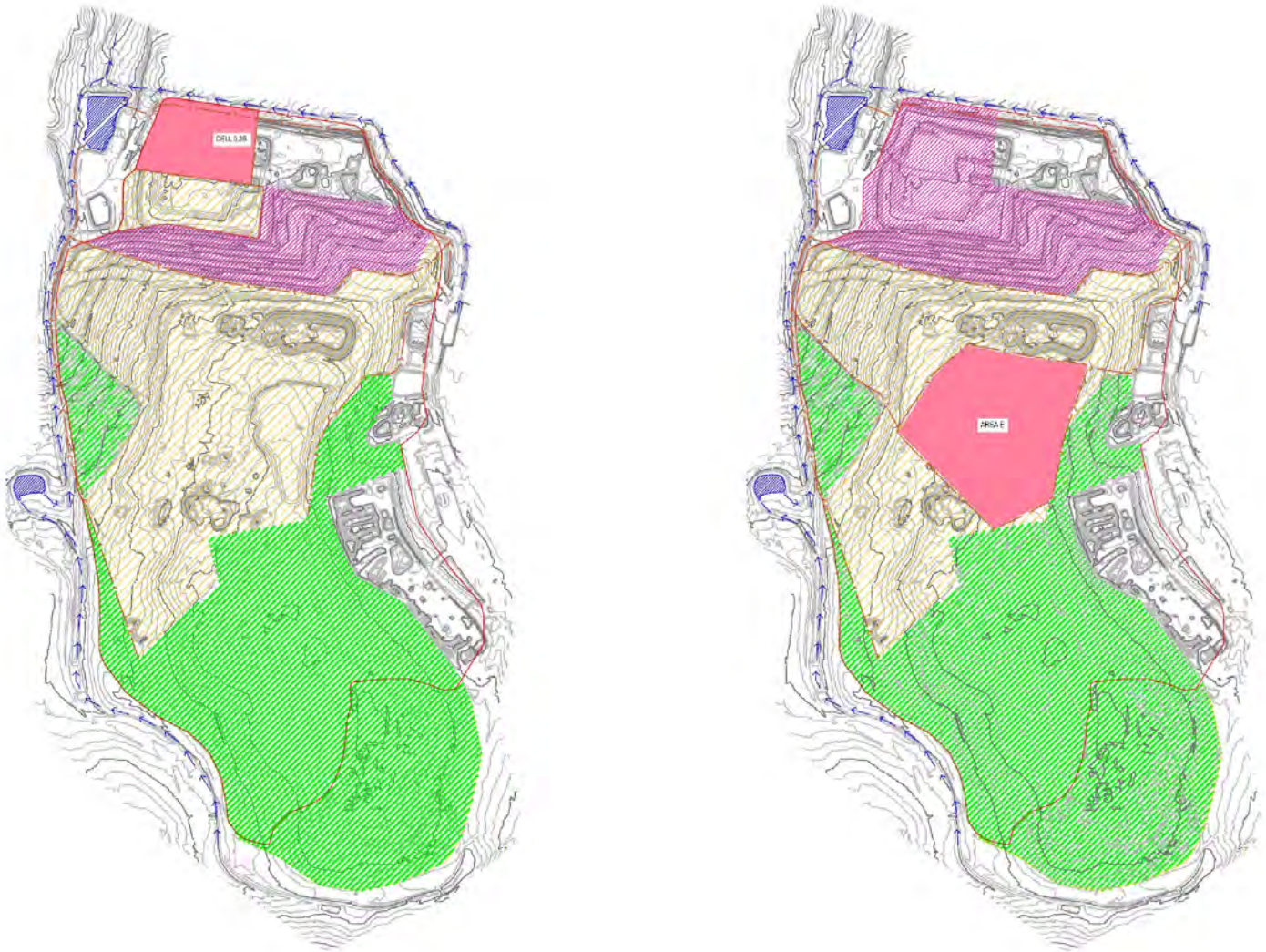
SITA
Lucas Heights Visibility Analysis

Viewpoint 3:
New Illawarra Road far side of road

Job Number	21-20508
Revision	A
Date	20 Sep 2012

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

Appendix E – Staging plans



Paper Size A4

N

- Proposed Re-profiling Boundary
- Active Cell
- Intermediate Cover - Platform
- Intermediate Cover - Slopes
- Existing Cap
- Proposed Final Cap - Platform
- Proposed Final Cap - Slopes
- Proposed Post Closure Cap - Platform
- Proposed Post Closure Cap - Slopes
- Indicative Surface Water Diversion Drain
- Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

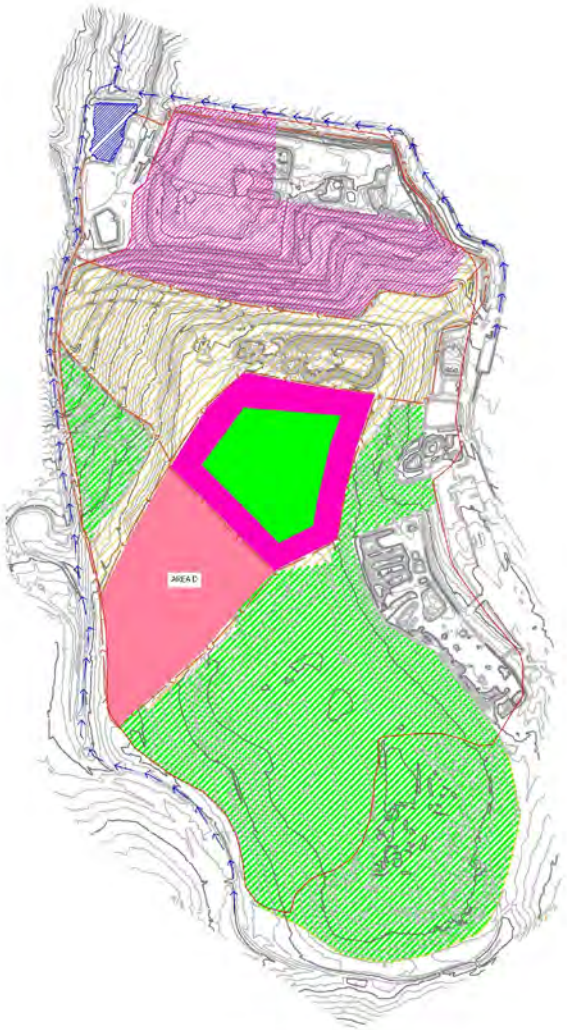
Proposed Reprofiling Staging Plan
Existing and Phase 1

Figure 13.3

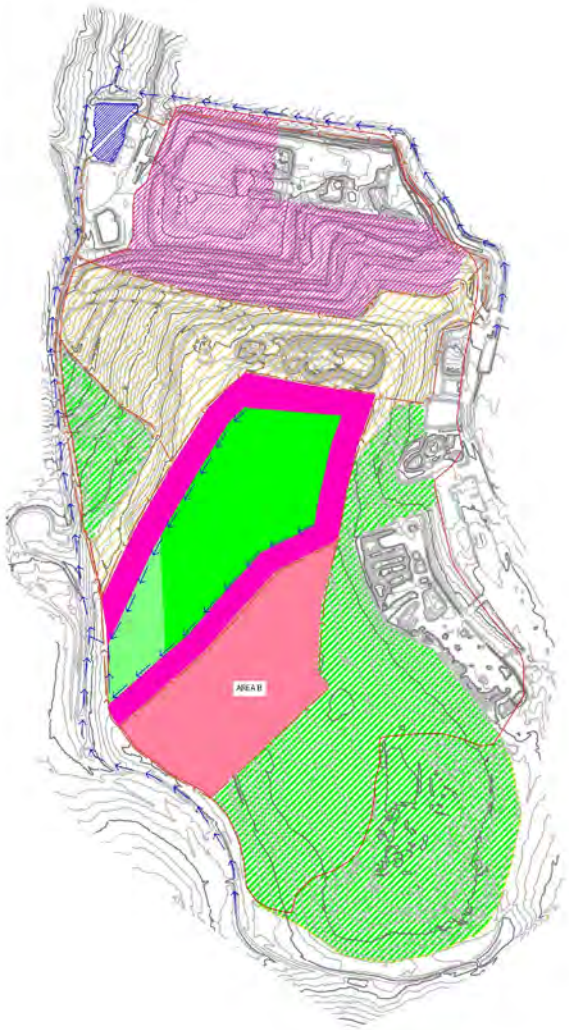
G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z050-Staging_1.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller



PHASE 2



PHASE 3

Paper Size A4

N

- Proposed Re-profiling Boundary
- Active Cell
- Intermediate Cover - Platform
- Intermediate Cover - Slopes
- Existing Cap
- Proposed Final Cap - Platform
- Proposed Final Cap - Slopes
- Proposed Post Closure Cap - Platform
- Proposed Post Closure Cap - Slopes
- Indicative Surface Water Diversion Drain
- Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

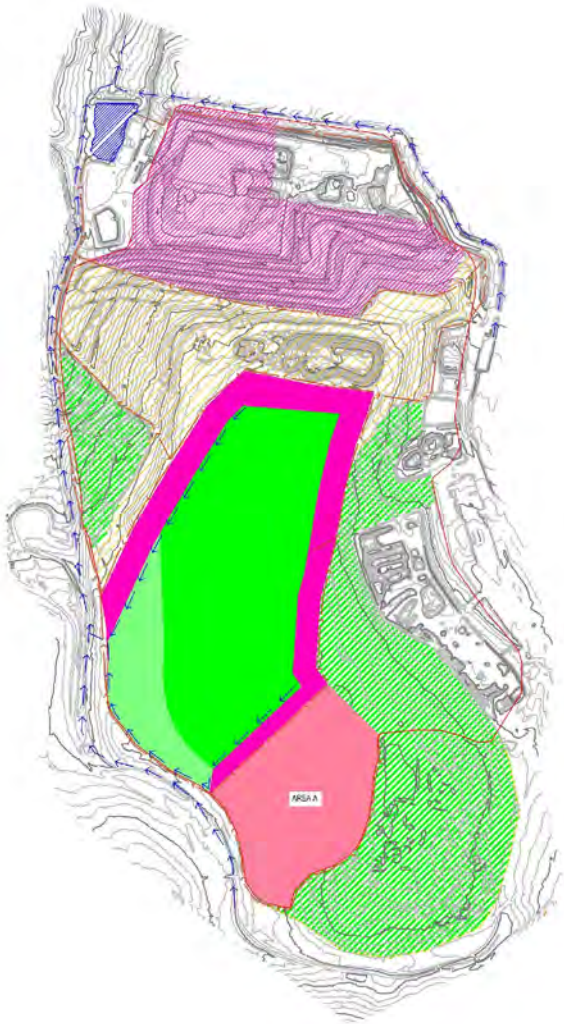
Proposed Reprofiling Staging Plan
Phase 2 and 3

Figure 13.4

G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z051-Staging_2_3.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller



PHASE 4

PHASE 5

Paper Size A4

N

- Proposed Re-profiling Boundary
- Active Cell
- Intermediate Cover - Platform
- Intermediate Cover - Slopes
- Existing Cap
- Proposed Final Cap - Platform
- Proposed Final Cap - Slopes
- Proposed Post Closure Cap - Platform
- Proposed Post Closure Cap - Slopes
- Indicative Surface Water Diversion Drain
- Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

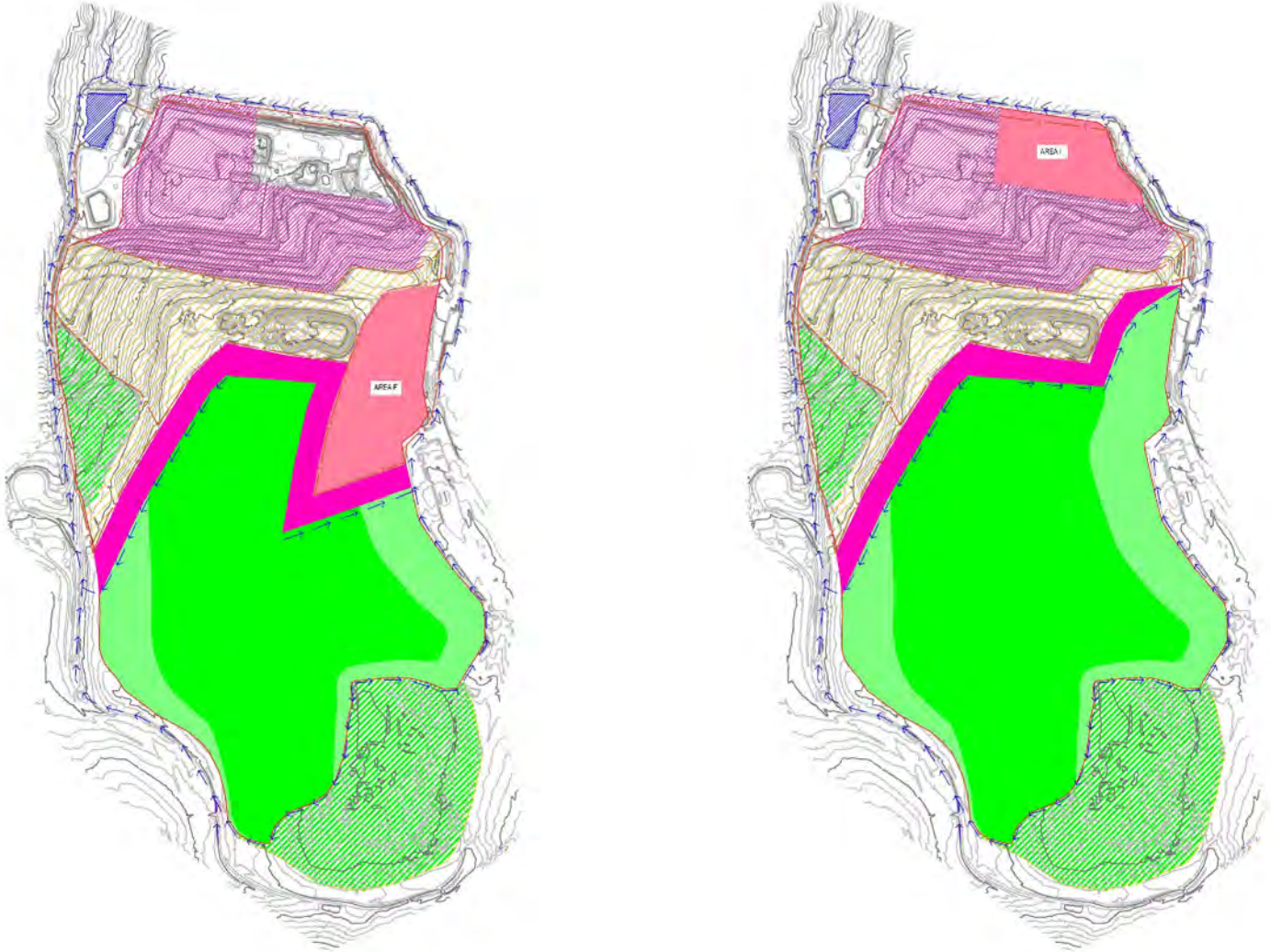
Proposed Reprofiling Staging Plan
Phase 4 and 5

Figure 13.5

G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z052-Staging_4_5.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller



Paper Size A4

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Proposed Re-profiling Boundary
Active Cell
Intermediate Cover - Platform
Intermediate Cover - Slopes
Existing Cap
Proposed Final Cap - Platform
Proposed Final Cap - Slopes
Proposed Post Closure Cap - Platform
Proposed Post Closure Cap - Slopes
Indicative Surface Water Diversion Drain
Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

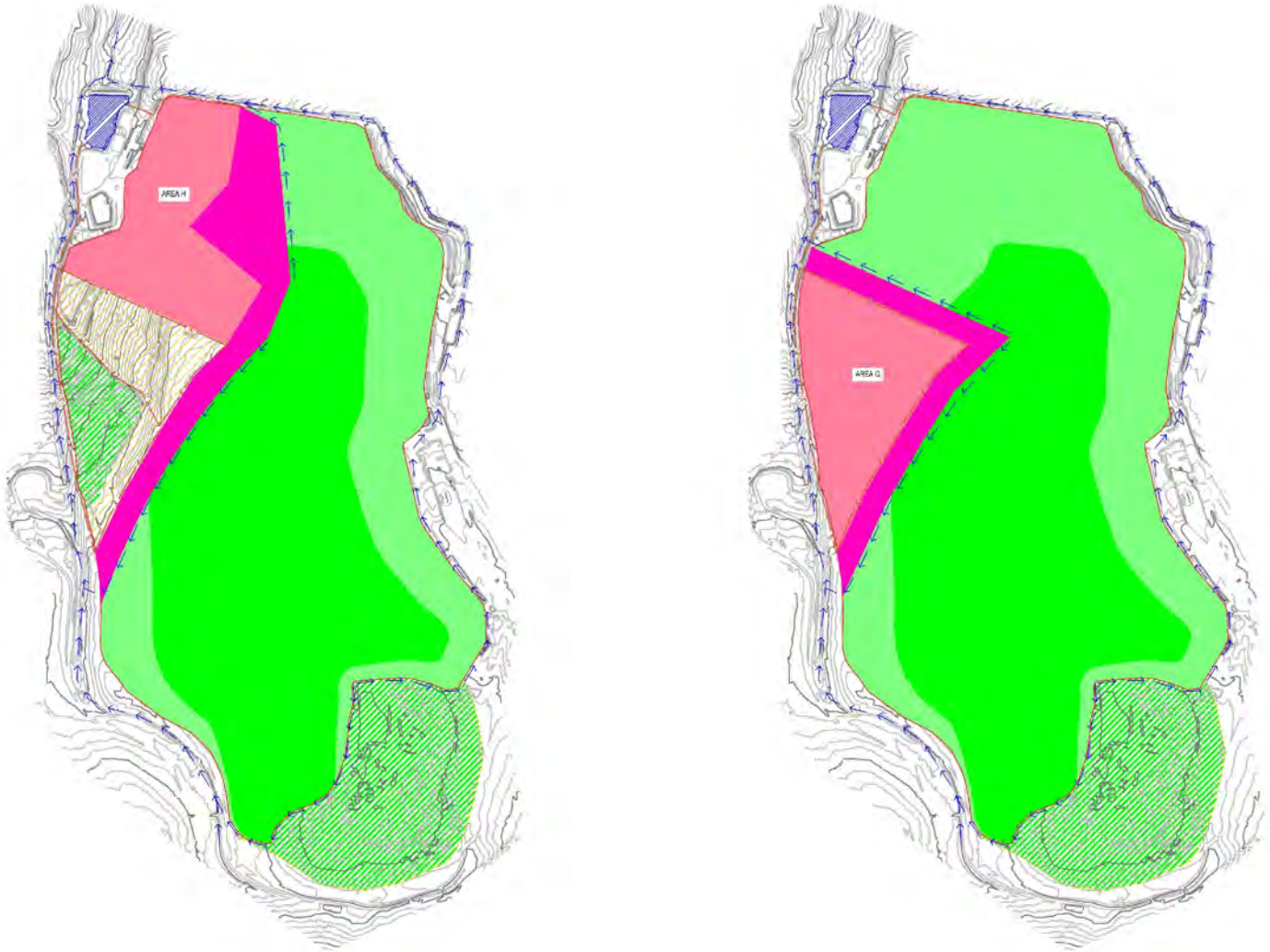
Proposed Reprofiling Staging Plan
Phase 6 and 7

Figure 13.6

G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z053-Staging_6_7.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller



Paper Size A4

N

Proposed Re-profiling Boundary
Active Cell
Intermediate Cover - Platform
Intermediate Cover - Slopes
Existing Cap
Proposed Final Cap - Platform
Proposed Final Cap - Slopes
Proposed Post Closure Cap - Platform
Proposed Post Closure Cap - Slopes
Indicative Surface Water Diversion Drain
Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

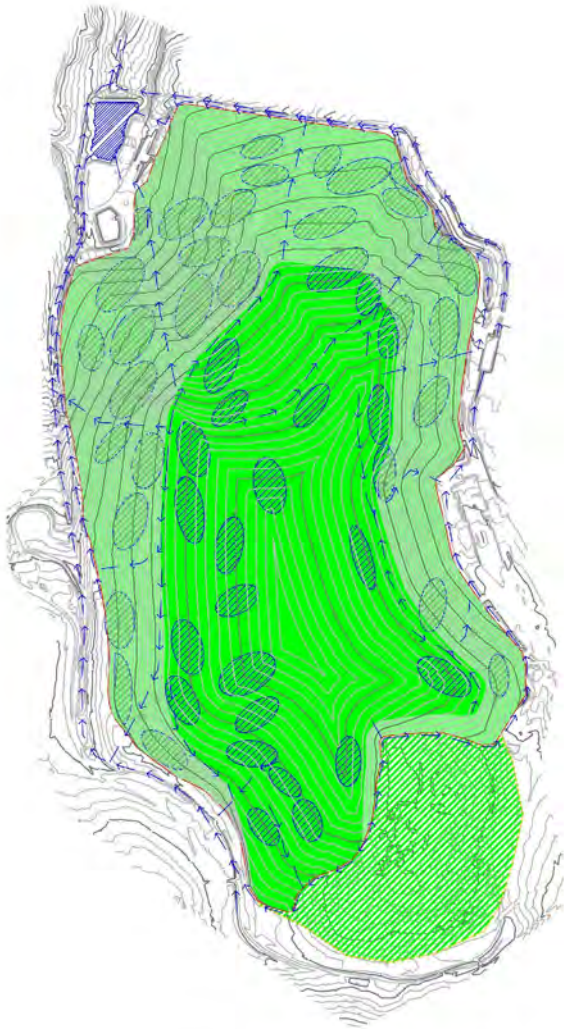
Proposed Reprofiling Staging Plan
Phase 8 and 9

Figure 13.7

G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z053-Staging_8_9.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller



FINAL POST-CLOSURE

Paper Size A4

N

- Proposed Re-profiling Boundary
- Active Cell
- Intermediate Cover - Platform
- Intermediate Cover - Slopes
- Existing Cap
- Proposed Final Cap - Platform
- Proposed Final Cap - Slopes
- Proposed Post Closure Cap - Platform
- Proposed Post Closure Cap - Slopes
- Indicative Surface Water Diversion Drain
- Indicative Surface Water Collection Drain

SITA Australia
Lucas Heights Resource Recovery Park

Job Number 21-23482
Revision A
Date 08 Jul 2015

Proposed Reprofiling Staging Plan
Final Post Closure

Figure 13.8

G:\21\23482\GIS\Maps\MXD\Staging\21-23482-Z053-Staging_Final.mxd

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

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:apmiller

GHD

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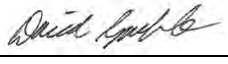
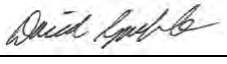
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
6	A Horlyck	D Gamble		D Gamble		21.09.2015

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