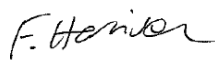





Hornsby Shire Council
Foxglove Oval - Interim Environmental Management Plan

September 2020

Document status	Response	Signatures (as relevant)
Date	10 th September 2020	
Version	1	
Author/s	Felicity Harrison (GHD Pty Ltd)	
Reviewer/s	Andrew Kohlrusch (GHD Pty Ltd)	
	Helen Milne (CEnvP)	
	Nichola Clarke (Hornsby Shire Council)	
Document commissioned and approved by	Steve Fedorow, Director, Community and Engagement (Hornsby Shire Council)	

Glossary of Terms

Term	Definition
% v/v	Percentage volume of gas compared to that of air
ACM	Asbestos containing materials
Active	Active management systems
DP	Deposited Plan
COPCs	Contaminants of Potential Concern
CS	Characteristic gas situation
CSM	Conceptual Site Model
DBYD	Dial Before You Dig
DQO	Data Quality Objectives
DQI	Data Quality Indicators
EIL	Ecological investigation levels
ESL	Ecological screening levels
Elevated exceedance/s	An exceedance of nominated assessment criteria that is a potential immediate human health hazard. In the context of this site, this is 5% v/v or more methane for any monitored location.
EMP	Environmental Management Plan
EMS	Environmental Management System
Exceedance/s	Exceedance of nominated assessment criteria
GSV	Gas screening value
IEMP	Interim Environmental Management Plan
HIL	Health investigation level
HSL	Health screening level
Leachate	Water that has percolated through a solid and leached out some of the constituents
LEL	Lower explosive limit
LFG	Landfill gas
LGA	Local Government Area
mbgl	Metres below ground level
MSW	Municipal Solid Waste
NATA	National Association of Testing Authorities
NSW	New South Wales
PACM	Potential asbestos containing materials
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PFOS	Perfluorooctane Sulphonate
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
SAQP	Sampling, Analytical and Quality Plan
Site	Foxglove Oval, as outlined in the VMP
UEL	Upper explosive limit
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
VMP	Voluntary Management Proposal

Table of contents

1.	Purpose	1
1.1	Introduction	1
1.2	Background	1
1.3	Objectives	2
1.4	List of stakeholders	3
2.	Background	5
2.1	Site Identification.....	5
2.2	Summary of site history	5
2.3	Summary of environmental setting	6
3.	Existing/residual contamination.....	8
3.1	The contamination	8
3.2	Contaminant migration pathways	15
3.3	Receptors.....	15
4.	Management activities	16
4.1	Overview of activities and procedures	16
4.2	Management structure and responsibility	16
4.3	Existing environmental management system (EMS).....	18
4.4	Monitoring of site conditions and site management measures.....	18
4.5	Approval and licensing requirements.....	19
4.6	Conditions of consent	19
4.7	Reporting requirements	19
4.8	Communication protocols	20
4.9	Emergency contacts and response	20
4.10	Operating hours	20
4.11	Contingency plans	20
4.12	Environmental training	21
5.	Inspection, maintenance, environmental sampling, analysis and reporting	22
5.1	Overview	22
5.2	Inspections and maintenance	22
5.3	Environmental sampling and analysis	32
5.4	Integrity inspection or testing or maintenance inspection program and frequency	47
6.	Monitor and review of the IEMP	51
6.1	Schedule for IEMP review	51
6.2	Monitoring checklist (IEMP reviews).....	51
6.3	Corrective actions and triggers	51
6.4	Notification to the regulator and/or consent authority with request to amend or end management activities	51
7.	Communications and notifications	52

7.1	List of stakeholders	52
7.2	Stakeholder notification.....	52
7.3	Enforceability	52
8.	References	53
9.	GHD Limitations	54

Table index

Table 1-1	Stakeholders	3
Table 2-1	Site information summary	5
Table 3-1	Contamination Status.....	9
Table 4-1	Hornsby Shire Council contact details	16
Table 4-2	Known Site approvals	19
Table 4-3	Summary of reporting requirements of this IEMP.....	19
Table 4-4	Emergency contacts.....	20
Table 5-1	Data Quality Objectives.....	32
Table 5-2	Nominated criteria for soil and asbestos assessment	34
Table 5-3	Nominated criteria for groundwater, surface water, leachate and seepage	35
Table 5-4	Characteristic gas situation	38
Table 5-5	Investigation locations – rationale.....	38
Table 5-6	Recommended monitoring locations and frequencies	46

Figure index

Figure 1	Site location and layout.....	4
Figure 2	Exceedance plan – Landfill gas (surface emissions and sub-surface service pits and penetrations)	10
Figure 3	Exceedance plan – Landfill gas (sub-surface wells).....	11
Figure 4	Exceedance plan – Groundwater.....	12
Figure 5	Exceedance plan – Surface water	13
Figure 6	Exceedance plan – Leachate and seepage.....	14
Figure 7	IEMP organisational structure	16
Figure 8	Locations of existing and proposed management measures	30
Figure 9	Location of known on and off-site sub-surface services	31
Figure 10	Proposed sampling locations plan – soil.....	41
Figure 11	Proposed sampling locations plan – landfill gas – surface monitoring	42

Figure 12 Proposed sampling locations plan – Landfill gas - Sub-surface monitoring wells	43
Figure 13 Proposed sampling locations plan – Landfill gas - sub-surface service pits and penetrations	44
Figure 14 Proposed sampling locations plan – Groundwater, surface water, leachate and seepages	45

Appendices

Appendix A – Declaration and VMP

Appendix B - Sampling Analysis and Quality Plan (including existing well review report)

Appendix C – Example inspection report templates

Appendix D – Example IEMP review checklist

1. Purpose

1.1 Introduction

Hornsby Shire Council (Council) owns and manages Foxglove Oval (the site). The site is a former landfill, which operated between 1970 and 1980 and accepted putrescible and non-putrescible municipal wastes. The site has since been rehabilitated as a sports field and is used for sporting and recreational activities. The site is defined as Lot 507 in DP 752053, Lot 19 DP 1002578 and part of Chestnut Road reserve to the west of the oval as defined on Figure 1 following. The site's address is 24X Foxglove Road, Mount Colah, NSW.

1.2 Background

The site was declared 'significantly contaminated land' by the New South Wales Environment Protection Agency (NSW PA) on 21 February 2020 with the following key areas of concern noted under *NSW EPA notice Ref 20201102* (a copy is presented in Appendix A):

- The site is a former landfill which was used for the disposal of Municipal Solid Waste (MSW) over a number of years. The decomposition of wastes contained in the landfill is a source of leachate and ground gases, including methane and carbon dioxide.
- Concentrations of methane and carbon dioxide measured in monitoring wells installed within the waste materials at the perimeter of the park on the north-west, north-east and south-east boundaries, exceeded the nominated assessment criteria.
- There is the potential for off-site migration of landfill gases via preferential pathways and for the landfill gases to accumulate in enclosed spaces, including service trenches and nearby residences.
- The initial air monitoring within residences adjoining the landfill have shown no risk, however further testing is required for confirmation, and to delineate the extent of the landfilled area and the migration of gases.
- Operational details and the efficiency of the leachate interception trench are not known. Further assessment is required to identify whether leachate is impacting groundwater and/or surface water and if there are potential risks from migration beyond the site boundaries.

In response to this declaration, Council engaged an environmental consultant (GHD Pty Ltd) (GHD) to perform a number of monitoring events at the site. Investigation findings from the initial monitoring event (GHD Pty Ltd, 2020a) indicate:

- Exceedances of the nominated assessment criteria for methane and/or carbon dioxide were detected at various wells across/around the site. Exceedances of the nominated methane assessment criteria and/or elevated concentrations of methane were also detected at certain surface locations and in certain sub-surface service pits on the southern and eastern sides of the site.
- Exceedances of the nominated assessment criteria for dissolved methane, ammonia, perfluorooctane sulphonate (PFOS), heavy metals and/or thermotolerant coliforms were detected in groundwater present around the site.
- Exceedances of the nominated assessment criteria for ammonia, nitrate, PFOS, Total Suspended Solids (TSS) and/or thermotolerant coliforms were detected in surface water around the site.

- Exceedances of the nominated assessment criteria for ammonia, nitrate, PFOS, heavy metals and/or thermotolerant coliforms were detected in leachate/seepages present at/around the site.

1.2.1 Voluntary Management Proposal

On 21 May 2020 the NSW EPA approved a Voluntary Management Proposal (VMP) for the site (Notice 20201708) (a copy is presented in Appendix A).

The VMP outlines the main contamination related objectives of Hornsby Council for the site:

1. Confirm the nature, significance and extent of contamination present at the site.
2. Identify the risks that the contaminants may pose to human health and/or the environment and (if necessary).
3. Implement appropriate measures to manage the identified contamination thereby reducing the potential risks to human health and the natural environment.

In order to address these objectives, an Interim Environmental Management Plan (IEMP) is required to be developed and implemented.

The IEMP will outline the required management actions proposed to meet the VMP objectives. These will include the recommended scope of the monitoring and investigative work, interim management works and/or remedial measures.

More specifically, the VMP requires the following capital works and regular monitoring to be undertaken as part of the broader IEMP:

- Capital works:
 - Repair and/or enhancement (where necessary) of the existing perimeter landfill gas and groundwater monitoring well network.
 - Installation of leachate monitoring wells.
 - Repair and/or enhancement (where necessary) of the existing leachate management system.
 - Repair and/or enhancement (where necessary) of the existing stormwater management systems.
- Monitoring:
 - Regular building, surface, sub-surface perimeter, sub-surface service pit/penetration and off site building landfill gas monitoring and reporting.
 - Regular groundwater, surface water, leachate and seepage monitoring and reporting.

These capital works and regular monitoring activities, and associated management actions are presented in this IEMP.

1.3 Objectives

This active¹ IEMP will be implemented upon endorsement by the EPA accredited Site Auditor, or at the latest from 30 September 2020. Its ongoing need will be reviewed throughout its

¹ As identified in (NSW Environmental Protection Authority, 2020b). Systems to manage contamination within an environmental management plan may be passive or active. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components. In some cases, passive systems may relate to notification of residual contamination to ensure mechanisms for managing risks are applied. Active management systems usually incorporate mechanical components and/or require monitoring and regular maintenance and inspection. Most active management systems are applied at sites where, if the systems are not implemented, an unacceptable risk may occur. Active management systems must only be considered for properties where effective long-term management is feasible. This IEMP is considered to be an active management plan as it requires monitoring and regular maintenance works at the site. It is considered that an active approach is feasible at this site.

implementation. As a minimum, a formal review of this IEMP will be undertaken and documented annually (refer Section 6).

It is noted there is a discrepancy between the dates in the VMP and this IEMP. The reason for the discrepancy is the consultant and auditor required more time to prepare and review the two documents that support the IEMP: namely the Sampling, Analysis and Quality Plan (SAQP) and the Well Audit Report (both included in Appendix B). No other dates in the VMP have been changed at this time.

This IEMP is designed to satisfy the requirements of the current (or if required an updated) VMP for the site. Council is responsible for the implementation and review/maintenance of this IEMP (refer Section 4.2).

This IEMP will go into 'Safehold', Council's Work Health and Safety (WHS) system. The IEMP will be recorded within Safehold's Induction Checklist for Contractors – WHS Induction Checklist - Contractors. It will also be added to Council's Contaminated Lands Register and Environmental Management Plan (EMP) Register. It will also be incorporated into Council's GIS system within the EMP mapping layer, and Council's Customer Request Management System and recorded on the Dial Before You Dig service. The IEMP will also be recorded with the NSW EPA.

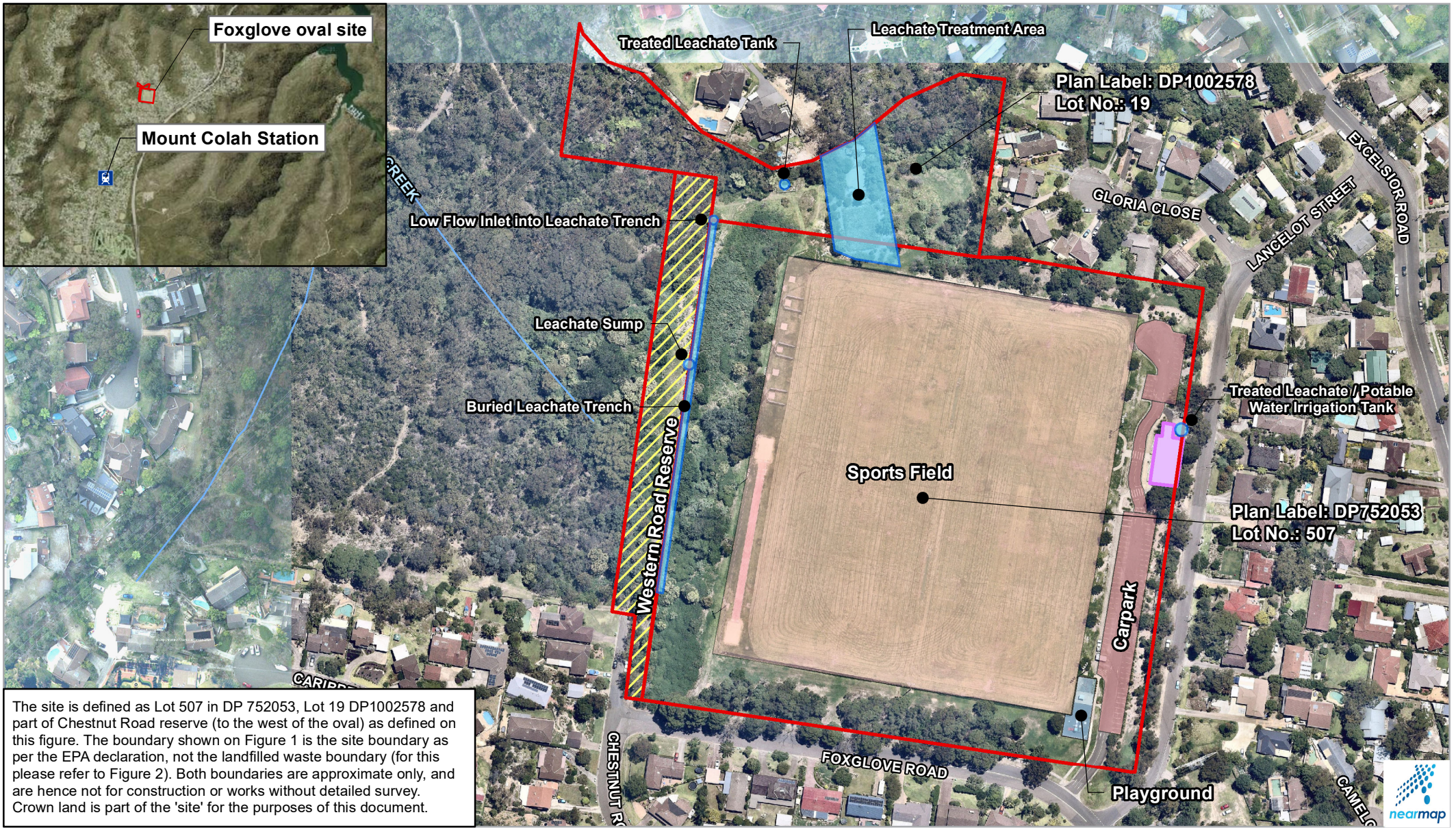
This document has been prepared with consideration of guidance relevant to the preparation of Environmental Management Plans provided in NSW EPA (2020) *Consultants reporting on contaminated land: Contaminated land guidelines*.

1.4 List of stakeholders

In relation to this IEMP, stakeholders have been identified as either primary or secondary. Primary stakeholders have direct responsibilities within the IEMP. Secondary stakeholders are those who have the potential to be impacted by the activities undertaken under this IEMP. These stakeholders are outlined in Table 1-1.

Table 1-1 Stakeholders

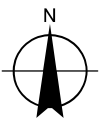
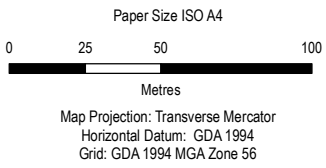
Primary stakeholders	Secondary stakeholders
Director, Community and Environment	Foxglove Oval users
Environmental Consultant	Organisations not employed by Hornsby Shire Council undertaking intrusive works on- or adjacent to the site
Manager, Parks, Trees and Recreation	Sydney Water
Park Operations Staff	Fire and Rescue NSW
Contractors on-site (Watermatic and Biospot)	Adjoining residents
Site Auditor	DBYD
	NSW EPA



The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

Legend

- Foxglove Oval site (VMP) boundary
- Leachate Treatment Infrastructure
- Crown Land
- Sports Field
- Building 1 (B1) - Amenities building
- Carpark



Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW

**Interim Environmental Management Plan
Site Layout**

Project No. 2128141
Revision No. A
Date 18 Aug 2020

FIGURE 1

2. Background

2.1 Site Identification

The site boundary (as defined in the VMP) is shown on Figure 1. A summary of site information is provided in Table 2-1 and Table 2-1 below.

Table 2-1 Site information summary

Item	Details
Address	Foxglove Oval, 24X Foxglove Road, Mount Colah, NSW 2079
Site land owner	Hornsby Shire Council
Lot/DP	The site constitutes the following lots: <ul style="list-style-type: none"> • Lot 507 DP 752053 (Hornsby Shire Council) • Lot 19 DP 1002578 (Hornsby Shire Council) • Part of Chestnut Road reserve to the west of the oval (Crown Land)
Site use	The site comprises the following land uses: amenities building, Foxglove Oval playing fields, car parking areas, playground, bushland areas and western road reserve.
Local Government Area	Hornsby Shire Council
Consent Authority	Hornsby Shire Council
Size	The site covers approximately 70,793 m ² (7.07 hectares)
Land zoning (Current and future)	The site is located within two land zonings as classed by the Hornsby Local Environmental Plan (Hornsby Shire Council, 2013): <ul style="list-style-type: none"> • RE1 – Public Recreation across the majority of the site • R2 – Low Density Residential along the part of the western road reserve that is included in the site <p>No known intended change to this in the foreseeable future. Further information on current and future land uses at the site is provided in Appendix B.</p>
Site boundary	North: Residential properties on Gloria Close, Excelsior Road and Dianella Way
	East: Residential properties on Lancelot Street
	South: Residential properties on Foxglove Road
	West: Residential properties on Chestnut Road and bushland. Gleeson Creek is located in the bushland and is immediately down-gradient of the site.
Broad description of location	The site is located approximately 25 kilometres north northwest of the centre of Sydney, NSW and is on the northern side of the northern suburb of Mt Colah. The site is primarily playing fields.

2.2 Summary of site history

A review of the historical aerial photographs and the site history from previous investigations is provided in the Foxglove Oval SAQP (Appendix B). In summary:

- The site operated as a sanitary landfill between 1970 and 1980, which received both putrescible and non-putrescible municipal waste.
- In 1983, Council received approval for Development Application No. 15/83 for the construction of playing fields, car parking and amenities building as a staged development

including the amenities block and lighting and fourth field (spreading topsoil and sprig runners, parking area and fencing).

- In 1984 the site was rehabilitated and began operation as an Oval for sports and recreational activities.
- Between 1985 and 1995, various remedial action/remediation and various site investigations were undertaken regarding off-site leachate migration via surface and subsurface discharge waters.
- In 1990 Council commissioned a leachate collection trench and well on the western side covering N/W to S/W of the landfill site.
- In 1996, a 110 m agricultural line and sump was investigated, designed and constructed across the base of the landfill to collect leachate. Between 1996 and 2001, the leachate volumes and pollutant concentrations were monitored. A geotechnical report and the sealing of two adjacent stormwater lines (joint grouting and internal liner) was also completed during that time.
- In 2004 a constructed wetland was commissioned to treat the leachate. The treatment process involved capturing the effluent using a collection well at the base of the landfill site. The collected leachate is pumped to a two- cell reed bed shallow wetland. Monitoring of the leachate quality and reuse volumes (via flow meters) is undertaken by the operator of the system.
- Between 2006 and 2007, the oval surface was re-contoured and a landfill cap with a suitable clay material was installed to prevent rainfall from entering the fill.
- In 2008 a nitrification biological treatment facility was installed in conjunction to the wetland to remove ammonia. Monitoring showed acceptable ammonia levels. Anecdotal information provided by Biospot to GHD in early 2020 indicated the treatment facility has been treating approximately 6,500 LPD of leachate.

2.3 Summary of environmental setting

The SAQP presented in Appendix B provides a detailed description of the site's environmental setting. A summary of the findings is provided in the following sections.

2.3.1 Hydrology

The nearest significant surface water body is Gleeson Creek located immediately down-gradient of the site (on the western side of the site adjacent to Chestnut Road Reserve). Gleeson Creek flows in a north-west direction into Calina Creek approximately 1,500 metres to the north-west of the site.

An unnamed Creek is located approximately 175 metres northeast of the site; up topographic gradient of the site. The creek flows in a north-easterly direction into Lyle Bird Gully approximately 800 metres northeast of the site.

2.3.2 Geology and soils

The site is a former landfill, which operated between 1970 and 1980 and accepted putrescible and non-putrescible municipal wastes. The site has since been rehabilitated as a sports field and is used for sporting and recreational activities. Subsurface conditions were described (Arcadis 2018 & 2019) as general fill comprising reworked clay, sandy clay and landfill waste was encountered to variable depths ranging from 0.8 metres to 11.50 metres below ground level (bgl). The maximum depth of the landfill or thickness is unknown; however based on topography it could be up to 16 m or so deep. The landfill's design including that of the cap and leachate

management system are largely unknown. These aspects of the site are in need of further investigation.

The Hawkesbury Soil Landscape is a colluvial landscape features rolling to very steep hills on Hawkesbury Sandstone with narrow crests and ridges, narrow incised valleys, steep side slopes with rocky benches, broken scarps and boulders. Soil is susceptible to extreme erosion with risk of mass movement. It is also highly permeable with low soil fertility.

The geological series sheet for the site (Sydney 1:100,000 scale, Sheet No. 9130 (Herbert, 1983)) indicates that:

- The site and surrounding area to the north, south, east and west is underlain by the Triassic Hawkesbury Sandstone Formation which comprises medium to coarse grained quartz sandstone, very minor shale and laminate lenses. Sandstone outcrops are observed on the northern and western boundaries of the site.
- To the south of the site, along the southern ridge line, the Triassic Mittagong Formation overlies the Hawkesbury Sandstone.

The soil landscape series sheet (Sydney 1:100,000 scale, Sheet No. 9130) (Chapman, Murphy, Tille, Atkinson, & Morse, 2009) indicates that the area of the site is underlain by the Hawkesbury Soil Landscape with disturbed terrain on the site of the former landfill itself.

2.3.3 Hydrogeology

Based on the information available, the direction of groundwater flow is towards the north-west in alignment with the topography of the local region and location of nearby surface water bodies. Localised groundwater flows may be influenced by fill materials/landfilled wastes at the site.

GHD conducted a search of existing registered groundwater borehole records in the vicinity of the site on 4 June 2020 using the NSW Water Information Database and no groundwater boreholes were recorded within 500 metres of the site.

The water level data contained in (GHD Pty Ltd, 2020a) identifies that the typical depth to groundwater in the clayey sand and/or sandstone immediately underlying it was between 0.9 and 3.5 metres below ground level (mbgl). The only measured depth to leachate was 3.25 mbgl (well GW14).

3. Existing/residual contamination

3.1 The contamination

3.1.1 Potential sources of contamination

Historical use of the site

- Buried waste from historical landfill and other possible light industrial activities, including both putrescible and non-putrescible waste and asbestos containing materials (ACM) with associated generation of landfill gas and leachate. The exact extent of this landfilling area is uncertain.
- Imported filling of unknown origin.

Other

- Mount Kuring-gai Rural Fire Service (RFS) located 274 metres north east of the site.
- Local sewer networks (which are known to over-flow).

3.1.2 Contaminants of concern

The contaminant of concern are:

- Metals (e.g. arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc)
- Hydrocarbons (including benzene, toluene, ethylbenzene, xylene (BTEX)) and phenols
- Polycyclic aromatic hydrocarbons (PAHs)
- Total recoverable hydrocarbons (TRHs)
- Asbestos
- E. coli and thermotolerant (faecal) coliforms
- Nutrients (nitrogen, phosphorus) and ammonia
- Per- and Polyfluoroalkyl Substances (PFAS)
- Landfill gas, including methane, carbon dioxide, carbon monoxide and hydrogen sulphide

3.1.3 Contaminated media

In relation to this IEMP, the contaminated (or potentially contaminated) media are the air (LFG being emitted from the site), groundwater, surface water, leachate, and/or soil.

3.1.4 Concentrations and locations of the contaminants of concern

As identified in Section 1.2, the investigation completed as part of (GHD Pty Ltd, 2020a) in March 2020 identified various exceedances of nominated assessment criteria for landfill gas, groundwater, surface water, leachate and seepages. Further testing in April, May, June and July 2020 identify no significant changes to these results on site. The March results are summarised in Table 3-1 and Figure 2 to Figure 6 following.

Table 3-1 Contamination Status

Potential contaminant source	Contaminant(s) in exceedance (Section 5.3.1)	Comments (GHD Pty Ltd, 2020a)
Soil contamination (including asbestos)	None confirmed	Current status of soil contamination on-site is unknown. Fill of unknown origin has been imported onsite for the construction of the playing fields and for the construction of the western road reserve and the leachate treatment area.
Landfill gas (generated by buried waste in the landfill)	Methane and carbon dioxide	Elevated methane and/or carbon dioxide concentrations recorded on or around the site at various locations.
Groundwater	Dissolved methane, ammonia, perfluorooctane sulphonate (PFOS), heavy metals and thermotolerant coliforms	Only ecological criteria were exceeded with the exception of: a) The thermotolerant coliforms exceedances which were exceedances of a human health related criterion. b) The dissolved methane exceedances which were exceedance of a widely used sewer disposal criterion (UK Environment Agency - Guidance on the treatment of landfill leachate (2007)).
Surface water	Ammonia, nitrate, PFOS, Total Suspended Solids (TSS) and thermotolerant coliforms	Only ecological criteria were exceeded with the exception of the thermotolerant coliforms exceedances which were exceedances of human health related criterion. The source of ammonia at SW4 is not currently well understood.
Leachate and seepage	Ammonia, nitrate, heavy metals, PFOS and thermotolerant coliforms	The leachate treatment process appears to have no notable effect on the PFOS concentrations. Only ecological criteria were exceeded with the exception of the thermotolerant coliforms exceedance which was an exceedances of human health related criterion. Seepage samples (locations SW2a and SW2b) show certain signs of potential leachate migration from the site and/or other sources (for example local stormwater systems and/or local sewer systems).

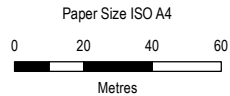


The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

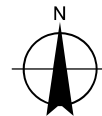
Monitoring Event March 2 to March 4 2020

Legend

- Elevated (but not exceeding) sub-surface service pit or penetration reading
- Sub-surface service pit or penetration exceedance
- Surface Exceedence
- Surface transects
- Surface transects inaccessible (not monitored)
- Multiple continuous exceedances
- Extent of landfill (approximate)



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



Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. 21-28141
Revision No. A
Date 26/03/2020

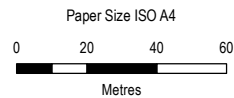
Landfill Gas Exceedance Locations – Surface Emissions and Sub-surface Service Pits and Penetrations - Methane

FIGURE 2

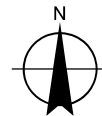


Legend

- Carbon dioxide and methane exceedance
- Carbon dioxide exceedance
- No exceedances
- Environmental monitoring well - destroyed, damaged or not able to be located
- Extent of landfill (approximate)



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



Hornsby Shire Council
 Foxglove Oval, Mount Colah, NSW
 Interim Environmental Management Plan
**Landfill Gas Exceedance Locations –
 On-site and Off-site
 Sub-surface Wells - Methane**

Project No. 21-28141
 Revision No. A
 Date 01/04/2020

FIGURE 3

The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

Analyte	Concentration
Ammonia	22 mg/L
Chromium (III + VI)	0.026 mg/L
Copper	0.030 mg/L
Dissolved methane	1800 µg/L
Nickel	0.02 mg/L
Nitrate	16 mg/L
PFOS	0.0060 µg/L
Zinc	0.069 mg/L

Analyte	Concentration
Ammonia	4.7 mg/L
Copper	0.013 mg/L
Dissolved methane	350 µg/L
PFOS	0.127 µg/L
Zinc	0.055 mg/L

Analyte	Guideline
Ammonia	0.9 mg/L - ANZG (2018) Freshwater 95% species protection
Aluminium	0.055 mg/L - ANZG (2018) Freshwater 95% species protection
Nitrate	2.4 mg/L - NIWA (2013)
Cadmium	0.0002 mg/L - ANZG (2018) Freshwater 95% species protection
Chromium (III + VI)	0.001 mg/L - ANZG (2018) Freshwater 95% species protection
Cobalt	0.0014 (mg/L) - ANZG (2018) Unknown level of species protection
Copper	0.0014 (mg/L) - ANZG (2018) Freshwater 95% species protection
Manganese	1.9 mg/L - ANZG (2018) Freshwater 95% species protection
Nickel	0.011 mg/L - ANZG (2018) Freshwater 95% species protection
Zinc	0.008 mg/L - ANZG (2018) Freshwater 95% species protection
PFOS	0.00023 µg/L - NEMP (2020) Freshwater 99% species protection
Thermotolerant coliforms	1000 cfu/100ml - ANZG (2018) Secondary contact recreation
Dissolved methane	140 µg/L - Environment Agency of England and Wales (2007)

Analyte	Concentration
Ammonia	5.3 mg/L
Chromium (III + VI)	0.015 mg/L
Dissolved methane	290 µg/L
Nickel	0.015 mg/L
PFOS	0.084 µg/L

Analyte	Concentration
Ammonia	13 mg/L
Copper	0.008 mg/L
Dissolved methane	1400 µg/L
Nickel	0.017 mg/L
PFOS	0.22 µg/L
Zinc	0.04 mg/L

Analyte	Concentration
Ammonia	62 mg/L
Copper	0.003 mg/L
Dissolved methane	1400 µg/L
PFOS	0.10 µg/L
Thermotolerant coliforms	>24000 cfu/100mL
Zinc	0.01 mg/L

Analyte	Concentration
Copper	0.029 mg/L
PFOS	0.046 µg/L
Zinc	0.036 mg/L

Analyte	Concentration
Aluminium	0.11 mg/L
Cobalt	0.003 mg/L
PFOS	0.0085 µg/L
Zinc	0.036 mg/L

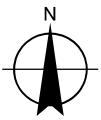
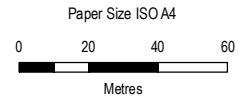
Analyte	Concentration
Aluminium	0.25 mg/L
Cadmium	0.0002 mg/L
Cobalt	0.010 mg/L
Copper	0.006 mg/L
Nitrate	6.8 mg/L
PFOS	0.0003 µg/L
Zinc	0.039 mg/L

Insufficient water to sample

Analyte	Concentration
Aluminium	30 mg/L
Chromium (III + VI)	0.011 mg/L
Cobalt	0.79 mg/L
Copper	0.003 mg/L
Manganese	2.0 mg/L
Nickel	0.024 mg/L
PFOS	0.0007 µg/L
Zinc	0.091 mg/L

Monitoring Event March 2 to March 4 2020

- Legend**
- Monitored well
 - Well not monitored
 - Extent of landfill (approximate)



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

Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. 2128141
Revision No. A
Date 18/08/2020

Groundwater Exceedances

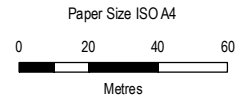
FIGURE 4

\\ghdnet\ghd\AU\Sydney\Projects\2128141\GIS\Maps\Deliverables\2020 Figures\IEMP\21_28141_2004_IEMP_Fig04_ExceedancesGroundwater.mxd
Print date: 18 Aug 2020 - 21:43

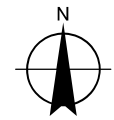
Data source: sixmaps, LP12015, Nearmap (28/12/2018), Services Data Source: Hornsby Shire Council, Foxglove Oval, Mt Colah map, created 27/02/2019. Created by: jamaic



Legend
 Surface water sampling location
 Extent of landfill (approximate)



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



Hornsby Shire Council
 Foxglove Oval, Mount Colah, NSW
 Interim Environmental Management Plan

Project No. 2128141
 Revision No. A
 Date 18/08/2020

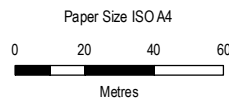
**Exceedances of Guideline Criteria -
 Surface Water**

FIGURE 5



Legend

- Leachate sampling locations
- Seepage sampling locations
- Extent of landfill (approximate)



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



Hornsby Shire Council
 Foxglove Oval, Mount Colah, NSW
 Interim Environmental Management Plan

**Exceedances of Guideline Criteria -
 Leachate and Seepage**

Project No. 2128141
 Revision No. A
 Date 18/08/2020

FIGURE 6

3.2 Contaminant migration pathways

3.2.1 For human receptors

Potential exposure pathways for human receptors based on the identified contaminants of concern in (GHD Pty Ltd, 2020b) are:

- Dermal contact with contaminated soil, groundwater, leachate, seepage and/or surface water.
- Ingestion of contaminated soil, groundwater, leachate, seepage and/or surface water.
- Inhalation of dust particulates from atmospheric dispersion of contaminated surficial soil and asbestos fibres (if present).
- Inhalation of vapour emanating from contaminated soil, groundwater, leachate and/or surface water.
- Inhalation, toxic effects and/or explosion hazards from emission/accumulation of landfill gas.
- Services (for example stormwater and/or sewer) as potential preferential pathways of landfill gas from the site to residences.

3.2.2 For ecological receptors

Potential exposure pathways for ecological receptors based on the identified contaminants of concern are:

- Plant uptake of contaminants present in root zones (typically top 2 metres of soils).
- Direct contact and ingestion of contaminated soil, groundwater, leachate, seepage and/or surface water.
- Downward migration of contamination from soil, leachate, seepage and surface water to groundwater aquifer.
- Migration of contamination via surface water run-off and groundwater movement to nearby Creek.
- Inhalation, toxic effects and/or explosion hazards from emission/accumulation of landfill gas.

3.3 Receptors

3.3.1 Potential human receptors

Identified potential human receptors in relation to the site include:

- Recreational users of the site.
- Maintenance workers (for both intrusive and non-intrusive works).
- Off-site residents and workers.

3.3.2 Potential ecological receptors

Identified potential ecological receptors in relation to the site include:

- Flora and fauna on-site and offsite (Berowra Valley National Park).
- Surface water bodies (Gleeson Creek).
- Groundwater underlying the site.

4. Management activities

4.1 Overview of activities and procedures

This IEMP requires various management activities to be completed by relevant stakeholders in accordance with associated procedures. These are outlined in the following text.

4.2 Management structure and responsibility

4.2.1 Overview

The implementation of the measures outlined in this IEMP will be the responsibility of the site owner (Council). It will be assisted by other primary stakeholders as identified in the organisation structure identified in Figure 7 below.



Figure 7 IEMP organisational structure

Further details on specific responsibilities of these primary stakeholders are identified in the following sections.

4.2.2 Hornsby Shire Council – Director, Community and Environment

The implementation of the measures outlined in this IEMP will be the responsibility of the site owner (Council) and specifically the responsibility of the Director: Community and Environment. Contact details for Hornsby Shire Council are provided in Table 4-1.

Table 4-1 Hornsby Shire Council contact details

Council contacts	Role	Phone number	Email
Hornsby Shire Council customer service	Main switchboard (24 hours)	02 9847 6666	hsc@hornsby.nsw.gov.au
David Sheils	Manager, Parks, Trees and Recreation	9847 6792 0418 960 028	DSheils@hornsby.nsw.gov.au
Steve Fedorow	Director, Community and Environment	02 9847 6541 0478 318 183 (after hours)	SFedorow@hornsby.nsw.gov.au

Specific to this IEMP, the Director, Community and Environment's responsibilities include:

- Establishing and maintaining systems for the implementation of the IEMP.

- Informing and training Hornsby Shire Council - Park Operations Staff/Contractors as relevant in relation to the IEMP and its requirements.
- Ensuring persons undertaking works at the site are aware of and comply with the relevant requirements of this IEMP.
- Reporting elevated exceedances detected at the site to the Park Operations Staff/Contractors, Site Auditor and/or NSW EPA as relevant.
- Record keeping in relation to detected elevated exceedances and associated management measures taken.
- Coordinating corrective actions.
- Working with the Environmental Consultant, Park Operations Staff/Contractors, Site Auditor and/or NSW EPA as relevant to develop and implement management measures for the detected elevated exceedance/s.
- Instruct the Manager, Parks, Trees and Recreation in the implementation, maintenance and eventually removal of relevant site controls including those at elevated exceedance locations (locations that present an immediate risk to human health).
- Investigating and documenting any identified breaches of the IEMP.
- Co-ordinating reviews and/or updates of the IEMP.

4.2.3 Hornsby Shire Council – Manager, Parks, Trees and Recreation

The Manager, Parks, Trees and Recreation is responsible for the day to day running of the site. Specific to this IEMP, Hornsby Shire Council- Manager, Parks, Trees and Recreation is responsible for the implementation, maintenance and eventual removal of relevant site controls as detailed in Section 5.

The Hornsby Shire Council Manager, Parks, Trees and Recreation responsibilities include;

- Implementation of relevant site controls, including the management of any subsurface activities.
- Ensuring that relevant Parks Staff/Contractors attend IEMP training events and that their attendance is recorded.
- At the instruction of the Director, Community and Environment, implementing, maintaining and eventually removing (following instruction from the Director, Community and Environment) relevant site controls including those at elevated exceedance locations (locations that present an immediate risk to human health).
- Ensuring only allowable activities identified in this IEMP (or activities otherwise approved by the Director, Community and Environment in writing) are adhered to at the site including within the vicinity of detected elevated exceedances.
- Informing the Director, Community and Environment of any identified breaches of the IEMP on site.

4.2.4 Environmental Consultant

An Environmental Consultant contracted by Council will undertake regular environmental monitoring at the site, data gap analysis, and other additional tasks at the Site Auditor's or Hornsby Shire Councils request. The scope of that monitoring is detailed in (GHD Pty Ltd, 2020b). Specific to this IEMP, the Environmental Consultant's responsibilities include:

- Identifying and reporting on any elevated exceedances detected at the site.

- Informing the Director, Community and Environment of any elevated exceedances detected at the site as soon as reasonably practicable.
- Working with the Director, Community and Environment, Manager, Parks, Trees and Recreation, Site Auditor and/or NSW EPA as relevant to develop and implement management measures for the detected elevated exceedance/s.
- Informing the Director, Community and Environment of any identified breaches of the IEMP noticed during monitoring works.

4.2.5 Site Auditor

An independent NSW EPA accredited Site Auditor contracted by Council will undertake a statutory site audit with the purpose of confirming that the existing use of the site (playing fields) is acceptable from a human health and ecological risk perspective.

The Site Auditor's responsibilities include:

- Independent review of the IEMP, its implementation and review.
- Independent review of the management measures suggested by other primary stakeholders for the identified elevated exceedance locations (further explained in Section 5).
- Undertake a statutory site audit on the site's suitability to remain playing fields and not represent an unacceptable health or environmental risk. This will be done at the conclusion of the studies undertaken, and yet to be undertaken and refer back to the objectives of the VMP.

4.3 Existing environmental management system (EMS)

Hornsby Shire Council does not have an existing EMS. However, the IEMP will be uploaded to Council's Contaminated Lands Register and Environmental Management Plan (EMP) Register. It will also be incorporated into Council's GIS system within the EMP mapping layer, and Council's Customer Request Management System.

This IEMP will be recorded on the Dial Before You Dig (DBYD) service so that external contractors/third parties can access the relevant documentation.

4.4 Monitoring of site conditions and site management measures

Baseline environmental monitoring data is currently being collected by an Environmental Consultant. Following the approval and endorsement of this IEMP, the works outlined in the Sampling, Analysis and Quality Plan (refer Appendix B) would be implemented between 30 September 2020 and 13 October 2021 as identified in the VMP (refer Appendix A).

Current site management measures include:

- Landfill cover layer
- Leachate management system
- Stormwater management systems
- Signage and fencing

Further details on these measures are provided in Section 6.

4.5 Approval and licensing requirements

Contamination at the site is currently regulated under a VMP and management of the contamination will be maintained through this IEMP. A summary of this VMP is provided in the Executive Summary and a copy is presented in Appendix A. No other relevant approval or licensing requirements are in place.

4.6 Conditions of consent

Contamination at the site is currently regulated under a VMP and management of the contamination will be maintained through this IEMP. Site approvals that have been granted for the former and current use of the site are provided in Table 4-2. A review of these documents by GHD has not identified any conditions of relevance to the current and future management of the site. For example, no requirements to maintain the existing cover layer.

Table 4-2 Known Site approvals

Application Number	Date approved	Description
N/A (Health, 1964)	July 1964	Department of Public Health approval for use of the site as a sanitary depot for the disposal of garbage
DA/15/1983 (Woodward, 1983)	28/2/1983	Approval for sports fields
DA/334/1996 (Ball, 1996)	9/10/1996	Approval for extensions to Amenities Building for storage of athletic equipment
BA/2136/1996 ² (Clarke, 2020)	6/1/1997	Extensions to Amenities Building for storage of athletic equipment

4.7 Reporting requirements

A number of reporting requirements are contained in this IEMP and are further outlined in Section 5. Table 4-3 summarises these requirements and the relevant parties involved.

Table 4-3 Summary of reporting requirements of this IEMP

Report	Responsible Party	Recipient	Timeframe
Reporting of exceedances of nominated assessment criteria detected during monitoring at the site	Environmental Consultant	Director, Community and Environment	Immediately via phone call and further reported as outlined in the SAQP (Appendix B).
Quarterly and annual reports	Environmental Consultant	Director, Community and Environment Site Auditor	As outlined in the SAQP (Appendix B).
Recording site works and closing out these works	Manager, Parks, Trees and Recreation	Director, Community and Environment	Council is developing a process and will be conveyed in EMP

² As per the email sent from Nichola Clarke from Hornsby Shire Council to Matt Welsh and Felicity Harrison on 6 August 2020: "To date, we've not been able to find much for BA/2136/1996." As such, this email from Nichola is referenced for this Application number.

Report	Responsible Party	Recipient	Timeframe
Reporting of exceedances of nominated assessment criteria detected during monitoring at the site	Director, Community and Environment	NSW EPA Manager, Parks, Trees and Recreation Site Auditor Fire and Rescue NSW (as relevant)	Within 24 hours or immediately if immediately hazardous to human health
Reporting of any identified breaches of this IEMP (for example removal of fences or signage without prior approval)	Manager, Parks, Trees and Recreation Environmental Consultant	Director, Community and Environment	Within 24 hours of identification or immediately if immediately hazardous to human health

4.8 Communication protocols

Specific communication protocols for the Environmental Consultant, Site Auditor, Director, Community and Environment and the Manager, Parks, Trees and Recreation are presented in detail in Section 5.

4.9 Emergency contacts and response

Table 4-4 outlines Hornsby Shire Council's emergency contacts in case of an emergency that is related to this IEMP (for example a fire or explosion at the site). If there is an immediate risk to the health and safety of the park users, emergency services (Fire/ambulance/police as relevant) will be contacted immediately on 000.

Table 4-4 Emergency contacts

Council contacts	Title	Phone number	Email
Steve Fedorow	Hornsby Shire Council – Director, Community & Environment	02 9847 6541 0478 318 183 (after hours)	SFedorow@hornsby.nsw.gov.au
David Sheils	Manager, Parks, Trees and Recreation	02 9847 6792 0418 960 028	DSheils@hornsby.nsw.gov.au
Fire and Rescue NSW	-	1800 679 737	-
Main switchboard (24 hours)	Hornsby Shire Council Customer Service	02 9847 6666	hsc@hornsby.nsw.gov.au

4.10 Operating hours

The IEMP is in place for the same hours that the site is open i.e. 24 hours a day, 365 days a year.

4.11 Contingency plans

At this time, specific contingency plans are not considered necessary for this IEMP. As such, none currently exist.

4.12 Environmental training

The Director, Community and Environment is responsible for the development, implementation and review of training modules relating to this IEMP. Attendance of relevant staff at these training modules, recording of attendance and maintenance of training records of relevant staff will be the responsibility of the Manager, Parks, Trees and Recreation.

At a minimum, these training modules will include the following as documented in this IEMP:

- An overview of the site and its contamination related matters.
- An overview of the contamination control measures.
- An overview of the IEMP highlighting its need and key requirements.
- An outline of the maintenance or works approval and record keeping process. Including confirming reinstatement (where required) or confirmation of no adverse impact on contamination control measures, and including waste management and records.
- An overview of the IEMPs primary stakeholders and their key responsibilities.

Inclusion of the IEMP will go into 'Safehold', Council's Work Health and Safety (WHS) system. The IEMP will be recorded within the WHS Induction Checklist – Contractors.

5. Inspection, maintenance, environmental sampling, analysis and reporting

5.1 Overview

The interim environmental management measures for the site contained in this IEMP include:

1. Assessment of the landfill cover layer and associated inspection, maintenance and enhancement/repair (as required) as determined to be appropriate by that assessment.
2. Assessment of the leachate management system and associated inspection, maintenance and enhancement/repair (as required) as determined to be appropriate by that assessment.
3. Repair and/or enhancement (where necessary) of the existing perimeter landfill gas and groundwater monitoring well network.
4. Assessment of the stormwater and sewer management systems and associated inspection, maintenance and enhancement/repair (as required) as determined to be appropriate by that assessment.
5. Installation, inspection and maintenance of appropriate signage and fencing on site as required.
6. Installation of leachate monitoring wells.
7. Further investigation and confirmation of prevailing contamination related issues at the site (including amendments to the existing well network as identified in (GHD Pty Ltd, 2020c) and soil investigations).
8. On-going environmental monitoring of landfill gas (including the completion of an additional four rounds of in house residential LFG monitoring as accessible) and water (groundwater, surface water, leachate and seepages).
9. Further confirmation of the extent of landfill at the site is required.

It is noted that there is no engineered landfill gas management system in place at the site currently.

Locations of proposed and existing management measures (and are shown on Figure 1, Figure 8 and Figure 9. Figure 9 also shows the locations of known sub-surface services at and around the site.

5.2 Inspections and maintenance

5.2.1 Capping and vegetation cover maintenance

Areas Affected: All areas where landfill cover/landfilled waste is understood to be present and along western road reserve (as shown on Figure 10).

Objective: Confirm that existing landfill cover layer and/or vegetation cover is well maintained, covers the full extent of the waste body and sufficient in the short term to reduce the likelihood of potential contamination related impacts.

Procedure: Capping is to be maintained in thickness over the nominated areas of the site. A minimum of 300 mm of uncontaminated earthen cover

above the landfilled waste is suggested as a minimum barrier between the waste and site users. The existing cover layer is of a largely unknown nature and thickness. This will be confirmed as part of the works associated with this IEMP.

Inspection of the capped surfaces will be undertaken to identify any failures such as cracks, excessive erosion, differential settlement causing ponding, land slippage, and leachate seepage/surfacing.

In order to achieve the above, regular mowing and maintenance is required of the on-site vegetation. This would be undertaken as required to allow effective inspection and monitoring of the landfill, and may include:

- Targeted replacement of vegetation affected by landfill gas or erosion if necessary, to maintain the vegetation cover.
- Targeted removal of unsuitable vegetation that may have seeded naturally on the site, for example deep rooting vegetation not suited to the revegetation layer thickness.

Responsible Parties: The Consultant, Director, Community & Environment and Manager, Parks, Trees and Recreation.

Inspection Frequency: Monthly for the duration of the IEMP. Inspections would be undertaken as part of the monthly surface landfill gas monitoring events identified in (GHD Pty Ltd, 2020b).

Reporting: Inspections shall be reported as per Section 5.2.8 back to the Director, Community & Environment.

Actions: If the cover layer and/or vegetation cover is damaged or degraded it should be reinstated to meet the requirements of this procedure as soon as practicable. Works should be undertaken in accordance with an approach approved by the Director, Community & Environment.

5.2.2 Leachate management system

No specific inspections and maintenance have been identified for the leachate system at this time. This is because its condition and operations are currently not well understood.

As such an assessment of the system is proposed as a first step to identify appropriate actions required. Further detail on this assessment is identified in Section 5.4. Section 5.4 will be updated as further assessments are conducted.

5.2.3 Stormwater and sewer management systems

No specific inspections and maintenance have been identified for the stormwater and sewer management systems at the site at this time. This is because the condition and operations of these systems are currently not well understood.

As such an assessment of these systems is proposed as a first step to identify appropriate actions required. Further detail on this assessment is identified in Section 5.4. Section 5.4 will be updated as further assessments are conducted.

5.2.4 Signage and fencing

Area Affected:	Leachate treatment area, leachate sump area, surface water bodies, seepage areas, elevated exceedance locations including at the Mulberry Tree near Chestnut Road.
Objective:	Appropriate signage and fencing (as appropriate and assuming physically safe to do so) shall be maintained/erected to indicate potential hazards and/or prevent unauthorised access, sufficient to control access to the identified locations/hazards.
Procedure:	<p>Where absent, signage shall be placed at appropriate intervals at/along the surface water bodies advising of potential risks associated with the water/steep drops in those locations. Where absent, fencing shall be erected around the leachate sump and surface water locations SW2, SW3 and SW4_2 (refer (GHD Pty Ltd, 2020b). A sign shall be erected next to the Mulberry tree near Chestnut Road advising of the unknown risk of consuming the Mulberries. A sign shall be erected at the amenities building and surrounding area to communicate the risk of the methane gas accumulating in the area, and warn of the risks of open flames.</p> <p>Where already present (leachate treatment area and identified elevated exceedance locations), signage and fencing shall be maintained.</p> <p>When identified, new hazards and risks on site, as identified during regular environmental monitoring, should be communicated by signage and fencing where possible.</p> <p>Where appropriate, fencing should be locked with a key, and the keys should be held with Council or their nominee (including any nominated site manager), and authorisation for access should be obtained from this source. The site should only be accessed by authorised personnel and a record of those with access keys should be maintained by Council.</p>
Inspection Frequency:	The signage and fencing shall be inspected monthly for the duration of the IEMP, or at greater frequency depending on the risk.
Responsible party:	Manager, Parks, Trees and Recreation.
Reporting:	Inspections shall be reported as per Section 5.2.8 back to the Director, Community & Environment.
Actions:	If the signage and/or fencing has been damaged or degraded, it should be reinstated to meet the requirements of this procedure as soon as reasonably practicable.

5.2.5 Sub-surface works

Area Affected:	All site.
Objective:	To aid in protecting the health and safety of workers if sub-surface works are required. Council will provide the details of this IEMP to 'Dial before You Dig' (DBYD) requests for the site to ensure the

management information is passed on to prospective intrusive maintenance workers.

Procedure:

Sub-surface works (i.e. below the ground surface at the site) shall only be undertaken when absolutely necessary and all measures should be undertaken to maintain the integrity of the landfill cover and vegetation layers (if present). Any sub-surface works shall be undertaken in accordance with the following measures.

Supervision and Standard of Works

All sub-surface works involving the disturbance of the landfill cover layer and vegetation layer must be undertaken in accordance with relevant provisions including:

- Wearing appropriate Personal Protective Equipment (PPE) (as described below).
- The workers should provide a safe work method statement providing reference to the IEMP to Council. Safe work methods should include landfill related matters such as waste, gas and leachate. This shall be reviewed and authorised by the Council prior to conducting works.
- If uncovered, waste/fill materials are to be kept contained at all times, made inaccessible to members of the public and workers at all times and sediment controls will be installed surrounding the area.
- Appropriate decontamination facilities are to be provided to allow the safe removal and storage of PPE.

All workers potentially exposed to impacted materials (for example waste materials) are required to wear appropriate levels of PPE as identified by their safe working method statement.

Soils Management

In undertaking excavation works, at least two distinct soil types may require excavation, including:

- Surface vegetation and topsoil materials.
- Underlying fill/waste material.

These materials must be kept segregated during all stages of the works. Where materials become mixed at any stage, then the mixed materials shall be regarded as contaminated soils until tested and classified (as per relevant NSW EPA requirements) for disposal to an appropriate licenced facility or reused on site. Lining will be placed under the areas used for the stockpiling materials to prevent potentially mixing with non-impacted soils, and impacted material is covered with plastic lining to prevent potential exposure. Stockpiles will also need to be appropriately bunded and sediment controls installed around them to prevent erosion/contaminated run-off from the stockpiled materials. An Environmental Management Plan specific to the works on site should be prepared and submitted to the Director, Community & Environment.

Dust and Asbestos Control Measures

Dust control measures (such as damping down soils) will be employed during all stages of subsurface works.

Until sampling of the surface cover for the presence of asbestos is conducted, airborne fibre monitoring will be completed by a competent person during all excavation works (greater than 0.1 mbgl) in accordance with the *NOHSC:3003, Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition, 2005* and analysed by a National Association of testing Authorities (NATA) accredited laboratory. Due to the potential presence of fibrous asbestos, it is noted that any worker on site doing subsurface works is required to have a Type A licence prior to undertaking the work. All works will be undertaken in accordance with WorkSafe requirements.

Reinstatement of Landfill Cover Layer and Vegetation

The landfill cover layer and vegetation is to be reinstated immediately at the cessation of any sub-surface works. This shall include reinstatement in accordance with Section 5.2.1.

New Structures

No structures are to be erected on the site without an assessment of risk, including risk of installing building foundations.

Council is developing a process, including assessment for any major works on site. This will be conveyed in the EMP.

Repair to landfill cover layer

Any breaches in the landfill cover layer shall be repaired within one day of identification by Council or notification to Council by their representative.

Where the landfill cover layer cannot be repaired within this timeframe, the area of the breach shall be delineated by landfill gas monitoring, site fencing and signage until repair works are undertaken.

Inspection Frequency: During and at completion of sub-surface works.

Responsible party: Manager, Parks, Trees and Recreation and any on-site intrusive contractor.

Timing: As required.

Reporting: At the completion of any sub-surface works, the reinstatement of the landfill cover layer and vegetation (as appropriate) shall be reported to the Director, Community & Environment. Sub-surface works shall also be clearly documented including as-constructed plans, surveys and photographs of the works and provided to Council.

Actions: A breach of the landfill cover layer or ground surface should be dealt with as soon as reasonably practicable as outlined in this procedure. If the landfill cover layer or vegetation cover is insufficient post

inspection it should be reinstated to meet the requirements of this procedure.

5.2.6 Environmental monitoring and monitoring infrastructure maintenance

Area Affected:	Environmental monitoring locations (refer (GHD Pty Ltd, 2020b).
Objective:	Environmental monitoring is required to confirm the contamination status of the site. Maintenance of the monitoring infrastructure is required to ensure that the monitoring network retains adequate integrity and performance to meet this aim.
Procedure:	<p>The Environmental Consultant will undertake the environmental monitoring program required by the IEMP (refer (GHD Pty Ltd, 2020b).</p> <p>The Environmental Consultant will undertake regular inspection of the landfill gas, groundwater and leachate monitoring wells in active use as identified in (GHD Pty Ltd, 2020c) during each monitoring round to confirm the integrity and performance of them. This will include the following:</p> <ul style="list-style-type: none">• Inspection of well protection measures (such as gatic cover or monument cover).• Inspection of the well caps to confirm the pipework is sealed airtight.• Inspection of pipework for any damage.• Annual inspection of non-active wells or decommissioned as required. <p>If matters of concern or requiring maintenance are identified, these would be communicated to the Director, Community & Environment for action.</p>
Responsible party:	Environmental Consultant and the Manager, Parks, Trees and Recreation.
Frequency:	Every monitoring event. Non- active wells as identified in (GHD Pty Ltd, 2020c) will be inspected on an annual basis.
Reporting:	Inspections shall be reported as per Section 5.2.8 back to the Director, Community & Environment.

5.2.7 Site inspections

Area Affected:	Whole site.
Objective:	To check the continued integrity of the signage, fencing, landfill cover layer and monitoring infrastructure. The inspection should be completed by a person who is recognised as being appropriately competent in the field of contaminated sites as per the criteria provided to National Environment Protection (Assessment of Site Contamination) Measures, 1999 (amended 2013).
Procedure:	An inspection of the area/infrastructure shall be undertaken by Council or their nominee (including any nominated site manager) or

any future land owner. If required, the Environmental Consultant could be contracted to conduct the inspections.

The inspections should include as a minimum (as relevant to the task):

- Inspection of the integrity of the area/infrastructure.
- Walkover the landfill cover area and assessment for consistent ground levels and cover, and that the coverage is a minimum of 80% vegetation or hardstand covered.
- Inspection of any areas of apparent disturbance or breaks.
- Ensure there are no redundant or inappropriate materials are stored on site.

Where an area of potential breakage is confirmed, the area shall be clearly marked by the placement of survey flag or otherwise, and marked on a figure. Repairing the breakage shall be undertaken in accordance with the relevant procedure.

Responsible party: Environmental Consultant and the Manager, Parks, Trees and Recreation.

Frequency: Annually during the IEMP.

Reporting: Inspections shall be reported as per Section 5.2.8 back to the Director, Community & Environment

5.2.8 Reporting on maintenance and inspections activities

Area Affected: Areas outlined in Sections 5.2.1 to 5.2.7.

Objective: To provide results of inspections in a clear and concise format and to allow comparison to site management requirements.

Procedure: *Reporting*

Council or any future landowners should ensure that inspection reports are prepared by an appropriately qualified person.

The nominated person shall fill out a checklist and prepare reports summarising each respective inspection event completed under this IEMP. Each report shall contain details of the following (where relevant):

- Type and date of inspection events undertaken in the reporting period.
- Name and organisation of person undertaking inspection.
- Site observations during inspection.
- Notes of activities undertaken during inspection.
- Assessment of vegetation across landfill cover areas.
- Assessment of landfill cover across landfill cover areas.
- Assessment of signage and/or fencing.
- Whether any development or demolition has taken place on site.

- Assessment of any redundant materials at the site, including illegally dumped materials or stockpiled materials.
- Any relevant recommendations for future monitoring or implementation of the IEMP.
- Comparison to site management measures.

A copy of each inspection report and checklist should be held by Council or any future land owners.

Assessment

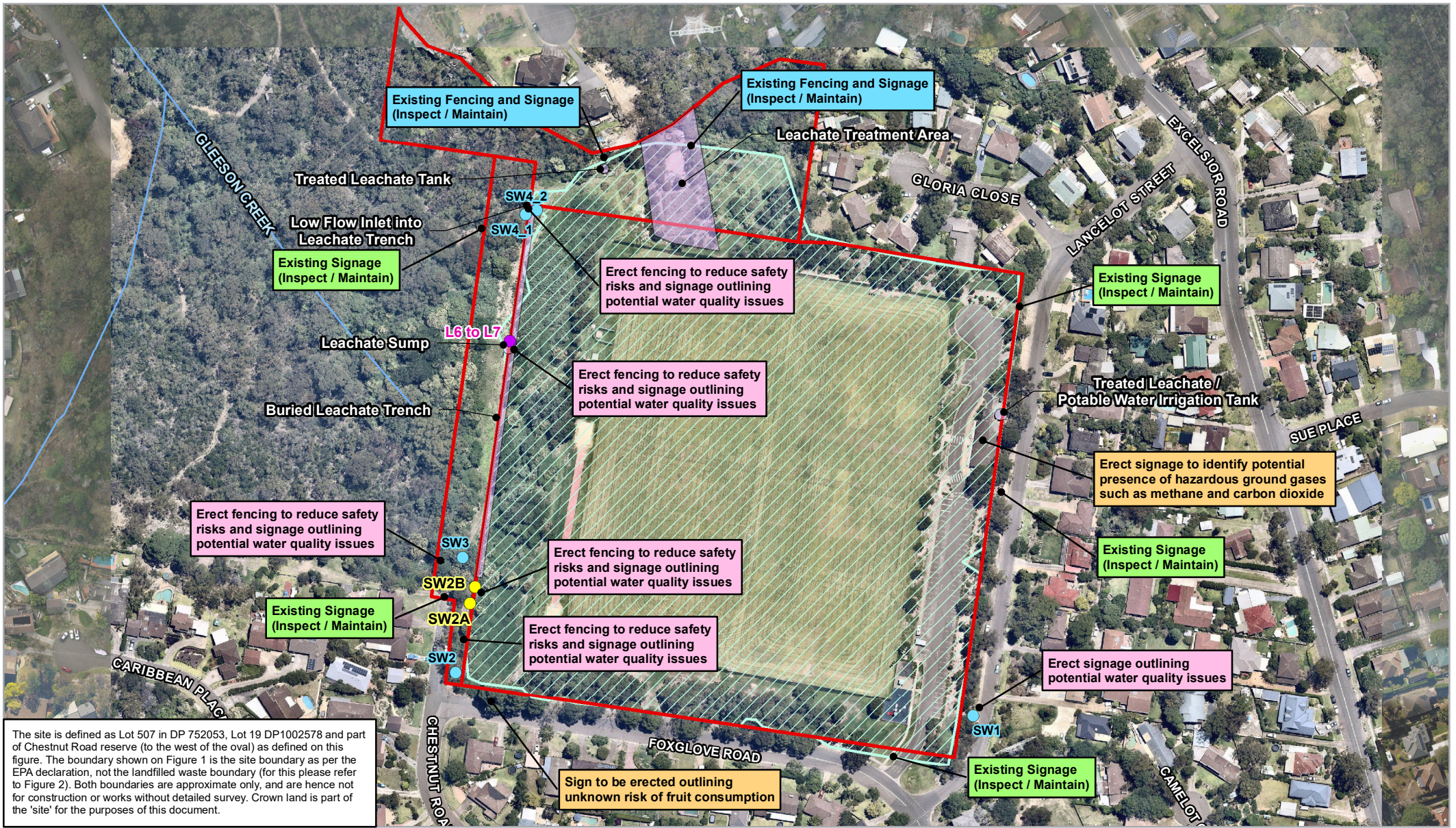
Any breaches in the vegetation, landfill cover layer, signage and/or fencing must be clearly identified in the inspection report. Any breaches rectified, necessitating the inspection and inspection report shall be noted in the report.

Frequency:

Within two weeks of the completion of an inspection event.

Inspection/Reporting:

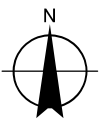
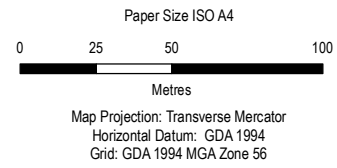
Copies of all inspection reports should be held by Council or any future land owners. Example inspection report templates are provided in Appendix C.



The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

Legend

- Foxglove Oval site boundary
- Leachate Treatment Infrastructure (Approximate)
- Extent of waste and cover layer (approximate)
- Watercourse (LPI 2015)
- Surface Water Sampling Location
- Leachate Sampling Location
- Seepage Sampling Location

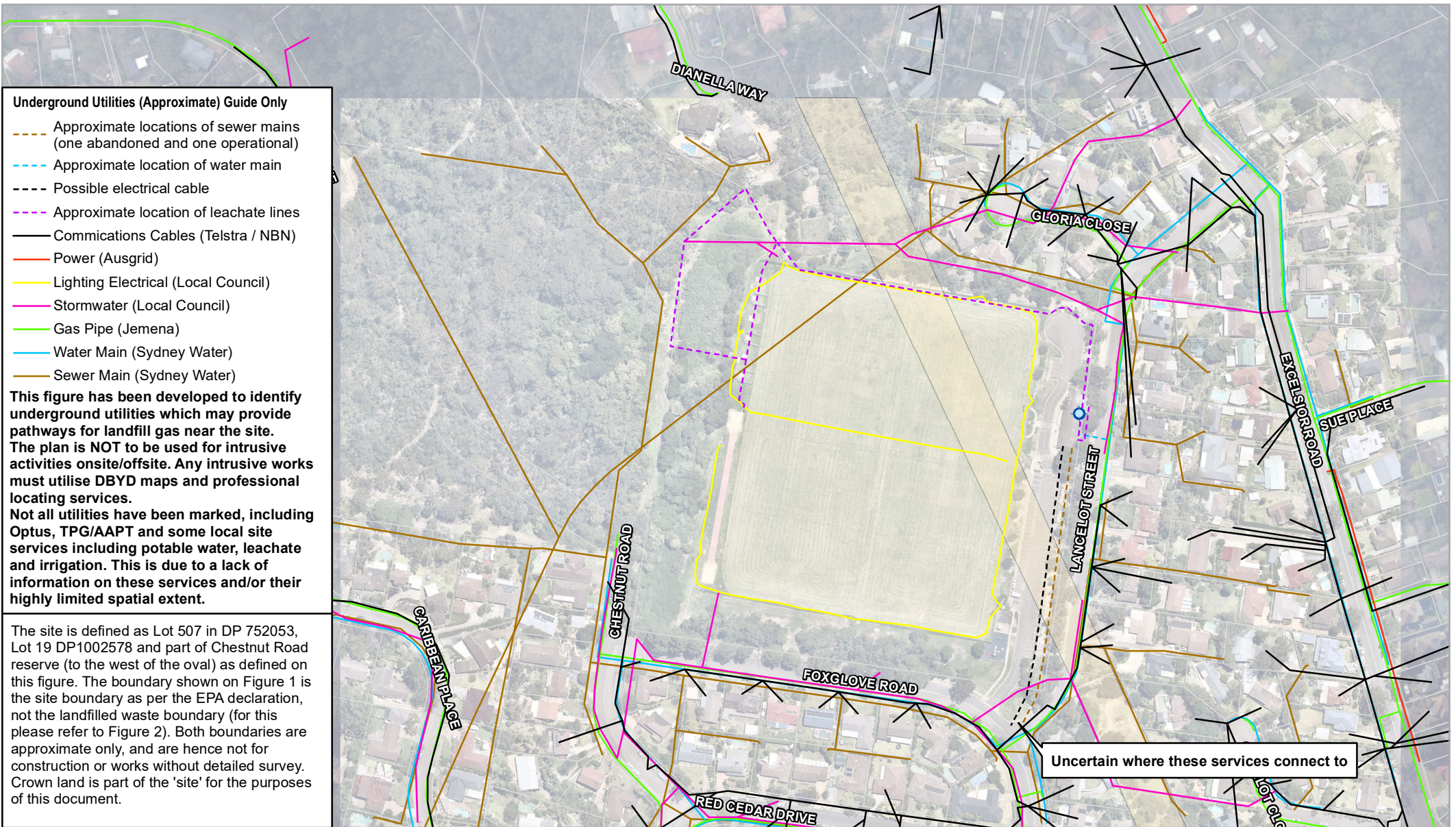


Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Existing and Proposed Management Measures

Project No. 21-28141
Revision No. A
Date 18 Aug 2020

FIGURE 8



Underground Utilities (Approximate) Guide Only

- Approximate locations of sewer mains (one abandoned and one operational)
- Approximate location of water main
- Possible electrical cable
- Approximate location of leachate lines
- Commications Cables (Telstra / NBN)
- Power (Ausgrid)
- Lighting Electrical (Local Council)
- Stormwater (Local Council)
- Gas Pipe (Jemena)
- Water Main (Sydney Water)
- Sewer Main (Sydney Water)

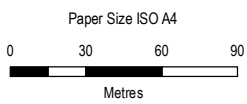
This figure has been developed to identify underground utilities which may provide pathways for landfill gas near the site. The plan is NOT to be used for intrusive activities onsite/offsite. Any intrusive works must utilise DBYD maps and professional locating services.

Not all utilities have been marked, including Optus, TPG/AAPT and some local site services including potable water, leachate and irrigation. This is due to a lack of information on these services and/or their highly limited spatial extent.

The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

Uncertain where these services connect to

- Legend**
- Treated Leachate / Irrigation Water Tank
 - Lot Boundaries
 - Overhead High Voltage Power Easement



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

Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. 21-28141
Revision No. A
Date 19 Aug 2020

**Known On and Off-site Services
(Approximate Locations)**

FIGURE 9

5.3 Environmental sampling and analysis

As per the monitoring requirements of the VMP, an environmental sampling and analysis program has been designed. It is summarised in this section.

Following the installation of the updated well network, environmental sampling and analysis should be conducted as per the sampling, analysis and quality plan (SAQP) presented in Appendix B. The following sections provide a summary of the requirements.

Prior to the installation of the wells, a reduced monitoring program to that listed in the SAQP will be implemented, further details of which are provided in Section 5.3.4. Nominated data quality objectives for the sampling program as listed in the SAQP are listed in Table 5-1.

Table 5-1 Data Quality Objectives

Step	Description
1	<p>State the problem to be resolved</p> <p>Further confirmation of soil capping layer (contamination and thickness) and the prevailing LFG, water (groundwater, surface water, leachate and seepage) and extent of landfill and migration via services and buildings and conditions and quality at the site is required.</p>
2	<p>Identify the decision/s to be made</p> <p>The decisions that need to be made about the contamination problem identified above are:</p> <ul style="list-style-type: none"> • What is the contamination status of the surface soil / capping at the site and does it present any risks to the health and safety of recreational users and maintenance workers? • Is the site suitable for its ongoing use as a recreational field? • What is the contamination status of the surface soil / capping at the site and does it affect the aesthetics of the site? • What criteria does soil at the site meet in accordance with NEPC (2013) human health and ecological guidelines? • What are the prevailing LFG conditions at and around the site and are they of potential concern from a contamination perspective? • Is LFG migrating from the site? • What is the quality of the water (groundwater, surface water, leachate and seepage) at and around the site and is it of potential concern from a contamination perspective? • Is the methodology proposed adequate to meet the investigation objectives? • Is there a need for further assessment, remediation and/or management of soil, LFG and/or water (groundwater, surface water, leachate and seepage) from a contamination perspective at the site? • What is the extent of the landfill? • What is the operation process of the leachate system?
3	<p>Identify the inputs to the decision</p> <p>The information needed to support the decisions identified above at this time is as follows:</p> <ul style="list-style-type: none"> • Preliminary Monitoring Report (GHD, 2020) findings and ongoing monitoring results of LFG and water (groundwater, surface water, leachate and seepage). • Relevant consultant's reports (as outlined in Appendix B). • CSM (Section 4). • Relevant guidelines (Section 5.3.1).

Step	Description
4. Define the boundaries of the study	<p>The study boundary comprises soil, landfill gas, groundwater, surface water, leachate and seepage within the site as shown on Figure 1 and on surrounding land generally within 200 metres of the site.</p> <p>The temporal boundaries are from 30th September 2020 to 13 October 2021.</p>
5. Develop a decision rule	<p>The decision rules to be applied are as follows:</p> <ul style="list-style-type: none"> • If the data has been collected in a manner from which it is possible to establish completeness, comparability, representativeness, precision and accuracy, the data will be considered suitable for the purposes of this assessment. • If reported chemical concentrations are above soil/LFG and/or water (groundwater, surface water, leachate and seepage) the adopted assessment criteria, then soil, LFG and or water (groundwater, surface water, leachate and seepage) assessment will be undertaken to determine if these constitute an unacceptable risk to potential receptors. In this case, further investigation, remediation or management will be recommended. • If concentration(s) of chemical contaminant(s) exceed the adopted assessment criteria, then further assessment of the soil, LFG and/or water (groundwater, surface water, leachate and seepage) may be required to evaluate the need for additional investigation and / or remediation / management activities.
6. Specify the tolerable limits on decision errors	<p>Two primary decision error-types may occur due to uncertainties or limitations in the project data set:</p> <ul style="list-style-type: none"> • A sample/area may be deemed to pass the nominated criteria, when in fact it does not. This may occur if contamination is 'missed' due to limitations in the sampling plan, or if the project analytical data set is unreliable. <p>It is noted that the investigation comprises an ongoing monitoring program for landfill gas, groundwater, surface water, seepage and leachate, and investigation points will be adjusted based on investigation findings as considered required.</p> <ul style="list-style-type: none"> • A sample/area may be deemed to fail the nominated criteria, when in fact it does not. This may occur if the project analytical data set is unreliable, due to inappropriate sampling, sample handling, or analytical procedures. • An assessment will be made as to the likelihood of a decision error being made based on the results of a QA/QC assessment and the closeness of the data to the assessment criteria. • A quality assurance / quality control (QA/QC) assessment evaluating the reliability and useability of data, which are expressed as five data quality indicators (DQI).
7. Optimise the design for obtaining the data	<p>The sample design will be optimised through:</p> <ul style="list-style-type: none"> • Monitoring/sampling of soil, LFG and water (groundwater, surface water, leachate and seepage) in selected locations at and around the site. • Recording of field chemistry and chemical laboratory analysis of water samples (groundwater, surface water, leachate and seepage) for selected contaminants of potential concern in consideration of relevant guidelines and GHD's previous experience with similar sites. • Collection and analysis of Quality Control / Quality Assurance samples to address the DQIs mentioned in Section 5.

Step	Description
	<ul style="list-style-type: none"> Assessment of data quality with reference to the specified DQIs to evaluate the reliability and useability of the obtained data. Continually reviewing data and revising the CSM, modifying sampling and monitoring plans as required. <p>Based on program investigation results findings, changes to the monitoring program may be proposed in consultation with Council, the site Auditor and the NSW EPA as required.</p>

5.3.1 Basis for assessment criteria

Contamination assessment criteria soil, groundwater, surface water, leachate and seepage

The NEPC (2013) contains guideline values for soil, surface water and groundwater for use in evaluating potential contamination risk to human health and the environment. The application of the assessment criteria is subject to a range of limitations and their selection and use must be in the context of the CSM relating to the nature and distribution of impacts and potential exposure pathways. The adopted screening criteria are outlined in Table 5-2 and Table 5-3.

Table 5-2 Nominated criteria for soil and asbestos assessment

Criteria	Selection rationale
Human health criteria	
NEPC (2013) health screening levels (HSL) for petroleum hydrocarbons and health investigation levels (HIL) for other contaminants.	<p>As the site is currently used as a sports ground, recreational criteria have been selected. HSL C were adopted for petroleum hydrocarbon contaminants.</p> <p>HIL C were adopted for contaminants including some PAHs.</p> <p>The HSL takes into account the vapour inhalation pathways. The screening levels will be selected following intrusive investigations in accordance with the applicable site characteristics.</p> <p>The HILs take into account direct contact pathways, including incidental ingestion and dermal contact.</p> <p>It is noted all samples are intended to be in Council's land (or lot boundaries where fence line is absent) as such these will be assessed against HILC/HSLC.</p> <p>There may be small portions of the site to the north where encroachment from residential properties may have occurred within the site boundary. If samples eventually need to be taken from these areas, these would be assessed against HIL A and HSL A for a low density residential scenario.</p>
HSL for Intrusive Maintenance Worker (Shallow Trench)	Consideration was given to HSLs for petroleum hydrocarbons, for intrusive maintenance workers associated with shallow trench works (Friebel & Nadebaum, 2011).

Criteria	Selection rationale
Management Limits residential, parkland and public open space land use scenario	Consideration has been given to NEPC (2013) Management limits applied to TRH contamination to address the issues of free phase formation, fire and explosive risks.
Asbestos	<p>Selected samples will be screened for asbestos using a presence / absence protocol in laboratories. It is noted that this analytical method does not allow quantification of asbestos concentrations in soil for comparison against the HSL criteria in NEPC (2013). Therefore the criterion adopted is based on positive or negative identification of asbestos in collected soil samples.</p> <p>If asbestos is detected, further asbestos sampling for comparison against the HSLs in NEPM would be undertaken from these locations specifically.</p>
Ecological criteria	
NEPC (2013) Ecological investigation levels (EIL) and Ecological screening levels (ESL) for urban residential and public open and areas of ecological significance space land use	<p>The NEPC (2013) includes ecological investigation levels (EIL) for heavy metals and naphthalene and ecological screening levels (ESL) for petroleum hydrocarbons. EIL and ESL will be adopted for contaminants including metals, some PAHs and some pesticide to protect terrestrial ecosystems. EILs and ESLs for urban residential and public open space scenario would be selected.</p> <p>Ecological investigation levels for specific metals will be adjusted based on the background pH, clay content and cation exchange capacity (CEC) from background soil samples.</p>

Table 5-3 Nominated criteria for groundwater, surface water, leachate and seepage

Document	Adopted assessment criteria
Groundwater – Human Health Criteria	
NEPC (2013) health screening levels (HSL) for petroleum hydrocarbons for recreational open space scenario.	The HSL takes into account the vapour inhalation pathways. The screening levels will be selected following intrusive investigations in accordance with the applicable site characteristics.
HSL for Intrusive Maintenance Worker (Shallow Trench)	Considerations to HSLs for petroleum hydrocarbons, for intrusive maintenance workers associated with shallow trench works (Friebel & Nadebaum, 2011).
National Health and Medical Research Council (2011). Australian Drinking Water Guidelines (ADWG). Version 3.5 (updated 2018) – Recreational waters	Values for recreational water adopted as a conservative approach as it is understood Gleeson Creek may be possibly used for paddling in a limited way.
Groundwater – Ecological Criteria	
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	95% Protection Level for Freshwater for numerous analytes would be selected.

Document	Adopted assessment criteria
ANZECC and ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC)	Medium to low reliability level for Freshwater to be selected for the assessment of nitrate.
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	Secondary contact recreation for Thermotolerant Coliforms (1000 CFU ³ /100 ml).
Kjeldsen et. Al (2002) Present and Long -Term Composition of MSW Landfill Leachate: A Review	Minimum ranges for potential presence of landfill leachate: <ul style="list-style-type: none"> • Potassium (50 mg/l) • Total Organic Carbon (30 mg/l) • Total Dissolved Solids (2000 mg/l)
HEPA (2020). PFAS National Environmental Management Plan, Version 2, 2020.	99% species protection – high conservation value systems for Freshwater: <ul style="list-style-type: none"> • PFOS (0.00023 ug/L) • PFOA (19 ug/L) • Recreation water: <ul style="list-style-type: none"> • PFOS/PFHxS (0.7 ug/L) • PFOA (5.6 ug/L) • Note HEPA (2020) suggests 99% protection levels for this application for Freshwater owing to bioaccumulation effects.ug/Lug/L
Surface Water – Human Health	
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	Secondary contact recreation for Thermotolerant Coliforms (1000 CFU/100 ml). Primary contact not adopted as not believed that Gleeson Creek is used for swimming, but possible it may be used for paddling in a limited way (i.e. secondary recreational contact).
National Health and Medical Research Council (2011). Australian Drinking Water Guidelines (ADWG). Version 3.5 (updated 2018) – Recreational waters	PFAS will be further assessed for recreational water as a conservative approach. It is understood Gleeson Creek may be possibly used for paddling in a limited way.
Surface Water – Ecological	
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	95% Protection Level for Freshwater for ammonia (0.9 mg/l).
Kjeldsen et. Al (2002) Present and Long -Term Composition of MSW Landfill Leachate: A Review	Minimum ranges for landfill leachate: <ul style="list-style-type: none"> • Potassium (50 mg/l). • Total Organic Carbon (30 mg/l). • Total Dissolved Solids (2000 mg/l).
HEPA (2020). PFAS National Environmental Management Plan, Version 2, 2020.	99% species protection – high conservation value systems for Freshwater: <ul style="list-style-type: none"> – PFOS (0.00023 ug/L) – PFOA (19 ug/L) Recreation water: <ul style="list-style-type: none"> – PFOS/PFHxS (0.7 ug/L) – PFOA (5.6 ug/L)

³ CFU = Coliform Forming Unit

Document	Adopted assessment criteria
	Note HEPA (2020) suggests 99% protection levels for this application for Freshwater.
NSW Government (2004) Managing Urban Stormwater: Soils and Construction	Criteria of 50 mg/l for suspended solids.
Leachate and seepage– Human Health	
HSL for Intrusive Maintenance Worker (Shallow Trench)	Considerations to HSLs for petroleum hydrocarbons, for intrusive maintenance workers associated with shallow trench works (Friebel & Nadebaum, 2011).
National Health and Medical Research Council (2011). Australian Drinking Water Guidelines (ADWG). Version 3.5 (updated 2018) – Recreational waters	Values for recreational water for numerous analytes as it is understood Gleeson Creek may be possibly used for paddling.
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	Secondary contact recreation for Thermotolerant Coliforms (1000 CFU/100 ml).
Leachate and seepage – Ecological	
ANZG 2018 Australian and New Zealand Guidelines for Fresh and Marine Water Quality	95% Protection Level for Freshwater for numerous analytes. Adopted as potential for leachate to impact upon Gleeson Creek (down gradient from site)._
ANZECC and ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC)	Medium to low reliability level for Freshwater for nitrate. Adopted as potential for leachate to impact upon Gleeson Creek (down gradient from site).
Kjeldsen et. Al (2002) Present and Long -Term Composition of MSW Landfill Leachate: A Review	Minimum ranges for landfill leachate: <ul style="list-style-type: none"> • Potassium (50 mg/l) • Total Organic Carbon (30 mg/l) • Total Dissolved Solids (2000 mg/l) Adopted as potential indicators of landfill leachate impact upon Gleeson Creek.
HEPA (2020). PFAS National Environmental Management Plan, Version 2, 2020.	99% species protection – high conservation value systems for Freshwater: <ul style="list-style-type: none"> – PFOS (0.00023 ug/L) – PFOA (19 ug/L) – Recreation water: <ul style="list-style-type: none"> – PFOS/PFHxS (0.7 ug/L) • PFOA (5.6 ug/L)

Nominated criteria - landfill gas

The New South Wales Environmental Protection Authority (NSW EPA) *Environmental Guidelines: Solid Waste Landfills (Second Edition April 2016)* provides the following landfill gas environmental benchmarks:

- For sub-surface well monitoring, the threshold levels for further investigation and corrective action are detection of methane at concentrations above 1% (volume/volume) and carbon dioxide at concentrations of 1.5% (volume/volume) above established natural background levels.

⁴ CFU = Coliform Forming Unit

- The natural background levels within the landfill investigation area have been conservatively assumed to be 0% (volume/volume) for both methane and carbon dioxide.
- For surface emission monitoring, the threshold level for further investigation and corrective action is detection of methane at concentrations above 500 parts per million (ppm) (volume/volume) at any point on the landfill surface.

Assessment of the landfill gas (LFG) data are assessed using the process outlined in NSW EPA (2020) *Assessment and management of hazardous ground gases, Contaminated Land Guidelines* (the Hazardous Ground Gas Guideline).

The Hazardous Ground Gas Guideline presents an approach for identifying potential levels of ground gas related risk associated with an individual site. This approach requires borehole flow rate and methane and carbon dioxide concentrations to be measured in the field on a number of occasions. That data is then used to calculate gas screening values (GSVs) for the site. These GSVs are then used to identify the characteristic gas situations (CS) for that site and the level of ground gas protection measures that may be required for the site.

The formula used to calculate the GSVs is as follows:

GSV (litres of gas per hour (l/hr)) =

Maximum stabilised borehole flow rate (l/h) x Maximum gas concentration of methane or carbon dioxide (% v/v)

Once the GSV values have been calculated for an individual monitoring location, these are used to identify the CS of the site using Table 6 on page 31 of the Hazardous Ground Gas Guideline. This is replicated in Table 5-4.

Table 5-4 Characteristic gas situation

Gas screening value threshold (L/hr)	Characteristic gas situation	Risk classification	Additional factors
<0.07	1	Very low risk	Typical methane <1% v/v and or carbon dioxide <5% v/v otherwise increase to situation 2
<0.7	2	Low risk	Borehole flow rate not to exceed 70 L/hr, otherwise increase to Situation 3
<3.5	3	Moderate risk	
<15	4	Moderate to high risk	Consider need for Level 3 Risk assessment
<70	5	High risk	Level 3 risk assessment required
>70	6	Very high risk	

5.3.2 Sampling rationale

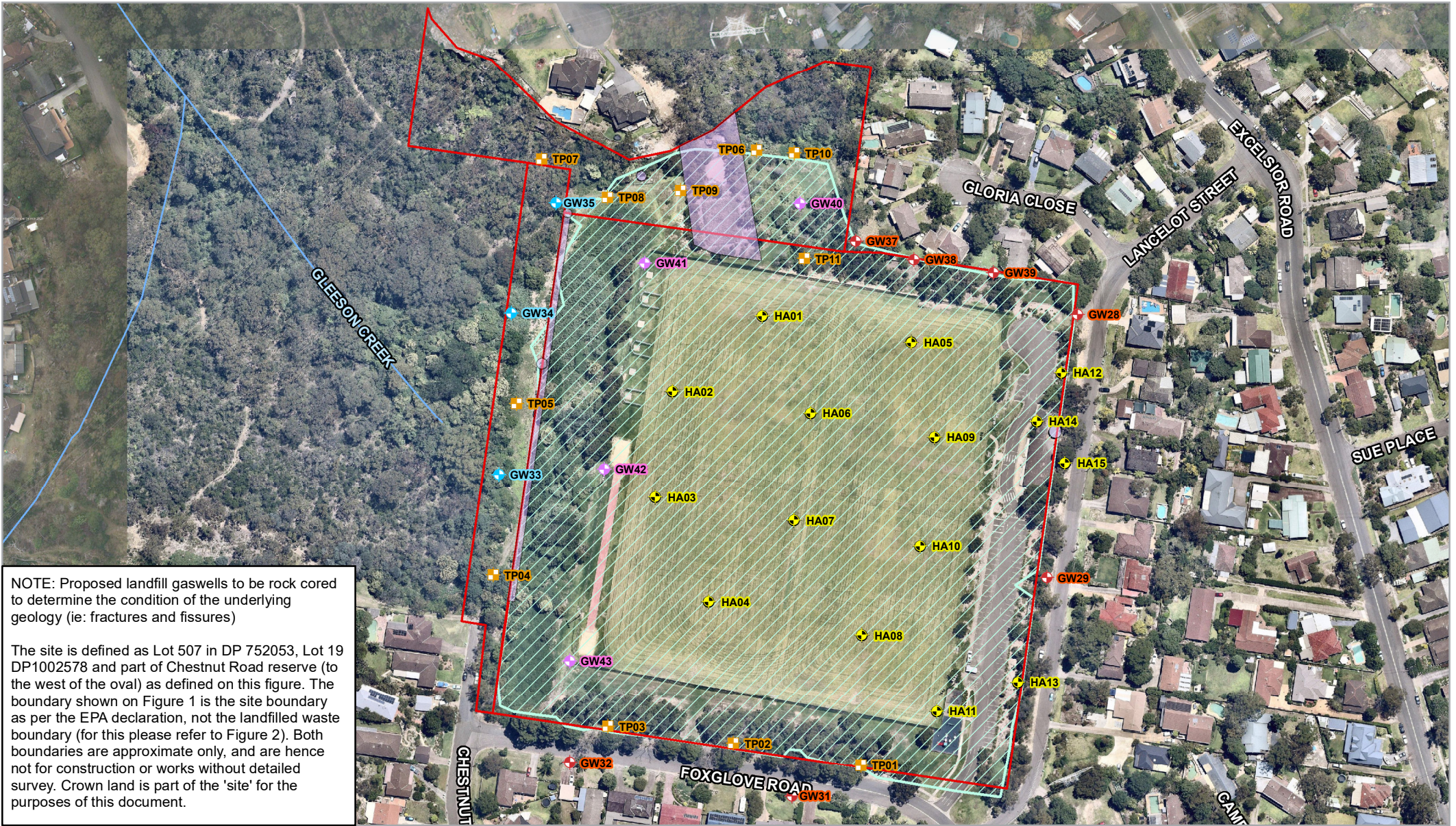
Details of the investigation rationale for the proposed sampling program to be undertaken by the Environmental Consultant is summarised in Table 5-5, with additional information available in Appendix B. The sampling locations are provided in Figure 10 to Figure 14 as follows:

Table 5-5 Investigation locations – rationale

Type of monitoring	Locations	Reason
Soil	Forty sampling locations across the surface of the site. Soils will be collected from 15 hand auger locations and 11 test pit locations. Additionally, soil samples will be collected from the	To assess the quality of the soil at the landfill cap and whether asbestos is present. To characterise the extent of the

Type of monitoring	Locations	Reason
	installation of 14 new monitoring wells as presented in Figure 10.	estimated quarry/valley walls/ cover layer.
LFG - On-site buildings / structures	Inside and around the amenities building, including services.	To measure the methane concentrations in and around this building and in services within this building. Considered necessary based on DQOs, relevant guidance, previous LFG results and GHD Conceptual Site Model sections.
LFG - Site's surface	Across the surface of the inferred waste mass - 24 grid lines spaced approximately 25 metres apart across the site's surface.	To measure the methane concentrations on the site surface. Considered necessary based on DQO's, relevant guidance, previous LFG results and GHD Conceptual Site Model.
LFG – Off site surface	Residential properties in the vicinity of the site. One round of air sampling was undertaken by GHD on May 2019 for residential properties located at GHD completed a Foxglove Oval air testing program in May 2019 for residential properties located at 19, 21, 23, 25, 27, 29, 31, 33, 35 Foxglove Road, 1, 3, 5, 7, 9, 14, 16 Gloria Close, 28, 29, 30 Lancelot Street, 15, 17, 19, 21 Chestnut Road and 8 Dianella Way. As presented in Table 5-6 four rounds excluding the one already completed in 2019 will be undertaken. It is noted that this will rely on approval from property owners and the number of properties monitored on each visit may vary.	To measure if there is any LFG intrusion in private residences in the vicinity of the site.
LFG – Subsurface wells	Monitoring locations include: Thirteen LFG existing wells (GW08, GW09, GW11, GW12, GW20, GW24, GW25, GW26, GW27, MW1, MW2, MW3, MW4) and nine new LFG wells (GW28, GW29, GW30, GW31, GW32, GW36, GW37, GW38, GW39) as presented on Figure 13 and the review of existing well network report in Appendix B.	<p>To measure LFG in perimeter bores to establish sub-surface LFG conditions. Considered necessary based on DQOs, relevant guidance, previous LFG results and GHD Conceptual Site Model.</p> <p>GW wells within the amenities building have not been proposed at this stage as surface monitoring will be undertaken within the building.</p> <p>There are no wells currently proposed for the north western boundary of the site. Based on investigation findings GHD will consider the requirement to install additional wells along this area.</p> <p>It is noted GW28 is intended for LFG monitoring but it may be acceptable for GW monitoring too. If following results findings it is determined that this well is not</p>

Type of monitoring	Locations	Reason
		<p>suitable for this purpose, additional wells may be required to be installed in this location for groundwater monitoring.</p> <p>Wells GW31 and GW32 could be used for GW sampling if required, if findings from this investigation determine these wells are not suitable for this purpose, additional wells may be required in this location for groundwater monitoring.</p>
LFG - Sub-surface service pits and penetrations	All sub-surface service pits and penetrations on-site and all off-site sub-surface service pits on the roads immediately adjacent to the site (82 in total).	To confirm that elevated methane concentrations are not present in or around sub-surface service pits or penetrations. Considered necessary based on DQOs, relevant guidance, previous LFG results and GHD Conceptual Site Model.
Groundwater	Monitoring of groundwater at nine existing locations (GW8, GW9, GW10, GW16, GW17, GW19, GW20, GW23, GW27), one proposed landfill gas/groundwater well (GW31) and three proposed groundwater monitoring wells (GW33, GW34, GW35) as presented in Figure 14 and in the review of existing well network report in Appendix B.	To confirm what prevailing groundwater conditions around the site are. Considered necessary based on DQOs, relevant guidance, previous water results and GHD Conceptual Site Model.
Surface water	Eleven locations (SW1, SW2, SW3, SW4, SW4_1, SW4_2, SW5, SW6, SW7, SW8, and SW9) are proposed as part of this SAQP in order to have greater information on Gleeson Creek in adjacent property owners land and/additional upstream and on-site locations. Sampling locations are presented in Figure 14.	To confirm the prevailing surface water conditions around the site. Considered necessary based on DQOs, relevant guidance, previous water results and GHD Conceptual Site Model.
Leachate	Four new proposed locations (GW40, GW41, GW42, and GW43) and eight leachate sampling locations (L1, L2, L4, L5, L6, L7 (as appropriate based on standing water column), L8 and L9) are proposed as part of this investigation. Leachate sampling locations are presented in Figure 14.	To confirm the prevailing leachate conditions at the site and if they differ between the 'in waste' leachate and that at the leachate treatment plant. Considered necessary based on DQOs, relevant guidance, previous water results and GHD Conceptual Site Model.
Seepage	Two seepage locations (SW2A and SW2B). Additional seepage samples will be collected if observed during field investigation works. Seepage locations are presented in Figure 14.	To confirm the chemistry of these seepages and if they may be landfill derived. Considered necessary based on DQOs, relevant guidance, previous water results and GHD Conceptual Site Model.

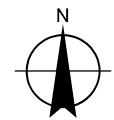
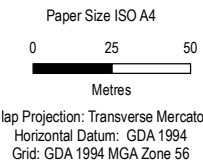


NOTE: Proposed landfill gaswells to be rock cored to determine the condition of the underlying geology (ie: fractures and fissures)

The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

Legend

- Foxglove Oval site (VMP) boundary
- Extent of landfill (approximate)
- Leachate Treatment Infrastructure
- + Proposed Landfill gas / Groundwater Wells - for Soil Sampling
- + Proposed Groundwater Wells - for Soil Sampling
- + Proposed Leachate Wells - for Soil Sampling
- + Proposed Hand Auger Locations
- + Proposed Test Pit Locations

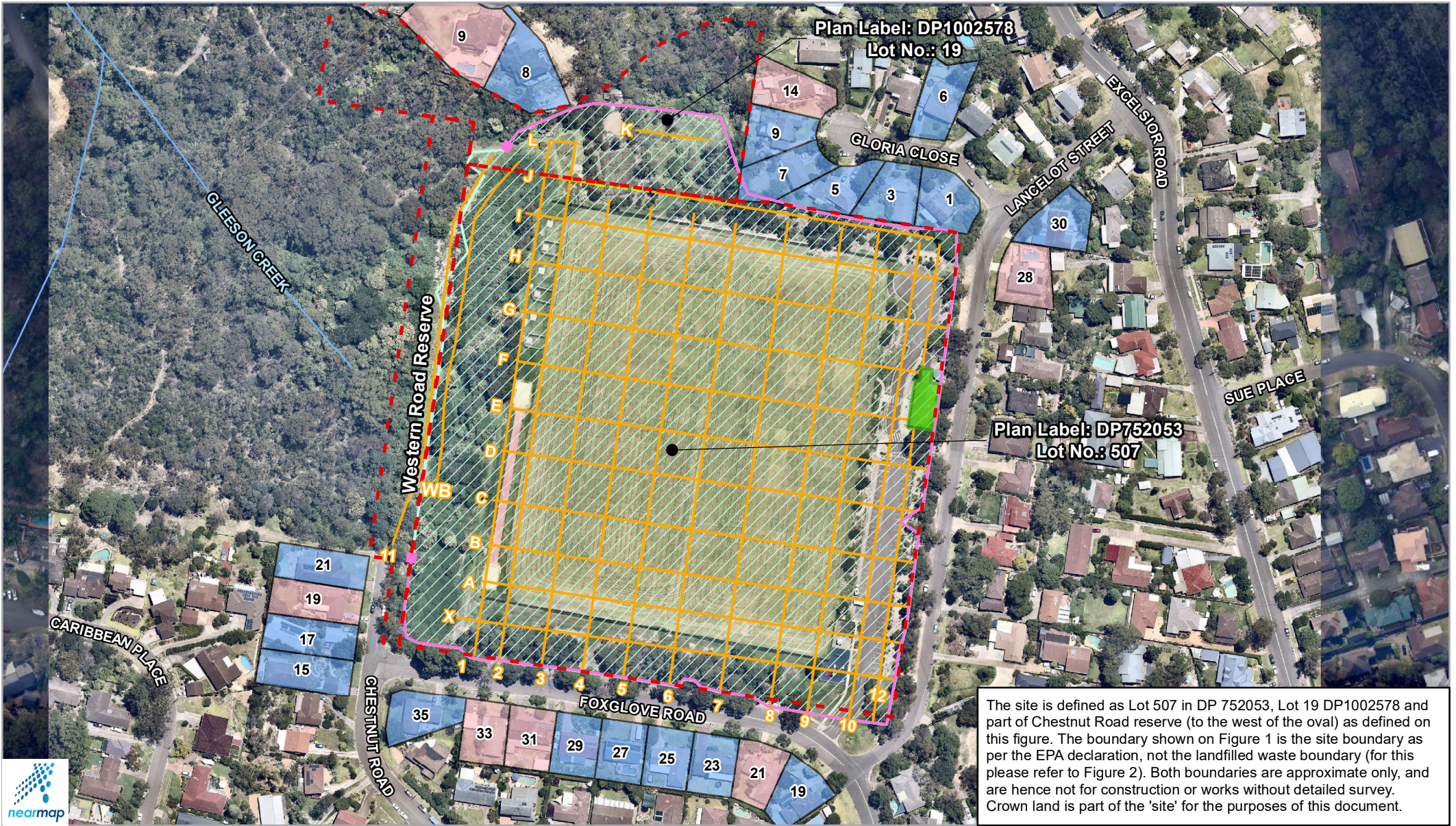


Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. **21-28141**
 Revision No. **A**
 Date **18 Aug 2020**

Proposed Soil Sampling Locations

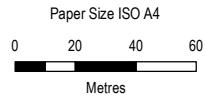
FIGURE 10



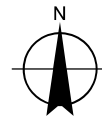
The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

- Legend**
- Foxglove Oval site (VMP) boundary
 - Building 1 B(1)
 - Extent of Landfill (approximate)
 - Building Monitoring - Undertaken, April 2019
 - Building Monitoring - Offered but not accepted, April 2019

- Surface Transects (approximate)
- Surface Transects Inaccessible
- Boundary Transect (approximate)



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

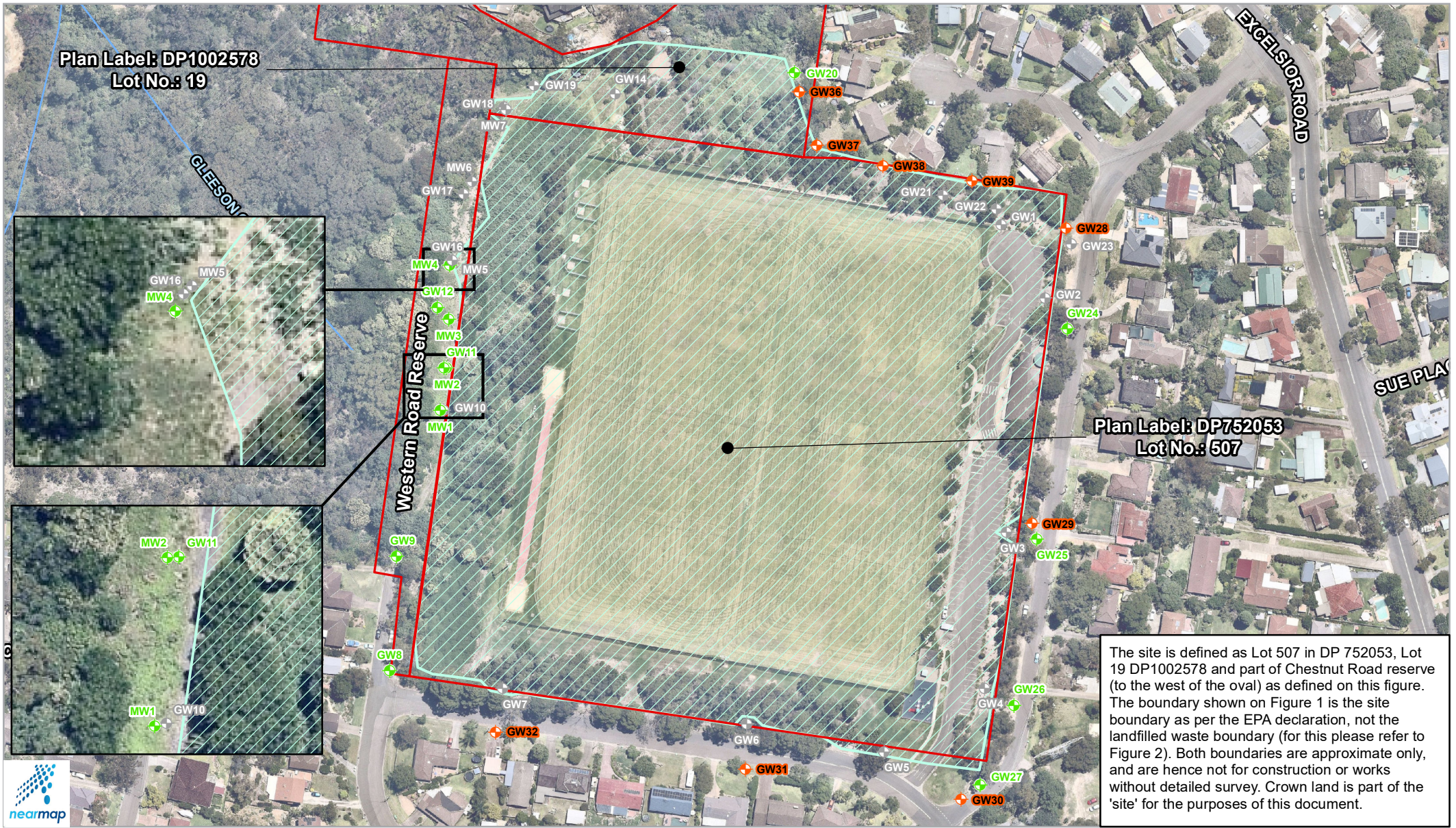


Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. 21-28141
Revision No. A
Date 26 Aug 2020

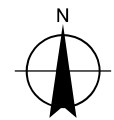
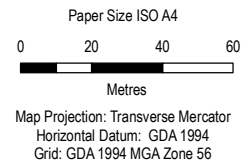
Surface Landfill Gas Monitoring

FIGURE 11



The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

- Legend**
- Extent of landfill (approximate)
 - Foxglove Oval site (VMP) boundary
 - Well location not monitored for LFG
 - Existing Well for Landfill Gas Monitoring
 - Proposed Landfill Gas / Groundwater Wells



Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Project No. 2128141
Revision No. A
Date 26 Aug 2020

Landfill Gas Monitoring - Subsurface Wells

FIGURE 12



The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

- Legend**
- Foxglove Oval site (VMP) boundary
 - Extent of landfill (approximate)
 - Building 1 (B1)
 - Sub-surface service pit or penetration**
 - Electricity pole
 - Electrical box
 - Leachate
 - Potable water
 - Sewer
 - Stormwater
 - Telstra
 - Unidentified sub-surface service pit or penetration

Paper Size ISO A4

Metres

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



Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

Sub-surface Service Pits and Penetrations

Project No. 21-28141
Revision No. A
Date 18 Aug 2020

FIGURE 13

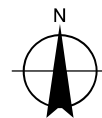
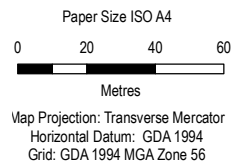
\\ghdnet\ghd\AU\Sydney\Projects\21\28141\GIS\Maps\Deliverables\2020
Figures\IEMP\21_28141_2013_IEMP_Fig13_Service Pit_Monitoring.mxd
Print date: 18 Aug 2020 - 21:19

Data source: sixmaps, LP2015, Nearmap (Date Extracted: 28/12/2018, Imagery Date: 2018) © Department of Customer Service 2020. Created by: elbertson



The site is defined as Lot 507 in DP 752053, Lot 19 DP1002578 and part of Chestnut Road Reserve (to the west of the oval) as defined on this figure. The boundary shown on Figure 1 is the site boundary as per the EPA declaration, not the landfilled waste boundary (for this please refer to Figure 2). Both boundaries are approximate only, and are hence not for construction or works without detailed survey. Crown land is part of the 'site' for the purposes of this document.

- Legend**
- Watercourse (LPI 2015)
 - Foxglove Oval site (VMP) boundary
 - Extent of landfill (approximate)
 - + Existing Well for Leachate
 - + Existing Well for Groundwater Monitoring
 - Leachate Sampling Location
 - Seepage Sampling Location
 - Surface water sampling location
 - + Proposed Groundwater Wells
 - + Proposed Leachate Wells
 - + Proposed Landfill Gas/Groundwater Wells



Hornsby Shire Council
Foxglove Oval, Mount Colah, NSW
Interim Environmental Management Plan

**Proposed sampling locations plan -
Groundwater, surface water,
leachate and sepages**

Project No. 2128141
Revision No. A
Date 26 Aug 2020

FIGURE 14

5.3.3 Frequency of monitoring

At this stage, and until a review of the four monthly rounds of monitoring that were conducted in 2020 (up to July), monthly water (groundwater, surface water, leachate, seepage) and landfill gas monitoring is proposed for a period of 12 months. Following this period, or following an interim review, based on results findings, recommendations on the frequency of the monitoring events shall be reassessed by the Environmental Consultant in consultation with Hornsby Shire Council and the Site Auditor. The recommended monitoring frequencies are presented in the table below.

Table 5-6 Recommended monitoring locations and frequencies

Type of monitoring	Frequency
Landfill Gas – Bores	Monthly
Landfill Gas – Surface and penetrations	Monthly
Landfill Gas – Sub-surface service pits (on and off-site)	Monthly
Landfill gas – buildings / structures (on-site)	Monthly
Landfill gas – buildings (off-site inside residential houses)	Four visits in total (exclusive of monitoring completed in April 2019).
Groundwater	Monthly
Surface Water	Monthly
Leachate and seepage samples	Monthly

With reference to the assessment of the characteristic gas situation, specific gas screening value (GSV) and characteristic situation (CS) calculations will be undertaken as part of each LFG monitoring round. It is noted GHD will undertake reasonable attempts to capture worse case events.

GHD believes that regular monitoring will inherently capture data from a range of different conditions. It is noted that planning to try to monitor during 'worst case' conditions is very difficult and you cannot undertake surface and perimeter monitoring under worst case conditions (as it will be raining, surface monitoring will be unachievable). We will aim to capture one worst case scenario round of monitoring for perimeter wells during the 12 months duration of the monitoring events and may need to consider undertaking additional monitoring events.

5.3.4 Interim monitoring program

Prior to the installation of the new wells, a modified monitoring program (compared to that required by the SAQP) will be undertaken monthly. This will comprise LFG, groundwater, surface water, leachate, seepage and potable water monitoring. The key aspects of this modified program are as follows:

- LFG monitoring of the amenities buildings, site's surface, 28 wells and 82 sub-surface pits / penetrations). This will include gauging all the perimeter wells.
- Sampling and analysis of water present at the new surface water sampling location at SW5 (total alkalinity only) and SW6.
- Observations of water presence/appearance at existing surface sampling locations (i.e. SW1, SW2, SW3, SW4, SW4_1, SW4_2, SW5 and SW6).

- Leachate sampling and analysis at L1, L2, L4, L5, L6, L7 (dependent on evidence of stratification in sump), L8 and L9. Well GW14 will not be sampled but it will be gauged.
- Sampling and analysis at existing seepage sampling locations only (i.e. SW2A and SW2B). If new seepage locations are identified during a perimeter walkover, they will be sampled and tested.
- One round of sampling and analysis of potable water from public access points (i.e. bubblers within the playground, taps at the southern boundary of the site and taps within the amenities building). Assuming analytical results do not warrant further investigation, the potable water testing will only occur once.

For each monthly round, and following fieldworks and receipt of laboratory results, email reports will be prepared, briefly summarising the works and findings (one email for landfill gas, and one email for water).

5.3.5 Triggers for responses or reassessment arising from the environmental sampling, analysis and reporting, and required actions

The triggers for responses or re-assessment are as per those identified in Section 5.2, Section 5.3 and in the VMP contained in Appendix A.

5.4 Integrity inspection or testing or maintenance inspection program and frequency

The locations of the existing and proposed management measures are shown on Figure 8 and Figure 9.

5.4.1 Leachate system

The condition, operational status and efficiency of the leachate system is not currently well understood.

As such, an initial assessment of the condition, operational status and efficiency of the leachate system will be designed within three months of the approval of this IEMP. The scope of that investigation will be provided to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the investigation's scope and timeframe, the investigation will commence.

The precise scope of the investigation is not currently confirmed, but it is considered likely to include some or all of the following:

- Review and collation of existing relevant reports.
- Meeting with all relevant stakeholders (which may include Sydney Water).
- Discussion and confirmation of the objectives of the leachate system.
- Discussion and confirmation of existing maintenance, issues and reporting.
- Inspection, confirmation and documentation of current condition and operational status of leachate treatment system including:
 - Geophysical survey of leachate trench (to attempt to confirm its location, depth along profile, grade and relative water levels within in) and survey/set out on the ground's surface.
 - Camera inspections of pipework to verify integrity (for example leachate sump, leachate trench if possible, low flow inlet, overflow from treated leachate tank to leachate trench).

- Integrity testing of existing leachate treatment ponds (visible holes in geomembrane apparent at ground level).
- Confirmation of reed health/suitability in leachate treatment wetland (many of which appear to be dead).
- Installation and monitoring of flow meters across the leachate system to confirm water flows and losses.
- Water balance modelling (with consideration of findings of landfill cover layer assessment) (required).
- Conclusions and recommendations in relation to the condition, operational status and efficiency of the leachate system.

Following completion of the assessment, it would be documented and provided in a report to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the assessment, a plan for the implementation of its recommendations would be developed and provided to the Director, Community and Environment and Site Auditor for review and endorsement. Following that plan's endorsement, it would commence implementation within one month.

No amendments to the leachate system will be made without prior approval from the Director, Community and Environment.

5.4.2 Stormwater systems

The condition, operational status and efficiency of the stormwater systems at the site are not currently well understood.

As such, an initial assessment of the condition, operational status and efficiency of the stormwater systems will be designed within three months of the approval of this IEMP. The scope of that investigation will be provided to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the investigation's scope and timeframe, the investigation will commence.

The precise scope of the investigation is not currently confirmed, but it is considered likely to include some or all of the following:

- Review and collation of existing relevant reports.
- Meeting with all relevant stakeholders (which may include Sydney Water).
- Discussion and confirmation of the objectives of the stormwater systems.
- Discussion and confirmation of existing maintenance, issues and reporting.
- Inspection, confirmation and documentation of current condition and operational status of stormwater systems potentially including:
 - Camera inspections of pipework to verify integrity (for example pipes coming from out of and/or through the site).
 - Monitoring of stormwater flows through the stormwater systems to confirm water flows and losses.
- Water balance/ catchment modelling.
- Likelihood of LFG migration through the system.
- Conclusions and recommendations in relation to the condition, operational status and efficiency of the stormwater systems.

Following completion of the assessment, it would be documented and provided in a report to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the assessment, a plan for the implementation of its recommendations would be developed and provided to the Director, Community and Environment and Site Auditor for review and endorsement. Following that plan's endorsement, it would commence implementation within one month.

No amendments to the stormwater management systems will be made without prior approval from the Director, Community and Environment.

5.4.3 Sewer investigation

The condition, operational status and efficiency of the sewer systems, both onsite and offsite, are not currently well understood.

As such, an initial assessment of the condition, operational status and efficiency of the sewer systems will be designed within three months of the approval of this IEMP. The scope of that investigation will be provided to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the investigation's scope and timeframe, the investigation will commence.

The precise scope of the investigation is not currently confirmed, but it is considered likely to include some or all of the following:

- Review and collation of existing relevant reports.
- Meeting with all relevant stakeholders (which may include Sydney Water).
- Discussion and confirmation of the objectives of the sewer systems.
- Discussion and confirmation of existing maintenance, issues and reporting.
- Inspection, confirmation and documentation of current condition and operational status of sewer systems potentially including:
 - Camera inspections of pipework to verify integrity (for example pipes coming from out of and/or through the site).
 - Monitoring of wastewater flows through the sewer systems to confirm water flows and losses.
- Water balance/catchment modelling.
- Likelihood of LFG migration through system.
- Conclusions and recommendations in relation to the condition, operational status and efficiency of the sewer systems.

Following completion of the assessment, it would be documented and provided in a report to the Director, Community and Environment and Site Auditor for review and endorsement.

Within one month of the approval of the assessment, a plan for the implementation of its recommendations would be developed and provided to the Director, Community and Environment and Site Auditor for review and endorsement. Following that plan's endorsement, it would commence implementation within one month.

No amendments to the onsite sewer management systems will be made without prior approval from the Director, Community and Environment.

5.4.4 Landfill gas system

It is noted that there is no engineered landfill gas system at the site currently and a need for such a system has not yet been confirmed. As such, as a first step a landfill gas generation model will be prepared for the site to indicate potential landfill gas generation rates at the site. This will help inform the potential magnitude of landfill gas generation at the site (small, medium or large) and how those gas generation rates may need to ultimately be managed.

In addition the monitoring data will be collected and ultimately assessed along with the landfill gas model as part of a formal landfill gas risk assessment for the site. The model would be completed within six months of the approval of this IEMP and the landfill gas risk assessment would be developed following the collection of twelve month of data from the amended well network amended as per (GHD Pty Ltd, 2020b). If there was strong evidence of significant LFG offsite migration that posed risk to human health, the environment or property identified prior to this proposed timing the need for adjusting timing above and/or the need of landfill gas management measures would be assessed and if necessary appropriate measures would be undertaken

5.4.5 Trend assessment of environmental data

Following the installation of the new monitoring wells (refer SAQP) and the completion of a minimum of three monitoring rounds at these new wells, a trend assessment of the existing dataset (landfill gas, groundwater, surface water, leachate and seepage) will be undertaken.

Such an exercise will be useful in relation to formally baselining the environmental site conditions, reviewing the data gathered to date and identifying possible amendments to the requirements of the SAQP. For example, the trend assessment may identify that modifications to the analytical schedule, locations and frequencies presented in the SAQP may be possible or necessary.

The trend assessment of environmental data will be presented in a report that will be prepared in a manner consistent with the NSW EPA (2020), *Consultants reporting on contaminated land*.

The report will include the following:

- Data quality objectives for the rounds of monitoring.
- Description of the rounds of monitoring.
- Comparison of sample analytical results to adopted assessment criteria to evaluate the potential human and ecological risks.
- A formal trend assessment of the LFG and water data obtained for the site from April 2019 to the time of completion of three rounds of monitoring from the new wells identified above.
- Provision of conclusions and recommendations on ongoing investigations and site management as required.

The report will also contain figures illustrating results of sampling, highlighting exceedances against the adopted guidelines, the trend assessment and diagrammatic presentation of contaminant results where required.

Supporting documentation contained within appendices shall include:

- Site figures, indicating the sampling locations.
- Analytical results tables including assessment against the adopted assessment criteria.
- Laboratory documentation, including chain-of-custody documentation, certificates of analysis, and quality control reports.

6. Monitor and review of the IEMP

6.1 Schedule for IEMP review

The need to update this IEMP will be reviewed throughout its implementation. As a minimum, a formal review of this IEMP will be undertaken and documented annually. If changes to current site use and/or the site ownership are proposed, a review of this IEMP shall be undertaken at that time with consideration of the proposed changes.

Where a review identifies matters which require modification of the IEMP, then an updated revision of the IEMP shall be prepared by the Consultant, then reviewed and endorsed by the Site Auditor, before implementation. All formal IEMP reviews and revisions shall be retained by the Hornsby Shire Council and/or future land owners of the site (whether all of it or just a portion of it). Results of any formal revisions of the IEMP will be provided to the EPA.

6.2 Monitoring checklist (IEMP reviews)

All IEMP reviews and revisions will be guided by a monitoring checklist. An example checklist is provided in Appendix D.

6.3 Corrective actions and triggers

The IEMP reviews shall consider:

- The frequency of inspections required.
- Any non-compliance with the IEMP that have been unable to be resolved.
- Any changes in state or national environmental protection or occupational legislation or guidelines that impact any part of the IEMP.
- Proposed changes in land use of the site or adjoining sites.

Until such a time where a long term solution to the LFG on site is established for the site, the IEMP will be reviewed as outlined above and amended to reflect the outcomes of the monitoring reports.

6.4 Notification to the regulator and/or consent authority with request to amend or end management activities

This will be determined on a case by case scenario and notifications will be made to relevant stakeholders as required.

7. Communications and notifications

7.1 List of stakeholders

The stakeholders for the site and this IEMP are provided in Section 2.

7.2 Stakeholder notification

A copy of the IEMP will be provided to all relevant Primary Stakeholders. Signage will be erected at Foxglove Oval notifying contractors, employees and users of the site of the IEMP and including reference details in order to locate the document in Council's record keeping systems if required. The IEMP will be recorded on the Dial Before You Dig (DBYD) service so that external contractors/third parties can access the relevant documentation.

Primary stakeholders and the EPA will be contacted directly by email, letter or phone call if any changes to the document have occurred or is likely to occur. All other secondary stakeholders will be updated if and when required. Methods of communication to secondary stakeholders may include letters, 'pop up' events and/or updates to Council's website as considered appropriate to Council at the time.

7.3 Enforceability

The IEMP will be uploaded to Council's Contaminated Lands Register and Environmental Management Plan Register. It will also be incorporated into Council's GIS system within the EMP mapping layer, and Council's Customer Request Management System.

Hornsby Shire Council has not been asked to date for financial assurance by the EPA.

8. References

- Ball, R. J. (1996, October 09). Notice to Applicant: Development Consent. Hornsby, NSW, Australia: Letter to Simon Wells & Associates Pty Ltd.
- Clarke, N. (2020, August 06). Email to GHD titled: Approvals for Foxglove Oval. Hornsby, NSW, Australia.
- Environmental Protection Authority. (2019, February 25). *Declaration of significantly contaminated land*. Retrieved from NSW EPA Contaminated land: Record of notices: <https://apps.epa.nsw.gov.au/resources/clm/docs/html/n20181108.htm>
- EPA Victoria. (2018). *Publication 1684: Landfill Gas Fugitive Emissions Monitoring Guidelines*.
- GHD Pty Ltd. (2020a). *Draft Preliminary Monitoring Round - March 2020*.
- GHD Pty Ltd. (2020b). *Sampling Analysis and Quality Plan*.
- GHD Pty Ltd. (2020c). *Well Review Report*.
- Health, D. o. (1964, July 20). Sanitary Depot for Disposal of Garbage at Mount Colah. Hornsby, NSW, Australia: Letter to The Shire Clerk of Hornsby Shire Council.
- NSW Department of Mineral Resources. (1983). *Sheet 9130, Sydney 1:100,000*.
- NSW Environmental Protection Authority. (2020b). *Consultants reporting on contaminated land guidelines*. Parramatta, NSW 2124: NSW Environmental Protection Authority.
- NSW EPA. (2016). *Environmental Guidelines: Solid Waste Landfills (2nd Edition)*.
- NSW EPA. (2020a). *Assessment and management of hazardous ground gases: COntaminated Land Guidelines*.
- NSW EPA. (2020b). *Foxglove Oval Voluntary Management Proposal*.
- Woodward, R. (1983, March 02). Notice to Applicant of Determination of a Development Application No. 15/83. Hornsby, NSW, Australia.

9. GHD Limitations

This report: has been prepared by GHD for Hornsby Shire Council and may only be used and relied on by Hornsby Shire Council for the purpose agreed between GHD and Hornsby Shire Council as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Hornsby Shire Council 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 (refer Section 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

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

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

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendices

Appendix A – Declaration and VMP



DOC20/358220-3

Hornsby Shire Council
296 Peats Ferry Road
HORNSBY NSW 2077

By email: sfederow@hornsby.nsw.gov.au

Attention: Steve Fedorow – Group Manager Environment and Human Services

Dear Mr Fedorow

**Foxglove Oval - Foxglove Road Mount Colah NSW 2079
Notice of Approval of Voluntary Management Proposal**

Thank you for submitting the Voluntary Management Proposal for Foxglove Oval, at Foxglove Road, Mount Colah (the site). The final proposal was submitted on 30 April 2020 following declaration of the site as significantly contaminated land on 18 February 2020 under the *Contaminated Land Management Act 1997*.

The NSW Environment Protection Authority (EPA) considers that the proposal is suitable for approval subject to conditions. Please find enclosed a Notice of Approval of Voluntary Management Proposal (Notice No. 20201708), which includes these conditions.

The notice and the proposal will be published on the Contaminated Land Record of Notices at <http://app.epa.nsw.gov.au/prclmapp/searchregister.aspx>.

Any request to vary the terms of the proposal, such as an extension to a milestone date, must be made in writing to the EPA. The request should clearly set out the reason/s why you think the variation should be granted. If you are requesting an extension to a milestone date, you should also nominate a revised timeframe by which the milestone will be achieved. The request must be made at least 21 days prior to the relevant milestone date in the proposal.

Please note Council must specify that the site is subject to an approved Voluntary Management Proposal on any planning certificate for the land issued under section 10.7 of the *Environmental Planning and Assessment Act 1979*. This obligation forms part of the requirements of section 59(2) of the CLM Act.

If you have any questions, please contact Kate Sargent on (02) 9995 6804 or via email at kate.sargent@epa.nsw.gov.au.

Yours sincerely

21/05/2020

BEN LIVISSIANIS
Unit Head Regulatory Operations
Environment Protection Authority

Attachment 1: Notice of Approval of Voluntary Management Proposal (Notice No. 20201708)

Phone 131 555
Phone 02 9995 5555
(from outside NSW)

Fax 02 9995 5999
TTY 133 677
ABN 43 692 285 758

PO Box A290
SYDNEY SOUTH
NSW 1232

4 Parramatta Square, 12
Darcy Street
PARRAMATTA NSW 2150

info@epa.nsw.gov.au
www.epa.nsw.gov.au

Notice of Approved Voluntary Management Proposal

Section 17 of the *Contaminated Land Management Act 1997*



To: Hornsby Shire Council
296 Peats Ferry Road
HORNSBY NSW 2077

Attention: Mr Steve Fedorow, Director, Community and Environment

Notice No. 20201708; Declaration No. 20201102; Area No. 3453

Why is the EPA writing to you?

The Environment Protection Authority (EPA) has issued this Notice of Approved Voluntary Management Proposal to notify you of approval of the Voluntary Management Proposal (Proposal) submitted by you, subject to the conditions set out in this Notice. Further information is set out below.

What are you required to do?

Please read this Notice carefully and comply with its conditions. If you have any queries about this matter, please contact Kate Sargent on kate.sargent@epa.nsw.gov.au or (02) 9995 6804.

BACKGROUND

A. The EPA is responsible for administration and enforcement of the *Contaminated Land Management Act 1997* (Act) and has issued this Notice under s 17(3) of the Act.

Land to which this Notice applies

- B. The Proposal relates to the land described in Declaration No.20201708, being Foxglove Oval, Foxglove Road Mount Colah, NSW (Lot 507 in DP752053, Lot 19 in DP1002578 and part Chestnut Road Reserve to the west of the oval), within the Local Government Area of Hornsby Shire Council (Land).
- C. The Proposal, dated 30 April 2020, was submitted by Hornsby Shire Council.

Appropriate Terms of Proposal and other Considerations

- D. Prior to approval of the Proposal, the EPA has been satisfied that the terms of the Proposal, as modified by the conditions of this Notice, are appropriate.
- E. The EPA is also satisfied that the party has taken all reasonable steps to identify and find every owner and notional owner of the Land and every person responsible for significant contamination of the Land and given those persons identified a reasonable opportunity to participate in the formulation and carrying out of the Proposal on reasonable terms.

It is satisfied of these matters for the following reasons:

- (i) The landfill operated as Council tip between approximately 1970 to 1980 accepting putrescible and non-putrescible municipal type waste. Therefore, the party likely to be responsible for the contamination is Hornsby Shire Council; and
- (ii) The former landfill is now occupied by Foxglove Oval. The land continues to be managed by Hornsby Shire Council.

NOTICE OF APPROVED VOLUNTARY MANAGEMENT PROPOSAL

The EPA approves the Proposal relating to the Land and submitted by the party (Approved Party), subject to the following conditions.

1. The Proposal, as submitted by the party, is approved in the terms set out in Annexure A (Approved Proposal).
2. The Approved Party is to comply with each undertaking or term of *Part 2 Undertakings* of the Approved Proposal.
3. The Approved Party is to complete or otherwise comply with each feature, milestone, reporting or other term of *Part 3 Performance Schedule* of the Proposal by the date specified in the Approved Proposal.
4. A failure to satisfactorily complete any term of the Approved Proposal by the due date may be taken as a failure to carry out the terms of the Approved Proposal for the purposes of s 17(6) of the Act.
5. The Approved Party cannot recover contributions under Part 3 Division 6 of the Act.
6. The Approved Party must make available for inspection by any person, free of charge, and provide a copy to any person for a reasonable fee, any document required to be prepared and submitted to the EPA under the Approved Proposal. It is not necessary to disclose:
 - (a) any information contained in those documents that relates to any manufacturing, industrial or commercially sensitive information, or working processes; or
 - (b) any personal information, within the meaning of the *Privacy and Personal Information Protection Act 1998*, contained in those documents.
7. Any report submitted to the EPA to comply with the Approved Proposal must be prepared, or reviewed and approved, by a consultant certified by an EPA recognised scheme. A personalised electronic seal providing evidence of certification must be affixed alongside the certified person's details in the quality information section of a report. Further information, and a list of contaminated land consultant certification schemes recognised by the EPA is available on the EPA's website at <http://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/engaging-consultant>.
8. Where the Approved Proposal requires an Approved Party or any other person to give a document to the EPA, that document may be given to the EPA by:

Email contaminated.sites@epa.nsw.gov.au; or

Post Director
Regulatory Operations Metro South
NSW Environment Protection Authority
Locked Bag 5022
PARRAMATTA NSW 2124



BEN LIVISSIANIS
Unit Head Regulatory Operations
NSW Environment Protection Authority

(by delegation)

Date of this Notice: 21 May 2020

Further Information about this Notice

Continuing Offences

Under s 108A of the Act, a Notice made under the Act that specifies a time by which, or period within which, a direction or other requirement in the Notice must be complied with continues to have effect until the direction or requirement is complied with. Where a time is not specified, the direction or requirement continues to have effect until it is complied with.

Cost Recovery

Section 34 of the Act allows the EPA to recover its costs in connection with assessing and settling the terms, monitoring actions under, or seeking compliance with an approved voluntary management proposal. The EPA may also recover the costs of any other matter associated with, or incidental to these matters, or other matters prescribed by the regulations.

Information recorded by the EPA

Section 58 of the Act requires the EPA to maintain a public record. A copy of this Notice will be included in the public record and is available for access at the principal office of the EPA and on the EPA's website.

Information recorded by Councils

Section 59(1)(c) of the Act requires the EPA to inform the relevant local Council as soon as practicable after this Notice of Approved Voluntary Management Proposal has been served. Pursuant to s 59(2)(c) of the Act, Land being the subject to an approved voluntary management proposal is a prescribed matter to be specified in a planning certificate issued pursuant to s 10.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EPA is required to inform the relevant Council as soon as practicable when the Notice is withdrawn or completed (s 59(1)(c) Act). Pursuant to s 59(3) of the Act, if a Council includes advice in a planning certificate regarding a Notice that no longer applies to the Land the subject of that Notice, it is to make it clear on the planning certificate that the Notice no longer applies.

Relationship to other regulatory instruments

This Notice does not affect the provisions of any relevant environmental planning instruments which apply to the Land or provisions of any other environmental protection legislation administered by the EPA.

Guidelines made or approved under s 105 of the Act

All the investigation or remediation works must be carried out in accordance with guidelines made or approved under s 105 of the Act. See <https://www.epa.nsw.gov.au/your-environment/contaminated-land/statutory-guidelines>.

Amendment or Repeal

This Notice may be amended or repealed by subsequent notices. Under s 44 of the Act, the subsequent notice must state the reasons for the amendment or repeal.

Cessation of the approved voluntary management proposal

This Notice will cease if the EPA serves a notice in writing on an approved party or approved parties, stating that it is satisfied that the terms of the Approved Proposal have all been carried out, or stating that it withdraws its approval of the proposal, at the time specified in the Notice or if no time is specified, at the time the EPA notifies each approved party of the cessation of the Approved Proposal.

Management Order

Under s 17(6) of the Act, the EPA may serve a management order in relation to significantly contaminated land the subject of an approved voluntary management proposal on an approved party to the proposal, if in the opinion of the EPA, the terms of the approved proposal are not carried out, or the management order relates to a matter that is not adequately addressed by the proposal, or its approval of the proposal was given on the basis of false or misleading information.

ANNEXURE A
APPROVED VOLUNTARY MANAGEMENT PROPOSAL

Dated: 21 May 2020

VOLUNTARY MANAGEMENT PROPOSAL UNDER THE CONTAMINATED LAND MANAGEMENT ACT 1997

Part 1

Preliminary Details

1. Proponent's Details

(a) Name and contact details

If not a registered company, your full name(s):
Trading as: HORNSBY SHIRE COUNCIL
ABN: 20 706 996 972

Phone: (02) 98547 6666
Fax: (02) 9847 6999
Email: hsc@hornsby.nsw.gov.au
Postal address: 299 PEATS FERRY ROAD, HORNSBY. NSW
Postcode: 2077
EPA licence number (if applicable): N/A

(b) Who the EPA should contact technical enquiries about the proposal

Name: STEVE FEDOROW
Employer/Company: HORNSBY SHIRE COUNCIL
Position title: DIRECTOR, COMMUNITY & ENVIRONMENT
Type of business: LOCAL GOVERNMENT
Phone (business): (02) 9847 6541
Phone (after hours): 0478 318 183
Fax: (02) 9847 6999

Email: sfedorow@hornsby.nsw.gov.au

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

2. Site to which proposal applies

The site to which the proposal applies ("the site") is:

The land located at Foxglove Oval, Foxglove Road, Mount Colah, NSW (lot 507 in DP 752053, lot 19 in DP1002578 and part Chestnut Road Reserve to the west of the oval), within the Local Government Area of Hornsby Shire Council. The land to which the proposal applies is shown bounded by the yellow line on Figure 1 below.



Figure 1 Site on which proposal applied

3. The contamination

Soil and/or groundwater and/or surface water at the site are contaminated with substances and the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997*. The substances of concern ("the contaminants") are:

- Landfill gases, including methane and carbon dioxide
- Landfill leachate, including ammonia, heavy metals and organic contaminants.

4. The management proposal

The management proposal ("the proposal") comprises:

- a) the information set out above;
- b) the actions, works and other components set out in the following documents:

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

- c) the undertakings set out in Part 2 of this document; and
- d) the performance schedule set out in Part 3 of this document.

Title	Prepared by	Date
Report on Geotechnical Investigation Proposed Residential Subdivision, Stage 1, 23 Chestnut Road, Mount Colah, NSW	Douglas Partners	March 2015
Report on Preliminary Site (Contamination) Investigation Proposed Residential Subdivision, Stage 1, 23 Chestnut Road, Mount Colah, NSW	Douglas Partners	September 2016
Landfill Gas Assessment, Foxglove Oval, Mt Colah NSW	Arcadis	April 2018
Landfill Gas Delineation Assessment and Leachate Investigation Foxglove Oval, Mt Colah NSW	Arcadis	February 2019
Foxglove Oval – Landfill Support Works: Preliminary Advice – Water Quality Monitoring Results and Assessment	GHD Pty Ltd	April 2020
Foxglove Oval – Landfill Support Works: Preliminary Advice – Landfill Gas Monitoring Results and Assessment	GHD Pty Ltd	April 2020
Landfill gas monitoring in amenities building, along new sewer alignment and at certain sub-surface service pits	GHD Pty Ltd	March 2020
Foxglove Oval – Landfill Support Works: Landfill Gas Monitoring Report - Summary	GHD Pty Ltd	November 2019

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

Part 2

Undertakings Included in Voluntary Management Proposal

THE PROPOSAL INCLUDES THE FOLLOWING UNDERTAKINGS:

General

1. All works or activities carried out in connection with the proposal, including sampling and preparation of associated reports ("the activities"), will be carried out in accordance with applicable provisions of *State Environmental Planning Policy 55 – Remediation of Land* and any requirements imposed under it in relation to the activities.
2. All matters listed as relevant to a remediation action plan by the EPA's *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* will be taken into account in the carrying out of the activities.
3. All the activities will be carried out consistently with guidelines made or approved under section 105 of the CLM Act.
(See www.epa.nsw.gov.au/clm/guidelines.htm)
4. All the activities will be carried out in compliance with applicable NSW environmental legislation, and in particular:
 - i) All the activities, including:
 - (1) the processing, handling, movement and storage of materials and substances used to carry out the activities; and
 - (2) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activities will be carried out in a competent manner;
 - ii) All plant and equipment installed at the site or used in connection with the activities:
 - (1) will be maintained in a proper and efficient condition; and
 - (2) will be operated in a proper and efficient manner.
5. All the activities at the site will be carried out in a manner that prevents or minimises the emission of dust, odour and noise from the site.
6. Waste generated or stored at the Site will be assessed and classified in accordance with the EPA's *Waste Classification Guidelines Part 1: Classifying Waste*.
(See www.epa.nsw.gov.au/wasteregulation/classify-guidelines.htm)
7. All waste transported from the Site that is required by the *Protection of the Environment (Waste) Regulation 2005* to be tracked must be tracked using the EPA's on-line tracking system or an alternative tracking system approved in writing by the EPA.
(See www.epa.nsw.gov.au/owt/aboutowt.htm)
8. The proponent will make this voluntary management proposal available to the public free of charge and consents to the EPA placing this proposal on its public website.
9. The proponent will make all documents referred to in, and required to be prepared under, this voluntary management proposal available to the public free of charge, unless the proponent identifies commercial-in-confidence or private/personal information (including information relating to a third party) within those documents. In

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

these cases, the proponent will remove such information from the documents to make the documents suitable for public release.

10. The proponent will:

- i) prior to the implementation of the proposal provide for the EPA's approval a strategy for communicating about that implementation, particularly the actual management works, with members of the public who are likely to have a real interest in or be affected by that implementation; and
- ii) implement the strategy as approved in writing by the EPA.

Monitoring, Record Keeping & Reporting

11. At least until the EPA has notified the proponent that the EPA no longer considers that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997*, record and retain all monitoring data and information and provide this record to the EPA at any reasonable time if so requested by the EPA and as specifically provided under the proposal.
12. The EPA will be informed in writing within 7 days of the proponent becoming aware of information or data indicating a material change:
 - a) in conditions at the site, or
 - b) in its surrounding environment,which could adversely affect the prospects of successful management of the site or result in harm to the environment.
13. The EPA will be informed in writing within 7 days of the proponent becoming aware of any failure, either by the proponent or any other person, to comply with any term of the proposal.
14. The EPA will be informed in writing as soon as practicable of any notification by the proponent, its employees or its agents to an appropriate regulatory authority other than the EPA of any pollution incident at the site within the meaning of the *Protection of the Environment Operations Act 1997*.

(See <http://www.epa.nsw.gov.au/licensing/dutytonotify.htm>)

Performance Schedule

15. The performance schedule which is in Part 3 of this document will be adhered to.

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

Part 3

Performance Schedule

1. Objectives of the proposal

This proposal is for the ongoing management of Foxglove Oval, Foxglove Road, Mount Colah, NSW (lot 507 in DP 752053, lot 19 in DP1002578 and part Chestnut Road Reserve to the west of the oval) (the site).

The main contamination related objectives of Hornsby Council for the site are as follows:

- 1) Confirm the nature, significance and extent of contamination present at the site.
- 2) Identify the risks that the contaminants may pose to human health and/or the environment and (if necessary)
- 3) Implement appropriate measures to manage the identified contamination thereby reducing the potential risks to human health and the natural environment.

At this time, it is proposed that these objectives will be addressed through the following action:

1. Development and implementation of an Interim Environmental Management Plan (IEMP).

An IEMP shall be developed for the site that outlines the required management actions proposed to meet the objectives identified above. This would include the recommended scope of monitoring / investigative works (including landfill gas, groundwater, surface water, leachate and soil), interim management works and/or remedial works. Further details are provided in Section 2 following.

This IEMP shall subsequently be reviewed and endorsed by an NSW EPA Accredited Site Auditor and then submitted to the NSW EPA for review and endorsement. Following Site Auditor and NSW EPA endorsement of the IEMP, the IEMP will be implemented by Council.

It is noted that although some information is currently available in relation to the nature, significance and extent of contamination present at the site, there are some data gaps that need to be addressed. Appropriate environmental investigations and monitoring works will be included in the IEMP to inform upon these matters and help with the identification of appropriate management actions.

The works undertaken as part of the IEMP will ultimately inform a longer-term site management plan (not included as part of this VMP at this time).

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

2. Principal features of the proposal

The principal features of the proposal are as identified in the following sections.

a. Capital works

The proposed capital works would be outlined in the IEMP. At this time, it is anticipated that these may include the following:

- P1. Repair and/or enhancement (where necessary) of the existing perimeter landfill gas and groundwater monitoring well network.
- P2. Installation of leachate monitoring wells.
- P3. Repair and/or enhancement (where necessary) of the existing leachate management system.
- P4. Repair and/or enhancement (where necessary) of the existing stormwater management systems.

These actions will be confirmed through the development of the IEMP, along with their associated timeframes.

b. Remediation

The works undertaken as part of the IEMP will ultimately inform potential remedial works. Specific remedial works are not included as part of this VMP at this time.

c. Monitoring

- P5. The proposed monitoring works would be outlined in the IEMP. At this time, it is anticipated that these will include:
- Regular building, surface, sub-surface perimeter, sub-surface service pit/penetration and off-site building landfill gas monitoring and reporting.
 - Regular groundwater, surface water, leachate and seepage monitoring and reporting.

3 Key milestones for investigation, remediation and other actions

All works set out in the proposal must be completed by the deadlines specified in the table below. At this time, potential remediation works have not been accounted for as their precise need and nature is not currently well defined. If remedial works are found to be required during the development of the IEMP, further details on those works and their associated timeframes will be communicated to the Site Auditor and NSW EPA via an updated VMP.

Works	Deadline
T1. Development, review and endorsement (by NSW EPA Site Auditor and NSW EPA) of IEMP	13 August 2020
T2. Implementation of IEMP	14 August 2020
T3. Delivery of draft IEMP implementation report to NSW EPA Site Auditor	13 October 2021
T4. Comments from NSW EPA Site Auditor on draft IEMP implementation report (provided as Interim Audit Advice)	3 November 2021
T5. Review and update revised draft IEMP implementation report (based on NSW EPA Site	17 November 2021

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

Auditor's comments)	
T6. Comments from NSW EPA Site Auditor on revised draft IEMP implementation report	24 November 2021
T7. Finalise the revised IEMP implementation report.	01 December 2021
T8. Preparation of and issue of draft EMP to NSW EPA Site Auditor.	25 February 2022
T9. Comments from NSW EPA Site Auditor on draft EMP.	18 March 2022
T10. Review and update revised draft EMP (based on NSW EPA Site Auditor's comments)	01 April 2022
T11. Comments from NSW EPA Site Auditor on revised draft EMP	15 April 2022
T12. Issue of the final EMP.	26 April 2022
T13. Site audit report and site audit statement based on the final EMP from NSW EPA Site Auditor	26 July 2022

4. Reporting requirements and timeframe for submission of reports

The EPA must be provided with the following reports by the deadlines specified below:

Report	Deadline
R1. Foxglove Oval – Preliminary Monitoring Round Report	5 June 2020
R2. Review of draft IEMP by NSW EPA Site Auditor	2 July 2020
R3. IEMP endorsed by NSW EPA Site Auditor	13 August 2020
R4. Draft IEMP implementation report to be issued to NSW EPA Site Auditor	13 October 2021
R5. Revised IEMP implementation report to be issued to NSW EPA Site Auditor	17 November 2021
R6. Finalise IEMP implementation report	01 December 2021
R7. Draft EMP to be issued to NSW EPA Site Auditor	25 February 2022
R8. Review of draft EMP by NSW EPA Site Auditor	18 March 2022
R9. Revised EMP to be issued to NSW EPA Site Auditor	01 April 2022
R10. Finalise EMP report	26 April 2022
R11. EMP endorsed by NSW EPA Site Auditor	3 May 2022
R12. Site audit report and site audit statement based on the final EMP from NSW EPA Site Auditor	26 July 2022

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

Signature of proponent

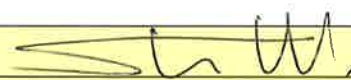
This application for approval of this voluntary management proposal may only be signed by a person(s) with the legal authority to sign it. The various ways in which the application may be signed, and the people who may sign the application, are set out in the categories below.

Please tick (✓) the box next to the category that describes how this application is being signed.

If the proponent is:		The application must be signed and certified by one of the following:
an individual	<input type="checkbox"/>	the individual.
a company	<input type="checkbox"/>	the common seal being affixed in accordance with the <i>Corporations Act 2001</i> , or
	<input type="checkbox"/>	two directors, or
	<input type="checkbox"/>	a director and a company secretary, or
	<input type="checkbox"/>	if a proprietary company that has a sole director who is also the sole company secretary – by that director.
a public authority other than a council	<input type="checkbox"/>	the chief executive officer of the public authority, or
	<input type="checkbox"/>	by a person delegated to sign on the public authority's behalf in accordance with its legislation (Please note: a copy of the relevant instrument of delegation must be attached to this application).
a local council	<input checked="" type="checkbox"/>	the general manager in accordance with s.377 of the <i>Local Government Act 1993</i> ('LG Act'), or
	<input type="checkbox"/>	the seal of the council being affixed in a manner authorised under the LG Act.

I/We (the proponent):

- **apply for approval of the voluntary management proposal set out in this proposal and in any documents referred to in Part 1.4 of this proposal**
- **declare that the information in this proposal form (including any attachment or document referred to in Part 1.4 of this proposal) is not false or misleading.**

Signature		Signature	
Name (printed)	STEVEN HEAD	Name (printed)	
Position	GENERAL MANAGER, HORNSBY SHIRE council	Position	
Date	30 APRIL, 2020.	Date	

Seal (if signing under seal):

Proponent: HORNSBY SHIRE COUNCIL

Site: FOXGLOVE OVAL, MOUNT COLAH. NSW

Proposal Date: 30 APRIL 2020

Appendix B - Sampling Analysis and Quality Plan (including existing well review report)

Appendix C – Example inspection report templates

SITE INSPECTION FORM – FINAL LANDFORM AND FINAL CAPPING LAYER

Site name:	Reference no.:	
Inspector(s):		
Date:	Arrival time:	Departure time:

Weather and ground conditions:

Workplace Health and Safety (have the inspection staff completed relevant safety procedures and training, have the inspection staff undertaken a pre-inspection safety assessment):

General site observations (identify inspection areas on site plan and assign number to location of observation. Attach marked up site plan to completed inspection form and submit to owner):

1. Cracks, erosion, depressions and flaking of landform surface and batters (e.g. surface cracking, cap erosion, etc):

2. Steepness and stability of landform surface and batters (e.g. oversteepened batters, slumping batters, overflattened surfaces, etc):

SITE INSPECTION FORM – FINAL LANDFORM AND FINAL CAPPING LAYER

3. Drainage issues (e.g. ponding, excessive surface water seeping into the landfilled waste, leachate seeping from site surface /and batters, etc):

4. Condition and suitability of vegetation (e.g. dead vegetation, significant weeds, large trees on capped area, etc):

5. Other (exposed waste, illegally dumped waste, landfill gas odours, unapproved stockpiles, etc):

SITE INSPECTION FORM – FINAL LANDFORM AND FINAL CAPPING LAYER

Corrective actions proposed and/or performed (including maintenance and monitoring):	
Photographs taken, references and descriptions:	
Signature:	
Inspection plan attached:	

SITE INSPECTION FORM – MONITORING BORES

Site name:	Reference no.:	
Inspector(s):		
Date:	Arrival time:	Departure time:

Weather and ground conditions: _____ _____
Workplace Health and Safety (have the inspection staff completed relevant safety procedures and training, have the inspection staff undertaken a pre-inspection safety assessment): _____ _____
General site observations (identify inspection areas on site plan and assign number to location of observation. Attach marked up site plan to completed inspection form and submit to owner): 1. Condition of bore protection and cover (gatic cover, monument cover, etc): _____ _____ _____ _____ _____ _____ 2. Condition of bore cap (correct cap, sealed airtight, etc): _____ _____ _____ _____ _____ _____

SITE INSPECTION FORM – MONITORING BORES

3. Condition of pipework (correctly aligned, not damaged or compromised, etc):

4. Other:

Corrective actions proposed and/or performed (including maintenance and monitoring):

Photographs taken, references and descriptions:

Signature:

Inspection plan attached:

SITE INSPECTION FORM – SURFACE DRAINS

Site name:		Reference no.:
Inspector(s):		
Date:	Arrival time:	Departure time:

<p>Weather and ground conditions:</p> <hr/> <hr/>
<p>Workplace Health and Safety (have the inspection staff completed relevant safety procedures and training, have the inspection staff undertaken a pre-inspection safety assessment):</p> <hr/> <hr/>
<p>General site observations (identify inspection areas on site plan and assign number to location of observation. Attach marked up site plan to completed inspection form and submit to owner):</p> <p>1. Condition of drain surface (Cracks, erosion, scour, slumping, etc):</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>2. Condition of drain vegetation (excessive vegetation, scoured vegetation, significant weeds, etc):</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

SITE INSPECTION FORM – SURFACE DRAINS

3. Other (obstructions, damaged lining, sediment build up, etc):

Corrective actions proposed and/or performed (including maintenance and monitoring):

Photographs taken, references and descriptions:

Signature:

Inspection plan attached:

Appendix D – Example IEMP review checklist

Example IEMP checklist

Item	Check	Comment
Body of IEMP		
Purpose	Is the purpose of the IEMP still appropriate?	
Background	Is the background information still appropriate for the IEMP? Is any additional background information now available that should be considered/included in an updated IEMP?	
Existing/residual Contamination	Is the existing/residual contamination information still appropriate for the IEMP? Is any additional information now available that should be considered/included in an updated IEMP?	
Management activities	Are management activities, protocols, contacts, responsibilities, reporting requirements etc. still appropriate for the IEMP?	
Inspection, maintenance, environmental sampling, analysis and reporting	Are the inspection, maintenance, environmental sampling, analysis and reporting activities/protocols etc. still appropriate for the IEMP?	
Communications and notifications	Are the communications and notifications activities/protocols etc. still appropriate for the IEMP?	
Appendices of IEMP		
Figures	Are the figures still appropriate for the IEMP?	
Example corrective action database	Is the example corrective action database still appropriate for the IEMP?	
EMP Checklist	Has the EMP checklist in the relevant guidance document been updated? Are the responses prepared by GHD to the EMP checklist still appropriate?	
Example IEMP review checklist	Is the example IEMP review checklist still appropriate for the IEMP?	

Item	Check	Comment
Other		
Relevant statutory documents	Are the statutory documents identified still appropriate for the IEMP?	
Relevant guidance	Are the guidance documents referenced still appropriate for the IEMP?	

GHD






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

© GHD 2020

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

2128141-19793-
487/https://projects.ghd.com/oc/sydney2/landfillassessment/Delivery/Documents/2128141-REP-IEMP_Rev1.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	F. Harrison	A. Kohlrusch		A. Kohlrusch		19/08/2020
1	F. Harrison	H. Milne	 	A. Kohlrusch		10/09/2020

www.ghd.com

