



Long Term Environmental Management Plan

1 Sirius Road, Lane Cove West, NSW

Prepared for:
AW Edwards Pty Ltd
Level 1, 131 Sailors Bay Road
Northbridge NSW 2063

9 November 2020





Distribution

Long Term Environmental Management Plan 1 Sirius Road, Lane Cove West, NSW

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Document History and Status

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Executive Summary

Introduction

Senversa Pty Ltd (Senversa) was engaged by AW Edwards Pty Ltd (AWE) on behalf of AirTrunk Pty Ltd (AirTrunk) to prepare this Long-Term Environmental Management Plan (LTEMP) for the property identified as 1 Sirius Road, Lane Cove West, New South Wales (NSW) (the site). An LTEMP is required due to contaminated materials remaining on-site following development of the site. The contaminated materials are located under a capped area in the northern part of the site. This LTEMP has been prepared to provide guidance to site owners/occupiers to ensure that residual contamination at the site does not impact site users in the future.

Purpose of the LTEMP

The overall purpose of this LTEMP is to outline the minimum environmental management measures required to protect human health and the environment from potential risks associated with contaminated media at the site. The principle elements of this LTEMP are to:

- Specify responsibilities and obligations of relevant parties in the implementation of this LTEMP.
- Provide information to relevant parties regarding the contamination status of the site and the potential risk posed by these contaminants.
- Specify the environmental management procedures to be employed during the occupation and use of the site and during soil disturbance works.

The LTEMP has been prepared to provide a framework of procedures and controls to minimise risks of harm to human health and the environment that may be posed by identified soil, groundwater and ground gas contamination during ongoing occupation and maintenance of the site and during minor below-ground intrusive works that do not penetrate below the capping layer.

Residual Contamination at the Site

The site in its current form poses a low risk of harm to human health and/or sensitive environmental receptors. The following table summarises contamination remaining at the site following development.

Potential Contaminated Media	Location
Contaminated soil within capped area	Northern portion of the site illustrated on Figure 2 and Figure 3
Contaminated groundwater	Migrating in a northerly direction underneath the site
Ground gases within the former landfill materials	Northern portion of the site illustrated on Figure 2 and Figure 3

Environmental Management Requirements

The primary control measures for the management of contamination at the site are:

- Ensuring that contaminated fill materials located within the capped area (illustrated on **Figure 3**) remain undisturbed and that the integrity of the cap is not compromised.
- Preventing abstraction of groundwater for any purpose other than monitoring.
- Undertaking a ground gas intrusion assessment prior to construction of any additional buildings across the capped area and monitoring for ground gases in any intrusive excavations below 0.3 metres below ground level.

This LTEMP is not intended to apply to major excavations or construction activities that penetrate below the capping layer. An activity specific management plan should be prepared and implemented during major works.



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List of Acronyms

Acronym	Definition
ACM	Asbestos Containing Materials
AHD	Australian Height Datum
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
AST	Aboveground Storage Tank
AWE	AW Edwards Pty Ltd
CEMP	Construction Environmental Management Plan
DP	Deposited Plan
EMP	Environmental Management Plan
ESL	Ecological Screening Level
LTEMP	Long-Term Environmental Management Plan
m	Metre
m²	Metres Squared
m³	Cubic Metres
m AHD	Metres Australian Height Datum
m bgl	Metres Below Ground Level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
MGA	Map Grid of Australia
N/A	Not Applicable
NEPC	National Environment Protection Council
NHMRC	National Health and Medical Research Council
NRMMC	National Resource Management Ministerial Council
NSW	New South Wales
NSW EPA	New South Wales Environment Protection Authority
RAP	Remedial Action Plan
TRH	Total Recoverable Hydrocarbons
VENM	Virgin Excavated Natural Material
VSAQP	Validation Sampling Analysis and Quality Plan
WH&S	Workplace Health and Safety



1.0 Introduction and Purpose

Senversa Pty Ltd (Senversa) was engaged by AW Edwards Pty Ltd (AWE) on behalf of AirTrunk Pty Ltd (AirTrunk) to prepare this Long Term Environmental Management Plan (LTEMP) for the property identified as 1 Sirius Road, Lane Cove West, New South Wales (NSW) (the site). The site is also identified as Lot 15 in Deposited Plan (DP)1179953. The site location is indicated on **Figure 1**, and the site layout is shown on **Figure 2**.

1.1 Reason

An LTEMP is required due to contaminated materials remaining on-site following development of the site. The contaminated materials are located under a capped area in the northern part of the site as indicated on **Figure 3** and **Figure 4**.

This LTEMP has been prepared to provide guidance to site owners/occupiers to ensure that residual contamination at the site does not impact site users or the environment during future site management work and general day to day site operations.

Prior to the commencement of any intrusive works, all site personnel are to be inducted into the requirements of this LTEMP and acknowledge and understand the requirements and obligations outlined within the LTEMP.

1.2 Overview

The site owner, AirTrunk, with its head contractor AWE, is in the process of redeveloping the site for use as a data centre facility with one basement level, four above ground storeys and general landscaping and carparking facilities.

The northern portion of the site was previously used as an unlicensed landfill, which was capped with a low permeability clay layer in or around 1995 (refer to **Figure 4**). This part of the site was regulated by the NSW Environment Protection Authority (NSW EPA) under a '*Maintenance of remediation notice*' number 28027, issued on 27 September 2005 (**Appendix A**). This placed restrictions on works carried out in the identified area. During development of the site in 2020, surface materials identified as being impacted by asbestos and heavy metals from across the remainder of the site were placed over the central part of the former landfill area. These site-won contaminated soils were covered with a geotextile marker and a second cap was formed over these materials with clean, site-won clay cut from other parts of the site (refer to **Figure 3** and **Figure 4**). Further details are provided in **Section 3.0**.

The LTEMP has been prepared for Airtrunk, AWE, tenants, contractors and future site owners and occupiers to provide a framework of procedures and controls to minimise risks of harm to human health and the environment that may be posed by identified soil, groundwater and ground gas contamination during:

- Ongoing occupation and maintenance of the site.
- Below-ground intrusive works that do not penetrate below the capping layer (e.g. landscaping or replacement of surface coverings).

The LTEMP is a passive plan, i.e. no mechanical components have been incorporated and there is no requirement for monitoring or regular maintenance or inspection.

This LTEMP is not intended to apply to major excavations or construction activities that penetrate below the capping layer. An activity specific management plan, such as a Construction Environmental Management Plan (CEMP), should be prepared and implemented during major works in this area.



1.3 Purpose

The overall purpose of this LTEMP is to outline the minimum environmental management measures required to protect human health and the environment from potential risks associated with contaminated media at the site. The principle elements of this LTEMP are to:

- Specify responsibilities and obligations of relevant parties in the implementation of this LTEMP.
- Provide information to relevant parties regarding the contamination status of the site and the potential risk posed by these contaminants.
- Specify the environmental management procedures to be employed during the occupation and use of the site and during minor soil disturbance works.

The LTEMP is required to be continually implemented (in perpetuity) to ensure that the site remains suitable for commercial/industrial land use.

Any additional environmental management plans (EMPs) prepared by contractors working on the site may refer to the information detailed in this document and must ensure that their activities are carried out in a way that complies with the relevant environmental policies and legislation outlined in **Section 1.5**. This LTEMP does not preclude the conduct of any additional environmental management measures not specifically mentioned. Furthermore, this site-specific LTEMP does not specifically include workplace health and safety (WH&S) requirements with which site users must comply. This may require the development of a site-specific WH&S plan.

1.4 Legal Enforceability and Public Notification

The northern portion of the site was previously regulated by the NSW EPA. A Maintenance of remediation notice was placed onto the site by the NSW EPA in 1996, with a subsequent notice (Notice No. 28027) issued in 2005, regulating the site under the *Contaminated Land Management Act 1997*.

A NSW EPA accredited site auditor was engaged during redevelopment of the site to oversee the management of contaminated materials during construction activities.

Given NSW EPA and site auditor endorsement of this LTEMP, the site is no longer regulated by the NSW EPA provided that the accompanying section A2 site audit statement and this LTEMP are recorded on the Section 10.7 planning certificate by the relevant authority (Lane Cove Council).

1.5 Regulatory Framework

This LTEMP has been developed with reference to the relevant requirements of the following documents, current at the time of production:

- NSW EPA (2020). Consultants reporting on contaminated land, Contaminated Land Guidelines.
- NSW EPA (2017). Guidelines for the NSW Site Auditor Scheme – 3rd Edition.
- National Environment Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measures 1999 (ASC NEPM).

During the course of any future works, all operational personnel working on the site shall comply with the applicable environmental regulatory requirements in NSW current at the time of work.



1.6 LTEMP Revision

This LTEMP is intended to last in perpetuity but it may require review and amendment from time to time. Therefore, it is the responsibility of AirTrunk, or future site owners, to ensure that all required stakeholders are provided with the current version of this LTEMP and that relevant stakeholders are informed of any changes to the LTEMP. The current version of this LTEMP is detailed within the table below. Readers of this document and the person-in-charge of proposed works should ensure they have the current version of the LTEMP.

The LTEMP should be revised if any of the following events occur:

- At the completion of each stage of the Airtrunk redevelopment.
- There is a change of use or redevelopment that results in a material change to the surface coverings/cap.
- NSW EPA made or approved guidelines are updated that require material changes to inclusions in EMPs.
- Inspections identify that the LTEMP requires updating.

Any amendments or revisions of this LTEMP must be controlled by the site owner and be completed by a suitably qualified environmental consultant. In making any amendments or revisions, the site owner must provide the appointed suitably qualified person with the reports referred to in **Section 1.7** of this LTEMP. Should the LTEMP be revised due to a change in use or redevelopment of the site occurs that results in a material change to the surface coverings and/or use of the site as described in this version of the LTEMP, the revised LTEMP must be subject to review by a NSW EPA accredited site auditor for acceptance as appropriate and to ensure that the revised LTEMP continues to be able to be legally enforceable.

Any subsequent versions of this LTEMP must include a clear date / revision identifier to ensure the most current version of the LTEMP is implemented, as per below:

Document Name	Document Revision Number	Date
Long Term Environmental Management Plan, 1 Sirius Road, Lane Cove West, NSW	Revision 0	9/11/2020

1.7 Assumptions

This LTEMP has been prepared based on information presented in the following reports:

- Environmental Investigations Australia Pty Ltd (EI Australia, 2006). *Environmental Site Assessment, 1 Sirius Road, Lane Cove, NSW*. 3 July 2006.
- Senversa (2018a). *Phase 1 Due Diligence Assessment, 1 Sirius Road, Lane Cove West, NSW*. 18 October 2018.
- Senversa (2018b). *Phase 2 Acquisition Environmental Due Diligence Assessment, 1 Sirius Road, Lane Cove West, NSW*. 13 December 2018.
- Senversa (2019a). *Re: Groundwater Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.
- Senversa (2019b). *Re: Landfill Gas Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.
- Senversa (2019c). *Remedial Action Plan, 1 Sirius Road, Lane Cove West, NSW*. 14 August 2019.
- Senversa (2019d). *Sampling and Analytical Quality Plan – Site Validation Works, 1 Sirius Road, Lane Cove West, NSW*. 31 October 2019.
- Senversa (2020). *Remedial Validation Report, 1 Sirius Road, Lane Cove West, NSW*. In production.



The following assumptions have been made regarding the site:

- The levels of contamination identified in the previous investigations do not necessarily represent the maximum concentrations of contaminants that may be encountered at the site.
- Soils and groundwater considered to be potentially contaminated, along with ground gas, should be handled in accordance with appropriate regulations and measures set out in this LTEMP.



2.0 Implementation and Responsibilities

2.1 Record of Implementation of this LTEMP

To ensure all site contractors are aware of requirements detailed within this LTEMP, this LTEMP will be recorded on the site's induction database. The induction register should include the name of the person, their employer, the date of induction, nature of works being completed, whom the person has been engaged to do the works by and signatures of both the inductor and inductee.

Prior to the commencement of any minor intrusive works within the capped area, site contractors will be required to complete a general site induction, general work permit and a 'Permit to Work – Excavations' which will include induction into the requirements of this LTEMP. Note that this LTEMP does not apply to major excavation works, such as piling type activity, that penetrate the capping layer.

Although regular inspections of the integrity of the capping across the capped area is not required, records of identified non-conformances with environmental management controls (as specified in **Section 6.1**) and rectification works (corrective actions) should be maintained to demonstrate compliance with the requirements of this LTEMP.

2.2 Area to which this LTEMP applies

The site is identified as 1 Sirius Road, Lane Cove West, NSW.

This LTEMP applies to the whole site, but more specifically to the area of the site where contaminated materials are retained under the site surface in the capped area, as illustrated on **Figure 2** and **Figure 3**.

2.3 Application of LTEMP

The LTEMP will be applied following completion of Stage 1 development / construction works at the site. At this time, excavation and development works will have been completed, however the following intrusive maintenance activities may occur:

- Maintenance and/or upgrade of hard surfaces over the capping layer, as shown on **Figure 5**.
- Maintenance of landscape areas illustrated on **Figure 6**.
- Maintenance and/or upgrade of site utilities and drainage services. It is noted that all services and drainage channels will be installed at least 1 metre (m) above the contaminated material in clean imported material.

The LTEMP will require updating and auditor approval after subsequent stages of development.



2.4 Roles and Responsibilities

Stakeholders relevant to the implementation of this LTEMP, along with their responsibilities for the measures outlined within this LTEMP, are provided in the below table.

Position / Company	Responsibility
Site Auditor and NSW EPA	<ul style="list-style-type: none"> • Approve the LTEMP • Attach the LTEMP to the stage 1 section A2 site audit statement. • Provide both to the client, the NSW EPA, the Department of Planning, Industry and Environment and Lane Cove Council.
Site Owner	<ul style="list-style-type: none"> • Notify the relevant regulatory authority (Lane Cove Council) of the requirement to record this LTEMP on the Section 10.7 planning certificate. • Maintain the site in accordance with the environmental management measures outlined in Section 6.0. • Ensure that current versions of the LTEMP are included in the site's induction database and provided to operational staff working in the capped area. • Advise persons occupying and working at the site of the requirements of the LTEMP. • Ensure all contractors understand the extent and location of contaminated materials within the site. • Oversee implementation of the requirements of the LTEMP. • Require all contractors and sub-contractors to comply with statutory, approval and licensing requirements (as required). • Maintain records of all works undertaken within the site as required within this LTEMP. • Undertake corrective action where observations of compromised integrity or verified complaints are made. • Update the LTEMP as required in Section 1.4.
Site Operational Staff	<ul style="list-style-type: none"> • Provide adequate training for all employees and contractors during site induction, and as required on an ongoing basis during the works. • Implement the LTEMP at site level to ensure compliance. • Complete all necessary registers, databases and records required in the LTEMP. • Conduct all site operations in an environmentally responsible manner on a day to day basis. • Meet relevant WH&S regulatory requirements. • Undertake all site operations in a safe and responsible manner on a day to day basis. • Ensure that all environmental protection measures are in place and are functioning correctly. • Notify the site owner if suspected contaminated fill material is encountered during works on the site. • Complete non-conformance and corrective action reports as required and report them to the site owner. • Undertake corrective actions in response to requests made by the site owner regarding specific environmental or safety issues. • Complete incident reports and complaint reports and follow up as required. • Require any sub-contractors to comply with statutory and license requirements and conditions of the LTEMP. • Inform the site owner if conditions change significantly from those documented in this LTEMP.



3.0 Background Information

3.1 Site Details

The site identification information is presented within the table below:

Item	Description
Site Address	1 Sirius Road, Lane Cove West, NSW
Legal Description	Lot 15 in DP 1179953
Geographical Coordinates (MGA Zone 56)	33° 48' 28" S 151° 8' 40" E
Site Elevation in metres Australian Height Datum (m AHD)	Ranging between approximately 2 - 34 m AHD
Site Location	Figure 1
Site Layout/Boundary	Figure 2
Location of contaminated fill and typical cross sections of capping layer	Figure 3, Figure 3a, Figure 3b, Figure 4
Site Owner	Airtrunk
Local Government Area	Lane Cove Council
Consent Authority	The Department of Planning, Industry and Environment
Site Zoning	<ul style="list-style-type: none"> • Current: Light Industrial – IN2 • Future: Light Industrial – IN2

3.2 Site History

The site history has been summarised below based on information presented in the following reports:

- EI Australia (2006).
- Senversa (2018a).

The site comprised undeveloped bushland adjacent to the Lane Cove River and Stringybark Creek, until sometime in the 1930s or early 1940s. At this time, a large above ground storage tank (AST) and associated pipework was constructed within the north-western corner of the site and the area surrounding the AST along the northern boundary of the site was cleared. The AST was used for storage of molasses. A small building, of unknown use, was also constructed during this time in the central portion of the site, but had been demolished by 1956.

The river flat adjacent to Lane Cove River and Stringybark Creek was raised and levelled by a layer of uncontrolled, loosely packed fill (approximately 12,000 cubic metres [m³] over an area covering 6,509 metres squared [m²]) imported on to the northern area of the site over a period of many years, until around 1968. The landfill consisted of anthropogenic wastes (stoneware and porcelain jars), demolition rubble, industrial (chemical) wastes, ash, coke, broken bricks, concrete and asbestos.



Since the late 1950s or early 1960s, portions of the site had also been used for stockpiling of materials (largely within the south-western and central portions of the site) and storage of equipment / waste materials from the adjacent industrial facilities (within the northern portion of the site).

The northern portion of the site (the former landfill) was remediated in or around 1995 by capping the contaminated fill and installing drainage trenches to act as lateral migration barriers around the northern boundary. The capping layer comprised low permeability clay and rock/gravel compacted in 0.15 m layers to an overall reported thickness of 1.0 m. A Maintenance of remediation notice was placed onto this part of the site by the NSW EPA in 1996, with a subsequent notice (Notice No. 28027) issued in 2005, regulating the site under the *Contaminated Land Management Act 1997*.

The AST was removed in the late 1990s or early 2000s. Significant vegetation clearance occurred in the mid-2010s, with vegetation only remaining on the north-eastern and south-eastern corners of the site. Illegal tipping and stockpiling of waste soil materials continued on the site until site development by AirTrunk commenced in 2019.

The site redevelopment in 2019 and 2020 included cut and fill activities to facilitate the construction of a data centre facility. In addition to the capped landfill materials, asbestos impacted surface materials were identified in the southern, central and western portions of the site, and isolated contaminated fill materials were identified in the western portion of the site. To facilitate development and ensure the site was suitable for the proposed land use, Senversa developed a Remedial Action Plan (RAP¹) and Validation Sampling and Analysis Plan (VSAQP²) outlining the required processes and procedures to be implemented during site remediation works.

The remedial approach involved the removal of the asbestos impacted surface materials and excavation of the identified contaminated fill materials from the southern, central and western portions of the site and placement above the central portion of the landfill capped area (the area formerly regulated by the NSW EPA) in the northern portion of the site (**Figure 3** and **Figure 3a**). Following placement, the site-won contaminated material was covered with a geofabric marker layer and then capped with clean, beneficially reused, site-won clay. This secondary capping layer, as well as the remainder of the surface of the NSW EPA regulated landfill capped area, was covered with clean, beneficially reused, site-won materials to fill the area to final development levels (see **Figure 3b** for final levels across the area where the site-won contaminated materials were placed and **Figure 4** for a typical vertical profile through this area).

NSW EPA regulation of the site ceased once the stage 1 site audit statement and site auditor approved LTEMP was listed on the land title.

Full details of remediation and validation works are presented within the Senversa Remedial Validation Report (in production).

3.3 Site Use and Layout

As outlined in **Section 2.2**, this LTEMP applies to the whole site but more specifically to the area of the site where contaminated materials are retained under the site surface, i.e. the capped area. The capped area is partially located under a building, road and landscaping areas, as indicated on **Figure 5**.

¹ Senversa (2019c). *Remedial Action Plan, 1 Sirius Road, Lane Cove West, NSW*. 14 August 2019.

² Senversa (2019d). *Sampling and Analytical Quality Plan – Site Validation Works, 1 Sirius Road, Lane Cove West, NSW*. 31 October 2019.



4.0 Residual Contamination Requiring Management

Previous investigations estimated that approximately 12,000 m³ of landfill material is contained within the former NSW EPA regulated, landfill area.

Upon completion of site remedial and validation works in 2020, approximately 6,500 m³ of asbestos and heavy metal impacted fill material (i.e. site-won contaminated material) had been placed on top of the central portion of the capped area, which was subsequently capped with 3,000 m³ of site-won, beneficially reused, clean excavated clay. A marker layer of white geofabric was placed at the boundary between the site-won contaminated and clean material. The secondary capping layer, as well as the remainder of the surface of the NSW EPA regulated landfill capped area, was successively covered with site-won, beneficially reused, clean excavated material to raise the surface level to final design levels.

The location of the capped area, in which both of the above contaminated material types are located, is illustrated on **Figure 2** and **Figure 3**. The typical vertical profile through the capped area is presented on **Figure 4**, which shows the thickness of both contaminated strata and capping materials on top of each strata. Details of both contaminated strata within the capped area are provided in the below table.

Contaminated Strata	Contaminated Media	Contaminants of Concern	Maximum Concentrations (based on latest monitoring data)
Landfill material	Soil	Asbestos	N/A ^a
		Total Recoverable Hydrocarbons (TRH) >C10-C16	350 mg/kg ⁴
		Copper	560 mg/kg ⁴
		Nickel	73 mg/kg ⁴
		Zinc	610 mg/kg ⁴
	Groundwater	Copper	0.041 mg/L ⁵
		Nickel	0.048 mg/L ⁵
		Zinc	0.17 mg/L ⁵
		Arsenic	0.013 mg/L ⁵
		Ammonia	1.5 mg/L ⁵
	Ground Gas	Carbon Dioxide	13.8% ⁶
Site-won contaminated material	Soil	Asbestos	N/A ^a
		Copper	790 mg/kg ⁴
		Nickel	74 mg/kg ⁴
		Zinc	190 mg/kg ⁴

Notes:

1. N/A = not applicable
2. mg/kg = milligrams per kilogram
3. mg/L = milligrams per litre
4. Senversa (2018b). *Phase 2 Acquisition Environmental Due Diligence Assessment, 1 Sirius Road, Lane Cove West, NSW*. 13 December 2018.
5. Senversa (2019a). *Re: Groundwater Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.
6. Senversa (2019b). *Re: Landfill Gas Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.



The landfill material was described by Senversa (2018b) to comprise predominantly sandy, clayey, gravelly material with inclusions of bricks, tile, plastic pipe and rare asbestos containing material (ACM), which Senversa concluded pointed to the material being predominantly demolition rubble type material rather than domestic putrescible waste. The site-won contaminated material was described by Senversa (2018b) to comprise a mixture of black sandy gravel with quartz inclusions and dark brown to brown-yellow, silty to clayey sands with trace anthropogenic inclusions, including rare ACM, however, more ACM was identified during site development and placed over the central portion of the former NSW EPA regulated, landfill capped area. The secondary capping material placed over the site-won contaminated material comprises clay. The bulk fill used to raise the surface level to final design levels comprised mostly sandstone gravels and sandy soils.

Previous investigations (Senversa, 2018b and 2019c) concluded that groundwater flows in a north-westerly direction, towards Stringybark Creek and the Lane Cove River.

Surface water across the capped area is expected to flow overland down-gradient towards the northern and north-western boundaries. Surface water infiltration across this area is limited due to the clay capping present over the landfill materials. Off-site stormwater flow has been managed through the installation of underground stormwater pipes and infiltration trenches along the north-western boundary of the site.



5.0 Potential Risks to Human Health and the Environment

5.1 Material Remains Undisturbed (Under Management Controls)

The site in its current form poses a low risk of harm to human health and/or sensitive environmental receptors. The following table outlines the potential risk to human health and the environment if the contaminated material located within the capped area remains undisturbed.

Contaminant	Management Controls	Human Health Risks	Environmental Risks	Exposure Pathways
Landfill Materials				
Asbestos	Maintenance of capping as per Figure 4	Negligible	Negligible	Negligible
TRH >C10-C16	Maintenance of capping as per Figure 4	Negligible	Negligible	Negligible
Copper, Nickel and Zinc	Maintenance of capping as per Figure 4	Negligible	Negligible	Negligible
Site-won Contaminated Material				
Asbestos	Maintenance of capping as per Figure 4	Negligible	Negligible	Negligible
Copper, Nickel and Zinc	Maintenance of capping as per Figure 4	Negligible	Negligible	Negligible
Groundwater				
Arsenic, Copper, Nickel and Zinc	No abstraction of groundwater for purposes other than monitoring	Negligible	Copper, nickel and zinc concentrations exceeded the freshwater guidelines. However, these concentrations are considered likely related to natural background levels in the aquifer and therefore are not considered to pose an unacceptable environmental risk.	Human Exposure Pathways: Negligible Environmental Exposure Pathways: Migration into Lane Cove River and uptake by aquatic flora and fauna.
Ammonia	No abstraction of groundwater for purposes other than monitoring	Negligible	Ammonia slightly exceeded the freshwater guidelines. However, the toxicity of ammonia depends on the pH, temperature and ionic composition of the receiving surface water. Landfill material remains off-site to the north, therefore, ammonia migration from the site presents a low risk to the environment.	Human Exposure Pathways: Negligible Environmental Exposure Pathways: Migration into Lane Cove River and uptake by aquatic flora and fauna.



Contaminant	Management Controls	Human Health Risks	Environmental Risks	Exposure Pathways
Ground Gas				
Carbon Dioxide	Limited building footprint over landfill extent as per Figure 5 and floor slab constructed above the filled area on continuous flight auger piles. Monitoring for carbon dioxide during any intrusive works below 0.3 metres below ground level (m bgl).	Negligible	Negligible	Negligible

5.2 Material if Disturbed (Under No Management Controls)

If the management controls outlined in this LTEMP are not implemented, then the site may pose an unacceptable risk of harm to human health and/or sensitive environmental receptors. The following table outlines the potential risk to human health and the environment if the material is disturbed without proper management controls.

These risks may result from excavation works, installation of services, stockpiling of excavated materials and works that breach the geotextile marker if not undertaken in a controlled manner.

Contaminant	Disturbed	Human Health Risks	Environmental Risks	Exposure Pathways
Contaminated Soils				
Asbestos	Intrusive works such as excavation works, stockpiling of materials etc.	Asbestos fibres can cause asbestosis, lung cancer and mesothelioma.	Asbestos is inert within the environment and therefore poses no known environmental risk.	Human Exposure Pathways: Inhalation could occur through breathing in fibres in dust generated during soil disturbance activities. Environmental Exposure pathways: Nil
TRH >C10 – C16	Intrusive works such as excavation works, stockpiling of materials etc.	Negligible inhalation risk due to derived trigger value exceeding soil saturation criteria. Negligible direct contact/incidental ingestion risk due to on-site concentrations being two orders of magnitude below criteria for a commercial/industrial setting.	Concentrations of TRH >C10-C16 exceeded the ecological screening level (ESL) by less than one order of magnitude. These soils are not suitable as growing media without further investigation.	Human Exposure Pathways: Inhalation of vapours or contaminated dust / direct contact / incidental ingestion. Environmental Exposure pathways: Uptake by terrestrial flora and fauna and potential to leach into surface/groundwater.
Copper, Nickel and Zinc	Intrusive works such as excavation works, stockpiling of materials etc.	Negligible direct contact/incidental ingestion risk due to on-site concentrations being two to three orders of magnitude below criteria for a commercial/industrial setting.	Concentrations of these heavy metals exceeded the corresponding ESL by less than one order of magnitude. These soils are not suitable as growing media without further investigation.	Human Exposure Pathways: Direct contact / incidental ingestion. Environmental Exposure pathways: Uptake by terrestrial flora and fauna and potential to leach into surface/groundwater.



Contaminant	Disturbed	Human Health Risks	Environmental Risks	Exposure Pathways
Groundwater				
Arsenic, Copper, Nickel and Zinc	Groundwater abstracted or encountered during excavations.	Arsenic and nickel concentrations exceeded the drinking water criteria. However, concentrations of both contaminants were below the recreational criteria (10 x drinking water criteria), which is more likely to represent exposure scenarios under a commercial/industrial setting. Therefore, the potential health risks are low.	No change from if the material remains undisturbed.	<p>Human Exposure Pathways: Direct contact / incidental ingestion.</p> <p>Environmental Exposure Pathways: Migration into Stringybark Creek and Lane Cove River and uptake by aquatic flora and fauna.</p>
Ammonia	Groundwater abstracted or encountered during excavations.	Insufficient data to set a guideline value based on health considerations ³ and therefore potential health effects are low risk.	No change from if the material remains undisturbed.	<p>Human Exposure Pathways: Inhalation could occur through breathing in vapours from exposed groundwater or direct contact / incidental ingestion.</p> <p>Environmental Exposure Pathways: Migration into Stringybark Creek and Lane Cove River and uptake by aquatic flora and fauna.</p>
Ground Gas				
Carbon Dioxide	Intrusive works such as excavation works into former landfill materials	Health risks due to exposure to carbon dioxide are concentration dependent and, for the concentrations detected on-site, effects range from laboured breathing and headaches to unconsciousness. However, exposure in a commercial/industrial setting will likely involve some degree of atmospheric mixing within a trench, which will reduce concentrations. Elevated levels of carbon dioxide may also result in an oxygen deficient environment resulting in asphyxiation.	Carbon dioxide is a greenhouse gas and additional emissions will contribute to climate change.	<p>Human Exposure Pathways: Inhalation.</p> <p>Environmental Exposure Pathways: Emissions into the atmosphere.</p>

³ NHMRC, NRMCC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra. Version 3.5 updated August 2018.



6.0 Environmental Management Requirements

Prior to the commencement of works, it is the responsibility of the site owner and/or its nominated representative to determine if works will be undertaken within the capped area as illustrated on **Figure 3**.

6.1 Maintenance of Existing Environmental Management Controls

Remedial environmental measures to control the risk posed by contamination at the site have already been implemented. This primarily consisted of the initial capping material placed over the former landfill materials (i.e. the former NSW EPA regulated, landfill capped area) along with the secondary capping layer and bulk fill that has been placed over the site-won contaminated material that was placed over the initial capping material as illustrated on **Figure 4**.

Ongoing environmental management controls to be undertaken to minimise the risks posed by contamination at the site include:

- The integrity of the capping layer over the capped area must be maintained in the future, with the current thickness not to be reduced. Measures to protect the integrity of the capping include:
 - Maintenance of hardstand (road and building) over the southern portion of the capped area as shown in **Figure 5**. Any subsidence, cracks, potholes, degradation or similar should be recorded and rectification works should be carried out within one month of identification.
 - Maintenance of landscaping over the remainder of the capped area as shown on **Figure 6**. Any subsidence, erosion, thinning or dying of vegetation, or animal burrows should be recorded and rectification works should be carried out within one month of identification.
 - Revegetation within the capped area should be as per the landscape design indicated on **Figure 6**.
- Groundwater should not be abstracted from under the site for any purpose other than monitoring.
- Plans for future above-ground structures or buildings over the capped area should assess the risks posed by ground gas at the time of construction.
- Minor works, involving activities such as landscaping or replacement of surface coverings which do not penetrate the geotextile marker, should be undertaken in accordance with the requirements outlined in **Section 6.2** below.
- Where the geotextile marker is breached, an activity specific EMP, such as a CEMP, is to be prepared by a suitably qualified environmental consultant. Works should be undertaken in accordance with that plan and a suitably qualified environmental consultant should be engaged to manage, monitor and evaluate environmental controls implemented during site works.

6.2 Minor Works (No Disturbance of Contaminated Soils)

The following section relates to any minor works within the capped area that are **not** intending to breach the geotextile marker under the surface capping.

Requirements

- All site workers involved in undertaking intrusive works at the site must be informed of the areas where contaminated materials are contained beneath the geotextile marker and the depth of the contaminated materials.
- All works must be planned and carried out to avoid breaching the geotextile marker.



- A monitor capable of measuring carbon dioxide and oxygen concentrations should be used during any excavations in the capped area that is deeper than 0.3 mbgl.
- If imported fill is required to backfill any minor excavations above the geotextile marker or to raise the level of the cap where the integrity of the capping has been compromised, only certified 'Virgin Excavated Natural Material' (VENM) is to be imported for use.
- All due care must be taken to avoid breaching the geotextile marker; however, if the layer is impacted works are to cease, further access to the area is to be prevented and the site owner is to be contacted immediately.

6.3 Reporting Requirements

This LTEMP does not require regular inspections of the cap within the capped area or audits of compliance with the LTEMP. However, if non-conformances are observed, or WH&S or environmental incidents occur, or complaints are filed, then corrective actions must be undertaken within one month and a corrective action report provided to the site owner within 21 days of completion of works.

Report	Requirement
Material Classification Reports	<ul style="list-style-type: none"> • All reports relating to unexpected finds, offsite disposal of fill materials and importation of any materials used for construction/backfilling purposes are to be provided to the site owner upon completion of works. • Reports are to include details of laboratory analysis and subsequent classification information and materials tracking information detailing the total volume and final placement / disposal location.
Non-Conformance Reporting	<ul style="list-style-type: none"> • Non-conformances will be recorded in a Non-Conformance and Corrective Action Report. Details of the non-conformance, including any immediate corrective actions undertaken, are to be recorded by the operational staff. • It is the responsibility of the site owner to immediately initiate corrective actions, if required. Once completed, the site owner will provide details of the actions undertaken on the Non-Conformance Report and sign, date and file the report.
Incident Reporting	<ul style="list-style-type: none"> • Records will be kept of any environmental incidents, accidents, hazardous situations, unusual events and unsafe health exposures and the corrective action taken. • The contractor / site superintendent will adequately investigate the cause of any incident so that necessary changes in work practices can be made to prevent the incident recurring.
Complaints Reporting	<p>During works undertaken within the area illustrated within Figure 4, the contractor will maintain a register of complaints, which will include a record of any action taken with respect to the complaints.</p> <ul style="list-style-type: none"> • If a complaint identifies a non-conformance, a Non-Conformance and Corrective Action Report must be initiated. • A copy of all complaint reports and subsequent investigations are to be provided to the land custodian or their nominated representative for filing and included within compliance reporting (detailed below).
Corrective Action Reporting	<p>Upon completion of any maintenance within the specified area illustrated within Figure 4, the contractor is to provide the site owner a Corrective Action Report detailing the following:</p> <ul style="list-style-type: none"> • Details of any non-conformances, incidents or complaints. • Details of the works undertaken. • Details of management provisions in place to ensure compliance with this LTEMP. • Details of any modification to the existing ground surface. <p>The report is to be provided to site owner within 21 days of completion of works.</p>
Record Keeping	<p>All records related to implementation of the LTEMP should be maintained by the site owner in a consolidated and easily accessible location.</p>



7.0 Principles and Limitations of Investigation

The following principles are an integral part of site contamination assessment practices and are intended to be referred to when resolving any ambiguity or exercising such discretion as is accorded the user or site assessor.

Area	Principle and Limitation
Elimination of Uncertainty	Some uncertainty is inherent in all site investigations. Furthermore, any sample, either surface or subsurface, taken for chemical testing may or may not be representative of a larger population or area. Professional judgment and interpretation are inherent in the process, and even when exercised in accordance with objective scientific principles, uncertainty is inevitable. Additional assessment beyond that which was reasonably undertaken may reduce the uncertainty.
Failure to Detect	Even when site investigation work is executed competently and in accordance with the appropriate Australian guidance, such as the National Environment Protection (Assessment of Site Contamination) Amendment Measure ('the NEPM'), it must be recognised that certain conditions present especially difficult target analyte detection problems. Such conditions may include, but are not limited to, complex geological settings, unusual or generally poorly understood behaviour and fate characteristics of certain substances, complex, discontinuous, random, or heterogeneous distributions of existing target analytes, physical impediments to investigation imposed by the location of services, structures and other man-made objects, and the inherent limitations of assessment technologies.
Limitations of Information	The effectiveness of any site investigation may be compromised by limitations or defects in the information used to define the objectives and scope of the investigation, including inability to obtain information concerning historic site uses or prior site assessment activities despite the efforts of the user and assessor to obtain such information.
Chemical Analysis Error	Chemical testing methods have inherent uncertainties and limitations. Senversa routinely seeks to require the laboratory to report any potential or actual problems experienced, or non-routine events which may have occurred during the testing, so that such problems can be considered in evaluating the data.
Level of Assessment	The investigation herein should not be considered to be an exhaustive assessment of environmental conditions on a property. There is a point at which the effort required to obtain information is outweighed by the time required to obtain that information, and, in the context of private transactions and contractual responsibilities, may become a material detriment to the orderly conduct of business. If the presence of target analytes is confirmed on a property, the extent of further assessment is a function of the degree of confidence required and the degree of uncertainty acceptable in relation to the objectives of the assessment.
Comparison with Subsequent Inquiry	The justification and adequacy of the findings of this investigation in light of the findings of a subsequent inquiry should be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made.
Data Useability	Investigation data generally only represent the site conditions at the time the data were generated. Therefore, the usability of data collected as part of this investigation may have a finite lifetime depending on the application and use being made of the data. In all respects, a future reader of this report should evaluate whether previously generated data are appropriate for any subsequent use beyond the original purpose for which they were collected, or are otherwise subject to lifetime limits imposed by other laws, regulations or regulatory policies.
Nature of Advice	The investigation works herein are intended to develop and present sound, scientifically valid data concerning actual site conditions. Senversa does not seek or purport to provide legal or business advice.



8.0 References

- El Australia (2006). *Environmental Site Assessment, 1 Sirius Road, Lane Cove, NSW*. 3 July 2006. Environmental Investigations Australia Pty Ltd.
- National Environment Protection Council (NEPC) (1999). *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended May 2013, herein referred to as the ASC NEPM.
- NHMRC, NRMCC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra. Version 3.5 updated August 2018.
- NSW EPA (1995). *Sampling Design Guidelines*. Environmental Protection Authority, 1995.
- NSW EPA (2014) *Waste Classification Guidelines: Part 1: Classifying Waste*. Environment Protection Authority, November 2014.
- NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme (3rd edition)*. Environmental Protection Authority, 2017.
- NSW EPA (2020). *Consultants reporting on contaminated land, Contaminated Land Guidelines*.
- Senversa (Senversa, 2018a). *Phase 1 Due Diligence Assessment, 1 Sirius Road, Lane Cove West, NSW*. 18 October 2018.
- Senversa (2018b). *Phase 2 Acquisition Environmental Due Diligence Assessment, 1 Sirius Road, Lane Cove West, NSW*. 13 December 2018.
- Senversa (2019a). *Re: Groundwater Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.
- Senversa (2019b). *Re: Landfill Gas Monitoring Report, 1 Sirius Road, Lane Cove West, NSW*. 17 July 2019.
- Senversa (2019c). *Remedial Action Plan, 1 Sirius Road, Lane Cove West, NSW*. 14 August 2019.
- Senversa (2019d). *Sampling and Analytical Quality Plan – Site Validation Works, 1 Sirius Road, Lane Cove West, NSW*. 31 October 2019.
- Senversa (2020). *Remedial Validation Report, 1 Sirius Road, Lane Cove West, NSW*. In production.



Appendix A: Maintenance of Remediation Notice

Environment Protection Authority

Maintenance of remediation notice

Section 28 of the Contaminated Land Management Act 1997

REGISTERED MAIL

Demian Developments Pty Ltd
2/24 Carnarvon Street
SILVERWATER NSW 2264

A.C.N. 87 082 158 003

Notice Number: 28027
Area # 3039

Date: 27 September 2005

Demian Developments (the "recipient") must maintain remediation action in accordance with the requirements set out in this notice.

This notice is issued under section 28 of the Contaminated Land Management Act 1997 ("the Act").

1. Land to which this notice applies ("the land")

This notice applies to the land located at Sirius Road, Lane Cove, NSW, being part of Lot 2, DP 884454 (formerly part of Lot 1, DP 546860) as shown on the attached survey plan P18495 of the former Lot 1 DP 546860, and currently owned by Demian Developments.

2. Commencement of maintenance of remediation

This Notice takes effect on **1 October 2005** and continues in force until it is otherwise varied or revoked.

3. Maintenance requirements

The Environment Protection Authority (EPA) requires the recipient to maintain the following remediation action in relation to the land:

- (a) The recipient must obtain the prior written approval of the EPA to any works that are to be carried out on the land, whether or not the works are carried out by the recipient, for the purposes of:
 - (i) Covering, dispersing or reducing the contamination of the land; or
 - (ii) Restoring or rehabilitating the land; or
 - (iii) Removing or disposing of any soil, sand, rock, water, or any other solid or liquid material of any kind from the land; and
- (b) The recipient must maintain the land in a manner that maintains the integrity and impermeability of the clay capping which is on the land, including selection of vegetation with root systems that do not grow into the clay capping layer; and
- (c) The recipient must not undertake any work, or cause, permit or allow the undertaking of any work which would result in any disturbance to, or modification of the clay capping layer unless the prior written approval of the undertaking has been obtained from the EPA and the work is undertaken in accordance with any conditions of that approval.

4. Notification of change of owner/occupier

At least 30 days prior to the recipient selling, transferring, leasing or otherwise relinquishing ownership or occupation of the land or any part of the land, the recipient must give written notification of this to the EPA and of the name and contract details of the prospective owner or occupier.

Signed

ELVIN WONG
Acting Director Contaminated Sites
Department of Environment and Conservation
(by Delegation)

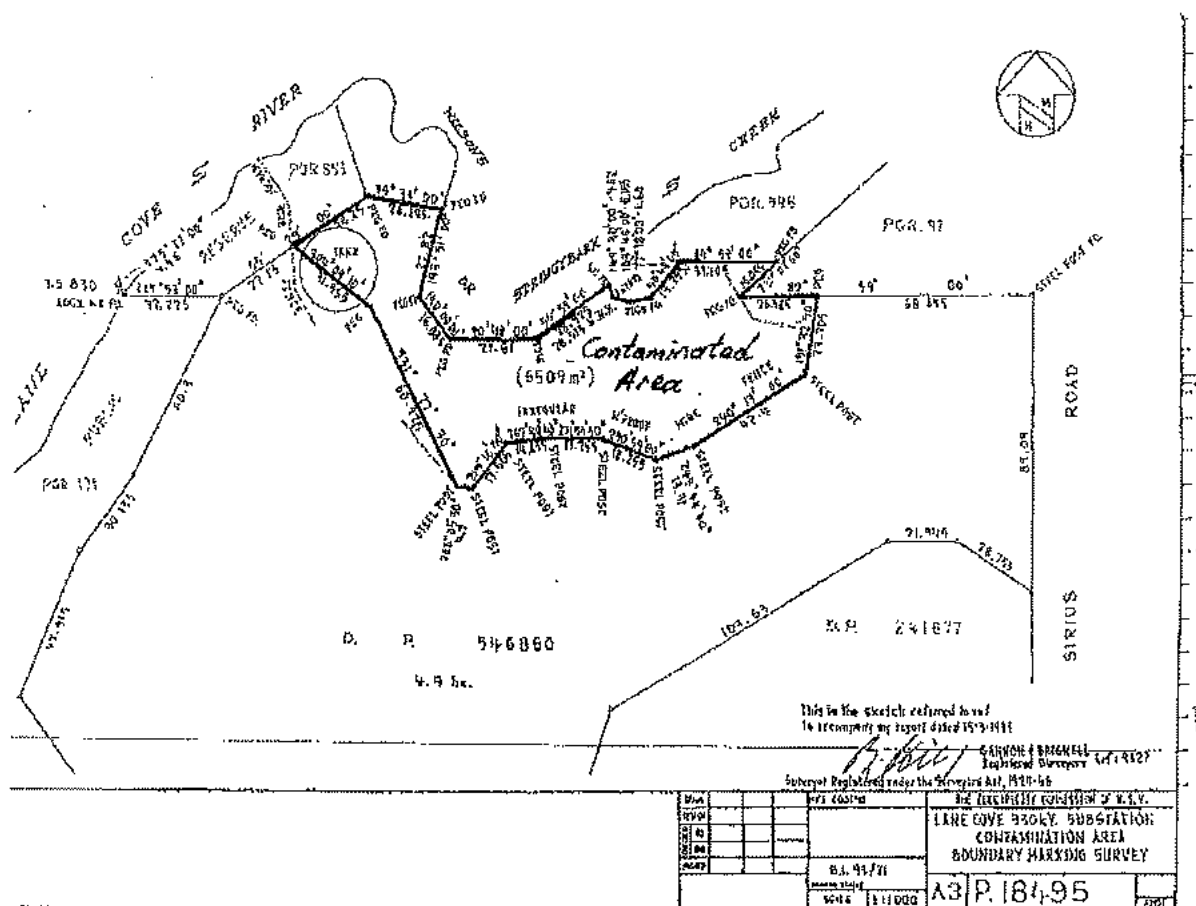
NOTE:

Breaches of this Notice

A person who fails to comply with a notice issued under section 28 of the Act is guilty of an offence. Heavy penalties may be imposed where a person fails to comply with directions given in a notice issued under section 28 of the Act.

Information recorded by EPA

Section 58 of the Contaminated Land Management Act 1997 and clause 6 of the Contaminated Land Management Regulation 1998 requires the EPA to maintain a public record. A copy of this notice will be included in the public record.





Figures

Figure 1: Site Location

Figure 2: Site Layout

Figure 3: Capped Area Details

Figure 3a: Surveyed Top of Site-Won Contaminated Materials

Figure 3b: Surveyed Top of Capping and Bulk Fill Material across Area containing Site-Won Contaminated Materials

Figure 4: Capped Area Profile Through Area with Site-Won Contaminated Materials

Figure 5: Site Development/Final Design

Figure 6a: Design for Planting across the Site

Figure 6b: Landscaping and Irrigation Network Details

Path: S:\01_Jobs\1.NSW_Jobs\16913_AIRTRUNK SIRIUS LANE COVE_DSIMXD01.Wor\16913_030_F002_Site Layout.mxd



Notes:
Aerial imagery (01/08/2020) sourced from Nearmap Pty Ltd
Capped area georeferenced from Geoscapes Landscape Architects, Drawing No. LAN-001.10,
Top Soil Capping Requirements, provided by client



Address: Level 5, 201 Kent Street,
Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

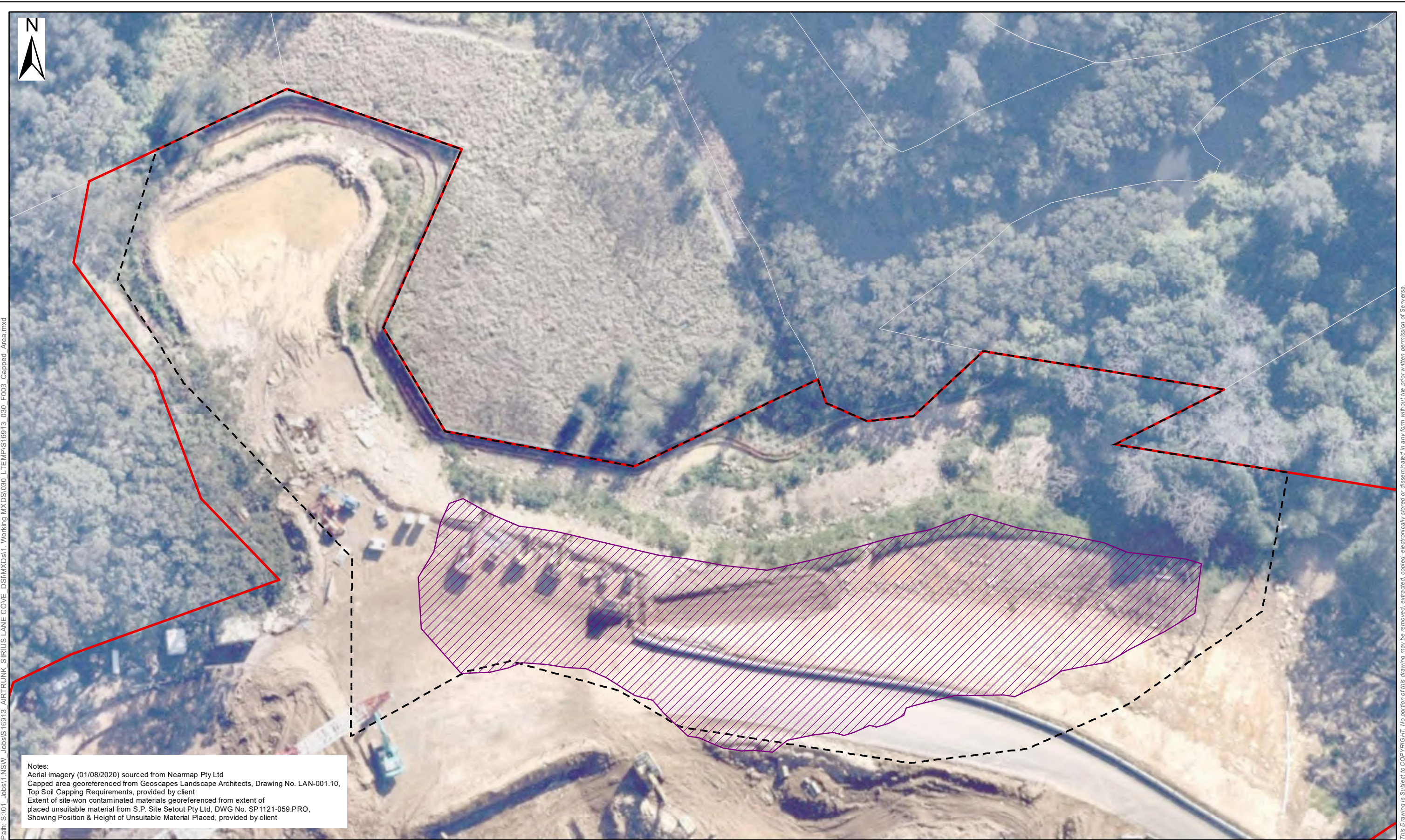
Legend

- Capped Area
- Site Boundary
- Lot Boundary

Designed:	N. Lukeman	Date:	8/11/2020
Drawn:	M. Sari	Revision:	0
Checked:	E. Walsh	Scale:	1:1,250 (A3)
File:	S16913_030_F002_Site_Layout		
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Figure No:	2
Title:	Site Layout
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd

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Path: S:\01_Jobs\1 NSW_Jobs\1 SIRIUS LANE COVE_DSIMXD\01 Working MXDS\030_LTEMP\S16913_030_F003_Capped_Area.mxd

Notes:
Aerial imagery (01/08/2020) sourced from Nearmap Pty Ltd
Capped area georeferenced from Geoscapes Landscape Architects, Drawing No. LAN-001.10, Top Soil Capping Requirements, provided by client
Extent of site-won contaminated materials georeferenced from extent of placed unsuitable material from S.P. Site Setout Pty Ltd, DWG No. SP1121-059.PRO, Showing Position & Height of Unsuitable Material Placed, provided by client

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Address: Level 5, 201 Kent Street,
Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Legend

- Capped Area
- Area Containing Site-Won Contaminated Materials
- Site Boundary
- Lot Boundary

Designed:	N. Lukeman	Date:	8/11/2020
Drawn:	M. Sari	Revision:	0
Checked:	E. Walsh	Scale:	1:500 (A3)
File:	S16913_030_F003_Capped_Area		
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Figure No:	3
Title:	Capped Area Details
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd

Path: S:\01_NSW_Jobs\16913_AIRTRUNK_SIRIUS LANE COVE_DSIMXD\01_Working MXDS\030_LTE\SPS16913_030_F003a_Impacted_Material.mxd



Notes:
Aerial imagery (01/08/2020) sourced from Nearmap Pty Ltd
Capped area georeferenced from Geoscapes Landscape Architects, Drawing No. LAN-001.10,
Top Soil Capping Requirements, provided by client
Extent of site-won contaminated materials georeferenced from extent of placed unsuitable material,
and survey values also obtained from, S.P. Site Setout Pty Ltd, DWG No. SP1121-059.PRO,
Showing Position & Height of Unsuitable Material Placed, provided by client



Address: Level 5, 201 Kent Street,
Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

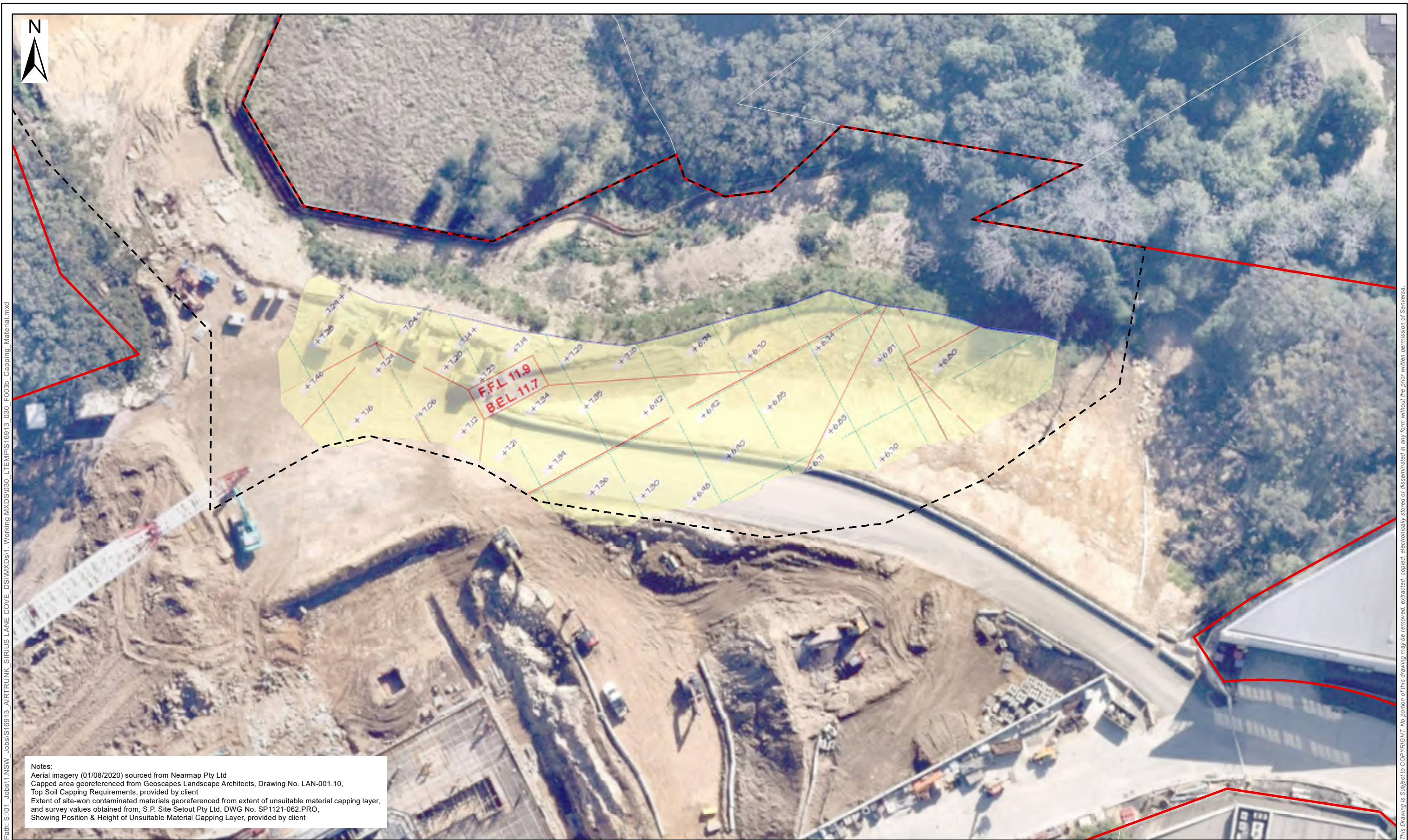
Legend

- Capped Area
- Area Containing Site-Won Contaminated Materials
- Site Boundary
- Lot Boundary

Designed:	N. Lukeman	Date:	8/11/2020
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File:	S16913_030_F003a_Impacted_Material		
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Figure No:	3a
Title:	Surveyed Top of Site-Won Contaminated Materials
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd

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Address: Level 5, 201 Kent Street,
Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Legend

- Capped Area
- Area Containing Site-Won Contaminated Materials
- Site Boundary
- Lot Boundary

Notes:

Aerial imagery (01/08/2020) sourced from Nearmap Pty Ltd
Capping material georeferenced from SP1121_062_LOCATION_AND_LEVEL_OF_UNSUITABLE_CAPPING_LAYER.pdf provided by client

Designed: N. Lukeman

Date: 8/11/2020

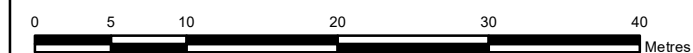
Drawn: M. Sari

Revision: 0

Checked: E. Walsh

Scale: 1:500 (A3)

File: S16913_030_F003b_Capping_Material



Datum GDA 1994, Projection MGA Zone 56

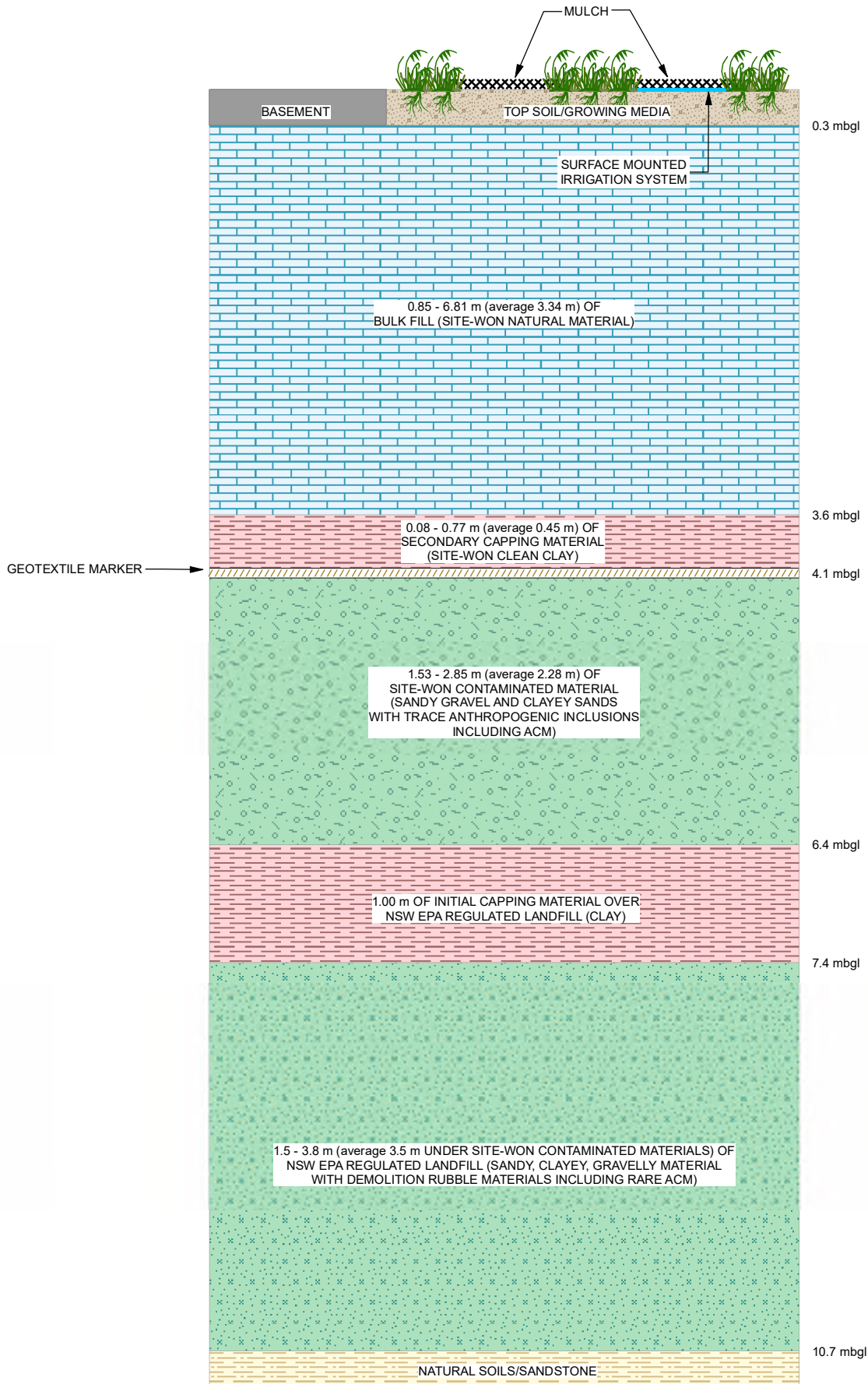
Figure No: 3b

Title: **Surveyed Top of Capping and Bulk Fill Material across
Area containing Site-Won Contaminated Materials**

Project: Long Term Environmental Management Plan

Location: 1 Sirius Road, Lane Cove West

Client: AirTrunk Pty Ltd



Notes:

Minimum, maximum and average thicknesses of bulk fill (bulk design), secondary capping material (unsuitable capping), site-won contaminated material (unsuitable) and initial capping material (capping) calculated from survey points on S.P. Site Setout Pty Ltd, DWG No. SP1121-159-PRO, Showing Sections Through Unsuitable Material, provided by client

Minimum, maximum and average thickness of NSW EPA regulated landfill under site-won contaminated materials calculated from test pit observations in Appendix B of Senversa, 2018b

Designed:	E. Walsh	Date:	8/11/2020
Drawn:	M. Sari	Revision:	0
Checked:	E. Walsh	Scale:	(A3)
File:	S16913_030_F004_Profile		

Figure No:	4
Title:	Capped Area Profile Through Area with Site-Won Contaminated Materials
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd



ROADWAY CONSTRUCTED ABOVE SECONDARY CAPPING LAYER
AND BULK FILL ACROSS LTEMP REGULATED CAPPED AREA

FIRE TRAIL

FINISHED FLOOR LEVEL OF BASEMENT CONSTRUCTED
ABOVE SECONDARY CAPPING LAYER AND BULK FILL
ACROSS LTEMP REGULATED CAPPED AREA

BUILDING FOOTPRINT

Notes:
Aerial imagery (01/08/2020) sourced from Nearmap Pty Ltd
Capped area, security fence, bush regeneration area, landscape area
(proposed workers amenity area) georeferenced from
Geoscapes Landscape Architects, Drawing No. LAN-001.10,
Top Soil Capping Requirements, provided by client

Legend

- 2.4 m High Palisade Security Fence
- Bush Regeneration Area
- Landscape Area
- Capped Area
- Site Boundary
- Lot Boundary



Address: Level 5, 201 Kent Street,
Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Designed:	N. Lukeman	Date:	8/11/2020
Drawn:	M. Sari	Revision:	0
Checked:	E. Walsh	Scale:	1:1,200 (A3)
File:	S16913_030_F005_Final_Design		
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Figure No:	5
Title:	Site Development/Final Design
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd

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02

PLANTING AREAS ACCORDING TO VMP
SCALE 1:1000

LEGEND

- APV PLANTING AS PER BUSHING REPORT BY TRIVERS ECOLOGY.
- SWAMP BAY FLOODPLAIN FOREST CONTAMINATED LAND PLANTING AS PER BUSHING REPORT BY TRIVERS ECOLOGY.
- SMOOTH-BARKED APPLE - RED BLOODWOOD OPEN FOREST PLANTING AS PER BUSHING REPORT BY TRIVERS ECOLOGY.
- MACROPHYT PLANTING AS PER VMP REPORT BY TRIVERS ECOLOGY.
- EXTENT OF EXISTING ROCK FACE REFER TO ENVS DMC.
- APV PLANTING WITHIN SECURITY SETBACK ZONE.
- ESTIMATED EXTENT OF EXISTING ROCK FACE.
- AREA OF CONTAMINATED LAND.
- PROPOSED WORKER'S AVENUE AREA 10% OF THE TOTAL SITE AREA REQUIRED AS WORKER'S AVENUE.
- 10M BUFFER ZONE SETBACK.
- EXISTING BUSH REGROWTH AREA REFER TO VMP PREPARED BY TRIVERS ECOLOGY.
- FIRE TRAIL REFER TO ARCHITECTURAL DRAWINGS.
- EXTENT OF ASSET PROTECTION ZONE (APV BOUNDARY) REFER TO VMP PREPARED BY TRIVERS ECOLOGY.

PROPOSED APV PLANTING						
CODE	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	SIZE	PLANTING DENSITY	QTY*
Canopy trees						
ANG COS	<i>Angophora costata</i>	Sydney Red Gum	20m	AS PER VMP	As Shown	2
COR CUM	<i>Corymbia gummifera</i>	Red Bloodwood	30m	AS PER VMP	As Shown	3
EUC RES	<i>Eucalyptus resinifera</i>	Red Mahogany	25m	AS PER VMP	As Shown	1
EUC PEP	<i>Eucalyptus piperita</i>	Sydney peppermint	20m	AS PER VMP	As Shown	2
CYN DUC	<i>Syncarpia glomulifera</i>	Turpentine tree	25m	AS PER VMP	As Shown	1
Sub-canopy trees						
ACA PAR	<i>Acacia parramattensis</i>	Parramatta Wattle	12m	AS PER VMP	As Shown	2
ALL LIT	<i>Allocasuarina littoralis</i>	Black Sheak	10m	AS PER VMP	As Shown	3
ELA RET	<i>Elaeagnus reticulata</i>	Blueberry Ash	8m	AS PER VMP	As Shown	14
NEI LIN	<i>Abelara linearifolia</i>	Snow in Summer	8m	AS PER VMP	As Shown	2
Shrubs 1 per 25m2						
ACA FL	<i>Acacia floribunda</i>	Sally Wattle	6m	AS PER VMP	As Shown	23
BRE GBT	<i>Bryonia albigloba</i>	Carrot Bush	6m	AS PER VMP	As Shown	23
BUR SPI	<i>Bursaria spinosa subsp. spinosa</i>	Blackthorn	6m	AS PER VMP	As Shown	50
DOO BI	<i>Sedunaea biquetria</i>	Common Hop Bush	2m	AS PER VMP	As Shown	26
KUN ANB	<i>Kunzea ambigua</i>	Tick Bush	2m	AS PER VMP	As Shown	26
MEI THY	<i>Abelara thymifolia</i>	Thyme Honey myrtle	2m	AS PER VMP	As Shown	14
TRF TAM	<i>Thymus tamensis</i>	Native peach	2m	AS PER VMP	As Shown	22
Groundcovers 3 per 1m2						
CEN ASI	<i>Centella asiatica</i>	Asiatic pennywort	0.2m	AS PER VMP	As per VMP	2191
COM CYA	<i>Commelina cyanea</i>	Scoury weed	1m	AS PER VMP	As per VMP	1294
DIA CAS	<i>Dianella caerulea</i>	Blue flax Lily	0.5m	AS PER VMP	As per VMP	355
DIP VAR	<i>Dipodium variegatum</i>	Blotched hyacinth orchid	1m	AS PER VMP	As per VMP	1294
EDH CAS	<i>Echloa caespitosa</i>	Noddying Grass	0.75m	AS PER VMP	As per VMP	1294
ENT MAR	<i>Entolasia marginata</i>	Panic Grass	0.3m	AS PER VMP	As per VMP	2191
ENT STR	<i>Entolasia stricta</i>	Right angled grass	0.8m	AS PER VMP	As per VMP	2191
IMP CYL	<i>Imperata cylindrica</i>	Cogon grass	0.8m	AS PER VMP	As per VMP	2191
JUN ASI	<i>Juniperus ascaris</i>	Common Rush	0.6m	AS PER VMP	As per VMP	1540
LOM LIN	<i>Lomandra linearifolia</i>	Spiny head Mat rush	0.8m	AS PER VMP	As per VMP	355
MIC STI	<i>Microstema stipoides</i>	Weeping Grass	0.8m	AS PER VMP	As per VMP	2191
OPL ANN	<i>Opilomenes annalis</i>	Bucket grass	0.3m	AS PER VMP	As per VMP	1294
OPL IND	<i>Opilomenes indicus</i>	Bucket grass	0.3m	AS PER VMP	As per VMP	1294
THE BI	<i>Themeda triandra</i>	Kangaroo Grass	0.3m	AS PER VMP	As per VMP	2300

SMOOTH-BARKED APPLE - RED BLOODWOOD OPEN FOREST						
CODE	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	SIZE	PLANTING DENSITY	QTY*
Canopy trees						
ANG COS	<i>Angophora costata</i>	Sydney Red Gum	20m	AS PER VMP	As Shown	8
COR CUM	<i>Corymbia gummifera</i>	Red Bloodwood	30m	AS PER VMP	As Shown	6
EUC RES	<i>Eucalyptus resinifera</i>	Red Mahogany	25m	AS PER VMP	As Shown	5
CYN DUC	<i>Syncarpia glomulifera</i>	Turpentine tree	25m	AS PER VMP	As Shown	6
Sub-canopy trees						
ACA PAR	<i>Acacia parramattensis</i>	Parramatta Wattle	12m	AS PER VMP	As Shown	2
ALL LIT	<i>Allocasuarina littoralis</i>	Black Sheak	10m	AS PER VMP	As Shown	4
ELA RET	<i>Elaeagnus reticulata</i>	Blueberry Ash	8m	AS PER VMP	As Shown	19
NEI LIN	<i>Abelara linearifolia</i>	Snow in Summer	8m	AS PER VMP	As Shown	16
Shrubs 1 per 5m2						
ACA FL	<i>Acacia floribunda</i>	White Wattle	5m	AS PER VMP	As Shown	21
ACA LIN	<i>Acacia longifolia</i>	Sydney golden wattle	8m	AS PER VMP	As Shown	21
BRE GBT	<i>Bryonia albigloba</i>	Carrot Bush	6m	AS PER VMP	As Shown	21
DOO BI	<i>Sedunaea biquetria</i>	Common Hop Bush	2m	AS PER VMP	As Shown	21
GRE LEX	<i>Grevillea leucophylla</i>	Grey spider flower	2m	AS PER VMP	As Shown	21
GRE WAT	<i>Grevillea watsonii</i>	Silky Grevillea	2m	AS PER VMP	As Shown	21
KUN ANB	<i>Kunzea ambigua</i>	Tick Bush	3m	AS PER VMP	As Shown	21
LIP BI	<i>Lepidospermum bivalvium</i>	Pagodar Oak	2m	AS PER VMP	As Shown	21
LIP POL	<i>Lepidospermum polycarpum</i>	Carrot	3m	AS PER VMP	As Shown	21
ODD DIA	<i>Ocotea discolor</i>	Rice flower	2m	AS PER VMP	As Shown	21
PER PIN	<i>Persea pinifolia</i>	Pine Island Grahame	3m	AS PER VMP	As Shown	21
PER LIN	<i>Persea linearis</i>	Narrow Island Grahame	5m	AS PER VMP	As Shown	21
WOO PAN	<i>Woodwardia pumila</i>	Snow Wreath	3m	AS PER VMP	As Shown	21
TR PL	<i>Trichomanes pilula</i>	Moist Star	1.5m	AS PER VMP	As Shown	21
Groundcovers 4 per 1m2						
ARI VAG	<i>Arctostaphylos vagans</i>	Thicket spurge	0.80m	AS PER VMP	As per VMP	461
AUS PUB	<i>Austrobaileya pubescens</i>	Spargan	1.0m	AS PER VMP	As per VMP	461
BLI CAR	<i>Blechnum carolinianum</i>	Grass fern	1.0m	AS PER VMP	As per VMP	461
CEN ASI	<i>Centella asiatica</i>	Asiatic pennywort	0.2m	AS PER VMP	As per VMP	461
DIA CAS	<i>Dianella caerulea</i>	Blue flax Lily	0.5m	AS PER VMP	As per VMP	461
DIP VAR	<i>Dipodium variegatum</i>	Blotched hyacinth orchid	1.0m	AS PER VMP	As per VMP	461
ENT STR	<i>Entolasia stricta</i>	Right angled grass	0.8m	AS PER VMP	As per VMP	461
IMP CYL	<i>Imperata cylindrica</i>	Cogon grass	0.8m	AS PER VMP	As per VMP	461
LOM LIN	<i>Lomandra linearifolia</i>	Spiny head Mat rush	0.8m	AS PER VMP	As per VMP	461
MIC STI	<i>Microstema stipoides</i>	Weeping Grass	0.8m	AS PER VMP	As per VMP	461
OPL ANN	<i>Opilomenes annalis</i>	Bucket grass	0.3m	AS PER VMP	As per VMP	461
OPL IND	<i>Opilomenes indicus</i>	Bucket grass	0.3m	AS PER VMP	As per VMP	461
THE BI	<i>Themeda triandra</i>	Kangaroo Grass	0.3m	AS PER VMP	As per VMP	461

MACROPHYT PLANTING						
CODE	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	SIZE	PLANTING DENSITY	QTY*
Groundcovers 5 per 1m2						
BAL TAT	<i>Balanites tomentosa</i>	Forest Cord Bush	1.5m	As per VMP	As per VMP	262
CAR APP	<i>Carex appressa</i>	Tall Sedge	1.2m	As per VMP	As per VMP	262
DIA CAS	<i>Dianella caerulea</i>	Blue flax Lily	0.5m	As per VMP	As per VMP	262
FCI END	<i>Ficinia endonea</i>	Knobby clad rush	0.8m	As per VMP	As per VMP	262
GAM GLE	<i>Gabonella glabra</i>	Red-fruit Saw sedge	1.5m	As per VMP	As per VMP	262
JUN LRA	<i>Juniperus lra</i>	Scar Bush	1m	As per VMP	As per VMP	262
JUN ASI	<i>Juniperus ascaris</i>	Common Rush	0.6m	As per VMP	As per VMP	262
LOM LIN	<i>Lomandra linearifolia</i>	Mat Rush	0.8m	As per VMP	As per VMP	262
PHI LIN	<i>Phyllocladus imbricatus</i>	Woody Fringe Heath	0.3m	As per VMP	As per VMP	262

SWAMP BAY FLOODPLAIN FOREST						
CODE	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	SIZE	PLANTING DENSITY	QTY*
Shrubs 1 per 3m2						
BRE GBT	<i>Bryonia albigloba</i>	Carrot Bush	6m	AS PER VMP	As Shown	106
BUR SPI	<i>Bursaria spinosa subsp. spinosa</i>	Blackthorn	3m	AS PER VMP	As Shown	106
DOO BI	<i>Sedunaea biquetria</i>	Common Hop Bush	5m	AS PER VMP	As Shown	106
MEI THY	<i>Abelara thymifolia</i>	Thyme Honey myrtle	2m	AS PER VMP	As Shown	106
TRF TAM	<i>Thymus tamensis</i>	Native peach	1.5m	AS PER VMP	As Shown	106
Groundcovers 6 per 1m2						
ARI VAG	<i>Arctostaphylos vagans</i>	Thicket spurge	0.80m	AS PER VMP	As per VMP	941
AUS PUB	<i>Austrobaileya pubescens</i>	Spargan	1.0m	AS PER VMP	As per VMP	941
BLI CAR	<i>Blechnum carolinianum</i>	Grass fern	1.0m	AS PER VMP	As per VMP	941
CEN ASI	<i>Centella asiatica</i>	Asiatic pennywort	0.2m	AS PER VMP	As per VMP	941
COM CYA	<i>Commelina cyanea</i>	Scoury weed	1m	AS PER VMP	As per VMP	941
DIA CAS	<i>Dianella caerulea</i>	Blue flax Lily	0.5m	AS PER VMP	As per VMP	941
DIP VAR	<i>Dipodium variegatum</i>	Blotched hyacinth orchid	0.8m	AS PER VMP	As per VMP	941
ENT MAR	<i>Entolasia marginata</i>	Panic Grass	0.6m	AS PER VMP	As per VMP	941
FCI END	<i>Ficinia endonea</i>	Knobby clad rush	0.8m	AS PER VMP	As per VMP	941
GAM GLE	<i>Gabonella glabra</i>	Tall Saw sedge	0.8m	AS PER VMP	As per VMP	941
IMP CYL	<i>Imperata cylindrica</i>	Cogon grass	0.8m	AS PER VMP	As per VMP	941
JUN ASI	<i>Juniperus ascaris</i>	Common Rush	0.6m	AS PER VMP	As per VMP	941
LOM LIN	<i>Lomandra linearifolia</i>	Spiny head Mat rush	0.8m	AS PER VMP	As per VMP	941
MIC STI	<i>Microstema stipoides</i>	Weeping Grass	0.8m	AS PER VMP	As per VMP	941
OPL IND	<i>Opilomenes indicus</i>	Bucket grass	0.3m	AS PER VMP	As per VMP	941
THE BI	<i>Themeda triandra</i>	Kangaroo Grass	0.3m	AS PER VMP	As per VMP	941

PROJECT NO: 16913_030_F006a		DATE: 8/11/2020	
DRAWN BY: M. Sari		REVISION: 0	
CHECKED BY: E. Walsh		SCALE: 1:2,500 (A3)	
FILE: S16913_030_F006a_Planting_Design			
Datum GDA 1994, Projection MGA Zone 56			

PROJECT NO: 16913_030_F006a		DATE: 8/11/2020	
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CHECKED BY: E. Walsh		SCALE: 1:2,500 (A3)	
FILE: S16913_030_F006a_Planting_Design			
Datum GDA 1994, Projection MGA Zone 56			

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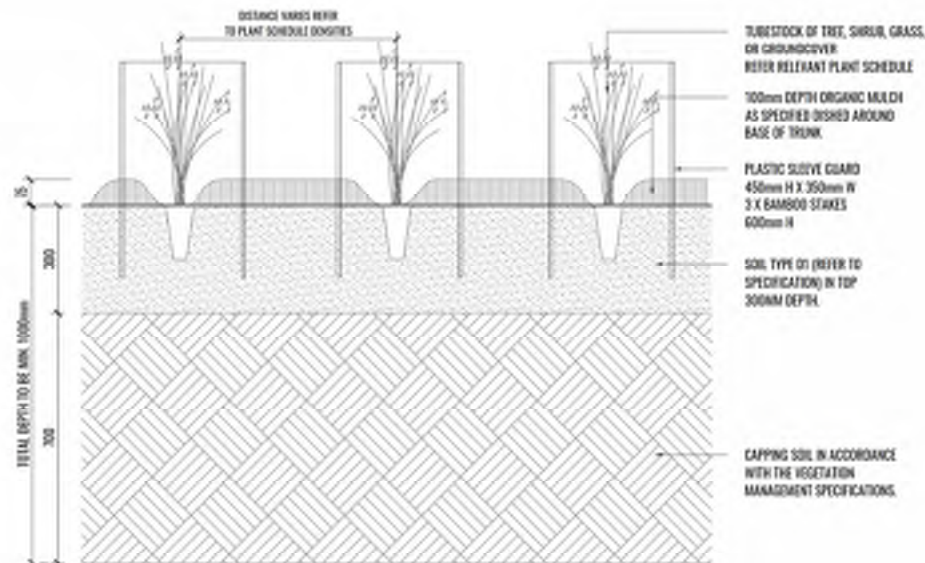
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FILE: S16913_030_F006a_Planting_Design			
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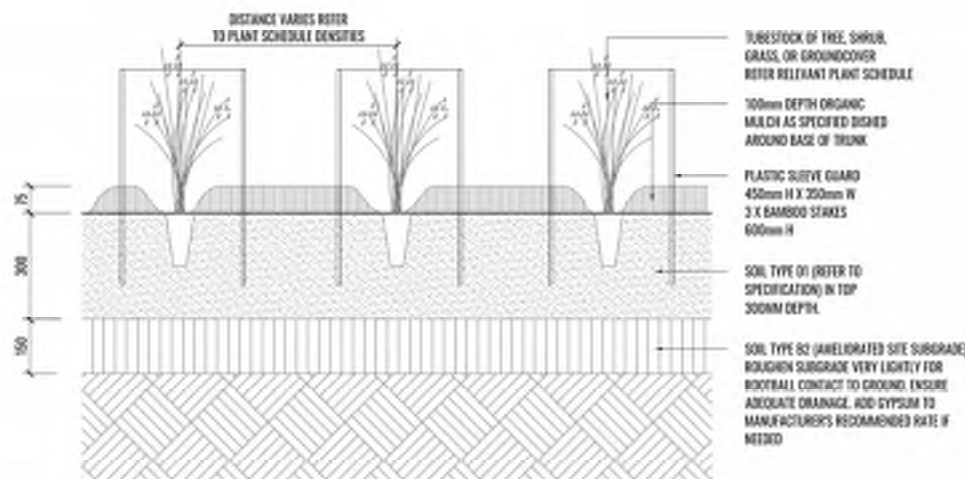
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CHECKED BY: E. Walsh		SCALE: 1:2,500 (A3)	
FILE: S16913_030_F006a_Planting_Design			
Datum GDA 1994, Projection MGA Zone 56			

PROJECT NO: 16913_030_F006a		DATE: 8/11/2020	
DRAWN BY: M. Sari		REVISION: 0	
CHECKED BY: E. Walsh		SCALE: 1:2,500 (A3)	
FILE: S16913_030_F006a_Plant			



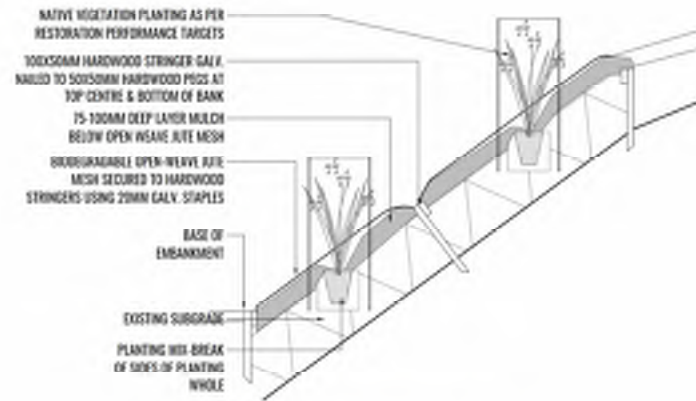
NOTE: ALL REVEGETATION PLANTING MUST BE IN ACCORDANCE WITH THE VEGETATION MANAGEMENT SPECIFICATIONS AS PREPARED BY TRAVERS ECOLOGY
REFER TO DOCUMENT REF: TRAVERS IN REVEG AREAS STEEPER THAN 1:4 EROSION CONTROL MATTING SHOULD BE USED WITHOUT MULCH

01 SECTION TYPICAL TUBESTOCK REVEGETATION PLANTING DETAIL IN CONTAMINATED AREAS
SCALE 1:10

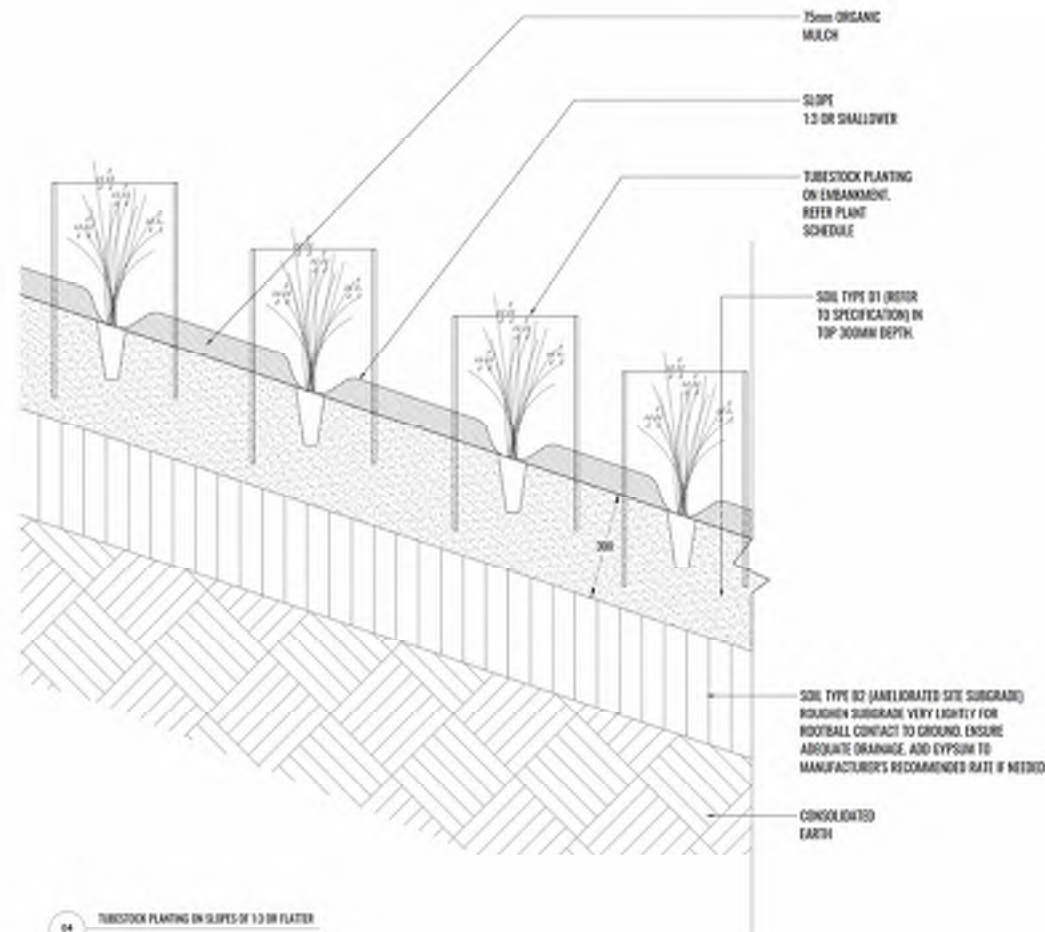


NOTE: ALL REVEGETATION PLANTING MUST BE IN ACCORDANCE WITH THE VEGETATION MANAGEMENT SPECIFICATIONS AS PREPARED BY TRAVERS ECOLOGY
REFER TO DOCUMENT REF: TRAVERS IN REVEG AREAS STEEPER THAN 1:4 EROSION CONTROL MATTING SHOULD BE USED WITHOUT MULCH

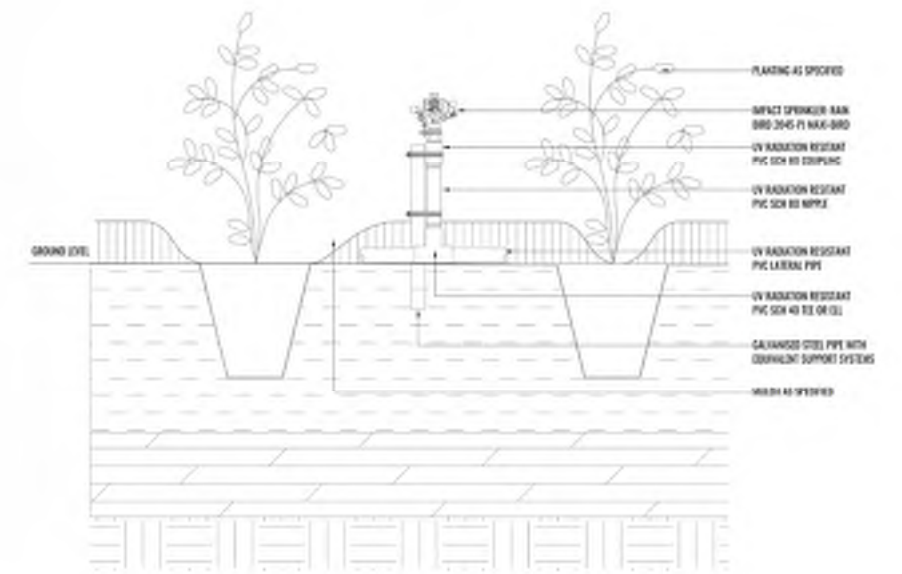
02 SECTION TYPICAL TUBESTOCK REVEGETATION PLANTING DETAIL IN NON-CONTAMINATED AREAS
SCALE 1:10



03 TYPICAL REPAIR BANK STABILISATION DETAIL NORMALLY FOR SLOPE OF 1 IN 2
SCALE 1:10



04 TUBESTOCK PLANTING ON SLOPES OF 1:3 OR FLATTER
SCALE 1:10



05 FULL OR PART-CIRCLE IMPACT SPRINKLER: 2045-PJ MAXI-BIRD ON GRADE DETAIL
SCALE 1:5



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Notes:
Images copied directly from Geoscapes Landscape Architects,
Drawing No.s LAN-401.08, Irrigation Specifications and Details,
and LAN-601.10, Landscape Details 1, provided by client

Designed:	N. Lukeman	Date:	8/11/2020
Drawn:	M. Sari	Revision:	0
Checked:	E. Walsh	Scale:	(A3)
File:	S16913_030_F006b_Landscaping_Details		

Figure No:	6b
Title:	Landscaping and Irrigation Network Details
Project:	Long Term Environmental Management Plan
Location:	1 Sirius Road, Lane Cove West
Client:	AirTrunk Pty Ltd



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