

Appendix 8

Remedial Action Plan

City of Canada Bay **Remedial Action Plan** Timbrell Park, Five Dock, NSW

Purpose:

Detail required remedial action in consideration of the known contamination at the site in order to render the Timbrell Park development suitable.

Prepared for:

City of Canada Bay Council

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1. INTRODUCTION

EDP Consultants Pty Ltd (EDP) was engaged by City of Canada Bay Council (Council) to prepare a Remedial Action Plan (RAP) to manage the risks associated with the known asbestos, PAH and heavy metal contamination located within areas of Timbrell Park, Five Dock (the site), which will be encountered during development works. The proposed development works are part of Council's plan to upgrade an area of the park which is subject to with drainage issues and also requires upgrades to the sportsfield lighting.

The location of the site is shown on **Figure A1** provided in **Appendix A**. The proposed development area is shown in **Figure A2** in **Appendix A**.

2. BACKGROUND

The Timbrell Park Sportsfield Upgrade (TPSU) works will involve elevating the height of the sports field for the installation of an improved drainage and irrigation system, reprofiling of the site and improved playing surfaces.

EDP understand that the site may have been historically prone to fly tipping as well as historical Council records from 1949 indicating filling of the site with ash material sourced from Pymont Power Station also occurred. The site has appeared to remain relatively unchanged and used as a public reserve since the later 1950's. It is presumed that at this time the park was informally capped and transformed into a grassed sports field.

The TPSU will require planning approval, and a review of environmental factors (REF) is currently being prepared. Refer to the concept plans provided in **Appendix B** for detailed plans of the redevelopment design.

3. OBJECTIVES

The RAP was prepared to provide remediation and validation methodologies for contaminated soils at the site, in order to render the redevelopment footprint suitable for the proposed use as a public open space. The objectives of the RAP were to:

- Document the procedures and standards to be followed in order to manage any risk posed by soil contamination identified at the site;
- Outline the remedial and validation strategy to ensure the development footprint area is remediated (where required) to a satisfactory standard considering the proposed use as a public open space; and
- Outline a contingency plan to address issues which may arise during the preferred remedial scope.

4. SCOPE

4.1 General

To achieve the objectives, the RAP has been designed to:

- Provide a plan of remediation for the site to remove the unacceptable risk that contaminated soils pose to human and ecological health;
- Establish remediation acceptance criteria (RAC) appropriate for the intended ongoing use of the site in the context of the identified contamination;
- Detail an appropriate waste management procedure for spoil materials generated as part of the redevelopment (if required); and
- Demonstrate that the proposed remediation strategy is compliant with state and local government and planning statutes and that it suitably addresses issues relating to site environmental management, community relations and contingency planning.

4.2 Outline of RAP

This RAP has been developed under the guidance of the appropriate regulatory framework endorsed by the NSW Environment Protection Authority (EPA) and complies with the provisions of the *Contaminated Land Management Act 1997* and associated guidelines and regulations.

The RAP outlines the following:

- Stakeholders;
- Site description;
- Summary of previous investigations and previous results;
- Site condition and surrounding environment;
- Conceptual site model;
- Remediation design and acceptance criteria;
- Remediation methodology;
- Validation requirements;
- Site environmental controls;
- Contingency planning;
- Work health and safety; and
- Community consultation and liaison.

5. STAKEHOLDERS

The key stakeholders with regard to the implementation of the remediation strategy in accordance with this RAP are provided below in **Table 1**.

Table 1: Stakeholders

Stakeholders:
Site Owner - City of Canada Bay Council
Local Government – City of Canada Bay Council
Principal Contractor – TBC
Licensed Asbestos Removal Contractor – TBC
Environmental Consultant – TBC
Future Site Occupiers – Council and general public
Surrounding Site Occupiers & Local Community

6. TECHNICAL FRAMEWORK

The RAP has been developed in accordance with the following legislation, industry standards, codes of practice and guidance documents and other reference documents stated throughout this document:

- *NSW Work Health and Safety Act, 2011*;
- *NSW Work Health and Safety Regulation, 2017*;
- *Contaminated Land Management (CLM) Act, 1997*;
- *CLM Amendment Act, 2008*;
- *Protection of the Environment Operations (POEO) Act, 1997*;
- *POEO Regulation (Waste), 2014*;
- *National Environment Protection Council (NEPC) Act, 1994*;

- *National Environment Protection (Assessment of Site Contamination) Measure, 1999 (April 2013) (NEPM 2013);*
- *NSW EPA Sampling Design Part 1 - Application - Contaminated Land Guidelines.*
- *NSW EPA State Environmental Planning Policy (Resilience and Hazards), 2021*
- *NSW EPA Waste Classification Guidelines, 2014 (NSW Waste Classification Guidelines);*
- *NSW EPA Guidelines on the Duty to Report Contamination Under the CLM Act 1997, 2015;*
- *NSW EPA Contaminated Land Guidelines: Consultants Reporting on Contaminated Land, 2020;*
- *NSW EPA Guidelines for the NSW Site Auditor Scheme (Third Edition), 2017 (NSW Guidelines for the NSW Site Auditor Scheme);*
- *CRC Care Technical Report No. 10, Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, 2011 (CRC Care 2011);*
- *Department of Agriculture and Water Resources National Acid Sulfate Soils Guidance; National acid sulfate soils sampling and identification methods manual 2018 (DAWR, 2018a);*
- *Department of Agriculture and Water Resources National Acid Sulfate Soils Guidance; National acid sulfate soils identification and laboratory methods manual 2018 (DAWR, 2018b);*
- *Australian Standard (AS) 4482.1, Guide to Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds, 2005;*
- *AS 4482.2, Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Substances, 1999; and*
- *AS 1726 Geotechnical Site Investigations, 1993.*

7. SITE SETTING

7.1 Site Identification Summary

Site identification details are summarised in **Table 2** and the location of the site is shown on **Figure A1**, provided in **Appendix A**.

Table 2: Site Identification Details

Site Identification	
Site Address:	Timbrell Park – Henly Marine Drive, Five Dock, NSW
Legal Identification:	Lot 7010 in DP93651 and Lot 1 in DP356799
Site Description:	Sportsfield and Public Recreation
Site Area:	Approximately 70,740 m ²
Current Zoning:	RE1 – Public Recreational
Owner:	City of Canada Bay Council (Council)
Current Land Use:	Park, recreational open space
Surrounding Land Use	▪ North The north of the site is immediately bound by Henley Marine Drive. Beyond this lies residential housing and then Five Dock Park, approximately 500m north of the site. Five Dock Ampol fuel station is located approximately 500m northwest of the site and sits above the site in topography. ▪ East Immediately to the east of the site, Timbrell Drive runs from north to south and makes up the site's eastern boundary. Following Timbrell Drive is the Parramatta River. At this location the Parramatta River is in a tidal estuarine environment and is expected to be saline. ▪ South Iron Cove Creek makes up the site's southern boundary. The creek runs from west to east and confluences with the Parramatta River at the site's southeast corner. Beyond Iron Cove Creek lies Dobroyd Parade highway and residential land.

Site Identification

- **West** The west of the site is immediately bound by Henley Marine Drive. Beyond this lies residential housing. Five Dock Ampol fuel station is located approximately 500m northwest of the site and is topographically elevated above the site.

7.2 Site Description

Timbrell Park comprises a children's playground, a small café, a clubhouse and a large open space with various sports fields. The ground surfaces are largely (~80%) maintained grass with baseball and cricket pitches, and occasional paved surfaces associated with the playground, café and club house in the central-western portion of the site. In the centre of the playing fields is a 20m² shrubbery area with bushes and sandy ground cover. The topography has a gentle southerly slope toward the Iron Cove Creek.

For the purposes of this RAP, the site comprises the areas planned for development, as shown in **Figure 2, Appendix A**.

8. PREVIOUS INVESTIGATIONS

8.1 Summary

Several previous investigations have been undertaken on the site and are detailed below.

8.2 Previous Environmental Reports

A summary of the reports and documents pertaining to Timbrell Park, which encompasses the site area are summarised as follows:

8.2.1 Remedial Action Plan (RAP) – Environmental Investigation Services (EIS), 2010

Environmental Investigation Services (EIS) were commissioned by Council to prepare an environmental assessment and a remedial action plan (RAP). This was to support the works associated with the installation of eleven light poles around the perimeter of Timbrell Park.

The contaminants of concern at the site identified during the environmental assessment included:

- mid to heavy fraction Total Petroleum Hydrocarbons (TPH (C10-C36).
- Polycyclic aromatic hydrocarbons (PAH), including benzo(a)pyrene (BaP).
- Concentrations of lead were also encountered above the adopted site assessment criteria (SAC). However, statistical analysis of the data set indicated that the mean, standard deviation and UCL values met the assessment criteria and were below the SAC. Therefore, lead was excluded from the list of contaminants for the purpose of the RAP.

The RAP identified the following remediation areas:

- Area A (Known Extent): This area was confined to the immediate vicinity of the boreholes drilled for the light poles; and
- Area B (Unknown Extent): The remaining sections of the site fall in this category.

The horizontal extent of the contamination was not established and was beyond the scope of works for this investigation. Potential contamination associated with the fill material in other sections of the park could not be ruled out. The proposed remediation was based on point source data that was spatially interpreted between previous sampling points. Therefore, the proposed remediation was confined to the proposed light pole locations. It was recommended that the most viable option for remediation of Area A (light poles) was considered to be excavation of the contaminated material followed by off-site disposal to an appropriate facility.

The most viable option for Area B was considered to be the implementation of an environmental management plan (EMP). Remediation of the whole site to remove all of the contaminated soil was considered impractical and unfeasible.

8.2.2 EDP Detailed Site Investigation (DSI) (November 2023)

EDP Consultants Pty Ltd (EDP) was engaged by Canada Bay City Council (Council) to conduct a Detailed Site Investigation (DSI) of Timbrell Park, Five Dock, NSW. The DSI was prepared to advise and support the Council's plan to upgrade an area of the park presenting drainage issues after rainfall events. The Timbrell Park Sportsfield Upgrade (TPSU) works will involve elevating the height of the sports field for the installation of an improved drainage and irrigation system, and the reprofiling of site.

The scope of work included a review of existing environmental reports, site history, historical aerial photographs, environmental setting detail and conducting and intrusive site investigation. The intrusive assessment involved advancement of a total of 112 sampling locations across the investigation area to a maximum depth 2 m bgl. Soil analytical results were compared against the adopted human health and ecological criteria for the site, in accordance with NEPM 2013, the HEPA PFAS National Environmental Management Plan 2.0 2020 (NEMP 2020) and other applicable guidelines.

Review of historical databases, aerial photographs and previous reports review identified potential contamination by historical landfill waste disposal on the site and dredging materials used to raise the level of the site.

The upper soil profile (0-1m) across the site generally comprised of sandy clay fill with inclusions of ash, gravel, slag, glass and shells. The lower soil profile (1-2m) consisted of damp/wet dark sandy clay which was identified as Potential Acid Sulfate Soils based upon pH screening, olfactory observations and laboratory analysis.

Benzo(a)pyrene TEQ was the only analyte to exceed the adopted human health risk criteria (HIL/HSL C) after statistical application. These exceedances were found to be more frequent in the upper portion of the soil profile (0.5m and above) and widely spread across the site. Numerous exceedances against the adopted ecological criteria were recorded, however, the risk from these contaminants to ecology is considered low and acceptable. This is due to the low risk of contaminant mobilisation from the site and the lack of sensitive receptors nearby. In addition, an assessment of groundwater and ground gas did not identify any risks to human or ecological health via these pathways.

Chromium Reducible Sulphate testing confirmed there is an Acid Sulphate Soil layer at approximately 1.2m across the site. This does not pose a risk to human or ecological health in its current undisturbed state. However, if excavations intersect this layer, there would be a potential onsite and offsite environmental risk from acidification of soils and water caused by oxidation of sulfides.

The results of the investigation can be summarised as follows:

- Benzo(a)pyrene TEQ was the only analyte to exceed the adopted human health risk criteria (HIL/HSL C) after statistical application. These exceedances were found to be more frequent in the upper portion of the soil profile (0.5m and above) and widely spread across the site. Numerous exceedances against the adopted ecological criteria were recorded, however, the risk from these contaminants to ecology is considered low and acceptable. This is due to the low risk of contaminant mobilisation from the site and the lack of sensitive receptors nearby.
- Chromium Reducible Sulfur testing confirmed there is an Acid Sulphate Soil layer at approximately 1.2m across the site. This does not pose a risk to human or ecological health in its current undisturbed state. However, if excavations intersect this layer, there would be a potential onsite and offsite environmental risk from acidification of soils and water caused by oxidation of sulfides.
- Of the 111 primary sampling locations which were sieved at the surface, one location identified visual asbestos in the form of ACM, which was located in the upper 0.5m of BH01. As a result of the sieving conducted on site, the approximate concentration of asbestos was calculated to be 0.0018%w/w, which is below the site criteria of 0.02 w/w%.

Based on the results, EDP concluded that the key site risk to human health is Benzo(a)pyrene TEQ. In the short-term controls at the park which prevent direct contact with exposed soils in areas of the site where these exceedances were recorded were recommended. This may include maintenance of healthy grass cover or preventing access through other methods where this is not achievable. Medium to long-term management of these concentrations will be through an Environmental Management Plan (EMP) for the site, or alternatively through a Remediation Action Plan (RAP).

8.2.3 EDP EMP (2024)

EDP Consultants Pty Ltd (EDP) was engaged by City of Canada Bay Council (Council) to develop an Environmental Management Plan (EMP) for Timbrell Park, Five Dock NSW. The requirement for an EMP arose following results of investigation works carried out by EDP in October 2023, which identified a potential human health risk for the site.

The EMP outlines an unexpected finds protocol and ongoing management requirements for the site for the medium to long-term management of the BaP concentrations as recommended in the DSI (2023). The EMP also outlines protocols for construction and excavation works.

8.2.4 EDP ASSMP (2025)

EDP Consultants Pty Limited (EDP) was engaged by City of Canada Bay Council (Council), to prepare an Acid Sulfate Soils Management Plan (ASSMP) for Timbrell Park located in Five Dock, NSW on Lot 7010 in DP93651 and Lot 1 in DP356799 (the site). The ASSMP has been developed for the site following a detailed site investigation (DSI) ahead of planned upgrades to the sports field.

A review of analytical results indicated the following:

- pH_i (pH prior to oxidation) ranged between 4.97 and 7.5;
- pH_{fox} (pH post oxidation) ranged between 0.82 and 5.66; and
- The observed reaction of soil samples varied for all samples were high, indicating a risk of acid generation in oxidised at the site.

This PASS depth generally became shallower to the northeast of the site, closer to the Parramatta River. Net Acidity (Acidity Units) exceeded the WQ Australia 2018 - Acid Sulfate Soil Guidance Action Criteria (fine materials, >1000t disturbance) in numerous samples across the site. The majority of these samples were at depths of 1 or 2m. While less prominent than deeper soils, the existence of Acid Sulfate Soils must be acknowledged across site in the upper soil profile.

The Acid Sulphate Soil layer is likely to be a result of deposited dredged material from the Parramatta River to raise the site's ground level. This layer is not considered to be natural due to the occasional anthropogenic inclusions such as tile and glass at these depths.

ASS management will be required to prevent adverse impacts occurring to the environment and infrastructure from ASS during the proposed excavation works at the site.

Based on the nature of the works, and the identification of PASS within the soils planned for disturbance, the recommended ASS management strategy for the proposed works should be undertaken over two stages:

- Stage 1: Onsite treatment and assessment prior to off-site disposal; and
- Stage 2: Disposal of treated ASS offsite.

At time of preparation of this ASSMP, it is understood that excavated soils will be disposed offsite. However, if there is opportunity for re-use, soils which have been demonstrated to be effectively treated for ASS and do not present any other chemical or contamination risks, can be considered for re-use.

The ASSMP outlines assessment and onsite treatment of soils requirements prior to off site disposal, liming rates, sampling and validation rates and water management strategies.

Refer to **Figure A2** provided in **Appendix A** for the sample locations of the previous environmental investigation and results conducted at the site.

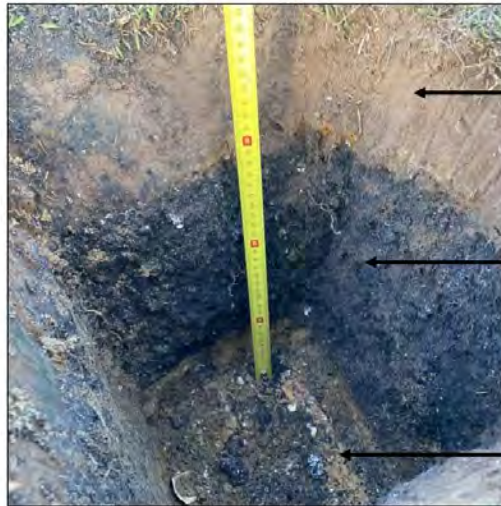
8.2.5 Soil Profile report

A sportfield profile investigation report was carried out in February 2025 (*Timbrell Park, Sportfield Profile Investigation*, Greenspace 4D, 2025).

The investigation included the excavation of 18 inspection test pits. The objective was to report any significant variation in the sub soil components and the depths of notable profile horizons. The report contains photographs of the ash band

located from depths of 50mm to 260mm. Topsoil was observed up to 182mm with the underlying material described as either sand or heavy orange clay.

Observations/ Findings



Majority of the upper profile was a brown loamy sand to an average depth of 182 mm

Below the upper profile loamy sands was a very heavily compacted Ash band with an average band width of 189 mm

Common base material was a compacted orange clay (right) and clean sand (image left)





This report is appended in **Appendix C**.

9. ENVIRONMENTAL SETTING

9.1 Topography

The topography across the site is relatively flat and low lying with a variation of 2 – 4 mAHD. There is a slight and even slope towards the south and Iron Cove Creek.

9.2 Surface and Groundwater

It is assumed that surface water on-site will partially infiltrate through the soil into the groundwater. However, due to the clayey superficial deposits, infiltration will be impeded. Excess surface water runoff is expected follow the site topography toward Iron Cove Creek which discharges to the Parramatta River.

A review of WaterNSW Real-time Water Databases indicated there are no groundwater wells within a 500 m of the site. The nearest monitoring well is approximately 656.5m to the southeast and has a Standing Water Level (SWL) of 1.5m.

Groundwater flow directions are anticipated to be similar to a subdued version of the topographic surface, heading toward Iron Cove Creek.

9.3 Local and Regional Geology

A review of the NSW Seamless Geology version 2.2 (May 2022) shows the site is underlain by the Hawkesbury Sandstone bedrock (Triassic). This is described as medium to coarse grained quartz sandstone, with minor shale and laminitic lenses. The superficial deposits here are identified as alluvial valley deposits of Quaternary age. This layer is described as silt, clay, lithic to quartz-lithic sand and gravel. Above this layer, the report details anthropogenic deposits described as natural surface elevation raised by placement of fill over former estuarine swamps and subaqueous estuarine margins (supratidal to subtidal zone); estuarine banks and islands formed from dredge spoil.

9.4 Acid Sulfate Soils

The Coastal Acid Sulfate Soils Register identifies the entire site as Class 2. In a Class 2 area, Acid Sulfate Soils are likely to be found below the natural ground surface and a development consent is required for disturbance.

The Atlas of Australian Acid Sulfate Soils identifies the site as an area with a Low Probability of Occurrence. However, immediately to the east the Parramatta River is identified as an area with a High Probability of occurrence. This is where dredged material is expected to have originated.

Investigations by EDP have identified Acid Sulfate Soils as outlined in **Section 8.2.4**.

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10. PRE-REMEDIATION CONCEPTUAL SITE MODEL

Based on the results of the desktop assessment, review of site history, background information and previous investigation reports, the CoPCs associated with the proposed land uses and the source-pathway-receptor linkages assessment were considered to include the following as presented in **Table 4** below. It should be noted that a reduced potential contaminants suite has been determined based on the general absence of other analytes as reported in the DSI:

Table 3: Pre-remediation Conceptual Site Model

Location	Source of contamination	Potential Contaminants	Potential Exposure Pathways	Potential Human and Environmental Receptors	Assessment of Risk
- Hotspot remediation (localised to areas of cut); - Light pole area; - On-site detention basin; - Ring main drainage trenches; infrastructure; and - General areas of cut.	- Anthropogenic deposits of historical landfill material; - Deposits of dredged material; - Uncontrolled importation of soil material; and - Historical demolition waste of small structures	Heavy metals, PAHs, TRH and asbestos	- Downward migration and leaching of contaminants via infiltration of rainwater through the soil; - Lateral migration via groundwater to surface water and off-site; - Overland flow of surface water to off-site soils and surface water; - Absorption or adsorption to fauna and vegetation through contact and diffusion in soil; - Dispersion of airborne particulates due to wind; and - Inhalation, ingestion, dermal contact.	<u>Human receptors:</u> - Current site users and maintenance; - Future construction and maintenance workers, and site users; and - Current and future site users on neighbouring properties. <u>Environmental Receptors:</u> - Transient fauna or macroinvertebrates; - Vegetation; - Groundwater dependent ecosystems; and - Surface waters such as the Iron Cove Creek and Parramatta River.	<u>Health:</u> Moderate – SPR linkages potentially complete. <u>Environment:</u> Moderate – SPR linkage potentially complete for surface water, groundwater and ecology.
Deeper excavations for light pole, ring main drainage trenches area and on-site detention basin.	Excavation and Stockpiling of Actual ASS (AASS) and/or Potential ASS (PASS) soils	AASS / PASS;	- Migration of acidic leachate / runoff to surface water or infiltration to groundwater; - Rill and gully erosion, salinisation and scarring of landscape; and - Acid corrosion of onsite structure.	<u>Human Receptors:</u> - Site maintenance workers or users coming into contact with impacted soils; and - Weakening of onsite structures and affecting users. <u>Environmental Receptors:</u> - Groundwater; and - Surface waters such as the Iron Cove Creek and Parramatta River, and their catchments.	<u>Health:</u> Low – Unlikely impact of AASS/PASS to human health if site ASSMP is followed <u>Environment:</u> Moderate – SPR linkages potentially complete for surface water, groundwater and ecology

11. REMEDIATION DESIGN

11.1 Remediation Objective

The objective of the remediation is to manage the known contamination at the site in order to eliminate or minimise the risk posed to human health and the environment during development works and render the site suitable for the continued land use as a public open space.

11.2 Remediation Area

The site has five distinct remediation areas within the site as below:

- Hotspot remediation.
- Light pole installation.
- On-site detention basin.
- Trenching for drainage infrastructure.
- Surface reticulation infrastructure/grading and levelling.

Areas outside the five areas outlined have not been included in this RAP.

Based on review of previous environmental investigation at the site, a layer of ashy fill is present at depths from up to 1 metre below ground level.

Due to the non-homogeneous nature of the fill materials and the risk of the presence of CoPC, any area where proposed excavation (i.e. cut) or intrusive works is proposed to occur with the spoil reapplied to the site as part of the development design levels will need to be assessed prior to applying material to other areas of the park.

See **Figure A3** attached in **Appendix A** (Cut to Fill Diagram or Kennys overlay).

11.3 Remediation Hierarchy

The preferred order of options for site remediation and management is detailed in Volume I of the NEPM 2013. The NEPM Assessment of Site Contamination Policy Framework (16) states that the preferred hierarchy of options for site clean-up and/or management is:

- On-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site.

If the above are not practicable, other remediation options include:

- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material; or
- Consolidation and isolation of the soil and contamination on site within a properly designed barrier.

11.4 Review of Remedial Options

Several remediation options have been considered for the site. An assessment was made based on environmental impacts, time constraints, site logistics and cost. The possible remediation options considered were:

- Do Nothing;
- Monitored Natural Attenuation;
- On-Site Treatment;
- Excavation and Off-site Disposal; and
- On-Site Management.

11.4.1 Do Nothing

The “Do Nothing” approach involves leaving the contaminated soil materials in their current locations and either continue the development without concern for the remediation of contaminated soils or continue the existing use. **This approach is considered inappropriate** due to several factors:

- Some areas where ground surface is exposed are known to have surface materials that are contaminated. The proposed use of the site would be affected by the presence of uncovered contaminated materials and would not be suitable for the proposed land use;
- The areas of concern at the surface exceed the adopted land use criteria and are not considered acceptable for use without remediation or management being undertaken; and
- The exposed contaminants that have been identified are known to be persistent in the environment and will pose a long-term human health and environmental hazard if left on the site in their current state.

11.4.2 Monitored Natural Attenuation

Natural attenuation is the degradation, immobilisation or destruction of hydrocarbons, or other potential contaminants, by natural processes. The natural attenuation process is controlled by the CoPC and the physical, chemical, biological and hydro geological properties of the site.

Natural attenuation is not considered to be an appropriate remedial action as the majority of the contamination present within the soils at the site will not naturally degrade (heavy metals and B(a)P) and pose an unacceptable risk for current and future uses of the site.

11.4.3 On Site Treatment

On site treatment methods include both in-situ and ex-situ treatments of soils. Treatment may be physical, chemical, mechanical or biological. On site treatments have the potential to be cheaper than offsite disposal. The main disadvantages of some onsite treatment are the time constraints, or the inability to treat the contaminants to an acceptable level.

On site treatment is not considered to be an appropriate remedial action, as some contaminants present at the site cannot be easily or effectively treated.

11.4.4 Excavation and Off-site Disposal

This method includes the excavation of the fill material and disposal offsite to an appropriately licensed landfill.

This approach has the advantage of removing the contaminated soils from the site (to an extent practicable) and removing land use restrictions associated with contaminated soils. It also has the advantage of being relatively fast and may not further impact other areas of the site. The main disadvantage of excavation and disposal is the expense associated with off-site disposal of contaminated materials to an appropriately licensed landfill in addition to the limited space available in landfills.

EDP considers that this remediation method is suitable for the remediation of the site.

11.4.5 On Site Management

On site management of the contamination would involve selective remediation across the site to reduce the impact to human health or the environment and long-term management of any remaining contamination.

On site management would primarily involve the placing of a permeable surface marker layer (such as geo-fabric material) across the contaminated area and then covering with soil layers or encapsulating the contaminated materials with hardstand concrete (or other media). The site would then require a site-specific Long-Term Environmental Management Plan (LTEMP) to prevent the exposure of the contamination to the users or future workers of the site.

The disadvantages of such a strategy would be the imposing of a LTEMP, associated notification obligations on the land title and ongoing management of the site for compliance with the LTEMP.

EDP recommends that this remediation method is suitable for the remediation of the site.

11.5 Preferred Remedial Strategy

EDP considers that the excavation and off-site disposal of contaminated fill materials and disposal offsite to an appropriately licensed landfill is the preferred remedial strategy.

However, should contamination be identified beyond what is identified as remedial extents and this approach becomes no longer viable, on-site management is considered an equally suitable remedial alternative. Refer to **Section 20** for further details.

11.6 Rationale Behind the Selection of Remediation Strategy

The selection of a remediation strategy for the site was undertaken in consideration of the contaminants being remediated, the extent of the remediation area and the intended landuse. Other considerations included the time required to achieve remediation, impacts of remediation such as ecological or aesthetic values, overall cost and future management effort.

This remedial option was selected based on the following:

- The requirement to manage unacceptable health risks posed to future site users;
- The immobile nature of the identified soil contamination at the site;
- The proposed land use of the site, post remediation and development;
- The cost of the remediation of the site; and
- Time constraints by which the remediation is required to be completed.

12. ROLES AND RESPONSIBILITIES

For the purposes of the remedial work the roles and responsibilities are presented in **Table 4**.

Table 4: Roles and Responsibilities

Role	Reports to	Responsibilities
Council	Regulatory Authorities (as required)	Engage Principal Contractor Engage an Environmental Consultant. Provide funding for approvals. Review documentation provided by the Principal Contractor.
Principal Contractor (TBC)	Council & Regulatory Authorities	Review the RAP and any other report developed by consultants. Ensure the RAP is implemented correctly. Comply with all legislative requirements and the Environmental Consultant requirements for this project.
Licensed Asbestos Removal Contractor (TBC, where required)	Principal Contractor	Develops and implements an Asbestos Removal Control Plan (ARCP) and Safe Work Method Statement (SWMS) for the asbestos related earthworks in consultation with the Environmental Consultant and Principal Contractor representatives. Establish an asbestos work zone/s including installation of appropriate signage, exclusion zones, decontamination facilities and work areas. Arrange for the transport and disposal of waste in accordance with applicable state legislation, standards, guidelines and waste classification.
Environmental Consultant (TBC)	Council	Ensure works are being undertaken in accordance with this RAP and current legislative requirements. Provide WHS and environmental consultancy to all stakeholders. The Environmental Consultant has the right to stop the works if they are not being carried out in accordance with the contract, regulations and relevant codes of practices. The Environmental Consultant also has the right to request that a worker be removed from the site and be replaced after a serious safety breach, subsequent to discussion with all stakeholders. Preparation of Site Remediation and Validation Report (SRVR). Preparation of LTEMP.

13. REMEDIATION ASSESSMENT CRITERIA

The RAC used in NSW to evaluate soil analytical results are based on the NSW EPA Guidelines for the *NSW Site Auditor Scheme, 3rd Edition, 2017*, the NEPM 2013 and the *NSW EPA Waste Classification Guidelines: Part 1 – Classifying Waste, 2014*. These combined guidelines present a range of human health and ecological based assessment and disposal criteria for the application to various land use scenarios in NSW.

Groundwater remediation was not applicable for the site and the status of the groundwater contamination is not known for the site. The groundwater assessment criteria is not included within this section.

The RAC require that:

- Soil material from hotspot excavation will be required to be disposed offsite. All soils proposed for off-site disposal must be adequately characterised and disposed off-site to an appropriately licensed waste facility, in accordance with the *NSW Waste Classification Guidelines*;

- Site won material is proposed to form the site levels. It is proposed that further testing of the site won materials is required to determine if the cut material is suitable to be kept on site. Contaminant concentrations should be below the adopted contaminant thresholds for the site (based on use as a public open space),
- All exposed residual soils to have contaminant concentrations that are below the adopted contaminant thresholds for the site (based on use as a public open space), if applicable;
- All soils imported onto the site (where required) must be characterised as either Excavated Natural Material (ENM) in accordance with the *NSW EPA Excavated Natural Material Order 2014* or Virgin Excavated Natural Material (VENM) in accordance with the definition of VENM as stated in the *Protection of Environment Operations (POEO) Act 1997*.
- A suitably qualified and experienced Environmental Consultant must conduct all validation inspections and validation sampling required during and following the completion of the remediation works. Following validation assessment, a SRVR and LTEMP/EMP must be prepared by the Environmental Consultant.

Derived from the NEPM 2013 for public open space land use, the adopted RAC for the contaminants identified on the site are detailed in **Table 5**. Note that due to the variable nature of the fill material across the site, all CoPC have been considered for the RAC. Additionally, the RAC will also apply to all imported materials to be placed in areas with potential for direct contact with future site users. Furthermore, imported materials must meet all relevant requirements for classification under the *POEO Act 1997* and *NSW EPA POEO (Waste) Regulation 2014* and the RAC and other requirements for imported materials as defined in the 4th dot point above.

In addition to the chemical validation, all imported materials (where it is not practicable to use site-won material) must be assessed to be suitable from an aesthetic value, ensuring the imported materials are suitable for use in the development area. This will require an assessment of the extent and type of any foreign materials in certified ENM, understanding that although compliant with ENM exemption, the material may not be acceptable for a public contact site.

Table 5: Adopted Soil Remediation Assessment Criteria

CoPC	Adopted RAC
NEPM 2013 Health Investigation Levels:	
Total PAHs	300 mg/kg
Carcinogenic PAHs (as BaP TEQ)	3 mg/kg
Arsenic	300 mg/kg
Cadmium	90 mg/kg
Chromium VI	300 mg/kg
Copper	17,000 mg/kg
Lead	600 mg/kg
Mercury	80 mg/kg
Nickel	1,200 mg/kg
Zinc	30,000 mg/kg
Sum of Aldrin + Dieldrin	10 mg/kg
PCBs	1 mg/kg
NEPM 2013 Health Screening Levels:	
Bonded ACM	0.02 %
Fibrous Asbestos (FA) and Asbestos Fines (AF)	0.001 %
All forms of asbestos	No visible asbestos to surface 100 mm
Benzene	0.6 mg/kg
Toluene	190 mg/kg
Xylene	45 mg/kg
Naphthalene	3 mg/kg

CoPC	Adopted RAC
TRH C ₆ -C ₁₀	50 mg/kg
TRH C ₁₀ -C ₁₆	130 mg/kg
NEPM 2013 Ecological Investigation Levels*:	
Arsenic	100 mg/kg
Chromium	190 mg/kg
Copper	60 mg/kg
Lead	1,100 mg/kg
Nickel	30 mg/kg
Zinc	70 mg/kg
DDT	180 mg/kg
Naphthalene	170 mg/kg
NEPM 2013 Ecological Screening Levels**:	
TRH (F1 - F4), BTEX and BaP	ESLs for coarse soil for urban residential and public open space, Schedule B1, Table 1B(6) of NEPM 2013.
NEPM 2013 Management Limits:	
TRH (F1 - F4)	Management Limits for coarse/fine soil for residential/parkland and public open space Schedule B1, Table 1B(7) of ASC NEPM 2013.
Imported Materials	
VENM / ENM	Excavated Natural Material (ENM) in accordance with the NSW EPA Excavated Natural Material Order 2014 or Virgin Excavated Natural Material (VENM) in accordance with the definition of VENM as stated in the Protection of Environment Operations (POEO) Act 1997
Other RRO / RRE Material	Analytical results of the imported fill must demonstrate compliance with appropriate guidelines for public open space land use including heavy metal concentrations to be consistent with background range, organic compounds to be less than the LOR and asbestos to be absent. Imported landscaping materials are also to consider the ecological guidelines (EILs and ESLs) based on NEPM 2013
Waste Classification:	
TRHs, BTEX, PAHs, heavy metals, OCPs, OPPs, PCBs, VOCs/VHCs and asbestos	NSW EPA Waste Classification Guidelines – Part 1: Classifying Waste (NSW EPA 2014).
Acid Sulfate Soils Assessment (for subsurface soils assessment or waste classification, where required):	
Potential hydrogen field and potential hydrogen peroxide field tests (field pH (pHF) / field pH peroxide (pHFOX) analysis) Chromium reducible sulfur (laboratory test)	National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual (2018) and Acid Sulfate Soils Management Advisory Committee, Acid Sulfate Soil Guidelines (ASSMAC, 1998) for coarse/medium/fine textured soils, as applicable for the site.

*EILs have been based on the most conservatively adopted added contaminant limits (ACLs). Soil-specific EILs may be adjusted to account for soil physiochemical properties including pH, cation exchange capacity and clay content for aged ambient background concentrations (ABCs) in high traffic areas of NSW.

**As no health screening levels (HSLs) are specified for organic compounds for a public open space landuse setting, conservative values of HSLs for the organic compounds for low-high density residential landuse setting and for coarse soils for shallow depths have been adopted for this project. Lesser conservative HSL values could be adopted depending on the depth of the investigation.

14. COMPLIANCE WITH REGULATORY REQUIREMENTS

14.1 Environmental Planning and Assessment Act and Regulations

Remedial works at the site are not considered to present a designated development under Schedule 3 of the *Environmental Planning and Assessment Act 1979*. Furthermore, the program of rehabilitation works described in this RAP have been designed so that works shall not adversely affect the environment and will be an improvement to the environment. For these reasons the remediation works should not require the preparation of an Environmental Impact Statement (EIS).

14.2 State Environmental Planning Policy (Resilience and Hazards), 2021

State Environmental Planning Policy (SEPP) – Resilience and Hazards, 2021 under the *Environmental Planning and Assessment Act 1979* applies to works involving remediation or management of contaminated land in NSW. The objective of this planning policy is to provide a state-wide planning approach to the remediation of contaminated land. In particular, the policy aims to promote the remediation of contaminated land for the purpose of reducing risk of harm to human health or any other aspect of the environment.

Remediation can be Category 1 requiring consent of the relevant planning authority or Category 2 not requiring consent. Both Category 1 and Category 2 remediation require notification 30 days prior to the planned commencement of remediation to the consent authority. This remediation program is considered Category 2 though is understood to be conducted with a development consent.

14.3 SafeWork NSW

The remediation of asbestos impacted fill materials is considered to trigger the notification requirements for SafeWork NSW. It is the requirement of this RAP and site-specific AMP that a SafeWork NSW non-friable asbestos removal notification be submitted by the LARC and all works conducted in accordance with Class B (non-friable) removal conditions. Additional controls and update to the notification will be required should works identify friable asbestos materials in the fill material.

14.4 NSW Protection of the Environment Operations Act 1997

The objective of the *POEO Act 1997* is to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development and to increase opportunities or public involvement and participation in environmental protection. The *POEO Act 1997* prohibits the contamination of land through any means including the improper application of waste and prescribe the requirements for triggering which sites require an environmental protection license to operate. The objectives of the RAP align with the *POEO Act 1997* by focusing on an improved human and environmental amenity of the site and providing details of community consultation requirements.

14.5 City of Canada Bay Development Control Plan – Contaminated Land Risk

The aim of this Development Control Plan (DCP) is to establish objectives and development controls for the development of land within the City of Canada Bay. The aims of this DCP are to:

- Encourage development that responds to its context and is compatible with the existing built environment and public domain;
- Recognise and reinforce the distinctive characteristics of Canada Bay's neighbourhood and centres;
- Build upon the detailed objectives and controls under Canada Bay Local Environmental Plan (LEP) 2013;
- Protect and enhance the public domain;
- Encourage design that maintains and enhances the character and heritage significance of heritage items and heritage conservation areas; and
- Encourage ecologically sustainable development and reduce the impacts of development on the environment.

14.6 Guidelines on the Duty to Report Contamination (2015) under the Contamination Land Management Act 1997

At this stage, EDP does not consider that there has been a trigger of requirement to notify the NSW EPA of the site contamination, though this will be reassessed following review of the validation results.

15. REMEDIATION METHODOLOGY

The Principal Contractor should prepare a SWMS incorporating relevant sections of this RAP into a work methodology and any construction environmental management plan (CEMP) prepared for the remediation. Asbestos works must be supervised by a LARC in designated areas. The indicative work methodology can be summarised as follows:

15.1 Remediation Design Objectives

The objective of the remediation design is to ensure that all materials known to be contaminated are disposed of offsite, to ensure that contact between contamination and site users is prevented, and to ensure the site is suitable for the proposed use as a public open space in consideration of the adopted guidelines.

15.2 Work Area Establishment

Prior to undertaking remedial actions, the following steps must be undertaken to ensure the appropriate establishment of the work area, and where asbestos contamination has been identified, in accordance with the AMP prepared for the site:

15.2.1 General work establishment – for all remediation works and trench/deep excavations

In regard to works area establishment, establishment works should include:

- Demarcation of the work area and extent of the remediation boundary (approximately 10m²), and other safety requirements stipulated in the contractors documentation.
- Isolate the work area using barricading/warning tape.
- Establish a location for storage of the excavated soil in stockpiles.

15.2.2 Asbestos area establishment

In accordance with an AMP for the site, works should include:

- Isolate the asbestos-impacted soil work area within appropriate exclusion zones established surrounding the proposed work area using barricading/warning tape.
- Establish the location for stockpile storage for the asbestos contaminated spoil.
- Establish dust suppression protocols/infrastructure (fine mist water spray) to ensure contaminated soils remain damp during all soil disturbance;
- Asbestos removal contractor is to prepare an ARCP to outline site specific asbestos controls; and
- Environmental Consultant/LAA to conduct control asbestos-fibre air monitoring in accordance with the NOHSC *Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition 2005* [NOHSC:3003(2005)] during all soil disturbance works.

15.3 Remedial excavations

The remedial and development works will encounter contaminated fill in each of the highlighted areas. For the purposes of this RAP, these have been split into shallow excavation or deep excavation areas, (i.e. shallow excavation includes hotspot remediation and site grading/levelling and deep excavation includes excavations for the OSD, drainage pipework and lightpole installation). The following methodology are summarised below.

15.3.1 Shallow remedial excavations (hot-spot remediation)

The following methodology must be implemented for the planned excavation of the hotspots or other shallow excavations, such as grading and levelling of the site.

- Establish the boundary of the excavation and apply relevant controls.
- The locations of the remedial hot-spots and extents are shown in **Appendix A - Figure 3**.
- Remediation of asbestos hot-spots should apply additional asbestos controls as set out in **Section 15.2.2**.
- Excavate the hotspot to the specified remedial depth and a remedial extent of approximately 10 x 10 m of the hotspot.
- In the case of asbestos hotspots, asbestos controls should be put into place as per Section **15.2.2**.
- Carefully place excavated soils into the designated stockpile areas.
- Validation consultant to attend site to undertake validation sampling of the excavation walls and based and waste classification sampling from the stockpile.
- Samples will be sent to the laboratory for analysis with validation samples compared to the RAC, and waste classification samples compared to the Waste Classification Guidelines.
- Providing the validation clearance inspection and analysis data confirm the hotspot has been successfully remediated, the shallow excavation can be filled and re-established with validated imported or site-won materials.
- On receipt of waste classification results, the stockpile can be disposed off-site to a suitably licensed facility.
- Following re-establishment of the excavation pit and off site disposal of spoil, site controls can cease and works can be re-established at next location.

15.3.2 Deep excavations (development works)

The following methodology must be implemented for the planned excavation of drainage trenches, light pole installation and OSD excavation and installation.

- Establish the boundary of the excavation and apply relevant controls, including set up of the stockpile storage location for the excavated spoil.
- In the case of the OSD, a boundary fence should be erected around the perimeter of the development area, as well as any other safety requirements by the contractor due to the deep excavation proposed.
- Excavate the location to the specified construction excavation depth or design levels. All spoil generated should be stockpiled in the specified storage location. Stockpile storage should comply with requirements for Acid Sulfate Soils, as these are likely to be encountered during the works. The management of this material is required to be managed under the requirements of the ASSMP (EDP, 2025).
- Excavated soils (particularly from the OSD, due to excavation depths) will likely require treatment for Acid Sulfate Soils, the material will require sampling and potentially treating prior to off-site disposal. Requirements of management and disposal of Acid Sulfate soil is outlined in the ASSMP (EDP, 2025)
- A permeable geo-textile marker layer (such as Profab®) is then to be used to line the base and walls of excavations (see **Figure 1**). When installing the marker layer, the fabric should be pegged down and attached to the adjacent structures and surfaces where applicable. If there are no adjacent structures or surfaces available to peg down geofabric, the material may overlap on itself. Where sheets of the fabric overlap, a 300 mm overlap should be used to ensure no gaps in the coverage of the layer.
- On completion of the placement of geotextile, the validation consultant should attend site to undertake a visual inspection of the applied geotextile for clearance.
- Once required excavation depth or design levels are reached, the environmental consultant should attend site to undertake waste classification sampling of the stockpile and confirm the excavation is suitably lined with geo-textile. This is to demarcate the base and walls of the deeper excavations from potentially contaminated soils surrounding.
- Samples will be sent to the laboratory, and on receipt of results, will be compared to the remediation or validation criteria.

- If site-won material for reuse is preferred for the deeper soils, this can also be permitted, subject to appropriate soil sampling for beneficial reuse.
- On confirmation of the visual inspection of the geotextile is cleared, the excavation can be filled with clean soil and re-established. Clean soil shall be placed over the geotextile layer.
- On receipt of waste classification results, the stockpiled material can be disposed off site at a suitably licensed facility.
- Once the stockpile has been removed and the excavation re-established, site controls can cease and works can be re-established at the next location.

EDP is required to validate the remedial works conducted at various stages throughout the remediation of the site. Details of the validation procedure and requirements of the Environmental Consultant are provided in **Section 16**.

Details of all materials imported onsite must be provided to the validating Environmental Consultant for incorporation into the SRVR, to be prepared at the conclusion of the remedial and validation works. Information required to be recorded in imported soil tracking registers include: date, time, truck registration, classification, estimated volume and final site survey data (where applicable).

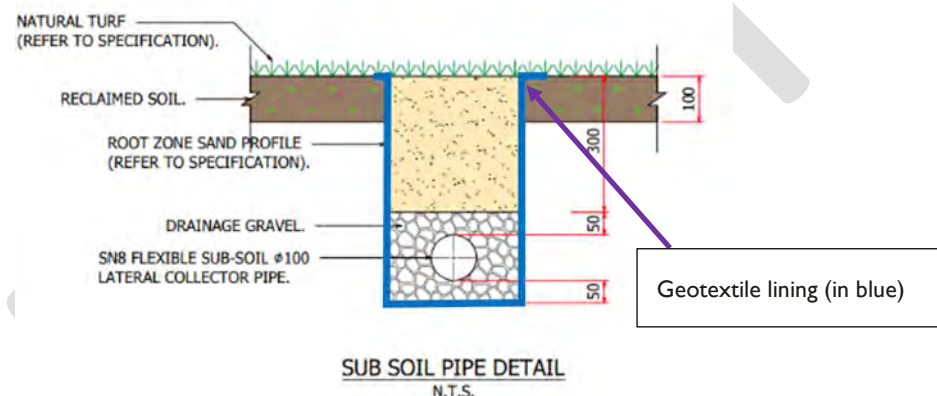


Figure 1: Proposed geotextile lining of drainage trench profile

15.3.1 Areas requiring cut during development

Portion of the site is proposed to be cut as per the cut to fill diagram presented **Figure A3**. Areas of shallow cut are intended to be used as site-won material in fill areas of the site. Prior to these works occurring, all hotspot remediation areas are to be validated.

- All hotspot areas should be validated prior to any surface disturbance works, as per **Section 15.3.1**.
- Once validation of hotspots is complete, further testing of the cut material proposed to be beneficially used as site one fill should be undertaken. This is outlined in **Section 17.2.6**.
- The site is known to contain ash fill, which is associated with high BaP levels as well as other contaminants. An example of ash fill that is present at the site is shown in **Figure 2** below (Greenspace 4D, 2025 report¹). As part of the further testing for site won materials, continuous spotting should be conducted to confirm site won materials are free of ashy material and otherwise be the focus of sampling should very minor instances of ashy material be observed.
- If ash-containing fill, or other deleterious material is encountered during cut, this will require further management., as per the Contingency Plan in **Section 20**.

¹ Timbrell Park, Sportsfield Profile Investigation, February 2025, Greenspace 4D

- This material would not constitute an unexpected find as its presence is known, however, this material should not be left at surface.
- If ash fill is encountered during cut and grading works, works should cease in this area, and the validation consultant should attend site.
- If ash fill material is exhumed this should be separated from other fill materials destined for potential site re-use.



Figure 2: Photographs of ashy fill material encountered at Timbrell Park

15.4 Waste Classification

It is understood that Council intends to retain site won materials where possible for unconditional re-use in filling areas of the site. However, in the case of contamination hotspot removal, or spoil generated from other deeper excavation zones such as the ring main drainage line, light poles, the OSD basin, or other general surplus soils, waste classification and off-site disposal will be required. This will involve the following:

- A waste classification assessment must be conducted, incorporating previous chemical data, in accordance with the *NSW Waste Classification Guidelines* and *NSW EPA Sampling Design Part 1 – Application - Contaminated Land Guidelines*.
- by the Environmental Consultant prior to the off-site disposal of any soil materials. This may be conducted in-situ or on stockpiled soil;
- Soils may also require treatment and verification for PASS prior to disposal in accordance with the ASSMP.
- Ideally, soil proposed for off-site disposal should be loaded directly into awaiting trucks. Alternately, a stockpiling area can be established where excavated soils will be stockpiled awaiting offsite disposal. If stockpiling is required, this will be in a designated area with appropriate stockpile controls;
- Spoil materials are to be loaded into trucks under dust suppression procedures and transported to a licensed waste facility suitable for accepting the wastes;
- Details of all materials removed from the site must be provided to the validating Environmental Consultant for incorporation into the SRVR, to be prepared at the conclusion of the remedial and validation works. Information required to be recorded in waste tracking registers include: date, time, truck registration, classification, estimated volume, WasteLocate records and tip dockets.

15.5 PASS Treatment

Generation of potential or actual acid sulfate soil (PASS/AASS) material is expected where ever there are deeper excavations extending beneath 1 metre, with PASS generally encountered at depths of 1.2 metres, while less prominent

than deeper soils on the site, the existence of ASS must be expected across the site in the upper soil profile. Soil should be treated in accordance with the ASSMP (EDP, 2025).

15.6 Imported Materials

All materials imported to site must meet the statutory definition of virgin excavated natural material (VENM), excavated natural material (ENM), or meet the definition of a Resource Recovery Order / Resource Recovery Exemption (RRO/RRE) under the *Protection of the Environment Operations (Waste) Regulation 2014*, or be commercially quarried products.

15.6.1 Quarried Material

Imported quarried products must be accompanied by a compliance certificate on the quarry producer letter head deeming the material a genuine quarried product. In order to permit importation, the following needs to be undertaken:

- Compliance certificate from the quarry
- Preparation of an imported material verification certificate (IMVC) by the validation consultant confirming the material is suitable for importation.
- Visual inspection of the material upon arrival confirming it is the material matching the description in the waste classification.
- Record of visual inspection with photographs, date, volume, source, imported material docket, material type (to match the classification), destination location on-site.

15.6.2 VENM or ENM Importation

Imported material be certified as VENM or ENM and must be supported by and waste classification certificate documents. Imported materials classified as ENM must be accompanied by a classification report developed by a reputable Environmental Consultant with compliant chemical testing in accordance with the NSW EPA ENM Order 2014 (ENM Order).

Materials imported as VENM must at minimum include analysis for heavy metals, TRH, BTEX, PAH, OCP, OPPs, PCBs and asbestos. All concentrations of analytes must be non-detect unless proven to be naturally occurring or within background concentrations. Sampling and analysis is representative and appropriate to the source site history with a sensible and representative sampling plan.

In order to permit importation, the following needs to be undertaken:

- Provision of waste classification reports with all supporting documentation (photographs, logs, laboratory data etc).
- A source site inspection by the validation consultant to verify the material at the source is ready for import and matches the description in the waste classification.
- Preparation of an imported material verification certificate (IMVC) by the validation consultant confirming the material is suitable for importation.
- Visual inspection of the material upon arrival confirming it is the material matching the description in the waste classification.
- Record of visual inspection with photographs, date, volume, source, imported material docket, material type (to match the classification), destination location on-site.

Where there are inadequacies in the data or completeness of the classification report, further sampling can be undertaken by the validation consultant to confirm the material suitability which can be incorporated in the IMVC.

15.6.3 Other RRO/RRE Materials and Landscaping Media

Other exempt materials considered for importation must be analysed in accordance with the appropriate resource recovery order and also can be practically applied under the corresponding exemption without posing a human health or environmental risk. For all RRO/RRE materials, additional testing must be undertaken to confirm suitability (or rationale provided in the IMVC as to why sampling was not considered necessary).

In order to permit importation of RRO/RRE materials, the following needs to be undertaken:

- Provision of waste classification reports with all supporting documentation (photographs, logs, laboratory data etc).
- A source site inspection by the validation consultant to verify the material at the source/distribution site is ready for import and matches the description in the waste classification.
- During the source site inspection, sampling to be undertaken for the following analysis unless rationale provided otherwise; heavy metals, TRH, BTEX, PAH, OCP, OPPs, PCBs and asbestos (AF/FA). Sampling to be at a ratio at least 1/250 m³, or a minimum of three samples per source or product type.
- Preparation of an imported material verification certificate (IMVC) by the validation consultant confirming the material is suitable for importation with compliant verification samples.
- Visual inspection of the material upon arrival confirming it is the material matching the description in the waste classification.
- Record of visual inspection with photographs, date, volume, source, imported material docket, material type (to match the classification), destination location on-site.

15.7 Material Tracking

Any materials stored and relocated onsite or disposed off-site must be tracked using forms with the following information recorded:

- **Material Excavation Form:** A record of excavated materials including the date of excavation, material type/description, classification report reference (if available), excavated quantity, source location and intended destination;
- **Stockpile Register:** A record of stockpiled materials must include the date of stockpiling, material type/description, stockpiled quantity, classification report reference (if available), source location and intended end use (e.g. “for backfilling” or “for offsite disposal”). Stockpiled materials will be clearly labelled with the stockpile source information and a stockpile ID; and
- **Material Placement Form** A record of all materials backfilled on the site (if any) must include the date, material type, quantity backfilled and source location.

The forms must be implemented throughout the excavation works program and provided as a complete set to the validation consultant for incorporation into the site validation report.

16. VALIDATION PROCEDURES

A suitably qualified and experienced Environmental Consultant must undertake a validation assessment, presented in a SRVR, in accordance with this RAP and relevant NSW EPA guidelines and AS4482.1.

The validation assessment should be conducted progressively throughout the remediation works. Sufficient validation must be conducted so that the SRVR will be able to conclude that the residual accessible soils present at the site will meet the RAC and NSW EPA standards, and that the site is suitable for the proposed land use as a public open space.

16.1 Asbestos and B(a)P Hotspots

The resulting excavations where impacts of asbestos and B(a)P require removal prior to the trimming / grading of the site, will require validation to verify the impacts have been adequately remediated. This will involve sampling and analysis of the walls and base of each of these excavations in conjunction with visual assessment. The sampling analysis and quality plan (SAQP) outlined in **Section 17** provides details on the validation sampling requirements.

16.2 Light Poles Excavations

Light poles are positioned around the perimeter of the site and will require deep excavation which in most cases will likely intercept ashy material which may pose a risk to workers or future site users. However, the light pole excavations themselves will be backfilled with concrete and constructed as per design presented in **Figure A3** in **Appendix A**.

As such, the validation requirements for the light pole excavations will involve:

- Visual inspection with photographic evidence confirming the placement of high-contrast geotextile material installed as a lining within the excavation.
- Where there are joins in the geotextile material section, the geotextile must be overlapping by at least 0.3 m and pinned in place.
- No residual soils to be visible on geotextile surface.

Where surrounding material around the light poles are within an area of nominated cut, then verification of this material will be captured under **Section 17** to confirm the suitability of site won material for reuse within the site.

16.3 Deep Drainage Trenches

A ring main drainage line as well as other connections to existing stormwater points which extend outside the site boundary will require deeper trench excavations and likely intercept ashy material which may pose a risk to workers or future site users. However, the trench excavations themselves will be backfilled with bedding sands and/or validated site won material, and constructed as per design presented in **Figure 1** in **Section 15**.

As such, the validation requirements for the deep trench excavations will involve:

- Visual inspection with photographic evidence confirming the placement of high-contrast geotextile material installed as a lining within all deep trench excavations.
- Where there are joins in the geotextile material section, the geotextile must be overlapping by at least 0.3 m and pinned in place.
- No residual soils to be visible on geotextile surface.

Where surrounding material around the trenches are within an area of nominated cut, then verification of this material will be captured under **Section 17** to confirm the suitability of site won material for reuse within the site.

16.4 Onsite Stormwater Detention Basin

An OSD basin is proposed in the northern portion of the site near the existing amenities building. The excavation will be up to 3 m deep and likely intercept ashy material which may pose a risk to workers or future site users. However, the excavation itself will be backfilled with tank bedding material as well as the OSD tank.

As such, the validation requirements for the OSD will involve:

- Visual inspection with photographic evidence confirming the placement of high-contrast geotextile material installed as a lining within the OSD excavation.
- Where there are joins in the geotextile material section, the geotextile must be overlapping by at least 0.3 m and pinned in place.
- No residual soils to be visible on geotextile surface.

Where surrounding material around the OSD are within an area of nominated cut, then verification of this material will be captured under **Section 17** to confirm the suitability of site won material for reuse within the site.

16.5 Site Won Materials

As outlined in **Section 15**, a large portion of the site, particularly the perimeters in the northern, eastern and southern, portion of the site will be cut (red areas) to a maximum depth of up to 0.2 m for the purposes of filling (green areas) the central and west portions of the site. Refer to **Appendix A - Figure 3** for an overview of the cut-to-fill plan with respect to the existing data.

Site won materials refer to any material which is cut at the site which is desired to be re-used within the site as general fill; to the exclusion of deeper light pole, trenches and OSD basin spoil which is expected to encounter deeper ashy materials.

Across the site, the 0.0 – 0.2 m fill horizon has been shown in many locations to be clear of unacceptable chemical concentrations in soil. Notwithstanding, given the number of locations which require hotspot removal within the near/at

surface profile, further assessment to confirm the suitability of soils from cut areas to be re-used within the site is required.

The sampling analysis and quality plan (SAQP) outlined in **Section 17** provides details on the validation sampling requirements for site won materials.

16.6 Remaining In-Situ Materials in Areas of Cut

Materials cut across the site will be assessed for suitability for re-use in accordance with **Section 16.5**, however the remaining and exposed in-situ soils where cut has occurred will require validation to confirm no unacceptable contamination remains at this surface.

The sampling analysis and quality plan (SAQP) outlined in **Section 17** provides details on the validation sampling requirements for at surface in-situ soils where cut has occurred.

16.7 PASS Verification

Where PASS/AASS are generated, the procedures for assessment, treatment and validation of the acid sulfate soils is to be undertaken in accordance with the ASSMP (EDP, 2025) which follows the acid sulfate soil verification procedures outlined in the DAWR, 2018a and DAWR, 2018b.

16.8 Imported and Disposed Materials and Material Tracking

To meet the imported material and material tracking requirements as outlined in **Section 15.6** and Error! Reference source not found., the validation requirements for imported material and material movements generally are provided in **Table 6**.

Table 6 – Materials Tracking

Material	Requirement	Yes / No
Quarried product	Compliance certificate with product and supplier details confirming material meets the definition of quarried material?	
	Evidence (such as a material inspection checklist) of visual inspection the material imported meets the quarried product certificate description upon arrival at site?	
	All imported material dockets and quantities have been retained and logged in the materials tracking system?	
VENM	Written VENM classification from a reputable environmental consultant confirming material meets definition of VENM?	
	Source site visited?	
	Representative sampling (spread and suite appropriate) to confirm material is VENM?	
	Evidence of acceptable quality control and quality assurance in the sampling with appropriate sampling methods?	
	Evidence (such as a material inspection checklist) of visual inspection the material imported meets the VENM classification upon arrival at site?	
	Imported Materials Verification Certificate (IMVC) completed for that material?	
	All imported material dockets and quantities have been retained and logged in the materials tracking system?	
ENM	Written ENM classification from a reputable environmental consultant confirming material meets the NSW EPA RRO definition of ENM?	

Material	Requirement	Yes / No
	Evidence of acceptable quality control and quality assurance in the sampling with appropriate sampling methods?	
	Sampling quantity and analysis results comply with the ENM RRO requirements?	
	Evidence (such as a material inspection checklist) of visual inspection the material imported meets the ENM classification upon arrival at site?	
	IMVC completed for that material, also confirming the material is suitable for import for the eventual land-use (under NEPM)	
	All imported material dockets and quantities have been retained and logged in the materials tracking system?	
Other RRO/RRE Materials	Written classification from a reputable environmental consultant confirming material meets that materials specific NSW EPA RRO definition (including Mulch)?	
	Sampling quantity and analysis results comply with those specific RRO requirements?	
	Thorough visual inspection of the material at source site with verification sampling completed at a ratio at least 1/250 m ³ , or a minimum of three samples per source or product type?	
	Other chemical analysis conducted as required dependant on the nature of the material?	
	Evidence of acceptable quality control and quality assurance in the sampling with appropriate sampling methods?	
	Evidence of an inspection of the material supplier's premises?	
	Evidence (such as a material inspection checklist) of visual inspection the material imported meets the waste classification upon arrival at site?	
	IMVC completed for that material, also confirming the material is suitable for import for the eventual land-use (under NEPM) and the RAC?	
	All imported material dockets and quantities have been retained and logged in the materials tracking system?	
Disposed Materials	Appropriately classified in accordance with the NSW EPA Waste Classification Guidelines?	
	Appropriately neutralised of PASS with supporting verification samples in accordance with the ASSMP	
	Waste classification unique identification number assigned to an in-situ or stockpiled material?	
	All intra-site movements of that material (from point of excavation to point of load) recorded in material tracking system?	
	All disposal information such as haulage contractor, truck ID, disposal facility, weigh bridge docket and waste classification the material disposed under all recorded on in material tracking system?	

17. SAMPLING, ANALYSIS AND QUALITY PLAN

17.1 Objective

The SAQP describes the sampling, analytical and quality program to be undertaken during the validation assessment on hotspots area, site won materials, as well as the in-situ soils surface area following earthworks cut. The objective of this SAQP will be to:

- Detail the validation sampling methodology to be utilised by the Environmental Consultant;
- Detail the sampling program for validation assessment with regard to sample density and location;
- Detail analytical requirements of validation assessment including methodologies and analytes; and
- Detail quality assurance/control (QA/QC) procedures throughout validation assessment.

This SAQP does not establish DQOs for validation aspects relating to waste, imported materials or deeper excavations. In these instances, reference should be made back to Section 16 for the relevant validation requirements. However, the sampling quality principles outlined in this SAQP will apply to all waste and imported material sampling.

17.2 Quality Assurance/Quality Control

Project specific quality QA/QC procedures must be adopted for the validation assessment to improve transparency, consistency, comparability, completeness, and confidence in the data collected. The field and laboratory QA/QC procedures, and compliance with the project's data quality objectives (DQOs) and data quality indicators (DQIs), which define the acceptable level of error required for the validation assessment, are outlined as follows:

17.2.1 Data Quality Objectives

Systematic planning and verification are critical to successful implementation of a validation assessment to ensure that the data is reliable and representative. A process for establishing DQOs for an investigation has been defined by the United States Environmental Protection Agency (US EPA). That process has been adopted by AS4482.1-2005 and referenced in NEPM 2013.

DQOs ensure that:

- The study objectives are set;
- Appropriate types of data are collected (based on potential sources of contamination and CoPC); and
- The tolerance levels are set for potential decision-making errors.

The DQO process is a seven-step iterative planning approach used to plan for environmental data collection activities. It provides a systematic approach for defining the criteria that a data collection design should satisfy, including when, where and how to collect samples or measurements, determination of tolerable decision error rates and the number of samples or measurements that should be collected. The seven-step process for this investigation is discussed and summarised in **Table 7**.

Table 7: Data Quality Objectives

Process	DQO
Step 1: State the Problem	Based on review of previous environmental investigation reports, there is contamination at the site including localised asbestos, TRH F3, PAHs (Benzo[a]pyrene) and lead. While these contaminants do not pose a risk at the site currently, the planned upgrade works at the site will disturb and potentially create new exposure pathways for this contamination to human receptors. The problem is how to can the earthworks and upgrade works at the site be undertaken while ensuring these contaminants do not pose a risk to construction workers or future site users.
Step 2: Identify the Decisions	To address the above problem, this remediation plan establishes a sampling and analysis approach to manage the contamination. This involves: ▪ Hotspot excavation and validation of all contamination impacts in near surface soils which will be disturbed during the works

Process	DQO
	▪ Verification of suitability of cut materials which are intended to be beneficially re-used on site. ▪ Validation of the remaining in-situ soils in areas of cut following earthworks The decision questions relating to these three validation aspects are as follows <u>Hotspot excavations</u> • Did the hotspot excavations extent to the correct depth and extent? • Were samples (analyte and quantity) appropriately collected within the hotspot excavations and do all final validation samples comply with the RAC? • Were all hotspot excavations visually clear of contamination impact? <u>Site won material</u> • Was a defensible sampling approach utilised and in accordance with the NSW EPA Sample Design Guidelines to allow a conclusion of suitability to be made on the assessed material? • Did all site won soil comply with the RAC? • Were all site won soil visually clear of contamination impact? <u>In-situ surface soils in areas of cut</u> • Was a defensible sampling approach utilised and in accordance with the NSW EPA Sample Design Guidelines to allow a conclusion of suitability to be made on the assessed material? • Did all in-situ soil results comply with the RAC? • Were all in-situ soils visually clear of contamination impact? <u>Overarching Decisions</u> • Is there a potential risk to human health and the environment in light of the proposed land use and sensitive receptors after remediation? • If there is residual contamination is identified following remediation, does this pose a potentially unacceptable risk to human health and the environment for the proposed land use?
Step 3: Identify Inputs in the Decision	The inputs required to make the above decisions were as follows: • Site setting and available background information and previous analytical data; • Selection of appropriate Tier 1 soil assessment criteria; • Visual observations; and • Field observation; • and laboratory analytical results (historical and based on the assessment).
Step 4: Define Boundaries of the Study	The boundary of the required validation assessment has been identified as the Timbrell Park boundary, as detailed in Figure A1, provided in Appendix A. The temporal boundaries of the validation works are the dates of fieldwork.
Step 5: Develop a Decision Rule	The adopted RAC within the remediation area assessed during validation assessment should be based on the ongoing land use (public open space – public park). <u>Decision Rules</u> • Where the data sets were not sufficiently populated to allow calculation of the 95% upper confidence limit (UCL_{mean}) then the individual results must be less than the adopted criteria. If all the individual results are below the adopted criteria, then no additional assessment and/or management is required. Where individual results exceed that adopted criteria, then further assessment and/or management is required. • In accordance with the NEPM 2013, where 95% UCL_{mean} of the average concentration for each soil analyte can be calculated, then the 95% UCL_{mean} must be below the adopted criteria; no single analyte concentration exceeds 250% of the adopted criteria; the standard deviation of the results must be less than 50% of the adopted criteria; and the normal distribution will only be used where the coefficient of variance is not greater than 1.2. Allowances to these decision rules apply where alternative 95% UCL methods that are not based on normal or log-normal distributions are adopted. • Where 95% UCL_{mean} results exceed the aforementioned criteria, then further assessment and/or management is required.

Process	DQO
	Asbestos contamination will be assessed based on exceedance of individual results, as statistical assessment is not applicable.
Step 6: Specify Limits on Decision Errors	The acceptable limits on decision errors applied during the assessment at the site and the manner of addressing possible decision errors were developed based on the DQIs of: Accuracy: a quantitative measure of the closeness of reported data to the true value. Comparability: a qualitative parameter expressing the confidence with which one data set can be compared with another. Completeness: a measure of the amount of useable data (expressed as %) from a data collection activity. Representativeness: the confidence (expressed qualitatively) that data are representative of each media present on the site. Precision: a quantitative measure of the variability (or reproducibility) of data. Acceptance Limits for Decision Errors The acceptable limits were as follows: - Individual or 95% UCLmean concentrations are below the adopted criteria; and 95% of the data satisfies the DQIs which were determined for completeness, representativeness, precision and accuracy of both field and laboratory data. Therefore, the limit on the decision error will be 5% that a conclusive statement may be incorrect.
Step 7: Optimise the Design	Targeted sampling methodology will be adopted in hotspots areas, cut area as well as on site won materials after remediation. In addition of visual observation during site inspection, Asbestos, PAHs (Benzo[a]pyrene) and lead will be adopted for the validation assessment to provide characterisation of the status of soil contamination. Refer to Section 17.2.6 for details on the sampling design for each of the three validation aspects.

17.2.2 Data Quality Indicators

EDP has selected the following DQIs for the validation assessment to ensure that the data obtained is of sufficient quality to be used to draw reliable and representative conclusions in regard to the decision rules adopted. The DQIs for the validation assessment are presented in **Table 8**.

Table 8: Data Quality Indicators

DQO:	Requirement:	DQI:
Precision		
Standard operating procedures appropriate and complied with	The sampling methods comply with industry standard and guidelines	Meet requirement
Field duplicates	1 per 20 primary samples analysed	Relative Percentage Differences (RDPs) <30%
Laboratory duplicates	1 per batch per analyte	RPDs <30%
Accuracy		
Trip and field blanks	1 per batch of samples	Results <Practical Quantitation Limits (PQLs)
Trip spikes	1 per batch of samples	Recoveries 70 to 130%
Rinsate blanks	1 per piece of reusable sampling equipment	Results <PQL
Laboratory matrix spikes	1 per batch per volatile/semi-volatile analyte	Recoveries 70 to 130%
Laboratory surrogate spikes	1 per volatile/semi-volatile analyte sample (as appropriate)	Recoveries 70 to 130%
Laboratory control samples	At least 1 per batch per analyte tested	Result <PQL
Representativeness		
Sampling methodology – preservation	Appropriate for the sample type and analysis	Meet requirement

DQO:	Requirement:	DQI:
Samples extracted and analysed within holding times	Specific to each analyte	Meet requirement
Field equipment calibration	All field equipment calibrated, and calibration records provided	Meet requirement
Laboratory method blanks	At least 1 per batch per analyte tested	Result < PQL
Comparability		
Sampling approach	Consistent with each sample	Meet requirement
Analysis methodology	Consistent methodology for each sample	Meet requirement
Handling conditions and sampler	Consistent for each sample	Meet requirement
Field observations and analytical data	Field observations support analytical results	Meet requirement
Consistent laboratory reporting limit	Consistent for each sample	Meet requirement
Completeness		
Sampling staff	Consistent sampling staff used	Meet requirement
Laboratory accreditation	NATA accredited laboratories and methods used	Meet requirement
Accredited methods	NATA accredited methods used appropriate for each analyte	Meet requirement
NEPM 2013 laboratory methods	Laboratory methods consistent with the ASC NEPM 2013	Meet requirement
Chain of custody documentation	Appropriately completed	Meet requirement
Field sampling decontamination	Appropriately completed	Meet requirement

In the event if any of the DQIs are not met, the following steps should be undertaken:

- Review information provided or obtained to identify the non-conformances.
- Determine the cause of the non-conformances.
- Identify the course of action required to rectify the non-conformances.

In the event the non-conformances cannot be rectified, assess how the non-conformance will significantly affect the usefulness of the data to determine whether the data will be used with discretion or be marked as invalid.

17.2.3 Field Quality Assurance Sampling Procedures

Fieldwork is to be undertaken by qualified and experienced Environmental Consultants in accordance with industry accepted standard practice and NEPM 2013.

Sampling is to be conducted in accordance with the sampling methodology detailed in **Section 17.2.6**, in addition to the following quality assurance procedures:

- Phosphate-free detergent to be used to clean re-usable sampling instruments between sampling locations.
- Sampling instruments to be rinsed in deionised water and sprayed with deionised water to minimise the potential for cross contamination to occur.
- Samples to be collected from soils not in direct contact with hand tools or machinery (where possible).
- Samples to be placed directly into laboratory supplied sampling jars with Teflon lined lids (soils) and sample bags (asbestos).
- Samples to be stored with ice before being transported to laboratory under chain of custody procedures.

17.2.4 Field Duplicate Samples

The purpose of field duplicate samples is to estimate the variability of a given characteristic or contaminant associated with a population.

Field duplicate soil samples should be collected from soil at the primary sample location by placing approximately equal portions of the primary sample into two additional sample jars. The duplicate samples must be labelled so as to conceal the relationship to the primary sample from the laboratory.

RPDs are to be calculated for each of the duplicate samples analysed. RPDs are calculated by dividing the difference between the primary sample and the duplicate sample by the average of the two.

When calculating the RPDs, the following procedures are to be considered:

- RPDs are only considered when a concentration is greater than the PQL; and
- In instances where results are greater than the PQL for the one sample, but below PQL for the corresponding primary or duplicate sample, a result equal to the PQL value is adopted where necessary in order to make a calculation possible.

17.2.5 Blank and Spike Samples

Rinsate blanks are to be used to assess the potential for cross contamination between sampling points by the equipment used. Rinsate blank samples (from an item of reusable sampling equipment) will be collected and analysed at a rate of one per piece of re-useable equipment per day of sampling. Concentrations of analytes are to be less than PQLs.

Trip blanks should be used to assess the potential for cross contamination between transit from the site to the laboratory. Field blanks should be used to assess the potential for cross contamination due to the atmospheric sampling conditions. Trip spikes should be used to assess the potential loss of volatile constituents from samples whilst in transit from the site to the laboratory.

Spike and blank samples must be analysed for volatile compounds and prepared by the primary laboratory, carried to the field unopened and subjected to the same preservation methods as the primary field samples.

17.2.6 Sampling Methodology

Sampling locations for the validation assessment should be selected on:

- Visual inspection for indications of contamination during the site inspection;
- Systematic sampling (gridded) pattern; and
- Accessibility of the proposed sampling location.

Samples shall be collected using the following methodology:

Hotspots areas:

Following excavation, soil validation samples are required to confirm that concentrations of PAHs (Benzo[a]pyrene) and heavy metals on the walls and base of the excavation are below the validation and remedial criteria, and no asbestos on the wall and base of the excavation. Systematic sampling method will be applied. The methodology include the following:

- One sample from each wall of the excavation, every 5 lateral meters;
- Visual inspection across the base of the excavation to confirm absence of asbestos or ashy materials;
- Collection of one sample per 25 m² (with a minimum of 3 samples) from the base;
- Soil samples will be recovered from accessible soils in each sampling location utilising hand or plant equipment where required, ensuring QA procedures are adhered to as detailed in **Section 17.2.3 – Section 17.2.4**;
- Soil samples will be collected in sampling containers provided by the analysing laboratory, ensuring sufficient sample is collected for the required analysis. All validation samples will include a:
 - 10L field screen sample using a 7 mm aperture sieve or material laid out on contrasting coloured plastic;
 - 500 ml soil samples for asbestos (AF/FA) analysis; and

- 250 ml soil sample for PAHs and heavy metals.
- All containers will be clearly labelled with unique sample identification;
- All samples will be stored with ice prior to dispatch and during transportation to the nominated laboratory under chain of custody procedures; and
- Samples will be submitted to a NATA accredited laboratory and analysed for asbestos (AF/FA), PAHs and heavy metals. Validation results will be assessed against the remediation criteria presented in **Section 13**.

Should samples fail validation, or the walls/base are found to contain asbestos or comprise ashy material at unacceptable concentrations, further excavation and validation will be required. Results will be documented within the validation report for the site.

Site won materials:

Site won materials must be assessed after excavation and before re-use on site for levelling, in accordance with the NEPM 2013 guidelines and NSW EPA *Sampling Design Part 1 – Application - Contaminated Land Guidelines*, to verify the suitability of the materials for proposed on-site use. It will be for the validation consultant to determine the sampling quantum depending on whether in-situ or stockpile assessment is undertaken, and the volumes of material.

- Soil samples will be recovered from accessible soils in each sampling location utilising hand or plant equipment where required, ensuring QA procedures are adhered to as detailed in **Section 17.2.3 – Section 17.2.4**;
- Visual inspection across the site won material to identify any evidence of asbestos or ashy materials;
- Soil samples will be collected in sampling containers provided by the analysing laboratory, ensuring sufficient sample is collected for the required analysis. All validation samples will include a:
 - 10L field screen sample using a 7 mm aperture sieve or material laid out on contrasting coloured plastic;
 - 500 ml soil samples for asbestos (AF/FA) analysis; and
 - 250 ml soil sample for PAHs and heavy metals.
- All containers will be clearly labelled with unique sample identification;
- All samples will be stored with ice prior to dispatch and during transportation to the nominated laboratory under chain of custody procedures; and
- Samples will be submitted to a NATA accredited laboratory and analysed for asbestos (AF/FA), PAHs and heavy metals. Validation results will be assessed against the remediation criteria presented in **Section 13**.

Should samples fail validation, or the material is found to contain asbestos or comprise ashy material at unacceptable concentrations, the materials must not be used on-site, and a waste classification should be conducted to classify the materials.

Footprint of cut area:

Due to known potential contamination in subsurface soils which will be exposed at surface after cutting / excavation, the validation assessment is required in the cut areas in accordance with the NEPM 2013 guidelines and NSW EPA *Sampling Design Part 1 – Application - Contaminated Land Guidelines*, to verify the suitability of the remaining in-situ materials.

Based on the size of the proposed cut area (approximately 32,067 m²):

- A minimum of approximately 45 samples will be required for the remaining in-situ soil validation works;
- Visual inspection across the cut area to identify any evidence of asbestos or ashy materials;
- Soil samples will be recovered from accessible soils in each sampling location utilising hand equipment where required, ensuring QA procedures are adhered to as detailed in **Section 17.2.3 – Section 17.2.4**;
- Soil samples will be collected in sampling containers provided by the analysing laboratory, ensuring sufficient sample is collected for the required analysis. All validation samples will include a:
 - 10L field screen sample using a 7 mm aperture sieve or material laid out on contrasting coloured plastic;
 - 500 ml soil samples for asbestos (AF/FA) analysis; and
 - 250 ml soil sample for PAHs and heavy metals.

- All containers will be clearly labelled with unique sample identification;
- All samples will be stored with ice prior to dispatch and during transportation to the nominated laboratory under chain of custody procedures; and
- Samples will be submitted to a NATA accredited laboratory and analysed for asbestos (AF/FA), PAHs and heavy metals. Validation results will be assessed against the remediation criteria presented in **Section 13**.

Should samples fail validation, or the exposed surface material is found to contain asbestos or comprise ashy material at unacceptable concentrations, further investigation on the extent and status of the area will be required. Results will be documented within the validation report for the site.

17.3 Site Remediation and Validation Report (SRVR)

Following the conclusion of the remedial works, the environmental consultant must prepare a SRVR. This SRVR must detail:

- The methodologies used in the remediation of the site;
- Site validation inspection and sampling events conducted throughout the remedial works;
- Compliance of the remedial works with the RACs, visual inspections and photographic documentation and site surveys;
- Compliance with the critical hold points; and
- The findings of the validation assessment.

The SRVR must be prepared in consideration of the SAQP provided in *NSW EPA Contaminated Land Guidelines, Consultants Reporting on Contaminated Land 2020*. The SRVR must come to a conclusion as to whether the site can be considered suitable for the proposed use following the completion of the remedial works, in accordance with the adopted legislative guidelines.

To verify the validation works conducted, the SRVR must include:

- Visual inspection by the environmental consultant of the site pre and post remediation works, including photographic evidence;
- Validation sampling and analysis in accordance with the SAQP detailed in this RAP (**Section 17**);
- Validation evidence, including photographic evidence of asbestos removal works, cut works, pole and OSD installation, trench works, and associated geotextile layer installation;
- Validation of documentation and analytical data for all imported materials;
- Summary tables of analytical results compared with adopted criteria;
- Imported materials dockets or other information such as truck run sheets, number of truck bogeys, volumes etc for all imported materials; and
- Reconciliation summary identifying waste classification certificate, disposal volume from dockets, and Environmental Protection License (EPL) number of receiving site and importation volumes from dockets or other documentation (if required).

Other information may include waste classification of unsuitable materials, unexpected finds responses and results of asbestos air monitoring.

18. POST-REMEDATION CONCEPTUAL SITE MODEL

After the remediation, the CoPCs associated with the proposed land uses, the source-pathway-receptor linkages assessment, and the risk assessment were presented in **Table 7** below:

Table 7: Post-remediation Conceptual Site Model

Location	Source of contamination	Potential Contaminants	Potential Exposure Pathways	Potential Human and Environmental Receptors	Assessment of Risk
- Hotspot remediation (localised to areas of cut); - Light pole area; - On-site detention basin; - Trenching for drainage infrastructure; - Central Portion; and - Surface reticulation infrastructure/grading and levelling.	- Anthropogenic deposits of historical landfill material; - Deposits of dredged material; - Uncontrolled importation of soil material to form the suspected capping layer; and - Historical demolition waste of small structures	Heavy metals, PAHs, TRH and asbestos	- Downward migration and leaching of contaminants via infiltration of rainwater through the soil; - Lateral migration via groundwater to surface water and off-site; - Overland flow of surface water to off-site soils and surface water; - Absorption or adsorption to fauna and vegetation through contact and diffusion in soil; - Dispersion of airborne particulates due to wind; and - Inhalation, ingestion, dermal contact.	<u>Human receptors:</u> - Current site users and maintenance; - Future construction and maintenance workers, and site users; and - Current and future site users on neighbouring properties. <u>Environmental Receptors:</u> - Transient fauna or macroinvertebrates; - Vegetation; - Groundwater dependent ecosystems; and - Surface waters such as the Iron Cove Creek and Parramatta River.	Health: Low – SPR linkages likely incomplete. Environment: Low – SPR linkage potentially incomplete for surface water, groundwater and ecology.
- Hotspot remediation (localised to areas of cut); - Light pole area; and - On-site detention basin.	Excavation and Stockpiling of Actual ASS (AASS) and/or Potential ASS (PASS) soils	- AASS / PASS; and - Asbestos	- Migration of acidic leachate / runoff to surface water or infiltration to groundwater; - Rill and gully erosion, salinisation and scarring of landscape; and - Acid corrosion of onsite structure.	<u>Human Receptors:</u> - Site maintenance workers or users coming into contact with impacted soils; and - Weakening of onsite structures and affecting users. <u>Environmental Receptors:</u> - Groundwater; and - Surface waters such as the Iron Cove Creek and Parramatta River, and their catchments.	Health: Low – Unlikely impact of AASS/PASS to human health if site ASSMP is followed Environment: Low – SPR linkages potentially incomplete for surface water, groundwater and ecology

19. SITE ENVIRONMENTAL CONTROLS

19.1 Overview

The remediation of the site must be carried out in a manner that does not harm or degrade the environment (both on-site and off-site). All people involved in the project must ensure the protection of the environment throughout the duration of the works with special consideration of the following:

- Work procedures;
- Control of fugitive emissions;
- Dust control measures;
- Erosion, sediment and surface water management;
- Equipment cleaning and operation; and
- Stockpiles.

19.2 Work Procedures

19.2.1 Establishment and Site Preparation

Prior to commencement of remediation activities, the Principal Contractor shall prepare a work site management plan. The objectives of the work site management plan are:

- To protect the health of site workers, adjacent landowners and the general public during remediation works; and
- To ensure workers do not negatively impact on potential environmental receptors and comply with applicable environmental legislations.

A control strategy must be proposed within the plan for the management of all possible sources of exposure or dust release on the site.

The following are the major points that need to be considered in the work site management plan:

- Safety of personnel both on and off site.
- Responsibility for the supply and application of isolating materials (e.g. ropes, barriers, plastic screens, waste containers, warning signs, etc), if required.
- Limiting access to remediation area.
- Perimeter/security fencing and erosion control.
- Transport facilities.
- Availability of water and drainage.
- Staff amenities.
- Protection of adjacent residential structures.
- Waste disposal responsibilities and clean-up requirements.
- Notification to, and approval from, regulating authorities where necessary.
- Cleanliness standards that much be achieved to fulfil the contract.

The site management plan must comply with the Canada Bay DCP, development consent conditions and other applicable guidelines or legislations.

19.2.2 Site Boundaries and Fencing

Warning signs at the boundaries of the remediation areas (at least 10 m from the removal areas) should be labelled “NO UNAUTHORISED ENTRY”. Signs must conform to AS 1319-1994 – *Safety Signs for the Occupational Environment*.

Entry to the remediation area shall be restricted to personnel directly engaged in the soil remediation. Other persons entering the area shall be required to observe the appropriate safety precautions for that area.

19.2.3 Supervisory Personnel

Supervisory personnel shall have a detailed knowledge of the precautions and procedures demanded by contaminated soil remediation and clean-up. In the light of this knowledge and personal experience, supervisors shall assume the following responsibilities:

- The total remediation procedure; the setting up, the actual remediation (i.e. excavation and offsite disposal) and final cleaning operation.
- Ensure that all necessary measures are taken to reduce the airborne dust, and that in any case workers are not exposed to levels exceeding the national exposure standards.
- Arrange for, and assess results of, air monitoring where appropriate.
- Ensure that all workers under their supervision are adequately trained in the safe working practices associated with working on construction sites.
- Ensure that the remediation of the contaminated soil is continually supervised and that the operation is carried out in a safe and proper manner.
- Ensure that personal protection equipment (PPE) is available to all workers and maintained in good condition.
- Ensure that the remediation site is maintained in a clean condition, that waste is quickly and properly disposed of and that the personal hygiene procedures are continually observed.

19.2.4 Emission Controls

Wetting of all work areas, where active soil disturbance shall occur that day, shall begin prior to the start of the disturbance activities. Wetting shall be conducted as appropriate, based on the visual observations made by the supervisory personnel. This may be done by hand or using mechanical sprayers.

Maintenance wetting shall occur at the close of each workday in preparation of the following day's work zones. If maintenance wetting from the previous workday appears adequate (in other words, preliminary movement of machinery to a work zone must not yield emissions), and passes inspection, additional initial wetting will not be required. Wetting shall occur to prevent the possible emission of material during the movement of equipment to another location. Care must be taken to assure that the application

of water does not produce emissions from the ground surface and that there is not excessive over-watering.

During the actual soil disturbance activity, water shall be applied to the site of the disturbance, as appropriate, to suppress any visible emission. In general, personnel tasked with misting duties must be assigned to each soil disturbance area to complete this activity. Fine spray misting shall be undertaken using a hose with spreading head to ensure even misting occurs.

19.2.5 Wind Speed Work Stoppage

The application of a wind speed work stoppage requirement is designed to control fugitive emissions due to increased air velocity. In the event of high wind speeds, excavation work must be stopped at the site until wind speeds are reduced to a speed that shall not generate visible emissions from the site. For the purposes of this site, work must be stopped when:

- Wind speeds reach a sustained 40 km/h; or,
- Any wind speed at which particulates are observed by site personnel to be entrained in the air stream.

If site-specific weather creates conditions that may result in fugitive emissions, work stoppage may occur at wind speeds less than specified above based on decisions of the site supervisor. The site supervisor shall make the decision as to when it is appropriate to restart.

19.2.6 Dust Control Measures

Prior to any intrusive works or other disruptive activities carried out on site, consideration must be given to how the work or activity can be undertaken with minimal dust generation. All works should be undertaken with control of dust as a priority. The dust control or avoidance measures should be documented in a SWMS, or similar, prepared for the proposed works. Secondary controls, such as the wearing of respirators should also be considered during potential dust exposure.

Should any unexpected hazards

rise, the client should be contacted immediately so that the risks (health or safety) can be re-evaluated and the appropriate level of management and/or protection can be implemented prior to the recommencement of any works.

The following procedures and techniques will aid to control dust generation:

- Erection of dust screens around the perimeter of the site;
- A tarpaulin (or equivalent) will securely cover all loads of soil material entering or leaving the site (if applicable);
- Water sprays should be used across the site over unsealed or bare surfaces;
- Plastic sheeting should be used by the Principal Contractor to cover excavation faces and stockpiles where necessary; and
- Materials at the site should be processed, handled, moved and stored in a proper and efficient manner in order to minimise exposure.

If the above procedures and techniques are not sufficient to control dust, then further contingency measures may include:

- Reducing the area of disturbed surfaces;
- Installation of perimeter sprays on the remediation site boundary fencing;
- Conducting work in more favourable weather conditions;
- Modifying the manner in which excavation work is conducted at the site;
- Using different equipment which generates less dust; and
- Using equipment in more favourable weather conditions.

19.2.7 Spills and Leaks

On site control measures must be in place throughout the remediation works to protect the surrounding environment from spills and leaks:

- Construction of stormwater retention basins or diversion drains (if required);
- Presence of an emergency supply spill control equipment, such as oil absorbent materials; and
- Containment of any storage tanks or drums within bunded areas, which have the capacity of 110% of the largest tank contained, or 25% of the total volume of all drums, whichever is greater.
- Works required within this RAP do not contain activities that will require any liquids to be stored on site, with the exception of fuels for machinery. These shall be kept to a minimum at all times.

19.3 Erosion, Sediment and Surface Water Management

19.3.1 Approach

An important part of the remedial works shall be the management of erosion, sediment and surface water. The strategy to be adopted must aim to:

- Prevent soil erosion at the site; and
- Protect off site waters and sediment from being polluted by onsite sources.

The strategy shall involve the installation and operation of a number of environmental control measures that shall be progressively implemented as work progresses across the site. The design approach adopted must satisfy the following principles:

- Control water flow from the top of the site, through the works and out the bottom of the site via the construction of earthen bunds to regulate water flow;
- In the case of an extreme rainfall event, overflow water from unremediated areas shall be filtered through straw bales and silt fences prior to discharge from the fill area. Given the short duration of the remediation program, the probability of an extreme event occurring is considered to be low; and
- Rehabilitate disturbed lands as quickly as possible.

Regular maintenance of all erosion, sedimentation and pollution control devices shall be undertaken to ensure their continuing effective and efficient operation.

19.4 Noise and Vibration Control Measures

Noise and vibration levels must be controlled throughout the project. Special precautions must be taken to avoid nuisance in neighbouring areas, particularly from machinery, vehicles and warning sirens. The control measures to be implemented shall include the following:

- All construction vehicles involved in the remediation project must generally enter and leave the site in accordance with specified site entry controls; and
- Use of suitable construction techniques and methodologies.

19.5 Equipment Cleaning and Operation

Throughout the remediation works, controls must be placed on the operation and movement of equipment. General procedures that shall be implemented include the following:

- Equipment working within an excavation area must be washed inside the area so that any wash water shall run into the excavation. Wash waters shall be allowed to naturally evaporate or be removed from the excavation area along with ponded surface water;
- Equipment washing facilities must be provided for the effective cleaning of equipment after they have been exposed to contaminated fill, and prior to their leaving the site. The facilities shall also be used to clean other earthmoving plant and equipment use
- on site;
- All vehicles transporting materials on site shall be operated in a manner so as to prevent any loss of materials during loading, transport and unloading activities; and
- Any storage tanks or drums used for fuels or liquids shall be bunded and bund shall contain at least 110% of the largest tank contained or 25% of the total volume of all drums, whichever is the greater, and the bund shall not be penetrated by any services.

19.6 Stockpiles

- Exposed or excavated fill materials or soils containing or suspected of containing significantly contaminated materials must not be left unattended.
- If it is necessary to leave the site unattended, the fill materials or soils must be dampened to prevent generation of dust and placed back in the excavation and the surface cover reinstated to prevent exposure to these materials from users of the site.
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets.
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered.
- All stockpiles of contaminated soil shall be stored in a secure area and be covered with weighted geofabric or high-density polyethylene sheeting if remaining more than 24 hours.

19.7 Remediation Schedule

It is recommended that site remediation activities be coordinated with other trades to prevent unauthorised personnel from being present in the remediation area. Works are not considered complete until the SRVR is provided.

19.7.1 Hours of Operation

This remediation process must be conducted in normal site hours only. No machinery or trucks must operate on site outside of the following times unless authorised by the Council:

Monday to Friday:	7 am to 6 pm
Saturday:	Subject to development consent
Sundays:	Subject to development consent
Public Holidays:	Subject to development consent
Night Work:	Subject to development consent

19.7.2 Potential Effects on Community and Environment

There is a potential for fugitive dust generated during the excavation and loading of trucks. The site supervisor must arrange the following dust control measures:

- Hosing with fine spray of water on exposed surfaces particularly during hot windy days.
- Hosing vehicles and covering loads prior to movement on site and especially prior to leaving the site (if required).
- Ensure all public roadways are kept as clean as possible.

All noise producing equipment should meet the requirements of *POEO Act 1997* and *POEO Act (Noise Control Regulations) 2008*. All contractors must ensure work times are adhered to.

The control of odours during excavations must be monitored during the remediation process. Should odours be detected beyond the site boundary, suppressant equipment must be deployed immediately to control odours entering nearby properties. All work must cease upon the detection of odours outside the property boundary. Commencement of work may take place once odours are controlled and validated by a suitably qualified professional.

19.7.3 Personnel

Prior to commencement of the remediation works the Principal Contractor must prepare a complete list of remediation contacts including site personnel. Personnel must hold the required certificates to complete the works required.

20. CONTINGENCY PLANNING

20.1 Overview

The unexpected conditions that could feasibly occur at the site include:

- Validation criteria failure;
- Surplus of contaminated materials;
- Unknown types of materials / unexpected finds (e.g. friable asbestos, coal tar, liquid wastes);
- Broad scale contamination;
- The generation of unacceptable dust;
- The generation of unacceptable odours;
- The generation of unacceptable noise and or vibration levels; and
- Spills or leak of hazardous materials.

Procedures that shall be used to address these contingencies are provided in the following sections.

20.2 Validation Criteria Failure

In the event that any of the validation criteria are not met, or that validation assessment determines that remedial actions have not mitigated the risks posed by the identified contamination, additional remediation and/or assessment will be required.

20.2.1 Remediation Acceptance Criteria Exceedance – Residual Materials

In the event that validation sampling and analysis shows an exceedance of the RAC for CoPC, within the residual materials at the site, the following must occur:

- Inspection of the site and the area of exceedance by Environmental Consultant;
- Review of remediation/excavation methodology;
- Additional remedial action (e.g. further excavation and offsite disposal); and
- Additional validation assessment including sampling and analysis to be conducted.

20.2.2 Remediation Acceptance Criteria Exceedance – Imported Materials

In the event that validation sampling and analysis shows an exceedance of the RAC for CoPC, within the materials imported onto the site, the following must occur:

- Reload imported materials and return to the site of origin or dispose of to an appropriately licensed facility in consideration of the *NSW Waste Classification Guidelines*;
- Import suitable ENM and/or VENM materials in consideration of the RAC specified in this RAP; and
- Subject newly imported materials to validation assessment in accordance with this RAP.

20.2.3 Unknown Types of Materials / Unexpected Finds

If any unknown materials are encountered during remedial works due to the observation of any unusual physical/sensory characteristics of the material (i.e. odours), the following process must be implemented:

- Work must immediately stop and the unexpected find area must be isolated;
- Environmental Consultant must inspect the area to identify the chemical/condition that has been observed;
- Environmental Consultant must engage in communication with the site auditor
- The extent of the unexpected find must be delineated;
- Develop a plan to manage any identified unacceptable risk associated with the unexpected find;
- Consult with the environmental consultant, Council, site auditor and any other stakeholder, as appropriate;
- Amend the RAP as necessary to include the additional remediation and validation of the unexpected find; and
- Implementation of the amended RAP.

20.2.4 Expected Finds (localised)

- Should localised ashy fill material or asbestos be uncovered during remediation works, remediation should be undertaken as per the remedial strategy in **Section 13**.
- The remediation strategy should be excavation of contaminated materials to the design level, off site disposal and covering the
- If wide-scale contamination is uncovered during development excavations, these would need to be covered under Broad Scale contamination in **Section 20.5** below.

20.2.5 Broad scale contamination

- Should broad scale contamination be uncovered during development works (e.g. but not limited to, encountering wide spread ashy fill across the surface, pockets of asbestos contamination, landfill material) that is considered to make the preferred remedial strategy of excavation and off-site disposal non-viable, then then consideration should be given to on-site management as the next alternative preferred remediation approach.
- Should on-site containment be required, an addendum to this RAP should be undertaken detailing the capping strategy
- On-site management would typically involve a capping and/or containment strategy which would generally involve the installation of a high visibility marker layer, followed by a compacted capping layer (usually 300 mm thick) underneath the topsoil layer. Other capping solutions can be a hardstand layer (such as a carpark, concrete footpath, pavement or similar).
- The site will then require an Long Term Environmental Management Plan (LTEMP) to detail the long term management requirements of the contaminated material.

20.2.6 Generation of Unacceptable Dust

Dust levels should be monitored during the remediation works. Dust suppression must occur throughout all earthworks conducted at the site as part of the remedial works. Consideration should be given to weather conditions (e.g. wind) throughout the remedial works with regard to the potential to generate dust. Should community complaints be registered regarding dust throughout the works, all works must cease, and dust mitigation measures should be revised.

20.2.7 Generation of Unacceptable Odour

Monitor ambient air levels and ensure site workers are using appropriate respirators if required. Ensure odour management procedures in place including (but not limited to):

- Covering of stockpiles;
- Mist sprays; and
- Hydrocarbon odour suppressants.

If odours are detected at areas around the site during the remediation works, photoionisation detector (PID) measurements should be obtained by the onsite environmental consultant. If PID readings >30 ppm are recorded, respiratory protection should be worn by workers in the vicinity of the odour, and if readings >300 ppm are recorded, odour suppressants should be applied.

Due to the nature of the identified contaminants and EDP's understanding of the site, it is not expected that unacceptable odours will be generated throughout the remedial works.

20.2.8 Generation of Unacceptable Noise/Vibration

Monitor noise levels during the works and implement mitigation measures if exceedances of the adopted criteria are recorded.

All machinery and equipment used onsite must be in good working order fitted with appropriate silencers when necessary and all equipment will be operated in an efficient manner. The Principal Contractor must adopt suitable methodology to ensure that vibrations will not cause damage to structures located at the site and on adjoining land. In addition, the relevant provisions of the POEO Act 1997 must be satisfied at all times.

20.2.9 Spills or Leaks of Contaminated Materials

In order to mitigate the potential risks associated with spills and leaks of contaminated materials, the Principal Contractor must ensure that a suitable 'Spill Kit' is present at the site throughout the remediation, and that site supervisors are familiar with the use of said kit.

In the event that a leak or spill occurs, the following procedure must be adhered to:

- Identify and stop source of soil/leak;

- Clean up spill/leak with spill kit (as appropriate);
- If appropriate, engage environmental consultant to assess impact of spill/leak;
- Isolate impacted material and store in designated area until it can be appropriately disposed of; and
- Review procedures to reduce future spill/leak incidents.

21. WORK HEALTH AND SAFETY

The Principal Contractor must prepare a Work Health and Safety Plan to establish standard health and safety procedures for the personnel involved in the remedial works at the site.

Areas to be addressed in the plan include but are not limited to:

- Identification and management of hazards, including:
 - Exposure and possible absorption through skin of contaminants;
 - Inhalation of volatile contaminant vapours;
 - Slips, trips, bumps, falls, falling objects, crushing injuries typical of every construction related job site;
 - Fire or explosion; and
 - Physical hazards, noise and hot weather.
- General work procedures for personal hygiene;
- PPE requirements; and
- Emergency management.

22. COMMUNITY CONSULTATION

To ensure the local community that has the potential to be impacted by the proposed works has the option to consult throughout the project, EDP recommend provision of site contact information shall be provided at the site, with communication and complaints to be managed by the Principal Contractor. In consideration of the nature of the required works, EDP recommends that the Principal Contractor selected for the project have a robust complaints process.

23. LONG TERM ENVIRONMENTAL MANAGEMENT PLAN

If isolation of contaminated materials is required, (which will be required if widespread contamination is encountered), a site-specific LTEMP will be required. The objective of a LTEMP is to document mitigation measures and/or monitoring requirements, where full clean-up is not feasible, or on-site containment of the contamination is proposed.

The LTEMP is required to outline the as-built site condition, type and location of contamination, and management strategies for monitoring and maintenance of the site. The LTEMP must state its objectives and describe:

- The nature and location of contamination remaining on site;
- What long-term site management is needed to ensure the ongoing protection of human health and the environment on- and offsite; and
- A mechanism for enforcement of the monitoring.

This LTEMP is required to ensure the site remains suitable for the proposed land use (public open space), detailing methodologies for engaging with encapsulated subsurface materials in the future, should it be required.

The LTEMP must be prepared in accordance with *NSW EPA Contaminated Land Guidelines, Consultants Reporting on Contaminated Land 2020*. This LTEMP must be made to be legally enforceable and publicly notifiable. The LTEMP must present a suitable enforcement and notification mechanism.

24. CONCLUSION

Subject to the successful implementation of the measures detailed in this RAP and appropriate validation reporting following the remedial works, it is considered that the site can be rendered suitable for the proposed land use as a public open space.

Documentation of the success of remediation is required in a subsequent SRVR at the conclusion of remedial works.

All works should also be carried out in accordance with the ASSMP (EDP,2025) for the site.

Should on-site containment be required, an LTEMP should be prepared.

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STATEMENT OF LIMITATIONS

This document has been prepared in response to specific instructions from the client to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by the client and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, EDP advises that the report should only be relied upon by the client and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and EDP should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

EDP is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

Reliance on Information Provided by Others

EDP notes that where information has been provided by other parties in order for the works to be undertaken, EDP cannot guarantee the accuracy or completeness of this information the client therefore waives any claim against the company and agrees to indemnify EDP for any loss, claim or liability arising from inaccuracies or omissions in information provided to EDP by third parties.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of the client and EDP recognises that the client will consider their specific needs and the business risks involved. EDP does not accept any liability for losses incurred as a result of the client not accepting the recommendations made within this report.

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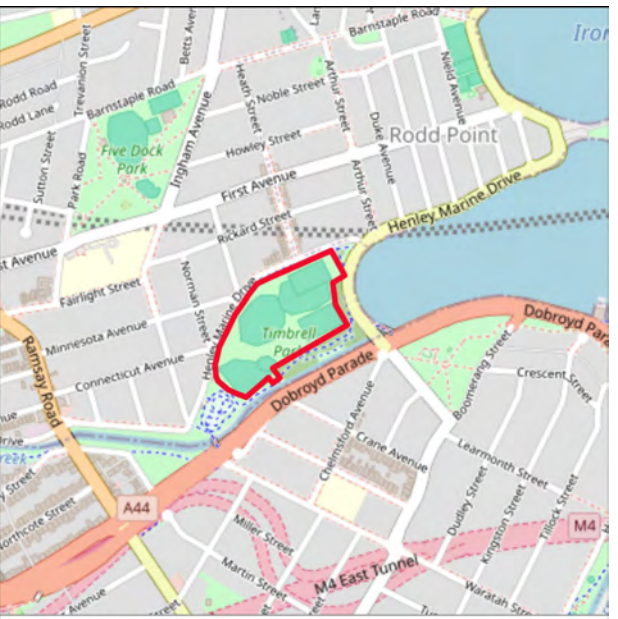
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Appendix A: Figures

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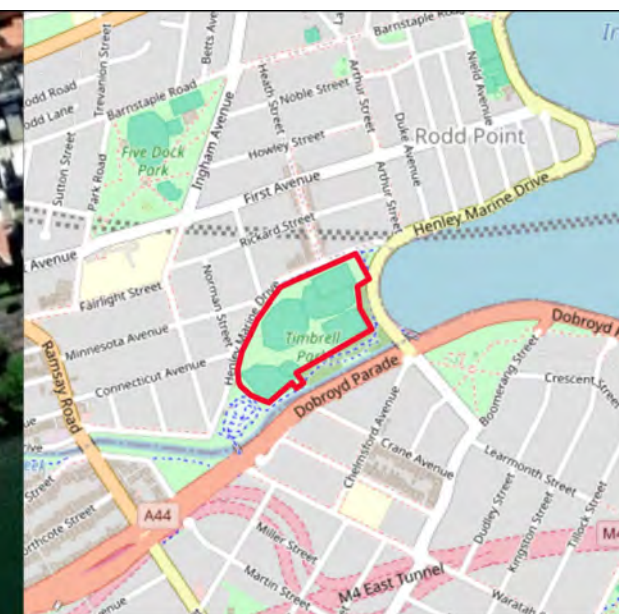
Legend

 Site Boundary

0 25 m 50 m
© Mapbox



Produced by **Datanest.earth**

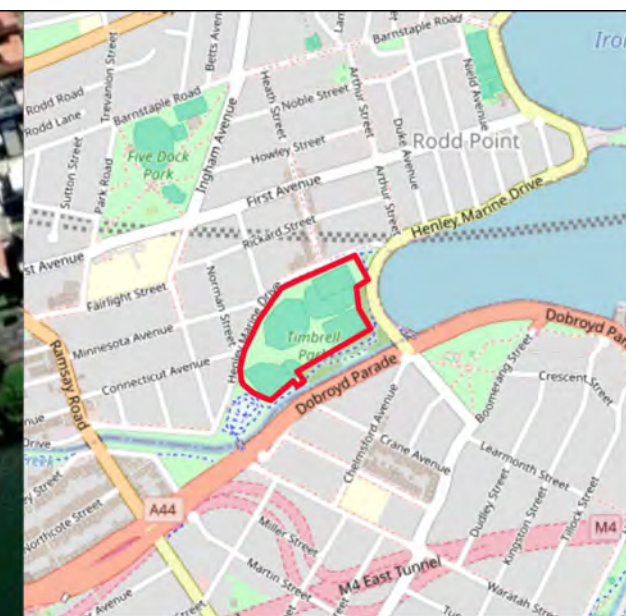


- Legend**
- Site Boundary
 - B(a)P TEQ and lead > HIL/HSL C (EDP 2023 DSI)
 - B(a)P TEQ < HIL/HSL C (EDP 2023 DSI)
 - B(a)P TEQ > HIL/HSL C (EDP 2023 DSI)
 - Appro. location that B(a)P > adopted criteria (EIS 2010)
 - Asbestos (fibre) > 1mbgl (EDP 2023 DSI)

0 25 m 50 m
© Mapbox



Produced by **Datanest.earth**



0 25 m 50 m
© Mapbox



Produced by **Datanest.earth**

Appendix B: Redevelopment Design Plans

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Improved Pedestrian & Bicycle Circulation

- The masterplan incorporates several shared path proposals for Timbrell Park into a cohesive circuit around the periphery, enhancing connections with existing and future links to the surrounding area.
- New Paths/Connections consist of:
 - 1 New shared path to the edge of Iron Cove Creek with pathway lighting consistent with best practice CPTED design to encourage the safe use of the park after dark.
 - 2 Upgraded shared path to northern & western edges of sports fields.
 - 3 Upgraded shared path on eastern edge of Timbrell Drive
 - 4 Separated pedestrian and bicycle entry to Timbrell Park from the Bay Run with upgraded pedestrian crossing over Timbrell Drive.
 - 5 Maintain existing footbridge across stormwater canal to link with proposed TfNSW pedestrian bridge across Dobroyd Parade.
 - 6 Connection of new & existing paths with the proposed shared path in the Iron Cove Creek Canal Naturalisation works.
- Investigate further options to enhance pedestrian and cyclist access to the park

Upgraded Sports Fields

- The sports fields will be regraded to offer an enhanced playing surface with improved drainage to reduce the risk of flooding.
- The fields are multipurpose and can accommodate Touch Football, Soccer, Cricket, Baseball & Tee-Ball.
- Consider upgraded lighting for training and competition needs.
- Potential development of the nets as a multipurpose cricket/basketball facility.

The Living Room

- 8 The 'Living Room' will replace the existing demountable Cafe adjacent to Livvi's Playspace with a permanent facility with a larger kitchen/prep space, indoor & covered outdoor seating options, additional storage rooms and an additional indoor general-use community space.

Fitness Zone

- 9 Located adjacent to Livvi's Playspace, the fitness zone will offer a variety of exercise equipment suitable for all ages.

Parking Strategy

- 10 Investigate options to increase parking capacity to mitigate the impact on local streets and residents without impacting usable recreation space.

Urban Tree Canopy

- Maximise opportunities for urban tree canopy expansion across the park with no impact on sports field areas.



Appendix C: Soil Profile Report

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Timbrell Park

Sportsfield Profile Investigation February 2025

The City of Canada Bay Council

Executive Summary

Timbrell Park was inspected on Thursday 27 February, as part of the proposed field upgrade works in coordination with Canada Bay Council.

- At the time of testing, the turf surface was in fair to good condition
- As observed at the time of inspection, botanical composition being made up of approximately 85% Kikuyu (*Pennisetum clandestinum*) 10% various Couch grass (*Cynodon sp.*) and 5% either weed content or bare soil
- No automated irrigation system is currently installed
- The average depth of the usable Loamy Sand topsoil is 182 mm
- An Ash band was found below the loamy sand ranging from 50 mm to 260 mm in width.
- Base material differed from a sand to heavy orange clay

Test hole images can be found in Appendix B

Methodology

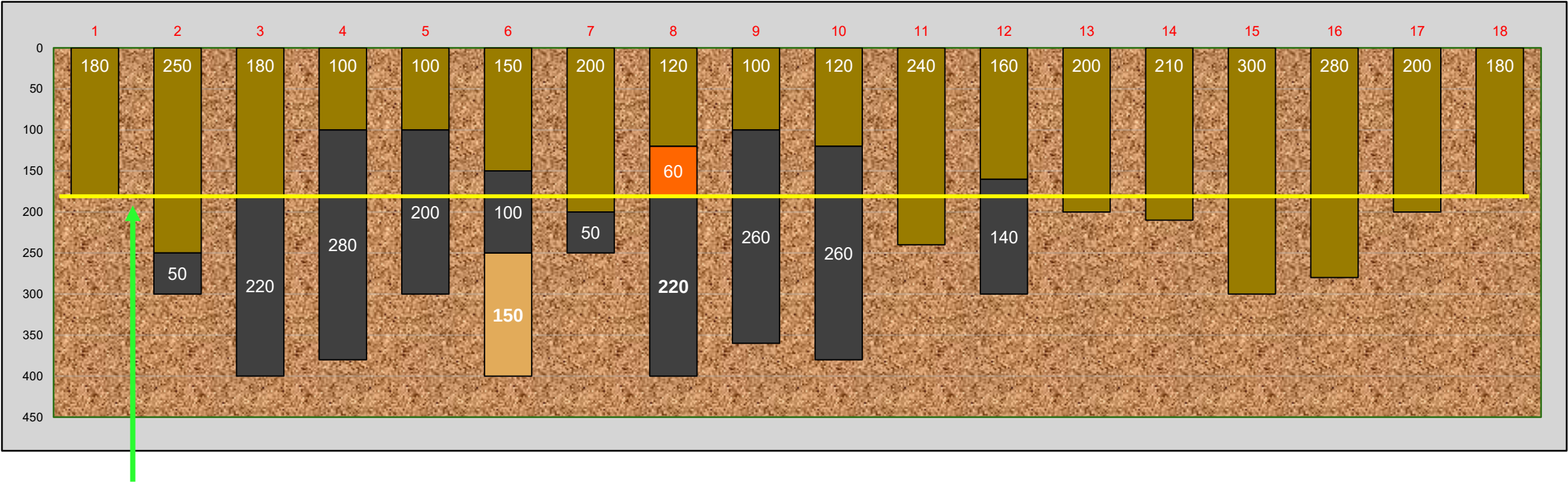
- Eighteen (18) inspection holes were dug across select locations to allow evaluation of the soil profile.
- The objective of digging these pits was to determine any significant variation in sub surface soil components, and the depths of notable profile horizons.
- Pits were approximately 300mm x 300mm and up to 500mm deep (*where applicable*) Findings shown in Appendix B
- Each test hole location has been plotted using GPS coordinates via the Pogo Turf pro Mapper (image right)



Observations/ Findings

Test Hole	Turf Type	Soil Type	Found to a depth of	Soil Type	Found from a depth of	...to	Soil Type	Clay Base layer at..	...to	Comment
1	Kikuyu	Loamy sand/ gravel	180	Compacted Ash	180					Very hard Ash / gravel layer
2	Kikuyu	Loamy sand	250	Ash	250	300	Clay	300		
3	Kikuyu	Loamy sand	180	Ash	180	400	Ash			Extremely hard digging through Ash layer
4	Kikuyu Paspalum	Loamy sand	100	Ash	100	380	Ash			
5	Mixed sward	Loamy sand	100	Ash	100	300	Ash			
6	Mixed sward	Loamy sand	150	Ash	150	250	Sand	250	400	
7	Mixed sward	Loamy sand	200	Clay	200	250	Ash	250		
8	Kikuyu	Loamy sand	120	Clay	120	180	Ash	180	400	
9	Mixed sward	Loamy sand	100	Ash	100	360	Ash			Shell grit in sand layer
10	Kikuyu	Sandy loam	120	Ash	120	380	Ash			Very dry upper profile
11	Kikuyu	Sandy loam	240	Clay	240					Very dry upper profile
12	Kikuyu	Sandy loam	160	Ash	160	300	Clay	300		Signs of potential Ground Pearl in Kikuyu
13	Kikuyu	Loamy sand	200	Clay	200					Heavily compacted clay rock base
14	Mixed sward	Loamy sand	210	Clay	210					Heavily compacted clay rock base
15	Kikuyu	Sandy loam	300	Clay rock	300					
16	Kikuyu	Sandy loam	280	Clay rock	280					
17	Kikuyu	Sandy loam	200	Clay	200					
18	Kikuyu	Loam	180	Clay	180					

Observations/ Findings



Average depth of “usable topsoil”
182 mm

Observations/ Findings



Majority of the upper profile was a brown loamy sand to an average depth of 182 mm

Below the upper profile loamy sands was a very heavily compacted Ash band with an average band **width** of 189 mm

Common base material was a compacted orange clay (right) and clean sand (image left)



Observations/ Findings

- Images below show the surface generally though to be in fair to good condition at time of assessment
- Predominantly Kikuyu (*Pennisetum clandestinum*) coverage with areas of various Couch grass (*Cynodon sp.*) species throughout the site
- Greatest weed pressure from Paspalum (*Paspalum dilatatum*) Image left.
- Images centre and right show areas of possible Ground Pearl insect damage. Less prevalent on the Couch grass species.
- Overall surface levels were fair



Recommendations

The following amelioration recommendations will ultimately improve soil structure and transform the existing surface/ profile to a free draining profile, whilst still having the ability to hold adequate nutrients for suitable plant growth.

1. Cultivate the existing vegetation and loam rootzone incorporating Aweganic Matta and Gypsum to create a more suitable growing medium.
2. Remove obsolete in ground fixtures
3. Regrade surface to a more desirable finished surface level, minimise topsoil soil movement, achieve a zero cut and fill ratio producing uniform grades that take advantage of the natural fall of the land.
4. Install irrigation and full sand slit drainage system concurrently to avoid conflict
5. Replacement of the current turf sward with a vigorous Couch grass variety such as Tahoma 31.
6. Implement an annual turf management plan, inclusive of nutrition, weed prevention and plant protection

Appendix B

Test Hole 1



Test Hole 2



Appendix B

Test Hole 3



Test Hole 4



Appendix B

[Test Hole 5](#)



[Test Hole 6](#)



Appendix B

Test Hole 7



Test Hole 8



Appendix B

Test Hole 9



Test Hole 10

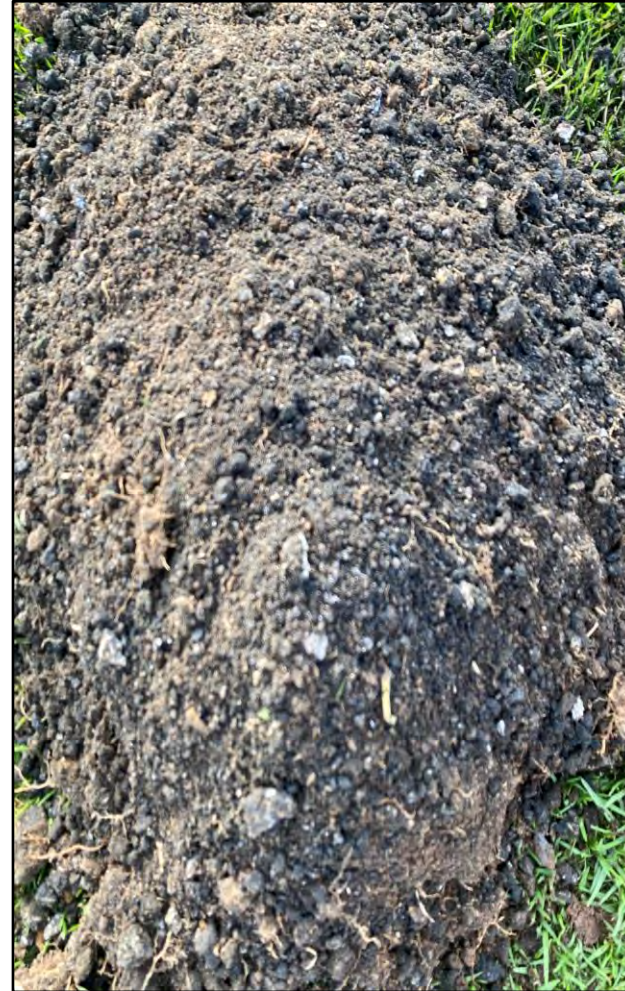


Appendix B

Test Hole 11



Test Hole 12



Appendix B

Test Hole 13



Test Hole 14



Appendix B

[Test Hole 15](#)



[Test Hole 16](#)



Appendix B

Test Hole 17



Test Hole 18





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