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Going Further in Managing Risk

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REMEDIATION ACTION PLAN

October 2021
J170993

City of Parramatta Council

FS Garside Reserve, Granville NSW 2142

C107839 : EV

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Document Control

Document Quality Management Details		
Report Name:	Remediation Action Plan	
Site Details:	FS Garside Reserve, Granville NSW 2142	
Project Number:	J170993	
Client Name:	City of Parramatta Council	
Client Number:	C107839	
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Issue Status

Version No.	Date	Creator	Reviewer
V2	29/10/2021	Eustace Vance	Matthew Barberson

Document Circulation

No of Copies	Type	Customer Name	Position & Company
1	Electronic	John Graham	Senior Landscape Architect | Capital Projects | City Assets and Environment

Remediation Action Plan

City of Parramatta Council

FS Garside Reserve, Granville NSW 2142

TABLE OF CONTENTS

1 Introduction

Greencap Pty Ltd (Greencap) was engaged by City of Parramatta Council (CoPC) hereafter referred to as 'the client' to prepare a Remediation Action Plan (RAP) for the property located at FS Garside Reserve (the site). The site location and regional context are provided in *Figure 1.* This RAP has been prepared, following discussions with the client.

2 Background

It is understood that CoPC is planning to upgrade FS Garside Reserve into a new park recreational facility including youth precinct, district playground, dog park, new car parking, amenities building, new soccer field and a new cycle way along the eastern side of Alfred Street between Parramatta Road and Eleanor Street, Granville. Greencap understands that the northern portion of the park will be developed with new picnic facilities and an upgraded playground space. A youth recreation area is proposed to the east of the sports field. Parking will be reconfigured and realigned to the bordering streets.

Historic records show that FS Garside Reserve operated as a local landfill during the 1920s and early 1930s. It was converted for use as a soccer field by placing a compacted soil layer over the landfill and planting a grass layer over the capped landfill site. Council commissioned a geotechnical investigation and contamination assessment at FS Garside Reserve as part of its planned works to upgrade community and recreational facilities (Douglas Partners 2019). Consistent with its former use as a rubbish tip, previous investigations indicated some areas of the park contained asbestos and , poly-cyclic aromatic hydrocarbons (PAH), and lead. As a result of this investigation further investigation was recommended for groundwater and ground gas.

Greencap were engaged in 2019 to undertake a landfill gas, groundwater and lead delineation investigation at FS Garside Reserve. Greencap concluded that based on the investigation, the site requires to be remediated to be made suitable for recreational public open space land use. Results of this assessment did not identify any issues with hazardous ground gases. Lead contamination delineation investigations undertaken at the north-west corner of the site identified an in-depth lead hotspot, which was contained by shallower soils with lead concentrations below relevant health criteria. It was concluded that the risk associated with the identified lead hotspot can be managed under a long-term Environmental Management Plan. Should this area be excavated or developed in the future, further remedial actions may be required. The groundwater investigation undertaken did not identify any groundwater contamination sourced from the site. Faecal contamination was identified in the confined aquifer on site, which is deemed to be sourced from upstream off-site sources (dissolved urban contamination and Duck Creek). This trigger would management requirements in case of potential future groundwater extraction activities or similar.

In June 2020, CoPC engaged Greencap to undertake a Contamination Assessment at FS Garside Reserve. Based on the sampling and analysis completed, Greencap concluded that the site requires remediation to meet the adopted criteria to be suitable for recreational public open space land use. Asbestos Containing Materials (ACM), in the form of fibre cement sheet fragments (Non-friable) and Asbestos Fines/Fibrous Asbestos (AF/FA) (friable) was observed to be present in fill material across the investigation area. Exceedances of the adopted ESL and HIL acceptance criteria for PAH contamination risk (as B(a)P) were recorded at a number of locations across the site. Based on the findings of the previous investigations and this assessment, it was considered that the site can be made suitable for the current land use and potentially any proposed re-development for the same land use subject to the development of a suitable RAP and the implementation of appropriate site remediation strategies.

The site requires remediation to be made suitable for the proposed development. This document therefore presents the scope of works for the remediation and validation of the site.

3 Objectives

The objective of the RAP is to set remedial goals to ensure that any contamination associated with the impacted soils can be remediated to an extent suitable for the proposed site use (recreational facility) and will not pose an unacceptable risk to human health or the environment. The RAP also documents in detail all procedures and plans to be implemented to reduce contamination risk to acceptable levels for the proposed site use.

The RAP document also establishes the environmental safeguards required to complete the remediation in an environmentally acceptable manner and identify and include proof of the necessary approvals and licences required by regulatory authorities.

The RAP has been designed to provide the relevant information and guidance for remediation of the identified impacted shallow soils at the site based on the proposed land use of recreational open space/recreational facility.

4 Site Information

The following sections are based on a summary of the Contamination Assessment reports undertaken by Douglas Partners (2019) and Greencap (2019 & 2020). For full details please refer to these reports. The site location and boundary is presented on *Figure 1*. General site information is provided in *Table 1* below.

Table 1: Site Information		
Site Address:	FS Garside Reserve, Onslow Street, Granville NSW 2142	
Property Identification:	Various – See Figure 1 for site boundary	
Local Government Area	City of Parramatta Council	
Approximate Area:	FS Garside Reserve, Playing Field - ~0.96 ha	
Current Zoning:	RE1 Public Recreation	
Current Site Use:	Recreational public space - soccer field	
Proposed Site Use:	Recreational public space	
Potential Site Users:	The general public	
Surrounding Site Use:	**North**	Low density residential
	East	Low density residential
	South	Mixed use - Commercial
	West	Low density residential
Surface Water Bodies:	**South-east** **North**	Duck Creek is located approximately 75m to the south eastern border of the site. A'Becketts Creek is located approximately 280m north of the site.

4.1 Site Surrounds and Sensitive Receptors

The site is bound by Parramatta Road to the south and low-density residential properties to the north, east and west. The area to the south, opposite Parramatta Road, is largely occupied by commercial development. Duck Creek is located south-west of the site as the nearest water body, while A'becketts Creek is located to the north of the site.

The nearest sensitive human receptors are the users of FS Garside Park, and the residents living at the low-density residential houses adjacent to the site. Although it is a disturbed ecosystem, Duck Creek is considered to be the nearest environmental receptor.

4.2 Site Setting

The site is underlain by Ashfield Shale of the Wianamatta Group in the north west, and with quartz sands, silty sand, silt and clay in the south east. The majority of the site, consisting of the south-eastern portion lies within disturbed terrain. The northern and north-western portion of the site lies within Birong group soils consisting of yellow podzolic and solodic soils. A minor portion of the site along its western boundary falls within the adjacent Blacktown group soils consisting of red and brown podzolic soils and yellow podzolic soils.

The elevation of the site ranges generally between approximately RL 6 m to RL 4 m relative to the Australian Height Datum (AHD) 4 – 6m mAHD. Natural vegetation at the site has been largely cleared with unsealed ground surfaces at the site generally covered with grass. There are a number of trees in the northern portion of the site and south-eastern portion.

Based on site topography, it is expected that surface runoff would flow overland downgradient towards the south/south-west west, and potentially then Duck Creek to the east/south-east of the site. Duck Creek is a tributary of Duck River which in turn is a tributary of Parramatta River to the north-east.

5 Summary of Previous Environmental Investigations

5.1 Douglas Partners (2019)

Following a desktop historical assessment, the investigation found that while the site was predominately used as a residential housing and recreational area, there is significant evidence that the site was also historically used for uncontrolled tipping of waste (i.e. landfill). The report concluded that the majority of the site contains unverified fill material.

5.1.1 Identified Contaminants

The Douglas Partners Investigation (DPI 2019) identified the following main contaminants of concern on the site:

- **Asbestos Containing Material (ACM)**

Asbestos in the form of either bonded ACM and/or AF[1] and FA[2] was identified in approximately 40% of test locations (28 of 72 test locations undertaken). Of these locations, the land use criteria for asbestos was exceeded at 22 locations for bonded asbestos, and at 6 locations for friable asbestos (AF/FA). The exceedances of the ACM included six locations in the Playing Field Surrounds that were visually observed to contain asbestos in concentrations exceeding of the HSL with most not being tested for safety reasons.

- **Chemical Contamination**

Exceedances of health-based site assessment Criteria for lead were identified in analysed soil samples at two locations in the northern portion of the site at 0.9-1.4 mBGL depths. The concentration of lead in the shallower layers of this location was below the relevant Health-Investigation Level (HIL). Consequently, the report found that this suggested that the lead impacts were confined to depths below 0.5m at this location. Furthermore, a lead hotspot at 2.0-2.1 depth was found in the south eastern section of the site.

Based on laboratory analysis results, the report found that the Duck Creek Area, the Dog Park areas, and the western part of the Playground Park were impacted by PAH. PAH impacts at the Playing Field area was identified as a potential data gap, due to the limited sampling conducted in this area. No groundwater monitoring data was available for the site at the time of this previous investigation.

[1] Fibrous Asbestos (FA) includes friable material, such as loose insulation or any material that can be crumbled or broken by hand pressure.
[2] Asbestos Fines (AF) includes any material less than 7mm x 7mm, including AF resulting from degraded, broken, damaged or weathered ACM or FA.

5.1.2 Recommendations of Douglas Partners (2019)

The DPI recommended the following actions:

A groundwater investigation, to investigate the contamination status of the groundwater at the site and assess the risk of leaching of identified contaminants from soil / fill and vertical migration to groundwater.

A landfill gas investigation, to confirm whether the site is producing landfill gases was recommended; and

Preparation of a Remediation Action Plan (RAP) for the site.

5.2 Greencap (2019)

Greencap undertook a Further Investigation in December 2019 ref: *J165297_F.S Garside Park-Further Investigation_V1*. A summary of this investigation is provided below.

Works undertaken within the scope of this investigation can be summarised as follows:

- Twenty-four service pits were accessible and measured for potential gas accumulation;
- Eight ground gas and one groundwater monitoring wells were installed;
- Ground gas monitoring at the eight well locations across the site were undertaken;
- Groundwater monitoring was undertaken at the installed groundwater well; and
- Soil sampling and laboratory analysis for lead delineation was undertaken.

Results of this assessment did not identify any issues with hazardous ground gases. The site has been classified as very low risk in accordance with the relevant risk classification method presented in the NSW EPA Guideline on Assessment an Management of Hazardous Ground Gases.

The groundwater investigation undertaken did not identify any groundwater contamination sourced from the site. Faecal contamination was identified in the confined aquifer on site, which is deemed to be sourced from upstream off-site sources (dissolved urban contamination and Duck Creek). This triggers management requirements in case of potential future groundwater extraction activities or similar.

Lead contamination delineation investigations undertaken at the north-west corner of the site identified an in-depth lead hotspot, which was contained by shallower soils with lead concentrations below relevant health criteria.

5.2.1 Conclusion (Greencap 2019)

The site requires to be remediated to be made suitable for recreational public open space land use. Remedial activities are to primarily target asbestos in soil and poly-cyclic aromatic hydrocarbon contamination identified on site.

The risk associated with the identified lead hotspot can be managed under a long-term Environmental Management Plan. Should this area be excavated or developed in the future, further remedial actions may be required.

5.2.2 Recommendations (Greencap 2019)

Based on the available information, Greencap recommended the following actions to be taken:

- A Remediation Action Plan (RAP) needs to be prepared for the site;
- The RAP is recommended to address specific considerations regarding potential future development planned to be undertaken on site;
- An Interim Site Management Plan (ISMP) is to be developed for the site;
- Current environmental and health management measures need to be incorporated into the ISMP; and

- Any potential future groundwater dewatering/ extraction activities needs to be managed under a Groundwater Management Plan (GMP).

5.3 Geotechnical Investigations & Contamination Assessment (Greencap, 2020).

Greencap was engaged by to undertake Geotechnical Investigations & Contamination Assessment at FS Garside Reserve & Alfred Street, Granville NSW 2142 in June 2020 *ref: J167804_ Geotechnical Investigations & Contamination Assessment - F.S Garside Reserve & Alfred Street_V1*.

The objectives of this project was to:

- Provide geotechnical information to guide structural design decisions of all proposed park upgrade civil and structural infrastructure; and
- Determine the extent of landfill and contamination (if any) of the existing turfed soccer playing field to inform the remediation plan and structural design.

To achieve this objective, the following scope was undertaken:

- An intrusive assessment of soils across the site which consisted of:
  - Drilling of 80 boreholes in the locations outlined in Appendix A of *"Invitation To Submit Fee Proposal March 2020 – FS Garside Reserve & Alfred Street"*:
  - Contamination Assessment of 32 borehole locations across FS Garside Reserve Playing Field;
  - 19 additional sampling points at the geotechnical drilling locations were taken that have previously not been assessed. These previously not assessed areas include FS Garside Reserve Playing Field Surrounds, Roadways of Onslow and Alfred Street and a Grassed Area to the south of John Irving Park;
  - Collection of soil samples for chemical analysis of the following CoPC as requested by the client:
    - Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
    - Total Recoverable Hydrocarbons (TRH); and
    - Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN); and
    - Polycyclic aromatic hydrocarbons (PAH).
  - Asbestos air monitoring during the intrusive works; and
  - An asbestos clearance inspection and clearance air monitoring was undertaken by a Licenced Asbestos Assessor (LAA) following intrusive works.
- Engagement of a geotechnical engineer to undertake a geotechnical assessment of the site and provide a Geotechnical Site Investigation with reference to the relevant standards.

5.3.1 Findings and Conclusion (Greencap 2020)

Based on the sampling and analysis completed, the site requires remediation to meet the adopted criteria to be suitable for recreational public open space land use. Remedial activities are to primarily target asbestos and PAH in fill soil. Based on the findings of the previous investigations and this assessment, it is considered that the site can be made suitable for the current land use and potentially any proposed re-development for the same land use subject to the development of a suitable remediation action plan (RAP) and the implementation of appropriate site remediation strategies.

5.3.2 Recommendations (Greencap 2020)

Based on the results of the soil contamination investigation, Greencap recommended the following:

- A Remediation Action Plan (RAP) needs to be prepared for the site;
- The RAP should address specific considerations regarding potential designs for future development planned for the site; and

- An Interim Site Management Plan (ISMP) is to be developed for the site to manage contamination prior to remediation.

6 Remedial Action Plan

6.1 Remedial Goal

The aim of the remediation at the site is to ensure that the site is remediated to a level that is suitable for the sites proposed land use of recreational open space/recreational facility.

Groundwater remediation is not considered necessary based on the fact that:

- The groundwater investigation undertaken (Greencap 2019) did not identify any groundwater contamination sourced from the site.
- Faecal contamination was identified in the confined aquifer on site, which is deemed to be sourced from upstream off-site sources (dissolved urban contamination and Duck Creek). This contamination triggers management requirements in case of potential future groundwater extraction activities or similar.

6.2 Potential for Contamination

Based on the investigation to date, the potential for contamination stems from the impacted fill material identified across the site. Identified contaminants include:

- Lead;
- Polycyclic aromatic hydrocarbons; and
- Asbestos.

Groundwater beneath the site was found to be impacted by faecal contamination. This contamination was deemed to be sourced from upstream off-site sources (dissolved urban contamination and Duck Creek).

6.3 Depth of Fill

6.3.1 Douglas Partners (2019)

The depth of fill encountered across the site generally extended beyond the limit of investigation (3.0 m BGL) at the majority of the test locations across the site. However, the east section of the Playground and Park, the western end of the Dog Park and part of the Playing Field areas had observable fill depths less than 1 m deep. Refer to Drawing 3 of Douglas Partners (2019) for average depths of fill encountered across the site.

6.3.2 Greencap (2019)

Greencap undertook drilling works to install ground gas wells and a groundwater monitoring well in 2019. The fill material generally consisted of brown clayey, gravelly silt or silty sand underlain by natural red/grey clay. Relatively shallow natural soils were only encountered at locations in the northern portion of the site: GG1, GG2, GG4, GG5 and GG7 at depths ranging from 0.2m to 1.1m BGL. Boreholes for the remaining three ground gas wells were terminated in fill material, at target depth of 1.0m BGL. At GW1 in the south-east, fill material was observed to reach 6 mBGL depth and consisted building rubble and Potential Asbestos-containing material (PACM). Refer to Figure 4 of the Further Investigation report for the drilling locations. Refer to *Figure 2* of this RAP for the location of the ground gas wells and ground water monitoring well (GW1).

6.3.1 Greencap (2020)

6.3.1 Observed Stratigraphy – FS Garside Playing Field

Relatively shallow natural soils were encountered at the following locations within the FS Garside playing field: BH54, BH57, BH58, BH62, BH63, BH64, BH65, BH66, BH67, BH68, BH69, BH70, BH71, BH72 and BH75 at depths ranging from 0.2m to 1.3m BGL. At BH52, fill material was observed to reach 3.9 mBGL depth.

In general, shallow fill was observed in the central/south-eastern and central/south-western portions of the playing field. Depths of fill ranging from 2.8m – 3.5m BGL (below ground level) were encountered in the northern portion of the playing field. Depths of fill ranging from 1.5m – 3.9m BGL were further noted in the southern most portion of the playing field. Refer to *Figure 3* for approximate depth of fill across the FS Garside Playing Field.

6.3.2 FS Garside Reserve Playing Field Surrounds

The stratigraphy noted during the geotechnical drilling works undertaken at BH9 (adjacent Onslow Street outside eastern boundary of FS Garside Reserve) consisted of topsoil underlain with natural clays. The stratigraphy noted during the geotechnical drilling works undertaken at BH20 (North-west of FS Garside Playing field) consisted of bare soils comprising fill material to a depth of 3.5m BGL underlain with natural clays. The stratigraphy noted during the geotechnical drilling works undertaken at BH24 (adjacent the north-western boundary of the FS Garside Playing Field) consisted of topsoil underlain with fill material comprising a significant quantity of friable ACM and the borehole was terminated at a depth of 0.9m BGL due to safety risks of field personnel. The stratigraphy noted during the geotechnical drilling works undertaken at BH26 (south-western portion of FS Garside Playing Field) consisted of topsoil followed by fill material underlain with natural clays. Refer to borehole logs presented in Appendix B of the Contamination Assessment.

6.4 Remediation Extent

Based on field and laboratory data collected to date, the excavation required for removal is not expected to extend deeper than 300mm across the site. Laterally the extent is expected to encompass the whole site.

An Unexpected Finds Protocol is discussed in *Section 13* of this RAP. Groundwater is not considered to require remediation at this stage.

6.5 Remediation Options Appraisal

The NSW EPA remedial hierarchy of most preferable option to least preferable option is:

1. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill; or
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

An options appraisal has been undertaken and is summarised in Table 2.

Table 2: Remediation Strategy Discussion

Remediation Strategy	Suitability	Rationale for Suitability Assessment
1. Do nothing	Not suitable	The site is being upgraded and developed for use as a recreational facility. Concentrations of asbestos, polycyclic aromatic hydrocarbons (PAHs) and heavy metals (lead) exceeding the adopted site criteria have been identified in fill soils. In order to make the site suitable for the proposed use, remediation of the impacted material is required to reduce or eliminate the risk to site users.
2. On-site Treatment	Not Suitable	The identified source of contamination at the site consists of lead, asbestos and PAHs. There is currently no method for treating asbestos containing materials on-site therefore on-site treatment is unsuitable for the asbestos contamination. On-site treatment for reducing levels of PAH in soil are available (bioremediation methods) however generally require long timeframes and reasonable amounts of space. The source of the contamination (ashy fill material, combustion by-products) is likely to make bioremediation difficult as the contaminants are tightly bound within the matrix of the fill material. The

Table 2: Remediation Strategy Discussion		
Remediation Strategy	**Suitability**	**Rationale for Suitability Assessment**
		development timeframe and small site area make on-site treatment of PAHs at this site an unsuitable method of remediation. Methods of reducing heavy metal concentrations in soil such as *insitu* chemical fixation, bioremediation, phytoremediation are generally successful methods of remediating some heavy metals in soils however on a project this size are likely to be both time and cost prohibitive therefore are not considered suitable.
3. Off-site Treatment	Not Suitable	As with the on-site treatment option, this option is also not considered suitable for asbestos impacted material and is not considered a viable option for PAH and heavy metal impacted soils as the timeframes and cost required for remediation are considered unfeasible. Furthermore, this method would require the material to be trucked to a suitable treatment facility which may mean excessive transport costs and the risk of having open excavations would also be a factor while the material was treated off-site. The site is situated in a largely residential area, excessive truck movements are likely to have an adverse impact on the residents and the traffic flow in the area.
4. Removal and disposal	Suitable – not feasible	The site is a legacy landfill and removal and off-site disposal of the entire waste body is not a feasible option for this site. Volumes of fill soil are likely to be large and the cost to dispose of the material is likely to be prohibitive and not feasible.
5. On-site Containment by engineered containment cell construction	Not suitable	This option is considered unsuitable due to deep fill being generally widespread across the site, limiting the potential for a dedicated suitable size containment cell. In areas with generally shallow fill <1.5 mBGL (north of FS Garside Playing Field), a lead hotspot exists. In addition, groundwater (confined beneath clay aquitard) encroaching on the containment cell would pose limitations.
6. Cap & Contain in-situ by raising site levels	Suitable – not preferred	This option is considered a suitable method for remediation as it is a cost-effective option due to minimised disposal costs. Capping is a preferable method to enhance project sustainability, however raising the site levels may not fit the project design and aesthetic requirements. Overland flooding and draining may be potential issues with this approach; therefore, this approach is not preferred.
7. Hybrid Remediation • Excavate and dispose (to achieve project levels); • Raise levels (if suitable); and • Cap & contain.	Suitable – preferred	A combination of the above suitable methods for remediation can be combined to achieve the proposed remediation goals. This approach assists achieving desired project levels and design. The remediation option limits material export costs and is considered a sustainable solution as it incorporates cap & contain, therefore this approach is the most preferred.

Note: At its current state, the lead contaminated soils in the northern portion of the site (Douglas Partners 2019 & Greencap 2019) are inaccessible to human receptors. Therefore, this material would not pose an unacceptable risk to human health or the environment given that it remains undisturbed and managed under a Long-Term EMP.

7 Adopted Remediation Strategy

CoPC have issued a draft concept design plan for inclusion in this RAP (Refer *Appendix A*). Following discussions with CoPC, the preferred remediation strategy were established as the following sequence of work (starting from 1):

1. *Demolition works & excavation and off-site disposal of contaminated soils— allowing enough room for required capping thicknesses (as per Table 3 below) throughout the entire site—(under Class – A asbestos controls);*
2. *Cut & fill plan execution (under Class – A asbestos controls);*
3. *Trench excavations and installation of drainage & utility lines (under Class – A asbestos controls);*
4. *Application of geofabric marker layer and importation of VENM to the site (no disturbance of capped contaminated fill at and beyond this point);*
5. *Preparation of a site environmental management plan (long term EMP) and notification on the land title. The site EMP can also be appended to the existing Council asbestos sites register and City of Parramatta EMP; and*
6. *Onsite management of capped contaminated soils (long term EMP).*

Offsite disposal of additional contaminated soils and wastes will be required in circumstances such as:

- Unexpected contamination encountered after completion of capping layer construction (including during future site excavations / maintenance works); and
- Disposal of excavated contaminated materials that cannot be placed under the capping layer due to levelling and capping requirements or unsuitable geotechnical properties such as insufficient compaction.

All excavated materials to be removed from the site will undergo waste classification for disposal at a licensed landfill. It is anticipated that all soils will classify as "Special Waste – asbestos" under the NSW EPA's Waste Classification guidelines 2014.

An Unexpected Finds Protocol (UFP) is included in *Section 13* of this RAP and a UFP will be included in the long-term EMP.

Table 3: **Proposed Remediation Solutions**

Management Area	Remediation Solution
Turfed Areas	"Cap and Contain" existing contaminated soil beneath minimum 300mm thick imported approved materials*(VENM clay and approved garden/turf underlay soils) (see Figure 4). A non-woven geofabric marker layer to be placed at the base of the capping layer. Turf underlay soil and turf to be established at the surface.
Garden Beds	Minimum capping requirements are as follows for garden accessible soils (inc. turfed areas, garden beds, and mulched areas)—from top to bottom (see Figure 4): • 100 mm turf; • 200 mm VENM; • Geofabric marker layer; and • Fill material/ contaminated soils. For utility trenches and/or the areas where the existing ground elevation is to be maintained: • Excavation and disposal of contaminated soil from the trench/ remediation area footprint to the required trench depth; and • Placement of a marker layer to cover the base and walls of the excavations, and Placement of approved capping layer soil into the trench (certified imported material*) on top of the marker layer (see Figure 6)—*trenches must not be backfilled with contaminated soils.* Capping layer soils include VENM clay, garden bed soils and turf underlay soils. Garden and turf underlay soil products to be VENM sand or sandy loam based and blended with compost. Compost source organic materials to be assessed for potential contamination.

Table 3: **Proposed Remediation Solutions**	
Management Area	**Remediation Solution**
Tree Management	Contaminated soils around tree roots will be managed by establishing a sustainable physical barrier between contaminated soils and ground surface. Following tree management options are proposed for this purpose and deemed acceptable by Greencap: Option 1: Certified mulch capping (100-300 mm), Option 2: 50mm-200mm sandstone rip-rap capping mix (100-300 mm), or Option 3: Porous pavement capping. Or any relevant & practical combination of above. Capping around trees shall be undertaken in coordination with a qualified arborist. Breathable marker layer should be applied below capping material around trees, to an extent that is deemed acceptable by the arborist (marker layer may not be applied on tree roots if arborist sees it as a risk to tree health). This must be documented in the LTEMP in addition to all as-built capping details as part of validation works.
Concrete/Hardstand Areas & Proposed Buildings	Strip existing turf and compact then overlay Geofabric marker layer, construct hardstand/building (concrete slab) (see Figure 5 and Figure 7 for trench details).
Sloped Surfaces & Eastern Embankment	Geocell on top of geofabric marker layer design is proposed and deemed acceptable for sloped areas, where establishment of 300 mm VENM layer is not practical. The design details are provided in Appendix B.

*Approved materials to be validated and approved by the Environmental Consultant. Imported materials include validated/certified "virgin excavated natural material" (VENM clay) and VENM based landscaping soil products (garden and turf underlay mixes), refer to *Sections 10, 11 & 12*. Source sites for imported materials to be approved by the environmental consultant.
The entire site is to be capped as per relevant capping specifications mentioned above.

7.1 Capping Layer Details and Concept Design

Refer to *Figure 4, 5, 6 and 7* for capping layer specification & indicative capping layer cross section diagrams. Capping layer details are as follows:

- Use of VENM classified and or certified soil composts and mulches (free of wastes and contamination) for the capping layer material. This is to ensure no contamination associated with recycled materials is present in surface layer capping materials. Soil suppliers soil/compost blends must provide material specifications including VENM certification for approved by CoPC before importing materials to the site

The marker layer below proposed capping areas will comprise a high visibility non-woven geofabric where a marker layer fabric is required (refer *Table 3*). The geofabric is to be approved by CoPC before installation and rolled out over the existing ground with minimum 300mm overlap of parallel lengths, followed by placement of capping layer soil.

The marker layer should consist of a bright coloured non-woven polyester continuous filament or PET (such as nonwoven geotextiles) or similar with a minimum density of approximately 150 grams per square metre (or equivalent). In general a marker layer should:

- Be easily recognisable within soils (e.g. a bright colour);
- Be durable as a long-term marker layer (i.e., > 150 grams per square metre); and
- Maintain integrity during remedial/civil works such as capping layer insulation.

For areas with proposed hardstand finishes (District Playground, Amenities Building, Carparking, Basketball Court/Youth Precinct and Spectator Bleachers) existing turf is to be stripped and compacted then overlaid by a geofabric marker layer prior to construction of the hardstand/building (concrete slab).

Note: Footings of grandstand areas and installation of service trenches must be managed in a correct sequence. Footings/service trenches are not to disturb capped areas once completed. These areas may require further remediation options in addition to the above.

Designers and contractors must take all necessary measures to avoid excavation of contaminated soils at remediated/ capped areas. Violation of remediation sequence may cause cross contamination of clean capping materials and may require further remediation.

7.2 Surveying Requirements

The contractors will engage a qualified surveyor to survey the entire site at the following stages:

- Prior to commencement of remediation works;
- Following the completion of off-site disposal of fill materials;
- Following the completion of cut & fill activities;
- Following the placement of geofabric marker layer and prior to importation of VENM capping materials/ cap construction; and
- Following the completion of VENM importation/ cap construction and remediation activities.

Above survey data will be provided to the validating consultant in PDF drawings where the mAHD contours are displayed.

7.3 Landfill Cap Soil Quality

Imported material required to construct the capping layers in all areas will require assessment and testing to confirm suitability and validation for the proposed use.

Capping layer materials are to be VENM classified and/or materials validated by the environmental consultant as discussed in *Section 10.4*. Compost additives and mulch are to be entirely free of contamination, wastes and foreign materials. This is to ensure no potential for contamination associated with products containing recycled materials is present in surface layer capping. Soil suppliers soil blends material specifications are to be approved prior to importing onto the site. Sampling and laboratory analysis of imported material should be performed prior to importing. The frequency of validation sampling required to successfully validate the imported material will be a function of the variability and number of sources of backfill material. As a guide, a minimum validation sampling frequency of one sample per 500 m^3 of imported material (min 3 sample per source/ material type) should be conducted.

The imported soils and backfill material will be considered validated if they meet the following:

- The materials have sufficient documentation that demonstrates that they meet NSW EPA VENM classification criteria, including assessment of source site historical land use;
- Imported VENM is to be visually clean and is free of waste inclusions;
- Imported VENM is sampled and analysed at the prescribed frequency;
- The concentration of metals in the VENM are within the typical background concentration range for the natural soil source; and
- Individual results for asbestos, TPH, BTEX, PAH, organochlorine/organophosphate pesticides (OCP/OPP) are below the limit of reporting for the laboratory.

7.3.1 VENM Source Site Criteria and Material Tracking

The history of the VENM source site and potential for ground contamination should be assessed for certification of VENM imported to the site. Inspection of VENM source and VENM sample analysis are also advised to verify VENM classification. Concentrations of organic compounds and asbestos screened in samples of the VENM should be below the respective laboratory limits of reporting (LORs) including TRH, BTEX, PAH, OCPs and PCBs. Concentrations of metals/metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) should be indicative of natural background concentrations for the VENM source site soils and rock.

The material should be inspected and assessed at the source site before importation to the remediation site and inspected upon arrival to verify only approved materials are imported.

7.3.2 Cap Thickness Survey and Quality Assurance and Control

The constructed cap thickness should be verified by level survey (before and after cap construction) to ensure that the appropriate thickness of cap/cover layer material is achieved. Inspections during import of soil should be carried out to verify VENM material matches material assessed at the source site. Validation of cap thickness could be provided by obtaining an accurate survey (grid pattern of spot levels) of the pre-cap and post-cap construction levels. Field and laboratory quality procedures should conform to the *National Environment Protection Council (Assessment of Site Contamination) Measure 2013*. Laboratory analyses for capping layer materials used above the cap should be performed (where possible) by laboratories with NATA accreditation for the tests performed.

7.3.3 Construction Completion Reporting

The results of the monitoring and validation program for the capping layer should be provided in a validation report prepared in accordance with NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA 2020).

7.4 Notification and Future Management

The site specific EMP will be updated following remediation and be appended to the existing Parramatta Council EMP/asbestos site register. Notification into the future can also be supported by inclusion of references to site contamination and landfill and EMP on land titles and on the 10.7 Certificates for the land. It is proposed that the EMP will apply to the whole site and will include procedures to ensure maintenance of the capping layer barrier to prevent exposure of contaminated materials and management of any excavations that are carried out in future.

7.5 Other Remediation Requirements

- No deep-rooted large plants/trees (which may grow and rupture the cap and marker layers or otherwise reduce the integrity of the cap) are to be planted within capped areas;
- It is recommended that plants are restricted to small shrubs and groundcover;
- Existing landscape items on contaminated soils will be carefully removed and re-used (where practical); and
- All environmental assessments including validation of imported materials and work health & safety protection measures and controls specified within this RAP are required for validation of the remedial works and must be followed.

7.6 Ground Gas Assessment, Service Pit and Surface Gas

Service pit monitoring results did not indicate hazardous gas accumulation in the measured service pits. The results of the surface gas monitoring conducted by Greencap on 22nd November 2019 indicated no methane emissions from landfill surface was present. Slightly elevated CO_2 (below NSW EPA trigger level) at SP14 and SP16 may have been sourced from legacy combusted waste material on site.

Landfill gas risk assessment undertaken in accordance with Modified Wilson and Card classification method outlined in NSW EPA (2020) indicated the site can be classified as Very Low Risk. Elevated CO_2 readings at GG3 (1.9%) and GG8 (1.8%) were deemed to be not significant as no flowrate was measured at these locations and GSV values were 0 L/ hr. For full results discussion, refer to Greencap (2019). Refer to *Figure 2* for locations of the ground gas wells.

As per the updated guideline NSW EPA (2020) a minimum of 2 events is required for low risk sites (including inert landfills). Greencap will undertake one additional round of Ground Gas, Service Pit and Surface Gas sampling prior to remediation works being undertaken. The following readings will be recorded at each service pit, across the surface of the site and at each ground gas well: CH_4, CO_2, CO, H_2S, O_2, balance (%),

8 Legislative Requirements

This RAP has been prepared in general accordance with guidance documents endorsed by NSW EPA under Section 105 of the *Contaminated Land Management Act 1997*. Works will be carried out with regard to the development consent conditions and relevant guidelines and regulations.

The primary references under the Act include:

- *NEPC NEPM 1999 National Environment Protection (Assessment of Site Contamination) Amendment Measure (2013 amendment);*
- *NSW DEC (2017), Guidelines for NSW Site Auditor Scheme (3rd Edition), NSW Department of Environment and Conservation;*
- *NSW EPA (2020), Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Site;*
- *NSW DECCW (2010) Technical Note: Site Validation Reporting;*

Other guidance references include:

- WA Department of Health (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*;
- *NSW WorkCover (2014), Managing Asbestos in or on Soil;*
- Code of practice - *How to manage and control asbestos in the workplace* (Safework NSW 2016);
- How to Safely Remove Asbestos (Safework NSW 2016);
- *Protection of the Environment Operations Act 1997;*
- *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55)*;*
- *NSW EPA Fact Sheet on Virgin Excavated Natural Material;*
- NSW EPA (2014) *Resource Recovery Orders under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 The Recovered Aggregates Order, Excavated Natural material Order 2014*.
- *NSW EPA 2014, Waste Classification Guidelines Part 1 Classifying Waste;*
- *Work Health and Safety Regulation 2011; and*
- *Storage and Handling of Dangerous Goods Code of Practice*.

It is noted that this list is not exhaustive and may be added to as the project progresses.

Any remediation at the site must comply with Councils most current Contaminated Land Policy. Remediation should also be undertaken with reference to SEPP 55.

9 Site Management and Regulatory Compliance

A licensed asbestos removal contractor (LARC) should be engaged and involved in preparation of an Asbestos Removal Control Plan (ARCP), Safe Work Method Statements (SWMS), Job Safety Assessments (JSA) and any other applicable procedures should be prepared prior to any works involving disturbance of the asbestos contaminated soils. The objective is to devise and implement systems to ensure that the disturbance of the asbestos is performed to a high standard and that precautions are maintained throughout the work to protect workers, occupants of adjacent areas, and visitors to site, from exposure to asbestos.

The following sections provide a staged, step by step approach for the establishment of controlled conditions for the removal of the ACM. Procedures must be in accordance with the *Codes of Practice:*

- How to Safely Remove Asbestos (Safework NSW 2016);
- Code of practice - How to manage and control asbestos in the workplace (Safework NSW 2016); and
- NSW WorkCover (2014), Managing Asbestos in or on Soil.

The following sections provide a summary of main requirements:

9.1 Preliminaries

Prior to remediation works occurring, the following preparatory items should be undertaken:

- Notification to SafeWork NSW to undertake the remediation must be submitted by the nominated licenced asbestos removal contractor (LARC). All persons undertaking the asbestos removal/remediation must be competent and appropriately trained, with training records available on-site;
- In addition to notifying the relevant regulatory authorities and in accordance with current legislation, any neighbouring properties and persons within and surrounding an area that may be affected by the asbestos works, must be informed of the works prior to their commencement;
- Sufficient and appropriate warning signs (e.g. “caution: asbestos removal”) are to be erected at regular intervals around the boundaries and at entry points to the work area exclusion zone during the works (the exclusion zone is required in areas where there is known ACM contamination to be disturbed). During site establishment and setting up activities, an exclusion (buffer) zone will be established designating the areas where contractors, occupants, customers and unauthorised personnel must be excluded.
- A dedicated decontamination area is to be established at the boundary of the exclusion zone, i.e. exit point. The decontamination area shall contain all necessary Personal Protective Equipment (PPE) and decontamination equipment, i.e. masks, respirators, disposable coveralls, gloves (Type 5, Category 3 minimum), gloves, and 200µm polythene labelled asbestos waste bags for disposal of waste PPE. A mobile decontamination unit with wash facilities is required for any asbestos works deemed as friable;
- Fencing or barricading must be in place around the boundaries of the exclusion zone and its integrity maintained for the duration of the works;
- An inspection by the supervising licensed asbestos assessor/hygienist is to be undertaken prior to the commencement of any works to confirm that the asbestos work area has been adequately set up; and
- A site induction must inform workers of the presence of asbestos, the related risks and controls in place to manage the risks and any other general information relating to asbestos as seen appropriate. A more detailed induction / training process must be implemented for all workers expected to come in direct contact with and/or disturbance of asbestos.

9.2 Earthworks and Capping Layer Construction

Any excavated fill material will require classification in accordance with the NSW EPA (2014) Waste Classification Guidelines and offsite disposal if it cannot be capped on-site.

Removal methods must ensure that the inadvertent breakage of ACM is prevented and that adequate measures are in place to avoid the release of dust and potential asbestos fibres. The following controls are to be maintained throughout the remediation works:

- A dedicated, Class A licensed asbestos removal supervisor must be present at all times to direct the works;
- A hygienist or experienced consultant will attend the site during the works to implement daily air monitoring and carry out inspections of materials, when requested/required;
- Personnel entering the exclusion zone are to use all required PPE. PPE is not to be removed whilst within the exclusion zone. Personal Protective Equipment (PPE) minimum requirements include a P2 half face particulate filter cartridge respirator and disposable coveralls, gloves & booties. Respirators, disposable coveralls, gloves should be used for works involving excavations into asbestos contaminated soils. This applies to people entering the asbestos affected area during excavation works and particularly to workers excavating and relocating soil. Continual moistening of the soil for dust suppression is required. The licensed asbestos removal contractor and hygienist will assess requirements periodically;
- Following placement and compaction of the fill material that contains asbestos, a marker layer (a durable geofabric, preferably coloured) is to be laid out over the lateral extent of this material to identify its upper boundary;
- The marker layer material should be rolled out with minimum 300mm overlap of parallel lengths;
- The marker layer is laid out prior to construction of pavements or placement of cover layer soils that form the capping layer over the soil with asbestos. The marker layer should be placed on the fill soil that contains asbestos. No fill soil that contains or potentially contains asbestos (any site gained fill material) is to be placed above the marker layer material**;**
- Bedding layer materials for pavements can be placed above the marker layer fabric if free of asbestos;
- Adequate dust suppression is to be maintained throughout the duration of the works such that no visible dust is generated, e.g. fine mist hose spray. The use of excessive water resulting in runoff is to be avoided;
- All trucks used for the transport of asbestos materials must have functional tarpaulins suitable for this work. The asbestos removal contractor must ensure that all loads are completely covered before leaving the work area. Spillage of soil during transport is to be prevented;
- It is the asbestos removal contractors' responsibility to ensure that all measures are in place to prevent potential cross contamination of 'clean' areas of the site as a result of excavator tracking or truck movements on haul roads between the stockpile and the encapsulation area;
- The asbestos removal contractors must ensure that entry gates into the remediation areas are always closed (other than to allow entry and exit of trucks) and that truck wheels are adequately clean if required before leaving the asbestos work areas;
- It is to be communicated and maintained that truck drivers must keep their windows closed and must not leave their truck cabins whilst within the asbestos removal work area;
- Any waste being disposed off-site must go to an EPA licensed landfill facility and must be accompanied by appropriate waste classification documentation. Tipping receipts and tracking documentation must be retained and provided to Greencap for inclusion in the final validation report;
- Any subsurface service trenches to be constructed within the capped area should be lined with a geofabric marker layer and backfilled with clean materials below, around and above the service conduits. Ideally the marker layer will be placed along the base of the trench prior to installation of conduits and backfilling with clean material;

- The works should be carried out in accordance with the Safework NSW Codes of Practice;
- An experienced environmental consultant / occupational hygienist should be onsite during the earthworks to obtain a photographic record of the filling and capping process, monitor the environmental and health and safety controls implemented by the licenced asbestos removal contractor and provide air monitoring and general advice as required. A clearance report on the asbestos remediation works should be provided;
- Barricade the area from the remaining work site and attach warning signs;
- Dust suppression (hose spraying) is to be undertaken during all works to minimise dust emissions and exposure to the site workers and the surrounding community;
- Any fill, asbestos and/or asbestos contaminated material removed from site must be classified as Special Waste-asbestos and appropriately disposed of at an suitably licensed landfill;
- Record the alignment of pipes, other services and location of pits, if built within in the ACM fill area;
- The fill soil (existing fill) at the site is not to be used in the final surface layer soil in any area, due to potential presence of asbestos. Soil that is entirely free of asbestos, or pavement materials), are to comprise the final surface layer and all capping layer materials are to be entirely free of asbestos. This surface capping layer is to form a durable continuous cover / barrier over the fill soil that contains asbestos to prevent asbestos exposure;
- Imported landscaping soils and aggregates, sand or topsoil are to be certified as free of asbestos or classified as virgin excavated natural material (VENM). Blended and manufactured soils imported for use as the capping layer should be validated prior to importing due to potential asbestos contamination. It is recommended that imported soil materials are validated prior to importing them onto the site by a qualified consultant. This includes either VENM classification or sample analysis for asbestos if use of non-VENM material is proposed.
- NSW EPA waste exemption order documentation is required for imported recycled materials including gravel aggregates and sands; and

Further general details on site management for asbestos remediation are included below.

9.3 Stockpiling

Fill material must first be underlain with geofabric or 200µm builders plastic, when placed on natural soils to minimise potential cross contamination of the ground surface. The stockpile must be wetted and securely covered with geofabric until moved.

Clean soils (inc. VENM or site gained natural material), when to be placed on fill material, must be underlain with geofabric or 200µm builders plastic to minimise potential cross contamination of the ground surface.

9.4 Decontamination Procedures / Exclusion Zone

Dry decontamination procedures are considered adequate for non-friable asbestos removal works. For friable asbestos removal a more thorough personal decontamination procedure must be adopted. In summary, personal decontamination will be supervised by the occupational hygienist and will involve the following:

- On exit from the exclusion zone, disposable PPE is to be removed and discarded in asbestos waste bags. Respiratory protection to be removed last;
- Dirty boots shall be washed before leaving the work area. Alternatively, dedicated steel capped gum boots should be provided to the workers and left within the work area during breaks;
- Washing of hands and face will finalise the dry decontamination process. Washing through a mobile decontamination unit is only undertaken for friable asbestos removal works;
- Contaminated equipment, clothes and PPE are to be double bagged, well-sealed and consolidated

pending disposal to an appropriately licenced landfill facility;

- In the event of an emergency evacuation situation which does not allow time to decontaminate, the decontamination procedures can be waived;
- Excavators, trucks and other plant leaving the work area will need to be cleaned in a washdown bay to the satisfaction of the occupational hygienist; and
- The exclusion zone barriers and decontamination area are to remain in place until the conclusion of the asbestos works. Barriers and asbestos control measures are not to be removed until approved by the occupational hygienist.

Refer to the Asbestos Management Plan, *Greencap ref: J170992_AMP - FS Garside Reserve, (2020)* for a detailed description of procedures for the proposed remediation.

9.5 Asbestos Fibre Air Monitoring

The air monitoring program will involve air sampling around the site for airborne asbestos fibres for the duration of remediation works. This will assist in assessing the potential exposure to asbestos during the works and measure the effectiveness of implemented control measures. A brief overview of the air monitoring program is provided below:

- Air monitoring will be undertaken mainly around the boundary of the asbestos exclusion area and also along the site perimeter (i.e. close to nearby residences) for the duration of the works to assess whether airborne asbestos fibre concentrations are below the relevant control levels (i.e. exposure limit) and analytical detection limit of 0.1 Fibres/mL and 0.01 Fibres/mL, respectively;
- Air monitors will be placed around the work area, decontamination area and lunchroom. Monitoring may also be conducted within the excavator cabin; and
- All air monitoring filters will be examined by a NATA-accredited laboratory in accordance with the Guidance Note on the Membrane Filter Method for the Estimation of Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

Table 4: **Air Monitoring Control Limits / Action Levels**

Action Level	Action
< 0.01 fibres/mL	Continue with control measures
0.01 – 0.02 fibres/mL	- Review control measures - Investigate the cause - Implement controls to prevent further release of asbestos fibre
> 0.02 fibres/mL	- Stop work - Notify regulator - Hygienist to conduct further assessment - Do not recommence work until results are <0.01 fibres/mL

9.6 Clearance Inspection

At the conclusion of the staged asbestos removal works, the occupational hygienist will conduct inspections for the presence of visible asbestos within the remediation areas and asbestos removal work areas.

9.7 Roles and Responsibilities

As a mechanism for ensuring compliance surveillance should be implemented at the site. This should include the following components:

- Appointment of a specific representative (e.g. project manager or site manager) who has responsibility for controlling works at the site (preferably experienced with working on asbestos impacted construction sites);

- Responsibility for the approval of a Safe Work Method Statement (SWMS);
- Responsibility for notifying site workers, sub-contractors, etc. of when excavation works are scheduled in known asbestos-contaminated areas, the exclusion zone and restricted access requirements;
- Maintaining a record of remediation works carried out, which includes confirmation that the requirements outlined in this plan have been met;
- Maintaining a log that records any non-compliance with the requirements of the plan and outlines action taken to prevent recurrence of the breach;
- Site inspections to confirm compliance with the requirements of the ARCP by site workers;
- Ensuring that no un-planned site works that have a potential to disturb ACM in soils are undertaken without the contractor being advised of the requirements of this plan; and
- Retaining results of asbestos removal, air monitoring and other relevant reports.

10 Site Contamination Assessment Criteria

10.1 Criteria for Chemical Contaminants in Soil

Criteria for chemical contaminants in soil is selected based on the Health-based Investigation Levels presented in *National Environmental Protection (Assessment of Site Contamination) Measure 1999 – Schedule B 1 Guideline on Investigation Levels for Soil and Groundwater, Table 1A (1).*

The criteria are presented in Table 5 below.

Table 5: Health investigation levels for soil contaminants

Chemical		Health-based investigation levels (mg/kg) Recreational[1] C
Metals	Arsenic	300
	Cadmium	90
	Chromium (VI)	300
	Copper	17000
	Lead	600
	Mercury (inorganic)	80
	Nickel	1200
	Zinc	30000
PAH	Carcinogenic PAHs (as BaP TEQ)	3
	Total PAHs	300
Phenols	Phenol	40000
	Pentachlorophenol	120
	Cresols	4000
Organochlorine Pesticides	DDT+DDE+DDD	400
	Aldrin and dieldrin	10
	Chlordane	70
	Endosulfan	340
	Endrin	20
	Hephtachlor	10
	HCB	10
	Methoxychlor	400
	Mirex	20
	Toxaphene	30

Note:

1. HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.

10.2 Criteria for Soil Vapour and Soil Vapour Intrusion

Criteria for soil vapour are selected based on the Interim Soil Vapour Health Investigation Levels for volatile organic chlorinated compounds presented in *National Environmental Protection (Assessment of Site Contamination) Measure 1999 – Schedule B 1 Guideline on Investigation Levels for Soil and Groundwater, Table 1A (2).*

The investigation criteria for chlorinated compounds is presented in Table 6 below.

Table 6: Interim soil vapour health investigation levels for volatile chlorinated compounds

		Interim soil vapour HIL (mg/m^3) Recreational C
Chemical	TCE	0.4
	1,1,1-TCA	1200
	PCE	40
	Cis-1,2-dichloroethene	2
	Vinyl chloride	0.5

For petroleum hydrocarbons HSL C criteria (recreational/ open space) is defined as no limit (NL) in Table 1A(3) of NEPM 2013 for all soil types and depths.

10.3 Criteria for Asbestos Contamination in Soil

Criteria for asbestos contamination in soil is selected based on the Health Screening Levels for asbestos contamination in soil presented in *National Environmental Protection (Assessment of Site Contamination) Measure 1999 – Schedule B 1 Guideline on Investigation Levels for Soil and Groundwater, Table 7.*

The criteria is presented in Table 7 below.

Table 7: Health Screening levels for asbestos contamination in soil

Form of asbestos	Health screening level (w/w) Recreational C[1]
Bonded ACM	0.02%
FA and AF[2] (friable asbestos)	0.001%
All forms of asbestos	No visible asbestos for surface soil

Note:

1. Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
2. The screening level of 0.001% w/w asbestos in soil for FA and AF (i.e.fibrous asbestos/asbestos fines, non-bonded/friable asbestos) only applies where the FA and AF are able to be quantified by gravimetric laboratory procedures. This screening level is not applicable to free fibres.

10.4 Criteria for Imported Virgin Excavated Natural Material (VENM)

The history of the VENM source site and potential for ground contamination should be assessed for certification of VENM imported to the site. Inspection of VENM source and VENM sample analysis are also advised to verify VENM classification. Concentrations of organic compounds screened in samples of the VENM should be below the respective laboratory limits of reporting (LORs) including TRH, BTEX, PAH, OCPs and PCBs. Concentrations of metals/metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) should be indicative of natural background concentrations for the VENM source site soils and rock.

10.5 Aesthetic Quality of Soils

The NEPM 2013 Schedule B(1) amendment and the NSW DECCW Guidelines for the NSW Site Auditor Scheme (2nd Edition), 2006 include aesthetic considerations for site assessment and validation, particularly for public open space and residential land use. An assessment of the site soil aesthetics requires consideration of the natural state of soil on any given site, and a comparison between it and the soil encountered during investigation and remediation validation works.

The aesthetic criteria for acceptance of soils are:

- Soils must not exhibit chemical odour (including petroleum hydrocarbons);
- Soils must not exhibit putrid odours associated with buried organic wastes; and
- Soils must not be discoloured or contain excessive amounts of waste materials including asphalt, building materials, ash, plastic, fabric, ceramics, metal, timber.

Where any of these characteristics are observed, they are to be noted on the testpit logs. An assessment is made based on the above criteria for identification of potentially unacceptable soils and wastes.

Soils containing minor fractions of wastes (excluding asbestos) will be assessed for suitability i.e. if minor fractions of waste are considered acceptable.

10.6 Criteria for Bulk Gases in Service Pits

Applicable criteria for service pits is presented in Table 8.

Table 8: Threshold Levels for Service Pits

Analyte	Threshold level reference	Unit	Threshold Level	Comments
Methane (CH_4)	NSW EPA 2016 (1)	% (volume/volume)	1.0	The threshold level for further investigation and corrective action
Carbon Dioxide (CO_2)			1.5	
Carbon Dioxide (CO_2)	Safe Work Australia HSIS (2)	ppm	TWA (3): 5000 STEL (4): 30,000	Work Place Exposure Standards - Only applicable to service pits to assess risks for utility workers - Not applicable for ground gas
Hydrogen Sulphide (H_2S)	Safe Work Australia HSIS (2)	ppm	TWA: 10 STEL: 15	
Carbon Monoxide (CO)	Safe Work Australia HSIS (2)	ppm	TWA: 30	

Note:

1. The threshold levels for further investigation and corrective action are detection of methane at concentrations above 1% (volume/volume) carbon dioxide at concentrations of 1.5% (volume/volume) above established natural background levels.
2. HSIS: Hazardous Substances Information System
3. TWA: Time weighted average
4. STEL: Short term exposure limit

10.7 Criteria for Gas Monitoring Wells

Criteria for ground gases in gas monitoring wells is selected based on the threshold levels presented in *Solid Waste Landfills Guideline (NSW EPA 2016)* and presented in Table 9.

Table 9: Threshold Levels for Hazardous Gasses				
Analyte	**Threshold level reference**	**Unit**	**Threshold Level**	**Comments**
Methane (CH_4)	NSW EPA 2016 (1)	% (volume/volume)	1.0	The threshold level for further investigation and corrective action
Carbon Dioxide (CO_2)			1.5	

Note:

1. The threshold levels for further investigation and corrective action are detection of methane at concentrations above 1% (volume/volume) carbon dioxide at concentrations of 1.5% (volume/volume) above established natural background levels.

When above levels are exceeded, further characterisation through the calculation of gas screening values (GSV) will be made. The method of deriving a GSV and thus ground gas risk will be based on the *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA 2012)*.

GSV is the concentration of gas measured in a monitoring well multiplied by the measured borehole flow rate. The GSV is used to calculate the Characteristic Gas Situation (CS) which provides a site ranking system of 1 to 6 based upon which different levels of gas protection are required (1 being the lowest risk level and 6 being the highest). Table 10 presents a summary of the GSV and CS as well as risk classification in accordance with the guideline.

Table 10: GSV and CS and Characterising Landfill Gas Risk (NSW EPA 2012)			
Gas Screening Value Threshold (L/hr)	Characteristic Gas Situation	Risk Classification	Additional Factors
<0.07	1	Very low risk	Typically, methane <1% v/v and/or carbon dioxide <5% v/v, otherwise consider increase to Situation 2
<0.7	2	Low risk	Borehole flow rate not to exceed 70L/hr otherwise consider increase to Situation 3
<3.5	3	Moderate risk	-
<15	4	Moderate to high risk	Consider need for Level 3 risk assessment
<70	5	High risk	Level 3 risk assessment required
>70	6	Very high risk	

11 Soil Validation Sampling and Analysis Procedures

11.1 Imported Materials (Capping Layer and Aggregates)

Material imported onto the site should be classified as virgin excavated natural material (VENM). The VENM is to be inspected and approved at the source site and tracked by comparison with materials received at the site. Materials such as mulch are to be validated by the environmental consultant. Prior to being imported to the site, all material should be certified by a suitably qualified Environmental Consultant as being either;

- Virgin excavated Natural Material (VENM);
- Excavated Natural Material (ENM); or

Other material such as aggregates used for drainage, roadbase or bedding material below conduits in trenches. Recycled materials require Waste Exemption Certificates issued by the supplier in accordance with the NSW EPA's guidelines (eg the Recovered Aggregates Order 2014) and assessment prior to import.

The consultant should refer to both the *Protection of the Environment Operations Act 1997* (POEO Act) and the *Contaminated Land Management Act 1997* (CLM Act) for the purposes of assessing imported fill, and guidance issued under the Acts, including but not limited to the following:

- Schedule 1, Section 39 Sub Clause 2E of the POEO Act with regard to VENM;
- *Protection of the Environment Operations (Waste) Regulation 2005* – General Exemption Under Part 6, Clause 51 and 51A The excavated natural material exemption 2012;
- NSW EPA (1995) *Contaminated Sites: Sampling Design Guidelines*; and
- NSW DEC (2017) Contaminated Sites: Guidelines for the NSW EPA Site Auditor Scheme (3nd Ed.).

11.2 Material Disposed Off-Site

Prior to any material being removed from the site it must be classified as per the NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying Waste*. Samples should be collected at a minimum rate of:

- 3 samples for stockpiles < 75 m^3;
- 1 sample per 25 m^3 for stockpile/in-situ material < 200 m^3;
- A minimum of 10 samples stockpile/in-situ material > 200 m^3; and
- 1 sample per 250 m^3 for stockpile/in-situ material >3000 m^3.

Results of the chemical analysis should be compared to criteria provided in NSW EPA *Waste Classification Guidelines: Part 1 Classifying Waste* (2014) and a Waste Classification Report stating its classification as either Special Waste-asbestos, General Solid Waste, Restricted Solid Waste or Hazardous Waste must be prepared by a suitably qualified Environmental Consultant prior to the waste being removed from the site.

11.3 Asbestos Inspections and Clearance Reports

Asbestos clearance of the site includes visual inspection of the ground surface during and following excavations or stripping and offsite disposal of material.

The ground surface and excavations will be inspected for presence of ACM. Following the completion of inspections, a Clearance Certificate can be issued indicating that the ACM removal works have been completed to a practically achievable standard. The Certificate will include photographs of the areas inspected and a site plan.

11.4 Laboratory Analysis

The laboratories engaged for this project include Eurofins Pty Ltd and Greencap Pty Ltd.

The Limit of Reporting (LOR) for asbestos is currently restricted to 0.01% for soil samples by NATA (National Association of Testing Authorities). The laboratories report an order of magnitude lower, (nominal 0.001%), for 500 ml soil samples, however, laboratory certificates will report results to the NATA accredited 0.01% level. Non-NATA accredited results are reported for FA and AF asbestos detections above 0.001% but <0.01%.

The adopted asbestos assessment procedure requires visual clearance and assessment of ACM in addition to, soil sampling and laboratory analysis methodologies from Schedule B(2) NEPM 2013 as follows:

- Visual inspection of the ground surface for ACM (and provision of asbestos clearance reports where required). Validation of an area requires recording no visible asbestos. This applies to all areas of the site. Final surface clearance inspections of remediated areas are carried out at completion of remediation;
- Visual inspection and sieving of fill soils removed from testpits for ACM and FA (including thorough inspection of minimum one 10 litre sample per metre depth of fill in accordance with NEPM 2013 Schedule B2 Section 11.3). Validation of fill requires recording “no visible asbestos” in test pit spoil and in the 10 to 30 litre samples thoroughly inspected based on the SMEC 2013 RAP criteria. Site fill soils observed to date include clay soils and 7 mm sieving will not be carried out on clays. Sand fill material samples will be sieved for assessment and gravimetric analysis of ACM; and

- NATA accredited asbestos analysis of FA/AF on 500 ml fill layer soil samples from testpits. A minimum of one 500 ml fill soil sample will be analysed from all testpits that encounter fill.

11.5 Material Tracking

All materials removed from the site will require tracking. This includes verification that excavated contaminated materials are disposed of offsite during visual clearance inspections and reporting.

Recycled material imported to the site, including concrete and brick aggregates, require contamination assessment and provision of Waste Exemption Certificates from the supplier.

Imported VENM material (if required) is to be inspected and assessed at the source site and tracked by comparison of materials inspected at source with materials received.

11.6 Summary Sampling and Analysis Procedure

The summarised sampling and analysis procedure includes:

- Visual inspection of soils, photographing and logging of material for presence of ACM asbestos and other inclusions of waste, odours and discoloration. PID screening of selected materials;
- Thorough inspection and sieving of minimum one bulk sample (10 to 30 litres) per sampling location, for gravimetric analysis of ACM/FA. Generally, one 10 to 30 litre sample is thoroughly inspected and sieved per metre depth of fill. The bulk sample volume and/or weight is recorded. Pieces of suspected ACM are placed in plastic bags and submitted to the Greencap-NAA asbestos laboratory (NATA accredited) for asbestos identification, weighing and estimation of asbestos percentage content;
- NATA accredited laboratory asbestos analysis on at least one 500 ml soil sample per testpit location and per metre depth of fill (LOR of 0.001% ACM/FA/AF); and
- Analysis of other COPCs where required for fill materials encountered with potential for contamination. Analysed contaminants include TRH, BTEXN, PAH and metals on at least one soil sample per metre depth of fill, targeting layers with indications of contamination.

11.7 Material Tracking

All materials removed from the site, relocated onsite or imported onto the site will require tracking. This includes verification that excavated contaminated materials are either disposed of, offsite or are transferred and placed below cap.

11.8 Fieldwork Quality Assurance

Fieldwork, soil profile logging and sample preservation and chain of custody controls are carried out in accordance with standard Greencap procedures. Field QA/QC soil samples are analysed at a rate of 1 per 20 samples for field duplicates). Refer to *Section 12.3*.

11.9 Site Validation Data Assessment

Soils have been successfully validated if:

- All validation samples results report concentrations below the site validation criteria threshold concentrations presented in *Section 10*; or
- (for HILs only) the 95% UCL of the average contaminant concentration for each contaminant within a particular area is below the respective validation criterion.

The following conditions must also be met for validation data (excluding asbestos):

- No single sample contains an analyte concentration greater than 2.5 times the relevant criteria; and

- The data set upon which the UCL is calculated must be statistically valid (i.e. sufficient data must be available to calculate a meaningful UCL figure).

The surface 100 mm layer is to be entirely free of asbestos.

11.10 Validation Reporting

On completion of the works, a Remediation / Validation Report detailing the works carried out will be prepared. The report will be structured in general accordance with EPA (2020) Guidelines for Consultants Reporting on Contaminated Sites, and shall document:

- Any variations to the strategy undertaken during the implementation of the remedial works;
- Results of environmental monitoring undertaken during the course of the remedial works;
- Validation sampling program completed including sampling methodology, sample locations and sample descriptions;
- Data Quality Objectives and DQI's(DQO's / DQIs);
- Results of validation sample and analysis including NATA certified laboratory certificates;
- Discussion and assessment of results based on site validation criteria;
- Waste disposal records if requested; and
- Details of any environmental incidents occurring during the course

12 Data Quality Objectives and QA/QC Data Quality Assessment Procedures

An assessment of the quality assurance program for the site data is to be made based on precision, accuracy and completeness of the data used for the site remediation validation assessment.

The quality assurance measures and data quality indicators (DQIs) are to comply with project data quality objectives (DQOs) and data completeness targets (sampling frequency).

The analytical data is to be shown as a sufficient basis for conclusions relating to the investigation and validation of the Site for the proposed land use. Details of data quality assurance procedures and measures implemented follow.

12.1 Data Quality Objectives and Indicators

The data quality objectives (DQOs) for the site based on a seven step process to ensure that data used for site validation are accurate, representative and complete. The process assesses data quality indicators (DQIs) obtained during sampling and laboratory analysis to assess the soil and groundwater data quality. A seven step approach is recommended in the Site Auditor Guidelines. The DQOs / DQIs define the type and quality of data required to achieve the validation of the site. The DQO / DQI process involves assessing uncertainty in sample analysis data and the overall validation data set resulting from sampling of heterogeneous soil materials, the sampling scheme and methods and from the analytical laboratory procedures used. In regard to laboratory data, DQOs include acceptable limits for data quality measures such as percent recovery of standard additions (spiked samples), laboratory method detection limits and LORs (sensitivity), and Relative Percent Differences (RPDs) between duplicate sample analyses (precision and reproducibility).

The validation data must demonstrate that soil contamination was remediated, that soils remaining onsite meet the adopted site criteria and provide evidence that the soils do not pose a risk to human health or the environment. The main data quality assessment protocols are described below.

The principal DQIs are measures of precision, accuracy, representativeness, comparability, completeness, and sensitivity of sampling and analytical methods. DQOs are the acceptance thresholds or goals for sample analytical method proficiency data, based on the individual DQIs for each sample and each analyte or analyte group. These DQIs are defined below for purposes of data quality assessment, as follows:

- Precision is the reproducibility of sample analysis results, (consistency providing confidence that one sample or sample data set can be compared to another or compared to common acceptance criteria). Precision is measured and expressed as Relative Percent Difference between duplicate sample analysis results (RPDs), applicable to both field duplicate sample results and internal laboratory duplicate sample results. Precision is evaluated by comparing the RPDs of field and laboratory duplicates to an acceptance limit of 50%;
- Accuracy measures the laboratory method bias and / or the level of agreement between a measured parameter and its true (known) value. Accuracy is measured and expressed as percent recoveries of analytes in laboratory control samples and recovery of known concentrations of analytes added to project samples (surrogates) i.e. the analysis result is compared with the known concentrations, assessed using acceptance limits for recovery of analyte standard additions;
- Representativeness is used to evaluate whether the data represents the actual site conditions during sample collection. The representativeness evaluation includes review of sampling plans, spatial distribution of samples and sampling density, sample collection, handling and storage methods, sample integrity until analysis, equipment rinsate and laboratory method blank results;
- The assessment of comparability includes a review of consistency of sample collection and handling methods and laboratory sample preparation, analysis and quantification limits; and
- Completeness of the data is that portion of the data that is judged as acceptable for use in assessing the site soils based on DQIs for precision, accuracy, representativeness and reproducibility.
- Precision and accuracy of data are assessed using limits on DQIs as follows:
- Relative percentage difference (RPD) to be less than 50% for internal laboratory duplicates where measured concentrations are greater than five times the lab limit of reporting (LOR). Any RPD is acceptable where one or both samples are below five times the LOR;
- RPDs to be less than 50% for field duplicates where measured concentrations are greater than five times the PQL. Any RPD is acceptable where one or both samples are below five times the PQL;
- Laboratory spike recoveries to be in the range 70-130% (metals), 60-140% (organics) and 10-140% for VOCs;
- Laboratory surrogate recoveries to be in the range 60-140% (organics) and 10-140% for VOCs; and
- Laboratory and field rinsate blank results less than laboratory LORs.

Intra-laboratory and inter-laboratory field duplicates should be collected at an overall combined frequency of 1 in 10 samples and analysed for the basic suite (TRH, BTEX, PAH and metals/metalloids).

Trip spikes (field samples spike with VOCs) and trip blank sample analysis for VOCs are to be included in the soil analysis QA/QC program if VOC contamination is identified as a CoPC. Trip spikes are used for assessment of potential loss of volatile organic compounds and potential for cross contamination between samples during sample collection, transport and storage.

12.2 Validation Data Completeness

The following questions were considered and are to be answered when assessing the completeness of validation data for the site:

- Is the spatial distribution of soil sample locations sufficient to adequately characterise the whole Site regarding the adopted remediation strategy, quality and variability of the subsurface materials?
- Have all contaminants of concern been identified based on the site history information and subsurface investigations?
- Is there sufficient information and validated sample analysis data for the contaminants of potential concern and aesthetic quality of soils, to enable assessment of the land based on comparison of data with the adopted Site criteria?

- Do any individual soil sample results exceed the adopted assessment criteria for the Site? If so:
  - Does the average concentration (95% upper confidence limit) for the sample populations exceed the adopted assessment criteria for the site?; and / or
  - Does any individual sample result exceed 2.5 times the adopted assessment criteria threshold concentration? If so has delineation been carried out and has a significant body of contaminated material been identified and remediated?;
  - Has additional remediation (excavation and disposal to remove material that exceeds the criteria), been completed and all areas validated?;
  - Has remediation of the entire site been completed i.e. do all sample results (and 95% upper confidence limits – UCLs) meet the adopted site criteria?

The completeness of the validation data set for site soils is shown as sufficient for validation of remediation works completed. This is based on assessment of the following:

- The sampling and analytical programme must be considered to adequately cover the entire Site and to be representative of the soils across the site and all imported materials;
- All soil CoPCs identified in the RAP to be analysed.
- Soil sampling densities to meet recommended sampling densities in NEPM 2013 and WA Dept Health 2009 guidelines;
- Inspection and asbestos clearance was carried out for the entire site area and for imported materials by qualified consultants. The sampling density ensured that a sufficient number of sampling locations were inspected for asbestos contamination and that a sufficient number of laboratory soil sample analyses were completed, to comply with rates in WA DOH 2009 Asbestos Remediation Guidelines;
- Laboratory data quality indicators to meet adopted acceptance limits;
- Full depth of the fill layer materials overlying natural soils to be assessed;
- Aesthetic quality of soils met the acceptance criteria;
- No individual sample results exceed 2.5 times the HIL or HSL criteria threshold concentrations. All results met the asbestos criteria.

12.3 Sampling and Laboratory Sample Analysis Data Validation

All laboratories used by Greencap are to be NATA-accredited for the tests performed with the exception of any analysis of AF/FA to 0.001%. It is noted that now laboratories in Australia currently have NATA accreditation for analysis asbestos to this detection limit.

The data quality assessment reports (data validation sheets) for each sample batch are to be included in with corresponding laboratory certificates of analysis, sample chain of custody and sample receipt notices from the laboratory.

There are two types of field duplicate sample analysis to assess the precision of the data:

- intra-laboratory (single laboratory) duplicates are analyses conducted on two separate samples that have been collected at the same location; and
- inter-laboratory (two laboratories) duplicates are analyses conducted by two independent laboratories on two separate samples that have been collected at the same location.

Divergence of results for field duplicate soil samples incorporates field sampling variability and soil heterogeneity as well as laboratory analysis variability.

A third type of duplicate samples analysis is the internal laboratory duplicate. This comprises two analyses of a single sample split by the laboratory. This duplicate sample sample data is less prone to field sampling heterogeneity and therefore internal lab duplicate results are more indicative of a single labs lab analytical precision.

The DQOs for fieldwork sampling procedures include:

- samples are representative of the location sampled;
- sample preservation procedures and holding times comply with industry standards;
- field duplicates be collected at 1 in 20 samples (intra-laboratory) and duplicate sample results RPDs are less than 50%; and
- PID, gas meter, FID and water quality meter instruments are correctly calibrated.
- Sample analysis by NATA accredited laboratories and analysis methods are required. Internal laboratory QA/QC sample results must meet control limits including:
- laboratory duplicates are analysed at a rate of 1 in 20 samples and duplicate sample results RPDs less than 50%, results for laboratory control samples and spikes (LCS); and
- matrix and surrogate spikes recoveries fall in the range of 70-130% for metals and 60-140% for organics, and laboratory blanks below detection limits.

Data validation assessment showing compliance with the DQOs/DQIs listed above as described on the Greencap Data Validation Sheets are to validate each and all individual sample batches (lab certificates) used in the site validation data set.

13 Unexpected Finds Protocol

An unexpected finds protocol (UFP) should be implemented during the remediation process in order to deal with any issues pertaining to contamination which may arise. The UFP should be a simple proforma which will lead the contractors on site through the process should an incident arise. For example an appropriate UFP for the site would include the following:

In the event that potential soil contamination and/or contaminated surface water or groundwater is identified during the works (e.g. odorous or stained soil, odorous water, or suspected asbestos containing material), the following procedures must be implemented:

- The workers that encounter the potential contamination must stop work immediately and notify their supervisor. The supervisor must then immediately notify the Principal Contractor in charge of the site. Work must cease in this area until potential contamination is further assessed and advice has been provided by a suitably qualified Environmental Consultant and the site auditor.
- If the encountered contamination is thought to present an immediate risk to human health or the environment (e.g. ruptured oil drum or friable asbestos), controls must be immediately implemented to contain further release of the contaminant. Workers initiating such controls must be suitably competent and wearing suitable personal protective equipment (PPE), which should be stored onsite alongside chemical spill kits.
- The Principal Contactor is to immediately notify the Environmental Consultant to undertake a preliminary assessment of the potential contamination. The site auditor is to be informed of all additional assessments which are undertaken by the environmental consultant. Based on the findings of the preliminary assessment further sampling and investigation may be required.
- Once confirmed that a contamination risk has been identified the Principal Contractor is to verbally advise the site workers. Written notification should follow, which will provide relevant information relating to any special recommendations to site workers / employees, further sampling, investigation and remediation that may be required.
- If required, the Principal Contractor must notify any relevant regulatory authorities (e.g. EPA, CoPC, SafeWork NSW, etc.), of the contamination incident as soon as practical.

14 Site Management Planning

An Asbestos Management Plan (AMP) has been prepared to detail the roles, responsibilities and requirements for management planning of excavation works involving soils containing asbestos identified at the site *Greencap ref: J170993_AMP - FS Garside Reserve_V1 (2020).*

The intent of the AMP technical scope is to describe systems to ensure that excavation works involving disturbance or the removal of the asbestos containing material, are performed to a high standard and that precautions and controls are maintained throughout the work to protect workers, occupants of adjacent areas and visitors to site, from exposure to asbestos.

The Licensed Asbestos Removal Contractor (LARC) engaged to carry out the work, should review the asbestos AMP and the RAP, and prepare an Asbestos Removal Control Plan (ARCP) for review by stakeholders prior to the work. The LARC shall make full provision for all project related works, including management of excavations, dust suppression, waste removal/disposal and any other works to be conducted.

The Principal Contractor shall also be responsible for all necessary management controls that need to be implemented on the site, with common management controls described as follows in the following sections.

Note that this RAP and the following sections which comprise a generic Construction Environmental Management Plan are not designed to act in place of a formal Construction Site Environmental Management Plan for the works.

14.1 Site Access and Security

The Principal Contractor shall be responsible for ensuring that site access is limited to required personnel and residents, that security of the work area is maintained and that all equipment and plant is maintained through the project. As a minimum the following is required:

- A visual barrier / signage and warning labels are to be erected around the boundaries of the work area; and
- A site induction and sign in/out register to familiarise personnel with site conditions and remediation requirements.

14.2 Traffic Control

The Principal Contractor shall be responsible for adequate levels of traffic control for the roadway entrances to the site. As a minimum the following needs to be implemented:

- Traffic Management for vehicles entering and leaving the site;
- A log in/out vehicle checklist for heavy vehicle movements on/off the site;
- Traffic management shall also be controlled internally on the site. Designated haul roads and exclusion areas shall be marked to ensure trucks do not enter restricted areas of the site. Where haul roads are bare earth appropriate dust suppression shall take place; and
- At no time are trucks to drive over exposed areas of the fill material.

14.3 Hours of Operation

The Principal Contractor shall be responsible for ensuring all works are conducted during the hours of 07:00 through 18:00 Monday to Friday, and 08:00 to 13:00 on Saturdays or otherwise as directed by Council on the Development Consent. No work will be carried out on Sundays and Public Holidays.

14.4 Contact Details

The Principal Contractor shall be responsible for the posting of contact details for key personnel associated with the remediation. As a minimum the following contact details should be posted in a visible portion of the site:

Table 11: Contact Details

Project Involvement	Company	Contact number	Contact Name/Title
Principal Contractor	TBA	TBA	TBA
Project Manager	Parramatta City Council	(02) 9806 5318	Erin Lottey - Project Manager Legacy Asbestos
Site Supervisor	TBA	TBA	TBA
Environmental Consultant	TBA	TBA	TBA
Out of hours contact	TBA	TBA	TBA
Note: Contact details shall be added to this list as contractor appointments are finalised.			

15 Environmental Control Measures

This section outlines the necessary steps which need to be implemented to ensure the protection of the site and surrounding environment during remediation projects. The key issues which, as a minimum, must be addressed by the Principal Contractor, associated with any remediation project, are listed in the following sections. The control measures discussed in this section are general and need to be considered on a site-specific basis.

15.1 Dust Control

Site personnel, the public, neighbours and the environment need to be protected from dust generated during remediation works. All works must be conducted with dust suppression in place such that no significant visible dust is generated. As a minimum the following needs to be implemented:

- Regular dampening of areas where heavy machinery will be utilised, where excavations are occurring and where spreading/compaction is being undertaken;
- Protecting stockpiled material with tarps, consolidation, erection of wind breaks and if these measures cannot be reached, then wetting down of the material;
- Ceasing work in heavy wind events;
- Loading of materials into trucks as close to stockpile or in situ locations as possible;
- Trucks should have their loads covered when not being loaded, including movement on the site; and
- Special consideration should be given to soils which may contain asbestos.

15.2 Sediment and Contaminant Run-off

The management of all storm and surface water runoff is critical in remediation projects to limit the potential for contamination spread and impact to waterways during exposure of soils. As a minimum the following is to be implemented:

- Storm and surface water diversion and detention system if required;
- Silt control fencing should be erected around the entire boundary of the works area;
- Silt control fencing should be placed around all stockpiles; and
- Regular inspections of fences should be conducted to ensure their ongoing effectiveness.

All works should be undertaken with reference to the NSW DECC (2008) *Managing Urban Stormwater, Soils and Construction Guidelines, Volume 2A Installation of services.*

15.3 Materials Handling and Transportation

The appropriate management of materials during remediation and transport is critical in remediation projects. As a minimum the following needs to be implemented if contaminated material is to be removed from the site:

- The trucks or bins used to transport waste from the site are to be lined with one layer of 200micron polythene sheeting or equivalent or are to be thoroughly cleaned at the completion of the project to facilitate decontamination after tipping of the waste;
- Trucks should have their loads tarped prior to leaving site and vehicles should stay to designate haul roads at all times to prevent the potential spreading of impacted material;
- Equipment, trucks, etc. are to be decontaminated prior to leaving the site to prevent the inadvertent transport of contaminated material off-site (e.g. materials tracked off-site on truck tyres etc.). If required a shaker grid should be installed at the exit point; and
- Trucks and other machinery transporting material around site or working in contaminated areas should remain on contaminated material until wheels/tracks and vehicle undercarriage can be cleaned.

Note: Any contaminated soils requiring offsite disposal will need to be classified for waste disposal prior to leaving site. Contaminated soils will need to be disposed of at a landfill facility licensed to accept that waste and all disposal dockets will need to be retained. Following the completion of disposal activities all disposal dockets and a material tracking sheet (a breakdown of all material disposals and imports undertaken) will be provided to the validating consultant to be included in the validation report.

15.4 Noise Control

Due to the use of heavy machinery required during remediation, excess noise will be generated. To help minimise excess noise the following needs to be implemented:

- Strict adherence to hours of operation as prescribed for the site; and
- Australian Standard (AS) 2436-1981 *Guide to noise control on construction, maintenance and demolition sites outlines guidelines for the minimisation of noise on construction sites* and should be implemented to minimise noise generation.

15.5 Maintenance of Environmental Controls

Regular inspections of the environmental controls to confirm their presence and validity should be routinely conducted by the Principal Contractor. This should be undertaken on a daily basis, and more frequently if conditions require, such as rain or high winds.

16 Waste Management

The following section provides a generic a waste management plan (WMP) for the site. It is recommended that the Principal Contractor develop a specific WMP once the contract for the project is awarded. This should be submitted to Council if required as part of the Development Conditions for the site.

16.1 Waste Objectives

The Principal Contractor at all times should aim to avoid waste in the design and implementation of the project through adopting strategies of separating, reusing and recycling during demolition and minimisation waste by reducing packaging at the source by subcontractor and supplier.

Procedures on and off-site for the management of waste materials should be developed. The Principal Contractor should monitor and record waste from all phases of the project including demolition, excavation and construction.

17 Workplace Health and Safety

This section outlines the general Workplace Health and Safety (WHS) issues pertaining to the remediation project. The steps outlined in the following sections will need to be followed during all remedial works. The WHS steps discussed in this section are general and need to be considered on a site specific basis based on the nature of the contamination, remediation works and associated risks.

17.1 Site Inductions

The Principal Contractor must ensure all personnel working on the remediation project attend a Site Induction undertaken prior to entering the site for the first time. The Site Induction should include a brief outline of the remediation project, details on general site hazards (e.g. vehicle movements, heavy machinery, contamination etc.) and details on the specific hazards associated with the remediation works including but not limited to:

- Nature of the materials being handled (i.e. asbestos contaminated soil);
- Personal protective equipment to be utilised on site; and
- Necessary decontamination procedures to be undertaken whilst on site.

17.2 Personal Protective Equipment

Safety boots, high visibility vests and hard hats shall be worn by all personnel on the site. Hearing protection devices will be worn by personnel exposed to noise levels exceeding LAeq,8hr 85 dB(A) or L_{peak} 140 dB(C) (e.g. those working around heavy machinery).

When personnel are working in the designated contaminated area and are required to handle or to come into direct contact with contaminated soil then disposable gloves, long sleeves and long trousers shall be worn as a minimum requirement. There is no requirement for personnel to wear respiratory protective equipment, however care should be taken in avoiding walking over the contaminated material and monitoring of volatile compounds should be undertaken using a PID. If the alarm limits of the PID are exceeded, then personnel should leave the work area until the odour has dissipated. Contaminated equipment, clothes and PPE are to be disposed of with contaminated waste materials at the completion of the project.

These requirements are specified as a minimum standard and may be modified at the discretion of the Project Manager or Principal Contractor during the remediation works.

17.3 Licensing and Permits

As per the *State Environmental Planning Policy No. 55 – Remediation of Land* the Council must be informed of the remediation no less than 30 days prior to the remediation taking place. The Principal Contractor is required to be appropriately licensed.

17.4 Decontamination

At the end of each work shift (i.e. before morning tea, lunch and afternoon tea), personnel will remove their contaminated gloves and any other contaminated clothing (if required) in the remediation area. Washing of hands and face will finalise the decontamination process. Separate controls may be required when friable asbestos is encountered.

17.5 Hazard Assessment

A hazard assessment will be conducted on site prior to commencement of works. It will address, as a minimum, the following:

- On site contamination hazard: The contaminant of concern is hydrocarbons. However, if any other odours, vapour or potential asbestos containing materials are identified, work is to stop, and the source is to be located;
- Additional hazards: Other hazards associated with remediation projects include heat stress, manual handling, underground utilities, electrical hazards and plant; and
- Hazard assessments should include information on the controls to be implemented by the contractor to minimise hazards associated with the works.

17.6 Community Health and Safety

As the site is a remediation project, only inducted personnel are allowed on site. To ensure the protection of the community, the following needs to be implemented:

- A visual barrier is to be erected around the entire perimeter of the remediation area; and
- Dust suppression is to be undertaken to minimise exposure to the site workers or the surrounding community.

It is understood that the surrounding neighbours will be advised of the remediation works.

17.7 Site Facilities and Personal Hygiene Requirements

As the site is a remediation project the following facilities need to be provided and available to the personnel on the site:

- Fresh protective coveralls will be available at all times during the remediation project to staff who require them;
- Lunchroom and associated facilities; and
- Bathroom and associated facilities.

The following hygiene requirements are to be followed by all personnel working at the site:

- No eating, smoking or drinking to be conducted in the remediation area; and
- Staff to wash hands and face prior to eating, smoking or drinking.

18 Emergency procedures and Response

The responsibility for emergency procedures lies with the Principal Contractor however the following is an example of the type of information which can be included in the general emergency procedure document.

In the event that an emergency arises, a potentially dangerous situation is encountered, or suspect/unknown material is identified, site work is to cease immediately, and the matter reported to the Principal Contractor for immediate assessment and action.

The following procedures should be conducted if site personnel are injured, suffer exposure or a condition is uncovered that has not been covered by this RAP is identified:

- Visual contact to be maintained by personnel on site;
- In the event that any site personnel experiences any adverse symptoms of exposure whilst onsite, work will be halted, and instruction or assistance sought from the Principal Contractor;
- In the event of an accident, the Site Supervisor and the injured person will compile an incident report, which will be submitted to the Principal Contractor within 24 hours of the incident. Follow-up actions will be carried out to correct the situation;

- In the event that an emergency situation arises, the Site Supervisor must address the problem and notify the ambulance, fire brigade and police if necessary. In addition, the Project Manager must be notified immediately;
- To minimise the impact of an emergency situation, at least one of the Principal Contractor's site personnel working full time on site will be trained in basic first aid procedures and all field personnel will have immediate access to a first aid kit; and
- Emergency phone numbers will be made available at the commencement of the project including ambulance, fire brigade, police and the nearest hospital. Emergency services can be called on 000 in a life-threatening emergency (or 112 via mobile phone). In addition, the mobile phone numbers of the Principal Contractor, Site Supervisor and the Project Manager will be made available.

19 Ongoing Site Management

Ongoing management is required to ensure that the capping layer integrity is maintained and risk from exposure of contamination is mitigated.

The processes, systems, activities and infrastructure required to manage and mitigate ongoing risks on the site will be detailed in an Environmental Management Plan for the site. This document will highlight ongoing management requirements as well as outline protocols for managing contingencies and unexpected finds.

The document will be prepared in accordance with the outcomes of the final validation report and with reference to Department of Infrastructure, Planning and Natural Resources (2004) *Guideline for the Preparation of Environmental Management Plans*.

October 2021

GREENCAP
Going Further in Managing Risk

Remediation Action Plan

City of Parramatta Council

FS Garside Reserve, Granville NSW 2142

Figures

Legend:

- Site Boundary
- Duck Creek

Metres
0 20 40 60 80

GREENCAP
Going Further in Managing Risk

Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Parramatta City Council				
Client Number:	C107839	Project Number: J174383			
Project Description:	Remediation Action Plan				
Address:	FS Garside Reserve, Granville NSW 2142				
Prepared:	EV	Reviewed:	MB	Date:	19/11/2020
Figure 1	Site Location and Regional Context				

Legend:

- Site Boundary
- Groundwater Monitoring Well
- Ground Gas Monitoring Well

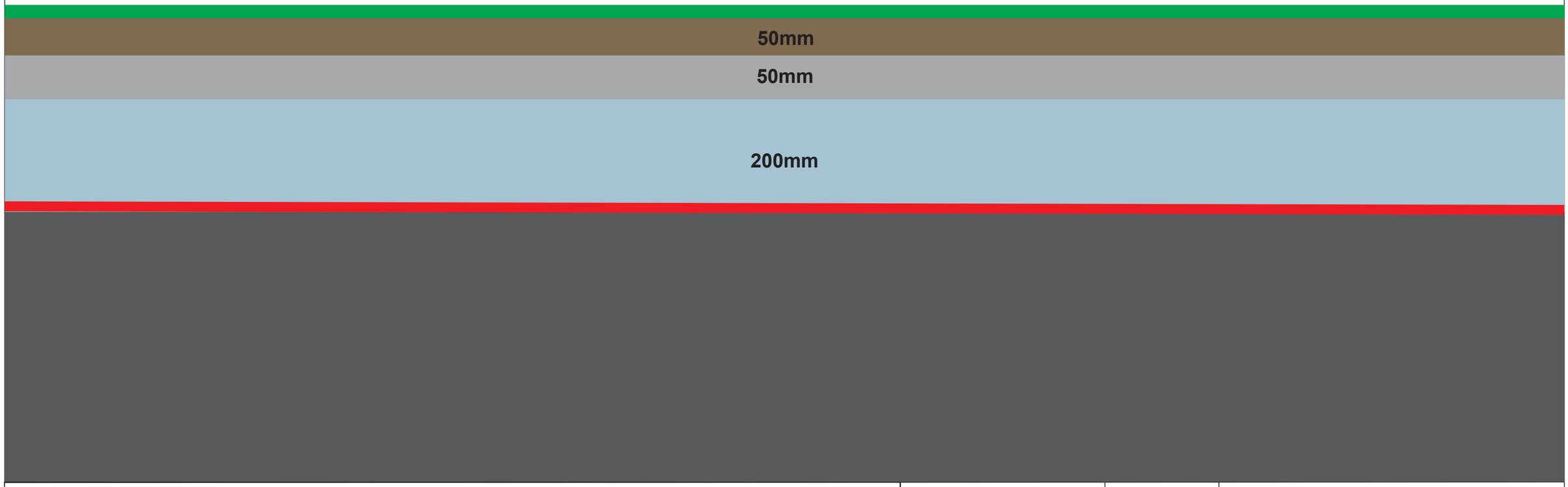
Metres: 0, 20, 40, 60, 80

GREENCAP
Going Further in Managing Risk

Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Parramatta City Council				
Client Number:	C107839	Project Number:	J174383		
Project Description:	Remediation Action Plan				
Address:	FS Garside Reserve, Granville NSW 2142				
Prepared:	EV	Reviewed:	MB	Date:	19/11/2020
Figure 2	Ground Gas & Groundwater Monitoring Well				

GREENCAP Going Further in Managing Risk	Client Name:	Parramatta City Council			
	Client Number:	C107839	Project Number:	J174383	
	Project Description:	Remediation Action Plan			
Level 2, 11-17 Khartoum Road North Ryde, NSW 2113 Ph: 02-9889-1800 Fx: 02-9889-1811	Address:	FS Garside Reserve, Granville NSW 2142			
	Prepared: EV	Reviewed: MB		Version Date:	19/11/2020
	Figure 3	Approximate depths of fill (Greencap 2020)			



Legend:

- Turf Layer
- Certified Turf Underlay
- Certified Organic Garden Bed Soil Mix
- Certified VENM or Validated Fill
- Non-Woven Geofabric Marker Layer
- Contaminated Fill

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Going Further in Managing Risk

Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	City of Parramatta Council				
Client Number:	C107839	Project Number:	J174383		
Project Description:	FS Garside Park Remediation Action Plan				
Address:	75 Parramatta Road, Granville, 2142				
Prepared:	MB	Reviewed:	EV	Date:	2/09/2021
Figure 4	Proposed Turfed Areas				

125mm

50mm

Legend:

- Reinforced Concrete Pavement
- Depth Compacted Base Course
- Non-Woven Geofabric Marker Layer
- Contaminated Fill

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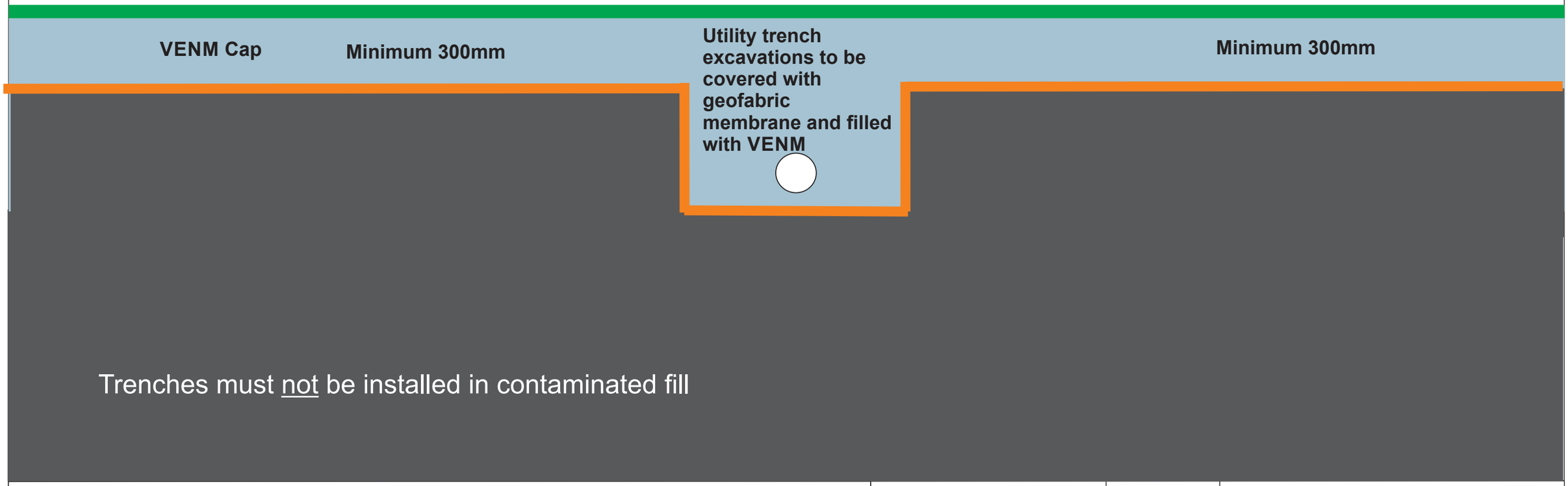
Going Further in Managing Risk

Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	City of Parramatta Council				
Client Number:	C107839	Project Number:	J174383		
Project Description:	FS Garside Park Remediation Action Plan				
Address:	75 Parramatta Road, Granville, 2142				
Prepared:	MB	Reviewed:	EV	Date:	2/09/2021
Figure 5	Remediation Area - Concrete Pavements				



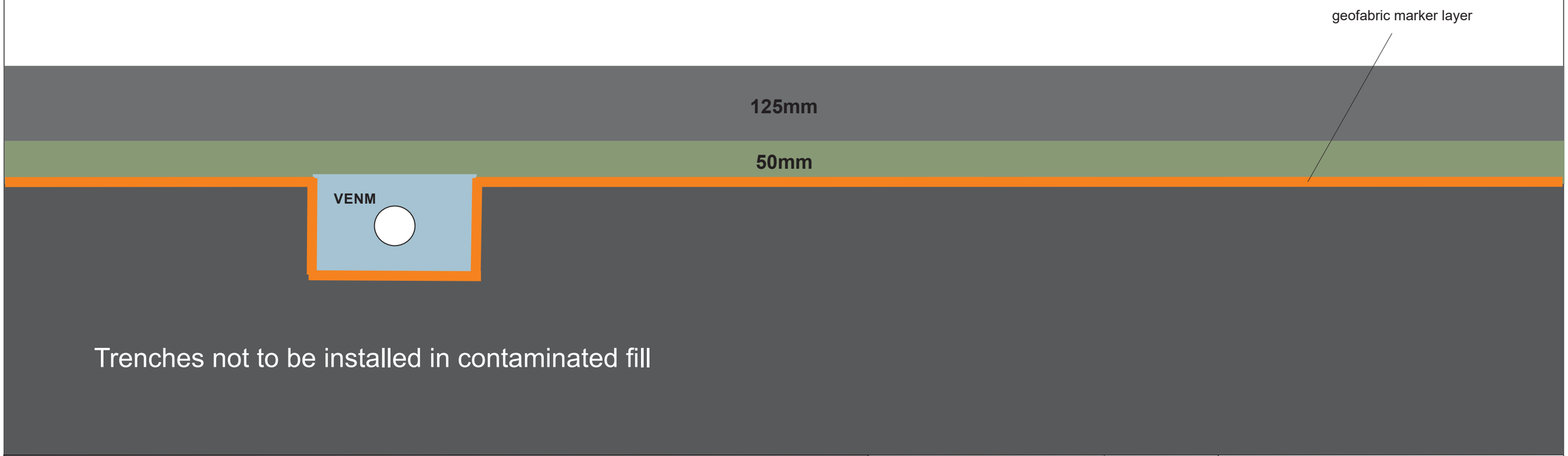
Legend:

- Turf Layer
- Certified VENM or ENM
- Contaminated Fill
- Drainage Pipe
- Non-Woven Geofabric Marker Layer

GREENCAP
Going Further in Managing Risk

GF, North Building,22 Giffnock Av
Mcquarie Park, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	City of Parramatta Council				
Client Number:	C107839	Project Number:	J174383		
Project Description:	FS Garside Park Remediation Action Plan				
Address:	75 Parramatta Road, Granville, 2142				
Prepared:	MB	Reviewed:	EV	Date:	2/09/2021
Figure 6	Remediation details for storm water pipes, trenches, and utilities				



Legend:

- Asphalt/ Concrete Pavement
- Depth Compacted Base Course
- Certified VENM or ENM
- Contaminated Fill
- Drainage Pipe
- Non-Woven Geofabric Marker Layer

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GF, North Building,22 Giffnock Av
Mcquarie Park, NSW 2113
Ph: 02-9889-1800
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Client Name:	City of Parramatta Council				
Client Number:	C107839	Project Number:	J174383		
Project Description:	FS Garside Park Remediation Action Plan				
Address:	75 Parramatta Road, Granville, 2142				
Prepared:	MB	Reviewed:	EV	Date:	2/09/2021
Figure 7	Remediation Area - Trafficable Pavement around the field				

October 2021

GREENCAP
Going Further in Managing Risk

Remediation Action Plan

City of Parramatta Council

FS Garside Reserve, Granville NSW 2142

Appendix A – Draft Concept Design Plan

F.S. GARSIDE PARK, GRANVILLE

DETAILED CONCEPT PLAN

F.S GARDSIDE KEY FACTS

PLAYING FIELD/STADIUM

- 105m x 68m line marked natural 'Couch' turf playing field with sand slit drainage and irrigation
- Playing field with 3.45m runoff to 1.2m high field boundary fence
- 30m length x 6m high ball screens behind both goal posts
- 1.8m high stadium fencing with sliding gates, maintenance access and one automated locking gate
- Home and away dugouts accommodating 10 players each
- Covered spectator bleacher seating for 200
- Un-covered spectator bleacher seating for 260
- Two enclosed 8m long x 1.8m wide x 2.4m high storage cages behind western bleacher stands
- Standard seating, shade tree planting and spectator seat walls on the eastern and western sides of playing field
- Natural turfed hill to northern end of field
- LED field floodlighting up to 200LUX
- Electronic scoreboard in the north-eastern corner
- Provisions for future ticket booths to the main east and west entry points to stadium
- Provisions for future PA system within stadium
- Provisions for future lighting of kick 'a' bout area to the south of the existing pavilion
- Storage room extension to the eastern side of the existing pavilion

PROPOSED TREE PLANTING SPECIES LIST
(SUBJECT TO AVAILABILITY)

- Angophora floribunda (Rough Barked Apple)
- Angophora costata (Smooth Barked Apple)
- Eucalyptus crebra (Narrow Leaved Ironbark)
- Eucalyptus microcorys (Tallowood)
- Eucalyptus sideroxylon (Red Ironbark)
- Corymbia maculata (Spotted Gum)
- Lophostemon confertus (Brush Box)
- Jacaranda mimosifolia (Jacaranda)
- Tristaniopsis laurina 'Luscious' (Watergum)
- Acer rubrum sp. (Maple)
- Fraxinus pennsylvanida sp. (Ash)
- Lagerstroemia indica sp. (Crepe Myrtle)

LEGEND

1	Irrigated natural couch turfed playing field with perimeter fencing, soccer dugouts and ball screen fencing
2	Open air spectator bleachers
3	Open air spectator bleachers with rear storage cages
4	Covered spectator bleachers
5	Public amenities building
6	Electronic scoreboard
7	Turfed spectator hill with access to district playground
8	Stadium entry areas
9	1.8m high stadium perimeter fencing with manual sliding access gates
10	Council controlled remote access electronic gate
11	Maintenance and emergency vehicular access gates
12	Above ground water tank for park and field irrigation
13	Turfed soccer warm up / kick 'a' bout area
14	Designated disabled parking spaces
15	Restricted 2 hour parking Monday to Friday 8am to 6pm to parking bays in Onslow and Gray Street
16	District size playground with nature play, climbing structures, flying fox, swings and play tower. Includes picnic facilities and BBQs
17	Provisions for future pop-up canteen/cafe
18	Separated two-way off road cycleway with turfed median, pedestrian pathway, tree planting and lighting
19	Cyclist (priority) and pedestrian raised threshold crossing
20	Fenced dog park (large dogs) with seating, lighting and drinking station
21	Fenced dog park (small dogs) with seating, lighting and drinking station
22	Pavilion storage room extension
23	Table tennis table and basketball / mini-soccer partially fenced multi-use sports court with lighting, seating, shelters and drinking station
24	Temporary pathway link from Onslow Street to Arthur Street
25	Pedestrian access pathway with lighting
26	Proposed finess equipment
27	Proposed fencing and planted buffer to road

CONSTRUCTION OF DASHED AREA SUBJECT TO AVAILABLE FUNDS

28	Precast concrete BMX pump track
29	Creek embankment stabilisation works and bush regeneration including native tree, shrub and groundcover planting
30	Permanent pathway link from Onslow Street to Arthur Street

Proudly funded by NSW GOVERNMENT

F.S Garside Park Concept Design
SCALE 1:600 @ A1

CAPITAL PROJECTS
LANDSCAPE ARCHITECTURE

CITY OF PARRAMATTA

50

NO 40

NO 38

GRAY STREET

DISTRICT PLAYGROUND

NATURAL TURF HILL

ALFRED STREET

ONSLOW STREET

ONSLOW STREET

ONSLOW STREET

ARTHUR STREET

NATURAL COUCH TURF PLAYING FIELD

TEMPORARY PATHWAY LINK

TEMPORARY PATHWAY LINK

CONSTRUCTION OF THIS DASHED AREA SUBJECT TO AVAILABLE FUNDS

INDICATIVE BMX PUMP TRACK

BUSH REGENERATION & EMBANKMENT STABILISATION

YOUTH PRECINCT

EXISTING PAVILION

WATER TANK

NATURAL TURF KICKABOUT AREA

DOG PARK (LARGE DOGS)

DOG PARK (SMALL DOGS)

PARRAMATTA ROAD

October 2021

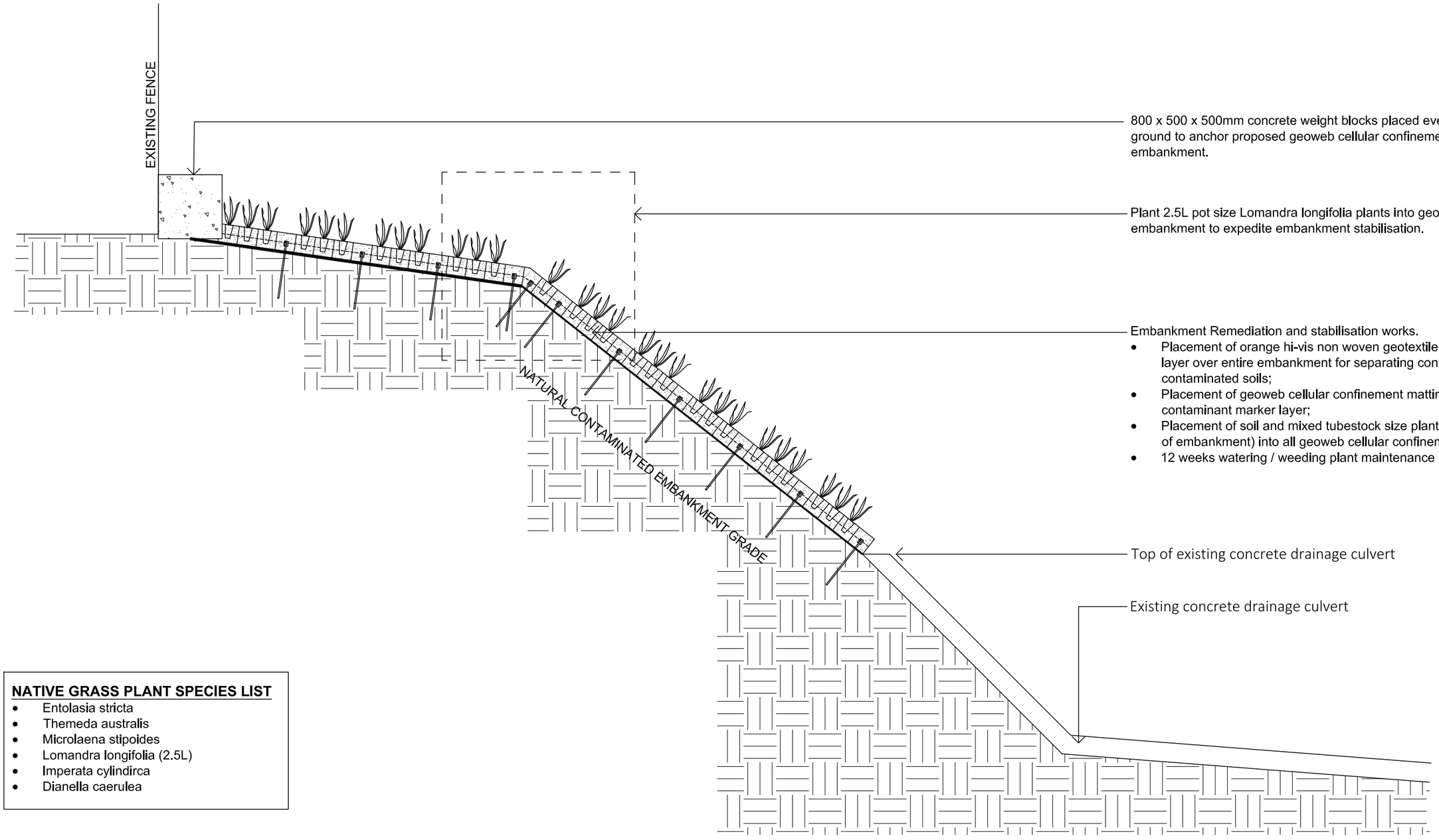
GREENCAP
Going Further in Managing Risk

Remediation Action Plan

City of Parramatta Council

FS Garside Reserve, Granville NSW 2142

Appendix B – Embankment Remediation Details



NATIVE GRASS PLANT SPECIES LIST

- Entolasia stricta
- Themeda australis
- Microlaena stipoides
- Lomandra longifolia (2.5L)
- Imperata cylindirca
- Dianella caerulea

INDICATIVE SECTION DETAIL A - A

Date:
18 January 2017

Drawing Status:
CONCEPT SHEET 2 of 3
** Subject to consultation & further investigative works*

N

ABECKETTS CREEK EMBANKMENT REHABILITATION WORKS

BETWEEN HARRIS AND GOOD STREETS GRANVILLE

LANDSCAPE CONCEPT PLAN

CITY OF PARRAMATTA

PRECEDENT SITE - SUBIACO CREEK EMBANKMENT, RYDALMERE OPERATIONS CENTRE

MATERIAL EXAMPLES (Images courtesy of Geofabrics Australasia)

Date:

18 January 2017

Drawing Status:

CONCEPT SHEET 3 of 3

** Subject to consultation & further investigative works*

N

ABECKETTS CREEK EMBANKMENT REHABILITATION WORKS

BETWEEN HARRIS AND GOOD STREETS GRANVILLE

LANDSCAPE CONCEPT PLAN

CITY OF PARRAMATTA

Appendix F

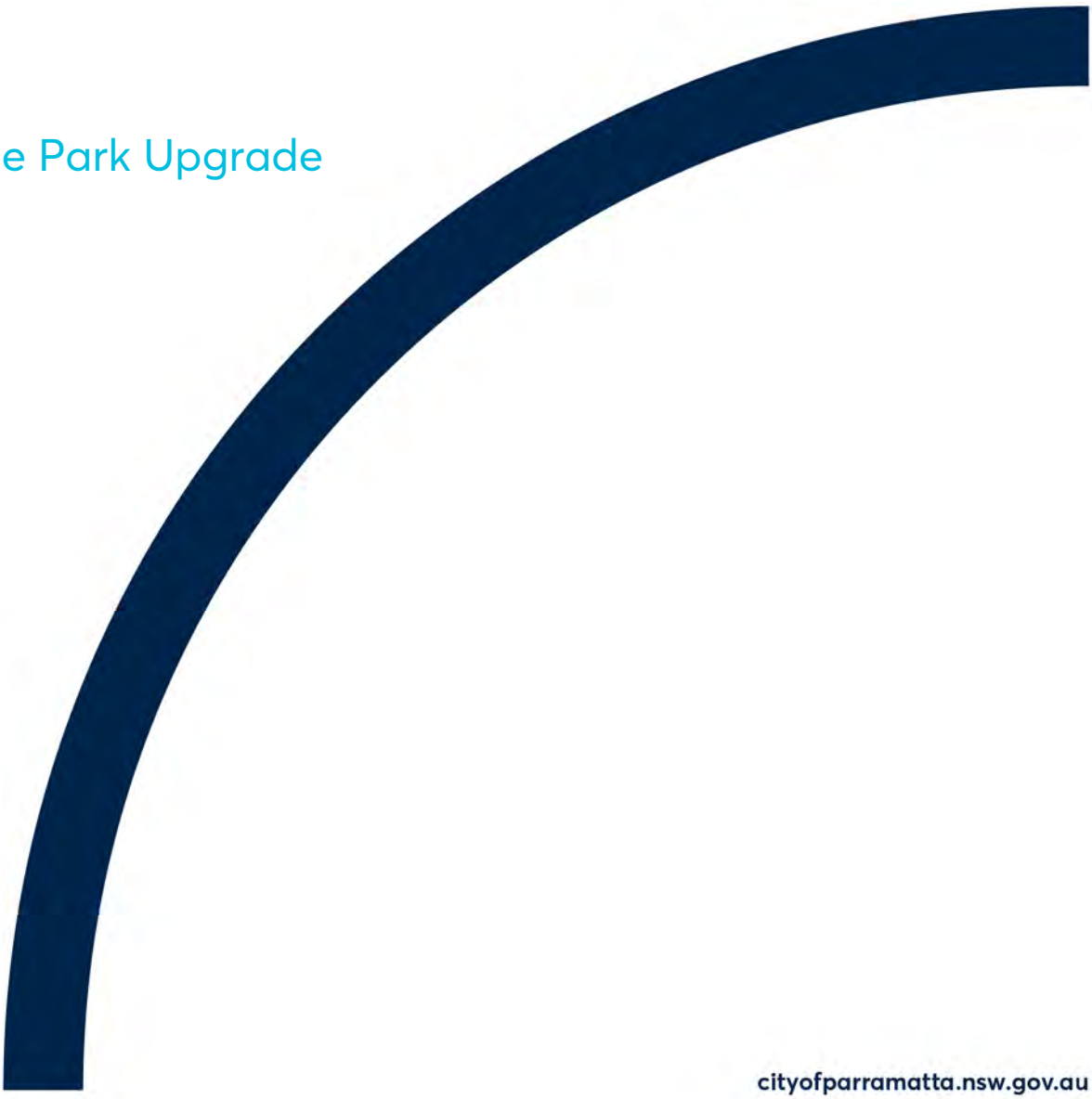
Aboriginal Heritage Due Diligence Assessment

CITY OF PARRAMATTA

Aboriginal Heritage Due Diligence Assessment

F.S. Garside Park Upgrade

July 2021



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CONTENTS

1. Summary

This Due Diligence Assessment report is prepared for the City of Parramatta Council (Council) by Troy Holbrook (Senior Open Space & Natural Area Planner) for the F.S Garside Park Upgrade project. The conclusion of this assessment is that for the purposes of this project an Aboriginal Heritage Impact Permit is not required.

The Council GIS indicates the site is mapped as low sensitivity and that there are no records for Aboriginal heritage objects within the vicinity of the proposed works. A Heritage NSW (HNSW) Aboriginal Heritage Information Management System (AHIMS) search was also undertaken to confirm the presence or absence of known Aboriginal heritage within or in proximity to the works site. The AHIMS search shows there are no Aboriginal places and no recorded Aboriginal sites within a 200m radius of the site.

As a precautionary approach, this assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010). This Due Diligence Assessment has determined that the proposed activity would not likely harm any Aboriginal heritage due to the following:

- **No Aboriginal objects or places known to be located within or near the project site (AHIMS); and**
- **Project site is 'disturbed land' due to previous infrastructure construction, landfill activities and associated contamination; and**
- **Unexpected finds protocol required as a condition of approval under Part 5 of the *Environmental Planning & Assessment Act 1979* (Review of Environmental Factors)**

It is therefore the conclusion of this assessment that an Aboriginal Heritage Impact Permit (AHIP) is NOT required. If any Aboriginal objects are found, work shall stop immediately and HNSW shall be notified. If human remains are found, work shall stop immediately, site shall be secured, and NSW Police and the HNSW shall be notified.

2. Background

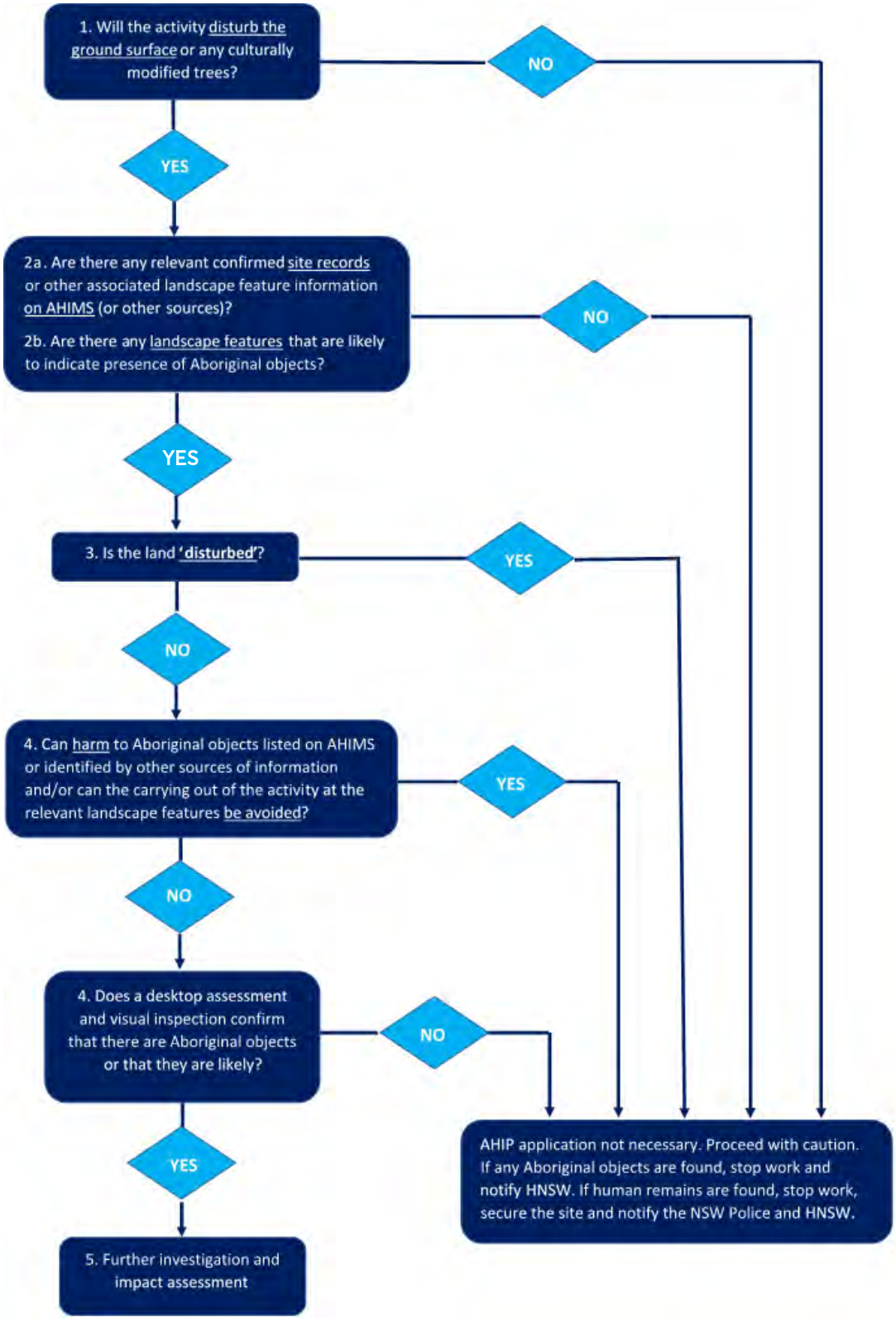
Council proposes the construction of new recreational facilities and associated remediation of contamination at F.S. Garside Park in Granville.

To ensure that the proposed works do not adversely impact upon potential Aboriginal cultural heritage, they must be assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Code of Practice) (DECCW, 2010). This Code of Practice assists Council to exercise due diligence prior to undertaking activities that may harm Aboriginal objects and provides a defence against prosecution for an offence if an object is unknowingly harmed without an AHIP.

It outlines reasonable and practicable steps which individuals and organisations need to take to:

- Identify whether or not Aboriginal objects are, or are likely to be, present in an area
- Determine whether or not activities are likely to harm Aboriginal objects (if present)
- Determine whether an AHIP is required

The Code of Practice prescribes key steps in undertaking due diligence, which are outlined as follows:



3. Low Impact Activities

Council is not required to follow the Code of Practice or undertake any other due diligence process if the proposed works are 'low impact activities' (however this does not apply to situations where the presence of an Aboriginal object/s is known). Section 7.5 of the Code of Practice specifies low impact activities.

(If the proposed activity is included in the below table, the works can proceed with caution. Should Aboriginal objects be found when carrying out the works, they must stop and HNSW must be notified).

Subclause	Questions (Code of Practice – Section 7.5)	Applicable
(1)	*(a) Maintenance work of the following kind on land that has been disturbed:* *(i) maintenance of existing roads, fire and other trails and tracks,* *(ii) maintenance of existing utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines), or*	No
	(b) Farming and land management work of the following kind on land that has been disturbed: *(i) cropping and leaving paddocks fallow;* *(ii) the construction of water storage works (such as farm dams or water tanks);* *(iii) the construction of fences;* *(iv) the construction of irrigation infrastructure, ground water bores or flood mitigation works;* *(v) the construction of erosion control or soil conservation works (such as contour banks); or*	No
	d) Grazing of animals, or	No
	e) An activity on land that has been disturbed that comprises exempt development or was the subject of a complying development certificate issued under the Environmental Planning and Assessment Act 1979; or	No
	(f) Mining exploration work of the following kind on land that has been disturbed: *(i) costeaning;* *(ii) bulk sampling;* *(iii) drilling; or*	No
	(g) Work of the following kind: *(i) geological mapping;* *(ii) surface geophysical surveys (including gravity surveys, radiometric surveys, magnetic surveys and electrical surveys), but not including seismic surveys;* *(iii) sub-surface geophysical surveys that involve downhole logging;* *(iv) sampling and coring using hand-held equipment, except where carried out as part of an archaeological investigation; or*	No

Subclause	Questions (Code of Practice – Section 7.5)	Applicable
	(h) Removal of isolated, dead or dying vegetation, but only if there is minimal disturbance to the surrounding ground surface, or	**No**
	(i) Work of the following kind on land that has been disturbed: *(i) seismic surveying,* *(ii) the construction and maintenance of ground water monitoring bores, or*	**No**
	(j) Environmental rehabilitation work including temporary silt fencing, tree planting, bush regeneration and weed removal, but not including erosion control or soil conservation works (such as contour banks).	**No**
(2)	*Subclause (1) does not apply in relation to harm to an Aboriginal culturally modified tree.*	**No**
(3)	*In this clause, Aboriginal culturally modified tree means a tree that, before or concurrent with (or both) the occupation of the area in which the tree is located by persons of non-Aboriginal extraction, has been scarred, carved, or modified by an Aboriginal person by:* *a) the deliberate removal, by traditional methods, of bark or wood from the tree, or* *b) the deliberate modification, by traditional methods, of the wood of the tree.*	**No**

For the purposes of this clause, **land is disturbed if it has been the subject of human activity that has changed the land's surface, being changes that remain clear and observable**. Examples of activities that may have disturbed land include the following:

a) soil ploughing,
b) construction of rural infrastructure (such as dams and fences),
c) construction of roads, trails and tracks (including fire trails and tracks and walking tracks),
d) clearing of vegetation,
e) construction of buildings and the erection of other structures,
f) construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure),
g) substantial grazing involving the construction of rural infrastructure,
h) construction of earthworks associated with anything referred to in paragraphs (a)-(g).

4. Due Diligence Assessment

As the proposed works are not deemed to be a 'low impact activity', a due diligence assessment has been undertaken in accordance with the Code of Practice as follows:

Step 1	
Will the activity disturb the ground surface?	**Yes** *(Remediation earthworks)*
Step 2a	
Are there any relevant confirmed site records or other associated landscape feature information on AHIMS (or any other sources of information of which Council is already aware)?	**No** *(Low sensitivity and no recorded sites within 200m)*
Step 2b	
Are there any of the following landscape features that are likely to indicate presence of Aboriginal objects: *(i) **within 200m of waters*** *(ii) located within a sand dune system* *(iii) located on a ridge top* *(iv) ridge line or headland* *(v) located within 200m below or above a cliff face* *(vi) within 20m of or in a cave, rock shelter, or a cave mouth*	**Yes** *(Adjoins Duck Creek)*
Step 3	
Is the site 'disturbed' (been the subject of human activity that has changed the land's surface, being changes that remain clear and observable). *Note: Examples of activities that may have disturbed land include the following:* *(a) soil ploughing,* *(b) construction of rural infrastructure (e.g. dams and fences),* *(c) construction of roads, trails and tracks (including fire trails and tracks and walking tracks),* ***(d) clearing of vegetation,*** ***(e) construction of buildings and the erection of other structures,*** ***(f) construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure),*** *(g) substantial grazing involving the construction of rural infrastructure,* *(h) **construction of earthworks** associated with anything referred to in paragraphs (a)-(g).*	**Yes** *(Former landfill / rubbish tip with imported fill depths of 1m to 4m)*
Step 4	
Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?	**N/A** *(Refer above)*
Step 5	
Further investigation and impact assessment.	**No** *(Not required as high level of disturbance. Proceed with caution)*

5. Site Photos

1943 Aerial Photograph

1978 Aerial Photograph

6. Conclusion

The proposed works are to occur on land that was a former landfill / rubbish tip and has been subject to significant earthworks. This has resulted in contaminated fill depths of between 1 and 4 metres, with no proposed works to occur below this level.

Vegetation has been cleared to facilitate the construction of buildings and other infrastructure for past and current land uses, with the adjacent waterway highly modified through realignment as an artificial channel. These human activities have resulted in substantial alteration to the land surface and the site is reasonably defined as 'disturbed land'. It is therefore unlikely that Aboriginal objects will be present nor likely to be harmed by the proposed works.

An AHIP is not required and works can proceed with caution. Should any Aboriginal objects be discovered, work is to stop immediately and HNSW notified. An AHIP will be required if it is intended to harm any unexpectedly discovered objects. If human remains are found, works must cease immediately, the site is to be secured, and NSW Police and Heritage NSW are to be notified.

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : FS Garside

Client Service ID : 608337

Parramatta City Council

Date: 26 July 2021

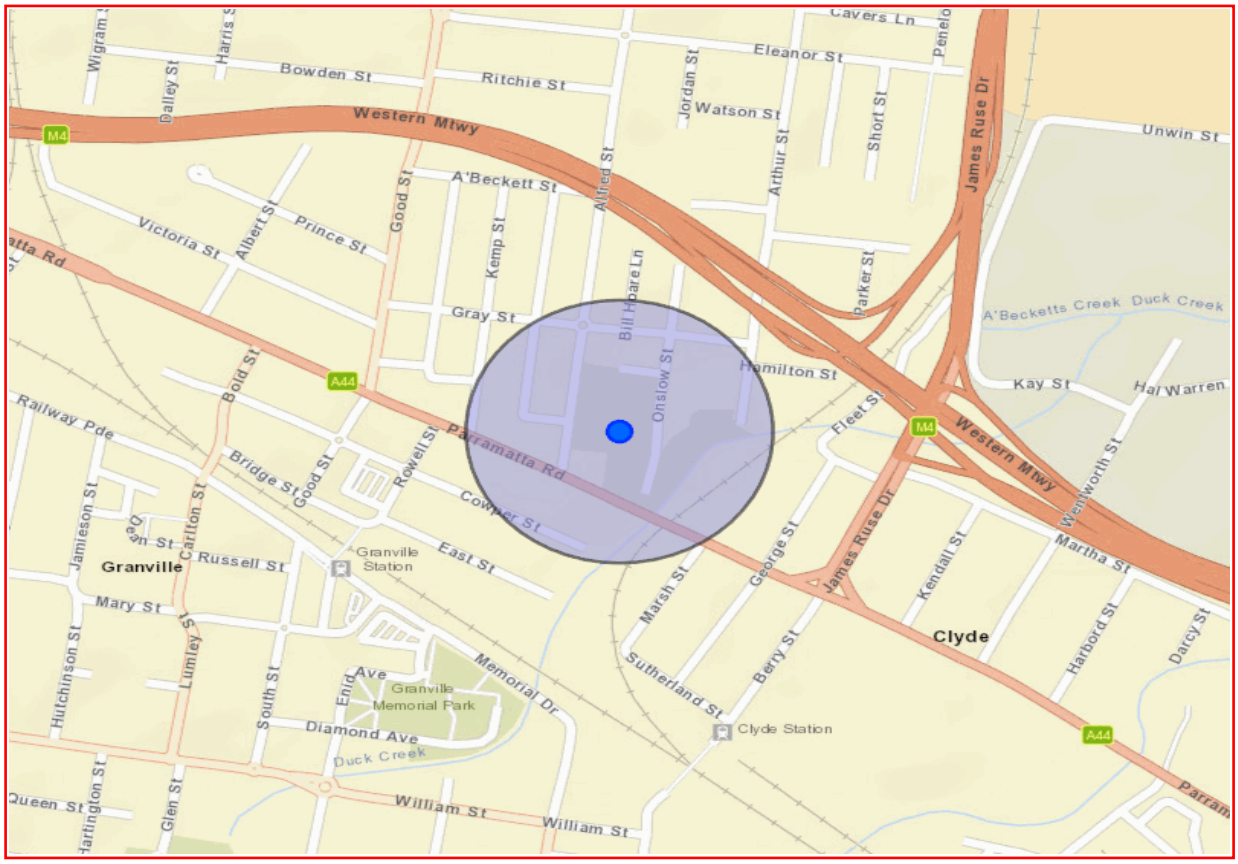
PO Box 32
Parramatta New South Wales 2124
Attention: Troy Holbrook

Email: tholbrook@parracity.nsw.gov.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Address : 75 PARRAMATTA ROAD GRANVILLE 2142 with a Buffer of 200 meters, conducted by Troy Holbrook on 26 July 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
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Tel: (02) 9585 6345

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Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au