

2. Site Description

2.1 Plant community types

This VMP addresses the approved removal of approximately 1,617 m² (0.16 ha) of planted native vegetation, which comprises the following:

- 467 m² of planted local native species, and
- 1,150 m² of planted non-local species.

Approximately 249 m² of the planted local native species was allocated to the plant community type (PCT) Coastal Valleys Swamp Oak Riparian Forest (PCT 4023 – formerly PCT 1800).

PCT 4023 is commensurate with the threatened ecological community (TEC) listed under both BC Act and EPBC Acts. However, the vegetation allocated to PCT 4023 in the Site is of planted origin and does not meet the condition and diagnostic thresholds to be considered a TEC community under either Act.

2.2 Arboriculture

An arboricultural impact assessment (AIA) of the Site identified and assessed 107 trees (Canopy Consulting, 2023) of which 71 trees (under 61 tag numbers) require removal and 36 trees (under 35 tag numbers) will be retained.

Table 2-1. Trees assessed in AIA

Project impact	Qty
Unmitigable encroachment into tree protection zone (TPZ) area and require removal	59 (under 55 tags)
Nil – removal recommended due to health or structural concerns or weed status	12 (under 6 tags)
Total being removed	71 (under 61 tags)
Major encroachment into TPZ area and require specific mitigation measures to ensure these trees remain viable	9 (under 9 tags)
Either acceptable minor encroachments of less than 10% into TPZ area or a nil encroachment and are anticipated to remain viable providing tree protection measures are installed and maintained	27 (under 26 tags)
Total being retained	36 (under 35 tags)

2.3 Fauna habitat

The Site does not contain microhabitat required by any threatened species that are likely to occur within the locality.

Existing vegetation was found to lack habitat features for most fauna other than highly mobile bird and bat species that might forage on Myrtaceae tree species when flowering.

Notwithstanding, resident avifauna may nest in the Site's trees in spring and early summer.

3. Implementation summary

Safeguards to manage potential biodiversity impacts are summarised in Table 3-1, together with who is responsible for their implementation, at what stage of the works and the relevant statutory mechanism.

Table 3-1. Management and mitigation measures summary table

ID	Measure/Requirement	Responsibility	Timing / Frequency	Reference / Notes
INDUCTION				
VMP1	All employees and contractors will be inducted to ensure that procedures outlined in this VMP are met. This will have a focus on clearing limits, tree protection management requirements and compliance with statutory requirements applicable to flora and fauna.	Management / Contractors / Employees	Prior to each employee or contractor commencing work on site	Provisions under the BC Act, Biosecurity Act, PCA Act, Pesticides Act, relevant Australian Standards.
VMP2	The approved Tree Protection Management shall be implemented and tree protection measures must be installed and maintained, as required to the satisfaction of the project arborist	Civil Contractor / Project Arborist	Prior to and during construction	Section 2.2 and Attachment A.
PRE-CLEARING SURVEYS				
VMP3	Pre-clearing surveys are to be undertaken immediately prior to clearing works by an experienced ecologist. Habitat features that will be cleared are to be appropriately marked and located by GPS.	Civil Contractor / Project Ecologist	Pre-clearing	Section 5

ID	Measure/Requirement	Responsibility	Timing / Frequency	Reference / Notes
VMP4	Pre-clearance reporting (including GPS measurements and FFMP constraints mapping) must be prepared to inform the following: <ul style="list-style-type: none"> Clearing limits, no-go zones, and areas that must be protected; Habitat features within clearing limits that require two-stage felling; and Amendments required to the Project's CEMP. 	Civil Contractor / Project Ecologist	Pre-clearing	Section 5
WILDLIFE PROTECTION				
VMP5	An ecologist is to be present for all felling of identified habitat features.	Civil Contractor / Project Ecologist	Ongoing throughout construction	Section 5
VMP6	Fauna rescue and release protocols will be followed to ensure native fauna are not impacted during construction.	Civil Contractor / Project Ecologist	Ongoing throughout construction	Section 5
VMP7	Should unexpected fauna be encountered on site, a stop works procedure must be followed.	Management / Contractors / Employees	Ongoing throughout construction	Section 5
LANDSCAPE MANAGEMENT				
VMP8	The approved Landscape Management Plan shall be implemented	Civil Contractor / Landscape Contractor	Ongoing throughout construction	Section 6 and Habit8 (23 March 2023)

ID	Measure/Requirement	Responsibility	Timing / Frequency	Reference / Notes
VMP9	The approved Landscape Management Plan shall be implemented	Civil Contractor / Landscape Contractor	Pre-operation	Section 6 and Habit8 (23 March 2023)
VMP10	Post construction, operation must not commence until the most recent version of the Landscape Management Plan approved by the Planning Secretary is implemented	Civil Contractor / Landscape Contractor		
VMP11	Landscaping and vegetation on the site must be maintained in accordance with the approved Landscape Management Plan for the life of the operation of development.	Landscape Contractor	Ongoing	
WEED AND PATHOGEN MANAGEMENT				
VMP12	General biosecurity duty shall be complied with at all times in order to minimise the risk of introduction and/or spread of biosecurity risks.	Management / Contractors / Employees	Throughout construction	Section 8

4. Tree protection

Section 6 of the Arboricultural Impact Assessment (AIA) identifies specific tree protect measures that are required to ensure the trees nominated for retention remain viable post-construction.

The specific measures identified in Section 6 of the AIA are to be read in conjunction with the Tree Protection Management Plan (TPMP) provided in Appendix C of the AIA.

Both Section 6 and the TPMP are provided in Attachment A of this VMP.

The TPMP indicates the position of tree protection devices and other measures to ensure the protection of trees within the site to be retained as part of the proposed development.

In general, the following protection measures have been recommended:

- **For trees where nil development encroachment will occur:**

Indirect or inadvertent encroachments may occur due to haul routes or machinery movement tree protection should be installed.

- **For trees where minor development encroachment will occur:**

Tree protection must be installed and maintained.

- **For trees where major development encroachment will occur:**

All works and excavations within the TPZ must be supervised by the Project Arborist. Tree protection must be installed and maintained for the duration of the project. Additional measures such as mulching or temporary irrigation may be required.

Additional inspections shall be conducted by the Project Arborist at several key points during the construction to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

Trees that are being retained in Figure 2-1.

Trees that are being removed are shown in Figure 2-1 and Figure TRP01 of the TPMP (refer Attachment A of this VMP).

Where tree protection fencing will be required is indicated in Figure 2-1 and shown in Figure TPMP01 of the TPMP (refer Attachment A of this VMP).


339-349 Horsley Road
Milperra SSD-45998963

Figure 2-1.
Vegetation clearing





Legend

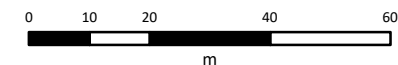
 Subject site

 Tree protection fencing

Trees

 To be retained & protected

 To be removed



Coordinate System: MGA Zone 56 (GDA 2020)
Image source: Nearmap 04 June 2022
Date drawn: 10 August 2023

5. Wildlife protection

5.1 Pre-clearance process

5.1.1 Pre-clearance surveys

Pre-clearing surveys are undertaken to provide a final check for presence of flora and fauna species and habitat on a site immediately before clearing begins. Pre-clearing surveys are required to:

- Identify habitat features suitable for native fauna that will require clear felling supervision and which will require a two-stage clearance procedure (refer Section 4.3);
- Identify any threatened flora or fauna that may have that may have moved into the subject site since ecological surveys were conducted;
- Provide input into determining appropriate exclusion zones; through:
 - Recording the details for all habitat features found in vegetation to be cleared (including where applicable: GPS location; species or type of habitat feature),
 - Marking the limits of clearing, habitat features in areas to be cleared and native vegetation to be protected during construction, using suitable methods,
- Locate nearby habitat suitable for the release of fauna that may be encountered during the pre-clearing process or habitat removal;
- Prepare constraints mapping and relevant induction materials;
- Determine any additional management measures that may need to be incorporated into the CEMP.

5.1.2 Marking limits of vegetation clearing

Prior to any clearing being undertaken within the subject site, clearing limits need to be clearly delineated, where clearing is adjacent to vegetation that is being retained. Clearing limits can be marked with high visibility tape, temporary fencing, or other appropriate boundary markers.

Materials and methods of marking trees to be removed or retained and protected will be agreed to prior to their employment. This will ensure there is no overlap with methods used by various Project contractors and that vegetation to be cleared, habitat features to be cleared, and vegetation to be retained and protected, are clearly identifiable.

Generally, to minimise confusion over growing amounts of flagging tape (or spray paint) generated by different surveys and the marking of environmental sensitive areas, certain colours will be used for specific purposes. The following colour coding system (that follows traffic light) is recommended:

- Green = trees to be cleared
- Orange (or yellow) = individual trees ready for clearing but in close proximity to habitat features (see below).
- Red (or pink) either flagging tape or spray painted "H" = habitat trees to be cleared that require fauna spotting and staged clearing.

To avoid unnecessary damage to adjacent vegetation or inadvertent habitat removal, the following shall apply:

- No-go / exclusion zones shall:
 - Be made completely visible and known to all contractors working on the Project;

- Be suitably protected by exclusion fencing;
- Remain untouched and not impacted for the duration of construction; and
- Be marked on constraints mapping for use in site inductions.
- No stockpiling of equipment, soils, or machinery will occur beyond the no-go / exclusion boundary;
- Construction vehicles shall not enter into vegetation retained beyond the approved impact areas. At no point is cleared vegetation to be bulldozed into adjacent areas retained beyond the limits of clearing;
- Where possible no plant, including motor vehicles, would be operated within 2x the dripline / canopy of retained trees, i.e., if the tree canopy is four metres in diameter, then an eight metre buffer will be placed around the tree trunk where the plant access is excluded;
- Sediment and erosion controls must be installed and maintained for the duration of the Project (see Section 5.2).

5.1.3 Reuse of felled trees

Condition B25(e) requires that opportunities for the reuse of felled tree hollows be detailed.

Opportunities to reuse any hollows found during the clearing process and non-hollow bearing tree materials will be incorporated into the landscaping, where practical.

This may potentially include, but *will* be limited to the following:

- If any hollows are found, the section of the tree containing the hollow will be retained for relocation within the Site's landscaping (providing it is able to be removed in one piece without breaking up, and the piece is small enough to be relocated in the Site).
- Chipped felled trees suitable for reuse as mulch providing that mulch can be re-used immediately in retained vegetated areas and/or stored on-site until needed.
- Placement of smaller branches or trunk sections in locations where planting densities will not be constrained.

5.2 Sediment and erosion control

Sediment and erosion control measures are to be installed prior to earthworks and maintained for the duration of the works in accordance with the Project's relevant erosion and sediment control plan.

Specific controls required during vegetation removal include:

- Appropriate boundary sediment controls (sediment fencing, excavated sediment traps, check dams, straw bale filters, etc) shall be installed around all areas of remnant vegetation to be retained; and
- Where vegetation removal is limited to isolated trees and shrubs, the tree/shrub removed shall have the root base backfilled and compacted as required.

5.3 Clearance process

Due to the proximity of vegetation to be cleared to neighbouring land, infrastructure and vegetation to be retained, tree felling will be done via chain sawing of branches and the main tree trunk(s) in sections and controlled lowering of limbs to ground followed by stump grinding and/or removal of the root ball where practical.

Most trees will be removed this way with only very small trees and shrubs mechanically knocked over.

5.3.1 Single staged clearing

Where no areas of habitat have been identified in the trees to be removed, clearing can be undertaken in a single-stage process, and includes the under-scrubbing of non-habitat vegetation using a combination of manual slashing and small excavator (as applicable). Vegetation cleared during single-stage clearance shall not be stockpiled on-site (unless chipped for reuse as mulch) as it may provide temporary habitat for displaced fauna.

5.3.2 Two-staged clearing

A two-stage clearing process is designed to enable fauna to feel secure whilst clearing occurs around their tree, and to allow them a chance to self-relocate at night to coincide with typical foraging behaviours of arboreal animals.

During clearing, an experienced ecologist must be present for the clearing of any habitat features.

Before the commencement of clearing works, local vets and or wildlife carers are to be notified (see Section 5.4.2).

Stage 1

Firstly, vegetation not identified during pre-clearance surveys as fauna habitat will be cleared. All vegetation around the habitat item will be cleared so that the fauna habitat item is isolated.

Stage 2

Secondly, identified habitat trees are left to stand overnight to allow resident fauna to voluntarily move from the area. Habitat trees will then be cleared by arborist using the following protocols:

- Tree will be gently agitated by machinery prior to clearing to encourage any animals remaining to leave the habitat;
- Tree branches surrounding and above the habitat item will be removed in manageable sections using chainsaw;
- Once surrounding foliage and timber have been removed the arborist shall inspect the hollow or nest to determine if the habitat item is in use (in consultation with ecologist and where necessary using camera/video to relay information to ecologist on ground);
- Whenever possible the animal will be recovered and relocated in either:
 - A section of tree containing the hollow (cut and carefully lowered to the ground), or
 - Removal of the main structural limb supporting an occupied nest and lowered to the ground inside bucket (see photo plates 1 and 2).
- Nests will be relocated and securely fastened to a tree being retained on the Site;
- Tree hollow relocation with animal *in situ* will be dependent on animal type and size (bird, microbat or other arboreal mammal) and where animal does not require veterinarian care. Whenever possible habitat will be relocated to a suitable tree being retained on the Site.



Photo plate 1: location of nest and location of supporting limb where cut



Photo plate 2: nest safely removed and in bucket for relocation

5.3.3 Post-clearance

- Following clearing, a post-clearing assessment will be prepared and must include at minimum the following results:
- Details of native fauna captured and relocated, injured or deceased;
- Photos of rescued fauna;
- Number of habitat features felled; and
- Analysis of the effectiveness of clearing and fauna rescue methods.

5.4 Fauna rescue and release procedure

All fauna handling and relocation shall be undertaken in accordance with this procedure to ensure that impacts upon native fauna are minimised for the duration of clearing works.

Employment of the procedure will assist in natural relocation of fauna that occupy the habitat features identified within the subject site and where required handling and relocation.

5.4.1 Fauna handling protocol

Ecologists are responsible for capturing vertebrate fauna during the habitat clearing process. Fauna handling is to be only undertaken by the experienced ecologist on site or licenced wildlife carer.

All fauna that are encountered during clearance works are to be identified and assessed by an ecologist with records of their health status detailed (e.g., released, self-relocated, transported to vet or as per Wires).

The acting ecologists must operate under the following:

- Scientific Licence under Part 2 of the BC Act; and
- Compliance with the PCA Act.

The following procedure is relevant to the rescue/relocation and transport of fauna, instances where fauna is shocked, trapped, injured, or if eggs or juvenile fauna are discovered.

1. Stop work if encountering any fauna within work area
2. If fauna is not injured allow it to move out of work area
3. If fauna does not move out of work area due to injury or other reasons, the health of the animal must be determined and the decision based on the welfare of the animal and whether it is likely to survive on release. Stress would be minimised through:
 - The use of soft containment and placement in a pet carrier or similar,
 - Animal retained in a quiet, warm location that is well ventilated, and
 - Relevant vet/rescue agency contacted.
4. Once the vet/rescue agency arrives at the site, they are responsible for the animal. Any decisions regarding the care of the animal will be made by the vet/rescue agency.
5. In the event the local veterinary service and/or rescue service cannot attend the site, the injured/captured animal will be transported to their location.

5.4.2 Fauna release locations

A suitable release location must be identified and when needed, injured animals will be assessed by a licensed ecologist and taken to a vet for further treatment if required. The vets nearest to the subject site are

- Panania Vet Clinic (2.8km from Site): 47 Anderson Avenue Panania Tel: 9774 1633 (Mon-Fri 9am-6pm)
- Vets for Pets Revesby (3.9km from Site): 143 The River Road Revesby Tel: 8739 8842 (Mon-Fri 9am-7pm)

The location of where each fauna species that is released must also be recorded.

6. Landscape specifications

6.1 Services

Before landscape work is commenced the Landscape Contractor is to establish the position of all service lines and ensure tree planting is carried out at least 3 metres away from these services. Service lids, vents and hydrants shall be left exposed and not covered by any landscape finishes (turfing, paving, garden beds etc.). Finish adjoining surfaces flush with pit lids.

6.2 Planting program

6.2.1 Plant supply

All plants supplied are to conform with those species listed in Table 6-1 (taken from the Landscape Concept Plan DA submission prepared by Habit8, dated 03.05.2023)

Generally, plants shall be vigorous, well established, hardened off, of good form consistent with species or variety, not soft or forced, free from disease or insect pests with large healthy root systems and no evidence of having been restricted or damaged.

Trees shall have a leading shoot. Immediately reject dried out, damaged or unhealthy plant material before planting.

All stock is to be container grown for a minimum of six (6) months prior to delivery to site.

Table 6-1. Plant Schedule

Code	Botanical name	Size	Density	Qty
Large trees				
AC	Angophora costata	100L	As shown on Landscape plans L01- L08 (Habit 8, 03.05.2023)	1
BI	Banksia integrifolia	100L		17
EC	Eucalyptus crebra	100L		5
BAC	Brachychiton acerifolius	100L		2
EM	Eucalyptus moluccana	100L		4
EP	Eucalyptus piperita	100L		8
EU	Eucalyptus punctata	100L		2
ET	Eucalyptus tereticornis	100L		6
MS	Melaleuca styphelioides	100L		5
Medium trees				
AP	Acacia parramattensis	100L	As shown on Landscape plans L01- L08 (Habit 8, 03.05.2023)	22
AB	Angophora bakeri	100L		8
CU	Ceratopetalum gummiferum	100L		16
ER	Elaeocarpus reticulatus	100L		33
EH	Eucalyptus haemastoma	100L		11
ML	Melaleuca linariifolia	100L		10

Code	Botanical name	Size	Density	Qty
MCWG	<i>Magnolia ‘Coolwyn Gloss’</i>	100L		20
GF	<i>Glochidion ferdinandi</i>	100L		11
TL	<i>Tristaniopsis laurina</i>	100L		15
CUP	<i>Cupaniopsis anacardioides</i>	100L		22
Shrubs				
BAN SPI	<i>Banksia spinulosa</i>	300mm	2m ²	50
CAL LIN	<i>Callistemon linearis</i>	300mm	2m ²	90
DIL SIE	<i>Dillwynia sieberi</i>	300mm	2m ²	100
GRE SER	<i>Grevillea sericea</i>	300mm	2m ²	120
HAK SER	<i>Hakea sericea</i>	300mm	2m ²	30
IND AUS	<i>Indigofera australis</i>	300mm	2m ²	150
KUN AMB	<i>Kunzea ambigua</i>	300mm	2m ²	160
LEP POL	<i>Leptospermum polygalifolium</i>	300mm	2m ²	100
CAL CIT	<i>Callistemon citrinus</i>	300mm	2m ²	220
DOF TRI	<i>Dodonaea triquetra</i>	300mm	2m ²	60
DOR EXC	<i>Doryanthes excelsa</i>	300mm	2m ²	131
PIT REV	<i>Pittosporum revolutum</i>	300mm	2m ²	318
Groundcover				
HAR VIO	<i>Hardenbergia violacea</i>	150mm	4m ²	490
PAN PAN	<i>Pandorea pandorana</i>	150mm	4m ²	260
DIA CAE	<i>Dianella caerulea</i>	150mm	4m ²	450
DIA REV	<i>Dianella revoluta</i>	150mm	4m ²	690
LOM LON	<i>Lomandra longifolia ‘Tanika’</i>	150mm	4m ²	1015
THE AUS	<i>Themeda australis</i>	150mm	4m ²	350
DIC REP	<i>Dichondra repens</i>	150mm	4m ²	350
DIC SIL	<i>Dichondra ‘Silver Falls’</i>	150mm	4m ²	200
VIO HED	<i>Viola hederacea</i>	150mm	4m ²	450
CAR GLA	<i>Carpobrotus glaucescens</i>	150mm	4m ²	420

TURF TYPE: Couch (Confirm prior to construction)

Plants that are not: true to species; vigorous and healthy; with a well-developed root system; free from disease / pests; and are not without scars or dead wood; are to be rejected at delivery.

6.2.2 Planting medium

Planting mixture is to be 300mm depth Imported Garden Mix. Type: Premium Available: Australian Native Landscapes (ANL)

Turf soil mixture (150mm DEPTH) Type: Turf underlay Available: Australian Native Landscapes (ANL)

6.2.3 Planting procedure

GENERALLY:

- Dig hole sufficient for root ball of plant. The removal from the container and the positioning of the plant is to be done with minimum disturbance to the roots.
- Slow-release native plant fertiliser (low phosphorous formulated native plant fertiliser tablet/granules) and water saving crystals shall be placed into the planting hole.
- After planting, the soil shall be replaced and carefully firmed, leaving a slight depression around each plant to allow for water collection. Soil is to be replaced in the hole so that the base of the stem is level with the soil surface, not set below the soil, or sitting above.
- All plants should be watered-in thoroughly after planting to settle any air pockets around the root ball of the plant and to give the plant a good initial supply of water.

STAKING AND TYING:

- Stakes shall be straight hardwood, free from knots and twists, pointed at one end and sized according to size of plants to be staked. a. 100-greater than 200litre 3x(1800x50x50mm)
- Ties shall be 50mm wide hessian webbing or approved equivalent nailed or stapled to stake.
- Drive stakes a minimum one third of their length, avoiding damage to the root system, on the windward side of the plant.

TURF:

- Obtain turf from a specialist grower of cultivated turf. turf shall be of even thickness, free from weeds and other foreign matter;
- Lay in stretcher pattern with joints staggered and close butted, perpendicular to gradient of FSL.
- Water immediately after laying.

FERTILISER

- Mass planting areas: Fertiliser shall be 'Nutricote' or approved equivalent in granule form intended for slow release of plant nutrients over a period of approximately nine months. Thoroughly mix fertiliser with planting mixture at the recommended rate, prior to installing plants.
- Turf: Shall be Shirleys No. 17 or approved equal thoroughly mixed into the topsoil prior to placing turf.
- Trees in grass and super advanced trees: Pellets shall be in the form intended to uniformly release plant food elements for a period of approximately nine months equal to Shirleys Kokei pellets, analysis 6.3:1.8:2.9. Kokei pellets shall be placed at the time of planting to the base of the plant, 50mm minimum from the root ball at a rate of two pellets per 300mm of top growth to a maximum of 8 pellets per tree.

6.2.4 Mulch

- MULCH TYPE: (75mm DEPTH) Type 1: Pine bark: From mature trees, graded in size from 15mm to 30mm, free from wood slivers. Dark brown in colour and texture.
- COMPOST Shall be "GO Compost" as available from Soilco or approved equal.

- MULCH APPLICATION: Place mulch to the required depth, (refer to drawings) clear of plant stems, and rake to an even surface finishing 25mm below adjoining levels. Ensure mulch is watered in and tamped down during installation.

6.3 Maintenance program

Maintenance shall mean the care and maintenance of the landscape works by accepted horticultural practice as rectifying any defects that become apparent in the landscape works under normal use. This shall include, but shall not be limited to:

- Watering
- Mowing
- Fertilising
- Re-seeding, returfing
- Weeding, pest and disease control
- Staking and tying
- Replanting, cultivation, pruning, aerating, renovating, top dressing
- Maintaining the site in a neat and tidy condition

GENERAL

The landscape contractor shall maintain the landscape works for the term of the maintenance (or Plant establishment) period to the satisfaction of the council. The landscape contractor shall attend to the site on a weekly basis. Landlord to maintain all landscape areas in perpetuity (life of the development).

WATERING

Grass, trees and garden areas shall be watered regularly so as to ensure continuous healthy growth.

RUBBISH REMOVAL

During the term of the maintenance period the landscape contractor shall remove rubbish that may occur and reoccur throughout the maintenance period. This work shall be carried out regularly so that at weekly intervals the area may be observed in a completely clean and tidy condition.

REPLACEMENTS

The landscape contractor shall replace all plants that are missing, unhealthy or dead at the Landscape Contractor's cost. Replacements shall be of the same size, quality and species as the plant that has failed unless otherwise directed by the Landscape Architect. Replacements shall be made on a continuing basis after the plant has died or is seen to be missing.

STAKES AND TIES

The landscape contractor shall replace or adjust plant stakes and tree guards as necessary or as directed by the Landscape Architect. Remove stakes and ties at the end of the maintenance period if so directed.

PRUNING

- General: Prune to reflect the natural growth flowering and regrowth habit of the individual species.
- Shrubs: Prune after flowering - Spring and Summer and on a spot basis as required. Hedge trimming: Schedule trimming at times which will maintain the character and design of hedges. Allow up to three times per season.
- Tip pruning: To encourage development of new shoots during the active growing season. Do not remove buds before the flowering season in those plants that have terminal flowers.

- Radical pruning: To maintain a hedge or formal shape or when a particular problem, growth habit, damage, or disease requires branch removal.
- Trees: Prune to eliminate diseased or damaged growth, avoid inter-branch contact and thin out crowns in a natural manner, maintain sight lines to signs and lights, or maintain visibility for personal security. Tree branch removal to AS 4373.

MULCHED SURFACES

All mulched surfaces shall be maintained in a clean and tidy condition and be reinstated if necessary to ensure that a depth of 75mm is maintained. Ensure mulch is kept clear of plant stems at all times. Remove all mulching materials off lawn or paved areas and maintain a clean and tidy appearance when viewed on a weekly basis.

PEST AND DISEASE CONTROL

The landscape contractor shall spray against insect and fungus infestation with all spraying to be carried out in accordance with the manufacturer's directions.

GRASS AND TURF AREAS

The landscape contractor shall maintain all grass and turf areas by watering, weeding, re-seeding, rolling, mowing, trimming or other operations as necessary. Seed and turf species shall be the same as the original specified mixture. Grass and turf areas shall be sprayed with approved selective herbicide against broad leaved weeds as required in accordance with the manufacturer's directions.

Grass and turf areas shall be fertilised once a year in autumn with "Dynamic Lifter" for lawns at a rate of 20kg per 100m². Fertiliser shall be watered in immediately after application. Irregularities in the grass and turf shall be watered in immediately after application. Grass and turf areas shall be kept mown to maintain a healthy and vigorous sward. Mowing height: 30- 50mm.

WEED ERADICATION

Eradicate weeds by environmentally acceptable methods using a non-residual glyphosate herbicide (eg. 'Roundup') in any of its registered formulae, at the recommended maximum rate. Regularly remove by hand, weed growth that may occur or recur throughout grassed, planted and mulched areas. Remove weed growth from an area 750mm diameter around the base of trees in grassed areas. Continue eradication throughout the course of the works and during the maintenance period.

SOIL SUBSIDENCE

Any soil subsidence or erosion which may occur after the soil filling and preparation operations shall be made good by the landscape contractor at no cost to the client.

7. Biosecurity

7.1 Overview

Biosecurity is the protection of the economy, environment and community from the negative impacts of pests and diseases, weeds and contaminants.

The Biosecurity Act introduces the premise that biosecurity is a shared community responsibility and introduces the legally enforceable concept of a General Biosecurity Duty (GBD). The GBD means that any person dealing with a biosecurity risk must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

Biosecurity risks relevant to the Project include the potential introduction and spread of priority weeds and pathogens and disease.

The site is largely hardstand with garden beds and limited areas where weed infestations occur. No evidence of pathogens or disease has been observed within the site.

However, weed propagules, pathogens and disease are easily spread on vehicles and plant and the risk of their introduction and spread cannot be discounted.

7.1 Weed control

Section 6.4 (landscape maintenance) summarises weed control requirements.

Generally, the following requirements must be adhered to for chemical treatment of weeds:

- Herbicide application is to be administered by authorised personnel only (ChemCert Accreditation AQF 3), in accordance with Workcover requirements, the Pesticides Act 1999, label directions and any relevant industry codes of practice.
- A Records Sheet must be completed within 24 hours of applying the herbicide and a copy submitted to the Project Environmental Representative.
- All personnel managing and using herbicides must receive appropriate training prior to commencing work.
- Only herbicides registered for use near water may be used near water.
- Avoid applying herbicides: (i) on hot days when plants are stressed. (ii) after seed has set. (iii) within 24 hours of rain or when rain is imminent. (iv) when winds will cause drift of herbicides into non-target areas.

7.2 Biosecurity hygiene protocol

Management, contractors and employees are required to fulfil their general biosecurity duty (GBD), which may simply be to ensure that their vehicles, boots and equipment are clean of any potential biosecurity risks.

It is expected that management, contractors and employees should know all biosecurity risks associated with the industry, business and relevant day-to-day work activities.

The presence or potential for biosecurity risks within the subject site will be addressed at a project level during site inductions, and the biosecurity protocol below is to be presented to all contractors and its requirements made clear.

All contractors are to follow the hygiene protocol detailed below in Table 7-1 prior to clearing, during construction and post-construction.

Table 7-1. Hygiene protocol

Protocol	Timing
Pre-start site inductions:	
Relevant biosecurity risks are to be discussed during toolbox talks.	Pre-start
In general:	
<p>Minimise work during wet/rainy periods.</p> <p>Vehicle/machine hygiene inspections are to be undertaken prior to works starting to determine if vehicles are free from soil and plant material.</p> <p>Tools to be cleaned free of soil and plant material prior to bringing tools to site or moving between works areas.</p> <p>Permanent or semi-permanent vehicle wash-down facilities may be constructed where machinery and vehicles require routine cleaning for fixed activities</p> <p>Truck wash down, rumble grids to be installed and operated to ensure mud, weeds or pathogens are not transported around the region or onto roads.</p> <p>Mud spilt on roads to be immediately removed by a road sweeper.</p>	At all times
Weeds and Pathogens	
Contractors that have recently engaged in work activities where Phytophthora or Myrtle rust are known to occur must ensure that infected soil, water and/or plant material are removed from machinery, vehicles, equipment and footwear	Prestart
Any soil, plants or other materials entering the site should conform to Australian Standards—for example, AS3743–2003 Potting mixes or AS4454–2012 Composts, soil conditioners and mulches.	At all times
Chytrid fungus	
Contractors that have recently engaged in work activities where the Chytrid fungus is known to occur must ensure that hygiene protocols include disinfection of work boots, car/plant wheels and tyres with benzalkonium chloride (an active ingredient to commercially available products such as ‘toilet duck’).	Prestart
Frogs rescued from each dam are to be inspected for any symptoms of Chytrid fungus by the Project ecologist and transported from the site in accordance with hygiene protocols for the control of disease in frogs (DECC 2008).	Dam decommissioning
<p>Relevant biosecurity risks are to be discussed during toolbox talks.</p> <p>Tools to be cleaned free of soil and plant material prior to bring tools to site or moving between works areas.</p>	Pre-clearance and prestart
Vehicles/machines must pass the hygiene inspection prior to works commencing, additional cleaning may be required to achieve this.	

8. References

Canopy Consulting (2023) Arboricultural Impact Assessment and Tree Management Plan v.3. 339-349 Horsley Rd, Milperra NSW 2214. Inspection Date: 18 June 2022. Prepared for Hale Capital Development, 23 March 2023

écologique (2023) SSD-45998963 339-349 Horsley Rd, Milperra –Biodiversity Development Assessment Report v.3. Prepared for Hale Capital Development Management, 2 March 2023.

Greater Sydney Local Land Services (LLS) (2019) Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022. Developed in partnership with the Greater Sydney Regional Weed Committee - Revised September 2019. ISBN: 978-0-6480418-1-8

Habit8 (2023) Proposed Industrial Development 339-349 Horsley Rd, Milperra NSW 2214. Landscape Concept Plan DA Submission. Issue I. Prepared for Hale Capital Development Management, 3 May 2023.

Attachment A. AIA/tree protection management plan



6. Recommendations

6.1. Project Arborist

An official “Project Arborist” must be commissioned to oversee the tree protection, any works within the TPZ’s and complete regular monitoring compliance certification.

The project arborist must have minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture – AQF Level 5.

6.2. Tree Retention and Removal

The recommendations of this report do not constitute consent to remove trees subject to this report. The council or consent authority should be contacted prior to undertaking works as consent may be required to remove and/or prune the tree(s).

Table 12 summarises tree removal and retention and is shown in the tree removal and retention plan.

Table 12: Tree Retention and Removal

Recommendation	No. of Trees or Groups (Tree QTY)	Tree Numbers
Remove - project impacts	55 (59)	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 52, 55, 56, 57, 58, 61, 62, 63, 64, 65, 67, 68, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89
Remove - irrespective	6 (12)	13, 15, 16, 35, 69, 70
Retain - generic	26 (27)	1, 11, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 59, 60, 94, 95, 96
Retain - generic plus	9 (9)	23, 24, 25, 26, 66, 90, 91, 92, 93
Total	96 (107)	

A total of 59 trees under 55 tag numbers have unmitigable encroachments and will require removal to facilitate the proposed development. Of these, 5 trees (5, 10, 12, 20, 21 and 22) are exempt under CBDCA.

Trees 13, 15, 16, 35, 69 and 70 are also recommended for removal as they are dead or in poor structural condition, are a weed species and should be removed irrespective of the development.

The proposed development would therefore see the removal of 71 trees in total under 61 tag numbers and the retention of 35 trees under 36 tag numbers.

Trees 23, 24, 25, 26, 66, 90, 91, 92, and 93 have major encroachments for bulk earthworks. These trees require generic tree protection measures plus those outlined in Section 6.3.

Trees 1, 11, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 59, 60, 94, 95, 96 have either an acceptable minor encroachment of less than 10% of the TPZ area or a nil encroachment. These trees are anticipated to remain viable provided tree protection measures (TPZ fencing and mulching) are installed and maintained.

6.3. Offset Planting

Any tree approved to be removed from a site should be replaced with a tree of like habit and indigenous to the LGA where possible, planted as near as practicable to the location of the removed tree, grown to maturity and replaced if the planting fails to survive and thrive.

Suggested species for replacement include:

- *Eucalyptus amplifolia* (Cabbage Gum)
- *Eucalyptus tereticornis* (Forest Red Gum)
- *Syncarpia glomulifera* (Turpentine)
- *Eucalyptus punctata* (Grey Gum)
- *Eucalyptus baueriana* (Blue Box)

Lophostemon confertus (Brush Box) should be used along the Horsley Road frontage to infill landscaped areas as this is the predominant species being retained in this area.

Trees should be sourced from a reputable nursery with stock grown to NATSPEC and Australian Standard AS 2303:2018 Tree Stock for Landscape Use criteria.

Trees should be a minimum of 100L pot size at the time of planting.

The trees should be planted and mulched with suitably composted, natural, hardwood mulch as per Figure 5.

Six things you should know when planting a tree.



- 1. Dial Before You Dig**
Several days before planting, call the Dial Before You Dig (DBYG) hotline on 1100 or apply via their website to have any underground services identified.
- 2. Handle with Care**
Always lift tree by the root ball. Keep roots moist until planting.
- 3. Digging a Proper Hole**
Dig 2 to 5 times wider than the diameter of the root ball with sloping sides to allow for proper root growth.
- 4. Planting Depth**
The trunk flare should sit slightly above ground level and the top most roots should be buried 25 to 55 mm.
- 5. Filling the Hole**
Backfill with native soil unless it's all clay. Tamp in soil gently to fill large air spaces.
- 6. Mulch**
Allow 25 to 50 mm clearance between the trunk and the mulch. Mulch should be 75 to 100 mm deep.

Source: Arbor Day Foundation

Figure 5: Recommended tree planting process. (Arbor Day Foundation, 2020)

6.4. Generic Tree Protection

Generic tree protection measures are recommended to restrict construction activities within the TPZ which may adversely affect the health and condition of a tree to be retained. In order of precedence, the following is required for trees to be retained. Tree protection measures are to be installed and maintained as shown in Appendix C - Tree Protection Management Plan.

1. Install TPZ fencing and signage as per Appendix C - Tree Protection Management Plan. Where impractical and subject to project arborist approval;
2. Install trunk and ground protection where machine access is required.

Notes:

- All activities within the fenced TPZ are to be supervised by the project arborist.
- TPZ fencing is not to be moved.

6.5. Generic Plus - Tree Protection Measures

Table 13 shows specific tree protection measures that are required to ensure the trees nominated for retention remain viable post-construction. These measures are to be read in conjunction with Appendix C – Tree Protection Management Plan (TPMP). The TPMP indicates the position of tree protection devices and other measures to ensure the protection of trees within the site to be retained as part of the proposed development.

Table 13: Specific Tree Protection Measures

Specific Recommendation - Includes Generic Recommendations +	No. of Trees or Groups (Tree QTY)	Tree Numbers
<ul style="list-style-type: none"> Exclude all cut and construction activities outside the area shown if the tree is to be retained as shown in Figure 6. Minor fill of up to 200mm of friable topsoil may be permitted (See Section 6.8). If additional fill is required, cellular confinement systems or a dry-well should be investigated to achieve these increased levels. Treat open soil area with Mycogold Biostim and Seamungs soil conditioner at label rates prior to demolition and every 6 months following until completion of construction. Install timed and metered irrigation system for duration of project Install mulch at a depth of 75-100mm. All demolition and construction activities within the TPZ are to be supervised by the project arborist. 	1 (1)	90
<ul style="list-style-type: none"> Treat open soil area with Mycogold Biostim and Seamungs soil conditioner at label rates prior to demolition and every 6 months following until completion of construction. Install timed and metered irrigation system for duration of project Install mulch at a depth of 75-100mm. 	8 (8)	23, 24, 25, 26, 66, 91, 92, 93
Total	9 (9)	

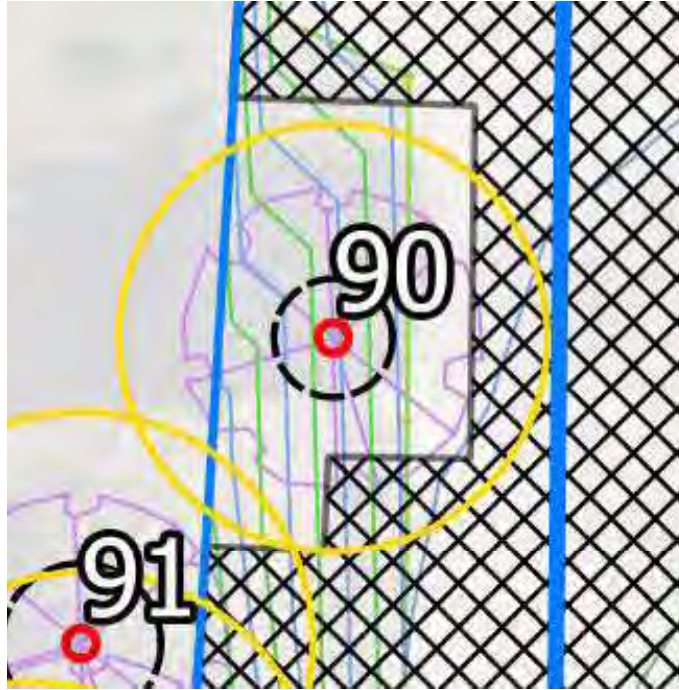


Figure 6: Non-hatched exclusion area required to retain tree 90. Fill using topsoil complying with section 6.8 may be possible within the TPZ subject to project arborist input. If additional fill is required, cellular confinement systems or a dry-well should be investigated to achieve these increased levels.

6.6. Compliance Inspection and Reporting

Compliance inspections are recommended to be completed on a **monthly** basis through the construction stage.

Following each inspection, the project arborist shall prepare a document detailing the condition of the trees. These documents should certify whether the works have been completed in compliance with the approved consent conditions relating to tree protection. These reports should contain photographic evidence where necessary.

Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

Any works within tree protection zones are to be monitored and supervised by the Project Arborist.

6.7. Compliance and Certification Reporting – Hold Points

The following project milestones are recommended to be carried out by the project arborist. These inspections are summarised below and expanded upon in the following sections.

Table 14: Compliance and Certification Table

Construction Stage	Task	Responsibility	Certification	Timing of Inspection
Pre-construction	Indicate clearly (with spray paint or tape on trunks) trees approved for removal only	Principal Contractor	Project Arborist	Prior to site establishment
	Install tree protection measures			
	Induct construction staff into Tree Protection Management Plan			
During Construction	Supervise all excavation works proposed within the TPZ of trees to be retained			As required prior to the works proceeding adjacent to trees to be retained
	Inspection of trees by Project Arborist			Quarterly during construction period
Post-construction	Final Inspection of trees by Project Arborist			Following practical completion of works

6.8. Tree Sensitive Construction Methods

Exploratory Root Investigation

Where trees are intended to be retained, and potential works areas may enter the TPZ or SRZ, determining root location and, therefore the impact on the trees is an important process.

Exploratory root excavation should be undertaken in a manner that causes the least amount of damage to root material in the process. This may include the use of air excavation (air-spade) or hydro or dry-vac excavation. Root investigations should be undertaken at pre-agreed locations that will most effectively guide the design.

Findings of the root investigation should be compiled into a report which identifies significant roots that should be retained and less significant roots that may be appropriate for severance. The size and volume of roots which may be cut must be assessed by an arborist and consider tree physiology, existing site and soil conditions and species traits and tolerance of root pruning.

Fill within Tree Protection Zones

Where unavoidable, fill placed within TPZ of trees to be retained shall be well-drained material equivalent or finer in texture than the existing site topsoil material and should comply with AS 4419:2003 *Soils for Landscaping and Garden Use*.

The fill can be lightly consolidated but not to engineering standards. If fill is to be placed by machinery, this must be done from outside the TPZ or from existing hard stand areas. Alternatively, ground, trunk and branch protection may be used to facilitate machine access.

Pavements within Tree Protection Zones

Any pavements or footpaths within TPZ of trees to be retained should be installed at or above the existing grade to minimise the need for excavation to avoid damage or severance of primary woody roots. The pavement sub-base shall be a coarse, gap-graded material with no fines in order to allow some aeration and moisture infiltration to the root zone. The use of permeable pavements, bonded aggregate or cellular confinement systems should be investigated as alternative construction methods.

Landscaping Works within Tree Protection Zones

The landscape plan is to be checked for compliance with the TPMP. Staged removal of tree protection methods may be required to facilitate landscaping works.

Any landscaping works within the TPZ of trees to be retained are to be under the direct supervision of the Project Arborist. These may include but are not limited to; retaining walls, irrigation and lighting systems, topdressing, planting and paving.

Any landscaping works requiring excavation for drainage or the like is to be undertaken using non-destructive methods previously described.

Trenching for Installation of Underground Services

All underground services should be routed outside the TPZ of trees to be retained. Where unavoidable, services may be installed via alternative methods which may include tree sensitive excavation or Horizontal Directional Drilling (HDD). Where HDD is used, entry and exit pits are to be located outside the TPZ of trees to be retained.

Where excavation or trenching is required to facilitate the installation of underground services within the TPZs of any site trees arborist supervision is required. Works should be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include

- Excavation by hand
- Excavation using a high-pressure water jet and vacuum truck
- Excavation using an Air Spade with a vacuum truck.

Machine excavation is prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

Arboricultural Impact Assessment

Horsley Road Multi-level Warehouse, Milperra (SSD-45998963)
339-349 Horsley Rd, Milperra NSW 2214



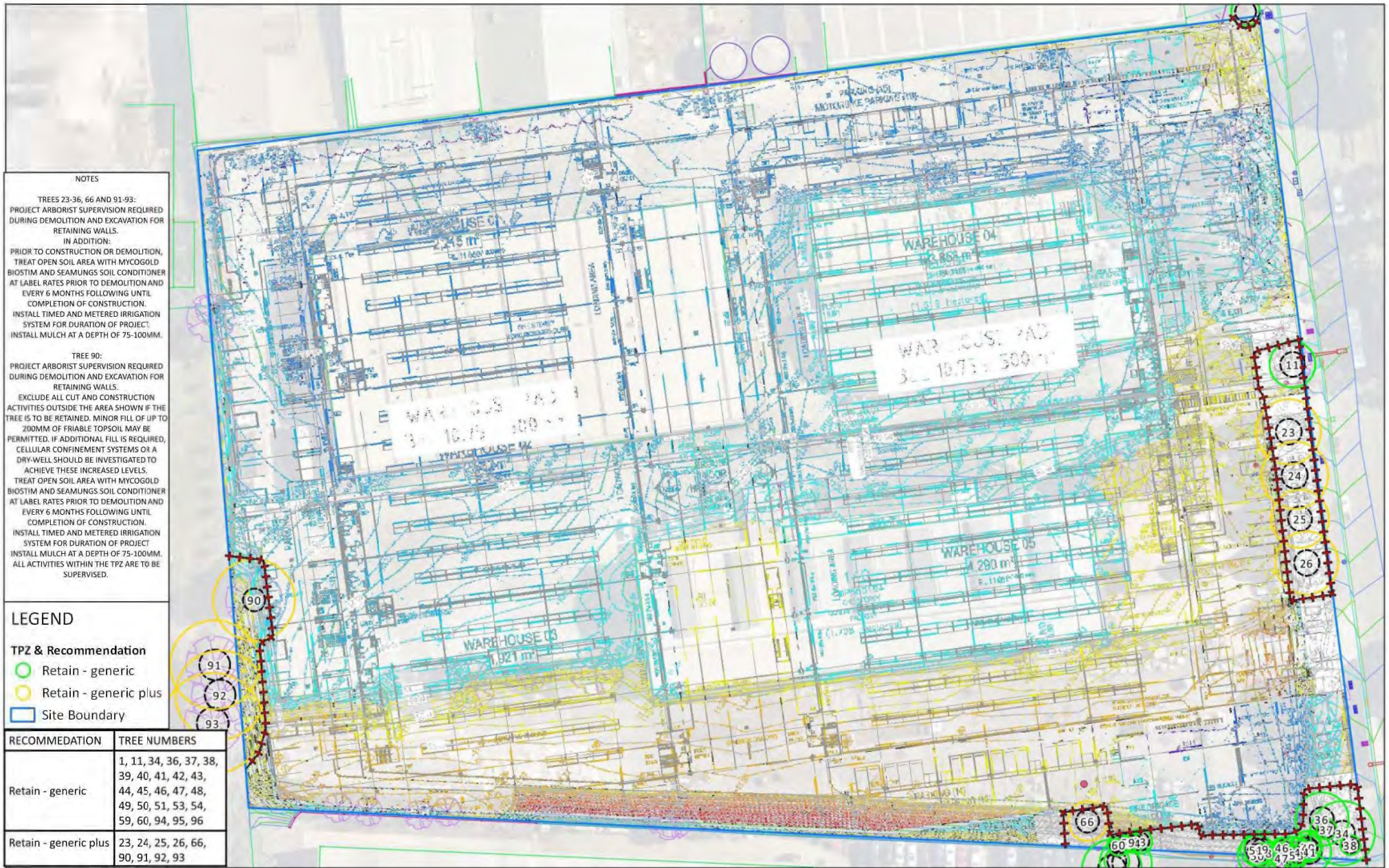
Where a situation occurs that a significant root (root greater than >50 mm diameter) requires pruning or removal, the root is to be severed with a sharp saw implement by or under the instruction of the Project Arborist.

Arboricultural Impact Assessment

Horsley Road Multi-level Warehouse, Milperra (SSD-45998963)
339-349 Horsley Rd, Milperra NSW 2214



13. Appendix C - Tree Protection Management Plan



TREE PROTECTION MANAGEMENT PLAN

339-349 HORSLEY RD, MILPERRA NSW

GENERAL

PROJECT ARBORIST

AN OFFICIAL "PROJECT ARBORIST" MUST BE COMMISSIONED TO OVERSEE THE TREE PROTECTION, ANY WORKS WITHIN THE TPZ'S AND COMPLETE REGULAR MONITORING COMPLIANCE CERTIFICATION.

THE PROJECT ARBORIST MUST HAVE MINIMUM FIVE (5) YEARS INDUSTRY EXPERIENCE IN THE FIELD OF ARBORICULTURE, HORTICULTURE WITH RELEVANT DEMONSTRATED EXPERIENCE IN TREE MANAGEMENT ON CONSTRUCTION SITES, AND DIPLOMA LEVEL QUALIFICATIONS IN ARBORICULTURE – AQF LEVEL 5.

GENERIC TREE PROTECTION

GENERIC TREE PROTECTION MEASURES ARE RECOMMENDED TO RESTRICT CONSTRUCTION ACTIVITIES WITHIN THE TPZ WHICH MAY ADVERSELY AFFECT THE HEALTH AND CONDITION OF A TREE TO BE RETAINED. IN ORDER OF PRECEDENCE, THE FOLLOWING IS REQUIRED FOR ALL TREES.

INSTALL TPZ FENCING AND SIGNAGE PER THE TPMP. WHERE IMPRACTICAL;
INSTALL TRUNK AND GROUND PROTECTION WHERE MACHINE ACCESS IS REQUIRED.

NOTES:

ALL ACTIVITIES WITHIN THE FENCED TPZ ARE TO BE SUPERVISED BY THE PROJECT ARBORIST.
TPZ FENCING IS NOT TO BE MOVED.

COMPLIANCE INSPECTION AND REPORTING

COMPLIANCE INSPECTIONS ARE RECOMMENDED TO BE COMPLETED ON A MONTHLY BASIS THROUGH THE CONSTRUCTION STAGE.

FOLLOWING EACH INSPECTION, THE PROJECT ARBORIST SHALL PREPARE A DOCUMENT DETAILING THE CONDITION OF THE TREES. THESE DOCUMENTS SHOULD CERTIFY WHETHER THE WORKS HAVE BEEN COMPLETED IN COMPLIANCE WITH THE APPROVED CONSENT CONDITIONS RELATING TO TREE PROTECTION. THESE REPORTS SHOULD CONTAIN PHOTOGRAPHIC EVIDENCE WHERE NECESSARY.

INSPECTIONS ARE TO BE CONDUCTED BY THE PROJECT ARBORIST AT SEVERAL KEY POINTS DURING THE CONSTRUCTION IN ORDER TO ENSURE THAT PROTECTION MEASURES ARE BEING ADHERED TO DURING CONSTRUCTION STAGES AND DECLINE IN TREE HEALTH OR ADDITIONAL REMEDIATION MEASURES CAN BE IDENTIFIED.

ANY WORKS WITHIN TREE PROTECTION ZONES ARE TO BE MONITORED AND SUPERVISED BY THE PROJECT ARBORIST.

HOLD POINTS

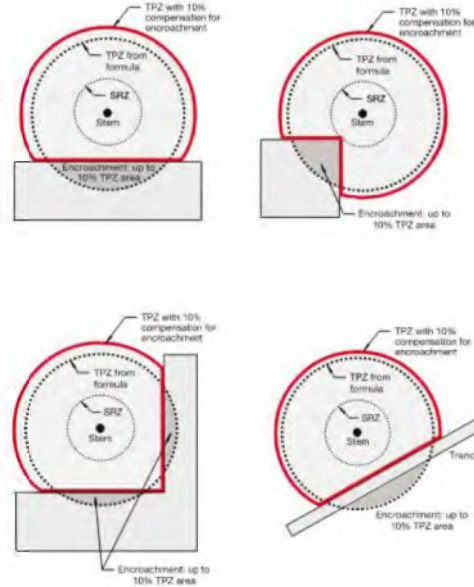
Construction Stage	Task	Responsibility	Certification	Timing of Inspection
Pre-construction	Indicate clearly (with spray paint or tape on trunks) trees approved for removal only	Principal Contractor	Project arborist	Prior to site establishment
	Install tree protection measures			
During Construction	Induct construction staff into Tree Protection Management Plan			As required prior to the works proceeding adjacent to trees to be retained
	Supervise all excavation works proposed within the TPZ of trees to be retained			
Post-construction	Inspection of trees by Project Arborist	Project Arborist	Project arborist	Quarterly during construction period
	Final inspection of trees by Project Arborist			Following practical completion of works

EXPLORATORY ROOT INVESTIGATION

WHERE TREES ARE INTENDED TO BE RETAINED, AND POTENTIAL WORKS AREAS MAY ENTER THE TPZ OR SRZ, DETERMINING ROOT LOCATION AND, THEREFORE THE IMPACT ON THE TREES IS AN IMPORTANT PROCESS.

EXPLORATORY ROOT EXCAVATION SHOULD BE UNDERTAKEN IN A MANNER THAT CAUSES THE LEAST AMOUNT OF DAMAGE TO ROOT MATERIAL IN THE PROCESS. THIS MAY INCLUDE THE USE OF AIR EXCAVATION (AIR-SPADE) OR HYDRO OR DRY-VAC EXCAVATION. ROOT INVESTIGATIONS SHOULD BE UNDERTAKEN AT PRE-AGREED LOCATIONS THAT WILL MOST EFFECTIVELY GUIDE THE DESIGN.

FINDINGS OF THE ROOT INVESTIGATION SHOULD BE COMPILED INTO A REPORT WHICH IDENTIFIES SIGNIFICANT ROOTS THAT SHOULD BE RETAINED AND LESS SIGNIFICANT ROOTS THAT MAY BE APPROPRIATE FOR SEVERANCE. THE SIZE AND VOLUME OF ROOTS WHICH MAY BE CUT MUST BE ASSESSED BY AN ARBORIST AND CONSIDER TREE PHYSIOLOGY, EXISTING SITE AND SOIL CONDITIONS AND SPECIES TRAITS AND TOLERANCE OF ROOT PRUNING.



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

PERMISSIBLE TPZ ENCROACHMENTS

REV	DESCRIPTION	DATE
A	DA	23/03/2023

TREE PROTECTION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT JOB No. E-001595-22

CLIENT: HALE
SITE: 339-349 HORSLEY RD, MILPERRA NSW

DWG No. TPMP.02
DRAWN KH

TREE PROTECTION MANAGEMENT PLAN

339-349 HORSLEY RD, MILPERRA NSW

DEMOLITION / PRE-CONSTRUCTION

SITE ESTABLISHMENT

THE PROJECT ARBORIST IS TO BE PROVIDED A COPY OF THE CONSTRUCTION MANAGEMENT PLAN (CMP) TO CHECK FOR COMPLIANCE WITH THE TPMP. THE CMP SHOULD ENSURE THAT SITE SHEDS, HAUL ROADS, LAYDOWN AREAS AND SEDIMENT CONTROL ARE LOCATED OUTSIDE THE TPZ OF TREES TO BE RETAINED.

AT THE COMPLETION OF SITE ESTABLISHMENT, THE PROJECT ARBORIST IS TO CERTIFY THAT TREE PROTECTION MEASURES COMPLY WITH THE TPMP.

TPZ FENCING

PROTECTIVE FENCING IS TO BE INSTALLED AS PER TREE PROTECTION MANAGEMENT PLAN. FENCING IS TO COMPLY WITH AUSTRALIAN STANDARD AS 4687-2007 TEMPORARY FENCING AND HOARDINGS.

ONCE ERECTED, PROTECTIVE FENCING MUST NOT BE REMOVED OR ALTERED WITHOUT APPROVAL FROM THE PROJECT ARBORIST. THE TPZ FENCING SHOULD BE SECURED TO RESTRICT ACCESS.

TPZ FENCING IS TO BE A MINIMUM OF 1.8M HIGH AND MESH OR WIRE BETWEEN POSTS MUST BE HIGHLY VISIBLE. FENCE POSTS AND SUPPORTS SHOULD HAVE A DIAMETER GREATER THAN 20MM AND SHOULD IDEALLY BE FREESTANDING, OTHERWISE BE LOCATED CLEAR OF THE ROOTS.

TREE PROTECTION FENCING MUST REMAIN INTACT THROUGHOUT ALL PROPOSED CONSTRUCTION WORKS AND MUST ONLY BE DISMANTLED AFTER THEIR CONCLUSION. THE TEMPORARY DISMANTLING OF TREE PROTECTION FENCING MUST ONLY BE DONE WITH THE AUTHORISATION OF THE PROJECT ARBORIST AND/OR THE RESPONSIBLE AUTHORITY. ANY WORKS TO BE UNDERTAKEN WITHIN THE TREE PROTECTION ZONE FENCING ARE TO BE MONITORED AND CERTIFIED BY THE PROJECT ARBORIST.

PROHIBITED ACTIVITIES WITHIN THE TPZ

ACTIVITIES GENERALLY EXCLUDED FROM THE TPZ INCLUDED BUT ARE NOT LIMITED TO: MACHINE EXCAVATION INCLUDING TRENCHING;

EXCAVATION FOR SILT FENCING;

CULTIVATION;

STORAGE;

PREPARATION OF CHEMICALS, INCLUDING PREPARATION OF CEMENT PRODUCTS;

PARKING OF VEHICLES AND PLANT;

REFUELLING;

DUMPING OF WASTE;

WASH DOWN AND CLEANING OF EQUIPMENT;

PLACEMENT OF FILL;

LIGHTING OF FIRES;

SOIL LEVEL CHANGES;

TEMPORARY OR PERMANENT INSTALLATION OF UTILITIES AND SIGNS; AND

PHYSICAL DAMAGE TO THE TREE.

TREE PROTECTION SIGNS

SIGNS IDENTIFYING THE TPZ ARE TO BE INSTALLED ON THE TREE PROTECTION FENCING IN 10M INTERVALS.

TRUNK BRANCH AND GROUND PROTECTION

GROUND PROTECTION IS TO BE INSTALLED AS SHOWN IN THE TPMP PLAN. THE PURPOSE OF GROUND PROTECTION IS TO PREVENT ROOT DAMAGE AND SOIL COMPACTION. MEASURES MAY INCLUDE A PERMEABLE MEMBRANE SUCH AS GEOTEXTILE FABRIC BENEATH A 100MM THICK LAYER OF MULCH OR CRUSHED ROCK BELOW RUMBLE BOARDS, OR STEEL PLATES OR TRACK MATS.

TREE TRUNK/S AND/OR MAJOR BRANCHES LOCATED WITHIN CLOSE PROXIMITY TO WORKS, MUST BE WRAPPED WITH PROTECTIVE HESSIAN OR SIMILAR ACCEPTABLE MATERIAL TO PREVENT TREE INJURY. MAJOR BRANCHES WOULD TYPICALLY BE CONSIDERED TO BE OF A DIAMETER GREATER THAN 100MM DIAMETER. TIMBER BATTENS (50 MM X 100 MM X 2000MM OR SIMILAR) MUST BE PLACED AROUND TREE TRUNKS WITH BATTENS SPACED AT 100 MM INTERVALS AND FIXED AGAINST THE TRUNK USING METAL OR DURABLE PLASTIC STRAPPING WITH CONNECTIONS APPROPRIATELY FINISHED OR COVERED TO PROTECT PEDESTRIANS FROM SNAGGING INJURY. THE HESSIAN AND TIMBER BATTENS MUST NOT BE FIXED TO THE TREE. TREE TRUNK AND MAJOR BRANCH PROTECTION ARE TO REMAIN IN PLACE FOR THE DURATION OF WORKS AND MUST BE REMOVED AT THE COMPLETION OF THE PROJECT.

SCAFFOLDING

WHERE SCAFFOLDING IS REQUIRED IT SHOULD BE ERECTED OUTSIDE THE TPZ. WHERE IT IS ESSENTIAL FOR SCAFFOLDING TO BE ERECTED WITHIN THE TPZ, BRANCH REMOVAL SHOULD BE MINIMIZED. THIS CAN BE ACHIEVED BY DESIGNING SCAFFOLDING TO AVOID BRANCHES OR TYING BACK BRANCHES. WHERE PRUNING IS UNAVOIDABLE IT MUST BE SPECIFIED BY THE PROJECT ARBORIST IN ACCORDANCE WITH AS 4373-2007 PRUNING OF AMENITY TREES. NOTE: PRUNING WORKS WILL REQUIRE APPROVAL BY DETERMINING AUTHORITY.

GROUND BELOW THE SCAFFOLDING SHOULD BE PROTECTED BY BOARDING (E.G. SCAFFOLD BOARD OR PLYWOOD SHEETING), WHERE ACCESS IS REQUIRED, A BOARD WALK OR OTHER SURFACE MATERIAL SHOULD BE INSTALLED TO MINIMIZE SOIL COMPACTION. BOARDING SHOULD BE PLACED OVER A LAYER OF MULCH AND IMPERVIOUS SHEETING TO PREVENT SOIL CONTAMINATION. THE BOARDING SHOULD BE LEFT IN PLACE UNTIL THE SCAFFOLDING IS REMOVED.

DEMOLITION OF HARDSTAND AREAS

DEMOLITION OF EXISTING HARD STAND AREAS WITHIN THE TPZ OF TREES TO BE RETAINED MAY BE UNDERTAKEN USING MACHINERY BUT MUST BE UNDER THE SUPERVISION OF THE PROJECT ARBORIST. DEMOLITION OF THE GROUND SURFACES MUST BE UNDERTAKEN FROM EXISTING HARD STAND AREAS OR GROUND PROTECTION AND SHOULD COMMENCE AT THE OUTER EXTENT OF THE EXISTING SURFACE MATERIAL AND MOVE AWAY FROM TREES TO BE RETAINED.

SEDIMENT CONTROL

SEDIMENT CONTROL WITHIN TREE PROTECTION ZONES IS TO BE INSTALLED TO AVOID BELOW GROUND EXCAVATION AS THIS MAY DAMAGE ROOTS. COIR LOGS INSTALLED ABOVE GRADE THAT ARE PINNED TO AVOID ROOTS ARE AN ACCEPTABLE METHOD.



EXAMPLE TPZ SIGNAGE

REV	DESCRIPTION	DATE
A	DA	23/03/2023

TREE PROTECTION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT JOB No. E-001595-22

CLIENT: HALE
SITE: 339-349 HORSLEY RD, MILPERRA NSW

DWG No. TPMP.03
DRAWN KH

TREE PROTECTION MANAGEMENT PLAN

339-349 HORSLEY RD, MILPERRA NSW

DURING CONSTRUCTION

EXCAVATIONS WITHIN TREE PROTECTION ZONES

THE PROJECT ARBORIST IS TO MONITOR THE IMPACTS OF DEMOLITION, BULK EARTHWORKS, AND INSTALLATION OF TEMPORARY INFRASTRUCTURE INCLUDING BUILDING, SEDIMENT CONTROL AND DRAINAGE WORKS.

WHERE THE EXTENT OF ENCROACHMENT IS LESS THAN 10% OF THE TPZ, INCLUDING ANY EXCAVATIONS FOR BENCHING AND SHORING, EXCAVATION MAY BE UNDERTAKEN USING CONVENTIONAL CONSTRUCTION METHODS. 10% OF THE TPZ IS EQUIVALENT TO ONE-THIRD OF THE TPZ RADIUS ON ONE SIDE.

WHERE THE ENCROACHMENT IS TO BE GREATER THAN 10% OF THE TPZ AND PRIOR TO ANY MECHANICAL EXCAVATIONS FOR BUILDING FOUNDATIONS, SHORING, RETAINING WALL OR PAVEMENT SUBGRADE WITHIN THE TPZ OF TREES TO BE RETAINED; EXPLORATORY EXCAVATION USING NON-DESTRUCTIVE METHODOLOGY SHALL BE UNDERTAKEN AT THE PERIMETER OF THE STRUCTURE, EXCAVATION REQUIRED FOR SHORING, RETAINING WALL OR PAVEMENT SUBGRADE WITHIN THE TPZ.

SUCH TECHNIQUES INCLUDE:

EXCAVATION BY HAND.

EXCAVATION USING A HIGH-PRESSURE WATER JET AND VACUUM TRUCK

EXCAVATION USING AN AIR SPADE WITH A VACUUM TRUCK.

THE NON-DESTRUCTIVE EXCAVATION SHALL BE UNDERTAKEN AT THE OUTER LIMITS OF THE STRUCTURE TO THE DEPTH OF THE FOUNDATION OR EXCAVATION, OR TO A MAXIMUM OF 800MM BELOW EXISTING SURFACE LEVELS. ALL CARE MUST BE TAKEN TO PREVENT THE DAMAGE OR SEVERANCE OF ROOTS GREATER THAN 50MM IN DIAMETER. ANY ROOTS

ENCOUNTERED THAT ARE LESS THAN 50MM IN DIAMETER MAY BE CLEANLY SEVERED WITH A SHARP PRUNING IMPLEMENT AT THE INTERFACE OF THE EXCAVATION NEAREST THE TREE. THE EXPOSED ROOT ZONE IS TO BE KEPT MOIST BY WAY OF GEOTEXTILE OR HESSIAN PLACED ALONG THE OPEN INTERFACE OF THE EXCAVATION NEAREST THE TREE.

WHERE ROOTS GREATER THAN 50MM IN DIAMETER ARE ENCOUNTERED DURING EXPLORATORY EXCAVATION, ADVICE FROM THE PROJECT ARBORIST SHALL BE SOUGHT.

PAVEMENTS WITHIN TREE PROTECTION ZONES

ANY PAVEMENTS OR FOOTPATHS WITHIN TPZ OF TREES TO BE RETAINED SHOULD BE INSTALLED AT OR ABOVE EXISTING GRADE TO MINIMISE THE NEED FOR EXCAVATION TO AVOID DAMAGE OR SEVERANCE OF PRIMARY WOODY ROOTS. THE PAVEMENT SUB-BASE SHALL BE A COARSE, GAP-GRADED MATERIAL WITH NO FINES IN ORDER TO ALLOW SOME AERATION AND MOISTURE INFILTRATION TO THE ROOT ZONE. THE USE OF PERMEABLE PAVEMENTS, BONDED AGGREGATE OR CELLULAR CONFINEMENT SYSTEMS SHOULD BE INVESTIGATED AS ALTERNATIVE CONSTRUCTION METHODS.

UNDERGROUND SERVICES WITHIN TREE PROTECTION ZONES

ALL UNDERGROUND SERVICES SHOULD BE ROUTED OUTSIDE THE TPZ OF TREES TO BE RETAINED. WHERE UNAVOIDABLE, SERVICES MAY BE INSTALLED VIA ALTERNATIVE METHODS WHICH MAY INCLUDE TREE SENSITIVE EXCAVATION OR HORIZONTAL DIRECTIONAL DRILLING (HDD). WHERE HDD IS USED, ENTRY AND EXIT PITS ARE TO BE LOCATED OUTSIDE THE TPZ OF TREES TO BE RETAINED.

WHERE EXCAVATION OR TRENCHING IS REQUIRED TO FACILITATE INSTALLATION OF UNDERGROUND SERVICES WITHIN THE TPZS OF ANY SITE TREES ARBORIST SUPERVISION IS REQUIRED. WORKS SHOULD BE UNDERTAKEN USING TECHNIQUES THAT ARE SENSITIVE TO TREE ROOTS TO AVOID UNNECESSARY DAMAGE. SUCH TECHNIQUES INCLUDE:

EXCAVATION BY HAND.

EXCAVATION USING A HIGH-PRESSURE WATER JET AND VACUUM TRUCK

EXCAVATION USING AN AIR SPADE WITH VACUUM TRUCK.

MACHINE EXCAVATION IS PROHIBITED WITHIN THE TPZS OF RETAINED TREES UNLESS UNDERTAKEN AT THE DIRECT CONSENT FROM THE PROJECT ARBORIST AND/OR THE RESPONSIBLE AUTHORITY.

WHERE A SITUATION OCCURS THAT A SIGNIFICANT ROOT (ROOT GREATER THAN >50 MM DIAMETER) REQUIRES PRUNING OR REMOVAL, THE ROOT IS TO BE SEVERED WITH A SHARP SAW IMPLEMENT BY OR UNDER INSTRUCTION OF THE PROJECT ARBORIST.

FILL WITHIN TREE PROTECTION ZONES

WHERE UNAVOIDABLE, FILL PLACED WITHIN TPZ OF TREES TO BE RETAINED SHALL BE WELL-DRAINED MATERIAL EQUIVALENT OR FINER IN TEXTURE THAN THE EXISTING SITE TOPSOIL MATERIAL AND SHOULD COMPLY WITH AS 4419:2003 (SOILS FOR LANDSCAPING AND GARDEN USE).

THE FILL CAN BE LIGHTLY CONSOLIDATED BUT NOT TO ENGINEERING STANDARDS. IF FILL IS TO BE PLACED BY MACHINERY, THIS MUST BE DONE FROM OUTSIDE THE TPZ OF FROM EXISTING HARD STAND AREAS. ALTERNATIVELY, GROUND PROTECTION MAY BE USED TO FACILITATE MACHINE ACCESS.

LANDSCAPING WORKS WITHIN TREE PROTECTION ZONES

THE LANDSCAPE PLAN IS TO BE CHECKED FOR COMPLIANCE WITH THE TPMP. STAGED REMOVAL OF TREE PROTECTION METHODS MAY BE REQUIRED TO FACILITATE LANDSCAPING WORKS.

ANY LANDSCAPING WORKS WITHIN THE TPZ OF TREES TO BE RETAINED IS TO BE UNDER THE DIRECT SUPERVISION OF THE PROJECT ARBORIST. THESE MAY INCLUDE BUT ARE NOT LIMITED TO: RETAINING WALLS, IRRIGATION AND LIGHTING SYSTEMS, TOPDRESSING, PLANTING AND PAVING.

ANY LANDSCAPING WORKS REQUIRING EXCAVATION FOR DRAINAGE OR THE LIKE IS TO BE UNDERTAKEN USING NON-DESTRUCTIVE METHODS PREVIOUSLY DESCRIBED.

POST CONSTRUCTION

DEFECTS LIABILITY PERIOD

COMPLETION OF OUTSTANDING BUILDING OR LANDSCAPING WORKS FOLLOWING THE CONSTRUCTION PERIOD MUST NOT INJURE TREES.

FINAL CERTIFICATION

THE FINAL INSPECTION BY THE PROJECT ARBORIST SHOULD DETAIL THE HEALTH AND CONDITION OF THE TREES AND THEIR GROWING ENVIRONMENT AND PROVIDE RECOMMENDATIONS FOR ANY NECESSARY REMEDIAL ACTIONS. THESE ACTIONS MAY INCLUDE PRUNING IN ACCORDANCE WITH AS4373:2007 PRUNING OF AMENITY TREES AND/OR SOIL REMEDIATION TO REPAIR THE GROWING ENVIRONMENT.

ON PROJECT COMPLETION, THE PROJECT ARBORIST SHALL CERTIFY IN WRITING TO THE CERTIFYING AUTHORITY THAT THE CONDITIONS OF CONSENT RELATING TO TREE PROTECTION, TREE REMOVAL, PRUNING AND PLANTING OF NEW TREES HAVE BEEN COMPLIED WITH OR, IF THE CONDITIONS HAVE BEEN CONTRAVENED, DETAIL THE EXTENT AND NATURE OF THE DEPARTURE FROM THE CONDITIONS AND THEIR IMPACTS ON TREES.

REV	DESCRIPTION	DATE
A	DA	23/03/2023

TREE PROTECTION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT JOB No. E-001595-22

CLIENT: HALE
SITE: 339-349 HORSLEY RD, MILPERRA NSW

DWG No. TPM?04
DRAWN KH

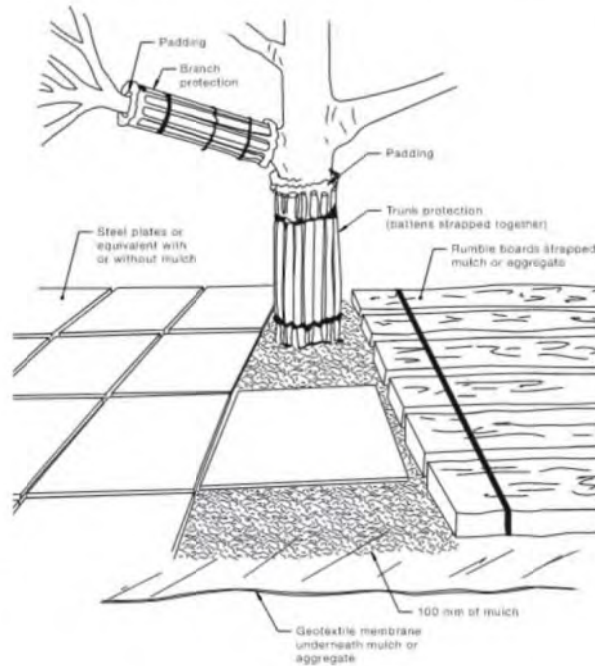


TREE PROTECTION MANAGEMENT PLAN **339-349 HORSLEY RD, MILPERRA NSW**

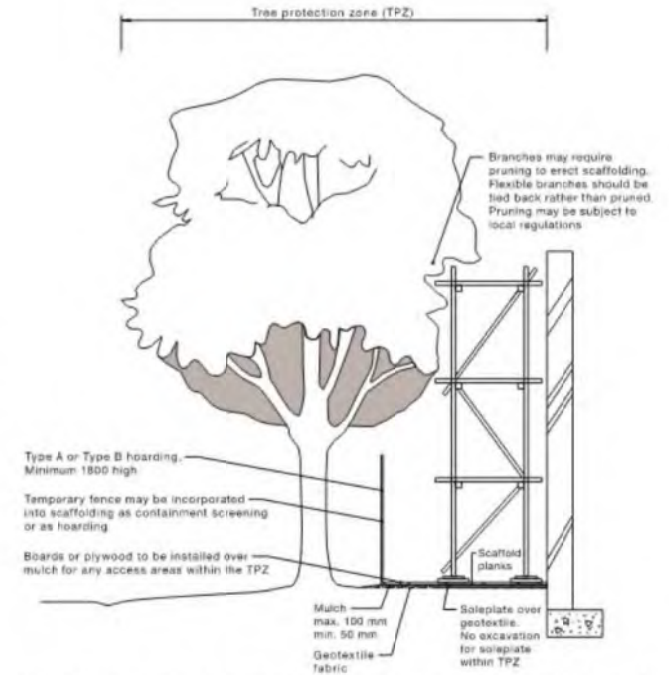


- LEGEND:**
- 1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
 - 2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
 - 3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
 - 4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

TPZ FENCING DETAIL - ABOVE



TRUNK BRANCH AND GROUND PROTECTION DETAIL



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

SCAFFOLDING DETAIL

REV	DESCRIPTION	DATE
A	DA	23/03/2023

TREE PROTECTION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT JOB No. E-001595-22
 CLIENT: HALE DWG No. TPMP.05
 SITE: 339-349 HORSLEY RD, MILPERRA NSW DRAWN KH





Appendix J Remediation Action Plan

Construction Environmental Management Plan

339 and 349 Horsley Road, Milperra (Lot 140 and 141 DP 550194)

Hale Capital Development Management Pty Ltd

SLR Project No.: 630.030737.00001

16 August 2023

‘Commercial in Confidence’
Hale Capital Development Management Pty Ltd

Remedial Action Plan

339-349 Horsley Road, Milperra NSW
Lot 140 & 141 DP 550194

8 September 2022

63429 / 144656 (Rev 0)

JBS&G Australia Pty Ltd

‘Commercial in Confidence’
Hale Capital Development Management Pty Ltd

Remedial Action Plan

339-349 Horsley Road, Milperra NSW
Lot 140 & 141 DP 550194

8 September 2022

63429 / 144656 (Rev 0)
JBS&G Australia Pty Ltd

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Appendices

Appendix A	Analytical Summary Tables
Appendix B	Design Plans
Appendix C	Bore Logs
Appendix D	Material Tracking/Placement and Characterisation Sheets

Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AF/FA	Asbestos Fines/Fibrous Asbestos
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
AST	Aboveground Storage Tank
AQ	Asbestos Quantification
bgs	Below Ground Surface
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
BTOC	Below Top of Casing
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DGS	Dangerous Goods Search
DLWC	Department of Land and Water Conservation
DP	Deposited Plan
DPI	Department of Primary Industry
DPIE	Department of Planning, Industry, and the Environment
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
ha	Hectare
HBMS	Hazardous Building Material Survey
HDPE	High Density Polyethylene
JBS&G	JBS&G Australia Pty Ltd
LEP	Local Environmental Plan
LOR	Limit of Reporting
NAPL	Non-Aqueous Phase Liquid
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PSI	Preliminary Site Investigation
RAP	Remedial Action Plan
RPD	Relative Percent Difference
SEPP	State Environmental Planning Policy
SWLs	Standing Water Levels
sVOC	Semi Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UFP	Unexpected Finds Protocol
UST	Underground Storage Tank
UPSS	Underground Petroleum Storage Systems
VOC	Volatile Organic Compounds
WH&S	Work, Health, and Safety
WTP	Water Treatment Plant

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Hale Capital Development Management Pty Ltd (the client), to provide a Remedial Action Plan (RAP) relating to the properties located at 339-349 Horsley Road, NSW (the site).

The site has historically been utilised for agricultural and industrial land uses, including market gardens, storage of freight and steel manufacturing.

JBS&G had previously completed a Detailed Site Investigation (DSI), comprising of a limited DSI and data gap assessment. These investigations did not identify concentrations of contaminants of potential concern (COPC) representing a potentially unacceptable risk to human or ecological health.

The findings of previous environmental investigations reported:

- Potential petroleum hydrocarbon impact to soil underlying the associated underground petroleum storage systems (UPSS) (principally in the central and northern portion of the site);
- The need to decommission and remove associated USTs/ASTs as part of the sites remediation and redevelopment; and
- Potentially asbestos impacted fill materials underlying existing structures and concrete hardstands proposed to be removed.

The preferred remedial strategy for the site is:

- Decommissioning and removal of petroleum infrastructure including UPSS by excavation and off-site disposal;
- Excavation and validation of hydrocarbon impacted fill/soil and off-site disposal in compliance with waste guidelines; and
- Where ACM impacted fill materials are identified, excavation and off-site disposal.

It is recommended that the processes outlined in this RAP be implemented to ensure the risks and impacts during remediation works are controlled in an appropriate manner.

A provisional Site Management Plan, which includes monitoring and management measures required to control the environmental impacts of the works, has been prepared as **Section 9.1**, and this shall be finalised and implemented.

A Workplace Health and Safety Plan (WHSP) to document the procedures to be followed to manage the risks posed to the health of the workforce shall be prepared and implemented consistent with **Section 9.2**.

Upon completion of the remediation works, a Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP.

Overall and subject to the limitations advised to **Section 11**, it is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW EPA.

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Hale Capital Development Management Pty Ltd (the client), to provide a Remedial Action Plan (RAP) relating to the properties located at 339-349 Horsley Road, NSW (the site). The site area, address and legal identifiers are shown in **Table 1.1**. The site location and layout are shown in **Figures 1** and **2**, respectively.

Table 1.1: Summary Assessment Area Details

Lot/DP	Address	Area (m ²)
140/550194	339 Horsley Road, Milperra NSW	17100
141/550194	349 Horsley Road, Milperra NSW	16900
Approximate Total Site Area		34000

It is understood that the client is proposing to redevelop the site for ongoing commercial/industrial land use zoned IN1 General Industrial (Bankstown LEP 2015), pursuant to the *National Environmental Protection Measure* (NEPM) (NEPC 2013¹).

The site has historically been utilised for agricultural and industrial land uses, including market gardens, storage of freight and steel manufacturing. The site currently continues to support the manufacturing of steel items such as guard rails, sheeting, and bollards within the southern lot, as well as material storage and truck deliveries/drop offs in the north.

Previously, the site has been subject to a Limited Detailed Site Investigation (DSI) (JBS&G 2022a²) as well as data gaps assessment which together were the basis for a DSI (JBS&G 2022b³). The DSI did not identify concentrations of contaminants of potential concern (COPC) to represent a potentially unacceptable risk to human or ecological health (**Appendix A**). Nevertheless, two USTs/ASTs require removal and potentially impacted soils adjacent the tanks require management.

This RAP has been prepared in accordance with guidelines made or endorsed by the NSW Environment and Protection Authority (EPA) inclusive of NEPC (2013⁴), and the planning requirements of Chapter 4 Remediation of Land of *State and Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP⁵); and by consideration of the principles of ecologically sustainable development (ESD).

¹ *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)*. National Environment Protection Council (NEPC 2013)

² *Limited Detailed Site Investigation, 339-349 Horsley Road, Milperra, NSW 2214*, JBS&G Australia Pty Ltd, 23 February 2022 (JBS&G 2022a)

³ *Detailed Site Investigation, 339-349 Horsley Road, Milperra, NSW 2214*, JBS&G Australia Pty Ltd, 5 July 2022 (JBS&G 2022b)

⁴ *National Environment Protection (Assessment of Site Contamination) Measure, Amendment No 1 (2013)*. National Environment Protection Council (NEPC 2013)

⁵ *State Environment Planning Policy No. 55 – Remediation of Land* (SEPP 55) has been repealed and the requirements incorporated into the Resilience and Hazards SEPP 2021 as of 25 July 2022.

1.2 Objective

The objectives of this RAP are to:

- Characterise and document the known extent of environmental/aesthetic impact within the site via presentation of a conceptual site model (CSM);
- Identify the remedial strategy(ies)/framework to be adopted by an assessment of remedial options and development objectives; and
- Document the procedures and standards to be followed in order to remove the risks posed by contaminated soils and aesthetic impacts to make the site suitable for suitable for the proposed commercial/industrial land use, while ensuring the protection of human health and the surrounding environment.

1.3 Proposed Development

The site is proposed to be developed as a multi-unit warehouse and distribution facility which includes:

- Demolition of all existing buildings and structure;
- Site preparation works, including tree clearing;
- Earthworks;
- Infrastructure comprising civil works and utilities servicing;
- Three vehicular crossovers to Horsley Road;
- Construction of two warehouse buildings, split over two storeys;
- On-site car parking; and
- Complementary landscaping and offset planting.

Minor cut and fill activities are anticipated to accommodate the proposed development, as well as excavation and removal of two USTs/ASTs. Upon completion of the built form, the majority of the site will remain paved with hardstands and occupied by newly proposed warehouses. Given the minor excavations proposed, fill material is subject to waste classification in order to be removed from the site. The proposed design plans are provided in **Appendix B**.

2. Site Condition, History & Surrounding Environment

2.1 Site Identification

The location of the site is shown on **Figure 1**. The current layout and area are shown on **Figure 2**. Site identification details are provided in **Table 2.1**.

Table 2.1: Summary Site Details

Lot Number	Lot 140 in DP 550194 and Lot 141 in DP 550194
Street Address	339-349 Horsley Road, Milperra, NSW
Site Area	Approximately 3.4 ha
Local Government Authority	City of Canterbury Bankstown
Current Zoning	Zone IN1 General Industrial, Bankstown Local Environment Plan 2015
Geographic Coordinates (MGA 56)	E: 314529 N: 6243154
Current Land-use	Operational Warehouses, Metal Fabrication, Offices, and Material Storage

2.2 Site Description

A detailed site inspection was conducted by one of JBS&Gs trained and experienced environmental consultants from the 7th to 8th July 2022. The site layout is shown in **Figure 2**.

Lot 140 (Southern Portion)

- The site comprised a central rectangular warehouse building with adjoining administration portion. The warehouse was being used for production of steel products including welding, machine pressing and guillotining . There was frequent movement of liquified petroleum gas (LPG) driven forklifts . Parts of the warehouse contained storage cabinets and tool racks, as well as an overhead mobile crane, however no obvious areas of surface staining or spills.
- The front portion of Lot 140 contained a central carpark, with entry and exit points for trucks . Transport trucks would enter along the north driveway and were either loaded/unloaded in the western or southern parts of the site. The northern and southern site boundaries were mostly occupied by storage of steel materials, with storage of LPG cannisters along the central north portion of the warehouse building .
- The west part of the site was predominantly surfaced with several different generations of concrete (reportedly the most recent of which was laid approximately 2 years ago), and rainwater was seen to accumulate at a drainage point in the northwest corner. The north and south driveways were surfaced with bitumen of variable quality, with road plates in use across some areas which became muddy during high rain.
- The southern portion of the site along the vehicle exit driveway was built-up in elevation relative to the rest of the site and contained a deeper fill profile. Metal storage racks and wooden pallets were observed in this area.

Lot 141 (Northern Portion)

- Lot 141 contained a front bitumen surfaced carpark with some grassed areas and planted garden beds along the roadside entry and adjacent to the Administration building. Transport trucks would enter along the north driveway which was surfaced with various generations of concrete.
- The front Administration building jointed onto a central warehouse building which was vacant . The warehouse contained a second level which was boarded off. Several bolted road plates on the ground floor indicated an historical pit (potentially relating to mechanical use). A raised wash bay was present adjoining the warehouse and contained a water treatment system with several grated drains and what appeared to be an oil/water separator. An adjacent wall mounted sign indicated use of detergents.

- A diesel aboveground storage tank (AST) with associated diesel dispenser, and adjacent AdBlue storage tank and dispenser were located near the wash bay. The diesel AST indicated a manufacturer test date of 2004 and capacity of 70,000 L, however a previous site investigation recorded the tank's capacity as 96,000 L and described the tank as double-walled, self-bunded with bunding around the fill point.
- A second and larger warehouse building was present in the west portion of Lot 141 and was surrounded by a concrete driveway. The larger warehouse was mostly vacant, apart from some storage of steel materials.
- Several stormwater drains were present across the Lot 141 area. The site was relatively flat, however was built-up in elevation relative to neighbouring commercial / industrial warehouses to the north. A deeper fill profile was present along the northern driveway and roadside front area (northeast portion).
- Two underground storage tanks (USTs) were present (confirmed previously by a ground penetrating radar [GPR] survey) near the roadway between the two warehouse buildings. Both USTs have been abandoned in-situ by likely methods of concrete or foam filling. No records were available for the reasons for abandonment.

2.3 Site Surroundings

Surrounding land-uses at the time of site inspection are described following:

- **North:** Horsley Road runs north fronting on both sides are a series of commercial / industrial businesses including Autoshift Diesel (mechanic), RoofBros Tile Recycling (recyclers), and Industrial Cleaning Services (cleaners);
- **East:** Horsley Road thence several automotive dealerships and service centres, material suppliers, recycling centres, and general businesses and shopfronts;
- **South:** Adjacent to the site is a series of commercial / industrial material supply businesses, with Western Sydney University Bankstown Campus further south; and
- **West:** Directly adjacent are several commercial / industrial warehouses and businesses which front Ashford Avenue .

2.4 Natural Site Setting

A summary of key information from JBS&G (2022a) and (2022b) pertaining to the environmental setting of the site is presented in **Table 2.2**.

Table 2.2: Summary of Environmental Characteristics

Environmental Aspect	Characteristics
Geology & Topography	<p>The site is underlain by Wianamatta group shale (Penrith 1:100 000) with a topographic slope ranging from approximately 15 to 10 m AHD (Bankstown topographic map). The site slopes in a general northerly direction.</p> <p>The site is mostly covered in concrete hardstand or bitumen ground surface, followed by variable thicknesses of gravel roadbase, reworked clay or silty sand fill materials to depths generally between 0.3-2.7 m below ground surface (bgs). Natural soil includes residual clay becoming siltier with inclusions of source rock up to the final investigation depth of 3 m.</p>

Environmental Aspect	Characteristics
Hydrology & Hydrogeology	<p>A search of the WaterNSW registered groundwater bore database indicated that there were no registered groundwater bores within 500 m from the site boundaries. The nearest registered bores are about 700 m from the site and are listed as 'monitoring'. Noting that the site exists in a commercial / industrial area, there would be no abstraction for drinking purposes. Further, a reticulated water supply is available to nearby industries and residents. Thus, there is limited beneficial use for groundwater near or below the site.</p> <p>Excess rainwater would be directed through the stormwater network and eventually discharge into the Georges River about 1.4 km northwest from the site.</p>
Meteorology	<p>A review of average climate data for the nearest relevant Bureau of Meteorology monitoring location (Bankstown Airport AWS), indicates the site is located within the following meteorological setting:</p> <ul style="list-style-type: none"> • Average minimum temperatures vary from 5.2 °C in July to 18.3 °C in January; • Average maximum temperatures vary from 17.4 °C in July to 28.5 °C in January; • The average annual rainfall is approximately 868.0 mm with rainfall greater than or equal to 1 mm occurring on an average of 82.1 days per year; and • Monthly rainfall varies from 43.8 mm in July to 115.0 mm in March, with the wettest periods occurring on average in January to March.
Acid Sulfate Soils (ASS)	<p>A Review of ASS Class Zone 5 under maps provided in the Bankstown LEP 2015 (Appendix F) indicated the site is within a Class 5 area and within 80 m of a Class 3 area where "works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land." It is considered unlikely that any future development of the site for warehousing purposes would involve a 5 m excavation or lowering of the water table (which occurs around 4-5 m bgs) by 1 metre. Where excavation below this depth occurs an ASS management plan may be required.</p>

2.5 Registers

A summary of key information from publicly registers (JBS&G 2022a and 2022b) pertaining to heritage and history of the site is presented in **Table 2.3**.

Table 2.3: Summary of Site Registers

Environmental Aspect	Characteristics
Planning Certificates	<p>A copy of Section 10.7 (2 and 5) Planning Certificates for Lot 140 and Lot 141 for the site were obtained and summarised below:</p> <ul style="list-style-type: none"> • Lot 140 and Lot 141 are subject to requirements of the Bankstown Local Environmental Plan (LEP) 2015; • Lot 140 and Lot 141 are currently zoned as IN1 General Industrial; • Lot 140 and Lot 141 are not affected by a heritage item or within a heritage conservation area; • Lot 140 and Lot 141 are not affected by any road widening or road realignment; • Lot 140 and Lot 141 are not affected by landslide, subsidence and tidal inundation; • Lot 140 and Lot 141 are affected by Acid Sulfate Soil (ASS) assessment and planning guidelines (see Section 2.6); • Lot 140 and Lot 141 are affected by 20-25 Australian Noise Exposure Forecast levels; • Lot 140 and Lot 141 are subject to flood related development controls; • Lot 140 and Lot 141 are not subject to vegetation plans or identified as biodiversity certified land; and • Lot 140 and Lot 141 are not listed as having loose-fill asbestos ceiling insulation

Environmental Aspect	Characteristics
Asbestos Register	Searches of the Fair-Trading Loose-fill asbestos insulation register on 22 February 2022 for '349 Horsley Road Milperra' and '339 Horsley Road Milperra' did not match with any records.
Land Title Records	<p>A list of land title records for Lot 140 and Lot 141 for the site were obtained and summarised below:</p> <ul style="list-style-type: none"> • Lot 140 <ul style="list-style-type: none"> ○ 1912-1960: Joseph and Lucy Fitzpatrick (Farmers) ○ 1960-1998: Several Proprietary Limited Companies ○ 1998-2004: Steve and Rosa Konstantopoulos (Family) ○ 2004-Date: Several Proprietary Limited Companies • Lot 141 <ul style="list-style-type: none"> ○ 1912-1960: Joseph and Lucy Fitzpatrick (Farmers) ○ 1960-Date: Several Proprietary Limited Companies <p>Multiple leases and easements were identified relating to both Lot 140 and Lot 141.</p>
Historic Aerials	A summary of historic aerial photographs identified the site use as being dominated by warehousing and industrial activity. The photographs identified the site to comprise of cleared land for agricultural purposes up until the mid-1960s. The site was then observed to be used commercially/industrially from the 1960s until present date
Heritage Register	A search of the NSW Heritage database was undertaken and no items of heritage significant were identified. The site is also not near any heritage areas identified in the Bankstown LEP 2015.

2.6 EPA Records

An updated search of the EPA's public register maintained under the Protection of the Environment Operations Act (POEO) 1997 was undertaken on 5 July 2022 and has been summarised below.

The following industries appeared on the POEO public register and were located within approximately 500 m from the site:

- Capral Aluminium Limited, 61 Ashford Ave Milperra. Environment Protection Licence (EPL) No. 11551 relating to waste generation or storage was surrendered during 2006, following clean-up notice 1055522 which was issued requiring remediation of contaminated soil and groundwater for copper, zinc, lead, chromium, and cadmium. The clean-up notice mentioned possible spills in the north-eastern portion of the property, which would be in close proximity to northwest corner of the Lot 141 site. A validation report was later received in October 2006, and the site is not listed on the contaminated land register. Further, the limited DSI (JBS&G 2022b) has targeted soil and groundwater sampling locations at the nearest site boundary (MW03 and SB17) and did not identify heavy metal contamination.
- Sims Group Australia Holdings Ltd, 43 Ashford Avenue Milperra. EPL No. 2207 is in force relating to scrap metal processing. A licence variation in 2013 required corrective action following identification of PCB oil spillage over the site hardstand and in stormwater drains. A subsequent licence variation listed the corrective actions as having been satisfied.
- Aplen Pty Ltd, 9/66 Ashford Avenue Milperra (Apollo Batteries). EPL No. 5050 was surrendered in 2007 and originally related to waste generation or storage. No non-compliances were listed.

- Cleanaway Pty Ltd, 10 Sheridan Close Milperra. EPL No. 5350 was surrendered in 2002 and originally related to waste generation or storage. No non-compliances were listed.
- James N Kirkby, 286 Horsley Rd Milperra (Heatcraft Australia Pty Ltd). EPL No. 2852 was related to waste generation or storage and is no longer in force. No notable licence non-compliances were listed.
- Jamestrong Packaging Australia Pty Ltd, 11 Amour Street Milperra. EPL No. 20054 is in force relating to metal coating, processing, and waste generation. A different EPL (12110) was previously held by Impress Australia Pty Ltd (Impress Aerosols Milperra) at the same site for waste generation or storage. No noteworthy non-compliances were listed for either licence.

A search of the EPA's public contaminated land register identified no nearby sites listed as being regulated under the CLM Act. Both Heatcraft Australia Pty Ltd (285 Horsley Rd) and United Group Rail Pty Ltd (landfill at 373 Horsley Rd) were within 500 m of the site and listed as 'regulation under the CLM Act not required'.

A search of the EPA's PFAS register identified that the Milperra site is near Bankstown airport which is affected by PFAS from historical use of Aqueous Film-Forming Foams (AFFF). The airport is approximately 700 m downgradient of the Milperra. Therefore, it is unlikely that the Milperra site is affected by PFAS from the airport.

2.7 Dangerous Goods Search (SafeWork NSW)

As discussed within JBS&G (2022b), A dangerous goods search was requested but made not available at the time of site works and reporting. The results of the search, when made available, can be managed in accordance with the remedial requirements similar to those listed for the removal of petroleum storage systems.

3. Previous Site Investigations

The following sections provide a summary of the information and characterisation data presented within assessment reports prepared by JBS&G and others which have been made available for review. Relevant information presented in the preliminary assessment reports has been discussed below.

3.1 Preliminary Site Investigation (Canopy 2020⁶)

Canopy completed a preliminary site investigation (PSI) for the north portion of the site (Lot 141). The scope of works included a desktop review of historical site information and a site inspection in order to develop a conceptual site model (CSM) including potentially contaminating activities and the likely contaminants of concern.

The PSI concluded that the site was likely used for agricultural activities until the early 1960s, and as a commercial/industrial property since then. No indicators of gross contamination were identified, and future investigation should occur near the USTs and ASTs.

Canopy (2020) referenced other previous investigations such as an inspection of the diesel AST (by J&K Fuel Maintenance Pty Ltd) and a hazardous building materials report for asbestos and lead (Airsafe Pty Ltd) however did not include the results or conclusions of those investigations.

3.2 Limited Detailed Site Investigation (JBS&G 2022a)

JBS&G (2022) completed a Limited Detailed Site Investigation (DSI) to provide an assessment of the contamination status of the site, while evaluating the suitability of the site for the proposed ongoing commercial/industrial land use and presenting a summary of commercial opportunities and constraints.

The scope of investigation comprised a review of the site history, environmental setting, previous relevant investigation works as provided by the client and available within the public domain, and completion of a targeted multi-media investigation program.

The key findings of the investigation were as follows:

- Historical potentially contaminated land uses have been identified at the site as associated with its former agricultural and since the 1960s commercial/industrial use, including freight storage and steel material manufacture. Previous and current land uses may have resulted in contamination of soil, groundwater and soil vapour by a range of typical industrial contaminants, including primarily heavy metals, polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons;
- Intrusive site investigations identified shallow to medium fill (clay and sand) across the site, with a max fill depth of 2.2 m, underlying the northern portion of the site adjacent to an above ground AdBlue AST. Underlying the fill material, natural soils (clay) and bedrock (shale) were encountered, which contained perched/groundwater at depths between 4 and 5 m. Bore logs for all soil investigations are provided in **Appendix C**;
- Representative samples of fill material and natural soils within accessible areas of the site (at 21 locations) were analysed for a range of identified potential contaminants of concern including heavy metals, PAHs, TRH, BTEX, OCP/PCBs, PFAS and asbestos;
- Odorous fill was identified near the two underground storage tanks (USTs) on Lot 141. There were no other unacceptable odours or staining associated with site soils, or any other

⁶ Preliminary Site Investigation, 349 Horsley Road, Milperra, NSW 2214, Canopy Enterprises Pty Ltd, 4 September 2020

aesthetic issues at the site surface. A sub-slab vapour assessment was completed at 25 locations within accessible areas of the site;

- Groundwater from six locations across the site were analysed for a range of identified potential contaminants of concern including heavy metals, PAHs, TRH and PFAS.
- Laboratory assessment of soil and groundwater did not identify contaminants of potential concern (COPC) at concentrations which would represent an unacceptable risk to future site users. However, exceedances of generic ecological screening and investigation levels for zinc, nickel, copper and TRH F2 were identified within fill materials across site. Contaminant levels as measured in sub-slab vapour were below the laboratory detection limits or the adopted guideline values for the assessment, thus indicating there were no volatile impacts within the sub-surface that would pose an unacceptable risk to future site receptors (via vapour intrusion to within enclosed spaces/buildings) in the areas assessed.;
- The presence of USTs underlying the concrete slab at 349 Horsley Road were reconfirmed by the assessment. JBS&G (2022) recommended the USTs be decommissioned and removed to ensure the site is suitable for the proposed redevelopment; and
- Data gaps were identified, comprising inaccessible areas within pre-existing structures and warehouses, potentially acid sulphate rich soil, ecological parameters, and site-specific criteria appropriate for the site, and assessing selected material for waste classification.

3.3 Detailed Site Investigation, including Data Gaps Assessment (JBS&G 2022b)

Identified data gaps within the Limited Detailed Site Investigation (JBS&G 2022a) were addressed as part of a data gap investigation (see **Figure 3**), including fill material beneath pre-existing structures and warehouses and a truck-wash located in the northern portion of site.

Laboratory assessment of the samples collected during the data gap assessment did not identify contaminants of potential concern (COPC) at concentrations which would represent an unacceptable risk to future site users. A single sample was reported as having concentrations of TRH C₁₆-C₃₄ equal to the adopted site criteria. No odours or staining were observed within the site that would further indicate the possible presence of contamination.

Asbestos was identified within the site in the form of a fragment at borehole location BH106 (0.4-0.5m) and labelled 'FRAG20220708_01'. The fragment was submitted and analysed, reporting that the material contained 'chrysotile, amosite, and crocidolite' forms of asbestos. No other visual or analytical presence of asbestos was observed.

The potential for generation of Acid Sulphate Soils (ASS) within the site was also assessed as part of the data gap assessment and reported in the DSI. Field screening indicated highly reactive samples indicative of Potential Acid Sulphate Soils (PASS) at two locations and samples were submitted for laboratory analysis. Confirmatory results identified that potential risk due to ASS within the site was unlikely, and JBS&G considered that an ASS management plan was not required.

Data collected during the investigations (JBS&Ga and JBS&Gb) were used in the scoping of appropriate remedial measures. Remedial areas identified within the site include:

- The proposed decommissioning / removal of USTs/ASTs underlying and overlying the concrete slab at 349 Horsley Road;
- Assessment of tank bedding material and associated UST/AST fill material for petroleum hydrocarbon contamination;
- Removal of classified waste material relative to future excavations as part of the planned redevelopment; and

- Possible presence of Asbestos Containing Materials (ACM) within fill material underlying pre-existing structures and warehouses addressed under an Unexpected Finds Protocol (UFP).

3.4 Hazardous Building Material Survey (HBMS, JBS&G 2022c⁷)

During the investigation, the site was also subject to a HBMS. The survey identified a number of hazardous materials existing within the warehouses. Non-friable ACM and friable asbestos impacted dusts were identified, suspected to be from the removal of the previous asbestos roofing. Elevated levels of lead were also reported in dust and paint samples taken from within the warehouses.

With consideration to the sites long commercial / industrial history, it is evident that these hazardous materials are related to the site's early establishment and development, often seen in structures pre-existing the prohibition of such materials. The results of the HBMS will be used in scoping demolition of site structures as part of the redevelopment.

⁷ *Hazardous Building Materials Survey, 339-349 Horsley Road, Milperra, NSW 2214, JBS&G Australia Pty Ltd, dated 1 August 2022, int. ref. 63429/146637 (JBS&G 2022c).*

4. Contamination Status and Conceptual Site Model

4.1 Overview

NEPC (2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments.

NEPC (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, vapours etc.);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

It is acknowledged that the site has been identified as previously storing petroleum hydrocarbon products associated with USTs/ASTs on site. The general requirements of a CSM described in the *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines*, NSW EPA, 2020 (EPA, 2020) will be met for the decommissioning and removal of the petroleum infrastructure, remediation of hydrocarbons (where encountered), and any other identified contamination at the site (such as ACM impacted fill).

4.2 Contamination Sources

Based on the available historical information, review of previous investigations, and with consideration to proposed ongoing commercial / industrial land use, areas of environmental concern (AEC) and associated Contaminants of Potential Concern (COPC) have been identified.

Investigation works identified the presence of the following AECs and COPC warranting remediation/management, as presented in **Table 4.1** and shown on **Figure 4**. No evidence of unacceptable contamination conditions was identified within the other potential AECs.

Table 4.1: Areas of Environmental Concern, Media, and Contaminants of Concern

AEC	COPC
AEC 1: Decommissioning and removal of USTs/ASTs within the northern lot. *	TRH, PAHs, lead, total phenol, anthropogenic material and/or infrastructure
AEC 2: Validation and removal of tank bed material underlying USTs/ASTs. *	TRH, PAHs, lead, total phenol
AEC 3: Assessment and removal of ACM impacted soil. *	ACM

* Note: An additional AEC was identified as the Work Health and Safety (WH&S) requirements of contractors and consultants against the COPCs mentioned, however was not included in the table above. WH&S requirements as part of the proposed WH&S Management Plan are further discussed in **Section 9.2**.

4.3 Hydrogeological Conditions

A monitoring well (MW05) was installed in close proximity and between the two USTs, as well as downgradient from the potential source (MW04). Reported concentrations for petroleum hydrocarbons, as well as BTEX, indicated that there was no evidence of significant contamination from the tanks into underlying groundwater.

4.4 Vertical and Lateral Migration

Due to the minor hydrocarbon impacts identified on site, the potential for vertical and lateral migration of petroleum hydrocarbons is relatively low. Fill material underlying the UPSS, and AST has been identified as possibly containing hydrocarbons from the overfilling of tanks or leak of tanks and associated piping.

4.5 Airborne Migration

Airborne migration potential of asbestos fibres and/or petroleum hydrocarbon vapours present on site is considered low. Air monitoring should it be undertaken in the event of unexpected asbestos contamination and/or hydrocarbon contamination.

4.6 Asbestos Impacted Soil

Bonded asbestos has been identified in one area underlying the site. The location of the identified ACM is shown on **Figure 4**.

ACM was identified below the sites concrete slab at a depth between 0.4-0.5 m (a single fragment). This portion of the site was sealed and within an operating metal fabrication factory. The area appears to have been subject to minor filling (use of imported fill of unknown origin) level ground surfaces. Further, site structures may have contained hazardous building materials which have been demolished/removed to establish the current site configuration.

500mL bag samples were analysed in selected boreholes, including at the location of where the asbestos fragment was identified. The laboratory reported that 'no asbestos was detected at the reporting limit of 0.001% w/w.'

4.7 Human and Ecological Receptors

Potential human populations who may be exposed to assessment area impacts in the future (if they are not remediated or appropriate management is not implemented prior to or during development) include:

- Current and future occupants of the development;
- Current and future construction workers and maintenance personnel;
- Current and future recreational users of public open spaces (parking areas, planted gardens, etc.); and
- Members of the public and/or occupants of neighbouring lots.

Potential ecological receptors within the site include flora species established within future open spaces and fauna which occasionally visit the site. Off-site ecological receptors are limited to downgradient water bodies and collection systems.

4.8 Potential Exposure Pathways

Based on the COPCs identified in various media as discussed above, and the proposed site/assessment area development activities, the exposure pathways for the site include:

- Oral/dermal contact with impacted soils; and
- Inhalation of impacted vapours and/or dust and/or asbestos liberated from impacted site media;

It is noted that the viable exposure pathways will depend on the final development scheme and accessibility of impacted media. It is anticipated that direct contact with soil/groundwater would be substantially limited by minimal cut and fill activities as part of the redevelopment. Where impacted media is retained on site under established building pavements/structures, potential exposure would be limited to vapour migration to indoor spaces, where relevant.

Potential human exposure pathways relative to human and ecological receptors are summarised in **Table 4.2** below.

Table 4.2: Review of Potentially Complete Human Exposure Pathways

Receptor	Location	Media	Potentially Complete Exposure Pathway
Occupants (Commercial/Industrial Workers)	Site (current and future)	Soils	Inhalation (vapour and particulate/fibres)
Construction workers and maintenance personnel	Site (current and future)	Soils	Oral and dermal
		Materials (ACM)	Inhalation (vapour and particulate/fibres)
Recreational Users	Site (current and future)	Soils	Inhalation
Public/Neighbours	Surrounds (current and future)	Soils	Inhalation (vapour and particulate/fibres)

Potential inhalation pathways have been identified for all constituents as associated with potential release of particulates / fibres and/or vapours during redevelopment of the site. Increased exposure to vapours from petroleum sources (USTs/AST) can occur by potential advective transport processes into buildings and accumulation with limited indoor / building ventilation.

5. Remedial Options

5.1 Remedial Goal

The goal for the remediation and/or management of environmental impact is to remove unacceptable risks to human populations who will potentially use the site in the future, mitigate constraints on redevelopment, and to undertake remedial works in a manner that best complies with ESD principles.

5.2 Extent of Remediation

The following sections outlined requirements for the extent of remediation of environmental impact as detailed by previous investigations (**Section 3**), and the AEC's described in the CSM (**Section 4**).

5.2.1 AEC 1/2: UPSS, AST and Petroleum Hydrocarbon Contaminated Soils

Previous assessments including JBS&G (2022a) and (2022b) did not identify gross or significant contamination to be present at the site. As such, the extent of remediation in regard to petroleum hydrocarbon contamination is limited to impacted soils, including tank backfill sands and residual clay soils directly below or adjacent to UPSS and/or fill lines, vents etc, if those soils are identified to be impacted.

The extent of hydrocarbon contamination surrounding the UPSS, and AST can be assessed by both a tank integrity assessment and validation sampling of surrounding tank pit material. With reference to the *UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS* (NSW EPA 2010), the EPA's preference is for USTs to be removed and appropriately validated, as "tank removal and remediation of any residual contamination decreases environmental and OH&S risks at UPSS sites, which reduces the liability of the person responsible for the site and/or its owner while increasing potential future land-use options" (NSW EPA 2010).

Following decommissioning and removal of UPSS, remediation will be required to address associated hydrocarbon impact within underlying soil. Relative tank infrastructure removed during the process will be assessed and scheduled for off-site disposal or recycling.

5.2.2 AEC 3: Bonded Asbestos Impacted Soil

Bonded ACM (single fragment) was identified in fill at one location:

- BH106 and a depth of 0.4-0.5 m below the concrete slab.

Samples taken at BH106 did not indicate the presence of asbestos or respirable fibres within the fill material surrounding the fragment. The fragment was removed during the data gap assessment, with the area no longer requiring management.

There is potential for further ACM presence beneath concrete pavements and building footprints. ACM impacts within underlying soils at the site have not otherwise been identified previously, or within other areas.

Due to ACM being identified at one location, it is assumed that >100m³ of asbestos impacted will be encountered and disposed of from the site during remediation. During the demolition phase of the proposed redevelopment, surface and underlying soils are to be inspected and/or sampled as per EPA *Sampling Design Guidelines* (EPA 2022⁸) and Western Australia Department of Health (DOH 2009⁹) guidelines. Requirements are further discussed in **Section 6.4.2**.

⁸ Contaminated Sites: Sampling Design Guidelines. NSW Environmental Protection Authority (EPA 2022).

⁹ Guidelines for the Assessment Remediation and Management of Asbestos Contaminated Sites in Western Australia. 2009, Western Australia Depart of Health (WA DOH) (DOH 2009)

Trace amounts of anthropogenic material (gravel, plastic, concrete, etc) were identified within fill material at multiple locations. Generally, inert waste is considered not to pose an unacceptable aesthetic issue under the proposed commercial/industrial land use – however the co-occurrence of these materials along with identified asbestos may require their removal and/or remediation.

An Unexpected Finds Protocol (UFP) is detailed in **Section 8.1** referencing the unexpected presence of ACM and other potentially contaminated media beneath pre-existing structures and hardstands.

5.3 Assessment of Remedial Options

The approach adopted in this RAP is consistent with the preferred hierarchy of options for site clean-up and/or management provided in NEPC (2013) and (EPA 2017¹⁰), which are listed as follows:

- on-site treatment so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
- 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; or

if the above are not practicable,

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

or

- where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

In addition, it is also a requirement that remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed. And, where there are large quantities of soil with low levels of contamination, alternative strategies are required to be considered or developed (EPA 2017).

Remedial options including the decommissioning and removal of associated UPSS within the site is also detailed in **Table 5.1** following. Remedial options have been considered specific to the site contamination issues identified as requiring to be addressed by this RAP.

The options are specific to the consideration of the occurrence of the contaminant in soil – noting the findings from the site CSM and previous investigation works that the majority of contaminant mass will occur within a soil matrix.

¹⁰ Contaminated land Management – Guidelines for the NSW Site Auditor Scheme (3rd Edition). NSW EPA 2017 (EPA 2017)

Table 5.1: Assessment of Remedial Options

Remedial Option	Applicability	Assessment
1. On-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.	<p><u>Hydrocarbon Impacted Material and UST/AST Infrastructure</u> Given that soil contaminants associated with petroleum storage possibly consisting of hydrocarbon constituents, there is a potential that they may be able to be remediated on site by a vertical/lateral excavation and bioremediation style method.</p> <p>Bioremediation occurs where contaminants are chemically broken-down by the metabolic processes of micro-organisms into less toxic or non-toxic forms. NSW EPA guidance requires bioremediation methods to demonstrate that pollutant emissions are not discharged to the atmosphere. On this basis, the lateral extent of the bioremediation activity requires to be restricted to ensure that air emissions from remediation materials are able to be collected.</p> <p>During the decommissioning and removal of on-site USTs/ASTs, petroleum hydrocarbon impacted media would need to be excavated, with the walls and base of the excavation validated to ensure no risk of significant hydrocarbon contamination remains. Material would need to be segregated on site within an area that is able to be used for bioremediation. Stockpiled material is required to be sampled in accordance with EPA (1995), and samples analysed specifically against human health and waste classification criteria for off-site disposal.</p>	<p>Bioremediation of excavated materials found to be impacted with hydrocarbon contamination is possible.</p> <p>Investigations have not identified gross contamination on site in close proximity to USTs/ASTs. Nevertheless, it is anticipated that material underlying, and surrounding petroleum infrastructure may be subject to minor hydrocarbon impact from leaking of USTs/ASTs and fuel lines. Due to this, the validation and removal of material for off-site disposal is considered an appropriate, cost effective and viable option.</p> <p>Not a suitable option.</p>
	<p><u>Bonded ACM Impacted Fill</u> This option is not considered relative to the impacts of ACM identified within the site. As discussed in the EPA legislation (2022), the picking of asbestos by manual or mechanical form in the top 0.1 m of fill material is no longer accepted as a remedial approach. Asbestos impacted media would need to be excavated, and then further treated on site to fall below specific human health criteria.</p>	<p>As per the EPA (2022), manual picking of asbestos fragments within the top 0.1 m of fill material is no longer permitted as a remedial approach. Minor impacts of asbestos have been identified on site; therefore, on-site treatment is not considered.</p> <p>Not a suitable option.</p>
	<p><u>Hydrocarbon Impacted Material and UST/AST Infrastructure</u> As above (Option 1), however, additional costs are incurred to take soils off-site and return them to the site, in addition to there being no/limited currently licensed facilities in proximity of the site to undertake soil treatment.</p>	<p>Energy/resource use associated with the transport and return of materials is not considered consistent with ESD principles and does not appear appropriate to the amount of contamination identified on site.</p> <p>Not a suitable option.</p>
2. Off-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level, after which the soil is returned to the site.	<p><u>Bonded ACM Impacted Fill</u> This option includes increased truck movements and the potential for exposure to emissions over a wider area. It is also noted that there are licensing issues and associated costs with off-site treatment.</p>	<p>The resources that would be required to remediate the material and available facilities precludes consideration of this option.</p> <p>Not a suitable option.</p>

Remedial Option	Applicability	Assessment
3. On-site in situ management of the soil by physical separation	<p><u>Hydrocarbon Impacted Material and UST/AST Infrastructure</u></p> <p>Although feasible, hydrocarbon impacted soil(s) are considered to be a potential secondary source of contaminant mass attributing to contamination of groundwater. This option is not being considered given the objective of the remediation to remove primary and secondary sources of contamination to prevent future contamination groundwater and hydrocarbon leachate in soils.</p> <p>Any containment system would require a specialised engineered design to mitigate the potential for leaching / leakage and further to prevent potential migration of vapours.</p>	<p>Preference given to suitable options as higher in order of suitability and feasibility.</p> <p>Not a suitable option.</p>
	<p><u>Bonded ACM Impacted Fill</u></p> <p>Bonded asbestos impacted material may be relocated at depth or placed in a location(s) not readily accessible (i.e. below an engineered concrete slab associated with the built form) such that they do not represent a potential health risk (i.e. not exposed at the site surface). This however does not seem viable as only minor excavations are proposed as part of the redevelopment.</p>	<p>A preferred option where a substantial quantity of asbestos affected materials confirmed as being present.</p> <p>Bonded asbestos has been identified to be at concentrations below the health criteria and not pose a strict health risk. However, management is required to comply with relevant aspects of health and safety legislation inclusive of an Asbestos Register and Asbestos Management Plan. Where low amounts of ACM impacted soil is identified, this option is not considered practical.</p> <p>Not a suitable option.</p>
4. Excavation and off-site removal of the impacted material.	<p><u>Hydrocarbon Impacted Material and UST/AST Infrastructure</u></p> <p>There are currently suitable facilities in the Sydney region capable of accepting the identified contaminants within fill materials. Given the potentially low volume of impacted material, consideration to this option is more in line in keeping with the principles of ESD. Consideration to the decommissioning and removal of associated UPSS and AST, as the tanks themselves will need to be disposed of.</p> <p>This option would be implemented as excavation of impacted soils and off-site disposal to a waste facility licensed to receive them.</p>	<p>A suitable option for all contaminant types.</p> <p>Not preferred for petroleum hydrocarbon contaminated soils where on-site treatment available, but available as the most preferred contingency if low quantities of impacted media are identified.</p> <p>Preferred for small volumes of asbestos impacted soils.</p> <p>Further assessment is detailed in Section 5.4.</p>

5.4 Preferred Remedial Strategy

A number of potential remedial options have been considered in **Table 5.1**. The preferred remedial strategy for the site is:

- Decommissioning and removal of petroleum infrastructure including UPSS by excavation and off-site disposal;
- Excavation and validation of hydrocarbon impacted fill/soil and off-site disposal in compliance with waste guidelines; and
- Where ACM impacted fill materials are identified; excavation and off-site disposal where asbestos impacted soils are restricted to a small quantity (<100 m³).

It is noted that petroleum hydrocarbon contaminated soils may possibly be present underlying USTs/AST. The soil and material remediation should be extended in each instance until validation samples have been analysed and reported as not having significant impact on the site.

6. Remedial Plan

6.1 Regulatory and Planning Requirements

This RAP has been prepared with reference to the following guidelines and legislation.

6.1.1 Environment Planning and Assessment Act 1979/Resilience and Hazards SEPP

Development approval for the project falls under the provisions of Part 4 of the *Environment Planning and Assessment Act 1979 (EP&A Act)*. It is understood that development consent for the remediation works will be incorporated with the development process for the remainder of the site.

The specific SEPP which is relevant to remediation of the site is the Resilience and Hazards SEPP (Remediation of Land), which requires that development consent is not granted unless contamination has been considered and, if required, remediated.

Specifically, in relation to the subject site, Chapter 4 of the Resilience and Hazards SEPP also requires that:

- The proposed remediation works are carried out in accordance with the contaminated land planning guidelines (DUAP/EPA 1998¹¹) and any guidelines in force under the CLM Act;
- The proposed remediation works are carried out in accordance with any development consent conditions; and
- Notice of completion is provided to the local council as the consent authority within 30 days of completion of the works, with the details required under clause 18 of Chapter 4 of the Resilience and Hazards SEPP.

6.1.2 Environment Planning and Assessment Regulation 2000 – Schedule 3 Designated Development

The proposed remediation works cover an aggregated area of less than 3 ha and no soil treatment is proposed.

6.1.3 Protection of the Environment Operations Act 1997

All potential discharges from the remediation works will require to be maintained below applicable assessment criteria/threshold guidelines during the remediation works. This would apply to potential emissions in air and water. Levels of discharges are typically assessed at a site boundary.

Site specific environmental management plans, as prepared and maintained by remedial contractor, will require to ensure appropriate controls and monitoring criteria to assess compliance with these aspects.

The proposed remediation/validation activities are not required to be licensed under the *Protection of the Environment Operation Act 1997* (POEO Act). The remedial area is less than 3 aggregated ha, does not propose handling of greater than 30,000 m³ of contaminated fill and hence does not trigger the licensing requirements.

6.1.4 Water Management Act 2000

Where substantial dewatering is required to facilitate remedial excavations, a dewatering licence is required to be obtained from the NSW Department of Primary Industry – Water (DPI). Minor quantities of dewatering are anticipated to be required to support the excavation of the saturated petroleum hydrocarbon impacted soils. If rainwater accumulates at the site and requires removal from the site, any discharge is required to be in accordance with the POEO Act. Where deemed

¹¹ *Managing Land Contamination – Planning Guidelines SEPP 55 Remediation of Land*. NSW EPA Department of Urban Affairs and Planning 1998 (DUAP 1998)

suitable, dewater may be discharged to the site surface to allow for re-infiltration to the subsurface (i.e. not discharged from the site). If any water is required to be discharged from site to sewer as part of the remedial works scope, approval from the asset owner (Sydney Water) will be required. Sydney Water's approval conditions will require to be upheld by the Principal/Remediation Contractor and demonstration thereof. It is noted here that Sydney Water will only provide approval for disposal of groundwater to sewer where the site is regulated under the CLM Act).

6.1.5 Protection of the Environment Operations (Waste) Regulation 2014

The POEO (Waste) Regulation makes requirements relating to non-licensed waste activities and waste transporting. The proposed works on the site will not require to be licensed. Section 48 of the Regulation requires that wastes are stored in an environmentally safe manner. It is also stipulated that vehicles used to transport waste must be appropriately licensed and covered when loaded with impacted materials. For transport activities this regulation also details additional tracking requirements for vehicles carrying Special (asbestos) waste if material is identified to contain asbestos following waste classification activities.

6.1.6 Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014

The removal of petroleum infrastructure will be undertaken in accordance with SafeWork NSW requirements, and a validation report will be provided in accordance with the provisions of the *Protection of the Environment Operations (UPSS) Regulation 2014*. The validation process in this RAP meets the requirements of the regulation and associated EPA guidance.

In addition, all removal works will be required to be undertaken in accordance with relevant Australian standards, regulations and codes of practice including Australian Standard AS 4976-2008: *The removal and disposal of underground petroleum storage tanks*, and AS 1940-2004: *Storage and handling of flammable and combustible liquids*), as amended.

6.1.7 Work Health and Safety Act 2011 and Work Health and Safety Regulation 2017

All remediation works should be undertaken in accordance with requirements of the *Work Health and Safety Act 2011 (WHS Act)* and *Work Health and Safety Regulation 2017 (WHS Regulation)*. The information and data provided in this RAP should be considered by the remedial contractor in preparation of their health and safety plans for the remedial works (refer to **Section 9.2**).

6.1.8 Bankstown (2015) Development Control Plan

The site is subject to development controls as specified in the Bankstown Development Control Plan 2015 (DCP), which have been incorporated into this RAP.

6.1.9 Waste Classification Guidelines

All wastes generated and proposed to be disposed off-site shall be assessed, classified, and managed in accordance with EPA (2014). Where wastes require immobilisation prior to off-site disposal (to reduce waste classifications) an immobilisation approval shall be sought in accordance with Part 2 of the guideline. Immobilisation is not anticipated.

6.1.10 Asbestos Removal and Management

The removal and disposal of asbestos will be managed in accordance with the *WHS Act* and *WHS Regulation* and relevant Australian standards, regulations, and codes of practice.

A licensed Class A/B asbestos removalist and SafeWork notification regarding the scope of the removal works is required if more than 10 m² of non-friable asbestos is identified.

6.2 Site Establishment

The extent of remediation has been described in **Section 5.2**, as prepared for the site as per **Section 6.3**.

The remedial contractor shall secure the site to ensure that all safety and environmental controls are implemented. These controls will include, but not be limited to:

- Locate and isolate all required utilities in the proximity of the works;
- Assess need for and implement of any necessary traffic controls;
- Work area security fencing;
- Site signage and contact numbers;
- Stormwater run-off and sediment controls, if required;
- Appropriate decontamination areas for personnel and plant, if required;
- Appropriate protective equipment and controls relative to type of work; and
- Appropriate decontamination areas for personnel and plant.

6.3 Remedial Works Sequencing

The following order of remedial works shall be undertaken:

1. Excavation, isolation, and removal of any asbestos impacted fill material identified during the demolition of pre-existing structures and concrete hardstands;
2. Decommissioning, excavation, and removal of UPSS and petroleum hydrocarbon impacted soils as per an extent determined by excavation in an inside-out manner and commencing from the location of the UPSS;
3. Dewatering and treatment of any hydrocarbon contaminated excavations as a result of groundwater infiltration, surface water run-off, or increased rainfall;
4. Backfilling of excavations and importation of additional imported fill materials to reinstate excavations and supply clean fill as necessary for the proposed site development.

The method to implement each stage of the works is described in the following sections.

6.4 Asbestos Management

The preferred remedial option for any asbestos impacted fill soils on the site is by excavation of the affected area and removal of the material off-site.

6.4.1 Overview

Impacted fill below surface soils will be managed to the extent achievable via excavation and validation of the affected area and off-site removal to a disposal facility.

The minimum requirements and identifiers for the off-site disposal of asbestos impacted waste is;

- As per the EPA (2014) *Waste Classification Guidelines*, 'Asbestos waste means any waste containing asbestos';
- If more than 10 square metres of non-friable asbestos is identified, a licensed class A/B asbestos removalist and SafeWork notification must be engaged;
- For disposal of asbestos impacted waste, material must cover no more than 100m³ in volume; and
- Any transportation of more than 100 kilograms or 10 square metres from site to a waste facility requires it to be tracked via *Waste Locate*.

6.4.2 Asbestos in Soils

Following the removal of concrete pavements and hardstand, underlying surface soils are to be inspected by a Licensed Asbestos Assessor (LAA) on a 1m x 1m grid basis for visible ACM, as per WA DOH (2009). Where asbestos is identified within the fill material underlying pre-existing structures and concrete hardstands, the impacted media is to be removed via vertical/lateral excavation with the walls and base validated as described in EPA (2022). At location BH106, a 1m x 1m area around the location is to be excavated and the material assessed for appropriate management. Trenching of impacted areas should occur until a visual clearance can be given to confirm the absence of asbestos. The walls and base of the excavation will be sampled to confirm the presence and concentrations of ACM. Excavation material is to be stockpiled on site above plastic sheeting or geofabric material, where it is to be validated and classified using EPA waste classification guidelines (2014) prior to removal off-site.

Excavation of any unexpected asbestos impact identified during remediation works will be subject to the requirements of the National Occupational Health and Safety Commission (NOHSC) Asbestos Code of Practice and Guidance Notes.

There are regulatory requirements under clause 42 of the *Protection of the Environment Operations (Waste) Regulation 2005* that apply to the management of asbestos waste, including:

- Waste must be stored on the premises in an environmentally safe manner;
- Non-friable asbestos material must be securely packaged at all times;
- Friable asbestos material must be kept in a sealed container;
- Asbestos-contaminated soil must be wetted down;
- All asbestos waste must be transported in a covered, leak-proof vehicle;
- Asbestos waste must be disposed of at a landfill site that can lawfully receive this waste. Always contact the landfill beforehand to find out whether asbestos is accepted and any requirements for delivering asbestos to the landfill;
- It is illegal to dispose of asbestos waste in domestic garbage bins; and
- It is also illegal to re-use, recycle or dump asbestos waste.

6.4.3 Asbestos Air Monitoring

During works which have the potential to disturb ACM inclusive of the excavation of ACM impacted soils for off-site disposal, perimeter air monitoring will be conducted on each of the site boundaries.

Additional downwind monitoring locations will be included in the air monitoring program as required.

Air monitoring will be conducted in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) Asbestos Code of Practice and Guidance Notes, in particular the *Guidance note for the estimation of airborne asbestos dust* [NOHSC 3002:2005].

6.5 UPSS Decommissioning and Removal

Removal of USTs/ASTs and associated contents is required to be undertaken in accordance with SafeWork NSW requirements and relevant provisions of the *Protection of the Environment Operations (UPSS) Regulation 2014* as applicable. In addition, all removal works are required to be undertaken in accordance with relevant Australian standards, regulations and codes of practice including AS 4976-2008: *The removal and disposal of underground petroleum storage tanks*, and AS 1940-2004: *Storage and handling of flammable and combustible liquids*.

Tank contents shall be initially pumped out by use of a liquid waste tanker and disposed off-site. Following pump-out each of the tanks shall be de-gassed and a gas-free environment within the tank will be confirmed. Following degassing, USTs shall be removed from the sub-surface and scrapped on-site. Scrap metal shall be disposed off-site for recycling. Petroleum / product transfer lines shall be removed from the site surface as moving outwards from the location of each UST/AST to chase out the pipework. Recovered pavement and steel from removed in-ground petroleum infrastructure shall be disposed off-site for recycling.

Where present, bedding material and associated impacted fill/soil will also be sampled, removed, and stockpiled as necessary for off-site disposal. Where encountered, bedding material within tank pit excavations are required to be segregated from any other impacted site fill material(s).

6.6 Removal of Other Industrial Infrastructure

Observations made during previous investigations identified other area(s) which may pose a potential source of contamination; whereby a detailed assessment of underlying media has been precluded by virtue of the presence of infrastructure and/or hardstand pavement. Confirmation that residual soils are not impacted has been identified by JBS&G (2022b), however the presence of asbestos has increased the likelihood of more being present. Therefore, further assessment of the surface soils underlying structures may be required.

Following removal of infrastructure (including hardstand pavement), residual soils will be inspected for indicators of contamination, including field PID screening and visual/olfactory assessment for staining and/or odours. If potential contamination is identified representative samples will be collected in accordance with the Unexpected Finds Protocol (**Section 8.1**). Remedial options, following collection of analytical data are likely to include off-site disposal to a facility lawfully able to accept the material.

In addition, following removal of the truck wash, an assessment of potential leakage from sumps/pipework will be undertaken and remedial measures implemented as appropriate.

If identified, impacted material chased out under the direction/supervision of one of JBS&G's qualified and experienced scientists/engineers. Excavated fill materials will be temporarily stockpiled during validation, before being disposed of off-site.

Excavation of these materials is discussed following.

6.7 Petroleum Hydrocarbon Impacted Soils Excavation

Petroleum hydrocarbon impacted soils are known/anticipated to be present in proximity of the site UPSS, within tank bedding material, and are readily distinguishable by petroleum odours and/or staining. Validation and excavation of these soils shall commence following removal of the site UPSS.

Excavations shall proceed in an inside-out manner inclusive of the initial excavation of the materials with the most prevalent environmental impacts. Excavations are likely required of an extent of unsaturated and saturated zone soils. The excavation shall be instructed by an environmental consultant and be based on observations of aesthetic indicators of petroleum hydrocarbon impact, as well as validation sampling data as provided by an accredited laboratory. The excavation shall continue until such time that all aesthetically and analytically impacted materials have been removed.

6.8 Off-Site Disposal of Soils and Materials

Off-site disposal during the remedial works stage is proposed for:

- Recovered demolition materials (as may still be present following demolition works which may otherwise remove these materials) that can be recycled inclusive generally of steel and concrete;
- Potentially small volumes of asbestos impacted soils;
- Potential soils impacted by petroleum hydrocarbons; and
- Surplus materials as generated by UPSS decommissioning and removal..

All surplus materials shall be classified in accordance with EPA (2014) prior to removal from the site.

6.9 Excavation Dewatering

Open excavations related to the removal of USTs/ASTs have the potential to fill with infiltration groundwater, surface water runoff and increase rainfall, if left open for extended periods. Dewatering of these excavations in the event of the described scenarios shall be required in the first instance to facilitate the excavation / removal of saturated soils and following to remove gross quantities of hydrocarbon impact.

Dewatering shall be undertaken by establishment of a sump at each of the contaminated soil excavation areas that extends into saturated soils. A submersible pump shall be used within the sump to remove water from the excavation. The extent of excavation into saturated soils at each excavation area shall be calculated. Dewatering of the areas shall be undertaken until such time that a pore volume of groundwater from the calculated volume of saturated soils has been removed; and there are no aesthetic indicators of NAPL present (i.e. separate phase layer on top of excavation). A pore volume is estimated as 0.3 times the saturated soil volume.

6.10 Dewater Treatment

Dewatering is being undertaken to cause the removal of any petroleum hydrocarbons as anticipated to be potentially present in water as a result of open excavations. Impacted water as removed from excavations shall be treated via Granular Activated Carbon (GAC) to remove remaining petroleum hydrocarbon contamination.

Note that dewatering is only relative in the event that due to open excavations caused by the removal of site USTs/ASTs, infiltrating groundwater or surface water run off collected within the excavation becomes contaminated.

6.11 Excavation Backfilling

Imported soils shall consist of a material that is classified as virgin excavated natural material (VENM) or otherwise meets an appropriate Resource Recovery Order (RRO) including Excavated Natural Material (ENM). A minor deficit of fill materials is anticipated on the site consequent of the off-site disposal of sub-surface UPSS and possibly contaminated soils.

It is preferred that backfill material is geotechnically similar to materials present on-site, but alternate materials may be used.

Backfill materials shall be re-instated in 300 mm layers with each layer track-rolled by the excavator undertaking filling works. A complete extent of track rolling shall be confirmed by visual observation of a uniform surface level prior to placement of the next 300 mm layer. Backfilling shall be completed to an extent to make excavations safe.

6.12 Materials Importation

If material is to be imported to the site (i.e. for the reinstatement of site surfaces, raise site levels) then it shall be validated as per **Section 7.5.3**.

6.13 Validation

Validation of the remedial works will be conducted by JBS&G to demonstrate that the remediation objectives have been achieved. Details of the validation program are provided in **Section 7**.

6.14 Site Disestablishment

On completion of the remediation works all plant/equipment and safety/environmental controls shall be removed from the site by the appointed remedial contractor. All equipment used during remediation works will need to be appropriately decontaminated or disposed of as waste in accordance with relevant waste regulations.

7. Validation Plan

7.1 Overview

Validation data is required to be collected to verify the effectiveness of the remedial works and document the final site conditions as being suitable for the proposed future use(s).

The following sections establish the data quality objectives (DQOs) to be adopted during validation of the site remediation works.

7.1.1 State the Problem

The site, which has a history of commercial/industrial land uses is proposed to be redeveloped for on-going commercial/industrial land use. Underground petroleum storage infrastructure is present on the site which may potentially act as a source of petroleum hydrocarbon contamination within tank bedding material. The site has been minimally contaminated with elevated levels of petroleum hydrocarbons present in soils. Potentially harmful levels of petroleum hydrocarbons may exist beneath the existing USTs/AST, and therefore warrant further assessment. Minor asbestos impacts were identified within the site during (JBS&G 2022b), however was removed during the investigation. Unexpected impacts related to asbestos (if any) will require further assessment.

7.1.2 Identify the Decision

The decisions which are required to be made for validation of the site are as follows:

- Have UPSS/infrastructure been appropriately decommissioned and removed?
- Does validation data demonstrate that contaminated soils have been remediated to a level that no longer pose a potential health or aesthetic risk (inclusive of potential direct exposures of sub-surface maintenance/excavation workers) under the proposed redevelopment?
- Was impacted soil classified and disposed offsite to a facility licensed to accept the classified waste?
- Was imported material used to backfill the site for the intended use?
- Have asbestos impacts (if identified during redevelopment) been removed the site, or are otherwise managed as per a long term strategy to not pose a potential health or aesthetic risk?
- Have the works complied with relevant regulatory frameworks such that there are no outstanding issues?
- Is there any potential migration of contaminants from the site?
- Is the site considered suitable for the proposed use?

During the remediation activities, sufficient validation of site activities is required to demonstrate that the identified environmental and health-based risks to future use(s) of the site have been adequately managed to render the site suitable for the proposed land use.

7.1.3 Identify Inputs to the Decision?

The inputs to the decision are:

- Soil data as collected with pre-remediation investigations to confirm the extent of asbestos and petroleum hydrocarbon impacts;
- Physical observations, including visual and olfactory indicators reported during remediation activities and in relation to all excavation bases, walls, and stockpiles particularly in respect of the petroleum hydrocarbons remediation scopes;
- Validation analysis data collected from the exposed ground surface and from the base and walls of the remedial excavations for all remedial work stages;
- Validation analysis data collected from UST/AST material and any potential surface water from open excavations during all remedial works;
- Waste classification and material characterisation data obtained during assessment of fill material prior to and during remediation works;
- Disposal dockets and relevant documents in relation to appropriate disposal of material to be removed from site as part of the remediation works (landfill dockets, beneficial reuse / recycling dockets, trade waste disposal, etc.);
- Relevant guideline criteria for validation and waste classification;
- Site development plans; and
- Data quality indicators (DQIs) as assessed by quality assurance/quality control (QA/QC).

7.1.4 Define the Study Boundaries

The site boundaries are defined in **Section 2.1** and presented on **Figures 1** and **2**. The surrounding land uses are outlined in **Section 2.3**. The vertical extent of the works will be the maximum depth of remedial excavations as further informed by validation sampling.

Validation works will be completed within development timelines. This will comprise validation of the removal of identified impacts prior to occupation of a redeveloped site.

7.1.5 Develop a Decision Rule

The decision rules adopted to answer the decisions identified in **Section 7.1.2** are discussed below in **Table 7.1** following.

Table 7.1: Summary of Decision Rules

Decision Rule	
1. Have UPSS/infrastructure been appropriately decommissioned and removed?	Where visual confirmation of removal of all UPSS, gas-free certificates prior to decommissioning on-site and waste disposal receipts for removal of UPSS materials is available, then the answer to the decision is YES . Otherwise, the answer to the decision is NO .
2. Does validation data demonstrate that contaminated soils have been remediated to a level that no longer pose a potential health or aesthetic risk (inclusive of potential direct exposures of sub-surface maintenance/excavation workers) under the proposed redevelopment?	Analytical data for chemical COPCs will be compared against the adopted criteria in the RAP. For the validation sample sets, statistical analysis of the data will be undertaken in accordance with relevant guidance documents, as appropriate, to facilitate the decisions. The following statistical criteria will be adopted with respect to soils analysis: EITHER: the reported (maximum) concentrations are below the site criteria; OR the 95% Upper Confidence Limit (UCL) of the average concentration for each analyte is below the adopted health-based site criterion, no single analyte concentration exceeds 250% of the adopted health based site criterion and the standard deviation of the results is less than 50% of the site health based criterion. AND No aesthetic indicators of contamination are present in soils at the extent of works (i.e. significant petroleum hydrocarbon odours and/or staining). If either of the criteria comparison methods stated above are satisfied, and aesthetic impacts are absent, the answer to the decision will be YES . If the statistical criteria are not satisfied or aesthetic impacts are still present, the answer to the decision will be NO and further remedial works shall be required.
3. Was impacted soil classified and disposed offsite to a facility licensed to accept the classified waste?	Soil analytical data will be compared against EPA endorsed criteria and a waste classification will be provided for waste disposal purposes. Waste disposal dockets will be required to be presented to confirm that disposed impacted soils were disposed of to a facility licenced to accept the waste. If disposal dockets confirm appropriate disposal, the answer to the decision is YES . Otherwise, the answer to the decision is NO .
4. Was imported material used to backfill the site suitable for the intended use?	Soil analytical data will be compared against EPA endorsed criteria. If supporting documentation from the source site is provided regarding suitability for use, the answer to the decision is YES . If soil analytical data exceeds the EPA endorsed criteria or documentation from source site is not provided, the answer to the decision is NO .
5. Have asbestos impacts been removed from the site, or are otherwise managed as per a long-term strategy to not pose a potential health or aesthetic risk?	If validation data is available where asbestos impacts were encountered to validate that impacted soils have been excavated sufficiently to cause removal of all asbestos. AND Asbestos contaminated soils have appropriately validated and disposed off-site Then the answer to the decision is YES . Otherwise, the answer to the decision is NO .
6. Have the works complied with relevant regulatory frameworks such that there are no outstanding issues?	Qualitative assessment of the works in relation to EPA, SafeWork/WorkCover, Council, Sydney Water etc. approvals will be undertaken during and following the completion of remediation activities. It shall be ensured that all waste tracking and disposal data is available for the site. If this review identifies there are no non-compliance or outstanding issues the answer to the decision will be YES . Otherwise, the answer to the decision will be NO .
7. Is there potential migration of contaminants from the site?	During the excavation of underlying fill material beneath USTs/ASTs, if gross contamination is observed in the form of soil or water, and validation sampling data indicates significant risk to human and ecological receptors, then the answer to this decision is YES . Otherwise, the answer to the decision will be NO .

Decision Rule	
8. Is the site considered suitable for the proposed use?	<p>Was the answer to the above decision rules 1-6 NO? If the answer was YES, then the answer to this decision question is NO and additional works are required to achieve the RAP objective.</p> <p>Was the answer to decision rule 7 YES? If the answer was YES, then further assessment of the impacted area, as well as additional measures, will be required and the answer to this question is NO.</p>

7.1.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA including NEPC (2013), appropriate indicators of data quality (DQIs used to assess QA/QC) and standard JBS&G procedures for field sampling and handling.

The pre-determined DQIs established for the project are discussed below in relation to precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS parameters), and are shown in **Table 7.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted criteria.

If any of the DQIs are not met, further assessment of the data set will be required in order to determine whether the non-conformance has significant effects on the usefulness of the data. Corrective action to correct an adverse impact on the reliability of the dataset may include, but is not limited to, the request of further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

Table 7.2: Summary of Quality Assurance/Quality Control Program

Data Quality Indicators	Frequency	Data Quality Criteria
Precision		
Split duplicates (intra laboratory)	1 / 20 samples	<50 % RPD ¹
Blind duplicates (inter laboratory)	1 / 20 samples (not required for soil vapour sampling)	<50 % RPD ¹
Laboratory Duplicates (not asbestos)	1 / 20 samples	<50 % RPD ¹
Accuracy		
Surrogate spikes (not asbestos)	All organic samples	70-130 %
Laboratory control samples (not asbestos)	1 per lab batch	70-130 %
Matrix spikes (not asbestos)	1 per lab batch	70-130 %
Representativeness		
Sampling appropriate for media and analytes	All samples	~2
Samples extracted and analysed within holding times	All samples	Soil: organics (14 days, other than vinyl chloride – 7 days), inorganics (6 months) Groundwater: metals (6 months, other than mercury – 28 days), sVOCs (PAHs, TRH<C ₁₀ – 7 days), VOCs/TRH>C ₁₀ – 14 days).
Laboratory Blanks (not asbestos)	1 per lab batch	<LOR
Trip spike (not asbestos and waste classification samples)	1 per lab batch (for volatile contaminants)	70-130% recovery
Storage blank (not asbestos and waste classification samples)	1 per lab batch (for volatile contaminants)	<LOR
Rinsate sample (not asbestos and waste classification samples)	1 per sampling event/media (when sampling with reusable equipment)	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All Samples
Standard analytical methods used for all analyses	All Samples extracted and analysed within holding times	NATA accredited methods for all sample analysis
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples ²
Limits of reporting appropriate and consistent	All Samples extracted and analysed within holding times	All samples ²
Completeness		
Sample description and chain of custody completed and appropriate	All Samples	All samples ²
Appropriate documentation	All Samples	All samples ²
Satisfactory frequency and result for QC samples		95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted Site assessment criteria	All samples	LOR<= Site assessment criteria

(1) If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

(2) A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be

7.1.7 Optimise the Design for Obtaining Data

The purpose of this step is to identify a resource-effective field validation sampling design that generates data that are expected to satisfy the decision performance criteria, as specified in the preceding steps of the DQO process. The output of this step is the sampling design that will guide development of the field sampling and analysis plan. This step provides a general description of the

activities necessary to generate and select data collection designs that satisfy decision performance criteria.

The remediation validation and subsequent laboratory analysis program as outlined in the following sections will need to be implemented during site remediation activities to demonstrate the successful completion of works in compliance with the RAP goals. The validation/characterisation sampling and analytical program for the site is outlined in **Tables 7.3 to 7.6** following.

Table 7.3: Characterisation/Remediation Validation Program – Soil Sampling

Item	RAP Sampling Frequency		Analytical Suite
Export of Materials			
Classified in accordance with EPA (2014) <i>Waste Guidelines</i>	Soils requiring classification for off-site disposal will be sampled by JBS&G as per the sampling density for stockpiled materials in NEPC (2013)	Heavy metals TRH PAH Asbestos (presence/absence: 40 g) TCLP (heavy metals / PAHs) as required	
UPSS, Petroleum Hydrocarbons Excavation(s) including UST, AST, and Fuel Line Removal			
	Excavation Floors	Excavation Walls	
Excavation less than 100 m ² extent	1 per 25 m ² (5 m grid) or minimum 1x sample per base.	1 per 5 m lineal (from each distinct horizon/material type/1 m vertical soil profile). Minimum 1 x sample per wall. If excavation is shallow, i.e. wall height ≤ 0.2 m, then wall samples are not required.	TRH PAHs Lead Total Phenol
Excavation greater than 100 m ² extent	1 per 100 m ² (10 m grid) or minimum 1x sample per base.	1 per 10 m lineal (from each distinct horizon/material type/1 m vertical soil profile). Minimum 1 x sample per wall. If excavation is shallow, i.e. wall height ≤ 0.2 m, then wall samples are not required.	TRH/BTEX PAHs Lead Total Phenol
ACM Remedial Excavation (if required)			
	Excavation Floors	Excavation Walls	
ACM remedial excavation	Visual, and 1 per 100 m ² (10 m grid) or minimum 1x sample per base	1 per 10 m lineal (from each distinct horizon/material type/1 m vertical soil profile). Minimum 1 x sample per wall. If excavation is shallow, i.e. wall height ≤ 0.2 m, then wall samples are not required.	Visual Inspection by JBS&G + Asbestos (NEPM protocol: 500 mL)
Exposed ground surface (following stockpiling of ACM impacted fill and picking of surface soils) , if required	Visual, and 1 per 100 m ² (10 m grid) or minimum 1x sample per base	1 per 10 m lineal (from each distinct horizon/material type/1 m vertical soil profile). Minimum 1 x sample per wall. If excavation is shallow, i.e. wall height ≤ 0.2 m, then wall samples are not required.	Visual Inspection by JBS&G + Asbestos (NEPM protocol: 500 mL)
Materials Importation			
Imported VENM	Minimum of 5 samples per source site/material type up to 10,000 m ³ then 1 sample per 1000 m ³ thereafter	TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (NEPM protocol: 500 mL)	
Quarried natural materials (e.g. blue metal, sandstone, shale)	Confirmation that the material is quarried rock (consistent with VENM) prior to importation, and visual confirmation.	Source site inspection required	

Item	RAP Sampling Frequency		Analytical Suite
Recycled materials including 'quarry' products that are recycled.	Letter showing compliance with the EPL from the source facility and supplemented with analytical data at a density of 3 samples per material type/batch up to 2,000m³ then 1 sample per 500m³ thereafter		TRH/BTEX PAH Heavy Metals Asbestos (NEPM protocol: 500 mL)
Imported ENM	As per the order/exemption		As per the order/exemption + asbestos (500 mL)
Unexpected Finds			
	Excavation Floors	Excavation Walls	
Unexpected Find	1 per 25m²	1 per 5m lineal	As appropriate, depending on the location and characteristics of the unexpected find

The nominated sampling densities and analytical program have considered sample density guidance provided in EPA made and endorsed guidelines.

7.2 Soil Sampling Methodology

7.2.1 Validation of Excavation(s)

Samples will be collected by an appropriately trained and experienced environmental scientist/engineer using a hand trowel or from the bucket of mechanical excavation equipment, at the required densities to meet the project DQOs.

Prior to collection of each sample, hand tools will need to be thoroughly decontaminated using phosphate free detergent and distilled water as per **Section 7.4.3**.

During the collection of soil samples, features such as seepage, discolouration, staining, odours, and other indicators of contamination will need to be noted on the field documentation.

7.2.2 Stockpile Sampling

For stockpile sampling, material will be obtained from a minimum depth of 0.3m into the surface of the stockpile at the time of sampling. Appropriate decontamination activities shall be followed following the collection of each sample.

During the collection of soil samples, features such as seepage, discolouration, staining, odours, and other indications of contamination will be noted on the field documentation.

Stockpile footprints are to be inspected and sampled following the removal of aboveground material as per stockpile sampling requirements (EPA 2022 / NEPC 2013).

Excavated and stockpiled material with the intention of being reused on site is to be sampled in accordance with EPA (2022). All materials are to be tracked and characterised with the appropriate documentation found in **Appendix D** and further discussed in **Section 7.5.3**.

7.2.3 Sampling for Asbestos Assessment

Bulk soil samples (minimum 10L) will be collected and weighed in the field. Collected bulk sample will be sieved in the field ($\leq 7\text{mm}$ passing) and separated fragments retained and weighed in the field or spread out on contrasting plastic. The asbestos concentration as ACM in soil will be calculated in accordance with NEPC (2013) and WA DOH (2021) and based on the weight of collected fragment/s (assuming 15% asbestos content) divided by the weight of the collected 10L soil sample, providing a w/w %. Validation criteria will be adopted in accordance with NEPC (2013) for the permissible land use.

A separate 500mL soil sample will be collected from the same location as a bulk sample, labelled and sent to the laboratory for asbestos analysis according to NEPM (2013) protocol.

During excavation of asbestos impacted material, visual clearance will be given when asbestos is no longer identified within the walls and base of the excavation.

7.3 Treated Water Sampling Methodology

Any accumulation of water within open excavations as a result of the decommissioning and removal of site USTs/ASTs, will be subject to sampling and validation for potential treatment and off-site disposal.

Water samples shall be assessed for constituents potentially attributable to the remedial works including at least TRH and VOCs – and expanded to the full analytical suite as required by a TWA agreed for the site.

It is to be noted that the treatment of water on-site is relative to the possibility of surface water accumulating within UST/AST excavations. Groundwater on the site has not been identified as being impacted as a result of hydrocarbon contamination.

7.4 General Sampling Requirements

7.4.1 Sample Handling

Collected samples will be immediately transferred to sample containers of appropriate composition (glass jars for chemical analysis, plastic bags for asbestos). Sample labels recorded: job number; sample identification number; and date of sampling.

Sample containers will be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form will be completed and forwarded with the samples to the testing laboratory.

7.4.2 Duplicate and Triplicate Sample Preparation and QA/QC Requirements

Field duplicate and triplicate samples for the characterisation/validation assessment will be obtained during sampling using the procedures outlined at a frequency outlined in **Table 7.2**. The primary sample will be divided laterally into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three clean glass jars and / or plastic bags. Water samples will be split during sample collection to fill multiple sample containers.

All sample containers will be filled completely with no headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled esky for laboratory transport.

Trip spike, storage blank and rinsate samples will be collected as per **Table 7.2**.

7.4.3 Sampling Equipment Decontamination

The following procedure will be used to clean non-disposable equipment, including the trowel, pick etc., prior to the collection of each sample:

- Scrubbing with a wire brush to remove gross contamination;
- Pressure spray with Decon-90 detergent and potable water mix;
- Pressure spray rinse with potable water; and
- Air drying.

Rinsate samples will be obtained during the field decontamination procedures at regular intervals during characterisation/validation sampling activities. Each rinsate sample will be obtained by rinsing the trowel with laboratory grade demineralised water following the decontamination procedure. The water sample will be appropriately preserved and stored with the site samples prior to transport to the laboratory for chemical analysis.

7.4.4 Laboratory Analyses

Eurofins MGT Pty Ltd will be the primary laboratory for the required analyses. The secondary laboratory to be contracted for the works will be Envirolab Services Pty Ltd (Envirolab). All laboratories are National Association of Testing Authorities (NATA) registered for the relevant analyses. In addition, the laboratories are required to meet JBS&G's internal QA/QC requirements.

7.5 Soil Validation Criteria

Based on the proposed development details and in accordance with the decision process for assessment of urban redevelopment sites (EPA 2017), validation criteria sourced from the publications have been adopted:

- NEPC (2013) Health-based Investigation Levels (HILs) for commercial/industrial land use (HIL- D);
- NEPC (2013) Health Screening Levels (HSLs) for petroleum hydrocarbons considering potential for vapour intrusion, fine- and coarse-grained soil for commercial/industrial land use (HSL D) land use at 0.0-1.0 m depth;
- NEPC (2013) site specific ecological investigation levels (EILs) derived through the added contaminant limits for commercial/industrial land use;
- NEPC (2013) Management Limits for TRH, fine- and coarse-grained soils for commercial/industrial land use;
- NEPC (2013) Ecological Screening Levels (ESLs) for TRH fractions, BTEX and benzo(a)pyrene in fine grained soil for commercial/industrial land use;
- NEPM (2013) screening levels of 0.001% (w/w) for asbestos fines (AF) and fibrous asbestos (FA) in soil; and
- Where there are no NSW EPA endorsed thresholds the laboratory LOR has been adopted as an initial screening value for the purposes of this validation assessment.

A validation criterion of “no visible ACM within fill material” has been adopted for asbestos remediated soils (if any).

7.5.1 Application of Soil Assessment Criteria

For soils to be considered as meeting the health/ecological based assessment criteria (i.e., not posing an unacceptable risk), the following criteria will be adopted:

Either:

- All contaminant concentrations were less than the adopted site assessment criteria,

Or:

- The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) was below the adopted criterion;
- No single analyte concentration exceeded 250% of the adopted criterion; and
- The standard deviation of the results was less than 50% of the criterion.

Analytical results for asbestos in soils will be directly compared to the site criteria. No statistical assessment for asbestos in soils will be undertaken.

7.5.2 Off-site Disposal

Where contaminated fill/soil is not suitable for on-site retention or is surplus to site requirements, materials are proposed to be remediated by off-site removal and disposal. Materials shall be classified in accordance with EPA (2014) *Waste Classification Guidelines* or an appropriate resource recovery order/exemption (RRO/RRE) as created under the *Protection of the Environment Operations (Waste) Regulation 2014*.

Material will require to be removed to a facility lawfully able to receive it.

7.5.3 Importation and Tracking Site Materials

In accordance with current EPA policy, only material that does not represent an environmental or human health risk at the receiving site may be considered for resource recovery. Imported materials will only be accepted to the site if they meet the restrictions placed on these materials and meet the definition of:

- Quarried natural materials;
- VENM as defined in as defined in EPA (2014) *Waste Classification Guidelines* and the *Protection of the Environment Operations Act (1997) Schedule 1*;
- Excavated Natural Material (ENM) as defined in the ENM RRO/RRE; or
- Recycle materials as per relevant RRO/RRE.

Inspection and sampling of imported material is required prior to importation onto the site in accordance with relevant NSW EPA guidelines. All material movement and placement within the site are to be tracked via a material tracking plan with record of date, lithology/matrix, volume, origin and intended destination/use through either a:

- Material Tracking and Placement Sheet (MTS)— a record of material excavated from an in-situ or stockpiled source, with relevant information regarding the temporary placement, stockpiling or disposal of material; and/or
- Material Characterisation Sheet (MCS) – a record of characteristics in relation to imported or excavated materials on site. A GPS or grid-based site reference is to be made available at the time of remedial works to provide a visual representation of material movement and location.

The material tracking/placement and characterisation sheets are provided in **Appendix D**. Sampling of materials as per relevant RRO/RRE (recycled products) is required to be undertaken by the facility prior to import. In addition, where materials are proposed for beneficial reuse under a relevant RRO/RRE (i.e. imported to the site), fill material will need to be further assessed by JBS&G for land use suitability (refer to **Section 7.1.7**).

7.5.4 Treated Water Validation Criteria

Contaminated water that is identified during remediation as a result of open excavations are subject to the following human health criterion:

- Recreational criteria adopted as a conservative assessment of worker exposure risk during potential excavation works involving interaction with groundwater, from the Australian Drinking Water Guidelines NHMRC (2011) as 10x the drinking water criteria for health;
- HIL/HSLs for maintenance workers for petroleum hydrocarbons in water as presented in CRC Care (2011).

The ASC NEPM (NEPC 2013) solubility limits for vapour intrusion for water in clay soil were also considered for screening purposes. It is to be noted however, that contaminated surface or groundwater has not been previously identified within the site, therefore the treated water

validation criteria is only applicable in the event of an unexpected water related impact during remediation.

7.6 Final Site Inspection

A final site inspection shall be undertaken following all works to confirm the following:

- No evidence of remaining site petroleum based or related infrastructure;
- No visual aesthetic indicators of impact; and
- No recognisable petroleum odours as present at walking height over the extent of the site surface.

If an unexpected find of asbestos is identified, an asbestos clearance shall be issued by a Licensed Asbestos Assessor (LAA) at the completion of remedial works.

7.7 Validation Report

At the completion of the remedial works, a validation report will be prepared in general accordance with the *Consultants Reporting on Contaminated Land Contaminated Land Guidelines* (EPA 2020), documenting the works as completed. The report will contain information including:

- Details of the remediation works conducted;
- Information demonstrating that the objectives of this RAP have been achieved, in particular the validation sample results and assessment of the data against both the pre-defined DQO and the remediation acceptance (validation) criteria;
- Information demonstrating compliance with appropriate regulations and guidelines;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Results of all environmental monitoring undertaken during the course of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents;
- Verification of regulatory compliance;
- Details on waste classification, tracking and off-site disposal including landfill dockets;
- The extent of impacted materials as retained; and
- Clear statement of the suitability of the site with respect to commercial/industrial land use.

The report will serve to document the remediation works for future reference.

8. Contingency Plan

A review of the proposed contamination-related aspects of the works associated with development of the site has been undertaken and has identified a number of potential risks, outlined in the following sections that required the development of contingencies to ensure that the objectives of this RAP are met.

8.1 Unexpected Finds

The possibility exists for hazards that have not been identified to date to be present within fill materials or underlying pavements/building on the site. The nature of hazards which may be present, and which may be discovered at the site are generally detectable through visual or olfactory means, for example:

- The presence of significant aggregates of friable and non-friable asbestos materials (visible) as opposed to minor occurrences of fibre bundles in soil; and/or
- Excessive quantities of construction/demolition waste that represents an aesthetics issue beyond that reported to date (visible); and/or
- Hydrocarbon/chemical impacted materials beyond that reported to date (visible/odorous); and/or
- Not previously identified infrastructure associated with the decommissioning and removal of USTs/ASTs; and/or
- Oily/tarry/ashy materials below USTs/ASTs (visible/odorous); and/or
- Potential petroleum hydrocarbon impact (sweet odour soils) not previously identified.

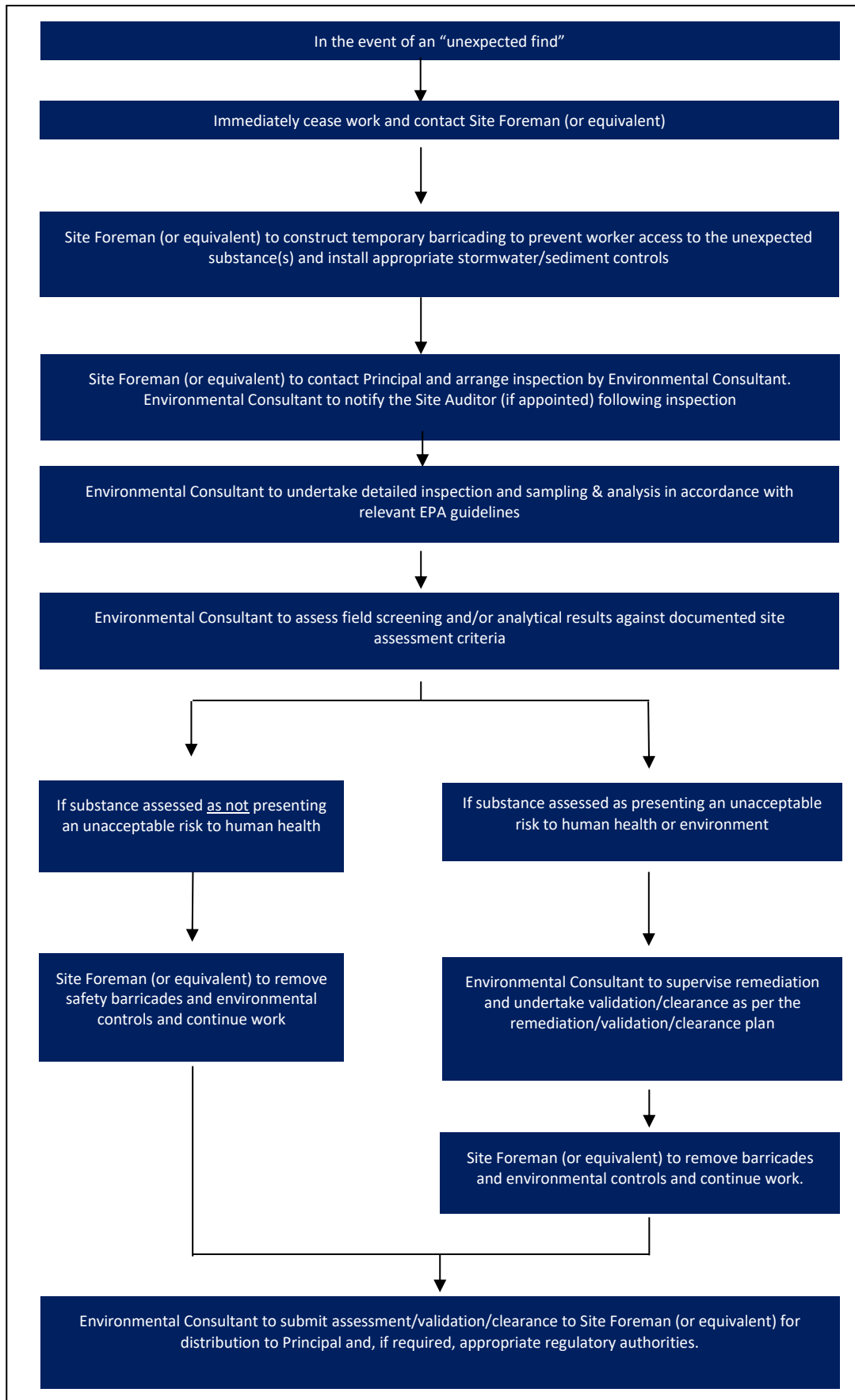
As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances (or any other unexpected potentially hazardous substance) be identified, the procedure summarised in **Flow Chart 8.1** is to be followed.

An enlarged version of the Unexpected Finds Protocol, suitable for use on the site, should be posted in the Site Office and referred to during the site-specific induction by the Principal Contractor.

The sampling strategy for each “unexpected find” shall be designed by the environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in EPA (1995) in addition to those outlined in **Section 7**.

Flowchart 8.1: Unexpected Finds Protocol



8.2 Contingency Scenarios

8.2.1 Material Storage and Management

Wherever possible, classified materials within the site will be transported directly from the excavation to an awaiting truck, however, where this is not possible and materials will require ongoing stockpiling, controls shall be emplaced (e.g. surface liner before placement, covering, sediment fence) to mitigate the potential for sediment run-off, aeolian transport of particulates or other uncontrolled physical movement of stockpiled materials.

If any materials stockpiled within a containment (bund, sediment fencing, plastic/geofabric covering) area or within engineered bunds (stored liquids, etc.) escape or have the potential to escape, this shall be considered a materials storage breach.

In the event that a materials storage breach occurs or has the potential to occur, then the engineering management controls shall be rectified or upgraded as required as soon as possible, and investigations undertaken to review the adequacy of the controls and any improvements

8.2.2 Emissions Complaints

Due to the nature of the activities and type of contaminants identified within the site, there is a potential for complaints to be received from members of the public and/or occupants of surrounding properties relating to environmental emissions including:

- Odour emissions arising from handling of malodorous soil;
- Noise and vibration arising from excavation, piling and other works;
- Dust emissions arising from excavation, material handling and placement; and
- Visibly impacted water quality in surface water discharge from the site.

Monitoring of all environmental emissions shall be undertaken during the works as detailed in **Section 9** and appropriate actions taken to further control emissions following receipt of a complaint. It is anticipated that one or more of the following actions will be considered:

- Increased application of odour screening/masking chemicals on odorous materials;
- Disturbance of soils during meteorologically favourable periods only; and/or
- Covering of impacted soils.

8.2.3 Severe Weather

Weather will be monitored daily via checking an internet-based weather service provider. Should severe weather be forecast, especially high winds, works will stop until safe to re-commence. All site management controls will be implemented prior to any severe weather events.

9. Management Plan

9.1 Site Management Plan

This section contains procedures and requirements that are to be implemented as a minimum during the remedial works within the site. A summary of the elements and their related requirements are discussed in **Table 9.1** below:

Table 9.1: Required Elements of the Site Management Plan

Element	Requirement
1. Dust and Airborne Hazard Control	Dust and asbestos air monitoring. Provisions for dust control based on monitoring results.
2. Excavation Pump-Out and Treatment	It is unlikely that any excavation pump-out will be required given the limited excavation requirements. In the event that it is required, dewatering and treatment options and procedures have been discussed as part of the Remedial Plan in Section 6 .
3. Visual Impacts	Visual monitoring at site boundary Specific colour requirements for various controls/measures, including PPE (e.g., masks/coveralls).
4. Emergency Response	As appropriate. Procedures required for spill incident response including material storage breach.
5. Noise Control and Vibration	Remediation work shall not give rise to 'offensive noise' as defined in the POEO Act. All equipment and machinery associated with the remediation work shall be operated by the Contractor in accordance with the POEO Act and the <i>Noise Control Regulations 2000</i> . All machinery and equipment used during remediation will be in good working order and fitted with appropriate silencers when necessary. The use of plant and machinery by the Remediation Contractor shall also not cause vibrations to be felt or capable to be measured at any premises.
6. Traffic	Controls on vehicle movements on public roads. Controls on transport of impacted materials.
7. Odour Control	Management of all potential odour generating activities (i.e., excavation of petroleum hydrocarbon contaminated soils) with appropriate odour controls incorporating safeguards and monitoring. Daily monitoring of odour levels at site boundary during handling of malodorous materials. Procedures for addressing elevated odour monitoring results, including, but not limited to reduction in earthworks activities within odorous material areas during adverse meteorological conditions; application of odour masking solutions at the odour source or between identified source(s) and receptor(s).
8. Handling of Contaminated Soil and Water	Soil and water management (stockpiling, site access, excavation pump out, reinstatement).
9. Hazardous Materials	Hazardous wastes arising from the remediation work shall be removed and disposed of in accordance with the requirements of NSW EPA, SafeWork NSW and the relevant regulations by the Remediation Contractor. Any hazardous wastes will be transported by a NSW EPA licensed transporter.
10. Soil Storage/Placement Areas	Soil and water management (Stockpiling, site access, excavation pump out, reinstatement). Bunding. Heavy vehicle/personnel decontamination. Site drainage requirements, incorporating clean/dirty areas and modifications to existing surface water and drainage controls beneath retained pavements. Monitoring as required.
11. Sediment Control	Bunding. Collection/treatment/handling impacted sediments.
12. Hours of Operation	Typical hours of operation for remedial works are: <ul style="list-style-type: none"> Monday to Friday: 7 am to 5 pm. Saturday: 8 am to 1 pm. Sunday and Public Holidays: No work permitted.
13. Decontamination of Equipment	Mechanical plant and manually operated plant, machinery, hand tools, and other potentially impacted and reusable media.
14. Environmental Monitoring	Monitoring of dusts, noise, odour, and fibres.

Element	Requirement
	Monitoring as required for vibration and water releases. Inspection checklists and field forms.
15. Disposal of Contaminated Material	All soils will be classified, managed, and disposed in accordance with the <i>Waste Classification Guidelines</i> (EPA 2014). Documentary evidence for all soil disposals including relevant waste management/tracking controls and records shall be kept by the Remediation Contractor for inclusion in the Validation Report.
16. Material Classification of Imported Fill	Any materials imported on site must be appropriately managed by the Remediation Contractor and comprise validated, environmentally suitable material, consistent with the definition of VENM, ENM or produced in accordance with a relevant EPA order/exemption.
17. Community Relations Plan	Specific communication protocols, incorporating nomination of specific contact persons & details and requirements for communications/response register.
18. Material Transportation	Trucks will be loaded in a designated area. The Remediation Contractor shall ensure that there is no material tracked offsite out onto public roadways and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction. The Remediation Contractor shall also log truck movements and approximate volume, via registration number and consignment number (where applicable). All appropriate road rules shall be observed, and state roads will be selected as far as practicable over local roads when planning the transport route to the off-site material disposal location. Plant and vehicles should limit their speed when working within asbestos exclusion zones and only traverse wetted haul roads.
19. Security and Signage	Secure site perimeter. Site boundary signage.
20. Training	All site personnel and workers to be site inducted and obtain training documentation relative to the individuals' tasks.
21. Contact Details	Company/personnel details, including names/phone numbers for: - Principal Contractor - Remediation Consultant - Remediation Contractor - OH&S Compliance - Environmental Compliance
22. Stockpiling	No stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior Council approval has been obtained. All stockpiles of soil or other materials shall be placed away from drainage lines gutters or stormwater pits or inlets. All stockpiles of soil or other materials likely to generate dust or odours shall be covered. All stockpiles of chemically contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours. All stockpiles of asbestos contaminated soils shall be kept damp and covered to minimise potential fibre release, and if left for more than 24 hours, be stored in a secure area. All stockpiles of soil or other materials shall be placed on an impermeable barrier (e.g. geofabric, plastic, concrete hardstand etc) to provide physical separation between the stockpiled material and underlying soils. Any material stockpiled otherwise will require validation sampling (EPA 2022NEPC 2013) of the underlying soil to ensure contaminant migration has not occurred.
23. Responsible Person	It is the responsibility of the appointed remedial contractor to implement the management strategies identified in Section 5.4 .

9.2 Work Health and Safety Management Plan (WHSP)

A WHSP shall be prepared by the remedial contractor prior to commencement of remediation works. The plan shall contain procedures and requirements that are to be implemented as a minimum during the works, in addition to the Contingency Plan, referred to in **Section 8**.

The objectives of the WHSP are:

- To apply standard procedures that minimises risks resulting from the works;
- To ensure all employees are provided with appropriate training, equipment, and support to consistently perform their duties in a safe manner; and

- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards, mandatory safety practices and procedures;
- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

10. Conclusions and Recommendations

With reference to the limitations in **Section 11**, the following conclusions and recommendations are provided.

10.1 Conclusions

It is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP, and the recommendations below, it is concluded that the site can be made suitable for the intended uses and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment.

10.2 Recommendations

It is recommended that the processes outlined in this RAP be implemented to ensure the risks and impacts during remediation works are controlled in an appropriate manner.

A provisional Site Management Plan, which includes monitoring and management measures required to control the environmental impacts of the works, has been prepared as **Section 9.1**, and this shall be finalised and implemented.

A Workplace Health and Safety Plan (WHSP) to document the procedures to be followed to manage the risks posed to the health of the workforce shall be prepared and implemented consistent with **Section 9.2**.

Upon completion of the remediation works, a Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

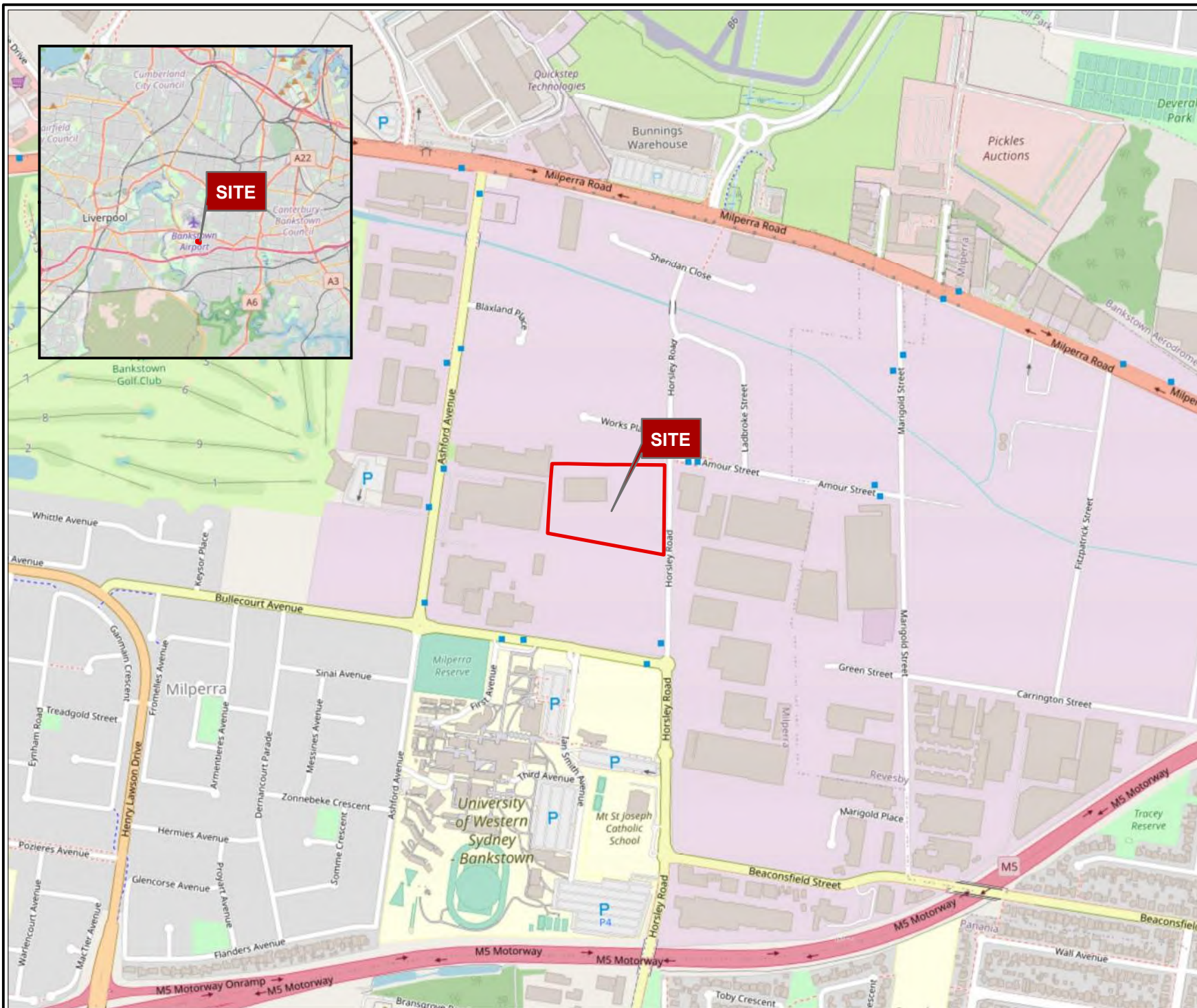
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.


Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history, and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend
 Approximate Site Boundary




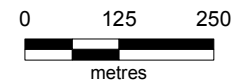
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Client: Tactical Group

Version: R01 Rev A Date 28/07/2022

Drawn By: YY Checked By: MC

Scale 1:10,000 



Coord. Sys. GDA 1994 MGA Zone 56

**339 – 349 Horsley Rd
 Milperra NSW 2214**

SITE LOCATION

FIGURE 1



Legend

- ▬ Approximate Site Boundary
- ▬ NSW Cadastre (DFS1, 2022)
- Site Features**
- ▬ AdBlue AST
- ▬ Diesel AST
- ▬ Truckwash
- ▬ UST
- ▬ Waste Water Collection System
- ▬ Main Office
- ▬ Metal + Wool Storage
- ▬ Vacant Warehouse & Offices
- ▬ Occupied Warehouse & Metal Storage
- ▬ Occupied/Operational Metal Fabrication Warehouse



Job No: 63429

Client: Tactical Group

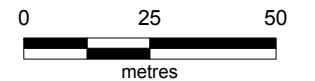
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Date 28/07/2022

Drawn By: YY

Checked By: MC

Scale 1:1,500



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**339 – 349 Horsley Rd
Milperra NSW 2214**

SITE LAYOUT & FEATURES

FIGURE 2



Legend

- Approximate Site Boundary
- Sample Locations
 - Borehole (JBS&G 2022a)
 - Monitoring Well (JBS&G 2022a)
 - Soil Vapour (JBS&G 2022a)
 - Borehole (JBS&G 2022b)



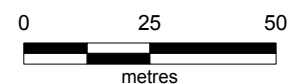
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Version: R02 Rev A Date 2/08/2022

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339 – 349 Horsley Rd
Milperra NSW 2214

SAMPLE LOCATIONS
(JBS&G 2022a and 2022b)

FIGURE 3

SB 11	Depth (m)	Date	Concentration (mg/kg)	Criteria
Analyte				
F2 (C-D-C 15 less Naphthalene)	0.25-0.3	15/03/2022	260	NEPC (2013) ESLs for Comm/Ind, Coarse Soil

BH 106	Depth (m)	Date	Note
Analyte			
Asbestos	0.4-0.5	7/07/2022	Asbestos Fragment "FRAG20220708_01"

Legend

Approximate Site Boundary

Site Features

Truckwash

Sample Locations

Borehole (JBS&G 2022a)

Monitoring Well (JBS&G 2022a)

Soil Vapour (JBS&G 2022a)

Borehole (JBS&G 2022b)



Job No: 63429

Client: Tactical Group

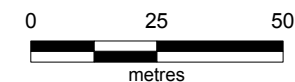
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Checked By: MC

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**339 – 349 Horsley Rd
Milperra NSW 2214**

**SOIL EXCEEDANCES
(JBS&G 2022a and 2022b)**

FIGURE 4



Legend

 Approximate Site Boundary

Site Features

 AdBlue AST

 Diesel AST

 Truckwash

 UST

 Waste Water Collection System

Remedial Areas

 AST & Tank Pit Material

 UST & Tank Pit Material

 Asbestos Remediation Area (1mx1m)

● Borehole (JBS&G 2022b)



Job No: 63429

Client: Tactical Group

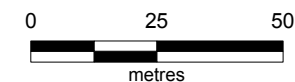
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Date 7/09/2022

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Checked By: MC

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**339 – 349 Horsley Rd
Milperra NSW 2214**

**REMEDIAL AREAS
(JBS&G 2022a and 2022b)**

FIGURE 5

Appendix A Analytical Summary Tables

Table A1 - Soil Analytical Table
Project Number: 63429
Project Name: Milperra RAP 2022



		Metals & Metalloids										THMs (MCLP 2015)										BTEX										PAH																																																																																																																																																																																																																																																																																																																																																			
		Asenic	Barium	Bismuth	Cadmium	Chromium (ppm V)	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Iron	2,4-D	1,2-D	1,4-D	1,5-D	1,6-D	1,7-D	1,8-D	1,9-D	2,3-D	2,4-D	2,5-D	2,6-D	2,7-D	2,8-D	2,9-D	3,4-D	3,5-D	3,6-D	3,7-D	3,8-D	3,9-D	4,5-D	4,6-D	4,7-D	4,8-D	4,9-D	5,6-D	5,7-D	5,8-D	5,9-D	6,7-D	6,8-D	6,9-D	7,8-D	7,9-D	8,9-D	9,10-D	9,11-D	9,12-D	9,13-D	9,14-D	9,15-D	9,16-D	9,17-D	9,18-D	9,19-D	9,20-D	9,21-D	9,22-D	9,23-D	9,24-D	9,25-D	9,26-D	9,27-D	9,28-D	9,29-D	9,30-D	9,31-D	9,32-D	9,33-D	9,34-D	9,35-D	9,36-D	9,37-D	9,38-D	9,39-D	9,40-D	9,41-D	9,42-D	9,43-D	9,44-D	9,45-D	9,46-D	9,47-D	9,48-D	9,49-D	9,50-D	9,51-D	9,52-D	9,53-D	9,54-D	9,55-D	9,56-D	9,57-D	9,58-D	9,59-D	9,60-D	9,61-D	9,62-D	9,63-D	9,64-D	9,65-D	9,66-D	9,67-D	9,68-D	9,69-D	9,70-D	9,71-D	9,72-D	9,73-D	9,74-D	9,75-D	9,76-D	9,77-D	9,78-D	9,79-D	9,80-D	9,81-D	9,82-D	9,83-D	9,84-D	9,85-D	9,86-D	9,87-D	9,88-D	9,89-D	9,90-D	9,91-D	9,92-D	9,93-D	9,94-D	9,95-D	9,96-D	9,97-D	9,98-D	9,99-D	10,00-D	10,01-D	10,02-D	10,03-D	10,04-D	10,05-D	10,06-D	10,07-D	10,08-D	10,09-D	10,10-D	10,11-D	10,12-D	10,13-D	10,14-D	10,15-D	10,16-D	10,17-D	10,18-D	10,19-D	10,20-D	10,21-D	10,22-D	10,23-D	10,24-D	10,25-D	10,26-D	10,27-D	10,28-D	10,29-D	10,30-D	10,31-D	10,32-D	10,33-D	10,34-D	10,35-D	10,36-D	10,37-D	10,38-D	10,39-D	10,40-D	10,41-D	10,42-D	10,43-D	10,44-D	10,45-D	10,46-D	10,47-D	10,48-D	10,49-D	10,50-D	10,51-D	10,52-D	10,53-D	10,54-D	10,55-D	10,56-D	10,57-D	10,58-D	10,59-D	10,60-D	10,61-D	10,62-D	10,63-D	10,64-D	10,65-D	10,66-D	10,67-D	10,68-D	10,69-D	10,70-D	10,71-D	10,72-D	10,73-D	10,74-D	10,75-D	10,76-D	10,77-D	10,78-D	10,79-D	10,80-D	10,81-D	10,82-D	10,83-D	10,84-D	10,85-D	10,86-D	10,87-D	10,88-D	10,89-D	10,90-D	10,91-D	10,92-D	10,93-D	10,94-D	10,95-D	10,96-D	10,97-D	10,98-D	10,99-D	10,100-D	10,101-D	10,102-D	10,103-D	10,104-D	10,105-D	10,106-D	10,107-D	10,108-D	10,109-D	10,110-D	10,111-D	10,112-D	10,113-D	10,114-D	10,115-D	10,116-D	10,117-D	10,118-D	10,119-D	10,120-D	10,121-D	10,122-D	10,123-D	10,124-D	10,125-D	10,126-D	10,127-D	10,128-D	10,129-D	10,130-D	10,131-D	10,132-D	10,133-D	10,134-D	10,135-D	10,136-D	10,137-D	10,138-D	10,139-D	10,140-D	10,141-D	10,142-D	10,143-D	10,144-D	10,145-D	10,146-D	10,147-D	10,148-D	10,149-D	10,150-D	10,151-D	10,152-D	10,153-D	10,154-D	10,155-D	10,156-D	10,157-D	10,158-D	10,159-D	10,160-D	10,161-D	10,162-D	10,163-D	10,164-D	10,165-D	10,166-D	10,167-D	10,168-D	10,169-D	10,170-D	10,171-D	10,172-D	10,173-D	10,174-D	10,175-D	10,176-D	10,177-D	10,178-D	10,179-D	10,180-D	10,181-D	10,182-D	10,183-D	10,184-D	10,185-D	10,186-D	10,187-D	10,188-D	10,189-D	10,190-D	10,191-D	10,192-D	10,193-D	10,194-D	10,195-D	10,196-D	10,197-D	10,198-D	10,199-D	10,200-D	10,201-D	10,202-D	10,203-D	10,204-D	10,205-D	10,206-D	10,207-D	10,208-D	10,209-D	10,210-D	10,211-D	10,212-D	10,213-D	10,214-D	10,215-D	10,216-D	10,217-D	10,218-D	10,219-D	10,220-D	10,221-D	10,222-D	10,223-D	10,224-D	10,225-D	10,226-D	10,227-D	10,228-D	10,229-D	10,230-D	10,231-D

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Lithological Class		Report / Parent Sample	Sample Date		Depth (m)																																																																																																																																																																																																																																																																																																																																																																																																																																		
Unit	Sample	Parent	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00	4.05	4.10	4.15	4.20	4.25	4.30	4.35	4.40	4.45	4.50	4.55	4.60	4.65	4.70	4.75	4.80	4.85	4.90	4.95	5.00	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50	5.55	5.60	5.65	5.70	5.75	5.80	5.85	5.90	5.95	6.00	6.05	6.10	6.15	6.20	6.25	6.30	6.35	6.40	6.45	6.50	6.55	6.60	6.65	6.70	6.75	6.80	6.85	6.90	6.95	7.00	7.05	7.10	7.15	7.20	7.25	7.30	7.35	7.40	7.45	7.50	7.55	7.60	7.65	7.70	7.75	7.80	7.85	7.90	7.95	8.00	8.05	8.10	8.15	8.20	8.25	8.30	8.35	8.40	8.45	8.50	8.55	8.60	8.65	8.70	8.75	8.80	8.85	8.90	8.95	9.00	9.05	9.10	9.15	9.20	9.25	9.30	9.35	9.40	9.45	9.50	9.55	9.60	9.65	9.70	9.75	9.80	9.85	9.90	9.95	10.00	10.05	10.10	10.15	10.20	10.25	10.30	10.35	10.40	10.45	10.50	10.55	10.60	10.65	10.70	10.75	10.80	10.85	10.90	10.95	11.00	11.05	11.10	11.15	11.20	11.25	11.30	11.35	11.40	11.45	11.50	11.55	11.60	11.65	11.70	11.75	11.80	11.85	11.90	11.95	12.00	12.05	12.10	12.15	12.20	12.25	12.30	12.35	12.40	12.45	12.50	12.55	12.60	12.65	12.70	12.75	12.80	12.85	12.90	12.95	13.00	13.05	13.10	13.15	13.20	13.25	13.30	13.35	13.40	13.45	13.50	13.55	13.60	13.65	13.70	13.75	13.80	13.85	13.90	13.95	14.00	14.05	14.10	14.15	14.20	14.25	14.30	14.35	14.40	14.45	14.50	14.55	14.60	14.65	14.70	14.75	14.80	14.85	14.90	14.95	15.00	15.05	15.10	15.15	15.20	15.25	15.30	15.35	15.40	15.45	15.50	15.55	15.60	15.65	15.70	15.75	15.80	15.85	15.90	15.95	16.00	16.05	16.10	16.15	16.20	16.25	16.30	16.35	16.40	16.45	16.50	16.55	16.60	16.65	16.70	16.75	16.80	16.85	16.90	16.95	17.00	17.05	17.10	17.15	17.20	17.25	17.30	17.35	17.40	17.45	17.50	17.55	17.60	17.65	17.70	17.75	17.80	17.85	17.90	17.95	18.00	18.05	18.10	18.15	18.20	18.25	18.30	18.35	18.40	18.45	18.50	18.55	18.60	18.65	18.70	18.75	18.80	18.85	18.90	18.95	19.00	19.05	19.10	19.15	19.20	19.25	19.30	19.35	19.40	19.45	19.50	19.55	19.60	19.65	19.70	19.75	19.80	19.85	19.90	19.95	20.00	20.05	20.10	20.15	20.20	20.25	20.30	20.35	20.40	20.45	20.50	20.55	20.60	20.65	20.70	20.75	20.80	20.85	20.90	20.95	21.00
BR000-0.0-0.1	FIH	BR000-0.0-0.1	17/07/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05</																					

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Table A1 - Soil Analytical Table
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]

Table A1 - Soil Analytical Table
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]

[illegible]

Table A1 - Soil Analytical Table
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]


Table A2 - Asbestos Analytical Results
Project Number: 63429
Project Name: Milperra RAP 2022



		Approximate Sample Mass		Asbestos Sample Dimensions		Mass ACM	Mass Asbestos in ACM	Asbestos from ACM in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass Asbestos in AF	Asbestos from FA & AF in Soil	Mass Asbestos in FA & AF	ACM - Comment	FA - Comment	AF - Comment	Organic Fibres - Comment	Respirable Fibres - Comment							
EQI	Comment	g	% (w/w)	g	% (w/w)	g	% (w/w)	g	% (w/w)	g	% (w/w)	g	% (w/w)	g	Comment	Comment	Comment	Comment	Comment							
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil							0.05						0.001													
Field ID	Lithological Class	Report / Parent Sample	Sample Date																							
BH100-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	528	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH100-1.0-1.1	Fill	JBS&G 2022b	7/07/2022	650	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH101-0.01	Fill	JBS&G 2022b	7/07/2022	524	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH101-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
BH102-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	536	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH102-0.9-1.0	Fill	JBS&G 2022b	7/07/2022	739	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH102-1.4-1.5	Fill	JBS&G 2022b	7/07/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
BH103-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	541	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH103-0.9-1.0	Fill	JBS&G 2022b	8/07/2022	575	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH104-0.4-0.5	Reworked Natural	JBS&G 2022b	8/07/2022	547	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH104-1.9-2.0	Fill	JBS&G 2022b	8/07/2022	569	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH105-0-0.1	Fill	JBS&G 2022b	8/07/2022	525	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH106-0.2-0.3	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	639	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH106-0.4-0.5	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	48	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH106-0-0.1	Fill	JBS&G 2022b	8/07/2022	591	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH107-0-0.1	Fill	JBS&G 2022b	7/07/2022	552	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH108-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	590	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
BH109-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	679	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							
FRAG20220708_01	Fill	JBS&G 2022b	7/07/2022	10	40x15x5	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Nil	Nil							
QA20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
QC20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022	382	-	0	0	0	0	0	0	0	0	0	Nil	Nil	Nil	Organic fibres detected.	No trace asbestos detected.							

Table A2 - Asbestos Analytical Results
Project Number: 63429
Project Name: Milperra RAP 2022



																													
															Approximate Sample Mass														
															g														
															Comment														
															g														
															Mass ACM														
															g														
															Mass Asbestos in ACM														
															% (w/w)														
															g														
															Mass FA														
															g														
															Mass Asbestos in FA														
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															g														
															Mass asbestos in AF														
															% (w/w)														
															g														
															Asbestos from FA & AF in Soil														
															g														
															Mass Asbestos in FA & AF														
															g														
															ACM - Comment														
															Comment														
															FA - Comment														
															Comment														
															AF - Comment														
															Comment														
															Organic Fibres - Comment														
															Comment														
															Respirable Fibres - Comment														
															Comment														
EQI																													
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil																													
0.05																													
0.001																													



JBS&G

Asbestos - Eurofins

Synthetic Fibres - Comment

Comment

EQI

NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil

Field ID	Lithological Class	Report / Parent Sample	Sample Date	
BH100-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	Nil
BH100-1.0-1.1	Fill	JBS&G 2022b	7/07/2022	Nil
BH101-0.01	Fill	JBS&G 2022b	7/07/2022	Nil
BH101-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	-
BH102-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	Nil
BH102-0.9-1.0	Fill	JBS&G 2022b	7/07/2022	Nil
BH102-1.4-1.5	Fill	JBS&G 2022b	7/07/2022	-
BH103-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	Nil
BH103-0.9-1.0	Fill	JBS&G 2022b	8/07/2022	Nil
BH104-0.4-0.5	Reworked Natural	JBS&G 2022b	8/07/2022	Nil
BH104-1.9-2.0	Fill	JBS&G 2022b	8/07/2022	Nil
BH105-0-0.1	Fill	JBS&G 2022b	8/07/2022	Nil
BH106-0.2-0.3	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	Nil
BH106-0.4-0.5	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	Nil
BH106-0-0.1	Fill	JBS&G 2022b	8/07/2022	Nil
BH107-0-0.1	Fill	JBS&G 2022b	7/07/2022	Nil
BH108-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	Nil
BH109-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	Nil
FRAG20220708_01	Fill	JBS&G 2022b	7/07/2022	Nil
QA20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022	-
QC20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022	Nil



Asbestos - Eurofins
Synthetic Fibres - Comment
Comment

EQI
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil

Field ID	Lithological Class	Report / Parent Sample	Sample Date
Field ID		Report / Parent Sample	Sample Date
AQ_MW03_0.25-0.3	Fill	JBS&G 2022a	15/02/2022
AQ_MW04_0.3-1.3	Fill	JBS&G 2022a	15/02/2022
AQ_MW04_1.3-1.8	Fill	JBS&G 2022a	15/02/2022
AQ_MW05_0.2-0.7	Fill	JBS&G 2022a	15/02/2022
AQ_MW06_0.0-0.15	Fill	JBS&G 2022a	14/02/2022
AQ_SB01_0.0-0.3	Fill	JBS&G 2022a	11/02/2022
AQ_SB02_0.2-0.4	Fill	JBS&G 2022a	11/02/2022
AQ_SB03_0.2-0.4	Fill	JBS&G 2022a	11/02/2022
AQ_SB05_0.1-0.2	Fill	JBS&G 2022a	14/02/2022
AQ_SB05_0.2-1.2	Reworked Natural	JBS&G 2022a	14/02/2022
AQ_SB07_0.3-1.2	Reworked Natural	JBS&G 2022a	14/02/2022
AQ_SB07_1.2-1.4	Fill	JBS&G 2022a	14/02/2022
AQ_SB09_0.3-1.2	Fill	JBS&G 2022a	14/02/2022
AQ_SB09_1.2-1.7	Reworked Natural	JBS&G 2022a	14/02/2022
AQ_SB10_0.2-0.4	Fill	JBS&G 2022a	15/02/2022
AQ_SB10_1.5-2.2	Reworked Natural	JBS&G 2022a	15/02/2022
AQ_SB11_0.4-0.8	Reworked Natural	JBS&G 2022a	15/02/2022
AQ_SB12_0.2-0.8	Fill	JBS&G 2022a	15/02/2022
AQ_SB13_0.3-0.5	Fill	JBS&G 2022a	15/02/2022
AQ_SB14_0.2-0.4	Fill	JBS&G 2022a	14/02/2022
AQ_SB17_1.4-1.8	Reworked Natural	JBS&G 2022a	15/02/2022
AQ_SB21_0.2-0.7	Fill	JBS&G 2022a	14/02/2022

Table A2 - Asbestos Analytical Results
Project Number: 63429
Project Name: Milperra RAP 2022



Asbestos Reported Result				Asbestos - Envirolab			
				Asbestos ID in Soil	Total Asbestos	Asbestos (ACM >7mm) Estimation	Asbestos in soil (<2mm AFPA) (%w/w)
				g/kg	g/kg	% (w/w)	% (w/w)
				Comment	0.1	0.01	0
EQI							
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil						0.05	0.001
Field ID	Lithological Class	Report / Parent Sample	Sample Date				
BH100-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH100-1.0-1.1	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH101-0.01	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH101-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH102-0.2-0.3	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH102-0.9-1.0	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH102-1.4-1.5	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH103-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH103-0.9-1.0	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH104-0.4-0.5	Reworked Natural	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH104-1.9-2.0	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH105-0-0.1	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH106-0.2-0.3	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH106-0.4-0.5	Fill	JBS&G 2022b (Additional Analysis)	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH106-0-0.1	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH107-0-0.1	Fill	JBS&G 2022b	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH108-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
BH109-0.2-0.3	Fill	JBS&G 2022b	8/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	-
PRAG20220708_01	Fill	JBS&G 2022b	7/07/2022	Chrysotile, amosite and crocidolite asbestos detected.	-	-	-
QA20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022		0	<0.1	<0.01
QC20220707	Fill	JBS&G 2022b / BH101_0.2-0.3	7/07/2022	No asbestos detected at the reporting limit of 0.001% w/w. Organic fibre detected. No trace asbestos detected.	-	-	<0.001 - 0-

Table A2 - Asbestos Analytical Results
Project Number: 63429
Project Name: Milperra RAP 2022



				Asbestos Reported Result	Asbestos - Envirolab				
					Asbestos ID in Soil	Total Asbestos	Asbestos (ACM >7mm) Estimation	Asbestos in soil (<2mm AFPA) (%w/w)	
					g/kg	g/kg	% (w/w)	% (w/w)	
Comment					0.1	0.01	0	0	
EQI									
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil						0.05	0.001		
Field ID	Lithological Class	Report / Parent Sample	Sample Date						
Field ID		Report / Parent Sample	Sample Date						
AQ_MW03_0.25-0.3	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_MW04_0.3-1.3	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_MW04_1.3-1.8	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_MW05_0.2-0.7	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_MW06_0.0-0.15	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S801_0.0-0.3	Fill	JBS&G 2022a	11/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S802_0.2-0.4	Fill	JBS&G 2022a	11/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S803_0.2-0.4	Fill	JBS&G 2022a	11/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S805_0.1-0.2	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S805_0.2-1.2	Reworked Natural	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S807_0.3-1.2	Reworked Natural	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S807_1.2-1.4	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S809_0.3-1.2	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S809_1.2-1.7	Reworked Natural	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S810_0.2-0.4	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S810_1.5-2.2	Reworked Natural	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S811_0.4-0.8	Reworked Natural	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S812_0.2-0.8	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S813_0.3-0.5	Fill	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S814_0.2-0.4	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S817_1.4-1.8	Reworked Natural	JBS&G 2022a	15/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	
AQ_S821_0.2-0.7	Fill	JBS&G 2022a	14/02/2022	No asbestos detected at the reporting limit of 0.001% w/w. *Organic fibre detected.No trace asbestos detected.	-	-	-	-	

Table A3 - Waste Classification Results
Project Number: 61429
Project Name: Milperra RAP 2022



		Metals & Metalloids										TMs (MEPC 2013)										BTEX										PAH									
		As mg/kg	Cd mg/kg	Cr mg/kg	Pb mg/kg	Co mg/kg	Cu mg/kg	Fe mg/kg	Mn mg/kg	Mo mg/kg	Ni mg/kg	Se mg/kg	Zn mg/kg	Al mg/kg	Ca mg/kg	Cl mg/kg	Si mg/kg	S mg/kg	Ti mg/kg	V mg/kg	W mg/kg	Ag mg/kg	Ba mg/kg	Be mg/kg	Br mg/kg	But mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg	Chloro mg/kg					
NSW 2014 General Solid Waste CTE (No Leaching)		100	20	1000	1000	4	40															10	200	500																	
NSW 2014 General Solid Waste SCC (with Leaching)		500	100	1000	1000	50	1000															18	538	1000																	
File ID	Lithological Class	Report / Parent Sample		Sample Date																																					
RP1000-0.2-0.3	FE	RP1000-2022b	1/27/2022	8.2	0.7	81	34	170	<0.1	42	91	<20	<50	1700	310	2010	<20	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
RP1000-1.0-1.1	FE	RP1000-2022b	1/27/2022	3.9	<0.4	10	<5	10	0.1	7.9	97																														
RP1010-0.0-1	FE	RP1010-2022b	1/27/2022	9.9	<0.4	22	38	10	<0.1	8.1	11	<20	<50	<1000	<1000	<100	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
RP1010-0.2-0.3	FE	RP1010-2022b	1/27/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
RP1010-0.2-0.5	FE	RP1010-2022b	1/27/2022	5.6	<0.4	38	18	33	<0.1	28	34	<20	<50	490	<1000	490	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
RP1010-0.8-1.0	FE	RP1010-2022b	1/27/2022	13	<0.4	28	17	28	<0.1	8.1	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
RP1010-1.4-1.5	FE	RP1010-2022b	1/27/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
RP1010-2.0-2.1	FE	RP1010-2022b	8/6/2022	10	<0.4	86	37	16	<0.1	76	58	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.9-1.0	FE	RP1010-2022b	8/6/2022	7.3	<0.4	22	17	21	0.1	9	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
RP1010-0.4-0.5	Remanufactured Natural	RP1010-2022b	8/6/2022	3.8	<0.4	1	10	12	<0.1	<5	1.8	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-1.9-2.0	FE	RP1010-2022b	8/6/2022	3	<0.4	<5	5.9	8.2	<0.1	<5	11	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.0-1	FE	RP1010-2022b	8/6/2022	11	<0.4	21	17	26	<0.1	5.2	29	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.4-0.5	FE	RP1010-2022b	8/6/2022	5.5	<0.4	13	21	20	<0.1	10	44	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.0-1	FE	RP1010-2022b	8/6/2022	4	<0.4	100	26	8.9	<0.1	110	46	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.0-1	FE	RP1010-2022b	1/27/2022	5.1	<0.4	21	75	78	<0.1	47	12	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.2-0.3	FE	RP1010-2022b	8/6/2022	11	<0.4	38	40	23	0.2	46	42	<20	<50	<1000	<1000	<1000	<100	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
RP1010-0.2-0.5	FE	RP1010-2022b	8/6/2022	4.2	<0.4	82	32	11	<0.1	88	58	<20	<50	130	100	230	<20	<50	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				
CA201010107	FE	RP1010-2022b / RP1010-0.2-0.3	1/27/2022	6	<0.4	21	21	13	<0.1	4	1	<20	<50	<1000	<1000	<1000	<20	<50	<0.2	<0.1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
DC201020207	FE	RP1010-2022b / RP1010-0.2-0.3	1/27/2022	11	<0.4	19	5.9	14	<0.1	<5	3.6	<20	<50	<1000	<1000	<1000	<20	<50	<0.4	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5				

Table A3 - Waste Classification Results
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]

[illegible]

Table A3 - Waste Classification Results
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]



			Notated Alliances									
Field ID	Lithological Class	Report / Parent Sample	1-2.2-differsome		1-2.3-differsome		Freshwater	1-2.4-differsome		1-2.5-differsome	1-2.6-differsome	1-2.7-differsome
			mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg			
NSW 2014 General Solid Waste C1b (1st Leachate)			14	10	4							
NSW 2014 General Solid Waste SC22 (1st leachate)			26.2	14	7.2							

Field ID	Lithological Class	Report / Parent Sample	1/27/2022	4/5/2022	6/5/2022	8/5/2022	10/5/2022	12/5/2022	2/6/2023	4/6/2023	6/6/2023	8/6/2023	10/6/2023	12/6/2023
RP1010-2-0.1	FR	RP1010-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1010-3-0.1	FR	RP1010-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1011-2-0.1	FR	RP1011-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1011-2-0.3	FR	RP1011-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1012-2-0.3	FR	RP1012-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1012-3-0.0	FR	RP1012-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1012-3-4.1.5	FR	RP1012-2020	1/27/2022	-	-	-	-	-	-	-	-	-	-	-
RP1013-2-2.0	FR	RP1013-2020	4/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1013-2-2.0	FR	RP1013-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1013-3-0.0	FR	RP1013-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1014-0-0.5	Reworked Natural	RP1014-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1014-3-0.0	FR	RP1014-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1015-0-0.1	FR	RP1015-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1016-0-0.5	FR	RP1016-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1016-0-0.1	FR	RP1016-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1017-0-0.1	FR	RP1017-2020	10/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1018-2-0.3	FR	RP1018-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
RP1018-2-0.3	FR	RP1018-2020	6/5/2022	-	-	-	-	-	-	-	-	-	-	-
CR30101017	FR	RP1016-2020 / RP1015-2-0.3	1/5/2023	-	-	-	-	-	-	-	-	-	-	-
CR30101017	FR	RP1016-2020 / RP1015-2-0.3	1/2/2023	-	-	-	-	-	-	-	-	-	-	-

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Table A3 - Waste Classification Results
Project Number: 63429
Project Name: Milperra RAP 2022

[illegible]

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Table A3 - Waste Classification Results
Project Number: 63429
Project Name: Milperra RAP 2022




	MAH										Miscellaneous Hydrocarbons										Chlorinated Benzenes										Tribromobenzenes		Ionic Balance		Chlorinated Hydrocarbons		Moisture Content		Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	2,4-dimethylbenzene	2,5-dimethylbenzene	toluene	propylbenzene	isopropylbenzene	1-methylbenzene	styrene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene	1-methylbenzene

Table A1 - Acid Sulfate Soil Sample Results

Project Number: 63429

Project Name: Milperra RAP 2022



Soil Sample ID	pH _{KCl}	pH _{ox}	TAA (mol H ⁺ /tonne)	TPA (mol H ⁺ /tonne)	TSA (mol H ⁺ /tonne)	S _{POS} %	a-ANC _E (mol H ⁺ /tonne)	SPOCAS-Net Acidity (mol H ⁺ /tonne)	Liming Rate
ASSMAC Assessment Guidleines (>1000 tonne disturbed)			18	18	18	>0.03			
BH101_0.2-0.3	6.3	6.5	<2	<2	<2	0.044	24	<10	<1
BH102_1.4-1.5	4.4	4.8	38	53	15	0.012	n/a	42	3.1

Table A5: TCLP Analytical Results
 Project Number: 63429
 Project Name: Milperra RAP 2022



Metals & Metalloids					Ionic Balance		
Chromium (hexavalent)	Chromium (III+VI)	Chromium (Trivalent)	Lead	Nickel	pH (after HCL)	pH (Final)	pH (Initial)
mg/L	mg/L	mg/L	mg/L	mg/L	pH Units	pH Units	pH Units
EQL	0.005	0.05	0.005	0.01	0.01	0.1	0.1
NSW 2009 General Solid Waste (leached)	5		5	2			

Field ID	Report	Sample Date								
BH100_0.2-0.3	JBS&G 2022b	8/07/2022	-	-	-	<0.01	-	0.5	6.4	9.6
BH106_0-0.1	JBS&G 2022b	8/07/2022	<0.005	<0.05	<0.05	-	0.05	0.5	5.4	9.8

Table B: Groundwater Analytical Results

Project Number: 63429

Project Name: Milperra RAP 2022




	Heavy Metals								TPHs (NEPC 1999)					TRHs (NEPC 2013)								BTEXN									
	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005	0.02	0.05	0.1	0.1	0.1	0.02	0.05	0.1	0.1	0.1	0.02	0.05	0.001	0.001	0.001	0.001	0.002	0.003	0.00001	0.00001	0.00001	0.00001	
Human Health																															
Aesthetic: NHMRC/NRMMC (2011)				1				3														0.025	0.003			0.02					
Recreational: NHMRC/NRMMC (2011) (Health*10)	0.1	0.02	0.5	20	0.1	0.01	0.2														0.01	8	3			6					
Recreational: NEMP (2020)																															
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m																			6	NL	5	NL	NL			NL					
Ecological																															
Marine Ecosystems: ANZG (2018) Default 95 %		0.0055	0.0044	0.0013	0.0044	0.0004	0.07	0.008													0.7	0.18	0.08		0.075				0.0004		
Marine Ecosystems: NEMP (2020) Interim marine 95 %																															
Field ID	Report / Parent Sample	Sample Date																													
MW01	JBS&G 2022a	16/02/2022	0.001	0.002	0.002	0.007	<0.001	<0.0001	0.082	0.27	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
MW02	JBS&G 2022a	16/02/2022	0.014	0.0006	0.002	0.005	0.003	<0.0001	0.03	0.062	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
MW03	JBS&G 2022a	16/02/2022	0.014	0.0006	0.002	0.005	0.003	<0.0001	0.03	0.062	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
MW04	JBS&G 2022a	16/02/2022	0.014	0.0006	0.002	0.005	0.003	<0.0001	0.03	0.062	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
QC01	JBS&G 2022a / MW04	16/02/2022	<0.001	<0.0002	<0.001	0.003	0.003	<0.0001	0.007	0.064	<0.02	0.45	0.2	<0.1	0.65	<0.02	0.48	0.1	<0.1	0.58	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
QA01	JBS&G 2022a / MW04	16/02/2022	<0.001	<0.0001	<0.001	0.001	0.002	<0.00005	0.008	0.072	<0.01	0.47	0.16	<0.1	0.63	<0.01	0.49	0.13	<0.1	0.63	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.0001	<0.0001	<0.0001	<0.0001
MW05	JBS&G 2022a	16/02/2022	0.014	0.0006	0.002	0.005	0.003	<0.0001	0.03	0.062	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.00001	<0.00001	<0.00001	<0.00001
MW06	JBS&G 2022a	16/02/2022	0.047	0.0017	0.002	0.007	0.004	<0.0001	0.078	0.079	0.03	<0.05	<0.1	<0.1	<0.1	0.03	<0.05	<0.1	<0.1	<0.1	0.03	<0.001	0.001	<0.001	0.003	<0.002	0.005	<0.00001	<0.00001	<0.00001	<0.00001

Table B: Groundwater Analytical Results

Project Number: 63429

Project Name: Milperra RAP 2022





	PAH																Chlorinated Alkane									
	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Benzo(b+j)fluoranthene	Benzo(b+i+k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.00001	0.0005	0.00001	0.0002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
Human Health																										
Aesthetic: NHMRC/NRMMC (2011)																										
Recreational: NHMRC/NRMMC (2011) (Health*10)	0.0001																						0.03			
Recreational: NEMP (2020)																										
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m												NL														
Ecological																										
Marine Ecosystems: ANZG (2018) Default 95 %	0.0002								0.0014			0.07	0.002				0.27	0.4	1.9				1.9	0.9	1.1	
Marine Ecosystems: NEMP (2020) Interim marine 95 %																										
Field ID	Report / Parent Sample	Sample Date																								
MW01	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
MW02	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
MW03	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
MW04	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
QC01	JBS&G 2022a / MW04	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
QA01	JBS&G 2022a / MW04	16/02/2022	<0.0001	<0.0005	-	<0.0002	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW05	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001
MW06	JBS&G 2022a	16/02/2022	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001

Table B: Groundwater Analytical Results

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s									Chlorinated Alkenes																							
	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	Dichlorodifluoromethane	Dichloromethane	Trichlorofluoromethane	1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	Acetone	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)					
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L					
EQL	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001					
Human Health																																
Aesthetic: NHMRC/NRMMC (2011)																																
Recreational: NHMRC/NRMMC (2011) (Health*10)			0.03				0.04		0.3					0.6		0.5	0.6			0.003												
Recreational: NEMP (2020)																										0.01						
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m																																
Ecological																																
Marine Ecosystems: ANZG (2018) Default 95 %			0.24				4		0.7							0.07			0.33	0.1												
Marine Ecosystems: NEMP (2020) Interim marine 95 %																										0.22						

Field ID	Report / Parent Sample	Sample Date	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW01	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW02	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW03	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW04	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
QC01	JBS&G 2022a / MW04	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
QA01	JBS&G 2022a / MW04	16/02/2022	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	<0.01	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	-	<0.00002	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001
MW05	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW06	JBS&G 2022a	16/02/2022	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

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JBS&G

			PFAS																				
	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDODA)	Perfluorotridecanoic acid (PFTTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluoronananesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTSA)	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA)	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	
Human Health																							
Aesthetic: NHMRC/NRMMC (2011)																							
Recreational: NHMRC/NRMMC (2011) (Health*10)																							
Recreational: NEMP (2020)																	0.002		0.002				
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m																							
Ecological																							
Marine Ecosystems: ANZG (2018) Default 95 %																							
Marine Ecosystems: NEMP (2020) Interim marine 95 %																		0.00013					
Field ID	Report / Parent Sample	Sample Date	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
MW01	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
MW02	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
MW03	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
MW04	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00005
QC01	JBS&G 2022a / MW04	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
QA01	JBS&G 2022a / MW04	16/02/2022	<0.00002	<0.00002	<0.00005	<0.0001	<0.0005	<0.0001	<0.00005	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00002	<0.00002	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
MW05	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005
MW06	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005

Table B: Groundwater Analytical Results

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Project Name: Milperra RAP 2022



								MAH										Miscellaneous Hydrocarbons										C	
	1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA) *	Sum of US EPA PFAS (PFOS + PFOA) *	Sum of PFAS (WA DER List)	Sum of PFAS	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Total MAH	Bromobenzene	Isopropylbenzene	1,2-dibromoethane	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	4-Methyl-2-pentanone	Methyl Ethyl Ketone	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene		
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
EQL	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.005	0.001	0.001		
Human Health																													
Aesthetic: NHMRC/NRMMC (2011)														0.004															
Recreational: NHMRC/NRMMC (2011) (Health*10)														0.3						0.01									
Recreational: NEMP (2020)			0.002																										
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m																													
Ecological																													
Marine Ecosystems: ANZG (2018) Default 95 %																		0.03											
Marine Ecosystems: NEMP (2020) Interim marine 95 %																													

Field ID	Report / Parent Sample	Sample Date																											
MW01	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
MW02	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
MW03	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
MW04	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	0.00001	0.00001	0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
QC01	JBS&G 2022a / MW04	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
QA01	JBS&G 2022a / MW04	16/02/2022	<0.00002	<0.00002	<0.00001	-	<0.00001	-	<0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	-	-	-	<0.001	<0.001
MW05	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	<0.003	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-
MW06	JBS&G 2022a	16/02/2022	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.0001	<0.001	<0.001	-	-	-	-	<0.001	-	0.004	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	-	-

Table B: Groundwater Analytical Results

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Project Name: Milperra RAP 2022



	hlorinated Benzenes				Trihalomethanes							
	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Carbon disulfide	Chlorinated hydrocarbons EPAVic	Other chlorinated hydrocarbons EPAVic	Hexachlorobutadiene
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.005	0.001
Human Health												
Aesthetic: NHMRC/NRMMC (2011)	0.001	0.02	0.0003	0.01								
Recreational: NHMRC/NRMMC (2011) (Health*10)	15		0.4	3								
Recreational: NEMP (2020)												
Vapour Intrusion: NEPC (2013) HSL D, Sand, 2-4 m												
Ecological												
Marine Ecosystems: ANZG (2018) Default 95 %				0.055		0.77						
Marine Ecosystems: NEMP (2020) Interim marine 95 %												

Field ID	Report / Parent Sample	Sample Date												
MW01	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
MW02	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
MW03	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
MW04	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
QC01	JBS&G 2022a / MW04	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
QA01	JBS&G 2022a / MW04	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	<0.001
MW05	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-
MW06	JBS&G 2022a	16/02/2022	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	-

Table C2: Field Measured Vapour Parameters - February 2022

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Project Name: Milperra RAP 2022



Sample Location	Sample Type	Date	Oxygen	CO2	PID	Methane	LEL
			%	%	ppm	%	%
SV01	Soil Vapour Pin	10-Feb-22	3.6	0.0	7.8	1.8	35.6
SV02	Soil Vapour Pin	10-Feb-22	13.6	0.0	35	0	0
SV03	Soil Vapour Pin	14-Feb-22	20.0	0.0	2	0	0
SV04	Soil Vapour Pin	14-Feb-22	20.0	0.0	4	0	0
SV05	Soil Vapour Pin	14-Feb-22	19.8	0.0	3	0	0
SV06	Soil Vapour Pin	14-Feb-22	20.0	0.0	1	0	0
SV07	Soil Vapour Pin	14-Feb-22	20.0	0.0	-	0	0
SV08	Soil Vapour Pin	14-Feb-22	19.2	0.0	2	0	-
SV09	Soil Vapour Pin	10-Feb-22	20.0	0.0	4	0	-
SV10	Soil Vapour Pin	10-Feb-22	20.0	0.0	2	0	-
SV11	Soil Vapour Pin	10-Feb-22	19.2	0.0	2	0	-
SV12	Soil Vapour Pin	10-Feb-22	20.0	0.0	2	0	-
SV13	Soil Vapour Pin	10-Feb-22	Wet, no sample				
SV13c	Soil Vapour Pin	14-Feb-22	16.7	0.0	3	0	0
SV14	Soil Vapour Pin	14-Feb-22	18.7	0.0	0	0	0
SV15	Soil Vapour Pin	10-Feb-22	11.9	0.1	16	0	0
SV16	Soil Vapour Pin	10-Feb-22	20.5	0.0	6	0	0
SV17	Soil Vapour Pin	10-Feb-22	9.2	0.0	47	0	0
SV18	Soil Vapour Pin	10-Feb-22	10.8	2.2	16	0	0
SV19	Soil Vapour Pin	10-Feb-22	19.2	0.8	16	0	-
SV20	Soil Vapour Pin	10-Feb-22	19.7	0.0	4	0	-
SV21	Soil Vapour Pin	10-Feb-22	20.8	0.0	4	0	0
SV22 (flooded while sampling)	Soil Vapour Pin	10-Feb-22	19.5	0.0	4	0	0
SV22c	Soil Vapour Pin	14-Feb-22	20.0	0.0	3	0	0
SV23	Soil Vapour Pin	10-Feb-22	11.9	0.4	17	0	0
SV24	Soil Vapour Pin	10-Feb-22	19.0	0.0	36	0	0
SV25	Soil Vapour Pin	14-Feb-22	20.0	0.0	1	0	0
SV26	Soil Vapour Pin	14-Feb-22	Wet, no sample				

Appendix B Design Plans

HALE CAPITAL PARTNERS

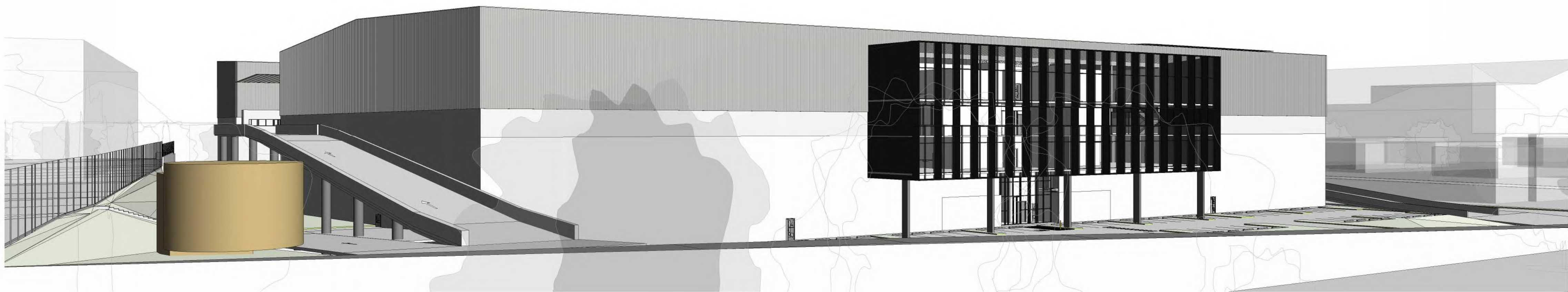
Proposed 2 Levels Industrial Development
339 - 349 HORSLEY ROAD, MILPERRA

DRAWING LIST		
Sheet Number	Sheet Name	Current Revision
DA000	COVER SHEET	1
DA010	3D VIEW PERSPECTIVES	1
DA014	3D SECTION	1
DA050	SITE ANALYSIS PLAN & SUMMARY	1
DA100	WAREHOUSE GF PLAN	1
DA102	WAREHOUSE L1 FLOOR PLAN	1

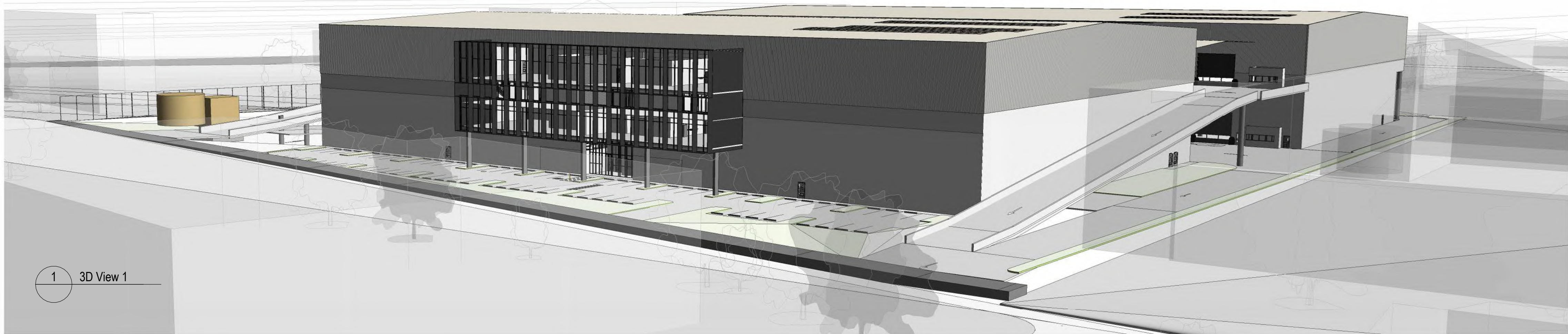




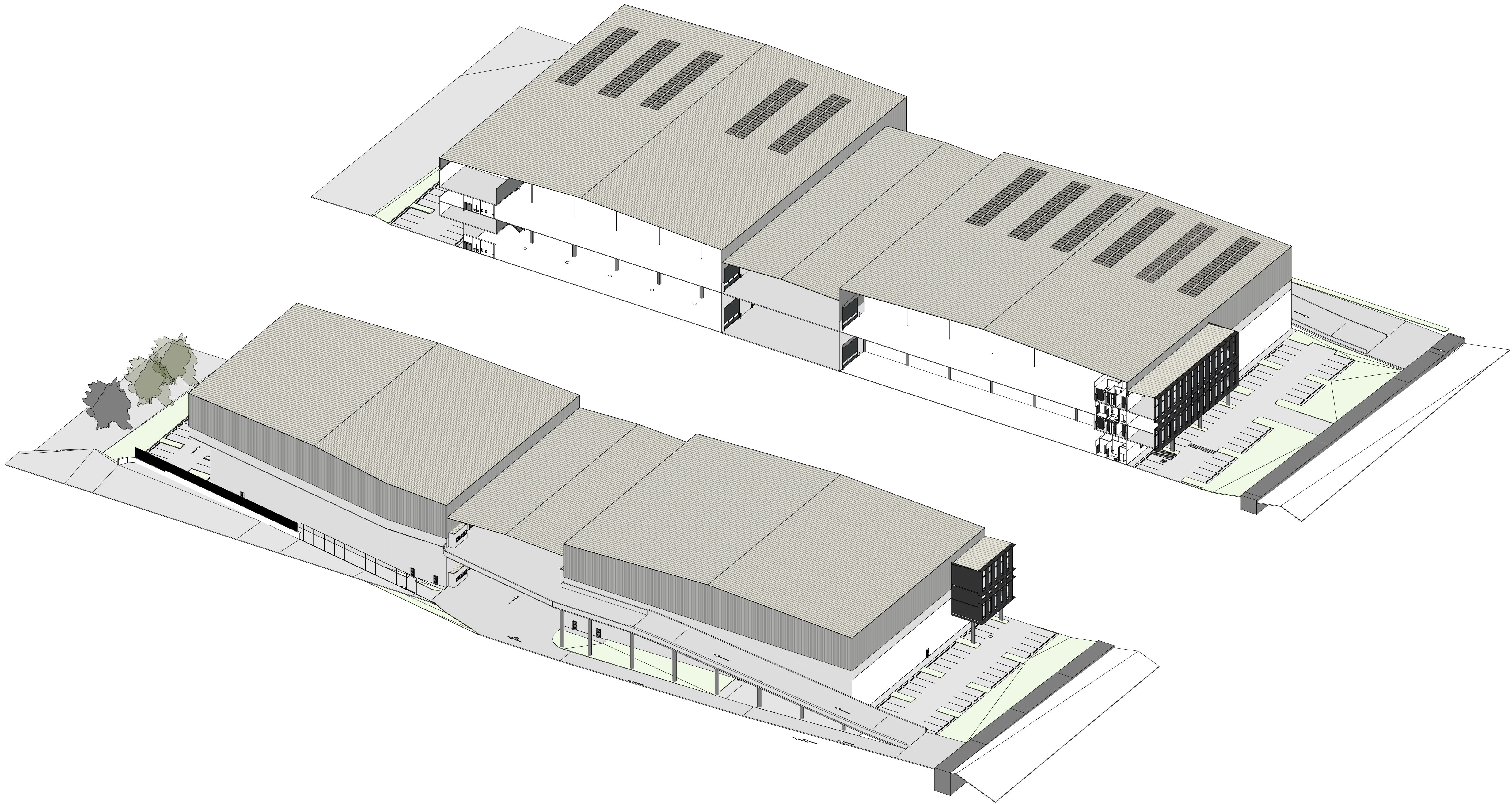
3 3D View 3



2 3D View 2



1 3D View 1





DEVELOPMENT SUMMARY		
GLA CALCULATIONS:		
DEVELOPABLE SITE AREA		33,772 m²
OFFICE <varies>		3,204 m²
WAREHOUSE <varies>		34,109 m²
TOTAL GLA:		37,313 m²
PROPOSED FSR		1.1:1
LANDSCAPE AREA	13.9%	4,685 m²
CAR SPACES REQUIRED		146
CAR SPACES PROVIDED		150
MOTORCYCLES PARKING		XX
BICYCLES PARKING		20

WAREHOUSE GROUND

WAREHOUSE 1	2,784 m²
WAREHOUSE 2	2,961 m²
WAREHOUSE 3	2,435 m²
WAREHOUSE 4	4,154 m²
WAREHOUSE 5	4,616 m²
	16,949 m²

WAREHOUSE L1

WAREHOUSE 6	2,852 m²
WAREHOUSE 7	3,076 m²
WAREHOUSE 8	2,474 m²
WAREHOUSE 9	4,158 m²
WAREHOUSE 10	4,599 m²
	17,161 m²

TOTAL WAREHOUSE 34,109 m²

MEZZANINE OFFICE - GROUND

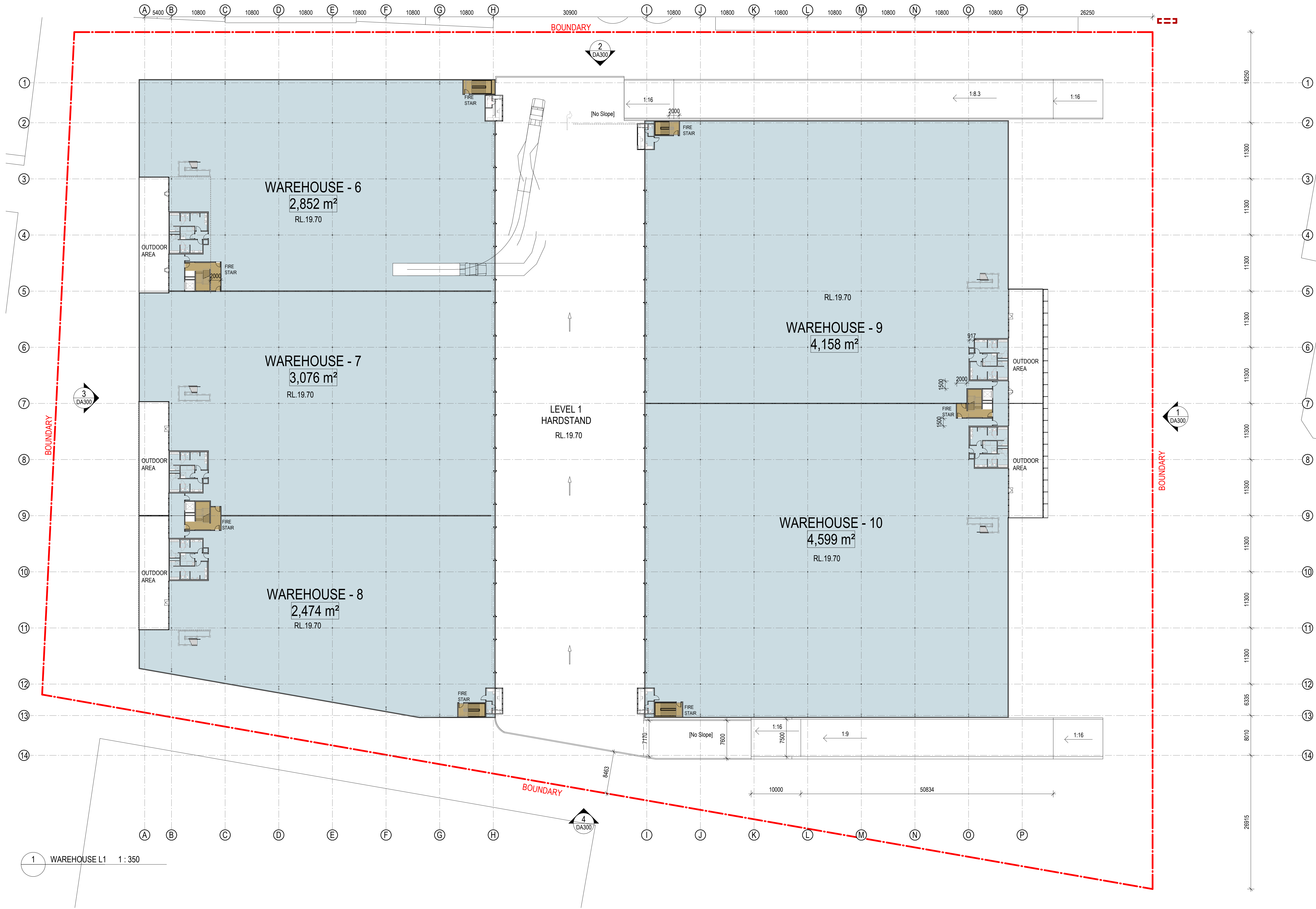
OFFICE 1	313 m²
OFFICE 2	316 m²
OFFICE 3	316 m²
OFFICE 4	338 m²
OFFICE 5	339 m²
	1,622 m²

MEZZANINE OFFICE - L1

OFFICE 6	307 m²
OFFICE 7	309 m²
OFFICE 8	309 m²
OFFICE 9	329 m²
OFFICE 10	328 m²
	1,582 m²

TOTAL OFFICE 3,204 m²





Appendix C Bore Logs



Test Pit:
Borehole:
Well:

Project No: 63429


Client:

Project Name:

Site Address:

Date: 7/7/22	Easting (MGA94):	Water Level Initial (mbgs):	Date:	Time:
Logged By:	Northing (MGA94):	Water Level Static (mbgs):	Date:	Time:
Contractor:	Zone/Area:	Surface Finish:		
Total Hole Depth (mbgs):	Reference Level:	Casing Type:	Depth To (mbgs):	
Bore Diameter (mm) / Pit Dimension (m³):	Elevation (m):	Screen Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete.					
			Concrete (0-15m).					
0	FL		Sandy clay, brown, het, damp, firm, M-P, w sand/gravel fines.	0-0.1	14.0	B+J	NOOSA.	
				0.2-0.3	12.8	B+J	↓	
0.4	FL		clayey sand, grey, het., damp, loose, s.a, w-g, coarse, w gravel fines.	0.4-0.5	7.6	B+J +ASS	NOOSA, grey color	
0.8	FL		sandy clay, grey/orange, het., clay, stiff, H.P, w sand/gravel fines.	1.0-1.1	3.1	B+J	NOOSA.	
1.4	NT		clay, red w/ grey mottle, het., clay, v. stiff, H.P, w trace sand/gravel fines.	1.7-1.8	0.4	B+J +ASS	NOOSA, red w/ grey mottle.	
			FOH @ 2.1mbgs.					

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite 2SP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils					Surface	Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour	CONCRETE (CC)	LIMESTONE (LS)
NATURAL (NT)	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	staining	BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	solid waste	CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)
	SILT (ML)								blue	mottled					DOLERITE (DL)
	CLAY (CL)														BASALT (BS)
	Organic SILT (OL)														COAL (CO)
	SILT (MH)														COLLUVIUM (CV)
	CLAY (CH)														
	Organic CLAY (OH)														
	PEAT (Pt)														
														Surface Description	
														bare ground	
														grass	
														lightly vegetated	
														heavily vegetated	
														paved	
														sealed	




Test Pit:
Borehole: BH101
Well:


Project No: 63429
Client:
Project Name:
Site Address:

Date: 7/7/22
Logged By:
Contractor:
Total Hole Depth (mbgs):
Bore Diameter (mm) / Pit Dimension (m³):
Method: Depth To (mbgs):
Method: Depth To (mbgs):
Method: Depth To (mbgs):
Easting (MGA94):
Northing (MGA94):
Zone/Area:
Reference Level:
Elevation (m):
Water Level Initial (mbgs):
Water Level Static (mbgs):
Surface Finish:
Casing Type:
Screen Type:
Backfill Type:
Backfill Type:
Backfill Type:
Date:
Date:
Time:
Time:
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete.					
			concrete core (0.25m), metal plate within core.				QA/QC 20220707	
0	FL		clay (remoulded), red w/ grey mottle, het., dry, stiff, H.P, w trace gravel fines/rocks; no inclusions @ 0.4mbgs.	0-0.1	13.2	BTJ	NOOSA, red w/ grey mottle	
				0.2-0.3	11.9	BTJ +ASS		
				0.4-0.5	4.0	BTJ		
0.7	NT		clay, red w/ grey mottle, het., v. stiff, dry, H.P.	0.9-1.0	0.3	BTJ +ASS		
			EOH @ 1.1mbgs.					


Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite ZSP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils			All Soils				Surface	Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL) NATURAL (NT)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour	CONCRETE (CC)	LIMESTONE (LS)
	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	staining	BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	solid waste	CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)
	SILT (ML)								blue	mottled					DOLERITE (DL)
	CLAY (CL)														BASALT (BS)
	Organic SILT (OL)														COAL (CO)
	SILT (MH)														COLLUVIUM (CV)
	CLAY (CH)														
	Organic CLAY (OH)														
	PEAT (Pt)														
														Surface Description	
														bare ground	
														grass	
														lightly vegetated	
														heavily vegetated	
														paved	
														sealed	


	Test Pit:	Project No: 63429
	Borehole: BH102	Client:
	Well:	Project Name:
		Site Address:

Date: 7/7/22	Easting (MGA94):	Water Level Initial (mbgs):	Date:	Time:
Logged By:	Northing (MGA94):	Water Level Static (mbgs):	Date:	Time:
Contractor:	Zone/Area:	Surface Finish:		
Total Hole Depth (mbgs):	Reference Level:	Casing Type:	Depth To (mbgs):	
Bore Diameter (mm) / Pit Dimension (m³):	Elevation (m):	Screen Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete.					
			concrete core (0.15m)					
0	FL		sandy/silty clay, black/grey, het., dry, firm, M.P., w sand/gravel fines, trace shale gravel, some gravel rocks.	0-0.1	14.9	B+J	NOOSA.	
			less sandy/silty @ 0.2m.	0.2-0.3	12.9			
0.4	FL		clay, brown/black/grey, het., dry, stiff, H.P., w trace gravel fines/rocks.	0.4-0.5	7.3	B+J +ASS	NOOSA, discoloration (slight)	
			becomes grey w/ yellow mottle + no inclusions @ 0.8mbgs.	0.9-1.0	2.0	B+J	NOOSA.	
				1.4-1.5	0.4	B+J +ASS	NOOSA grey mottle	
1.8	NT		clay, orange/grey mottle, het., dry, v. stiff, H.P.	1.9-2.0	0.1	B+J	NOOSA.	
			EOH @ 3.0, weathered shale + mottled clay (check for NT)					


Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite 2SP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification - All Soils			Coarse Grained Soils			Fine Grained Soils			All Soils			Surface			Rocks		
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks		
FILL (FL) NATURAL (NT)	GRAVEL (GW) GRAVEL (GP) Silty GRAVEL (GM) Clayey GRAVEL (GC) SAND (SW) SAND (SP) Silty SAND (SM) Clayey SAND (SC) SILT (ML) CLAY (CL) Organic SILT (OL) SILT (MH) CLAY (CH) Organic CLAY (OH) PEAT (Pt)	gravely sandy silty clayey organic	poorly graded well graded	boulders cobbles coarse gravel medium gravel fine gravel coarse sand medium sand fine sand	very angular angular sub-angular sub-rounded rounded well rounded	very loose loose medium dense dense very dense	non-plastic low plasticity medium plasticity high plasticity	very soft soft firm stiff very stiff hard	white black grey red brown orange yellow green blue	homogeneous heterogeneous stratified laminated lens root holes occasional inter-bedded mottled	dry damp moist wet saturated	and (35-50%) some (20-35%) little (10-20%) trace (0-10%)	odour staining solid waste	CONCRETE (CC) BITUMINOUS CONCRETE (BC) TOPSOIL (TS)	LIMESTONE (LS) SANDSTONE (SS) MUDSTONE (MS) SHALE (SH) CONGLOMERATE (CG) PHYLLITE (PH) TUFT (TF)		
														Surface Description: bare ground grass lightly vegetated heavily vegetated paved sealed	GRANITE (GR) DOLERITE (DL) BASALT (BS) COAL (CO) COLLUVIUM (CV)		

	Test Pit:	Project No: 63429
	Borehole: BH103	Client:
	Well:	Project Name:
		Site Address:

Date: 8/7/22	Easting (MGA94):	Water Level Initial (mbgs):	Date:	Time:
Logged By:	Northing (MGA94):	Water Level Static (mbgs):	Date:	Time:
Contractor:	Zone/Area:	Surface Finish:		
Total Hole Depth (mbgs):	Reference Level:	Casing Type:	Depth To (mbgs):	
Bore Diameter (mm) / Pit Dimension (m³):	Elevation (m):	Screen Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete					
			concrete core (0.25m)					
0	FL		gravelly clay, brown/red, het., damp, firm, M.P., w some blue metal gravels.	0-0.1	6.2	BTJ	NOOSA.	
			trace blue metal gravels - 0.2m.	0.2-0.3	3.8			
			trace gravels - 0.4m.	0.4-0.5	1.4			
0.8	FL		clay, red/pink w grey mottle, het., dry, stiff, H.P., w some gravel/sand fines.	0.9-1.0	0.7	BTJ + ASS	NOOSA, grey mottle	
1.3	NT		clay, red w grey mottle, het., dry, v. stiff, H.P.	1.4-1.5	0.5			
			EOH @ 1.6mbgs.					

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite 2SP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils				Surface	Rocks	
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour	CONCRETE (CC)	LIMESTONE (LS)
NATURAL (NT)	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	staining	BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	solid waste	CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)
	SILT (ML)								blue	mottled					DOLERITE (DL)
	CLAY (CL)														BASALT (BS)
	Organic SILT (OL)														COAL (CO)
	SILT (MH)														COLLUVIUM (CV)
	CLAY (CH)														
	Organic CLAY (OH)														
	PEAT (Pt)														
														Surface Description	
														bare ground	
														grass	
														lightly vegetated	
														heavily vegetated	
														paved	
														sealed	




Test Pit:
Borehole: **BH104**
Well:

Project No: **63427**
Client:
Project Name:
Site Address:

Date: **8/7/22** Easting (MGA94): Water Level Initial (mbgs): Date: Time:
Logged By: Northing (MGA94): Water Level Static (mbgs): Date: Time:
Contractor: Zone/Area: Surface Finish:
Total Hole Depth (mbgs): Reference Level: Casing Type: Depth To (mbgs):
Bore Diameter (mm) / Pit Dimension (m³): Elevation (m): Screen Type: Depth To (mbgs):
Method: Depth To (mbgs): Comment: Backfill Type: Depth To (mbgs):
Method: Depth To (mbgs): Comment: Backfill Type: Depth To (mbgs):
Method: Depth To (mbgs): Comment: Backfill Type: Depth To (mbgs):

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete					
			concrete core (0.15m)					
0	FL		sandy clay, brown/orange, het, damp, firm, m.p., w trace gravels/fines	0-0.1	6.9	BTJ	NOOSA	
				0.2-0.3	5.0	↓	↓	
0.4	RWK NT		clay, red/brown w/ grey mottle, dry, het., stiff, H.P., w trace sand.	0.4-0.5	3.6	BTJ +ASS	NOOSA, grey mottle	
				0.9-1.0	1.8	BTJ	↓	
1.3	RWK NT		clay, red w/ grey mottle / black sandy layer, het., dry, v. stiff, H.P., w black sandy layer.	1.4-1.5	1.0		NOOSA, black sandy layer.	
1.9	FL		sand, grey/black, het., loose, w.g, s.a., coarse, damp.	1.9-2.0	1.9		NOOSA.	
2.4	FL		clay (sandy), brown/orange, het., dry, stiff, H.P.	2.4-2.5	0.6	↓	↓	
2.7	NT		clay, red w/ grey mottle, het., dry, v. stiff, H.P., w trace sand.	2.9-3.0	0.1	BTJ +ASS	NOOSA, grey mottle.	

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite 2SP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	END OF HOLE FOH = 3.1mbgs.

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils					Surface	Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL) NATURAL (NT)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour	CONCRETE (CC)	LIMESTONE (LS)
	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	staining	BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	solid waste	CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)
	SILT (ML)								blue	mottled					DOLERITE (DL)
	CLAY (CL)														BASALT (BS)
	Organic SILT (OL)														COAL (CO)
	SILT (MH)														COLLUVIUM (CV)
	CLAY (CH)														
	Organic CLAY (OH)														
	PEAT (Pt)														
														Surface Description	
														bare ground	
														grass	
														lightly vegetated	
														heavily vegetated	
														paved	
														sealed	



Test Pit:
Borehole: BH105
Well:

Project No: 63429

Client:

Project Name:

Site Address:

Date: 8/7/22

Logged By:

Contractor:

Total Hole Depth (mbgs):

Bore Diameter (mm) / Pit Dimension (m³):

Method: Depth To (mbgs):

Method: Depth To (mbgs):

Method: Depth To (mbgs):

Easting (MGA94):

Northing (MGA94):

Zone/Area:

Reference Level:

Elevation (m):

Comment:

Comment:

Comment:

Water Level Initial (mbgs):

Water Level Static (mbgs):

Surface Finish:

Casing Type:

Screen Type:

Backfill Type:

Backfill Type:

Backfill Type:

Date: Time:

Date: Time:

Date: Time:

Depth To (mbgs):

Depth To (mbgs):

Depth To (mbgs):

Depth To (mbgs):


Depth To (mbgs):

SUBSURFACE PROFILE

SAMPLE

WELL

Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete.					
			concrete core (0.15m).					
0	FL		sandy clay, brown/red, het., dry, firm, M.P., w/ sand/gravel fines.	0-0.1	7.2	BTJ	NOOST.	
0.2	RWK NT		clay, red w/ grey mottle, het., stiff, dry, M.P., w/ some sand/gravel fines.	0.2-0.3	4.9	BTJ +ASS	NOOST, grey mottle	
				0.4-0.5	1.8	BTJ		
0.7	NT		clay, deep red w/ grey mottle, het., dry, v. stiff, H.P.	0.9-1.0	0.9	BTJ +ASS		
			FOH @ 1.1mbgs.					

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite ZSP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils					Surface		Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks	
FILL (FL) NATURAL (NT)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)		CONCRETE (CC) BITUMINOUS CONCRETE (BC) TOPSOIL (TS)	LIMESTONE (LS)	
	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	odour		SANDSTONE (SS)	
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	staining		MUDSTONE (MS)	
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)	solid waste		SHALE (SH)	
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)	
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)	
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)	
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)	
	SILT (ML)								blue	mottled					DOLERITE (DL)	
	CLAY (CL)														BASALT (BS)	
	Organic SILT (OL)														COAL (CO)	
	SILT (MH)														COLLUVIUM (CV)	
	CLAY (CH)															
	Organic CLAY (OH)															
	PEAT (Pt)															
														Surface Description		
														bare ground		
														grass		
														lightly vegetated		
														heavily vegetated		
														paved		
														sealed		



Test Pit:
Borehole: BH106
Well:

Project No: 63429
Client:
Project Name:
Site Address:


Date: 8/7/22
Logged By:
Contractor:
Total Hole Depth (mbgs):
Bore Diameter (mm) / Pit Dimension (m³):
Method: Depth To (mbgs):
Method: Depth To (mbgs):
Method: Depth To (mbgs):
Easting (MGA94):
Northing (MGA94):
Zone/Area:
Reference Level:
Elevation (m):
Comment:
Comment:
Comment:
Water Level Initial (mbgs):
Water Level Static (mbgs):
Surface Finish:
Casing Type:
Screen Type:
Backfill Type:
Backfill Type:
Backfill Type:
Date:
Time:
Date:
Time:
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):
Depth To (mbgs):

SUBSURFACE PROFILE


SAMPLE

WELL

Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete.					
			concrete core (0.15m)					
0	FL		Gravelly/sandy clay, black/grey, het., wet (wring), soft, LP, w bluemetal granels, gravel fines, trace concrete, trace plastic.	0-0.1	11.9	BTJ	NOOST.	
				0.20-0.3	7.4			
0.4	FL		clay, red/pink w/ grey mottle, het., dry, stiff, H.P, w trace granels/fines, trace ACM (fragment).	0.40-0.52	6	BTJ +ASS	NOOS, ACM frag. found: FRAG20220708-01; grey mottle	
0.7	NT		clay, orange w/ grey mottle, het., dry, v. stiff, H.P, w some weathered shale	0.9-1.0	0.3		NOOST, grey mottle	
			FOH @ 1.1mbgs.					

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite ZSP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	


Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils				Surface		Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL) NATURAL (NT)	GRAVEL (GW) GRAVEL (GP) Silty GRAVEL (GM) Clayey GRAVEL (GC) SAND (SW) SAND (SP) Silty SAND (SM) Clayey SAND (SC) SILT (ML) CLAY (CL) Organic SILT (OL) SILT (MH) CLAY (CH) Organic CLAY (OH) PEAT (Pt)	gravelly sandy silty clayey organic	poorly graded well graded	boulders cobbles coarse gravel medium gravel fine gravel coarse sand medium sand fine sand	very angular angular sub-angular sub-rounded rounded well rounded	very loose loose medium dense dense very dense	non-plastic low plasticity medium plasticity high plasticity	very soft soft firm stiff very stiff hard	white black grey red brown orange yellow green blue	homogeneous heterogeneous stratified laminated lens root holes occasional inter-bedded mottled	dry damp moist wet saturated	and (35-50%) some (20-35%) little (10-20%) trace (0-10%)	odour staining solid waste	CONCRETE (CC) BITUMINOUS CONCRETE (BC) TOPSOIL (TS)	LIMESTONE (LS) SANDSTONE (SS) MUDSTONE (MS) SHALE (SH) CONGLOMERATE (CG) PHYLLITE (PH) TUFF (TF) GRANITE (GR) DOLERITE (DL) BASALT (BS) COAL (CO) COLLUVIUM (CV)
														Surface Description bare ground grass lightly vegetated heavily vegetated paved sealed	

		Test Pit: Borehole: BH108 Well:		Project No: 63429 Client: Project Name: Site Address:	
Date: 8/7/22 Logged By: Contractor:		Easting (MGA94): Northing (MGA94): Zone/Area:		Water Level Initial (mbgs): Date: Time: Water Level Static (mbgs): Date: Time: Surface Finish:	
Total Hole Depth (mbgs): Bore Diameter (mm) / Pit Dimension (m³):		Reference Level: Elevation (m):		Casing Type: Depth To (mbgs): Screen Type: Depth To (mbgs):	
Method: Depth To (mbgs): Comment:		Backfill Type: Depth To (mbgs):		Backfill Type: Depth To (mbgs):	
Method: Depth To (mbgs): Comment:		Backfill Type: Depth To (mbgs):		Backfill Type: Depth To (mbgs):	
Method: Depth To (mbgs): Comment:		Backfill Type: Depth To (mbgs):		Backfill Type: Depth To (mbgs):	

SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: concrete					
			concrete core (0-15m)					
0	FL		gravelly/sandy clay, brown, het., wet (coring), soft, M.P., w blue metal gravel, gravel fines, trace concrete.	0-0.1	13.1	B+J	NOOSA, black/brown colour.	
0.2	FL		sandy clay, brown/red, het., damp, firm, M.P., w some shale gravel/fines.	0.2-0.3	8.3		NOOSA.	
0.4	FL		clay, red/pink w grey/white mottle, dry, stiff, H.P., w trace sand/gravel fines.	0.4-0.5	3.0	B+J +ASS	NOOSA, grey mottle	
0.7	NT		clay, pink w white mottle, het., dry, v-stiff, H.P.	0.9-1.0	0.5			
EOT @ 1.1mbgs.								


Method HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	Sample Type D - Disturbed U - Undisturbed	Reference Level AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Screen/Casing Type Class 18 PVC (50mm) - PVC50	Backfill Type BK - Backfill BN - Bentonite ZSP - 2mm Graded Sand	Well Finish RB - Roadbox MT - Monument SP - Standpipe	Pit Dimensions (m) A: B: C:	Well Development Details
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Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils		All Soils					Surface	Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL) NATURAL (NT)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour	CONCRETE (CC)	LIMESTONE (LS)
	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)	staining	BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)	solid waste	CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					GRANITE (GR)
	SILT (ML)								blue	mottled					DOLERITE (DL)
	CLAY (CL)														BASALT (BS)
Organic SILT (OL)														COAL (CO)	
SILT (MH)														COLLUVIUM (CV)	
CLAY (CH)															
Organic CLAY (OH)															
PEAT (Pt)															

	Test Pit:	Project No: 63429
	Borehole: BH101	Client:
	Well:	Project Name:
		Site Address:

Date: 8/1/22	Easting (MGA94):	Water Level Initial (mbgs):	Date:	Time:
Logged By:	Northing (MGA94):	Water Level Static (mbgs):	Date:	Time:
Contractor:	Zone/Area:	Surface Finish:		
Total Hole Depth (mbgs):	Reference Level:	Casing Type:	Depth To (mbgs):	
Bore Diameter (mm) / Pit Dimension (m³):	Elevation (m):	Screen Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	
Method: Depth To (mbgs):	Comment:	Backfill Type:	Depth To (mbgs):	




SUBSURFACE PROFILE				SAMPLE				WELL
Depth (m)	Lithologic Type	Lithologic Class	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Construction
			Surface Description: ASPHALT / BITUMEN					
0	FL		gravelly sand, black, het., w.g, s.a, coarse, loose, w/ bimetal gravels, asphalt/bitumen, trace clay deposits.	0-0.1	16.1	BTJ	NOOSA.	
			becomes clayey @ 0.2m.	0.2-0.3	9.3	BTJ + ASS	NOOSA, clayey/organic silt	
0.4	FL		silty clay, het., red/pink. w/ grey mottle, dry, stiff, H.P, w trace gravels/fines.	0.4-0.5	3.8		↓ Noost, grey mottle	
0.7	NT		shale clay, white/pink, het., dry, v. stiff, H.P, w some weathered shale.	0.9-1.0	0.8	BTJ	NOOSA.	
			EOH @ 1.1mbgs.					

Method	Sample Type	Reference Level	Screen/Casing Type	Backfill Type	Well Finish	Pit Dimensions (m)	Well Development Details
HA - Hand Auger NDD - Non Destructive Drilling SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tube AH - Air Hammer TP - Test Pit	D - Disturbed U - Undisturbed	AHD - Australian Height Datum TOC - Top of Casing GS - Ground Surface	Class 18 PVC (50mm) - PVC50	BK - Backfill BN - Bentonite ZSP - 2mm Graded Sand	RB - Roadbox MT - Monument SP - Standpipe	A: B: C: 	

Lithologic Classification – All Soils			Coarse Grained Soils				Fine Grained Soils			All Soils				Surface	Rocks
Lithologic Type	Lithologic Class - Soil	Texture	Grading	Grain Size	Angularity	Density	Plasticity	Consistency	Colour	Structure	Moisture	Inclusions	Contamination	Surface Materials	Lithologic Class - Rocks
FILL (FL) NATURAL (NT)	GRAVEL (GW)	gravelly	poorly graded	boulders	very angular	very loose	non-plastic	very soft	white	homogeneous	dry	and (35-50%)	odour staining solid waste	CONCRETE (CC)	LIMESTONE (LS)
	GRAVEL (GP)	sandy	well graded	cobbles	angular	loose	low plasticity	soft	black	heterogeneous	damp	some (20-35%)		BITUMINOUS	SANDSTONE (SS)
	Silty GRAVEL (GM)	silty		coarse gravel	sub-angular	medium dense	medium plasticity	firm	grey	stratified	moist	little (10-20%)		CONCRETE (BC)	MUDSTONE (MS)
	Clayey GRAVEL (GC)	clayey		medium gravel	sub-rounded	dense	high plasticity	stiff	red	laminated	wet	trace (0-10%)		TOPSOIL (TS)	SHALE (SH)
	SAND (SW)	organic		fine gravel	rounded	very dense		very stiff	brown	lens	saturated				CONGLOMERATE (CG)
	SAND (SP)			coarse sand	well rounded			hard	orange	root holes					PHYLLITE (PH)
	Silty SAND (SM)			medium sand					yellow	occasional					TUFF (TF)
	Clayey SAND (SC)			fine sand					green	inter-bedded					
	SILT (ML)								blue	mottled					
	CLAY (CL)														
	Organic SILT (OL)														
	SILT (MH)														
	CLAY (CH)														
	Organic CLAY (OH)														
PEAT (Pt)															




PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 11-Feb-22 - 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.2		Fill	Fill: Silty Sandy Gravel, dark grey, heterogeneous with coarse sand, poorly sorted, sub-angular to sub-rounded, dry	D	SB01_0-0.1	2	No odour, staining or asbestos
SFA		0.4		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with little gravel, firm to hard, non-plastic with medium plasticity nodules, dry	D	SB01_0.4-0.5	2	No odour, staining or asbestos
		0.6							
		0.8		CL-ML	Silty Clay, orange/grey mottled, homogeneous, firm, high plasticity, dry	D	SB01_0.7-0.8	1	No odour, staining or asbestos
		1.0							
		1.2			Termination Depth at: 1.20 m.				
		1.4							
		1.6							
		1.8							
		2.0							
		2.2							
		2.4							
		2.6							
		2.8							



PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 11-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	SB02_0.2-0.3	11	No odour, staining or asbestos
		0.4		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D			
		0.6					SB02_0.6-0.7	8	No odour, staining or asbestos
		0.8							
		1			Termination Depth at: 0.80 m.				
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							



PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 11-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
HA		0.2		Bitumen	Bitumen	D			
				Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry		SB03_0.2-0.3	4	No odour, staining or asbestos
		0.4		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D			
		0.6					SB03_0.6-0.7	5	No odour, staining or asbestos
		0.8							
		1			Termination Depth at: 0.80 m.				
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							





PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 11-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D	SB04_0.2-0.3	3	No odour, staining or asbestos
		0.4							
		0.6							
		0.8					SB04_0.7-0.8	3	No odour, staining or asbestos
		0.8			Termination Depth at: 0.80 m.				
		1							
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							





PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Bitumen	Bitumen	D			
				Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry		SB05_0.1-0.2	4	No odour, staining or asbestos
		0.4		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with little gravel and concrete, firm to hard, non-plastic with medium plasticity nodules, dry	D			
							SB05_0.4-0.5	5	No odour, staining or asbestos. QS01/01a
							SB05_0.9-1.0	5	No odour, staining or asbestos
		1.2		CL-ML	Silty Clay, light brown, heterogeneous with little shale fragments (sub-angular, soft, grey),: soft to hard, non-plastic to medium plasticity, dry	D			
		SB05_1.3-1.4					14	No odour, staining or asbestos	
		1.6			Termination Depth at: 1.50 m.				
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							





PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Bitumen	Bitumen	D			
				Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry		SB07_0.1-0.2	4	No odour, staining or asbestos
		0.4		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D			
							SB07_0.4-0.5	6	No odour, staining or asbestos
		1.2		Fill	Fill: Silty Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-3 cm rock and concrete gravel, dry	D			
							SB07_1.2-1.3	8	No odour, staining or asbestos
		1.6		CL-ML	Silty Clay, light brown, heterogeneous with little shale fragments (sub-angular, soft, grey), soft to hard, non-plastic to medium plasticity, dry	D			
							SB07_1.6-1.7	8	No odour, staining or asbestos
		1.8			Termination Depth at: 1.70 m.				
		2							
		2.2							
		2.4							
		2.6							
		2.8							





PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
SFA		0.2		Fill	Fill: Sandy Gravelly Silt (Topsoil), dark brown, heterogeneous with some gravels (rock, concrete), soft, non-plastic, dry	D	SB09_0-0.1	5	No odour, staining or asbestos
		0.4		Fill	Fill: Silty Sand, light brown, heterogeneous with little gravel rocks, loose, medium grain sand, dry	D	SB09_0.4-0.5	6	No odour, staining or asbestos
		0.6							
		0.8							
		1.0					SB09_0.9-1.0	7	No odour, staining or asbestos
		1.2							
		1.4		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D			
		1.6					SB09_1.5-1.6	8	No odour, staining or asbestos
		1.8							
		2.0		CL	Clay, grey/red mottled, homogeneous, stiff, high plasticity, dry	D	SB09_1.9-2.0	18	No odour, staining or asbestos
		2.2			Termination Depth at: 2.00 m.				
		2.4							
		2.6							
		2.8							

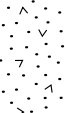




PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 15-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
SFA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	SB10_0.2-0.3	10	No odour, staining or asbestos
		0.4		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D	SB10_0.4-0.5	10	No odour, staining or asbestos
		0.6							
		0.8							
		1							
		1.2		Fill	Fill: Silty Sand, grey, heterogeneous with little gravel rocks, loose, medium grain sand, dry	D			
		1.4					SB10_1.2-1.3	8	No odour, staining or asbestos
		1.6		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D			
		1.8							
		2					SB10_1.9-2.0	9	No odour, staining or asbestos
		2.2		CL	Clay, grey/red mottled, homogeneous, stiff, high plasticity, dry	D			
		2.4					SB10_2.4-2.5	14	No odour, staining or asbestos
		2.6			Termination Depth at: 2.50 m.				
		2.8							




PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 15-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC		0.2		Concrete	Concrete				
SFA		0.4		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-5 cm rock and concrete gravel, dry	D	SB11_0.25-0.3	21	No odour, staining or asbestos
		0.6		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D	SB11_0.4-0.5	15	No odour, staining or asbestos
		0.8		Fill	Fill: Silty Sand, grey, heterogeneous with little gravel rocks, loose, medium grain sand, dry	D			
		1.0					SB11_0.9-1.0	16	No odour, staining or asbestos
		1.2							
		1.4		CL	Clay, grey/red mottled, homogeneous, stiff, high plasticity, dry	D	SB11_1.4-1.5	14	No odour, staining or asbestos
		1.6			Termination Depth at: 1.60 m.				
		1.8							
		2.0							
		2.2							
		2.4							
		2.6							
		2.8							

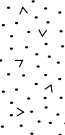



PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 15-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-5 cm rock and concrete gravel, dry	D	SB12_0.2-0.3	12	No odour, staining or asbestos
		0.4							
		0.6							
		0.8							
		1.0		Fill	Fill: Silty Sand, grey, heterogeneous with trace gravel rocks, loose, medium grain sand, dry	D	SB12_0.9-1.0	13	No odour, staining or asbestos
		1.2		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D	SB12_1.2-1.3	14	No odour, staining or asbestos
		1.4							
		1.6			Termination Depth at: 1.50 m.				
		1.8							
		2.0							
		2.2							
		2.4							
		2.6							
		2.8							




PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 15-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC		0.2		Concrete	Concrete				
HA		0.4		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	SB13_0.3-0.4	10	No odour, staining or asbestos
		0.6		Fill	Fill: Silty Sand, grey, heterogeneous with trace gravel rocks, loose, medium grain sand, dry	D	SB13_0.6-0.7	12	No odour, staining or asbestos
		0.8		CL-SC	Sandy Clay, brown/grey mottled, coarse sand, high plasticity, stiff, dry	D	SB13_0.9-1.0	12	No odour, staining or asbestos
		1			Termination Depth at: 1.00 m.				
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							

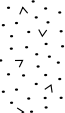


PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	SB14_0.2-0.3	17	No odour, staining or asbestos
		0.4		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D	SB14_0.4-0.5	17	No odour, staining or asbestos
		0.6							
		0.8			Termination Depth at: 0.70 m.				
		1							
		1.2							
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							








PROJECT NUMBER 62533	DRILLING COMPANY Terratest	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 15-Feb-22	NORTHING N/A
CLIENT	DRILL RIG GeoProbe	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Solid Flight Auger	COORD SOURCE
	DIAMETER 125 mm	LOGGED BY JD

COMMENTS

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC		0.2		Concrete	Concrete				
SFA		0.4		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	SB17_0.25-0.3	27	No odour, staining or asbestos
		0.6		RWN	Fill: Reworked Clay, brown/grey, heterogeneous with terracotta and gravel, stiff, high plasticity, dry	D	SB17_0.4-0.5	23	No odour, staining or asbestos
		0.8							
		1.0					SB17_0.9-1.0	20	No odour, staining or asbestos
		1.2							
		1.4							
		1.6							
		1.8		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D	SB17_1.8-1.9	18	No odour, staining or asbestos
		2.0							
		2.2			Termination Depth at: 2.10 m.				
		2.4							
		2.6							
		2.8							







PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD


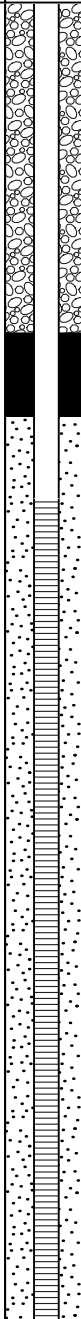






COMMENTS


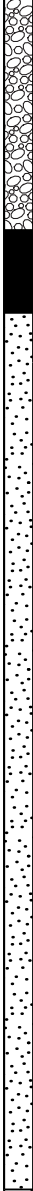





Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-5 cm cm rock and concrete gravel, dry. Wet (seepage water) from 0.6-0.9 m	W	SB20_0.2-0.3	9	No odour, staining or asbestos
		0.4							
		0.6					SB20_0.6-0.7	5	No odour, staining or asbestos
		0.8							
		1		CL-SC	Sandy Clay, brown/grey mottled, coarse sand, high plasticity, stiff, dry	D	SB20_1.0-1.1	4	No odour, staining or asbestos
		1.2							
		1.4			Termination Depth at: 1.20 m.				
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							

PROJECT NUMBER 62533	DRILLING COMPANY JBS&G	EASTING N/A
PROJECT NAME HaleCP Milperra	DRILLING DATE 14-Feb-22	NORTHING N/A
CLIENT	DRILL RIG N/A	COORD SYS N/A
ADDRESS 339-349 Horsley Rd Milperra NSW 2214	DRILLING METHOD Hand Auger	COORD SOURCE
	DIAMETER 90 mm	LOGGED BY JD

COMMENTS


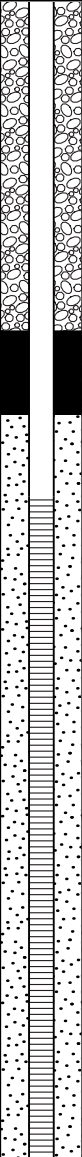

Drilling Method	Water (m bgl)	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations
CC				Concrete	Concrete				
HA		0.2		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-5 cm cm rock and concrete gravel, dry	D	SB21_0.2-0.3	5	No odour, staining or asbestos
		0.4							
		0.6					SB21_0.6-0.7	4	No odour, staining or asbestos
		0.8		CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D			
		1					SB21_1.0-1.1	5	No odour, staining or asbestos
		1.2			Termination Depth at: 1.10 m.				
		1.4							
		1.6							
		1.8							
		2							
		2.2							
		2.4							
		2.6							
		2.8							







PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A					
PROJECT NAME HaleCP Milperra				DRILLING DATE 14-Feb-22				NORTHING N/A					
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A					
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A					
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 8 m bgl				COORD SOURCE					
				DIAMETER 125 mm				LOGGED BY JD					
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 3 - 8 m bgl					
COMMENTS 30 L removed (grey sludge), minimal silt remaining.													
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations			
SFA			0.5		Bitumen	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	MW01_0.1-0.2	6	No odour, staining or asbestos			
					RWN		D	MW01_0.4-0.5	8	No odour, staining or asbestos			
			1		Fill	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D						No odour, staining or asbestos
					CL-ML		D						
			1.5		CL-ML	Fill: Silty Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-3 cm rock and concrete gravel, dry	D						No odour, staining or asbestos
						Silty Clay, light brown, heterogeneous with little shale fragments (sub-angular, soft, grey), soft to hard, non-plastic to medium plasticity, dry							
			2		CL-ML	Silty Clay, grey, heterogeneous with some shale fragments (sub-angular, soft to hard, grey), soft to hard, non-plastic to medium plasticity, dry. Damp from 4 m, wet from 7 m.	D					No odour, staining or asbestos	
			2.5										
			3										
			3.5										
			4										
			4.5										
			5										
			5.5										
			6										
			6.5										
			7										
			7.5										
			8										
8.5					Termination Depth at: 8.00 m.								

PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A			
PROJECT NAME HaleCP Milperra				DRILLING DATE 14-Feb-22				NORTHING N/A			
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A			
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A			
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 8 m bgl				COORD SOURCE			
				DIAMETER 125 mm				LOGGED BY JD			
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 2.2 - 7.2 m bgl			
COMMENTS 0.8 m cave in during well installation. 30 L removed (grey sludge), minimal silt remaining.											
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations	
SFA			0.5		Bitumen	Bitumen	D	MW02_0.1-0.2	1	No odour, staining or asbestos	
					Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 0.5-3 cm rock and concrete gravel, dry	D	MW02_0.4-0.5	1	No odour, staining or asbestos	
			1		Fill	Fill: Reworked Clay, brown/grey, heterogeneous with trace gravel, stiff, high plasticity, dry	D	MW02_0.9-1.0	2	No odour, staining or asbestos	
			1.5		CL-ML	Fill: Silty Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-3 cm rock and concrete gravel, dry	D	MW02_1.9-2.0	2	No odour, staining or asbestos	
			2			Silty Clay, light brown, heterogeneous with little shale fragments (sub-angular, soft, grey), soft to hard, non-plastic to medium plasticity, dry					
			2.5		CL-ML	Silty Clay, grey, heterogeneous with some shale fragments (sub-angular, soft to hard, grey), soft to hard, non-plastic to medium plasticity, dry. Damp from 5 m.	D	MW02_2.9-3.0	3	No odour, staining or asbestos	
			3								
			3.5								
			4					MW02_3.9-4.0	4	No odour, staining or asbestos	
			4.5								
			5					MW02_4.9-5.0	5	No odour, staining or asbestos	
			5.5					MW02_5.9-6.0	3	No odour, staining or asbestos	
			6								
			6.5					MW02_6.9-7.0	4	No odour, staining or asbestos	
			7								
			7.5					MW02_7.9-8.0	4	No odour, staining or asbestos	
			8								
			8.5			Termination Depth at: 8.00 m.					

PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A				
PROJECT NAME HaleCP Milperra				DRILLING DATE 15-Feb-22				NORTHING N/A				
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A				
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A				
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 8 m bgl				COORD SOURCE				
				DIAMETER 125 mm				LOGGED BY JD				
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 2 - 7 m bgl				
COMMENTS No clear water-strike. 1 m cave in during well installation. 4 L removed (grey sludge) and minimal silt in well.												
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations		
CC					Concrete	Concrete	D	MW03_0.25-0.3	15	No odour, staining or asbestos		
SFA			0.5		Fill	Fill: Sandy Gravel (Road Base), grey, heterogeneous, coarse sand, poorly sorted, sub-angular to sub-rounded, 1-5 cm cm rock and concrete gravel, dry	D	MW03_0.4-0.5	17	No odour, staining or asbestos		
			1		RWN						No odour, staining or asbestos	
			1		CL		Fill: Reworked Clay, red/grey/brown, heterogeneous with trace gravel rock, concrete, sandstone, non-plastic to medium plasticity, firm to hard, dry	D	MW03_0.9-1.0	16	No odour, staining or asbestos	
			1.5		CL-ML	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry	D					
			2			Silty Clay, light pink, heterogeneous with little shale fragments (sub-angular, soft, red), firm to hard, non-plastic to medium plasticity, dry		MW03_1.9-2.0	15	No odour, staining or asbestos		
			2.5									
			3					MW03_2.9-3.0	17	No odour, staining or asbestos		
			3.5									
			4		CL-ML	Silty Clay, grey, heterogeneous with some shale fragments (sub-angular, soft to hard, grey), soft to hard, non-plastic to medium plasticity, dry.	D	MW03_3.9-4.0	14	No odour, staining or asbestos		
			4.5									
		5						MW03_4.9-5.0	16	No odour, staining or asbestos		
		5.5										
		6						MW03_5.9-6.0	16	No odour, staining or asbestos		
		6.5										
		7						MW03_6.9-7.0	12	No odour, staining or asbestos		
		7.5										
		8				Termination Depth at: 8.00 m.		MW03_7.9-8.0	16	No odour, staining or asbestos		
			8.5									

PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A			
PROJECT NAME HaleCP Milperra				DRILLING DATE 15-Feb-22				NORTHING N/A			
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A			
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A			
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 8 m bgl				COORD SOURCE			
				DIAMETER 125 mm				LOGGED BY JD			
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 2.6 - 7.6 m bgl			
COMMENTS 0.4 m cave in during well installation. 30 L removed (grey sludge), minimal silt remaining.											
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations	
CC					Concrete	Concrete					
SFA			0.5		Fill	Fill: Silty Clayey Gravel, grey, heterogeneous with sub-rounded rock and concrete gravels, trace wire inclusions, coarse sand with nodules of soft reworked clay, loose, poorly sorted, dry. Siltier from 1 m.	D	MW04_0.3-0.4	19	No odour, staining or asbestos	
			1	MW04_0.8-0.9				18	No odour, staining or asbestos		
			1.5	MW04_1.1-1.2				24	No odour, staining or asbestos. QS04/04a		
			2								
			2.5	CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry.	D	MW04_1.9-2.0	18	No odour, staining or asbestos		
			3								
			3.5								
			4				MW04_3.9-4.0	17	No odour, staining or asbestos		
			4.5	CL-ML	Silty Clay, light brown/cream, heterogeneous with some shale fragments (sub-angular, soft to hard), soft to hard, non-plastic to medium plasticity, dry. Damp from 4 m.	D	MW04_4.9-5.0	22	No odour, staining or asbestos		
			5								
			5.5								
			6				MW04_5.9-6.0	24	No odour, staining or asbestos		
			6.5								
			7				MW04_6.9-7.0	12	No odour, staining or asbestos		
			7.5								
			8				MW04_7.9-8.0	19	No odour, staining or asbestos		
			8.5			Termination Depth at: 8.00 m.					

PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A			
PROJECT NAME HaleCP Milperra				DRILLING DATE 15-Feb-22				NORTHING N/A			
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A			
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A			
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 7 m bgl				COORD SOURCE			
				DIAMETER 125 mm				LOGGED BY JD			
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 3 - 7 m bgl			
COMMENTS 30 L removed (grey sludge), minimal silt remaining.											
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations	
CC					Concrete	Concrete				Slight hydrocarbon odour. No staining or asbestos.	
SFA			0.5	RWN	Fill: Reworked Clay, red/grey/brown, heterogeneous with trace gravel rock, concrete, sandstone, non-plastic to medium plasticity, firm to hard, dry	D	MW05_0.2-0.3	38			
							MW05_0.4-0.5	45			
			1	CL	Clay, red/grey mottled, homogeneous, stiff, high plasticity, dry.	D	MW05_0.9-1.0	33	Slight hydrocarbon odour. No staining or asbestos.		
			1.5						Slight hydrocarbon odour. No staining or asbestos.		
			2				MW05_1.9-2.0	10	No odour, staining or asbestos		
			2.5								
			3	CL-ML	Silty Clay, light pink, heterogeneous with little shale fragments (sub-angular, soft, red), firm to hard, non-plastic to medium plasticity, dry. Damp from 4 m, wet at 6 m, saturated at 7 m.	D	MW05_2.9-3.0	8	No odour, staining or asbestos		
			3.5								
			4				MW05_3.9-4.0	9	No odour, staining or asbestos		
			4.5								
			5				MW05_4.9-5.0	14	No odour, staining or asbestos		
			5.5								
			6				MW05_5.9-6.0	16	No odour, staining or asbestos. QS03/03a		
			6.5								
7				MW05_6.9-7.0	12	No odour, staining or asbestos					
			7			Termination Depth at: 7.00 m.					
			7.5								
			8								
			8.5								

PROJECT NUMBER 62533				DRILLING COMPANY Terratest				EASTING N/A			
PROJECT NAME HaleCP Milperra				DRILLING DATE 14-Feb-22				NORTHING N/A			
CLIENT				DRILL RIG GeoProbe				ELEVATION N/A			
PERMIT NO. N/A				DRILLING METHOD Solid Flight Auger				COORD SYS N/A			
ADDRESS 339-349 Horsley Rd Milperra NSW 2214				TOTAL DEPTH 8 m bgl				COORD SOURCE			
				DIAMETER 125 mm				LOGGED BY JD			
COMPLETION Roadbox				CASING Class 18 PVC - 50mm				SCREEN INTERVAL 2.7 - 7.7 m bgl			
COMMENTS 0.3 m cave in during well installation											
Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	PID	Additional Observations	
SFA			0.5		Fill	Fill: Sandy Gravelly Silt (Topsoil), dark brown, heterogeneous with some gravels (rock, concrete), soft, non-plastic, dry	D	MW06_0-0.1	10	No odour, staining or asbestos	
					Fill	Fill: Silty Sand, light brown, heterogeneous with little gravel rocks, loose, medium grain sand, dry	D	MW06_0.4-0.5	9	No odour, staining or asbestos	
			1		CL-ML	Silty Clay, brown/red, homogeneous, high plasticity, firm, dry	D	MW06_0.9-1.0	23	No odour, staining or asbestos	
			1.5		CL-ML	Silty Clay, light pink, heterogeneous with little shale fragments (sub-angular, soft, red), firm to hard, non-plastic to medium plasticity, dry	D				
			2					MW06_1.9-2.0	18	No odour, staining or asbestos	
			2.5								
			3					MW06_2.9-3.0	17	No odour, staining or asbestos	
			3.5		CL-ML	Silty Clay, light brown, heterogeneous with little shale fragments (sub-angular, soft, brown/grey), firm to hard, non-plastic to medium plasticity, dry. Damp from 5 m.	D				
			4					MW06_3.9-4.0	17	No odour, staining or asbestos	
			4.5								
			5					MW06_4.9-5.0	25	No odour, staining or asbestos. QS02/02a	
			5.5								
			6					MW06_5.9-6.0	23	No odour, staining or asbestos	
			6.5								
			7					MW06_6.9-7.0	40	No odour, staining or asbestos	
			7.5								
			8					MW06_7.9-8.0	55	No odour, staining or asbestos	
						8			Termination Depth at: 8.00 m.		
			8.5								

Appendix D Material Tracking/Placement and Characterisation Sheets

Material Characterisation Sheet

MCS Reference # _____

Completed by	
Date	
Material Identification (Stockpile name and grid reference, importation source name and unique identification name etc.)	Grid ref: ID:
Source location (Stockpile name and grid reference, source location and grid reference, off-site source address and description of source site residential, quarry etc.)	On site <input type="checkbox"/> Details: Off site (Source Site) <input type="checkbox"/> Details:
JBS&G material classification report reference	
Summary of material characterisation report as prepared by JBS&G (tick as appropriate).	VENM <input type="checkbox"/> ENM <input type="checkbox"/> Reuse on Site <input type="checkbox"/> Waste Classification <input type="checkbox"/> Other <input type="checkbox"/> Details:
Volume of material (tick as appropriate).	Survey Information <input type="checkbox"/> Field Estimate <input type="checkbox"/> Required Quantity (off-site source) <input type="checkbox"/> Details:
Material description (material type, colour, inclusions, etc.)	
Is the material free of ACM, staining and malodorous soils?	Yes <input type="checkbox"/> No <input type="checkbox"/> Details:
If assessment is of material from an off-site Source, is the material suitable for importation to the site?	Yes <input type="checkbox"/> No <input type="checkbox"/> Details:
If assessment is for off-site disposal of material, what is the final waste classification / reuse exemption conclusion?	
If the assessment is for reuse of the material at the site, where is the material suitable for reuse?	
Other comments:	

Material Tracking and Placement Sheet (Part A)

MTS Reference # _____

[illegible]

Material Tracking and Placement Sheet Part B

MTS Reference # _____

[illegible]

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Appendix K Unexpected Finds Protocol Contamination (Extract from JBS&G RAP)

Construction Environmental Management Plan

339 and 349 Horsley Road, Milperra (Lot 140 and 141 DP 550194)

Hale Capital Development Management Pty Ltd

SLR Project No.: 630.030737.00001

16 August 2023

8. Contingency Plan

A review of the proposed contamination-related aspects of the works associated with development of the site has been undertaken and has identified a number of potential risks, outlined in the following sections that required the development of contingencies to ensure that the objectives of this RAP are met.

8.1 Unexpected Finds

The possibility exists for hazards that have not been identified to date to be present within fill materials or underlying pavements/building on the site. The nature of hazards which may be present, and which may be discovered at the site are generally detectable through visual or olfactory means, for example:

- The presence of significant aggregates of friable and non-friable asbestos materials (visible) as opposed to minor occurrences of fibre bundles in soil; and/or
- Excessive quantities of construction/demolition waste that represents an aesthetics issue beyond that reported to date (visible); and/or
- Hydrocarbon/chemical impacted materials beyond that reported to date (visible/odorous); and/or
- Not previously identified infrastructure associated with the decommissioning and removal of USTs/ASTs; and/or
- Oily/tarry/ashy materials below USTs/ASTs (visible/odorous); and/or
- Potential petroleum hydrocarbon impact (sweet odour soils) not previously identified.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances (or any other unexpected potentially hazardous substance) be identified, the procedure summarised in **Flow Chart 8.1** is to be followed.

An enlarged version of the Unexpected Finds Protocol, suitable for use on the site, should be posted in the Site Office and referred to during the site-specific induction by the Principal Contractor.

The sampling strategy for each “unexpected find” shall be designed by the environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in EPA (1995) in addition to those outlined in **Section 7**.



Appendix L Acid Sulfate Soil Management Plan

Construction Environmental Management Plan

339 and 349 Horsley Road, Milperra (Lot 140 and 141 DP 550194)

Hale Capital Development Management Pty Ltd

SLR Project No.: 630.030737.00001

16 August 2023



'Commercial in Confidence'
Hale Capital Development Management Pty Ltd

Acid Sulfate Soil Management Plan

339-349 Horsley Road, Milperra NSW
Lot 140 & 141 DP 550194

8 September 2022

63429/146879 (Rev 0)

JBS&G Australia Pty Ltd

‘Commercial in Confidence’
Hale Capital Development Management Pty Ltd

Acid Sulfate Soil Management Plan

339-349 Horsley Road, Milperra NSW
Lot 140 & 141 DP 550194

8 September 2022

63429/146879 (Rev 0)

JBS&G Australia Pty Ltd

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Appendices

Appendix A	Summary of SPOCAS Results and Field Results
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Abbreviations

Term	Definition
AASS	Actual Acid Sulfate Soil
AHD	Australian Height Datum
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
AST	Above Ground Storage Tank
BGS	Below Ground Surface
EPA	NSW Environmental Protection Authority
ha	Hectare
JBS&G	JBS&G Australia Pty Ltd
LEP	Local Environment Plan
LOR	Limit of Reporting
NoW	NSW Office of Water
OEH	Office of Environment and Heritage
PASS	Potential Acid Sulfate Soil
pH	Potential of Hydrogen
PNSW	Property New South Wales
SAC	Site Action Criteria
S _{Cr} %	Chromium Reducible Sulfur (%)
SO ₄	Sulfate
sPOCAS	Suspended Potential Oxidation Combined Acidity and Sulfur (test method)
S _{pos} %	Potential Oxidisable Sulfur
SWC	Sydney Water Corporation
SWL	Standing Water Level
TAA	Total Actual Acidity
TPA	Total Potential Acidity
TSA	Total Sulfidic Acidity
UST	Underground Storage Tank

1. Introduction

1.1 Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) has been engaged by Hale Capital Development Management Pty Ltd (the client), to prepare an Acid Sulfate Soil Management Plan (ASSMP) as a precautionary measure for the insitu material at 339-349 Horsley Road, Milperra NSW (the site), as shown on **Figure 1**.

The site area, address and legal identifiers are shown in **Table 1.1**. The site layout is shown in **Figure 2**.

Table 1.1: Summary Assessment Area Details

Lot/DP	Address	Area (m ²)
140/550194	339 Horsley Road, Milperra NSW	17,100
141/550194	349 Horsley Road, Milperra NSW	16,900
Approximate Total Site Area		34,000

It is understood that the client is proposing to redevelop the site for ongoing commercial/industrial land use, pursuant to the *National Environmental Protection Measure* (NEPM) (NEPC 2013).

The site has historically been utilised for agricultural and industrial land uses, including market gardens, storage of freight and steel manufacturing. The proposed redevelopment includes minor excavation of natural materials to allow for the installation of concrete footings and drainage/sewer.

The site is proposed to be developed as a multi-unit warehouse and distribution facility which includes:

- Demolition of all existing buildings and structure;
- Site preparation works, including tree clearing;
- Earthworks;
- Infrastructure comprising civil works and utilities servicing;
- Three vehicular crossovers to Horsley Road;
- Construction of two warehouse buildings, split over two storeys;
- On-site car parking; and
- Complementary landscaping and offset planting.

Following a Detailed Site Investigation (DSI) (JBS&G 2022a¹), JBS&G prepared both a Waste Management Plan (WMP) (2020b²) and Remedial Action Plan (RAP) (2020c³) to guide management of contamination, unexpected finds and waste classification/tracking for materials coming to and from site.

In relation to Acid Sulfate Soils (ASS), the DSI did not identify ASS within natural soils at the site. However, due to the site being within an area potentially affected by ASS, as well as the limited vertical extent of the DSI, as a precaution a plan for the management of actual and potential soils has been developed. This ASSMP is also required under the *Work Health and Safety Regulations 2017* and has been prepared to ensure that if PASS/ASS are disturbed during the project works, they are appropriately managed to ensure the protection of the health of the site workers (direct workers), visitors and the neighbouring community.

¹ *Detailed Site Investigation*, 339-349 Horsley Road, Milperra, NSW 2214, JBS&G Australia Pty Ltd, 2 August 2022 (JBS&G 2022a)

² *Waste Management Plan*, 339-349 Horsley Road, Milperra, NSW 2214, JBS&G Australia Pty Ltd, 1 August 2022 (JBS&G 2022b)

³ *Remedial Action Plan*, 339-349 Horsley Road, Milperra, NSW 2214, JBS&G Australia Pty Ltd, 3 August 2022 (JBS&G 2022c)

1.2 Aims and Objectives

The aim of this ASSMP is to outline management techniques to mitigate the potential environmental impacts associated with the presence of ASS at the site associated with the proposed redevelopment. Specifically, the objectives of this ASSMP are to document:

- the material characteristics and requirement for management;
- evaluation of potential ASS management opportunities and constraints resulting in the identification of a preferred management strategy;
- a proposed monitoring strategy for implementation during the management works such that environmental risks associated with disturbance of the PASS/ASS may be appropriately minimised;
- procedures for the validation of affected material to demonstrate successful implementation of the management strategy; and
- contingency measures should monitoring and/or validation identify the requirement for additional management requirements.

2. Acid Sulfate Soil General Information

2.1 Acid Sulfate Soil Background

ASS is a common name given to naturally occurring sediments and soils containing iron sulfides (generally as iron sulfide or iron disulfide). These soil profiles are typically located in coastal, low-lying alluvial or estuarine areas such as mangroves, salt marshes, coastal rivers and creeks, estuaries, tidal lakes and coastal floodplains where historical iron rich sediment deposition in the presence of a sulfate source (commonly salt water), organic matter and microbial action over time has resulted in the formation of particular environmental conditions. Acid sulfate soils are predominantly encountered in areas with an elevation of less than 5 m AHD, and may be found close to the ground level or at depth in the soil profile where continued deposition has resulted in raising of the ground levels.

Changes in environmental conditions which result in the exposure of these materials to air, via excavation or drainage of subsurface soils, can lead to the reaction of the iron sulfides with oxygen, causing the generation of sulfuric acid. This may result in significant environmental and infrastructure damage if the produced acid is spread by ground or surface water.

ASS consist of two major categories:

- Actual Acid Sulfate Soils (AASS) are soils that have been exposed to oxygen which has caused the oxidation of iron sulfides to form sulfuric acid. Some of this acid is commonly neutralised by other soil particles in a process known as buffering, however the excess acid is spread by water movement through the soil; and
- Potential Acid Sulfate Soils (PASS) are soils which contain iron sulfides, but which have not been oxidised. These soils are generally kept from contact with air by permanent waterlogging or the density of the soil profile, keeping the reaction at equilibrium. In this state, the soils are generally non-acidic and are considered harmless to the environment. However, oxidation of such soils through disturbance has the potential to generate acidic conditions.

Commonly, an ASS profile will consist of a combination of both AASS and PASS material as a result of ongoing chemical reactions in response to environmental changes including groundwater fluctuations and seasonal soil moisture changes.

In NSW, development of land subject to ASS occurrence is managed at a planning level in accordance with the *Acid Sulfate Soil Manual* (1998) prepared by the Acid Sulfate Soil Management Advisory Committee (ASSMAC). Local Environmental Plans (LEP) also provide a regulatory regime for the sustainable management of ASS. The ASS Manual provides guidance on the assessment of ASS conditions and appropriate management strategies for development of ASS identified land.

2.2 Laboratory Assessment Guidelines

The assessment of site soil conditions with respect to PASS/ASS occurrence is completed in accordance with the guidance provided in ASSMAC (1998). The requirement to manage soils for ASS is evaluated by comparison of laboratory analysis results with Site Action Criteria (SAC) developed based on three broad soil texture categories. The SAC is based on the percentage of oxidisable sulfur or equivalent acid trail (i.e. titratable actual acidity-TAA or titratable potential acidity-TPA) results. There are two categories based on the scale of the proposed disturbance:

- SAC for small scale (less than 1000 tonnes) works based upon the texture of the soil material; and
- SAC for large scale (more than 1000 tonnes) works adopting the most sensitive criterion, being that of coarse textured soils in small scale works.

Table 2.1: ASSMAC Site Action Criteria based on General Soil Texture Categories

Type of material		Action Criteria 1-1000 tonnes disturbed		Action Criteria if more than 1000 tonnes disturbed	
Texture Range. McDonald at al. (1990)	Approx. clay content (%<0.002 mm)	Sulfur trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+ /tonne (oven-dry basis) e.g., TPA or TSA	Sulfur Trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+ /tonne (oven-dry basis) e.g., TPA or TSA
Coarse Texture Sands to loamy sands	≤ 5	0.03	18	0.03	18
Medium texture Sandy loams to light clay	5-40	0.06	36	0.03	18
Fine texture Medium to Heavy clays and silty clays	≥ 40	0.1	62	0.03	18

Exceedance of the SAC attributable to PASS/ASS material generally triggers the need to prepare a management plan and is based on the percentage of oxidisable sulfur (or equivalent TPA, TAA) for broad categories of soil. However, it is noted that other soil properties and constituents may cause acidic conditions in soils that are not related to PASS/ASS conditions. This may include sources of organic acidity where the soils have a pH of less than 5 and positive titratable actual acidity (TAA) or titratable potential acidity (TPA) but have no detectable sulfur source (i.e. no S%). In this case, exceedance of the Acid Trail SAC does not trigger treatment of these soils.

Given the nature of the conditions at the site and with consideration to the soil type identified during the previous investigations works, the SAC adopted for assessment and management of PASS/ASS at this site are:

- Sulfur Trail Criteria (S_{pos} or S_{Cr} %) > 0.03 %; and
- Acid Trail Criteria (TSA, TPA) > 18 mol H^+ / tonne soil.

2.3 Waste Classification Guidelines

Section 105 of the *Contaminated Land Management Act 1997* (CLM Act) allows the Environment Protection Authority (EPA) to “make or approve” guidelines for any purpose related to the objects of the Act. In addition to ASSMAC (1998), this management plan has been prepared with reference to the following:

- *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014a)
- *Waste Classification Guidelines Part 4: Acid Sulfate Soils* (EPA 2014b)
- *Protection of the Environment Operations Act 1997* (POEO Act) and associated regulations.

3. Site Condition & Surrounding Environment

3.1 Identification

The location of the assessment area within the site and surrounds is shown on **Figure 1**. The current site layout and features are shown in **Figure 2**. Site details are summarised in **Table 3.1** and discussed in detail in the following section.

Table 3.1: Summary Site Details

Lot / DP Number	Lot 140 in DP 550194 and Lot 141 in DP 550194
Street Address	339-349 Horsley Road, Milperra, NSW
Site Area	Approximately 3.4 ha
Local Government Authority	City of Canterbury Bankstown
Current Zoning	Zone IN1 General Industrial, Bankstown Local Environment Plan 2015
Geographic Coordinates (MGA 56)	E: 314529 N: 6243154
Current Land Use	Operational Warehouses, Metal Fabrication, Offices, and Material Storage

3.2 Site Description

The following details regarding site is abstracted from documentation prepared by JBS&G (2022a). A detailed site inspection was completed by an experienced JBS&G environmental consultant on 7th July 2022, and relevant details are documented below.

The site comprised two rectangular lots surrounded by commercial and industrial businesses, as well as the Western Sydney Bankstown University campus to the south of the site. The site was relatively flat, however was built-up in elevation relative to the neighbouring warehouses to the north.

The site consisted of almost entirely concrete hardstand, comprising two warehouses within the northern lot (Lot 141) and one in the south (Lot 140). The southern warehouse was primarily used for metal fabrication and production of steel products. Material and product storage was observed within the larger northern warehouse, with the smaller of the two appearing vacant and unused.

Minor grassed areas were identified within the eastern portion of the site, bound by Horsley Road and the adjacent site parking areas. Truck entry and exit points were surfaced with bitumen of variable quality, with road plates in use across some areas which became muddy during wet weather.

Two underground storage tanks (USTs) were present in Lot 141 (confirmed previously by a ground penetrating radar [GPR] survey) near the roadway between the two warehouse buildings. Two above ground storage tanks (ASTs) and a raised wash bay area were also identified adjacent to the vacant warehouse.

At the time of the inspection, no significant staining or odours were identified within the site. No asbestos containing material (ACM) was observed on the ground surface, however, a fragment was identified within fill material beneath the warehouse in Lot 140. The fragment was removed during the investigation, and the surrounding soils validated. No other potential visual indicators of contamination were observed at the site.

4. ASS Assessment Data

4.1 Desktop Assessment of Published Data

A review of the *Acid Sulfate Soil Risk Map for Liverpool*⁴ indicates that site area is surrounded by areas of “high probability” and “disturbed terrain” to the west and south, and “low probability” to the north, where site assessment for the presence of potential acid sulfate soils is required.

4.2 Intrusive Investigation Data

The DSI has been undertaken in two stages, a Limited DSI (JBS&G 2022d⁵) and a data gap assessment to supplement JBS&G (2022a) and reported herein. The combine assessments presented as a DSI for the site. A summary of both the current and historical sample locations are provided in **Figure 3**.

As part of the investigation JBS&G (2022a), the site was screened for the presence of PASS/ASS, prior to laboratory analysis. The soils were predominantly observed to comprise grey/brown/orange/red silty or sandy clays and clayey sands, with inclusions of gravels and gravel fines. Field screening did not identify indications of potential characteristics of PASS/ASS.

The suspension peroxide oxidation combined acidity and sulfur (sPOCAS) analysis results for two representative samples submitted for analysis are summarised in **Appendix A, Table A1**. The SAC of ‘greater than 1000 tonnes disturbed’ was adopted due to a lower acceptance in contaminate concentrations, given that potentially less than 1000 tonnes will be disturbed during foundation works as part of the site’s redevelopment.

In sample ‘BH101_0.2-0.3’ submitted to the laboratory, the peroxide oxidisable sulfur was reported to be 0.044 %S_{pos}. This result exceeds the adopted action criteria (greater than 1000 tonne disturbed) of 0.030 % S_{pos}. The total actual acidity (TAA) and total potential acidity (TPA) results for the opposing sample ‘BH102_1.4-1.5’ were reported at concentrations of 38 and 53 mol H⁺/tonne soil respectively, again above the adopted action criteria of 18 mol H⁺/tonne. However, with consideration to the minimal pH change and below LOR total sulfuric acidity (TSA), the residual risk associated with ASS/PASS was considered low.

Based on the results above and consideration of client requests, an ASSMP is required to be prepared as a precautionary measure to manage potential environmental risks associated with ASS/PASS within underlying material at the site.

⁴ *Acid Sulfate Soil Risk Map – Liverpool, Edition 2, 1997. 1:25 000 NSW DLWC*

⁵ *Limited Detailed Site Investigation, 339-349 Horsley Road, Milperra, NSW 2214, JBS&G Australia Pty Ltd, 23 February 2022(JBS&G 2022d)*

5. Management Procedures

The aim of the following management procedures is to implement appropriate mitigation measures such that the potential environmental impacts associated with any disturbance of this material are appropriately managed. Specifically, the objectives are to provide:

- A methodology for the identification of materials requiring management;
- Protocols for the on-site treatment and management of PASS/ASS materials;
- Soil quality targets for the treatment and on-site retention or removal of the affected materials; and
- A contingency framework in the event that the proposed treatment strategy fails.

5.1 Scope of Soil Disturbance Activities

As identified in **Section 2** and **4**, site investigations have not identify PASS/ASS conditions within natural underlying soils at the site. However, a review of ASS Class Zone 5 under maps provided in the Bankstown LEP 2015 indicated that the site is within a Class 5 area and within 80 m of a Class 3 area, stating that “works within 500 m of adjacent Class 1, 2, 3 or 4 land will likely trigger the requirement for assessment and may require management.” Minor excavation into the underlying natural material is proposed to occur at the site during implementation of the construction works and as such, consideration has been given to the potential for ASS/PASS characteristics to occur within the underlying in-situ natural material.

Proposed redevelopment works at the site includes the following:

- Demolition, decommissioning, and removal of site associated USTs/ASTs and underlying tank bedding material, pre-existing infrastructure and concrete hardstands and pavements;
- Minor excavation activities related to site leveling and warehouse establishment; and
- Construction of a warehouse facility within both Lot 140 and Lot 141.

5.2 Investigation of Occurrence of ASS and/or PASS Material

As limited field and laboratory assessment of ASS/PASS conditions has been completed within soils at the site, further investigation of the location and extent of these materials within areas of the site prone to ground disturbance should be undertaken either prior to the commencement of excavation works and/or sequentially as excavation materials extend vertically such that the material requiring management may be identified and treatment requirements established separate to non-ASS material.

To evaluate the potential presence and extent of ASS/PASS material, the following assessment activities should be undertaken by an appropriately qualified environmental consultant in accordance with the general philosophies outlined in ASSMP (1998) with regard to the identification of ASS/PASS material:

- Preliminary test sampling locations should be completed within the proposed excavation areas where soils are likely to be disturbed, based on current site plans;
- Visual inspection and sampling of representative soil profiles of damp to saturated soil at a frequency of no less than 1 per metre depth interval at each sampling location. Each sample should be the subject of field pH_f and pH_{fox} tests;
- Based on the inspection and field-testing results, at least one sample per material type per sampling location should subsequently be selected for sPOCAS or chromium reducible

sulfur (S_{cr}) laboratory analysis to confirm the presence/absence of ASS/PASS material requiring management; and

- The laboratory data will be used to identify anticipated liming requirements for ASS/PASS material types at the site.

5.3 Evaluation of Potential Management Strategies

In the event the requirement to manage environmental risks associated with PASS/ASS is identified, evaluation of options to minimise the level of disturbance and to mitigate the potential impact of disturbance of the materials is required. As per ASSMP (1998), potential mitigation approaches have been identified:

- Avoid ASS/PASS materials being encountered during works by not undertaking the proposed excavation works;
- Where material has already been disturbed, or where disturbance cannot be avoided, manage the potential for acid generation by neutralising disturbed materials and preventing movement of acid impacted water, followed by either reuse of the treated material, or off-site waste disposal;
- Where ASS/PASS materials have previously been disturbed, undertake works to mitigate the existing conditions, minimise the production of further acid during the proposed works and rehabilitate impacted areas;
- Treat identified ASS/PASS materials by allowing full oxidation of the sulfide component under controlled conditions followed by flushing the acid from the soil with water and neutralisation of the subsequent leachate, followed by reuse of the treated material, or off-site waste disposal; and
- Reburial of ASS materials beneath the permanent water table or beneath a dense soil profile which excludes oxygen exposure such as an engineered clay cap. This may be undertaken on-site if there are low lying areas where reburial and consequential flooding of the soil profile or construction of a suitable capping layer can be undertaken as part of works, or at an alternative off-site location provided that sufficient stabilisation of material is undertaken to minimise acid generation during transportation and handling.

The potential suitability of the various options is further discussed in the following sections.

5.3.1 Avoidance Strategies

Due to the design plans associated with the site's redevelopment, avoidance of excavation activities is impractical, therefore this strategy is not considered appropriate.

5.3.2 Management by Neutralisation

Neutralisation techniques can be used to treat ASS by the addition of chemicals that react with the produced acid to ensure that the acid is not released from the treated material. The neutralisation activities should result in the pH of the disturbed materials (soil and/or water) being between 5.5 to 7.5 and requires that PASS material disturbed during site activities be treated with the preferred neutralising agent.

Laboratory analysis is used to assess the levels of existing and/or actual acidity and indicates the level of neutralising capacity required to react with all potential acidity that may be generated during/following disturbance of the ASS/PASS material.

The potential uncertainty associated with the quantity of neutralising capacity to be added is commonly managed by the use of a factor of safety of 1.5 or 2 depending upon the level of uncertainty.

Sufficient capacity in terms of a suitable treatment area, machinery, budget to purchase the neutralising agent and time is necessary to successfully implement ASS/PASS neutralisation. Implementation of environmental controls is also necessary to ensure that all potentially acidic leachate produced during the treatment process is captured and adequately treated and that heavy metals which may be released during oxidation of ASS material are also appropriately managed.

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities.

For the purposes of this plan, the neutralising chemical is assumed to be high quality agricultural lime (aglime). The aglime should be fine ground (<1mm) calcium carbonate (CaCO_3) or calcite (limestone or marble powder). Consideration to neutralising chemicals other than aglime have been detailed in **Section 5.4.3**.

It is recommended that small scale treatment trials be implemented prior to broad scale implementation of alternative neutralising compounds. The small scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc.

In the event ASS/PASS materials are identified during the sites remedial and redevelopment works, sufficient supply of agricultural lime (aglime) will be required to be kept on site at all times. The quantity is based on requirements for the treatment of ASS/PASS to be neutralised within the treatment area. Additional quantities may be required for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.

ASS/PASS management by neutralisation is considered a suitable option for the proposed works as:

- The site covers a large area and will most likely be non-operational during redevelopment, therefore sufficient space is available to allow for the treatment of affected soils;
- The proposed works are able to be staged in a manner which will allow treatment of ASS material in a timely manner;
- Appropriate machinery to mix the soil and neutralisation chemicals can be supplied by appropriate contractors to complete the works at site; and
- Following successful completion of the neutralisation process, the treated soils are no longer considered to be ASS/PASS materials and so may either be reused on site or alternatively, may be removed off-site as waste.

5.3.3 Full Oxidation and Leachate Collection

This option requires the implementation of environmental controls to ensure that all acid produced is flushed from the soil as leachate. Similar to management by neutralisation, a suitable treatment area is necessary where material can be spread and reworked to allow oxygen to react with the sulfides in the soil and where all leachate produced can be captured and treated by neutralisation.

This method is considered not to be a viable option for the proposed works as the process of soil oxidation may take extended periods (weeks to months) to reach completion. In addition, given the low estimated volume of excavated material during ground disturbance works and the requirement to maintain environmental controls for this period, this option is considered undesirable when compared to the relatively low cost of neutralisation chemicals as discussed in **Section 5.3.2** above.

5.3.4 Reburial of ASS Material

As the site plans to undergo minimal deep excavations for the installation of concrete footings and drainage/sewer, the reburial of treated material is not considered an appropriate option.

5.3.5 Separation Techniques

Separation techniques are increasingly being implemented to reduce the quantity of ASS/PASS material requiring treatment in areas where works involve a large quantity of ground disturbance. These activities include the removal of fine ASS particles including pyrite and monosulfides from coarser grained soil particles. This results in two material streams, concentrated 'ASS fines' and non-ASS material which can be removed from the management process. Management of ASS fines would then involve implementation of other ASS management techniques such as reburial, neutralisation, etc.

Separation is typically implemented by creating a soil slurry where fine particles can be suspended in solution away from heavier soil particles using methods such as sluicing or cycloning. Typically, such methods require suitably grained soils such as sand or non-consolidated sediments and a significant water source to implement the separation.

Environmental controls are required during the separation processes to ensure that the ASS/PASS fines do not undergo oxidation prior to the implementation of other management measures and validation of the non-ASS stream would then be necessary to confirm that the ASS/PASS fines have been adequately removed.

On this site, separation techniques are considered not to be a viable management option as these techniques cannot be used as a standalone management option and as such the ASS/PASS fines once separated would still require further treatment. The use of separation techniques would require the construction of sluicing channels or installation of cyclone treatment equipment to manage the quantities of slurry produced during the treatment process and provide sufficient areas for drying of the separated non-ASS portions following separation of the ASS/PASS fines. In addition, observations made during fieldwork indicated that the presence of sand and non-consolidated material was somewhat limited.

5.3.6 Selection of Preferred Management Strategies

Evaluation of potential management strategies has identified the use of neutralisation techniques as the most appropriate technique for this site.

Management measures for identified ASS/PASS material during site remediation and redevelopment will include the application of neutralisation chemicals to insitu or stockpiled ASS/PASS material and the on-site reuse or off-site disposal of the treated media. This approach is considered to provide a cost effective, minimal disturbance risk management solution, given the low potential for and minimal identification of ASS at the site.

Management measures will also include the neutralisation (as appropriate) of drainage leachate produced during excavation and treatment works, if required. Following validation to confirm the acid generation potential of the material has been appropriately neutralised, the material will either remain at the site as fill material, or alternatively, will require off-site disposal as GSW as per the requirements of EPA (2014).

5.4 General Site Management Strategy

The site management strategy to be implemented during all site works in the event that ASS/PASS materials are identified and disturbed will ensure the following:

- Adequate treatment of ASS/PASS insitu or stockpiled material such that there is sufficient acid neutralizing capacity and no net acidity following stabilization (as measured through appropriate field testing and laboratory validation); and
- Water discharged from the treatment areas (including run-off and leachate) is neutral and discharged to stormwater once it has been shown to meet with the criteria specified in this plan or shall be reused on site, or alternatively reused on site for dust suppression.

Management shall also be undertaken consistent with the site RAP (JBS&G 2022c).

5.4.1 Pre-disturbance Works

Prior to the commencement of excavation works at the site, a works plan should be prepared by the appointed contractor which provides contingency measures for treatment of disturbed materials. Due to the minimal indications of ASS/PASS within soil examined by JBS&G (2022a), the pre-disturbance work plan relative to the site will make reference to the management strategy already in place in the event that ASS/PASS material are identified as part ground disturbance works.

5.4.2 Sediment Controls

Sediment controls should be installed at boundary points to prevent sediment loss in the event of heavy rainfall or severe weather conditions. Excavated and identified ASS/PASS material that is left exposed becomes prone to the leachate of contaminants, creating a higher risk to ecological receptors at the site. It is anticipated that these controls will be maintained until the completion of the ASS/PASS treatment works.

5.4.3 Neutralisation Chemicals

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities. For the purposes of this plan, the neutralising chemical is assumed to be high quality agricultural lime (aglime). The aglime should be fine ground (<1 mm) calcium carbonate (CaCO_3) or calcite (limestone or marble powder). In the event that neutralising products other than high quality aglime are selected for use, there are several issues that should be considered:

- Is there any potential environmental risk associated with use of the compounds (i.e. other components that may contaminate water, result in a much higher pH value (i.e. hydrated lime), stain treatment areas, etc); and
- Will the neutralising agent be of comparable effectiveness or will properties including: neutralising value, effective neutralising capacity, solubility, pH, chemical components, moisture content, impurities and particle size; require the quantity of agent addition to be varied by a consistent factor.

It is recommended that a small scale treatment trial be implemented at the commencement of site works prior to broad scale implementation of alternative neutralising compounds. The small scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc.

5.4.4 Material Treatment Area Design

A treatment area should be established prior to commencement of lime addition once ASS/PASS insitu material has been identified, giving consideration to the following:

- The treatment area should be isolated from major external surface water catchments, including overland surface water flow and potential flood water by ground surface contouring, installation of perimeter drains or bunds covered with an impervious layer.
- Once well mixed with a suitable quantity of neutralisation agent, the validation testing will be completed and the material will remain in place until receipt of the validation results. The material will then be cleared for beneficial reuse within the site.
- Contaminants resulting from oxidation of ASS/PASS should be collected, treated and/or managed on-site. Water discharges from the site must not have a significant impact on pH, buffering capacity, colour or ionic composition of the receiving water body (stormwater, groundwater, sewer, etc).

- A sufficient supply of aglime (or appropriate neutralizer) should be kept on site at all times for the treatment of PASS/ASS to be neutralised within the treatment area and for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.
- The supply shall be stored in a covered area to prevent accidental exposure to water and deterioration of the inherent neutralizing capacity. Such conditions may result in the clumping or surface crusting of particulate lime which can reduce the level of effectiveness in neutralising water or soil.

5.4.5 Surface Water Management

In accordance with the requirements of the POEO Act and Council development controls, no wastewater, chemicals, or other substances harmful to the environment shall be permitted to discharge from the site, including into the Council's stormwater system. Only clean, unpolluted water is permitted to be released from the site.

In the event that wastewaters are generated as part of redevelopment works or ASS/PASS material treatment, and in turn identified as not suitable for discharge to stormwater, water must be subject to on-site treatment to address contaminant concentrations (pH, turbidity/suspended sediment, heavy metals concentrations) prior to stormwater disposal or alternatively directed to the sewer of the Sydney Water Corporation (SWC).

5.4.6 General Site Management

All excavated material indicative of ASS/PASS must be treated as such until the soil is demonstrated to be non-PASS material or treatment effectively reduces the risk associated with the material and validation results meet the relevant specifications.

Bunding, diversion drains, contaminated water treatment/containment, etc may be used to contain surface water run-off from ASS/PASS storage and treatment areas. However, ASS/PASS materials must not be used in the construction of bunds and other diversion devices.

Equipment used in the treatment of ASS/PASS shall be washed with an alkaline solution at the completion of each work period to minimize corrosion of equipment.

5.4.7 Treatment of Excavated ASS/PASS Material

Treatment of ASS/PASS soils identified during redevelopment will comprise the addition of sufficient quantities of finely ground neutralising agent to treat all oxidisable S% and actual acidity and provide a factor of safety to compensate for potential impurities in the neutralising agent, non-homogenous mixing, and limitations to the solubility of the neutralising agent. Considering the minimal representative data, it is considered appropriate that a liming rate is to be established following the field screening and laboratory analysis of suspected ASS/PASS materials.

It is understood that the lime will be applied directly to the surface of any excavated ASS/PASS material to be mixed into the top 150-200 mm, to form a non-ASS capping layer. Mixing of the lime and soil may be undertaken by harrowing, rotary hoeing, using an excavator shaker bucket to blend the material, or similar equipment.

Care shall be taken to ensure that mixing occurs throughout the depth of the layer (0.2 m). The soil must be managed to achieve a consistency that will allow for thorough mixing of the soil and neutralising agent to ensure that the effective neutralisation occurs. This may require drying of the disturbed material (with associated management of any acidic leachate and other resulting contaminants), mechanical turning and breaking up of soil. Drying should not be undertaken during

foreseeable wet weather events due to the increased risk of runoff flushing acid from the material and into uncontrolled areas.

Following mixing, aglime shall be spread at a rate of approximately 5 kg lime/m² around the toe of excavated material, and around a 1 m perimeter between the toe of the material and across the exposed face of the bund to neutralise any leachate released from the soil. Once the soil has sufficiently dried that no more leachate is being released, the material should be turned to ensure that all leachate is released from the treatment area.

If there is a likelihood that neutralisation treatment of particular soils encountered during works (i.e. heavy clays) will not be effective for the soil type/s, a small scale trial to demonstrate that the proposal is practical should be performed before larger scale disturbance of this soil type.

5.4.8 Water Management During Treatment

Surface drainage that comes into contact with ASS/PASS materials has the potential to become acidic and contaminated with heavy metals leached from the acidified soil. Sources of water may include ground surface drainage associated with rainfall and leachate produced during treatment of excavated soils. In the event that surface water accumulates and it is identified that treatment is required to facilitate offsite discharge, the following outlines the management requirements.

In general, soil and water at the site is required to be managed under an earthworks Soil and Water Management Plan to be prepared by the Contractor prior to the commencement of site works. However, in addition to these requirements, water from within the treatment area will be required to be collected, assessed and treated prior to discharge from the site. Once pH and contaminant concentrations are considered suitable for discharge from the site, the water may be used for dust suppression at the site and/or released to the site stormwater system.

Water will be neutralised, where required by the addition of lime within a dedicated treatment tank. Lime shall be added incrementally and thoroughly mixed within the treatment vessel. Approximate lime application rates based on initial pH are provided in **Table 5.1** below.

Table 5.1 Treatment of Acidic Dewater

Water pH (Initial)	Agricultural Lime / 1000L Water
0.5	11.7kg
1.0	3.7kg
1.5	1.2kg
2.0	0.37kg
2.5	0.12kg
3.0	37g
3.5	12g
4.0	4g
4.5	1.2g
5.0	0.37g
5.5	0.12g

Lime addition and mixing shall continue until the pH of the water is within the range of 6.5 – 8.5.

5.4.9 Validation of Treated ASS/PASS Material

Following the application and mixing of lime to identified ASS/PASS material at the treatment pad, the material should be allowed to stand for a minimum of 48 hours prior to validation assessment. The spread soil should then be assessed to establish whether the following performance criteria have been achieved:

- The neutralising capacity of the treated soil must exceed the sum of the TAA and TPA of the soil, i.e. there is no net acidity in the soil as measured by sPOCAS / SCr < 0.03%S;

- Post neutralisation, the soil pH is greater than pH 5.5 (and preferably less than 9); and
- Excess neutralising potential should remain in the soil as all acid generation reactions may not be complete and so the soil may still have further capacity to generate acidity.

Validation testing using field tests to measure the soil/water pH shall be undertaken at a rate of ten samples per treatment batch (to a maximum quantity of 500 m³, or a rate of 1 sample per 25 m³ for batches less than 250m³). Field testing will include pH_f and post treatment peroxide pH_{fox}, with both required to meet the post neutralisation criteria noted above for all samples per treatment batch.

Confirmatory laboratory analysis (pH and sPOCAS / SCr) will be undertaken at a rate of five samples per treatment batch (to a maximum quantity of 250 m³, or a rate of 1 sample per 100 m³ for larger quantities). The samples obtained for laboratory analysis may be obtained by compositing three subsamples obtained from the treatment material to provide a broader indication of net acidity levels.

Validation samples will be collected following confirmation of the completion of the treatment works. Each sample should have its location logged with the laboratory validation sample identification so that laboratory results can then be matched to its in-situ location. Following additional applications of neutralisation chemicals, a greater density of validation sampling is necessary to confirm the successful neutralisation.

In the presence of positive field validation tests, laboratory analysis of validation samples may be employed to determine the level of net acidity and confirm that the treatment has been successful, or provide an indication of the quantity of further aglime application necessary to neutralise the soil.

If negative field tests occur but the confirmatory laboratory analysis results indicate that there is still net acidity, a further application of aglime will be mixed with the relevant material to ensure additional neutralisation capacity, prior to further confirmatory analysis.

Following receipt and logging of the successful laboratory validation results, the stabilisation works will be considered to have been completed appropriately. If the laboratory results indicate that the material requires further treatment, it should be treated as required prior to re-sampling.

5.4.10 Site Condition Monitoring

It is anticipated that monitoring of conditions will be undertaken by both the site contractors and an independent appropriately qualified consultant. Monitoring will occur in parallel with the commencement of site redevelopment works and will be implemented to ensure that the appropriate environmental controls are in place and the treatment strategy is minimising the environmental risk associated with identified ASS/PASS materials.

The following inspection/monitoring regime will be implemented during the site works period and documented as appropriate to demonstrate compliance with this ASSMP:

- The treatment area (if required) will be inspected daily by the Contractors with pH measurements of any retained leachate taken and recorded. If the leachate is significantly acidic (pH < 5.0), the material will be held until the laboratory results are available and the quantity of required additional lime application is known;
- A daily site inspection should be undertaken to assess potential ASS/PASS impacts to site surface water or local waterways with any evidence of impact (i.e cloudiness of water, red oxide smears, sediment) addressed prior to continuation of works; and
- If an on-site sump/collection basin is used to manage any surface water runoff within the ASS/PASS treatment area, monitoring points will be sampled and field tested, and the pH recorded every day by site contractors during active site activities.

Regular inspection of all soils, excavations, and treatment areas will be undertaken prior to and during redevelopment works to identify potential indications of ASS/PASS oxidation. These inspections should note:

- Unexplained scalding, corrosion or degradation of onsite steel equipment and surfaces;
- Formation of the mineral jarosite or other acidic salts in exposed or excavated soils;
- Areas of surface water blue-green, blue-white in colour or extremely clarified indicating high concentrations of aluminium;
- Rust coloured deposits on excavation faces, in drainage paths, on bunds, channels, etc indicating iron precipitates; and
- Such inspections should also identify the presence of unusual odours, including strong organic or sulfurous smells (i.e. rotten egg gas).

5.4.11 Removal of Neutralised ASS/PASS from the Site

Only material confirmed to be below the criteria listed in **Section 5.4.9** will be considered as stabilised ASS material for potential reuse within the site, or off-site removal as waste. A final round of field pH testing should be undertaken prior to loading of transport vehicles leaving site to ensure that pH levels remain above 6. Material to be removed from the site will be classified in accordance with current EPA (2014) requirements and disposed of to a licensed facility permitted to accept the material.

5.4.12 Emissions Complaints

Due to the nature of the activities and type of works required to be completed at the site, there is a potential for complaints to be received from members of the public relating to environmental emissions including:

- Sulfidic odour emissions arising from disturbance of ASS/PASS soil;
- Dust emissions arising from excavation, material handling and placement; and
- Visibly impacted surface water quality within the stormwater and gutters located in and adjacent to the site.

Monitoring of all environmental emissions shall be undertaken during the works as detailed in the Contractor's Works Plan and appropriate actions taken to further control emissions following receipt of a complaint. Such additional controls may include the following actions, required to be detailed in the Works Plan:

- Increased application of odour masking chemicals on odorous materials;
- Disturbance of soils during meteorologically favourable periods only;
- Additional application of dust suppression activities, including light water sprays; and/or
- Covering excavated materials to reduce dust potential, oxidation rates and associated release of odours.

6. Responsibilities

The selection of samples for environmental analysis as per **Section 5.3** shall be undertaken by a suitably qualified and experienced environmental or geotechnical consultant. Results of analysis shall be assessed and evaluated by a suitably qualified and experienced consultant.

Implementation of the physical treatment, material management and environmental controls portions of this ASSMP will be the responsibility of the appointed Contractor engaged to complete remediation works within the site. The monitoring of conditions, unless otherwise specified in the monitoring sections will be the responsibility of a suitable qualified environmental consultant who will regularly inspect the site, the treatment area and treatment activities and implement the validation assessments to document compliance with this ASSMP.

The Contractor should appoint a foreman or other responsible employee to undertake the appropriate monitoring activities as designated in this ASSMP. This person should be appropriately trained by the environmental consultant in all actions to be completed by the Contractor. Where doubt arises concerning the results of the inspections or of field test validity, the environmental consultant should be contacted for verification of appropriate actions.

The Contractor is not authorised to make any changes to this ASSMP or implement unapproved variations to the treatment and/or monitoring protocols outlined in this document unless explicit written approval is obtained from the environmental consultant prior to implementation of the changes.

Where ambiguity or conflicts in procedures arise, it is the Contractor's responsibility to seek clarification on appropriate actions from the environmental consultant.

ASS mitigation measures should be documented as they apply to all individual works activities to be undertaken at the site. All persons responsible for the works activities should be made aware of their responsibilities in writing and suitable ASS management training should be provided to those persons to ensure that the responsibilities can be achieved.

Where contingency actions are necessary, or in the event that non-compliance with the ASSMP is identified by the Contractor, the environmental consultant should be immediately informed in writing. The environmental consultant will then be obliged to provide a timely response documenting the necessary corrective actions.

7. Contingencies

In the event of unexpected events, including failure of management measures as described in this ASSMP, the associated environmental risk will be managed by the evaluation and implementation of the contingency procedures and mitigation strategies.

7.1.1 Failure of Initial Acid Neutralisation Treatment

As described in **Section 5.4.7** following the treatment of materials within the treatment pad area, validation sampling will be completed to assess the success of the neutralisation process prior to removal of the material from the holding area. If the validation testing indicates that neutralisation of the material is incomplete (i.e. $\text{pH} < 6$ or $S_{\text{pos}} > 0.03\%$), a further application of lime and repeat of the treatment procedure will be undertaken prior to further validation assessment. If the proposed techniques fail, further consideration may be given to alternative management strategies as outlined in **Section 5.3**.

7.1.2 Additional Water Management

In the event water volumes greater than the water treatment holding capacity are produced during site redevelopment activities, consideration should be given to off-site disposal of water via a licensed contractor or treatment of water using neutralisation chemical dosing within holding tanks prior to re-irrigation or off-site removal.

7.1.3 Material Storage Breach

In the event that any materials storage containment controls are breached, and stockpiled materials or chemicals have escaped (or have the potential to escape), then the management controls shall be rectified and investigations undertaken to review the adequacy of the controls and any improvements implemented. The Contractor's works plans shall include a documented process for identifying and responding to such incidents.

8. Conclusions

Previous investigations indicated the possible presence of PASS/ASS within insitu soils located within the site at depths greater than the vertical extent assessed by JBS&G (2022a). Management of material identified as ASS/PASS during the redevelopment of the site will be required as per the protocols outlined herein which, when successfully implemented, will minimise the environmental risks associated with disturbance of the ASS/PASS materials.

9. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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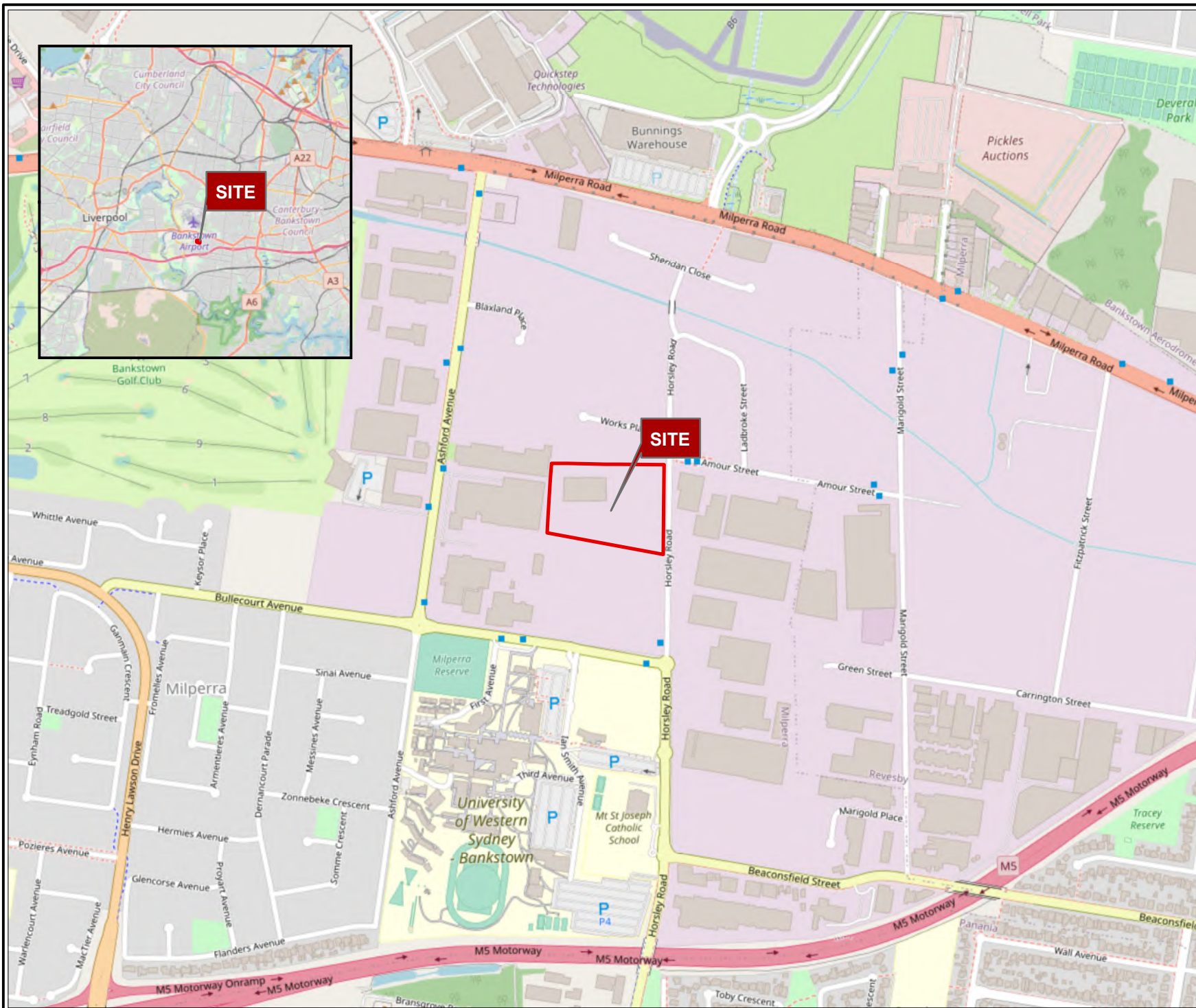
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history, and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend
 Approximate Site Boundary

Job No: 63429
 Client: Tactical Group
 Version: R01 Rev A Date 28/07/2022
 Drawn By: YY Checked By: MC
 Scale 1:10,000

 Coord. Sys. GDA 1994 MGA Zone 56
**339 – 349 Horsley Rd
Milperra NSW 2214**
SITE LOCATION

FIGURE 1



Legend

- Approximate Site Boundary
- NSW Cadastre (DFS1, 2022)
- Site Features**
- AdBlue AST
- Diesel AST
- Truckwash
- UST
- Waste Water Collection System
- Main Office
- Metal + Wool Storage
- Vacant Warehouse & Offices
- Occupied Warehouse & Metal Storage
- Occupied/Operational Metal Fabrication Warehouse



Job No: 63429

Client: Tactical Group

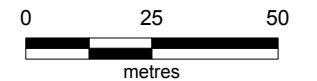
Version: R02 Rev A

Date 28/07/2022

Drawn By: YY

Checked By: MC

Scale 1:1,500



Coord. Sys. GDA 1994 MGA Zone 56

**339 – 349 Horsley Rd
Milperra NSW 2214**

SITE LAYOUT & FEATURES

FIGURE 2



Legend

- Approximate Site Boundary
- Sample Locations
 - Borehole (JBS&G 2022a)
 - Monitoring Well (JBS&G 2022a)
 - Soil Vapour (JBS&G 2022a)
 - Borehole (JBS&G 2022b)



Job No: 63429

Client: Tactical Group

Version: R02 Rev A Date 2/08/2022

Drawn By: YY Checked By: MC

Scale 1:1,500

0 25 50 metres

Coord. Sys. GDA 1994 MGA Zone 56

339 – 349 Horsley Rd
Milperra NSW 2214

SAMPLE LOCATIONS
(JBS&G 2022a and 2022b)

FIGURE 3

SB 11	Depth (m)	Date	Concentration (mg/kg)	Criteria
Analyte				
F2 (C-D-C 15 less Naphthalene)	0.25-0.3	15/03/2022	260	NEPC (2013) ESLs for Comm/Ind, Coarse Soil



BH 106	Depth (m)	Date	Note
Analyte			
Asbestos	0.4-0.5	7/07/2022	Asbestos Fragment "FRAG20220708_01"

Legend

 Approximate Site Boundary

Site Features

 Truckwash

Sample Locations

● Borehole (JBS&G 2022a)

● Monitoring Well (JBS&G 2022a)

✕ Soil Vapour (JBS&G 2022a)

● Borehole (JBS&G 2022b)



Job No: 63429

Client: Tactical Group

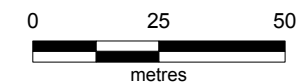
Version: R02 Rev A

Date 2/08/2022

Drawn By: YY

Checked By: MC

Scale 1:1,500



Coord. Sys. GDA 1994 MGA Zone 56

**339 – 349 Horsley Rd
Milperra NSW 2214**

**SOIL EXCEEDANCES
(JBS&G 2022a and 2022b)**

FIGURE 4



Legend

 Approximate Site Boundary

Site Features

AdBlue AST

Diesel AST

Truckwash

UST

Waste Water Collection System

Remedial Areas

AST & Tank Pit Material

UST & Tank Pit Material

Asbestos Remediation Area (1mx1m)

● Borehole (JBS&G 2022b)



Job No: 63429

Client: Tactical Group

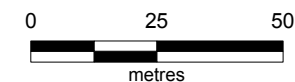
Version: R02 Rev A

Date 7/09/2022

Drawn By: YY

Checked By: MC

Scale 1:1,500



Coord. Sys. GDA 1994 MGA Zone 56

**339 – 349 Horsley Rd
Milperra NSW 2214**

**REMEDIAL AREAS
(JBS&G 2022a and 2022b)**

FIGURE 5

Appendix A Summary of SPOCAS Results and Field Results

Table A1 - Acid Sulfate Soil Sample Results

Project Number: 63429

Project Name: Milperra ASSMP 2022



Soil Sample ID	pH _{KCl}	pH _{ox}	TAA (mol H ⁺ /tonne)	TPA (mol H ⁺ /tonne)	TSA (mol H ⁺ /tonne)	S _{POS} %	a-ANC _E (mol H ⁺ /tonne)	SPOCAS-Net Acidity (mol H ⁺ /tonne)	Liming Rate
ASSMAC Assessment Guidleines (>1000 tonne disturbed)			18	18	18	>0.03			
BH101_0.2-0.3	6.3	6.5	<2	<2	<2	0.044	24	<10	<1
BH102_1.4-1.5	4.4	4.8	38	53	15	0.012	n/a	42	3.1

7/7/22.

+15 min

Sample Name	Water		Hydrogen peroxide		Comments
	pH Initial	pH Final	pH Initial	pH Final	
BH100-0.4-0.5	5.44	← initial	5.61		little / no reaction
+5m	6.68		5.29		↓
+10m	6.93		5.34		
+15m	7.04	← final	4.92	$\Delta = 0.69$	
BH100-1.7-1.8	5.18		4.88		slight bubbling
↓	5.51		5.28		↓
	5.75		3.31		
	5.89		3.20	$\Delta = 1.68$	
BH100-0.2-0.3	4.96		5.13		little / no reaction
↓	4.86		3.94		↓
	4.50		3.61		
	4.63		3.42	$\Delta = 1.71$	
BH101-0.9-1.0	4.98		4.97		slight bubbling
↓	5.55		4.05		↓
	5.76		3.74		
	5.85		3.66	$\Delta = 1.31$	
BH102-1.4-1.5	4.88		4.02		slight bubbling
↓	6.72		2.77		↓
	6.63		2.86	1.34	
	6.50		3.10	$\Delta = 0.92$	
BH102-0.4-0.5	5.31		5.67		slight bubbling
↓	7.60		5.50		↓
	7.52		5.64		
	7.30		4.73	$\Delta = 0.94$	
BH107-0-0.1	5.01		5.52		slight bubbling
↓	5.67		5.31		↓
	6.23		5.16		
	6.39		4.93	$\Delta = 0.59$	
BH107-0.4-0.5	5.31		4.93		slight bubbling
↓	6.10		4.21		↓
	6.42		4.10		
	6.08		4.41	$\Delta = 0.52$	

8/7/22

ACID SULFATE SOIL FIELD RESULTS

Sample Name	Water		Hydrogen peroxide		Comments
	pH Initial	pH Final	pH Initial	pH Final	
BH105 - 0.2-0.3	5.23		5.30		no reaction
↓ +5min	4.96		5.42		" "
↓ +10min	4.63		6.21		" "
↓ +15min	4.50		6.18	$\Delta = -0.88$	no reaction
BH105 - 0.9-1.0	5.86		5.19		no reaction
↓ *	5.28		5.07		" "
↓	4.92		5.08 ← 5.64		" "
↓	4.78		5.74	$\Delta = -0.55$	no reaction
BH103 - 0.9-1.0	5.81		5.16		no reaction
↓ *	5.01		5.08 ← 4.12		" "
↓	4.89		5.08 ← 5.21		" "
↓	4.81		5.98	$\Delta = -0.82$	no reaction
BH103 - 1.4-1.5	5.08 ← 5.45		5.12		no reaction
↓	4.79		4.29		slight bubbles
↓	4.70		5.67		" "
↓	4.72		5.98	$\Delta = -0.86$	no reaction
BH104 - 0.4-0.5	5.08 ← 5.32		5.17		no reaction
↓	4.75		* 3.81		slight bubbles
↓	4.83		4.29		" "
↓	4.89		4.58	$\Delta = 0.59$	no reaction
BH104 - 2.9-3.0	4.87		4.94		no reaction
↓	4.93		4.10		slight bubbles
↓	5.13		6.12		" "
↓	5.18		5.99	$\Delta = -1.05$	no reaction
BH106 - 0.4-0.5	5.69		5.08		no reaction
↓	5.37		4.45		" "
↓	5.21		5.86		" "
↓	5.16		5.89	$\Delta = -0.81$	no reaction
BH106 - 0.9-1.0	6.11		4.90		no reaction
↓	5.46		4.41		" "
↓	5.32		5.31		" "
↓	5.41		5.64	$\Delta = -0.74$	no reaction
BH108 - 0.4-0.5	4.51		5.52		no reaction
↓	4.93		4.78		" "
↓	4.70		5.02		" "
BH108 ↓	4.65		5.34	$\Delta = -0.18$	no reaction

8/7/22

pg. 2 of 2.

SAMPLE NAME	pH (W)	pH (HP)	Comments.
BH108-0.9-1.0	5.78	5.36	no reaction
+5mm	5.39	5.19	slight bubbles
+10mm	5.14	6.07	" "
+15mm	5.06	5.95	no reaction $\Delta = -0.59$
BH109-0.2-0.3	5.72	5.30	no reaction
+5mm	5.01	5.46	slight bubbles
+10mm	5.26	5.86	" "
+15mm	5.31	6.01	no reaction $\Delta = -0.71$
BH109-0.4-0.5	5.96	6.23	no reaction
+5mm	5.58	6.19	" "
+10mm	5.46	6.07	" "
+15mm	5.37	6.05	no reaction $\Delta = 0.18$

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		Name	Name	Signature	Date
A	Massimo Chapman	Seth Molinari	Joanne Rosner		09/08/2022





Appendix M Unexpected Finds Protocol Heritage (Extract from Austral ACHA)

Construction Environmental Management Plan

339 and 349 Horsley Road, Milperra (Lot 140 and 141 DP 550194)

Hale Capital Development Management Pty Ltd

SLR Project No.: 630.030737.00001

16 August 2023

10 RECOMMENDATIONS

The following recommendations have been developed after considering the archaeological context, environmental information, consultation with the local Aboriginal community, the findings of the archaeological survey and the predicted impact of the proposed development on archaeological resources. It is recommended that:

- 1) No further assessment or work is required to be undertaken for the study area. If during the project, unexpected finds or human remains, please follow recommendation 2
- 2) If unexpected finds occur during any activity within the study area, all works must in the vicinity must cease immediately. The find must be left in place and protected from any further harm. Depending on the nature of the find, the following processes must be followed:
 - a. If, while undertaking the activity, an Aboriginal object is identified, it is a legal requirement under Section 89A of the NPW Act to notify Heritage NSW, as soon as possible. Further investigations and an AHIP may be required prior to certain activities recommencing.
 - b. If, human skeletal remains are encountered, all work must cease immediately and NSW Police must be contacted, they will then notify the Coroner's Office. Following this, if the remains are believed to be of Aboriginal origin, then the Aboriginal stakeholders and Heritage NSW must be notified.
- 3) All contractors undertaking earthworks on site should be briefed on the protection of Aboriginal heritage objects under the *National Parks and Wildlife Act 1974* and the penalties for damage to these items.
- 4) A copy of this report should be forwarded to all Aboriginal stakeholder groups who have registered an interest in the project and to the AHIMS Registrar.



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