Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Sampling and Analysis Quality Plan

New Public School in Epping
86 Chelmsford Avenue, Epping

Prepared for
School Infrastructure New South Wales (SINSW)

Project 99671.03
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Douglas Partners
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
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1. Introduction

This Sampling and Analysis Quality Plan (SAQP) has been prepared to set out the proposed scope of works for a Detailed Site (Contamination) Investigation (DSI) at 86 Chelmsford Avenue, Epping (the site). The DSI is required to support the State Significant Development Application (SSDA) application for a proposed new public school.

The SAQP has been prepared in accordance with Standard Form Agreement SINSW00650/20 dated 8 April 2020 and Douglas Partners Pty Ltd (DP) proposal dated 17 November 2020 (Proposal ref: SYD201231). The work was commissioned by Johnstaff on behalf of the client, School Infrastructure NSW.

It is understood that this SAQP will be submitted to the appointed Site Auditor, Ms Rowena Salmon of Ramboll Australia Pty Ltd for comment and endorsement prior to the commencement of works.

The objective of this SAQP is to provide the proposed scope of works for the DSI to allow for feedback from the client and Site Auditor prior to commencement of works, and to allow for modifications to the proposed investigations if considered appropriate. The objective of the proposed DSI is to obtain data to assess the suitability of the site (from a contamination perspective) for the proposed school, and the need for additional works. It is noted that based on the identified contamination sources at the site, and current access restrictions it is anticipated that additional testing will be required following demolition of site structures and clearance of overgrown vegetation.

2. Scope of Works

The scope of works for this SAQP is:

- Review the available, relevant previous reports and summarise relevant information, including the conceptual site model (CSM);
- Review the proposed development plans;
- Undertake a site walkover for signs of concern and to assess suitable sample locations; and
- Provide the proposed scope and rationale for the DSI, including the fieldwork, assessment methods and quality assurance and quality control measures.

3. Site Identification and Location

The site is currently unoccupied, with infrastructure from the previous TAFE use remaining. Site details are shown in Table 1. The site location and boundary is shown in Figure 1 and Drawing R.001.D01, Appendix A.

Table 1: Summary of Site Details

Item	Details
Allotment Identification	Lot 1, Deposited Plan 582172
Street Address	86 Chelmsford Avenue, Epping
Site Area	20,680 m^2
Local Government Area	Parramatta City
Zoning	SP2 (Educational Establishment)
Current Land Use	Vacant (former TAFE property)

Figure 1: Site Location and Approximate Boundary (in red)

4. Previous Assessments

4.1 Reviewed Reports

The following relevant reports were available for review:

- Greencap *Preliminary Site Investigation TAFE NSW Epping Campus, Chelmsford Avenue, Epping NSW 2121* (Reference J154876, November 2018) (Greencap, 2018);
- GML Heritage *Epping South Public School Site (86 Chelmsford Avenue, Epping) Heritage Assessment*, Job 20-0115A, November 2020 (GML, 2020);
- DP *Report on Geotechnical Desktop Study New Public School in Epping, 86 Chelmsford Avenue, Epping*, Reference 99671.00.R.001.Rev1, dated April 2021 (DP, 2021a);
- DP *Report on Geotechnical Investigation New Public School in Epping, 86 Chelmsford Avenue, Epping*, Reference 99671.00.R.002.Rev1, dated April 2021 (DP, 2021b);
- DP *Report on Preliminary Site (Contamination) Investigation (PSI) New Public School in Epping, 86 Chelmsford Avenue, Epping*, Reference 99671.01.R.001.Rev1, dated April 2021 (DP, 2021c); and
- DP, *Report on Hazardous Building Materials (HBM) Survey New Public School in Epping, 86 Chelmsford Avenue, Epping NSW*, Reference 99671.02.R.001.Rev2, dated April 2021 (DP, 2021d).

DP (2021c) included a review of Greencap (2018) and GML (2020). Relevant information from these reports was covered in the PSI (DP, 2021c), which is discussed in Section 4.3.

DP (2021b), (2021c) and (2021d) were undertaken concurrently. The PSI (DP, 2021c) included a review of all of the geotechnical investigation (DP, 2021b) field results and analysis of soil samples from 15 of the total 16 boreholes and test pits utilised for the combined field investigation programme.

The borehole or test pit locations referenced in this section are shown on Drawing R.001.D03, Appendix A.

4.2 Geotechnical Investigation (DP, 2021b)

DP (2021b) included the following geotechnical model for the site:

> '*The development area is underlain by variable depths of fill over residual clays in most areas. Residual clays are derived from weathering of the Wianamatta Group bedrock and are typically stiff to hard, medium to high plasticity and moderately to highly reactive.*
>
> *The fill and residual clays are underlain by a weathered Minchinbury Sandstone and Ashfield Shale profile which is typically very low to low strength to the termination depths of the rock-cored boreholes. Defects and weathered seams were present throughout the bedrock profile, as well as bands of medium and high strength rock.*
>
> *Groundwater was measured at a depth of 5.2 m (RL 112.4 m AHD) in the monitoring well at BH02*.'

4.3 Preliminary Site (Contamination) Investigation (DP, 2021c)

DP (2021c) included a review of the site history and condition, development of a preliminary conceptual site model (CSM), logging soils / rock from 16 locations (a combination of test pits and boreholes) analysis of soil from 15 locations. The bore locations were selected for the purposes of DP (2021b) and generally targeted the area of the proposed new buildings. These were opportunistically sampled for contamination purposes. The test pit locations were selected to provide general site coverage.

The PSI identified eight potential areas of environmental concern (PAEC) which could be potential sources of contamination. These are summarise in Table 2, Section 7 of this SAQP.

The identified contaminants of potential concern (COPC) at the site comprised:

- Heavy metals (including As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Total recoverable hydrocarbons (TRH);
- Benzene, toluene, ethylbenzene and xylenes (BTEX);
- Polycyclic aromatic hydrocarbons (PAH);
- Organochlorine pesticides (OCP);
- Organophosphorus pesticides (OPP);
- Polychlorinated biphenyls (PCB);
- Volatile organic compounds (VOC)
- Phenols;
- Asbestos;
- Synthetic mineral fibres (SMF);
- Herbicides (glyphosate, paraquat and diquat);
- Possible use of other unidentified herbicides and fungicides; and
- Unidentified Oxidising Agent.

Fill soils were encountered to depths of 0.53 m to 1.64 m below ground level (bgl), underlain by residual clay and sandstone and / or siltstone bedrock. Potential building debris, ash and charcoal were observed in several test locations. Groundwater was not observed in any test locations during excavation or drilling (but was recorded in a groundwater well constructed as part of the geotechnical investigation as noted in Section 4.2).

No contamination of concern in soil was recorded by the laboratory analysis for the PSI. Hazardous building materials, including asbestos were identified in site buildings, and fibre cement was observed in a bag at the ground surface as discussed in Section 4.4.

The PSI considered that the site history and walkover indicated a potential for contamination to be present, and it was recommended that a DSI be conducted to provide a more thorough assessment of contamination, including for analytes not included in the PSI, and to confirm the need or otherwise for remediation.

Based on the results of the PSI it was considered that the site could be made suitable for the proposed new public school subject to the findings of the DSI and upon the implementation of any remedial measures that are deemed necessary based on the results of further testing.

4.4 Hazardous Building Material Survey (DP, 2021d)

DP (2021d) identified presence / assumed presence of hazardous building materials (HBM) in current site buildings / structures: asbestos (friable and non-friable), synthetic mineral fibres (SMF), lead paint, lead dust and polychlorinated biphenyls (PCB).

Asbestos / assumed asbestos cement fragments were identified in a bag at the ground surface adjacent to a glasshouse, and on the floor of another glasshouse.

5. Site Condition and Surrounding Environment

5.1 Site Layout

Figure 2, below provides an extract of a survey plan of the site by Chase Burke Harvey (reference 2016195, dated 27/07/16) with site structures labelled. A larger plan is provided as Drawing R.001.D02, Appendix A.

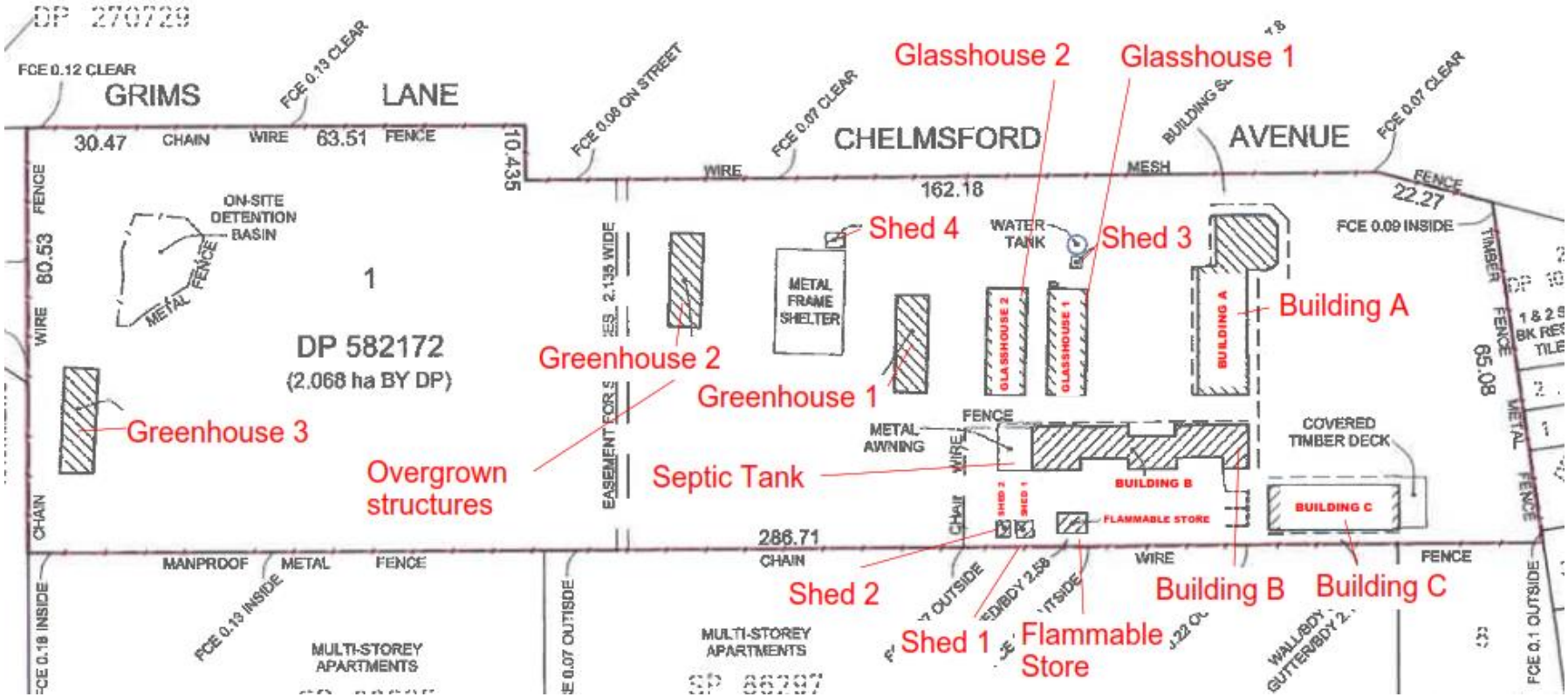


Figure 2: Site Structures (after Chase Burke Harvey survey reference 2016195, dated 27/07/16)

5.2 Site Observations

A site walkover was undertaken as part of the scope for DP (2021c) and again by an experienced environmental consultant on 25 November 2020 to assist in the development of this SAQP. Site photographs are provided in DP (2021c).

The following pertinent observations were made:

- Several single-storey brick and masonry buildings, including one building (Building B) with large roller doors suitable for oversize access to two workshop areas;
- The western workshop area in Building B was observed to have signage of the wall indicating storage locations for various products / fertilisers, namely: lime, muriate of potash, sulphate of potash, zinc sulphate, urea, copper sulphate, calcium nitrate borax, nitram, and banana special;
- Several glasshouses / greenhouses and sheds were observed to be present;
- Paved parking lots, roads, and footpaths between buildings;
- Various product storage bins, with aggregate, bark chips and a possible 'topsoil' product observed to be present in the bins;
- One Besser Block shed (the Flammable Store) and two metals sheds (Sheds 1 and 2) apparently used for storage of dangerous goods, chemicals and fertilisers/ soil ameliorants were present in the south east of the site, near the southern boundary (the 'Dangerous Goods Stores'). The sheds were on a built up area with a retaining wall to their south;
- The Besser Block Flammable Store had external signage for 'Flammable Materials' and 'Flammable Liquid' and cabinets consistent with previous fire extinguisher storage;
- The Besser Block Flammable Store had wooden floorboards underlain by a concrete slab. An access point for the underfloor areas was observed, and the concrete slab had been removed at this access point. Battery charging cables were recorded to be present. Dark staining was observed on the floor boards in one area, and appeared to be related to a leak in the roof at this location;
- Shed 1 had external signage for 'Flammable Materials', 'Flammable Liquid' and instructions for mixing and spraying of 'hazardous chemicals';
- A small bunded area was observed to the east of Shed 1, adjacent to the signage for the mixing and using of spray 'hazardous chemicals';
- Shed 1 had a concrete floor, with a plastic conduit placed vertically into the floor;
- To the west of Shed 2 a brick structure was observed below the shed floor level, with a plastic container filled with a dark, oily liquid. A plastic conduit, consistent in size with that observed in the floor of Shed 1, was observed to be entering the structure and apparently discharging into the container;
- Shed 2 was observed to have a concrete floor and wooden pallet-style storage areas. Bags of fertilisers (lawn food, organic life pellets, Banana Special, Boost Pellets and Blood and Bone) were observed. Labels and signage recorded the former storage and use of 'Roundup' / 'Glyphosate Green 360' and 'Spray Seed';
- A concrete water tank and adjacent metal shed (Shed 3) were present in the area of greenhouses. Signage indicated that Shed 3 had previously housed a pump;

- One shed labelled as Oxidizing Agent was observed adjacent to one of the green houses;
- A circular hole in the concrete slab was observed adjacent to the Oxidizing Agent Store;
- Bag taped up labelled as Asbestos Waste on the ground surface near the Oxidizing Agent Store during the PSI. This was not present during the walkover on 25 November 2020, which is consistent with advice from School Infrastructure NSW that they were looking to dispose of this waste;
- Garden beds and metal piping were observed in the glasshouses, including with signage 'Danger Hot Pipes;
- Some off-site powder, possibly a fertiliser / soil ameliorant was observed at the ground surface in the area of Greenhouse 1. No vegetation was observed to be growing in the immediate vicinity of the powder, consistent with various fertilisers which can 'burn' plants if they are directly applied;
- Overgrown vegetation was present over much of the site, particularly in the western portion;
- Various garden beds were observed;
- Dilapidated structures, including glasshouses and greenhouses were observed. An area south of Greenhouse 2 had various overgrown structures (e.g., steps, a concrete slab, decking and an ornamental pond);
- Overgrown mounds were observed at the crest of the slope in the central portion of the site, and appear likely to be mounds of soil;
- An on-site detection (OSD) basin was present in the west of the site, with a channel from the basin to the western site boundary;
- Some small concrete slabs, pits and other service infrastructure were observed over the site; and
- Various debris (e.g., plastic pots, pipes) was observed over the site. This included a black plastic container which was observed on the ground in an area of trees in the south western corner of the site. It was not labelled but appeared to have a capacity of approximately 20 L, and once opened was observed to be full with an oily, sweet smelling liquid. No signs of spillage or staining were observed on the adjacent ground.

5.3 Surrounding Land Use

The predominant adjacent land uses comprise:

- North: Low-density residential;
- East: Low-density residential;
- South: High-density residential; and
- West: High-density residential and recreational open space (Mobbs Lane Reserve).

5.4 Environmental Setting

5.4.1 Topography

The regional topography slopes downwards to the south-west.

The site topography generally slopes downwards to the south west, with the north east portion of the site located on a locally elevated and relatively flat area (top of a ridge), as shown in Figure 3. Ground levels range from approximately RL 104 m to RL 116 m relative to Australian Height Datum (AHD).

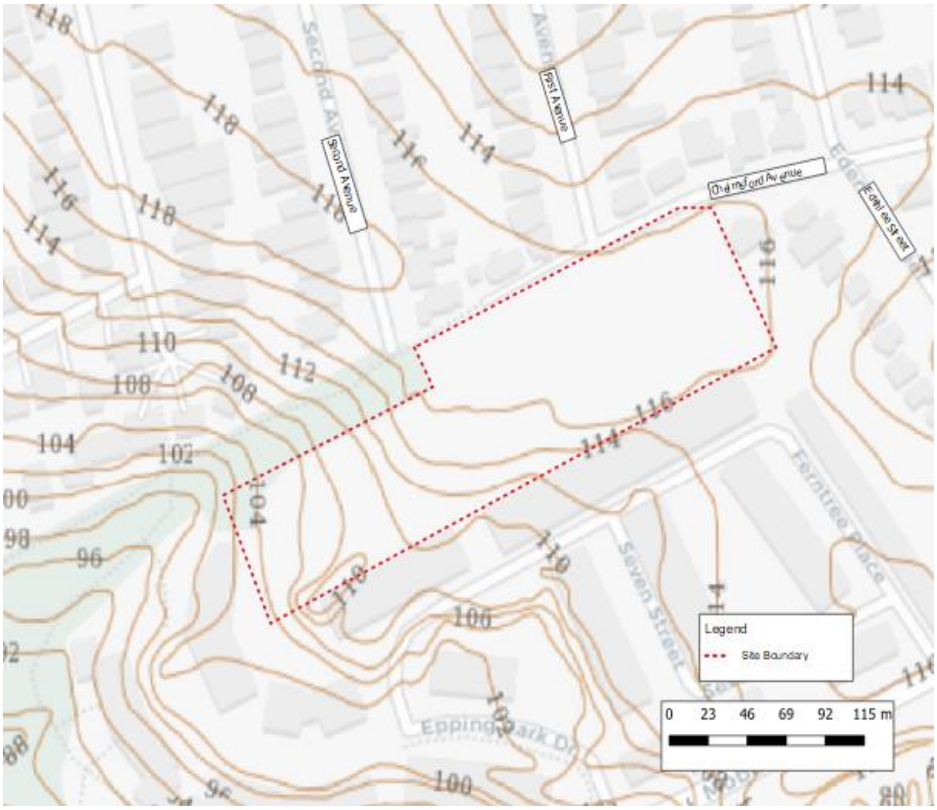


Figure 3: Site topography with 2 m surface contours relative to AHD

5.4.2 Site Geology and Soil Landscape

Published Geological Survey of NSW Sydney, 1:100 000 Geology Sheet indicates that the site is underlain by Bringelly Shale, which is the uppermost unit of the Wianamatta Group. Bringelly Shale typically comprises shale, carbonaceous claystone, laminite (finely interbedded sandstone and siltstone), fine to medium grained lithic sandstone, rare coal and tuff.

Soil Conservation Service of NSW, Sydney 1:100 000 Sheet indicates that the site is underlain by the Glenorie soil landscape group. The Glenorie soil landscape is an erosional soil landscape comprising a topography of undulating to rolling low hills on Wianamatta Group shales, with local relief of 50 m to 80 m and slope gradients of 5% to 20%. Soils underlain by the Glenorie soils landscape are typically shallow to moderately deep on crests, moderately deep on upper slopes, and deep on lower slopes and drainage lines.

5.4.3 Acid Sulphate Soils

Australian Collaborative Land Evaluation Program, Acid Sulfate Soils Risk Map [http://www.asris.csiro.au/arcgis/rest/services/ASRIS/Acid_Sulfate_Soils/MapServer] indicates that the site is in an area of low probability of Acid Sulphate Soil (ASS) occurrence.

Further assessment of ASS is not considered to be required.

5.4.4 Surface Water and Groundwater

An OSD basin is present in the west of the site, with a drainage line from the basin to the western boundary. The closest identified creek is Terrys Creek approximately 200 m south-west site. Terrys Creek is a tributary of the Lane Cove River.

DP (2021c) (refer to Section 4.3) did not identify any downgradient beneficial use of groundwater.

6. Proposed Development

The proposed development is for the establishment of a new K-6 Public School, master planned to cater for up to 1,000 students.

- Demolition of existing structures associated with the former use of the site as a TAFE campus;
- Construction of new buildings on the eastern and central portions of the site. The works are proposed to be undertaken in stages. Facilities which will generally include:
  - Home bases (classrooms) suitable for a school population of 1,000 students;
  - Administration and staff areas:
  - Hall and canteen;
  - Library;
  - COLA;
  - Special education unit; and
  - Special programs area.
- Play spaces in various locations;
- Accessible paths linking the school facilities; and
- A staff car park accessed from Second Avenue.

The proposal will also require potential remediation of the land and tree/vegetation removal. The works are proposed to be undertaken in stages. The application will be lodged as a concept development application. The application will also seek approval for the Stage 1 works. The Stage 1 works will provide a total of 25 home bases and associated facilities together with a hall and canteen, administration facilities and play spaces. Car parking for the Stage 1 development will also be provided.

7. Conceptual Site Model

A Conceptual Site Model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM is designed to provide the framework for identifying how a site became contaminated and how potential receptors may be exposed to contamination either in the present or the future *i.e.,* it enables an assessment of the potential source - pathway - receptor linkages.

Potential Sources

Based on the previous investigation reports reviewed, and the site walkover, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified, as discussed in Section 4.3 and summarised in Table 2, below.

Table 2: Summary of Identified Potential Areas of Environmental Concern

Source	Description	Comment	Contaminants of Potential Concern (COPC)
S1	Former agricultural land use, possibly grazing and orchards	Potential for residual contamination generally considered to be low	Metals, OCP, OPP
S2	Demolition / deterioration of former buildings	Possible hazardous building materials (such as asbestos, lead, SMF and PCB) may have contaminated soils. Impacts may have been spread over the site due to earthworks / levelling following demolition of structures.	Asbestos, lead (in paint and dust in buildings)
S3	Potential disturbed / levelled / filled ground	Potential for fill of unknown source / quality and spreading of localised areas of contamination over the site. The presence of fill was confirmed in the PSI (DP, 2021c).	Metals, TPH, BTEX, PAH, PCB, OCP, OPP and asbestos
S4	Former adjacent television studio	The land directly south of the site was previously used as a television studio, with the site part of the television studio property. The television studio was down-gradient / cross-gradient of the site, and contamination (if any) is likely to have been remediated during subsequent redevelopment for residential land use.	TPH, BTEX, PAH
S5	Former down-gradient/ cross-gradient brickworks	A former brickworks / quarry site operated within 500 m of the site. The brickworks was down-gradient / cross-gradient of the site, and associated contamination is likely to have been remediated during subsequent redevelopment for residential land use.	TPH, BTEX, PAH, phenols

Source	Description	Comment	Contaminants of Potential Concern (COPC)
S6	Horticultural education land use	Likely to have included the storage, mixing and use of pesticides and herbicides.	Metals, TPH, OCP, OPP, herbicides, fungicides [1] and unidentified Oxidising Agent [2]
S7	Dangerous Goods / Chemical Storage (including adjacent bunded area)	Signs on buildings observed during the site walkover indicated the former storage of 'Oxidising Agent' and 'Flammable Material'. Indicators of chemical storage and use.	Metals, TPH, BTEX, PAH, PCB, OCP, OPP, herbicides, fungicides [1], phenols and unidentified Oxidising Agent [2]
S8	Deterioration of existing buildings. Bagged asbestos observed on ground	Possible hazardous building materials (such as asbestos, lead, SMF and PCB) may have contaminated soils. Impacts most likely adjacent to existing structures.	Asbestos, SMF [3], lead (in paint and dust in buildings) and PCB

Notes:

1. The PSI identified that the herbicides: glyphosate, paraquat and diquat have been used at the site. Given the previous land use the potential for use of other herbicides and fungicides, for which records of use are unavailable, was also identified. The potential for other herbicides will be assessed by screening analysis for phenoxy acid herbicides and triazine herbicides (selected due to the availability of SAC in NEPC (2013) for some of the component compounds) and for fungicides will be assessed by screening analysis for triazole fungicides (selected due to them being a commonly used fungicide in Australia).
2. The unidentified Oxidising Agent will be assessed by screening for pH.
3. SMF will be assessed by visual inspection only.

Potential Receptors

The following potential human receptors have been identified:

- R1: Future site users (primary school);
- R2: Construction and maintenance workers;
- R3: Adjacent site users (including residential and recreational open space);
- R4: Terrestrial ecology;
- R5: Surface water (Terrys Creek, fresh water body);
- R6: Groundwater; and
- R7: In-ground structures.

Potential Pathways

The following potential pathways have been identified:

- P1: Direct contact.
- P2: Ingestion and dermal contact;
- P3: Inhalation of dust and/ or vapours;

- P4: Surface water run-off;
- P5: Leaching of contaminants and vertical migration into groundwater; and
- P6: Lateral migration of groundwater providing base flow to water bodies.

A 'source - pathway - receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The potential source - pathway - receptor linkages considered to be applicable to the site, shown below in Table 3.

Table 3: Summary of Potentially Complete Exposure Pathways

Potential Source	Transport Pathway	Receptor
S1 to S8 COPC: metals, PAH, TPH, PCB, OCP, OPP, herbicides, fungicides, phenols, SMF, asbestos and Oxidising Agent	(P1) Direct contact (P2) Ingestion and dermal contact	(R1) Future site users (R2) Construction and maintenance workers
	(P3) Inhalation of dust and/ or vapours	(R1) Future site users (R2) Construction and maintenance workers (R3) Adjacent site users
	(P4) Surface water run off (P6) Lateral migration of groundwater	(R5) Surface water
	(P5) Leaching and vertical migration into groundwater	(R6) Groundwater
	(P1) Direct contact	(R4) Terrestrial ecology
	(P1) Direct contact	(R7) In-ground structures

8. Site Assessment Criteria

8.1 Soil Site Assessment Criteria

The soil site assessment criteria (SAC) are sourced from NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013) (NEPC, 2013). Based on the proposed use of the site as a primary school the SAC will be as follows:

- **HIL-A** - Health investigation levels for residential with garden/ accessible soil (includes primary schools);
- **HSL-A & B (vapour intrusion)** - health screening levels for vapour intrusion for low - high density residential;
- **EIL and ESL** - environmental investigation and screening levels for urban residential and public open space;
- **Management Limits** - Residential, parkland and public open space; and
- **HSL (direct contact)** - health screening levels for direct contact for low density residential. These thresholds will be sourced from CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater*, 2011 (CRC CARE, 2011), as referenced in NEPC (2013).

Other inputs which were considered in determining the applicable SAC are summarised in Table 4, below.

Table 4: Inputs to the Derivation of SAC

Variable	Input	Applicable To	Rationale
Depth of application	0 – 3 m depth	HIL	NEPC (2013) recommends that the HILs are apply generally to a depth of 3 m below the surface for residential use. This is also considered appropriate for the proposed primary school use. This HILs will also be used as a screening threshold for any results obtained below 3 m, along with qualitative consideration of the risk.
	Various, 0 - >4 m depth	HSL	The HSL are depth specific
	0 – 2 m depth	EIL/ ESL	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
	Full profile	Management Limits	The risk from contamination above the Management Limits will be considered for all depths.
Soil Texture	Clay, silt, and sand	HSL	Based on the variety of soil textures encountered at the site in the PSI (DP, 2021c)
	Coarse and fine	ESL, Management Limits	
Clay content	1% to 50% (sample dependant)	EIL (Cr	Conservative estimate based on the variety of soil textures encountered at the site in the DP (2021c).

Variable	Input	Applicable To	Rationale
Level of Protection	80%	EIL	Based on NEPC (2013) recommendations for urban residential and public open space.
Contaminant "age"	"aged" (>2 years)	EIL (metals)	Based on likely source of contamination being historic fill and land use.
Traffic volume	Low	EIL (Cu, Ni, Cr, Zn	Based on the site location away from main roads. Used for estimating background concentrations.
pH	6.6	EIL (Cu, Zn)	Based on the average of field results from DP (2021c). Three samples were tested, and values ranged between 6.1 and 6.9.
CEC	11.3 cmol/kg	EIL (Cu, Ni, Zn)	Based on the average of field results from DP (2021c). Three samples were tested, and values ranged between 9 and 14.
Organic Carbon content	1%	EIL (Cu)	Conservative estimate due to no testing having been undertaken. Given the previous landuse and lenses of organic matter observed in DP (2021c) actual organic carbon content is expected to be higher.

8.2 Groundwater Investigation Levels

The groundwater investigation levels (GIL) are sourced from NEPC (2013) or from sources adopted in NEPC (2013) (or their superseding sources). The closest identified creek is Terrys Creek approximately 200 m south west site. Terrys Creek is a tributary of the Lane Cove River. Terrys Creek is considered to be a freshwater ecosystem.

The GIL for the groundwater investigation will be adopted from the following sources:

- NEPC (2013) HSL-A & B - Health screening levels for vapour intrusion for Low - high density residential;
- The Australian and New Zealand Governments (ANZG), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018* (ANZG, 2018). The criteria will be based on the protection of aquatic ecosystems for slightly to moderately disturbed freshwater ecosystems[1];
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008). The thresholds for the Recreational Water GILs will be calculated in accordance with NHMRC (2008) based on NHMRC, NRMMC *Australian Drinking Water Guidelines 6 2011,* Version 3.2 [the ADWG]; and
- Where criteria from the above sources are not available for a specific analyte, the laboratory practical quantitation limit (PQL) will be adopted as an initial screen. The significance of results recorded above the PQL for such analytes may be further considered with reference to other national or international thresholds. Where this is undertaken the source and purpose of the thresholds will be discussed in the DSI report.

[1] Note, this guidance supersedes the ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, 2000 guidelines referenced in NEPC (2013)

Drinking water guidelines are not considered to be directly relevant to the assessment as groundwater and surface water bodies receiving water from the site are not known to be utilised for drinking water, and the residences down-gradient from the site are expected to be services by the municipal drinking water supply.

8.3 Waste Classification

The DSI will include a preliminary assessment of the waste classification of the material for off-site disposal purposes. This will be conducted in accordance with the POEO Act and the EPA *Waste Classification Guidelines* (NSW EPA, 2014).

9. Sampling and Analysis Strategy and Sampling Methodology

9.1 Data Quality Objectives

This SAQP has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

(1) State the Problem

The "problem" to be addressed is that additional information is required to inform the assessment on the site's suitability for the proposed school and whether remediation is required to make the site suitable.

(2) Identify the Decision/ Goal of the Study

The goal (objectives) of the study are provided in Section 1.

The following decisions will be made based on the data proposed to be obtained:

- Do the existing fill and/or natural soils pose a potential risk to identified receptors?
- Does groundwater beneath the site pose a potential risk to identified receptors?
- Is the data sufficient to make a decision regarding the abovementioned risks, the compatibility of the site for the proposed development or are additional investigations required?
- Is the site suitable for the proposed school from a contamination perspective?
- Does contamination at the site, if encountered, trigger the Duty to Report requirements under the CLM Act 1997?
- Are there any off-site migration issues that need to be considered?
- Is the data sufficient to enable the preparation of a Remediation Action Plan (RAP) and / or Environmental Management Plan (EMP) should the data suggest these are required?

(3) Identify the Information Inputs

Inputs into the decisions will be as follows:

- Results of previous investigations (as discussed in Section 4);
- Site history (as discussed in Section 4);
- The site condition (as discussed in Section 5);
- Field observations;
- Field and laboratory test results;
- The assessment criteria (as discussed in Section 8);
- Field and laboratory QA / QC data; and
- Details of the proposed development (as discussed in Section 6).

(4) Define the Boundaries of the Study

The site is defined in Section 3 and the site boundaries are shown on Drawing R.001.D01, Appendix A.

The depth of the study will be the depth of intrusive investigation at any given location. In general boreholes and test pits will be extended to approximately 0.5 m into natural soil or prior refusal and groundwater wells will be installed to a depth of approximately 1 m below the observed groundwater level or 7 m (whichever is lesser) (based on previously recording groundwater at 5 m bgl).

It is noted that the investigation of the site will be constrained by the presence of current site structures and thick vegetation in some areas.

(5) Develop the Analytical Approach (or decision rule)

The information obtained during the assessment will be used to characterise the site in terms of contamination issues and risk to human health and/or the environment. The decision rules used in characterising the site will be as follows:

- Laboratory test results for systematic soil samples will be assessed individually or statistically (if considered appropriate) to determine the 95% upper confidence level (UCL) of the mean concentration for each analyte or analyte group (of like materials);
- Laboratory test results for targeted locations will be assessed individually or with other samples targeting the same issue;
- Laboratory test results for identified “hot spots” will be assessed individually;
- The adopted site criteria will be the NSW Environment Protection Authority (EPA) endorsed criteria (refer to Section 7);
- Where such criteria are not available, other recognised national or international standards will be used;

- The contaminant concentrations in soil / filling material will be considered to require further assessment or remedial action if:
  - The concentration of the contaminant is more than 2.5 times the SAC. Any location more than 2.5 times the adopted site criteria is classified as a 'hotspot', requiring further assessment/ management; and
  - The calculated 95% Upper Confidence Limit (95% UCL) of average concentrations (excluding any 'hotspot' concentrations) exceeds the adopted SAC; and
  - The standard deviation of the results is greater than 50% of the SAC.
- The groundwater will not be considered significantly impacted by a particular contaminant if there is no notable or significant increase in background concentrations and/or there are no analyte concentrations in the groundwater samples significantly exceeding the adopted GIL; and
- Further investigation, remediation and/or management will be recommended if the site is found to be contaminated or containing contamination "hot spots" or significantly impacted groundwater.

The acceptable limits for the proposed QA / QC assessment are provided in Section 10. An assessment of the overall data quality will be presented in the DSI report. Field and laboratory test results will be considered useable for the assessment after evaluation against the following data quality indicators (DQIs):

- Precision - a measure of variability or reproducibility of data;
- Accuracy - a measure of closeness of the data to the 'true' value;
- Representativeness - the confidence (qualitative) of data representativeness of media present on site;
- Completeness - a measure of the amount of usable data from a data collection activity; and
- Comparability - the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event.

(6) Specify Performance or Acceptance Criteria

The possible decision errors for the proposed DSI are:

- Deciding that the site is suitable for the proposed school without remediation when truly it is not; and
- Deciding that the site is not suitable for the proposed school without remediation when truly it is.

Decision errors for the proposed assessment will be minimised and measured by the following:

- Compare new data with available previous investigations;
- Systematic soil sample numbers will comply with those recommended in the NSW EPA Sampling Design Guidelines (1995), which have risk probabilities already incorporated;
- The sampling regime will target each stratum identified to account for site variability;
- Sample collection and handling techniques will be in accordance with standard field procedures;

- Samples will be prepared and analysed by a NATA-accredited laboratory with the acceptance limits for laboratory QA / QC parameters based on the laboratory reported acceptance limits and those stated in NEPC (2013);
- The analyte selection is based on the conceptual site model (refer to Section 7). The potential for contaminants other than those proposed to be analysed is considered to be low;
- The SAC and GIL will be adopted from established and NSW EPA endorsed guidelines. Where not available, recognised national and international guidelines were used. The SAC and GIL have risk probabilities already incorporated;
- A significance level of 0.05 will be adopted for data with statistical analysis of 95% Upper Confidence Limit (95% UCL) of average concentrations; and
- NATA accredited laboratories using NATA endorsed methods are used to perform laboratory analysis. Where NATA endorsed methods are not used, the reasons will be stated and the effect of using non-NATA methods on the decision making process will be explained.

(7) Develop the Plan for Obtaining Data

Data collection points have been determined to assess potential soil and groundwater impacts.

Based on a site area of approximately 2.1 ha, NSW EPA *Sampling Design Guidelines* 1995 recommends 31 sampling locations for a site with no known point sources for site characterisation purposes. Given the 15 previous test locations it is considered that the following additional sampling locations are required for the DSI:

- 16 sample locations spread in a systematic general grid pattern over the site; and
- Sample locations targeting the PAEC.

Section 9.2 provides the sampling plan for the DSI.

9.2 Sampling Strategy and Design

9.2.1 Overview

The following sampling and analysis works are proposed:

- Undertaking works, including collection and analysis of QA / QC samples in accordance with Section 10;
- Collection of samples using a combination of boreholes drilled with a drill rig, hand augered boreholes, test pits and surface samples. These locations will supplement the 15 locations tested as part of DP (2021c). The method of collecting samples will be based on access, target depth and other restrictions (e.g., archaeological controls), with the preferred method for each location provided in Appendix B. In summary the following is proposed:
  - Boreholes / test pits: 20 locations; and
  - Surface samples: 20 locations.

- The proposed target depth and/ or horizon(s) and rationale for each location are provided in Appendix B. The following rationale has been considered for targeted sampling:
  - Sampling locations targeting the Flammable Store will primarily be targeting the expected historic above ground storage of petroleum based products;
  - Sampling locations targeting the Dangerous Goods Stores - Shed 1 and 2 will primarily be targeting the expected historic above ground storage of pesticides, fertilisers and possibly petroleum products;
  - The bunded area outside of Shed 1 will be targeted for possible historic mixing of herbicides, pesticides, fungicides and petroleum products;
  - The waste area near Shed 2 will be targeted for leakage from the above ground collection of wastes from Shed 1;
  - The drainage line below the OSD basin will be targeted for potential chemicals previously used at the site which may have been present in surface runoff;
  - Former agricultural growing areas will be targeted for metals, OCP, OPP and pH;
  - The area of the previously recorded TRH in Sample BH09/0-0.1 will be targeted for TPH with silica gel clean up analysis;
  - The backfilled pit near the oxidising agent store will be targeted for a suite of common contaminants in fill as well as pH from former use of oxidising agent. Various former garden beds will also be tested for pH;
  - Test locations adjacent to buildings, with target metals, OCP, OPP, PCB and asbestos (500 mL samples). This will include samples from near two broken down pipes on Building C; and
  - If fill with building debris is observed, and sufficient sample can be obtained, it will be targeted for asbestos sieving samples (10L buckets) and 500 mL samples.
- Logging of encountered soil materials and pertinent field information;
- Construction of two groundwater wells as discussed in Section 9.3.2. One well will target the Dangerous Goods Store and other will be downgradient of the main building area;
- Collection of three groundwater samples as discussed in Section 9.3.3;
- Collection of one grab sample of surface water from the OSD basin (if sufficient water present); and
- Laboratory testing of selected soil and water samples as discussed in Section 9.3.5.

9.2.2 Proposed Sample Locations, Target Depths and Analytes

The proposed sample locations are shown on Drawings R.001.D03 to R.001.D08, Appendix A.

The target areas, depths and analytes for the proposed soil sample locations are summarised in Appendix B. In general, quarried aggregate (e.g., blue metal) horizons will not be sampled.

Groundwater sampling is proposed from three groundwater wells. The wells comprise one well that was constructed as part of DP (2021b) and two which will be constructed as part of the proposed works. The new wells will be constructed adjacent to the Dangerous Goods stores (P-GW110) and one down-gradient of the building area (P-GW113). The well constructed for DP (2021b) (in BH2) is located cross-gradient of the metal shelter and will be considered to provide data on background groundwater quality. If signs of significant gross contamination considered to present a risk to groundwater are observed in

other boreholes, groundwater wells will be constructed in these boreholes in addition to, or as an alternative to, the above locations. Regardless of observed signs of contamination concern one well will be constructed to target the Dangerous Goods storage area.

A surface water sample will also be collected from the OSD basin if sufficient water is present to provide information on the contaminants which may be running off the site surface.

The groundwater and surface water samples will be analysed for metals, TRH, BTEX, PAH, OCP, OPP, glyphosate, phenoxy acid herbicides, paraquat and diquat, triazole fungicides and VOC.

9.3 Sampling and Analysis Plan and Methodology

9.3.1 Soil Sampling Methodology

The proposed soil sampling methodology comprises:

- Collection of soil samples from all locations at the surface (where no pavement present), and then at regular intervals based on field observations, such as soil type and signs of potential concern.
- Transfer of samples for chemical analysis into laboratory-prepared glass jars, completely filled to ensure the headspace within the sample jar is minimised, and capped immediately to minimise loss of volatiles;
- Transfer of samples for asbestos analysis into snap-lock bags or laboratory-prepared glass jars. Approximate volumes of either 40 g or 500 mL will be collected as required for the proposed analysis;
- Replicate samples will be collected and screened for volatiles compounds using a calibrated photo-ionisation detector (PID);
- If 10L samples are obtained for asbestos assessment (i.e., due to the observation of fill with building debris in a test pit or in surface samples), they will be assessed on site in accordance with NEPC (2013) endorsed methods;
- QA / QC samples will be collected in accordance with Section 10;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the glass jars, with Teflon lined lid, into a cooled, insulated and sealed container for transport to the laboratory;
- All sampling information will be accurately recorded and quality control maintained throughout the investigation; and
- Soils penetrated during the investigations will be logged in general accordance with the Unified Soil Classification system, with features such as seepage, discolouration, staining, odours and other indications of contamination being noted.

9.3.2 Groundwater Well Construction and Development

Groundwater wells will be:

- Constructed to a depth of approximately 7 m;
- Screened in natural soil / rock;
- Constructed of 50 mm diameter acid washed, class 18, PVC casing and machine slotted well screen intervals with screw joints;
- The annulus will be filled with coarse sand from the base to approximately 0.5 m above the well screen;
- A bentonite plug of at least 0.5 m will be placed in the annulus above the sand;
- The wells will be finished flush with ground surface with a Gatic cover concreted into the surrounding pavement;
- Each groundwater well will be developed by removing at least three borehole volumes or until dry; and
- Details of the construction and development will be recorded.

9.3.3 Groundwater Sampling Methodology

The proposed groundwater sampling methodology comprises:

- Groundwater samples will be collected from the groundwater wells at least one week after their development. This will comprise two newly constructed wells and one well constructed as part of DP (2021b);
- Measurement of groundwater levels using an interface meter;
- Development of monitoring wells by removing a minimum of 3 bore volumes of water (or until well is dry), using a disposable bailer or a submersible pump;
- Micro-purging of wells using a low flow pump until field parameters (pH, temperature, dissolved oxygen, conductivity, turbidity and redox) have stabilised as per the criteria in Table 5, below (taken from Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers by Douglas Yeskis and Bernard Zavala 2002);
- Following stabilisation of field parameters, samples will be collected using a low flow pump. Samples will be placed with a minimum of aeration into appropriately preserved bottles. Groundwater samples will be collected from the mid-screen unless separated phase product is detected;
- For analysis of metals, the relevant sample fraction will be filtered using a sterilised 0.45 μm filter;
- Decontamination of the sample pump and all non-disposable sampling equipment between samples via a “triple rinse” procedure i.e., a rinse of all particulates in tap water followed by a decontamination using a 3% Decon 90 solution and a final rinse in deionised water;
- Sample containers will be labelled with individual and unique identification, including project number and sample location;
- Samples will be placed into a cooled, insulated and sealed container for transport to the laboratory; and

- All sampling information will be accurately recorded, and quality control maintained throughout the investigation.

Table 5: Stabilised Criteria with Reference for Water-Quality-Indicator Parameters

Parameter	Stabilisation Criteria
pH	+/- 0.1
Electrical Conductivity	+/- 3%
Oxidation/reduction potential	+/- 10 millivolts
Dissolve Oxygen	+/- 0.3 mg/L

9.3.4 Surface Water Sampling Methodology

The proposed surface water sampling methodology comprises:

- A surface water sample will be collected from the OSD basin if sufficient water is present;
- Field parameters (pH, EC, REDOX, dissolved oxygen) will be recorded;
- A 'grab' sample will be collected using laboratory prepared containers or a bailer;
- Samples will be placed with a minimum of aeration into appropriately preserved bottles;
- For analysis of metals, the relevant sample fraction will be filtered using a sterilised 0.45 μm filter;
- Sample containers will be labelled with individual and unique identification, including project number and sample location;
- Samples will be placed into a cooled, insulated and sealed container for transport to the laboratory; and
- All sampling information will be accurately recorded, and quality control maintained throughout the investigation.

9.3.5 Proposed Laboratory Analysis

Samples will be analysed for varying combinations of the COPC identified in the CSM (Section 7).

Target analytes for the proposed sample locations are provided in Appendix B.

Note that analysis of paraquat and diquat is not readily available in soils, and is not proposed. SMF will be assessed visually only, and no laboratory analysis is proposed.

Groundwater and surface water samples will be analysed for various combinations of:

- Heavy metals (including As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Total recoverable hydrocarbons (TRH);
- Benzene, toluene, ethylbenzene and xylenes (BTEX);
- Polycyclic aromatic hydrocarbons (PAH);
- Organochlorine pesticides (OCP);

- Organophosphorus pesticides (OPP);
- Volatile organic compounds (VOC)
- Phenols;
- Glyphosate;
- Paraquat;
- Diquat;
- Phenoxy acid herbicides;
- Triazine herbicides;
- Triazole fungicides;
- Asbestos (a combination of approximate 40 g and 500 mL samples); and
- pH.

9.4 Contingency Plan

In the event that the data obtained does not meet the DQO or is not sufficient to meet the project objectives the following will be conducted:

- Review the achieved results, the degree to which they are considered to be representative of site conditions and the known data gaps;
- Assess the significance of the data gaps with respect to the associated contamination risk and proposed development; and
- Consider the above in determining the need for, and scope of, additional works.

10. Quality Assurance and Quality Control

10.1 Field Quality Assurance and Quality Control

Quality Assurance (QA) and Quality Control (QC) procedures will be adopted throughout the field sampling program to assess sampling precision and accuracy and prevent cross-contamination.

Sample collection, management and field QA / QC procedures will include:

- An experienced contamination consultant collects the samples using standard operating procedures;
- Details of field observations are recorded for each sample location, including borehole or test pit logs with details of the materials observed and the samples collected;
- Field instruments and meters (i.e., the PID and water quality meter) will be calibrated prior to use;
- Field duplicates / replicates will be collected, and will be tested at a frequency of 10% of primary samples (comprising approximately 5% intra-laboratory replicate samples and 5% inter-laboratory replicate samples);

- Replicate samples will be analysed for the same chemical analytical suite of the primary sample;
- Trip spike and trip blank samples will be taken out into the field on a daily basis. Trip spike and blank samples will be analysed for BTEX. One trip spike and one trip blank will be analysed for each sample batch;
- Rinsate samples will be collected from non-disposable sampling equipment following decontamination and analysed for the TRH, BTEX and OCP. One rinsate sample from each day of fieldwork will be analysed where non-disposable equipment is used;
- An ice box (esky) with ice bricks will be used for storage of samples for chemical analysis during the fieldwork. Samples will be dispatched to the analytical laboratory in an ice box with ice bricks. Samples may be stored in a refrigerator at the DP office prior to dispatch to the analytical laboratory; and
- Samples will be dispatched with chain of custody documentation.

The following target ranges will be considered in assessing the data:

- Relative percentage difference (RPD) results for replicate/ duplicate samples of ≤+/-30% for inorganic analytes and ≤+/-50% for organic analytes;
- Trip blank sample result: do not indicate a potential for significant cross contamination (ideally <PQL); and
- Trip spike sample recovery: 60-140%.

10.2 Laboratory Quality Assurance and Quality Control

Laboratory QA / QC will include the following:

- Samples will be analysed using NATA accredited methods. If analysis is undertaken without NATA accreditation (e.g., analysis of approximate 500 mL samples in accordance with NEPC (2013)) discussion of the reason and implication for this approach will be provided in the DSI report;
- Samples will be analysed within the recommended holding times;
- The practical quantitation limits (PQL) will be appropriate for the assessment of risk for each analyte;
- The Quality Assurance / Quality Control (QA / QC) protocols and results reported by the laboratories comply with their NATA accreditation and are consistent with the requirements of NEPC (2013);
- The contract laboratories will be NATA accredited and will conduct in-house QA / QC procedures involving the routine testing of:
    - Reagent blanks;
    - Spike recovery analysis;
    - Laboratory duplicate analysis;
    - Analysis of control standards; and
    - Calibration standards and blanks.

11. Data Assessment and Reporting

The DSI report will assess the data in accordance with this SAQP, including an assessment of the QA / QC.

The report will make a conclusion regarding the suitability of the site for the proposed school and recommendations for further work (as appropriate).

12. Concluding Statement

Following this SAQP will assist in providing sampling and analysis results to address data gaps in the characterisation of contamination risk at the site and in association with the concerned areas, in terms of potential impact to the site and proposed new public primary school. The results of the proposed sampling and testing will also be used to assess the need for further investigations and / or remediation.

The SAQP will be reviewed and endorsed by the Site Auditor prior to implementation.

13. References

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

DP. (2021a). *Report on Geotechnical Desktop Study New Public School in Epping, 86 Chelmsford Avenue, Epping.* Reference 99671.00.R.001.Rev1, dated April 2021: Douglas Partner Pty Ltd.

DP. (2021b). *Report on Geotechnical Investigation New Public School in Epping, 86 Chelmsford Avenue, Epping.* Reference 99671.00.R.002.Rev1, dated April 2021: Douglas Partners Pty Ltd.

DP. (2021c). *Report on Preliminary Site (Contamination) Investigation (PSI) New Public School in Epping, 86 Chelmsford Avenue, Epping.* Reference 99671.01.R.001.Rev1, dated April 2021: Douglas Partners Pty Ltd.

DP. (2021d). *Report on Hazardous Building Materials (HBM) Survey New Public School in Epping 86 Chelmsford Avenue, Epping NSW.* Reference 99671.02.R.001.Rev2, dated April 2021: Douglas Partners Pty Ltd.

GML. (2020). *Heritage Epping South Public School Site (86 Chelmsford Avenue, Epping) Heritage Assessment.* Job 20-0115A, November 2020: GML Heritage Pty Ltd.

Greencap. (2018). *Preliminary Site Investigation TAFE NSW Epping Campus, Chelmsford Avenue, Epping NSW 2121.* Reference J154876, November 2018: Greencap.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water.*

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

14. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project for the New Public School in Epping, 86 Chelmsford Avenue, Epping under the Standard Form Agreement SINSW00650/20 dated 8 April 2020 and undertaken in accordance with Douglas Partners Pty Ltd (DP) proposal SYD201231 dated 17 November 2020. This report is provided for the exclusive use of School Infrastructure NSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and / or their agents.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

Notes About this Report

Drawings

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

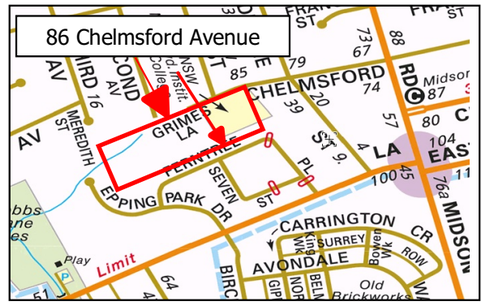
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.



LOCALITY MAP

Notes:
1. Basemap from MetroMap (dated 29/08/2020)
2. Locality map from street-directory.com (dated 27/04/20)

Legend

Site Boundary

0 10 20 30 40 50 60 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	AS
SCALE:	As shown	DATE:	21.04.2021

TITLE: **Site Layout**
New Public School in Epping
86 Chelmsford Ave, Epping

N

PROJECT No:	99671.03
DRAWING No:	1
REVISION:	1

PLAN: IDENTIFICATION SURVEY FOR LOT 1 DP 582172

No. 86 CHELMSFORD AVENUE, EPPING

DATE OF SURVEY: 27/07/16

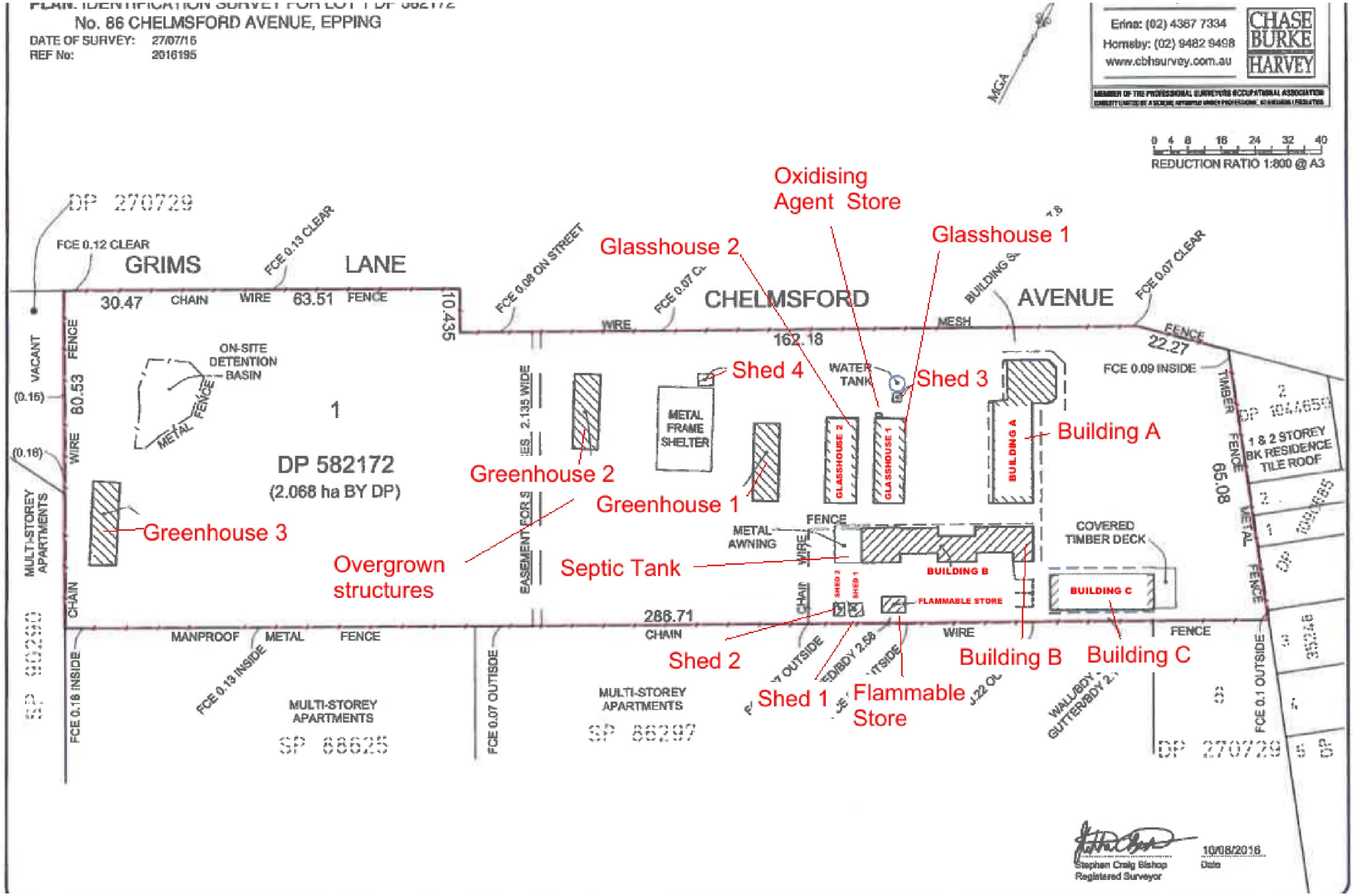
REF No: 2016195

Erina: (02) 4367 7334
Hornsby: (02) 9482 9498
www.cbhsurvey.com.au
CHASE BURKE HARVEY
MEMBER OF THE PROFESSIONAL SURVEYORS OCCUPATIONAL ASSOCIATION

MGA

0 4 8 16 24 32 40

REDUCTION RATIO 1:800 @ A3



Stephen Craig Bishop
Registered Surveyor

10/08/2016
Date

From Chase Burke Harvey survey plan (reference 2016195, dated 27/07/16)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: School Infrastructure NSW		TITLE: **Site Layout** **New Public School in Epping** **86 Chelmsford Ave, Epping**	N	PROJECT No: 99671.03
	OFFICE: Sydney	DRAWN BY: NLE			DRAWING No: R.001.D02
	SCALE: As Shown	DATE: 21.04.2021			REVISION: 1

Legend

- Site Boundary
- Proposed test pit (TP), borehole (BH) or hand auger (HA)
- Proposed surface sample location
- Previous borehole (DP, 2021b)
- Previous hand auger location (DP, 2021c)
- Previous test pit location (DP, 2021c)

Notes:
1. Basemap from MetroMap (dated 29/08/2020)
2. All locations are approximate only

0 10 20 30 40 50 60 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	NLE
SCALE:	As Shown	DATE:	21.04.2021

TITLE: **Overview of Previous and Proposed Sample Locations**
New Public School in Epping
86 Chelmsford Ave, Epping

N

PROJECT No:	99671.03
DRAWING No:	R.001.D03
REVISION:	1

Legend

Site Boundary

Proposed test pit (TP), borehole (BH) or hand auger (HA)

Notes:
1. Basemap from MetroMap (dated 29/08/2020)
2. All locations are approximate only

0 10 20 30 40 50 60 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	NLE
SCALE:	As Shown	DATE:	21.04.2021

TITLE: **Proposed Test Pits and Boreholes**
New Public School in Epping
86 Chelmsford Ave, Epping

N

PROJECT No: 99671.03
DRAWING No: R.001.D04
REVISION: 1

Legend

- Site Boundary
- Proposed surface sample location

Notes:
1. Basemap from MetroMap (dated 29/08/2020)
2. All locations are approximate only

0 10 20 30 40 50 60 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	NLE
SCALE:	As Shown	DATE:	21.04.2021

TITLE: **Proposed Surface Sample Locations**
New Public School in Epping
86 Chelmsford Ave, Epping

N

PROJECT No: 99671.03
DRAWING No: R.001.D05
REVISION: 1

Legend

- Site Boundary
- ★ Proposed water sampling location

Notes:
1. Basemap from MetroMap (dated 29/08/2020)
2. All locations are approximate only

0 10 20 30 40 50 60 m

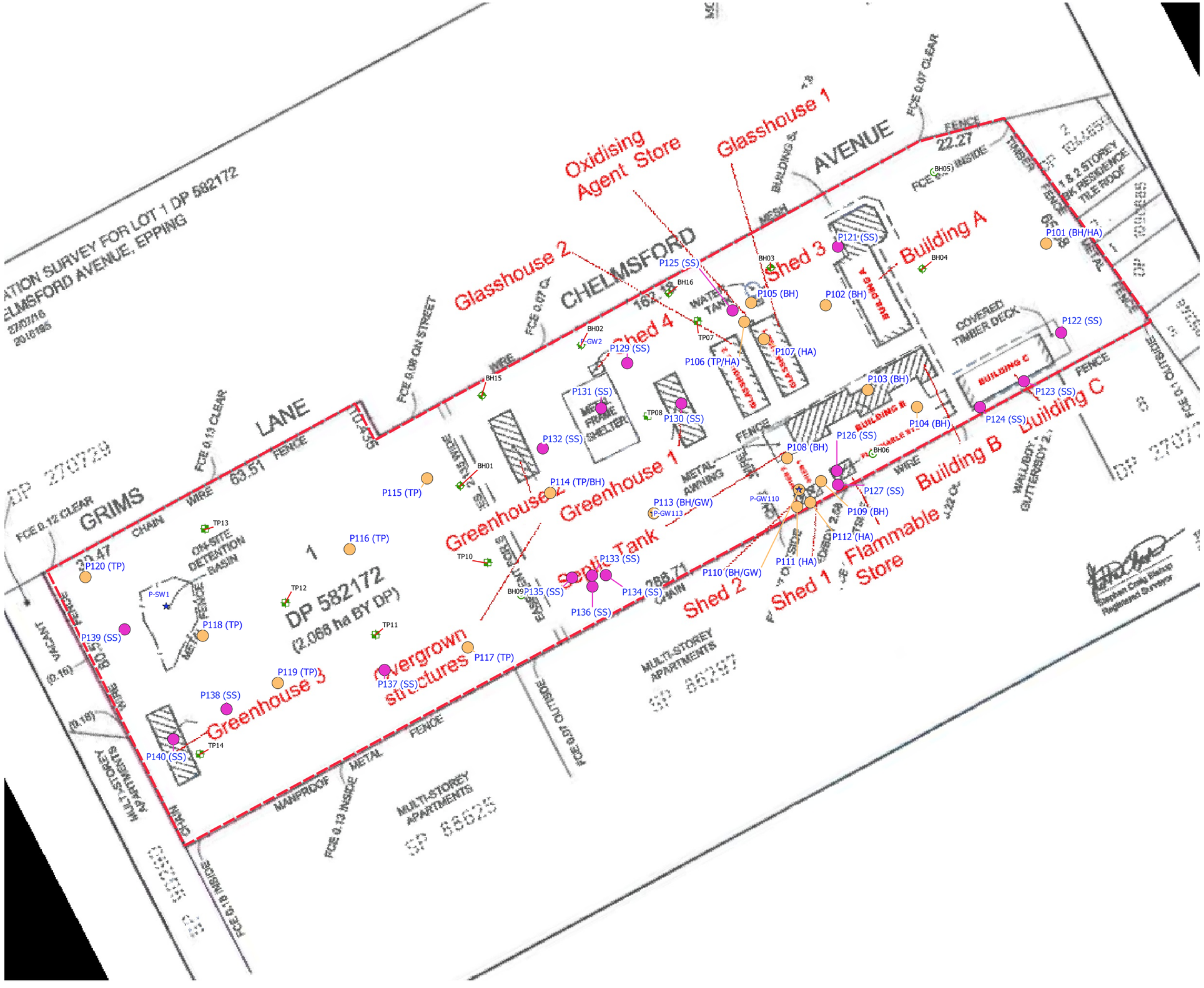
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	NLE
SCALE:	As Shown	DATE:	21.04.2021

TITLE: **Proposed Water Sample Locations**
New Public School in Epping
86 Chelmsford Ave, Epping

N

PROJECT No:	99671.03
DRAWING No:	R.001.D06
REVISION:	1



Legend

- Site Boundary
- Proposed test pit (TP), borehole (BH) or hand auger (HA)
- Proposed surface sample location
- Previous borehole (DP, 2021b)
- Hand Auger Location (DP, 2021c)
- Previous test pit location (DP, 2021c)

Notes:
1. Basemap from Chase Burke Harvey (reference 2016195, dated 27/07/16)
2. All locations are approximate only

0 10 20 30 40 50 60 m

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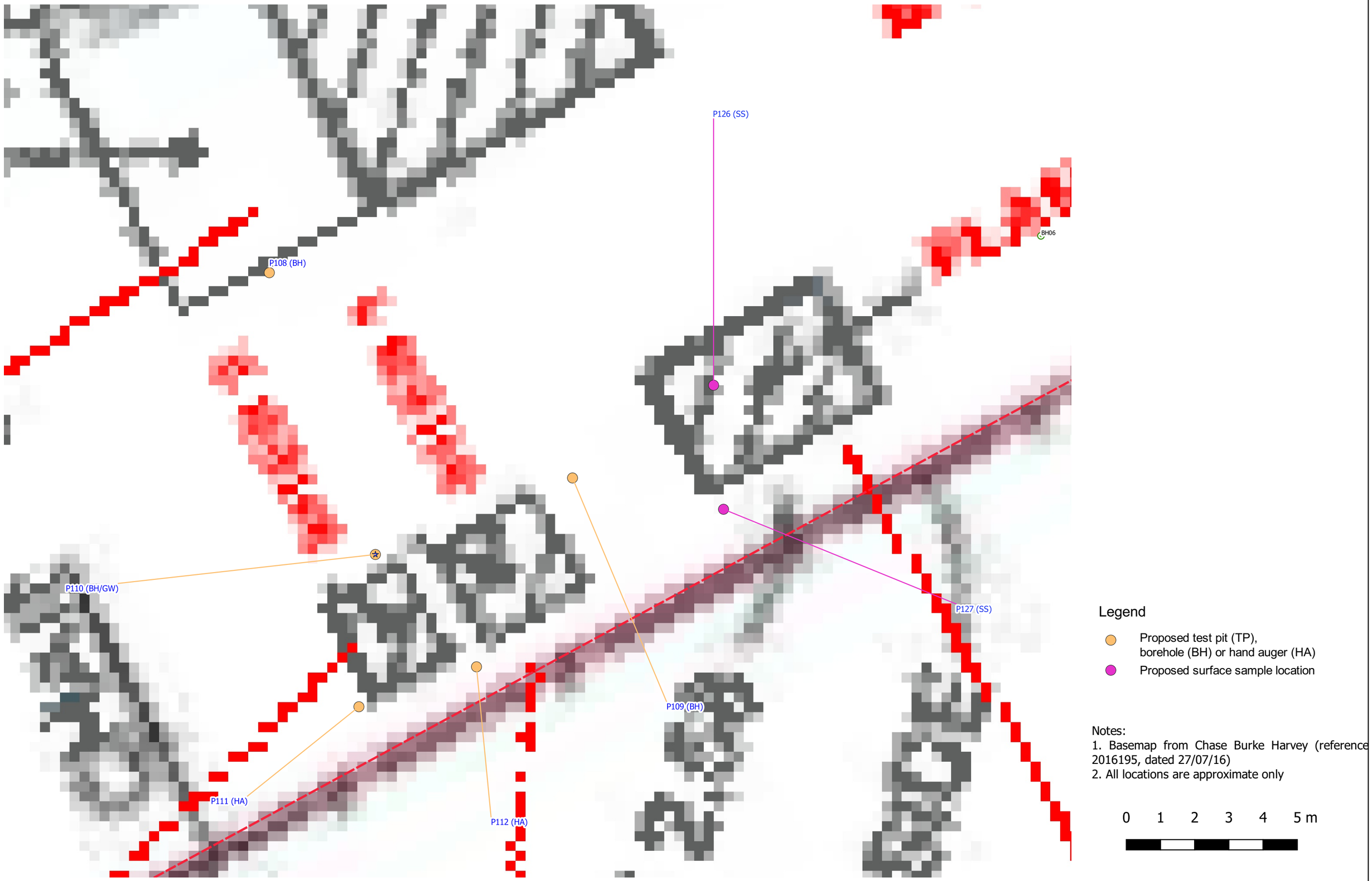
CLIENT:	School Infrastructure NSW	TITLE:	**Proposed Sample Locations Relative to Site Layout**
OFFICE:	Sydney	DRAWN BY:	NLE		**New Public School in Epping**
SCALE:	As Shown	DATE:	21.04.2021		**86 Chelmsford Ave, Epping**

N

PROJECT No: 99671.03
DRAWING No: R.001.D07
REVISION: 1



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CLIENT:	School Infrastructure NSW		
OFFICE:	Sydney	DRAWN BY:	NLE
SCALE:	As Shown	DATE:	21.04.2021

TITLE: **Proposed Sample Locations Relative to Site Layout - Dangerous Goods Area**
New Public School in Epping
86 Chelmsford Ave, Epping

PROJECT No:	99671.03
DRAWING No:	R.001.D08
REVISION:	1

Appendix B

Proposed Sample Location Information

Table B1: Proposed Sampling Location Information

ID	Target	Type	Proposed Depth	Sampling Target Horizon	Analytes
P101 (BH/HA)	Site Coverage	Borehole or hand auger	0.2m into natural soil	fill	Fill suite, pH
P102 (BH)	Site Coverage	Borehole	0.2m into natural soil	below pavement, fill	Fill suite
P103 (BH)	Former workshop/ garage	Borehole	0.2m into natural soil	below pavement, fill	Fill suite, phenols
P104 (BH)	Former storage area	Borehole	0.2m into natural soil	below pavement, fill	Fill suite
P105 (BH)	Shed 3 (pump), former growing area (1994-2004 aerial)	Borehole	0.2m into natural soil	0-0.1, fill	Fill suite, pH
P106 (TP/HA)	Infilled hole/ Oxidising Agent Store (within the infilled hole)	Test pit or hand auger	0.2m into natural soil	0-0.1, fill	Fill suite, pH
P107 (HA)	Glasshouse	Hand auger	0.1 m below pavement	0-0.1 below pavement	Metals, OCP, OPP, pH
P108 (BH)	Septic tank (immediately down-gradient of the identified tank / access area)	Borehole	0.2m into natural soil	0.5-2, fill	Fill suite, phenols, VOC, glyphosate
P109 (BH)	Dangerous Goods Store (within or immediately adjacent to bunded area, pending access and services)	Borehole	0.2m into natural soil	0-0.1, (0.1-1.0)	Fill suite, phenols, VOC, glyphosate, other herbicides, fungicides
P110 (BH/GW)	Dangerous Goods Stores (adjacent to Shed 2, pending access and services)	Borehole (with groundwater well)	7m	0-0.1, fill, top of natural	Fill suite, phenols
P111 (HA)	Dangerous Goods Store (down-gradient of waste collection structure)	Hand auger	0.2m into natural soil	0-0.1, (0.1-1.0)	Fill suite, phenols, VOC, glyphosate, other herbicides, fungicides
P112 (HA)	Dangerous Goods Stores (down gradient/ adjacent to Shed 1 and 2)	Hand auger	0.2m into natural soil	0-0.1, (0.1-1.0)	Fill suite, phenols
P113 (BH/GW)	Site Coverage	Borehole (with groundwater well)	7m	fill	Fill suite
P114 (TP/BH)	Former structures	Test pit or borehole	0.2m into natural soil	0-0.1, fill	Fill suite
P115 (TP)	Mounds (a trench will be constructed across adjacent observed mounds to visually assess for building debris/ asbestos)	Test pit	0.2m into natural soil	fill in mounds	Fill suite
P116 (TP)	Former garden beds (1986-2014 aerial)	Test pit	0.2m into natural soil	0-0.1 (0-0.5), fill	Metals, OCP, OPP, pH
P117 (TP)	Site Coverage	Test pit	0.2m into natural soil	0-0.1, fill	Fill suite
P118 (TP)	Site Coverage	Test pit	0.2m into natural soil	0-0.1, fill	Fill suite
P119 (TP)	Former garden beds (1986-2014 aerial)	Test pit	0.2m into natural soil	0-0.1 (0-0.5), fill	Metals, OCP, OPP, pH
P120 (TP)	Site Coverage	Test pit	0.2m into natural soil	fill	Fill suite
P121 (SS)	Building A adjacent garden bed	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, Asb (500mL)
P122 (SS)	Building C Under deck	Surface sample	0.1 m	0-0.1	OCP, OPP
P123 (SS)	Building C down pipe	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, Asb (500mL)
P124 (SS)	Building C down pipe	Surface sample	0.1 m	0-0.1	Asb (500mL)
P125 (SS)	Oxidising agent (area near store, not within the store)	Surface sample	0.1 m	0-0.1	pH
P126 (SS)	Flammable goods store (below floor within shed (ie where concrete slab is cut at the sub-floor access point)	Surface sample	0.1 m	0-0.1	TPH, BTEX, PAH, phenols, VOC
P127 (SS)	Flammable goods store (down-gradient of Shed)	Surface sample	0.1 m	0-0.1	TRH, BTEX
P128 (SS)	Possible former greenhouse (1986 aerial)	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P129 (SS)	Former growing area (1994-2004 aerial); surface spill (soil ameliorant?)	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P130 (SS)	Greenhouse 1	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P131 (SS)	Metal shelter	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P132 (SS)	Derelict structures	Surface sample	0.1 m	0-0.1	Fill suite
P133 (SS)	BH9 (possible former structure in 1982 aerial)	Surface sample	0.1 m	0-0.1	TPH (silica gel clean up)
P134 (SS)	BH9 (possible former structure in 1982 aerial)	Surface sample	0.1 m	0-0.1	TPH (silica gel clean up)
P135 (SS)	BH9 (possible former structure in 1982 aerial)	Surface sample	0.1 m	0-0.1	TPH (silica gel clean up)
P136 (SS)	BH9 (possible former structure in 1982 aerial)	Surface sample	0.1 m	0-0.1	TPH (silica gel clean up)
P137 (SS)	Former garden beds (1986-2014 aerial)	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P138 (SS)	Former garden beds (1986-2014 aerial)	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH
P139 (SS)	Drainage line	Surface sample	0.1 m	0-0.1	Fill suite, phenols, glyphosate, other herbicides, fungicides
P140 (SS)	Greenhouse 3	Surface sample	0.1 m	0-0.1	Metals, OCP, OPP, pH

Notes:

Fill suite	Metals, TRH, BTEX, PAH, OCP, OPP, PCB and Asbestos. For asbestos, if building debris is observed and sufficient sample is available, a 500mL sample will be analysed, otherwise a 40g sample will be analysed.
Other herbicides	Phenoxy acid herbicides and triazine herbicides
Fungicides	Triazole fungicides
Asb	Asbestos