Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Preliminary Site Investigation (Contamination)

Proposed Site Rezoning
Block 7 Section 4, Yarralumla

Prepared for
The Shepherd Foundation

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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.

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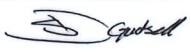
Author		Peter Storey/Shannon Goodsell	12 February 2021
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Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 2, 73 Sheppard Street
Hume ACT 2620
PO Box 1487
Fyshwick ACT 2609
Phone (02) 6260 2788

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1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by Oakstand on behalf of The Shepherd Foundation to complete this preliminary site investigation (contamination) with limited sampling (PSI-L) undertaken for a proposed site rezoning for the site at Block 7 Section 4, Yarralumla (the site). The site is shown on Drawing 1, Appendix A.

The investigation was undertaken in accordance with DP's proposal CAN200387 dated 5 November 2020 and acceptance received from Justin Micallef of Oakstand, on behalf of The Shepherd Foundation on 12 November 2020.

The objective of the PSI-L was to identify potential sources of contamination and determine the potential contaminants of concern, identify areas of potential contamination, identify human and ecological receptors associated with the proposed development and identify potentially affected media (soil, groundwater, ground gas etc.).

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

The work was undertaken with reference to policies and guidelines endorsed by the ACT Environment Protection Authority (EPA) as detailed in the Contaminated Sites Environment Protection Policy, ACT EPA 2017, including:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013);
- NSW EPA, Contaminated Sites – Sampling Design Guidelines, September 1995;
- ACT EPA Information Sheet 7, Guidance for Undertaking Preliminary Contamination Investigations for Development/Lease Variation Purposes, November 2018; and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

2. Scope of Works

The following scope of works was conducted in order to meet the project objectives:

- A desktop study of available topographical, geological and hydrogeological maps and plans;
- A review of registered groundwater bores located within a 1 km radius of the site obtained through the ACT Groundwater Abstraction Bore Register;
- Review of site history information incorporating;

- ACT Government records through the ACT Environment Protection Authority's Contaminated Land Register;
- Historical title deed information obtained through the Land Titles Office;
- Historical aerial photography archived with the ACT Planning and Land Authority; and

- Site inspection by an environmental scientist;
- Formulation of a preliminary conceptual site model (CSM) based on the site history review and inspection;
- Positioning and drilling of 13 boreholes to a maximum target depth of 9 m in conjunction with the geotechnical investigation;
- Soil sampling from multiple depth and laboratory testing on soil samples for a range of identified contaminants of potential concern (CoPC); and
- Preparation of this report.

3. Site Information

Site Address	1-5 Wilf Crane Crescent
Legal Description	Block 7 Section 4, Yarralumla
Area	109,300 m^2 / 10.9 hectares
Current Territory Plan Zoning	DES: Designated
	RZ1: Suburban
District	Canberra Central
Current Use	Research facility
Surrounding Uses	North – Golf club, with public open space beyond East – Low density residential South – Low density residential with former Canberra Brickworks development site beyond West – Golf Club

The approximate site boundary is shown on Figure 1.

Figure 1: Site Location

4. Environmental Setting

Regional Topography	The regional topography slopes down from the south to the north towards Lake Burley Griffin.
Site Topography	The site generally slopes from the south-west/west to the north-east/east and is positioned on a small ridgeline that is orientated in a south to north direction. The highest point is located within the south-west corner of the site at an approximate height of 592 m Australian Height Datum (AHD) and slopes down to the lowest point within the eastern portions of the site at a height of approximately 575 m AHD.
Soil Landscape	Residual soils of the Williamsdale Soil Group. The Williamsdale Soil Group is characterised by undulating rises, alluvial fans and valley flats on Silurian Volcanics of the Canberra Formation. Generally, little or no rock outcrops occur within this soil group. Soils are moderately deep, well drained podzolic soils, red and brown earths on upper rises and fan elements and moderately to very deep, poorly to imperfectly drained, solodic soils on lower rises and fan elements.
Geology	Calcareous and tuffaceous mudstone and siltstone of the Yarralumla Formation.
Acid Sulfate Soils	No known occurrence of Acid Sulfate Soil.
Surface Water	The nearest surface water feature is a stormwater drain located approximately 330 m south-west of the site within the Royal Canberra Golf Club. The stormwater drains into Lake Burley Griffin, located approximately 495 m to the north-east at its closest point. Both the stormwater drain and Lake Burley Griffin are located topographically down-gradient from the site.
Groundwater	The *Hydrogeology of the Australian Capital Territory and Environs* map indicates the site lies with an area maps as containing a fractured bedrock aquifer. Water quality is mapped as good (<500 mg/L total dissolved solids) with yield between 0.5 L/s to 1 L/s. Anticipated groundwater flow direction is inferred to be towards the north towards Lake Burley Griffin. A search of the publicly available registered groundwater bore database indicated that there are no registered groundwater bores within a 1 km radial search area of the site. The nearest registered bore is located approximately 1.4 km to the south-west of the site.

5. Site History

5.1 Title Deeds

A search for current and historical land titles was conducted through the ACT Land Information System website (actlis.act.gov.au) indicated that Block 7, Section 4 Yarralumla was leased commencing on 2

July 2002 to Commonwealth Scientific and Industrial Research Organisation (CSIRO). The current title indicated that the proprietor was listed as Gunyar Pty Ltd which commenced on 3 July 2002.

Copies of the historical and current titles are presented in Appendix C.

5.2 Historical Building Plans

A request for a building file search was lodged with ACT Building Services via the Access Canberra website (www.accesscanberra.act.gov.au). The search of the building files indicated that several buildings were present at the site. A survey drawing of the site undertaken in 2002, indicated a total of 28 buildings at the site. Building plans were present for the majority of buildings at the site. A summary of information contained in the buildings plans is presented in Table 1 below.

Table 1: Summary of Building Plan Information

Building ID	Location on site	Relevant Information on Building Plans
1	Southern portion of the site	Design plans from the National Capital Development Commission (NCDC) for the Forestry and Timber Bureau Forest Research Institute, dated November 1964 indicate the building contained three wings, an administration wing (1), an amenities wing (1a) and a laboratory wing (1b). Some drawings were marked as Rev A 'as at practical completion' and dated July 1967. Within the laboratory wing, the plans indicated that chemical stores, workshops and various laboratories were to be present. A maintenance book for the building (undated) indicated that heating for the building was provided by two hot water boilers burning heating oil stored in an underground 2,000 gallon oil storage tank. Building plans indicate that the UST was located between building 1 and 1b.
1a		
1b		
2	Central west portion of the site	A plan from Sinclair Knight Merz (SKM) dated August 2002, indicated the internal layout of Level 2 of Building 2. The plan indicated the building was used for offices. No further information was available for Building 2.
3	South-west portion of the site.	Plans from the Department of National Development, dated 1969, indicated the building was a 'Controlled Environment Building'. The plans indicated that the two storey building was a research facility with glass houses present on the northern side of the building and cooling towers on the western side of the building. No details regarding heating of the building were present.
4	South-west portion of the site.	Plans from the Commonwealth Forestry Bureau, dated between 1924 and 1967 indicate that buildings 4 to 4f are a series of glass houses or shade houses used for propagating plants. A drawing for 'Stove House' dated February 1928 indicated a boiler and fuel store was to be present.
4a		
4b		
4c		
4d		
4e		
4f		
5		

Building ID	Location on site	Relevant Information on Building Plans
5a	Central west portion of the site	A Plan from the 'Department of Works', dated April 1969 Building 5 was used as a residence for the site caretaker. Plans from Dub Design, dated December 2002, indicated that Building 5a, located to the west of Building 5 was a corrugated iron clad garage.
6	Central north portion of the site.	Plans from Dub Design, dated December 2002, indicated that Building 6 was used as an office block. The plans also indicated that large parts of the building were clad with flat or corrugated fibre cement sheeting. Additional plans dated from March 2008 indicated that the building was to be demolished. No information regarding demolition was present.
9	North-east portion of the site	Buildings plans dating from June 1926 indicate that Building 9 was the original Australian Forestry School building. The building layout included a library, museum, and office spaces. It is understood that the building is listed on the Australian Heritage Database
10	North-east portion of the site	A building plan dated March 1938 indicates that Building 10 was used as a museum and store for the Australian Forestry School.
12	Northern portion of the site	A building plan from SKM, dated August 2002 indicated that the building was used as workshops. A building plan from the Department of Works, dated November 1970, indicated that the building was to be used for a workshop and stores. Plans from the Department of Works understood to be dated from 1978, indicated that the building was extended to the west for used as a publication store. A mechanical services plan (dated 23/3/1978) indicated that a boiler room was present, though no indicated of the fuel source for the boiler was indicated. A site plan from the Department of Works, dated November 1970 showing the proposed location of Buildings 12,14 and 15, indicated that there were six buildings to be demolished. In addition, the plan detailed a 1,000 gallon UST and petrol bowser were to be installed. The UST and bowser were to be installed to the south of Building 12 and to the east of Building 14.
13	Northern portion of the site	Plans from Dub Design, dated December 2002 indicated that Building 13 was a garage. The plans indicated that a small above ground oil tank was mounted on the northern façade of the building. Plans of the building interior indicated fibre panel lining was present, indicating the potential presence of asbestos containing materials.
14	Northern portion of the site	Plans from the Department of Works, dated November 1970, indicated that the building was to be used for general stores, including soil and plant sample store, machine and bulky goods store and poison store. The plans also indicated a fuel bowser was to be located to the east of Building 14.
15	Northern portion of the site	Plans from the Department of Works, dated November 1970, indicated that Building 15 was to be used as an oil store. It is not clear from the plans if oil was stored in drums or an above ground storage tank within the building.
16	Northern portion of the site	Building plans from SKM, dated August 2002 indicated that Building 16 was used as a garage. The plans indicated that the buildings was corrugated iron clad with two roller doors present on the southern façade.

Building ID	Location on site	Relevant Information on Building Plans
17	Northern portion of the site	A building plan from SKM, dated August 2002 indicated that Building 17 was used as a general store.
18	Northern portion of the site	A building plan from the Department of Works, dated September 1973 indicated that Building 18 was a toilet block located to the north of tennis courts. Notes on the drawing indicated that an existing building was demolished prior to construction of Building 22.
22	Northern portion of the site	Plans from Dub Design, dated December 2002 indicated that Building 22 was a storage shed.
23	South-west portion of the site.	Plans from Dub Design, dated December 2002 indicated that Building 23 was a storage shed.
24	South-west portion of the site.	Plans from Dub Design, dated December 2002 indicated that Building 24 was a storage shed.

In addition, the survey drawing indicated the presence of buildings and features on site for which no building plans were provided by ACT Building Services. This included buildings number Building 21, Building 26, two buildings numbered Building 28. In addition, an underground tank was indicated to be present in the north-western portion of the site, approximately 85 m north-west of Building 2 and a transformer was shown to be present in the south west of the site, between Building 1 and Building 3.

A copy of selected historical building plans is presented in Appendix C.

5.3 Historical Aerial Photography

Several historical aerial photographs were obtained from public databases. Extracts of the aerial photographs are included in Appendix D. A summary of key features observed for the site and surrounding land is presented in Table 2.

Table 2: Summary of Historical Aerial Photographs

Year	Site	Surrounding Land Use
1951	The site had been developed with several buildings present in the northern portion of the site (assumed to be Buildings 9,10, 17). It appeared that at least one building was present and another building was under construction in the central portion of the site (assumed to be Building 2 and Building 5, respectively). An area of disturbed ground was visible in the vicinity of the construction.	The surrounding area appeared to be undergoing development. Immediately to the east of the site was an area of disturbed ground, while beyond residential properties had either been developed or were under development. To the north and west of the site agricultural land was present with several stands of trees present. To the south west of the site, the Canberra Brickworks were present with

Year	Site	Surrounding Land Use
	Several stands of trees were present across the remaining areas of the site, which is consistent with the use of the site as the Australian Forestry School.	extensive areas of disturbed ground appeared to be visible.
1961	Additional buildings had been developed at the site. In the northern portion of the site, tennis courts were visible. The building under construction in the previous photograph (Building 2) appeared to be complete and additional buildings constructed to the north and south of this building (Buildings 4 and 6). Stands of trees remained present at the site.	Additional residential development had been undertaken to the east of the site.
1972	Disturbed ground was present in the northern part of the site, to the north of the tennis courts. It appeared that buildings formerly present in this area of the site had been demolished and additional buildings were under construction (assumed to be Buildings 12 to 16). An additional building had been developed to the north of Building 2 (assumed to be Building 21). A building had been developed immediately to the south of the glass houses (assumed to be Building 3). Two rectangular buildings and associated car park area had been constructed in the southern part of the site (assumed to be Buildings 1 and 1b).	A golf course had been developed to the west and north-west of the site and Lake Burley Griffin was present to the north of the site. Additional residential development of the suburb of Yarralumla had been completed to the east of the site.
1979	Largely unchanged from the previous photograph. The disturbed ground in the north of the site was no longer visible and several buildings were present around a central yard area (assumed to be Buildings 12 to 16 and Building 22). In the middle of the yard, a structure that appeared to be a canopy was present (Building 16), indicating that the fuel dispensing activities may have been undertaken in this area.	Largely unchanged from the previous aerial photograph.

Year	Site	Surrounding Land Use
	A third building (assumed to be Building 1a) had been developed to the east of the two rectangular buildings in the southern portion of the site.	
1985	Largely unchanged from the previous photograph. The site appeared largely consistent with the current site layout.	Largely unchanged from the previous aerial photograph. Residential properties had been developed to the south-west of the site, between the site and the Canberra Brickworks site.
1991	Largely unchanged from the previous photograph.	Largely unchanged from the previous photograph. Some additional residential properties had been developed to the south-west of the site.
1998	Largely unchanged from the previous photograph. An additional building had been developed in the north-west portion of the site (assumed to be Building 28).	Largely unchanged from the previous photograph.
2004	Largely unchanged from the previous photograph. An additional building had been developed to the west of the tennis courts. Building 21 was no longer visible and assumed to have been demolished.	Largely unchanged from the previous photograph.
2020	Largely unchanged from the previous photograph. Building 6, 28 and the building to the west of the tennis courts were no longer visible and assumed to have been demolished.	Largely unchanged from the previous photograph.

5.4 Public Registers and Planning Records

ACT EPA Contaminated Land Search (letter presented in Appendix C).	The site is listed on the EPA contaminated sites database. EPA records indicates that fuel storage and distribution was undertaken at the site. A letter from the EPA indicated that the EPA reviewed an environment assessment report by Coffey Partners International Pty Ltd (Coffey) dated June 1998. The report detailed validation works for the removal of two underground storage tanks (USTs) at the site. The EPA assessed that the report detailed the satisfactory validation of the tank pit and

	surrounding area. However, it was noted that associated facilities such as the fuel lines remained in-situ and were not assessed. The ACT EPA indicated to DP that the former USTs were located between Buildings 12 and 14, in the northern part of the site as indicated on Drawings 1, 2 and 4, Appendix A.
Environmental Authorisations.	There are no Environmental Authorisations listed for the site. The closest authorisation to the site was issued to Royal Canberra Golf Club Ltd for the commercial use of agricultural and veterinary chemicals. For pest control or turf management. No details regarding the type or volume of chemicals authorised to be used were provided by the authorisation document.
WorkSafe ACT Dangerous goods search (presented in Appendix C)	The WorkSafe ACT Dangerous Goods search indicated that there was an approved licence for storing dangerous goods within the site. The licence was issued to the Division of Forest Research, CSIRO and was approved on 28 February 1985. Listed dangerous goods included the storage capacity of: • 21,000 L and 4,500 L of super petrol next to Building 16 (petrol bowsers); • 2,500 L of petrol, diesel, methanol, ethanol and turpentine within Building 15; • 2 tonnes of ammonium nitrate within Building 14; • Chemical, flammable liquids and LPG gas cylinder store within Building 1B A list of the chemicals that were stored in the laboratories of Building 1B can be viewed in Appendix B. Chemicals in the laboratories were generally stored in amounts of 500 g.
Planning Certificate(s)	No relevant records
Council Records	No relevant records

5.5 Other Sources

A search of the historical plans publicly available and listed on the ACTMAPi website (https://app.actmapi.act.gov.au/actmapi/index.html?viewer=hp) indicated that several historical maps were available for the site.

A map titled "Federal Territory Feature Map, Sheet 7", dated from approximately 1915, indicated that no development appeared at the site and the site was indicated to be part of 'Plain Paddock'. To the south of the site, the Commonwealth Brick Works were indicated to be present.

The site was marked on the map titled "Plan of Canberra City Shewing City Nomenclature" dated 23 July 1943 and that the site was listed as the Australian Forestry School. An extract of the map showing the site is presented in Appendix C.

A search of the Australian Heritage database (http://www.environment.gov.au/cgi-bin/ahdb/search.pl) was undertaken on 25 November 2020. A search for the Australian Forestry School indicated that the former Australian Forestry School is listed in the Australian Heritage database. A description of the site indicated that the site was first established as the Australian Forestry School in 1927. At its inception, the School comprised one building, that is currently located in the northern portion of the site.

The site is currently occupied by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CSIRO are currently responsible for managing the heritage aspects of the site and a search of the CSIRO website indicated that the site operated as the Australian Forestry School between 1927 and 1968. Between 1968 and 1975 the site operated as the Forestry and Timber Bureau, until CSIRO took occupation of the site from 1975. Since 2004, the site has been occupied by CSIRO and a number of other tenants. No information regarding the tenants were available.

DP is aware that contamination assessments have been undertaken by others on the Canberra Brick Works site located to the south of the site. It is understood that the brickworks located to the south of the site included a quarry area, brick manufacturing buildings including kilns, a boiler house and crusher houses, railway lines, workers cottages and a landfill where asbestos waste was deposited. It is also understood that underground fuel storage facilities were present within the Brick works.

5.6 Site History Integrity Assessment

The information used to establish the history of the site was sourced from reputable and reliable reference documents, many of which were official records held by Government departments/agencies. The databases maintained by various Government agencies potentially can contain high quality information, but some of these do not contain any data at all.

In particular, aerial photographs provide high quality information that is generally independent of memory or documentation. They are only available at intervals of several years, so some gaps exist in the information from this source. The observed site features are open to different interpretations and can be affected by the time of day and/or year at which they were taken, as well as specific events, such as flooding. Care has been taken to consider different possible interpretations of aerial photographs and to consider them in conjunction with other lines of evidence.

5.7 Summary of Site History

The site history indicates that the site was undeveloped until at least 1915 when the Federal Territory Feature Map, Sheet 7 indicated that the site was part of 'Plain Paddock' and was likely used for agricultural use. The site was developed as the Australian Forestry School in 1927 and has been used as a teaching or research facility since that time.

Since 1927, several buildings have been developed at the site, including glass houses. Subsequently some buildings have been demolished. ACT EPA records indicate that fuel storage and distribution has taken place at the site. Information from the ACT EPA indicated that two USTs used to store fuel were located at the site. These were subsequently removed from site in approximately 1998. Information reviewed indicated that fuel lines may still remain in-situ. Review of historical aerial photographs indicated that the buildings in the northern part of the site where the USTs were located were constructed in approximately 1972.

The WorkSafe ACT search indicated that chemical storage was licensed to the CSIRO in 1985. Chemical storage within the site included super petrol storage (the licence indicated that the bowers were adjacent to Building 16), petrol, diesel, methanol, ethanol and turpentine within Building 15 and ammonium nitrate within Building 14. Chemical, flammable liquids and LPG gas cylinder storage was present within Building 1B. It should be noted that it is likely the two USTs listed on the Dangerous Goods Search were the same tanks mentioned in the letter from the EPA that were removed and validated by Coffey in 1998.

Review of building plans indicated that the majority of the building at the site were either used as office block, research laboratories, glasshouses or stores/workshops.

6. Site Walkover

A site walkover was undertaken by a senior environmental scientist on 30 November 2020. The general site topography was consistent with that described in Section 4. The site layout appears to have remained unchanged from the 2020 aerial photograph. The following key site features pertinent to the PSI-L were observed (refer to photographs in Appendix E).

- The site comprised a former research facility complex with several buildings and roads present across the site. Land in between the buildings were primarily grassed with numerous trees located at the site;
- The site buildings appeared to be generally consistent layout with those observed on the most recent historical aerial photographs and building plans provided by ACT Building Services;
- Most of the buildings are built at grade with minimal site cut and/or fill. It is noted that Buildings 3 and 4A-4H have the most amount of earthworks for their construction, with cuts and fills estimated of up to approximately 2.0 m;
- Multiple carparks and roads are located across the site including Wilf Crane Crescent which forms the inside boundary of the C shaped site (next to Forestry Oval). The roads/carparks are asphalt surfaced, with the exception of the carparks around Buildings 4A-4H which are concreted;
- Buildings 1, 1A and 1B were disused at the time of the site inspection and appeared to have formerly been used for office space and laboratories. A bitumen car park was present at the eastern end of the building. Building 1B appeared to have been cut into the slope and fill material was potentially present beneath Buildings 1 and 1A. Buildings 1 and 1B were connected by a walkway;
- On the northern side of Building 1 signage indicated that a boiler room was present, with gas supply pipes noted to be present. A capped pipe was noted in the area where the heating oil UST was noted to be present on the plans available for the building. Anecdotal information from CSIRO indicated that tanks had been removed from the area around Building 1. There was no information or records available to indicate that the removal of the UST underwent a validation assessment;
- Building 2 was disused at the time of the site inspection and appeared to have formerly been used for office space;
- Building 3 was disused at the time of the site inspection and appeared to have formerly been used for office space;

- Buildings 4 and 4A – 4H were disused at the time of the site inspection and appeared to have formerly been used for greenhouses and controlled environments for plant cultivation. The indicated boiler and fuel store from the drawing for 'Stove House' dated February 1928 was not observed. Evidence of a removed UST was not observed in the Building 4 and Buildings 4A – 4H area either;
- Buildings 5 and 5A appeared to be disused at the time of the site inspection and appeared to have formerly been used for the caretaker's residence and garage;
- The northern portion of the site (Buildings 10, 12 – 19, 22 and 26) appeared to be consistent with the aerial photos of the site and the building plan descriptions (i.e. predominantly storage sheds and garages and storage buildings for miscellaneous items);
- Building 15 appeared to be a small storage building for flammable gas, liquid and non-toxic gas. Building 15 was not accessible at the time of the walkover;
- The small above ground oil tank mentioned in the building plans for Building 13 was not observed during the walkover. Staining of soils around Building 13 was not observed during the walkover either;
- The areas where nutrient and chemical storage was noted in the WorkSafe ACT Dangerous Goods Search all appeared to be within secure buildings and located on hardstand surfaces (i.e. Buildings 1B, 14 and 15). Nutrients and chemicals that were applied on site were most likely used in laboratories (Building 1B) or within the controlled environments buildings (Buildings 4, 4A – 4H);
- No evidence of stressed vegetation was noted around buildings where nutrients and chemicals were stored;
- No evidence of staining or odorous soils was noted during the site inspection;
- No evidence of potential asbestos containing materials (ACM) fragments were noted on the site's ground surface. It is noted that DP's scope did not include a hazardous building materials assessment and access inside the buildings was not gained at the time of the walkover. However, based on the provided building plans and the age of the buildings, it is likely that ACM will be present within the site's structures. There is also a possibility that ACM may be present within the soil and/or on the ground surface as a result of poor building practices in the past (i.e. on-site dumping of material off-cuts and poor backfilling practices); and
- Remnant ACM and other hazardous building materials (lead, synthetic building materials and PCB) may be present in previous building footprints.

7. Preliminary 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 provides the framework for identifying how the 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 (complete pathways).

Potential Sources

Based on the current investigation, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified.

- S1: Fill: Associated with levelling, demolition of former buildings on the site and potential burying of waste as evidenced in the site's environment protection licences.
  - COPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organophosphate pesticides (OPP), organochlorine pesticides (OCP) and asbestos.
- S2: Former USTs and associated pipework and bowsers.
  - COPC include lead, TRH, BTEX, PAH, and volatile organic compounds (VOC).
- S3: Chemical use and storage.
  - COPC include metals, TRH, BTEX, PAH, OPP, OCP, nutrients, acids and alkalis.
- S4: Site buildings constructed from hazardous building materials.
  - COPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB.

Potential Receptors

The following potential human receptors have been identified:

- R1: Current users [CSIRO site];
- R2: Construction and maintenance workers;
- R3: End users [residential]; and
- R4: Adjacent site users [recreational and low-density residential].

The following potential environmental receptors have been identified:

- R5: Surface water [stormwater drain ~ 330 m to the south-west and Lake Burley Griffin ~ 495 m to the north-east, fresh water];
- R6: Groundwater; and
- R7: Terrestrial ecology.

Potential Pathways

The following potential pathways have been identified:

- P1: Ingestion and dermal contact;
- P2: Inhalation of dust and/or vapours;
- P3: Surface water run-off;
- P4: Lateral migration of groundwater providing base flow to water bodies;
- P5: Leaching of contaminants and vertical migration into groundwater; and
- P6: Contact with terrestrial ecology.

Summary of Potentially Complete Exposure Pathways

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 possible pathways between the above sources (S1 to S4) and receptors (R1 to R7) are provided in below Table 3.

Table 3: Summary of Potentially Complete Exposure Pathways

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S1: Fill, Metals, TRH, BTEX, PAH, OCP and asbestos	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residents]	Disturbed ground was identified in Aerial Photographs 1951, 1961 and 1972. Potential fill may also be present within service trenches, underneath roads and buildings within the site. An intrusive investigation is recommended to assess possible contamination including testing of the soils. A groundwater investigation is not recommended at this stage based on the historical assessment. A groundwater investigation may be recommended at a later stage depending on the results of the soil sample assessment.
	P2: Inhalation of dust and/or vapours	R4: Adjacent site users [recreational and residents].	
	P3: Surface water run-off P5: Lateral migration of groundwater providing base flow to water bodies	R5: Surface Water	
	P4: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: terrestrial ecology	
S2: USTs, Lead, TRH, BTEX, PAH, and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residential]]	Former USTs and oil storage have been identified on site. An intrusive investigation is recommended to assess possible contamination including testing of the soils. A groundwater investigation is not recommended at this stage based on the

Source and COPC	Transport Pathway	Receptor	Risk Management Action
	P3: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater	R5: Surface Water.	historical assessment. A groundwater investigation may be recommended at a later stage depending on the results of the soil sample assessment.
	P4: Lateral migration of groundwater providing base flow to water bodies P5: Leaching of contaminants and vertical migration into groundwater	R4: Adjacent site users [recreational and residential] R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology	
S3: Chemical use and storage, metals, TRH, BTEX, PAH, pesticides, nutrients, acids and alkalis	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residential]]	Chemicals were stored on site that were associated with the maintenance of the site and plant cultivation (i.e. oil, fuel, pesticides, nutrients etc.). At this stage of the investigation, an intrusive investigation is recommended around areas of fuel storage to assess possible contamination including testing of soils. A validation assessment is recommended within the footprint of Buildings 1B, 4, 4A-4H, 14 and 15 after they are demolished. These storage buildings are secure and located on hardstand surfaces. A groundwater investigation is not recommended at this stage based on the historical assessment. A groundwater investigation may be recommended at a later stage depending on the results of the validation assessment.
	P3: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater	R5: Surface Water.	
	P4: Lateral migration of groundwater providing base flow to water bodies P5: Leaching of contaminants and vertical migration into groundwater	R4: Adjacent site users [recreational and residential] R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S4: Current and former buildings, asbestos, SMF, lead (in paint) and PCB	P1: Ingestion and dermal contact P2: Inhalation of dust	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residents]	A hazardous building materials assessment is recommended for existing structures. A validation assessment is also recommended within the building footprints once a current building has been demolished. An intrusive investigation is recommended within the footprint of current demolished buildings' footprints to assess possible contamination including testing of the soils. A groundwater investigation is not recommended at this stage based on the historical assessment. A groundwater investigation may be recommended at a later stage depending on the results of the soil sample assessment.
	P3: Surface water run-off* P5: Leaching of contaminants and vertical migration into groundwater*	R5: Surface Water.	
	P4: Lateral migration of groundwater providing base flow to water bodies* P5: Leaching of contaminants and vertical migration into groundwater*	R4: Adjacent site users [recreational and residential] R6: Groundwater	
	P6: Contact with terrestrial ecology*	R7: Terrestrial ecology	

Note: *Pathway only refers to lead and PCB for S4.

8. Sampling and Analysis Quality Plan

8.1 Data Quality Objectives

The PSI-L was devised with reference to the seven-step data quality objective process which is provided in Appendix B Schedule B2, NEPC (2013). The DQO process is outlined in Appendix F.

8.2 Soil Sampling Rationale

Based on the CSM and DQO, it was considered that 17 locations would be appropriate to give a preliminary indication of the contamination status of the site. A judgemental sampling strategy to determine borehole/test pit locations was adopted. Test locations were based on site history information

and the CSM with the rationale provided below. Borehole / test pit locations are shown on Drawing 3, in Appendix A.

Test Pit TP3 and Boreholes 102 and 103	In the vicinity of the former UST, oil storage, former bowser pipes and chemical storage.
Test Pit TP5 and Boreholes BH101, BH104, BH105, BH107	In the building footprints of former buildings.
Boreholes BH108 – BH110	Building plans indicated that a boiler and fuel storage may be/were present.
Boreholes BH111 and BH113	In the vicinity of Buildings 1, 1A and 1B where chemical storage, boilers and USTs have been indicated to exist on the building plans.
Borehole BH106	In the vicinity of a garage.

Soil samples were collected from each borehole / test pit at depths of approximately 0.1 m, 0.5 m, 1.0 m and every 1.0 m thereafter, and changes in lithology or signs of contamination.

It should be noted that at this stage of the site investigation, soils were not tested for nutrients (ammonium nitrate) and stored laboratory chemicals (acids and alkalis). According to records reviewed, nutrients and chemicals were stored within secure buildings which were located upon hardstand surfaces. Nutrient and chemical use was most likely used within the controlled environment glasshouse buildings (Buildings 4 and 4A – 4H). These buildings were also secure and located on hardstand surfaces.

The general sampling methods are described in the field work methodology, included in Appendix G.

9. Site Assessment Criteria

The site assessment criteria (SAC) applied in the current investigation are informed by the CSM (Section 7) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise a low-density residential land use scenario, the most conservative criteria for a proposed rezoning. The derivation of the SAC is included in Appendix H and the adopted SAC are listed on the summary analytical results tables in Appendix K.

10. Field Work Results

The borehole and test pit logs for this assessment are included in Appendix I, together with notes that define classification methods and descriptive terms. It should be noted that the geotechnical test pit and

borehole logs (TP1, TP2, TP4, TP8 and TP10 and BH6, BH7, BH9, BH11 and BH12) and sub-surface conditions have been included in this report. The logs recorded the following general sub-surface profile:

10.1 Test Pits (Pits 1 – 5, 8 and 10)

The test pits encountered slightly variable subsurface conditions with the principal succession of strata broadly summarised as follows:

- TOPSOIL: Sandy SILT to depths of 0.3 – 0.4 m in Pits 1 – 4;
- TOPSOIL FILL: Silty Sandy CLAY to depths of 0.1 – 0.2 m in Pits 5, 8 and 10;
- FILL: very stiff, medium to high plasticity CLAY from depths of 0.2 m to 0.45 – 1.5 m in Pits 8 and 10;
- ALLUVIUM: variably stiff to hard, medium to high plasticity CLAY/Silty CLAY from 0.3 – 0.4 m to 1.2 – 2.0 m in Pits 2-5, 8 and 10;
- COLLUVIUM: stiff, medium plasticity CLAY/Silty CLAY in Pit 1 from 0.4 – 2.0 m;
- SANDSTONE: low strength, highly weathered sandstone found in Pit 4 from 1.6 m to the limit of investigation depth of 2.0 m; and
- SILTSTONE: low strength, highly weathered siltstone found in Pits 3 and 10 from depth of 1.5 m and 1.85 m respectively to the limit of investigation depth of 2.0 m

10.2 Boreholes in Existing Pavement (Bores 6, 7, 9, 11, 12)

Boreholes 6, 7, 9, 11 and 12 encountered approximately 50 mm of asphalt underlain by up to 250 mm of road base material. The road base material was underlain by sandy/gravelly fill to depths of between 0.5 m to 0.7 m. Natural soils included medium to high plasticity clay/silty to depths of between 1.4 m to 2.0 m. Variably very low to low to medium strength siltstone was encountered within Bores 9, 11 and 12 from between 1.4 - 1.8 m depth up to the limit of investigation depth of 2.0 m.

Table 4 – Summary of Existing Pavement Profiles

Test Bore No	Depth Asphalt (m)	Depth Roadbase (m)	Depth Fill(m)	Depth Clayey/ Sandy Soils (m)	Depth Rock (m)
6	0.05	0.3	NE	2.0	NE
7	0.05	0.35	NE	0.9 – 1.5	0.35 – 0.9
9	0.05	0.3	0.7	1.8	1.9
11	0.05	0.3	0.5	1.4	2.0
12	0.05	0.3	NE	1.4	1.9

Note: NE – Not encountered.

10.3 Cored Boreholes (Bores 101 – 113)

- TOPSOIL: sandy silt topsoil/topsoil fill in Bores 101, 104, 105, 107, 111 and 113 to depths of 0.15 m to 0.4 m;

- FILL (PAVEMENT MATERIALS): 50 mm of asphalt overlying150 mm to 250 mm of road base gravel In Bores 102, 103, 106, 109, 110A and 112 and 60 mm and 80 mm thick concrete in Bores 108 and 110, with 120 mm of road base gravel in Bore 110 only;
- FILL (GENERAL): medium to high plasticity clay fill in Bore 108 to 1.6 m depth;
- CLAY/SILTY CLAY/SANDY CLAY: stiff to hard (and firm in Bore 109 to 1.8 m depth), low to high plasticity clay, silty clay and sandy clay at all test locations, excluding Bores 110 and 110A, to depths of 1.4 – 2.0 m depth; and
- BEDROCK: variably very low to high strength, highly to slightly weathered siltstone and sandstone bedrock at all test locations below depths of 0.5 m to 4.5 m to the termination depths of 2.4 – 9.0 m at either the limit of investigation or auger refusal.

10.4 Groundwater

Free groundwater was only encountered during the augering phase of Bore 102 at 6.6 m. However, the boreholes and test pits were backfilled immediately following excavation, precluding longer term monitoring of groundwater levels. Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature and soil permeability. For these reasons, it is noted that the moisture condition of the site soils may vary considerably from the time of the investigation compared to at the time of construction.

10.5 Field Screening and Contamination Observations

There were no other apparent records of visual or olfactory evidence (eg: staining, odours, free phase product) to suggest the presence of contamination within the soils or groundwater observed in the investigation. Trace amounts of anthropogenic materials (concrete boulder) were observed in TP5 at 0.3 m bgl.

Results of the PID screening was below 6 ppm in Bores 102 to 110, 112 and 113 and Test Pits 3 and 5, indicating the presence of VOCs to be very low to unlikely.

Results of the PID screening ranged from between 0.8 ppm – 80 ppm in Bores 101 and 111 indicating low to moderate presence of VOCs within the sub-surface. Although slightly elevated, the presence of volatile organic compounds is considered to be unlikely, nonetheless, the sample was selected for laboratory analysis.

10.6 Laboratory Analytical Results

The laboratory certificate of analysis together with the chain of custody and sample receipt information is provided in Appendix J.

The results of laboratory analysis are summarised in the following tables in Appendix K:

- Table K1: Summary of Results of Soil Analysis (Metals, Hydrocarbons and PAH); and
- Table K2: Summary of Results of Soil Analysis (OCP, OPP, PCB and Asbestos).

11. Discussion

11.1 Soils

Analytical results of soil samples were all within the adopted health-based (i.e. HIL-A / HSL-A/B) and ecological (i.e. EIL / ESL) criteria, and management limits for residential land use.

All soil results for TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the laboratory's practical quantitation limit (PQL). All soil results for metals were above the PQL with the exception of arsenic in samples TP / 0.1 m, BH113 / 0.5 m, BH113 / 2.0 m, BH112 / 0.5 m and BH102 / 0.5 m cadmium and mercury, but below the adopted screening criteria.

11.2 Data Quality Assurance and Quality Control

The data quality assurance and quality control (QA/QC) results are included in Appendix L and the relative percentage difference results for intra-laboratory replicates are included in Appendix K. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

12. Revised Conceptual Site Model

The CSM presented in Section 7 has been updated to incorporate the findings of this PSI-L.

A 'source-pathway-receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (complete pathways). The updated CSM is presented in Table 5.

Table 5: Updated Summary of Potentially Complete Exposure Pathways

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S1: Fill, Metals, TRH, BTEX, PAH, OCP and asbestos	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residents]	The results of the investigation encountered fill in several locations across the site. Some of the fill was located within previous building footprints, existing pavements or cut/fill areas of the building/pavement infrastructure. The results of the laboratory analysis indicated that reported concentrations of contaminants of concern were below the adopted assessment criteria. It is considered that the potential for chemical contamination associated with fill at the site is low, however, a construction
	P2: Inhalation of dust and/or vapours	R4: Adjacent site users [recreational and residents].	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
	P3: Surface water run-off P5: Lateral migration of groundwater providing base flow to water bodies	R5: Surface Water	environmental management plan (CEMP) is recommended to be prepared and implemented during potential future site works, including an 'unexpected finds protocol' (UFP) and asbestos finds protocol to address any potential contaminants of concern associated with fill.. In addition, should fill material require disposal off-site or if the stockpiled fill present is to be used on-site or disposed off-site, further assessment would be required
	P4: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: terrestrial ecology	
S2: USTs, Lead, TRH, BTEX, PAH, and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residential]]	The EPA provided the location of two former USTs within the site adjacent to Buildings 12 and 14. The tanks were removed in Coffey's 1998 validation assessment and the EPA assessed that the report detailed the satisfactory validation of the tank pit and surrounding area. However, it was noted that associated facilities such as the fuel lines remained in-situ and were not assessed. Other former oil storage tanks, USTs and above ground storage tanks as noted in the building plans were not observed during the walkover. The results of the laboratory analysis indicated that reported concentrations of contaminants of concern were below the adopted assessment criteria. DP recommends that a validation assessment be undertaken when the fuel lines are planned to be removed. Furthermore, DP recommends that a CEMP be prepared and implemented during potential future site works including a UFP if hydrocarbon contamination is suspected or USTs and other fuel storage tanks are found (i.e. staining of soil and odours).
	P3: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater	R5: Surface Water.	
	P4: Lateral migration of groundwater providing base flow to water bodies P5: Leaching of contaminants and vertical migration into groundwater	R4: Adjacent site users [recreational and residential] R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S3: Chemical use and storage, metals, TRH, BTEX, PAH, pesticides, nutrients, acids and alkalis	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residential]]	The results of the laboratory analysis indicated that reported concentrations of contaminants of concern (TRH, BTEX, PAH and pesticides) were below the adopted assessment criteria. DP recommends that a validation assessment be undertaken within the footprints of the buildings that have previously or currently stored the chemicals listed in the WorkSafe ACT Dangerous Goods Search. Furthermore, any chemicals that are currently stored on the site, would need to be disposed of lawfully before any demolition occurs.
	P3: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater	R5: Surface Water.	
	P4: Lateral migration of groundwater providing base flow to water bodies P5: Leaching of contaminants and vertical migration into groundwater	R4: Adjacent site users [recreational and residential] R6: Groundwater	
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology	
S4: Current and former buildings, asbestos, SMF, lead (in paint) and PCB	P1: Ingestion and dermal contact P2: Inhalation of dust	R1: Current users [CSIRO workers] R2: Construction and maintenance workers R3: End users [residents]	The results of the laboratory analysis indicated that reported concentrations of contaminants of concern were below the adopted assessment criteria or not detected (asbestos). If not already completed, an intrusive HBM survey within accessible and inaccessible locations of the buildings on site would need to be completed. The HBM survey would need to be completed by a suitably qualified environmental consultant and all recommendations of the survey would need to be completed prior to demolition of any building within the site.
	P3: Surface water run-off* P5: Leaching of contaminants and vertical migration into groundwater*	R5: Surface Water.	
	P4: Lateral migration of groundwater	R4: Adjacent site users [recreational and residential]	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
	providing base flow to water bodies* P5: Leaching of contaminants and vertical migration into groundwater*	R6: Groundwater	
	P6: Contact with terrestrial ecology*	R7: Terrestrial ecology	

Note: *Pathway only refers to lead and PCB for S4.

13. Conclusions and Recommendations

Areas that may be impacted by potential contamination were identified based on the available desktop site information, a site walkover, intrusive investigation (including observations made during the geotechnical investigation) and laboratory analysis results of selected samples. Based on the findings of the assessment, the potential for gross chemical contamination to be present within the site is considered to be low to moderate.

Building plans obtained by DP indicated that a vast majority of the existing buildings have a potential to comprise ACM. DP did not undertake a hazardous building material survey and at the time of the investigation, the buildings were inaccessible. Building plans also detailed the use of USTs and above ground storage tanks. During the site walkover, these USTs and above ground storage tanks were not observed. However, it **cannot** be assumed that all former fuel storage tanks have been removed from site.

ACT EPA records indicate that they reviewed an environment assessment report by Coffey dated June 1998. The report detailed validation works for the removal of two USTs at the site, adjacent to Buildings 12 and 14. The EPA assessed that the report detailed the satisfactory validation of the tank pit and surrounding area. However, it was noted that associated facilities such as the fuel lines remained in-situ and were not assessed. Anecdotal information from CSIRO indicated that the heating oil UST adjacent to Building 1 was removed, however it is not known whether the removal of the UST was validated.

Fill was identified across some areas of the site. The historical aerial photographs indicate that the site had undergone some ground disturbance, including the construction and refurbishment work of buildings within the site. Fill was also identified during the geotechnical and environmental intrusive investigation work. Other signs of contamination during the intrusive investigation were not observed (i.e. asbestos in fill, hydrocarbon affected soils including staining and odours and evidence of heavy pesticide use).

The results of the laboratory analysis indicated that reported concentrations of contaminants of concern for fill, hydrocarbons from on-site fuel and oil storage, chemical storage and HBM were below the adopted assessment criteria or not detected (asbestos).

DP considers that the site is suitable for all permissible uses in the Land Use Zone (DES: Designated and RZ1: Suburban) from a contamination perspective, subject to the following measures during any potential future development works:

- Before demolition works are conducted on site, it is recommended that a ground penetrating radar survey is conducted in areas where suspected UST are suspected (i.e. Buildings 1, 1B, Building 4 and the north-west portion of the site, ~85 m north-west from Building 2);
- During demolition works on the site, all tanks, bowsers and associate pipework should be removed and a validation assessment would need to be undertaken within the surrounding soils of tanks and associated infrastructure;
- A validation assessment would need to be undertaken within the soil of the building footprints of the buildings that were used as storage areas for the nutrients and chemicals mentioned in the WorkSafe ACT Dangerous Goods Search;
- A Construction Environment Management Plan should be prepared including an 'unexpected finds protocol' (i.e. asbestos in fill, hydrocarbon affected soils including staining and odours and evidence of heavy pesticide use) and implemented during potential future site works;
- Should suspected asbestos containing materials be encountered at the site, the affected area should be fenced off and assessed by a licensed asbestos assessor;
- It is further recommended that a hazardous building materials survey should be undertaken and all recommendations of the survey be completed on existing site structures prior to their demolition; and
- Should fill material be required to be disposed off-site, it must first be assessed in accordance with ACT EPA Information Sheet 4, Requirements for the Reuse and Disposal of Contaminated Soil in the ACT.

14. References

ACT Environment Protection Authority (2019), *'Information Sheet 4: Requirements for the Reuse and Disposal of Contaminated Soil in the ACT'*, dated January 2019

ACT EPA (2018) '*Information Sheet 7: Guidance for Undertaking Preliminary Contamination Investigations for Development/Lease Variation Purposes* ', dated November 2018:

ACT's Environmental Standards (2000), 'Assessment & Classification of Liquid & Non-liquid Wastes', dated June 2000.

Bureau of Mineral Resources (1992), 'Geology of Canberra Geological Series Sheet 8727, 1:100 000 scale map', dated 1992.

Bureau of Mineral Resources, Geology and Geophysics (1984) 'Hydrogeology of the Australian Capital Territory and Environs 1:100,000 scale map', dated 1984.

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene.* Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

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

NSW EPA. (1995). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

15. Limitations

Douglas Partners (DP) has prepared this report for this project at in accordance with DP's proposal dated 5 November 2020 and acceptance received from Justin Micallef of Oakstand, on behalf of The Shepherd Foundation dated 12 November 2020. The work was carried out under DP's Conditions of Engagement . This report is provided for the exclusive use of The Shepherd Foundation 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.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

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.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials,

such as concrete was, however, located in previous below-ground fill, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

Douglas Partners Pty Ltd