

Hydrogeology Report

Block 45, Section 3, Hume

Forestrack Pty Ltd

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1 Introduction

Forestrack Pty Ltd (Forestrack) engaged Lanterra Consulting Pty Ltd (Lanterra) to complete a hydrogeological assessment in support of an Environmental Impact Assessment (EIA) for the proposed TRG Bushfire Response and Training Centre located at Block 45 Section 3, Hume, ACT 2620 (herein referred to as the site).

Based on the ACT Territory Plan, the site is currently zoned as NUZ1: Broadacre and has an area of 35,163 square metres (m²). The location and layout of the site is illustrated in **Figure 1** and **Figure 2, Appendix A**.

This hydrogeological assessment has been prepared in response to the proponent requirement to prepare an Environmental Impact Statement (EIS) in line with the requirements set out in the Planning and Development Act and Environment Planning and Sustainable Development Directorate's (EPSDD) requirements. The proponent has been issued with a Scoping Document for preparation of an EIS on 24 March 2021.

This hydrogeological assessment has been prepared in general accordance with the EPA Victoria (2006) '*Hydrogeological Assessment (Groundwater Quality) Guidelines*'.

1.1 Objectives

The purpose of the PSI is to assess the risk of the proposed development may pose to groundwater both during construction and the operational phase of the site.

1.2 Scope of Work

The following scope of work has been completed to meet the project objectives:

- Review desktop information regarding the underlying groundwater conditions to assess the likely quality of groundwater.
- Review the proposed construction and operational requirements for the development to assess the potential impact these may have on groundwater.
- Complete an impact assessment to investigate the potential for undesirable effects the development may have on groundwater.
- Preparation of this hydrogeological report for inclusion with the EIS.

1.3 Limitations

The findings of the report were based on the Scope of Work outlined above. Lanterra performed services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties express or implied, are made.

Subject to the Scope of Work, the assessment was limited strictly to identifying typical environmental conditions associated with the subject property area and does not include evaluation of any other issues.

The absence of any identified hazardous or toxic materials on the subject property should not be interpreted as a guarantee that such materials do not exist on the site. Lanterra will not investigate any waste materials from the property that may have been disposed of off the site, nor related waste management practices.

The results of this assessment are based upon the site inspection and the sampling specified above conducted by Lanterra personnel and information from the Client or regulatory agencies. All conclusions and recommendations regarding the property area will be the professional opinions of the Lanterra personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability are made, Lanterra will not assume responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Lanterra, or developments resulting from situations outside the scope of this project.

2 Site Characteristics

2.1 Site Location

The site location and a detailed site plan are presented in **Figure 1** and **Figure 2, Appendix A**.

Table 1: *Summary of Site Details*

Site Characteristics	Detail
Street Addresses	Intersection of Lanyon Drive and Sheppard Street, Hume, ACT 2620
Approximate MGA GDA 94 coordinates (centre of site)	X: 697459.79448 Y: 6082146.64023
Approximate Elevation (m AHD)	586-592 m
Block, Section, Division	Block 45, Section 3, Hume
Land Zoning	NUZ1: Broadacre Zone
Current Land Use	The block is vacant
Block Area	35,163 m ²

2.2 Site Description

The following description is based on observations made during a site visit conducted on Monday 11 May 2020 during the drilling of boreholes by a suitably qualified environmental scientist from Lanterra.

- At the time of the investigation, the site was a vacant grassland and secured by a 1.5m fence with access via a lockable gate along Sheppard Street.
- An above ground power line is present within the site crossing it in a north-west to south-east direction.
- A wired fence was present inside the site separating the vacant area from the trees cover area in the north-east section of the site (amenity native plants).
- Asbestos-containing materials (ACM) were found outside the site in the vicinities of the lockable gate (i.e. near the driveway).
- Patches of rubbish (plastics, bricks, roof tiles, tin, wood) were randomly distributed across the site.
- Three spoil stockpiles were located within the site. They are oriented in a north-west to south-east fashion.
- Bedrock outcrops were observed within the highest area across the site, located in the north-east portion.
- Trees are present in approximately one-third of the site mostly located within the north-east portion of the site.

A detailed site plan is presented in **Figure 2, Appendix A** while photographs of the site are provided in **Appendix B**.

2.3 Previous Investigations

A preliminary site investigation (PSI) has been completed by Lanterra to assess the site for potentially contaminating activities to assess the suitability of the site for development from a contamination perspective. The results of the PSI were presented in the report titled 'Preliminary Site Investigation, Block 45 Section 3 Hume. A summary of the contamination assessment results is presented below.

- Forestrack engaged Lanterra to complete a PSI in support of an Environmental Impact Assessment (EIA) for the proposed TRG Bushfire Response and Training Centre located at Block 45 Section 3, Hume, ACT 2620.
- The objective of the project was to assess the suitability of the site for the land uses permitted under the zoning of the site of NUZ1: Broadacre Zone from a contamination perspective, and if required, identify an appropriate remediation strategy to make the site suitable for these purposes.
- The PSI included a historical review of the site, soil sampling and analysis to characterise the site.
- Based on the historical use of the site and the sampling of twenty-four (24) soil samples and eleven (11) stockpile samples undertaken during the PSI, the findings were as follows:
 - Patches of rubbish (plastics, bricks, roof tiles, tin, wood) were found across the site.
 - Potential imported materials resembling topsoil were encountered across the site looking like topsoil. This material comprised a dark brown to brown silty clay, dry to moist and soft.
 - Natural material was encountered at approximately 1.0m bgl in the cleared central area of the site. However, in the area surrounding the rocky outcrops and trees cover, natural material was found from 0.5m bgl. This soil was characterised as a brown to orange silty clay, dry to moist and soft to hard.
 - Concentrations of contaminants of potential concern (COPC) were below the adopted assessment criteria for residential use (HIL A, HSL A, EIL and ESL) in all soil and stockpile samples.
- Based on these findings, Lanterra considered that the site was suitable for the land uses permitted under the NUZ1: Broadacre Zone, from a contamination perspective.
- Prior to construction works commencing, it is recommended that a Construction Environmental Management Plan (CEMP) with a suitable unexpected finds procedure is prepared by a suitably qualified environmental consultant to assist construction workers with managing soil that may exhibit visual or olfactory indications of contamination.

2.4 Surrounding Land Uses

A summary of the land uses that surround the site are as follows:

- **North:** Lanyon Drive and Monaro Highway. Vacant paddocks in north-west and north-east directions. The Southcare Helicopter base is located approximately 500 m north of the site;
- **South:** Sheppard Street, industry buildings including manufacturers, engineering, real estate, builder and soil supplies, fabricators, etc. to the south-east and south-west of the site. Beyond the buildings is the border with New South Wales;
- **East:** Sheppard Street and vacant paddocks beyond; and
- **West:** Monaro highway, vacant paddocks and general industry sites.

2.5 Sensitive Environments

The nearest sensitive environments are Dog Trap Creek to the north of the site and a small creek to the east, both within a 150 m radius from the site. These creeks are tributaries of Jerrabomberra Creek which is located approximately 230 m east of the site.

2.6 Proposed Land Use

Based on the project brief by Forestrack, it is understood that the site is being prepared to build a new rescue helicopter base and for the proposed Bushfire Response and Training Centre.

3 Methods and Results

3.1 Desktop Study Methods

A desktop review of hydrogeological information has been completed. Information for the desktop analysis has been sourced from the following:

- Lanterra Consulting (2020) '*Preliminary Site Investigation, Block 45 Section 3, Hume, ACT*'
- Lotsearch Report: Cnr Sheppard St and Lanyon Drive, Hume ACT 2620
- Bureau of Mineral Resources (1984) '*Hydrogeology of the Australian Capital Territory and Environs*'
- Bureau of Mineral Resources (1992) '1:100,000 Geological Series, Canberra, New South Wales and Australian Capital Territory, Sheet 8727'

3.2 Geological Setting

The 1:100,000 Geological Series, Canberra, New South Wales and Australian Capital Territory, Sheet 8727 (Bureau of Mineral Resources, 1992) shows that the site is part of the Laidlaw Volcanic Suite of the Silurian period. Lithologies across the site would be comprised of rhyodacitic ignimbrite, and minor volcanoclastic and argillaceous sediments; tuff, tuffaceous sandstone, shale and ashstone; and rhyodacite lava.

3.3 Hydrogeological Setting

Based on the information provided in the above documents, the hydrogeological setting of the site can be described as follows:

- A review of the Bureau of Mineral Resources (1984) Hydrogeology of the Australian Capital Territory and Environs indicates that groundwater is hosted in fractured aquifers with high yielding zones associated with the upper and lower portions of the individual ash flow tuffs, and interbedded sediments.
- The quality of groundwater is expected to be variable, and the general total dissolved solids (TDS) is anticipated to be between 500 – 1000 milligrams per litre (mg/l) and the yield is estimated to be less than 0.5 litres per second (l/sec).
- Based on the topography of the site and the nearest water bodies, which are Dog Trap and Jerrabomberra Creeks, the groundwater flow direction is inferred to be from south-west to north-east.
- Based on the level at which groundwater was encountered (30 m bgl) in borehole 158 located 706 m north from the site at an elevation of 583 m AHD, the depth to groundwater is conservatively estimated to be approximately 15 m below ground level or deeper.
- No potentially contaminating activities were identified on Block 45 Section 3 Hume and the potential for groundwater to be contaminated from activities on the site is considered to be low.

The site is located within the Central Molonglo Water Management Area which includes the Molonglo River and Lake Burley Griffin to the north. The Jerrabomberra Wetlands which are located on the eastern margin of Lake Burley Griffin to the north of the site is the only nationally important wetland within the Central Molonglo Water Management Area and any impact by site activities on the wetland is considered negligible.

Figure 3 illustrates the location of the site within the Central Molonglo Water Management Area.

Based on the site never being developed previously, monitoring to assess the potential impact to groundwater is not considered necessary.

3.4 Groundwater Bore Search

A groundwater bore search was provided within the Lotsearch report. The purpose of the bore search was to document the location and depth of any nearby registered groundwater bores, and the associated quality of the groundwater so that potential impacts of contaminants from the site or surrounding land uses (if any) on local users of groundwater may be assessed.

This search indicated that there were two (2) abstraction groundwater boreholes according to the ACT Government data source within 2,000 m of the site and twenty-one (21) groundwater boreholes were registered with the Bureau of Mineralogy within 2,000 m of the site. The nearest of these boreholes is located approximately 651 m to the west of the site. No details regarding the groundwater quality were recorded.

The proposed activities on the site are unlikely to impact any use of groundwater from the known abstraction bores.

3.5 Indications of Contamination

Based on the site visit on 11 May 2020 patches of rubbish including bricks, fragments of PVC, tin, roof tiles, asphalt, concrete post remnants, and wood were randomly distributed across the site. In front of the entrance gate, outside the site, fragments of asbestos-containing material (ACM) were observed.

There was no evidence of storage tanks during the site walkover.

No hazardous materials were observed on-site during the assessment, with the exception of a potential asbestos-containing fragment observed near the driveway outside the property boundary.

There was no evidence of chemical storage on the site.

No olfactory indicators of contamination were noted during the site visit or sampling of boreholes drilled across the site.

Overall no potential contamination was identified that may pose an existing contamination risk to groundwater.

4 Conceptual Site Model

Conceptual site models (CSM) are a method of presenting site contamination information and the relationships between sources of contamination, how it may have been introduced to the site, possible pathways for contaminant migration and exposure, and the receptors that may be affected by contaminants.

A graphical conceptual site model has been prepared and shown on **Figure 4**.

4.1 Exposure Pathways and Receptors

For a contaminant to pose a risk to either human health and/or the environment, there must be a potentially complete or complete pathway between the contaminant and the receptor.

A receptor may be something (e.g. human, other living organisms or ecological systems) that may be adversely affected by a contaminant. For a receptor to be affected, a complete exposure pathway, that is a way in which the receptor may come into contact with a contaminant, must be present. Exposure pathways that are typically considered are through inhalation, ingestion or direct contact.

As there are no known abstraction wells in the vicinity of the site, the exposure pathways are considered to be incomplete as there is no method for direct contact or ingestion of groundwater in the vicinity of the site.

5 Impact Assessment

In accordance with the with Section 8.1.7 of the EIS Scoping document, information regarding stormwater/waste water management during both construction and operational phases needs to be provided. In addition to this, controls for the prevention of hydrocarbon spillage or leakage into the surrounding groundwater and mitigation for contamination to the stormwater network must be considered.

The following sections provide details regarding the management of waste water and stormwater during construction and operation of the facility.

5.1 Construction Phase

During construction, the threat of contamination to groundwater and stormwater regimes would be largely confined to operations during bulk earthworks by disturbing surface conditions and capturing/treatment / release of stormwater in the proposed sediment control basin. These threats and associated risks together with proposed mitigation measures are outlined in the following table.

The table also provides details on other sources of potential groundwater and stormwater regime impacts associated with waste/wastewater.

Following the table more information on proposed mitigation measures pertaining to groundwater/stormwater pollution is outlined to demonstrate sound management controls relating to treatment systems etc.

Table 2: Risk Assessment for Impact to Stormwater and Groundwater During Construction

Risk No	Risk ID	Comments	Likelihood	Consequence	Mitigation Methods
C1	Stormwater basin	In accordance with the “Blue book” requirements a sediment control basin is proposed for temporary stormwater control. The basin has the potential to leach to groundwater if conditions allow.	Possible	Moderate	Following construction of the sed basin it will be checked for water tightness to ensure that it does not leak. If the basin shows signs of leakage, it will be sealed with clay as is standard farmer’s dam practice. Further details on this protection measure are outlined below.
C2	Stormwater	If sediment controls are not established for bulk earthworks, there is a potential for stormwater ingress and migration to groundwater.	Possible	Moderate	The site will be established in accordance with EPA endorsed requirements to manage stormwater during construction activities. Further details on this protection measure are outlined below.
C3	Fuel spillage	Should fuel spillage occur on site there is potential for hydrocarbon pollution to subsoil and subsequent migration through the soil profile into groundwater.	Possible	Moderate	Spill kits will be kept on site by contractors to respond to any chemical spillages. Management procedures will ensure prompt response to such event(s). Further details on this protection measure are outlined below.

C4	Land contamination	Despite a preliminary land contamination assessment being undertaken and findings that the site presents a minimal risk of land contamination, contamination in the soil profile should not be discounted. If discovered contaminants would have the potential to be transported into the soil profile by stormwater and subsequent migration into groundwater.	Possible	Moderate	During earthworks, a specialist consultant will be engaged to monitor the site for land contamination and if discovered, procedures will be implemented to conduct further land contamination assessment of the site. Further details on this protection measure are outlined below.
C5	Waste management	In appropriate waste management may cause pollution to the site and surrounding environment, including possible groundwater impact.	Possible	Moderate	All contractors engaged on the project will be required to implement procedures which address waste management. The builder will be responsible for establishing a site toilet and a designated area for waste bins/skips. Further details on this protection measure are outlined below.

Table 3: Management Measures for Stormwater and Groundwater During Construction

Risk No	Risk ID	Proposed Mitigation Measures	Proposed Ongoing Management	Reference
C1	Stormwater basin	Following construction of the sed basin it will be checked for water tightness to ensure that it does not leak. If the basin shows signs of leakage, it will be sealed with clay as is standard farmer's dam practice.	Following the first storm event and subsequent capture of silt laden run off, the sediment basin will be checked for water tightness. This aspect will be recognised in the proponent's CEMP.	CEMP table of contents presented as an attachment to the EIS/DA.
C2	Stormwater	The site will be established in accordance with EPA endorsed requirements to manage stormwater during construction activities. Further details on this protection measure are outlined below.	In accordance with EPA requirements and the Dept of housing "Blue book" the endorsed sediment and erosion plan will be implemented and maintained. The CEMP will outline management aspects associated with maintenance/checklist and auditing of controls. Captured stormwater will be treated and released in accordance with EPA specifications.	CEMP table of contents is presented as an attachment to the EIS/DA. Erosion and Sediment control Plan is presented as part of the DA drwg/doc set.
C3	Fuel spillage	Spill kits will be kept on site by contractors to respond to any chemical spillages. Management procedures will ensure prompt response to such event(s).	All contractors working on the project will be required to prepare a CEMP for approval by the proponent. This plan will require contractors to address	The proponents CEMP and Quality system recognises various management aspects of contractor activities including, spill response

Risk No	Risk ID	Proposed Mitigation Measures	Proposed Ongoing Management	Reference
			chemical spillages, inter alia. Should spillage occur waste management plan obligations will be implemented.	Waste management, safety measures/insurances etc.
C4	Land contamination	During earthworks, a specialist consultant will be engaged to monitor the site for land contamination and if discovered, procedures will be implemented to conduct further land contamination assessment of the site.	Treats from disturbing soil to human and environmental health on the site will be recognised in the CEMP. It is proposed to have an environmental scientist on site during initial earthworks to understand if such threats exist. Moreover, stockpiled material as spoil will be subjected to testing prior to offsite disposal/reuse.	The proponents CEMP /Quality system will recognise the need for specialist consultant services throughout the project.
C5	Waste management	All contractors engaged on the project will be required to implement procedures which address waste management. The builder will be responsible for establishing a site toilet and a designated area for waste bins/skips.	All contractors working on the project will be required to prepare a CEMP for approval by the proponent. This plan will require contractors to address waste management. In accordance with DA approval requirements the builder is required to install adequate toilet facilities.	The contact engagement of the builder will ensure that all DA approval requirements are complied with.

With the implementation of the above mitigation and management measures, the potential risk that construction activities may have on groundwater is considered to be low.

5.2 Operational Phase

During operation of the proposed facility, the potential contamination risks identified together with the proposed mitigation measures are outlined in Table 4 below.

Further details regarding the proposed mitigation measures are outlined in Table 5 to demonstrate sound management controls which relate to the proposed treatment systems etc.

Table 4: : Risk Assessment for Impact to Stormwater and Groundwater During Operation

Risk No	Risk ID	Comments	Likelihood	Consequence	Mitigation Methods
O1	Pollution from the wash bay pit and associated plumbing	The wash bay pit located in the workshop building captures silt/wash water from the washing of machinery / vehicles with contains surfactants/detergents and hydrocarbons. If the pit and associated plumbing is not sealed correctly there is a	Possible	Moderate	stormwater/wastewater that has the potential to pollute the environment will be constructed in accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing.

Risk No	Risk ID	Comments	Likelihood	Consequence	Mitigation Methods
		potential to leak and ingress subsoil and migrate into groundwater etc.			Further details on this protection measure are outlined below. Further details on this protection measure are outlined below.
O2	Pollution from the wastewater treatment process (Plate separator and associated plumbing) and assoc. plumbing	Wash bay wastewater will be discharged to sewer, under a trade waste agreement via processing equipment to remove suspended solids etc. / coalescing plate separator -CPS unit. The CPS unit and associated plumbing has the potential to pollute subsoil and migrate to groundwater if not installed and managed correctly.	Possible	Moderate	All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing. In relation to the CPS, it will be contained in a bunded area and roofed to prevent the ingress of rainwater. Bund walls be evaluated for watertightness. Further details on this protection measure are outlined below.
O3	Stormwater sumps	Stormwater runoff from all hardstand areas will flow into stormwater pits to capture silt and flow into the hydraulic treatment system for further treatment prior to stormwater discharge. If the sumps and associated plumbing is not managed correctly there is a potential to overflow and pollute the surrounding environment.	Possible	Moderate	All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing. Sumps will be evaluated for watertightness and maintained to ensure effectiveness. Further details on this protection measure are outlined below.
O4	Stormwater collection/treatment system	The site will be equipped with underground stormwater detention and SPEL treatment tanks to managed stormwater from the site prior to discharged to the network. If the tanks and associated plumbing is not installed and managed correctly, there is the	Possible	Moderate	A maintenance regime will be implemented for all infrastructure devices which have the potential to pollute the environment. Inground tanks will be evaluated periodically for watertightness. Further details on this protection measure are outlined below.

Risk No	Risk ID	Comments	Likelihood	Consequence	Mitigation Methods
		potential to ingress subsoil and migrate to groundwater.			
O5	Storage of chemicals /oils	Lubricating oil / greases /degreasing solvents and pressure washing detergents will be stored on the site together with minor amounts of cleaning chemicals, all these substances will be stored in bunded areas located inside the workshop building. If these substances are not managed correctly there is the potential to pollute the environment.	Possible	Moderate	All oils and chemicals used in the facility will be contained in bunded areas. In relation to the oil storage new/used oil pallet bunds will be used to contain drums. Further details on this protection measure are outlined below.
O6	Waste Management	The facility will generate a variety of waste. A significant quantity of oil filter canisters will be disposed which have the potential for residual hydrocarbon to pollute the environment if not managed correctly.	Possible	Moderate	Used oil filters will be contained in 200lt drums and stored in the designated waste area prior to disposal at a recycling facility. Waste residues generated from the facility will be contained in a designated area designed in accordance with the waste control code. The waste area will be managed in accordance with the facility operation plan. Further details on this protection measure are outlined below.
O7	Residue from Site Fire	Residues from a site fire which may arise from a facility fire or response to a helicopter fuel/aircraft crash fire will flow into the stormwater system. Leakage from these systems may pollute subsoil and groundwater if not managed /constructed correctly.	Possible	Moderate	All structures are surrounded by hardstand areas which are graded towards stormwater sumps/stormwater systems. In the event of a fire, water used to extinguish fires which carry residues will flow to these structures for treatment / containment. Further details on this protection measure are outlined below. Per and polyfluoroalkyl substances (PFAS) compounds are not considered to be a risk as they are generally no longer used for use in fire fighting foams.

Risk No	Risk ID	Comments	Likelihood	Consequence	Mitigation Methods
O8	Fuel spillage	It is proposed to fuel the helicopter from a mobile tank which will be located on the hardstand area adjacent to the aircraft hangar. Should a fuel spillage occur it would flow into the stormwater system for capture/treatment. If the integrity of the system is compromised leakage could occur and cause pollution.	Possible	Med	All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing. Spill response measures will be activated in the event of fuel/chemical spillage. Further details on this protection measure are outlined below.

Table 5: Management Measures for the Protection of Stormwater and Groundwater During Operation

Risk No	Risk ID	Proposed Mitigation Measures	Proposed Ongoing Management	Reference
O1	Pollution from the wash bay pit and associated plumbing	<i>All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing.</i>	All plumbing fixtures will be designed and installed by qualified contractors. Following installation relevant fixtures will be tested for watertightness.	The design of fixtures will be prepared for the BA stage. In this stage all installations will be installed by appropriate contractors and subjected to quality control measures to ensure fit for purpose.
O2	Pollution from the wastewater treatment process (Plate separator and associated plumbing) and assoc. plumbing	<i>Wash bay wastewater will be discharged to sewer, under a trade waste agreement via processing equipment to remove suspended solids etc. / coalescing plate separator - CPS unit. The CPS unit and associated plumbing has the potential to pollute subsoil and migrate to groundwater if not installed and managed correctly.</i>	The proposed CPS unit is a mobile plant which will be installed inside the sea contained for the truck/machinery wash station. This unit will be managed in accordance with the facility operation plan and manufacturer's instructions – FOP. Furthermore, it is proposed to seek approval for sewer discharge from the entities concerned based on acceptable discharge requirements.	The facility Operation Plan – FOP's table of contents is presented in the EIS attachments. All infrastructure elements which require maintenance and management will be included in the Plan.
O3	Stormwater sumps	<i>All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in</i>	All structures which have the function of mitigating pollution will be subjected to a management, maintenance and audit regime in the FOP.	The facility Operation Plan – FOP's table of contents is presented in the EIS attachments. All infrastructure elements which require maintenance

Risk No	Risk ID	Proposed Mitigation Measures	Proposed Ongoing Management	Reference
		<i>accordance with standard plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bends and jointing. Sumps/structures will be evaluated for watertightness and maintained to ensure effectiveness.</i>		and management will be included in the Plan.
O4	Stormwater collection/treatment system	<i>A maintenance regime will be implemented for all infrastructure devices which have the potential to pollute the environment. Inground tanks will be evaluated periodically for watertightness.</i>	All structures which have the function of mitigating pollution will be subjected to a management, maintenance, and audit regime in the FOP.	The facility Operation Plan – FOP’s table of contents is presented in the EIS attachments. All infrastructure elements which require maintenance and management will be included in the Plan.
O5	Storage of chemicals /oils	<i>All oils and chemicals used in the facility will be contained in bunded areas. In relation to the oil storage new/used oil pallet bunds will be used to contain drums.</i>	All substances stored on site will be continued in dedicated bunds within fully roofed / contained structures.	The engineering and architectural plans for the development do not show any storage of substances in open areas as bunds are housed within the main warehouse building.
O6	Waste Management	<i>Used oil filters will be contained in 200lt drums and stored in the designated waste area prior to disposal at a recycling facility. Waste residues generated from the facility will be contained in a designated area designed in accordance with the waste control code. The waste area will be managed in accordance with the facility operation plan.</i>	The facilities FOP will contain a sub waste management plan which will outlines several management functions pertaining to waste management / minimisation.	The facility Operation Plan – FOP’s table of contents is presented in the EIS attachments. The plan addresses waste management issues which cover several relevant aspects.
O7	Residue from Site Fire	<i>All structures are surrounded by hardstand areas which are graded towards stormwater sumps/stormwater systems. In the event of a fire, water used to extinguish fires which carry residues will flow to these structures for treatment / containment.</i>	The proposed hydraulic regime has been designed to capture and treat run off from intrastate areas.	The civil site plan shows the proposed infrastructure hardstand areas/grading and drainage sumps. Also refer to the hydraulic plan /MUSIC model which shows the proposed treatment train.
O8	Fuel spillage	<i>All inground infrastructure structures which capture stormwater/wastewater that have the potential to pollute the environment will be constructed in accordance with standard</i>	The facility has been designed not to include an underground fuel tank. The FOP includes spill response procedures. In relation to refuelling the proposed helicopter	The facility Operation Plan – FOP’s table of contents is presented in the EIS attachments. The plan addresses helicopter operational aspects.

Risk No	Risk ID	Proposed Mitigation Measures	Proposed Ongoing Management	Reference
		<i>plumbing protocols, to ensure that leakage does not occur from sumps/flanges/pipework bens and jointing. Spill response measures will be activated in the event of fuel/chemical spillage.</i>	operation procedures will be outlined in the FOP in accordance with standard practice. Refuelling will take place from a registered mobile fuel tanker.	Operation aspects relating to the helicopter are also presented as an assessment attached to the EIS.

With the implementation of the above mitigation and management measures, the potential risk that activities associated with the operation of the facility may have on groundwater is considered to be low.

5.3 Ongoing Monitoring

The proposed facility does not have any planned fuel storage infrastructure on the site as all refuelling activities are proposed to be done via fuel trucks. In addition, with the implementation of the controls outlined in Sections 5.1 and 5.2, the risk of contamination to groundwater is considered negligible. Based on this, ongoing monitoring of groundwater on the site is not considered necessary.

6 Summary and Conclusions

Forestrack Pty Ltd (Forestrack) engaged Lanterra Consulting Pty Ltd (Lanterra) to complete a hydrogeological assessment in support of an EIS for the proposed TRG Bushfire Response and Training Centre, which will include a helicopter facility, located at Block 45 Section 3, Hume, ACT 2620.

The hydrogeological assessment comprised of a desktop review of the environmental setting including information related to groundwater quality, the proposed construction and operation of the facility.

The groundwater quality beneath the site is summarised as follows:

- The site is located within the Central Molonglo Water Management Area which includes the Molonglo River and Lake Burley Griffin to the north.
- Groundwater is hosted in fractured aquifers with high yielding zones associated with the upper and lower portions of the individual ash flow tuffs, and interbedded sediments of the Laidlaw Volcanic Suite.
- Groundwater quality is expected to be variable where the TDS concentrations are anticipated to be between 500 – 1000 mg/l and the yield is estimated to be less than 0.5 l/sec.
- The inferred groundwater flow direction is inferred to be from south-west to north-east.
- The depth to groundwater was conservatively estimated to be approximately 15 m below ground level or deeper.

The site is currently vacant and no potentially contaminating activities that may adversely affect groundwater have been identified on Block 45 Section 3 Hume.

A review of the activities for the proposed bushfire response and training centre, both during construction as well as the daily operation of the facility was completed. Based on this review, the following risks to groundwater during the construction phase were identified:

- Impact from a leaking stormwater and sediment basin: Provided the sediment basin was constructed in accordance with the requirements of the 'Blue Book', the risk to groundwater was considered to be low.
- Infiltration of Stormwater: Surface water and sediment controls would be implemented in accordance with an approved sediment and erosion control plan.
- Fuel spillage from plant and refuelling activities: The volumes of fill that will be delivered to operating plant during construction will be relatively low and are unlikely to adversely affect the underlying groundwater. Furthermore, any leaks and spills would be managed in accordance with spill protocols outlined in a CEMP.
- Existing land contamination: No known contamination that may adversely affect groundwater is present on the site. However, should an unexpected occurrence occur during construction, then this would be managed in accordance with an unexpected finds procedure to be included in the CEMP.
- Waste management: Appropriate waste management controls would be implemented through the CEMP.

The activities associated with the operation of the proposed bushfire response and training centre and the following risks to groundwater were identified:

- Impacts from washbay: The wash bay construction will be checked to ensure plumbing and pipework is properly sealed. Waste water from the wash bay will be diverted to a CPS prior to being discharged to sewer under an approved trade waste agreement.
- Waste water treatment system: This will be a CPS that receives waste water from the wash bay. Correct installation of the CPS will be checked to ensure plumbing and pipework is secure before commissioning.
- Stormwater sumps: Stormwater sumps will be checked to ensure that plumbing and pipework is properly secure to mitigate leaks. Stormwater will be discharged from the site to approved stormwater discharge areas.
- Stormwater collection / treatment system: Checks that there has been correct installation of the stormwater treatment system prior to commissioning while ongoing checking will be done as a part of the sites Facility Operation Plan.
- Chemical and oil storage: All chemicals and oils are to be stored in appropriately bunded locations with spill kits easily accessible in the event of a leak or spill. Based on the anticipated volumes of chemicals and oils that are to be stored on the site, the potential risk to groundwater is considered to be low.
- Waste Management: Waste, including used oil filters will be stored in designated waste storage facilities until collection.
- Site fire: In the event of a fire on the site, water used to extinguish the fire would be captured on hardstand areas for treatment. PFAS compounds are not considered to be a risk as they are generally no longer used for use in fire fighting foams.
- Fuel spillage: No large scale fuel storage facilities (e.g. underground or above ground fuel storage tanks) will be on the site. The refuelling of the helicopter will be done using a mobile fuel truck within a designated bunded refuelling area. Any leaks or spills would be immediately contained while the volume of fuel release is unlikely to pose a risk to groundwater.

Based on the results of this hydrogeological assessment, the risk that groundwater may be adversely affected by the construction and operational phase is considered to be low. As no large scale fuel storage or other chemical storage facilities are proposed for the site, groundwater monitoring is not considered necessary. However, should there be a major contaminant release during the construction or operation phases of the facility whereby there is a possible risk that groundwater would be adversely affected, then a groundwater investigation would be warranted.

7 References

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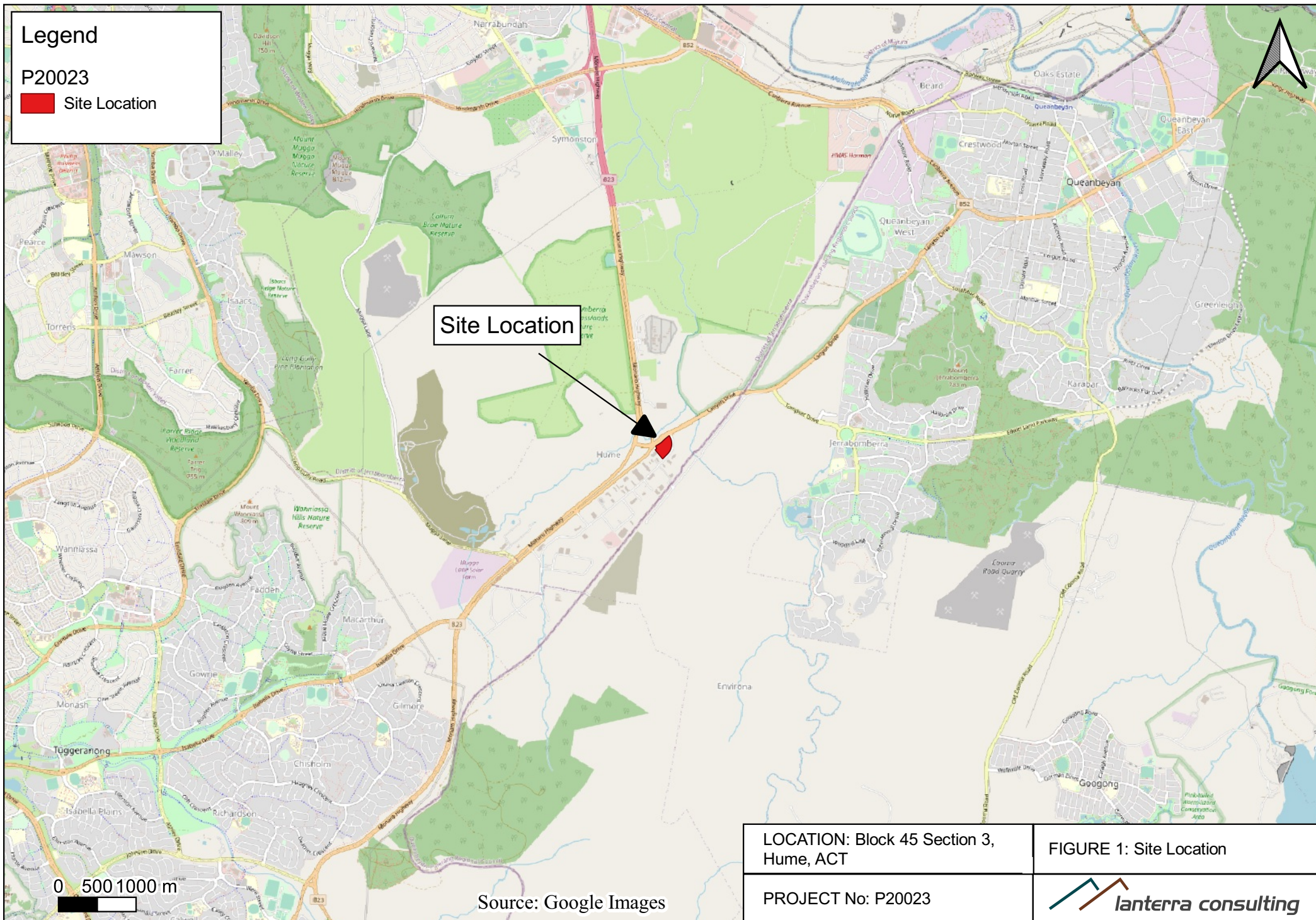
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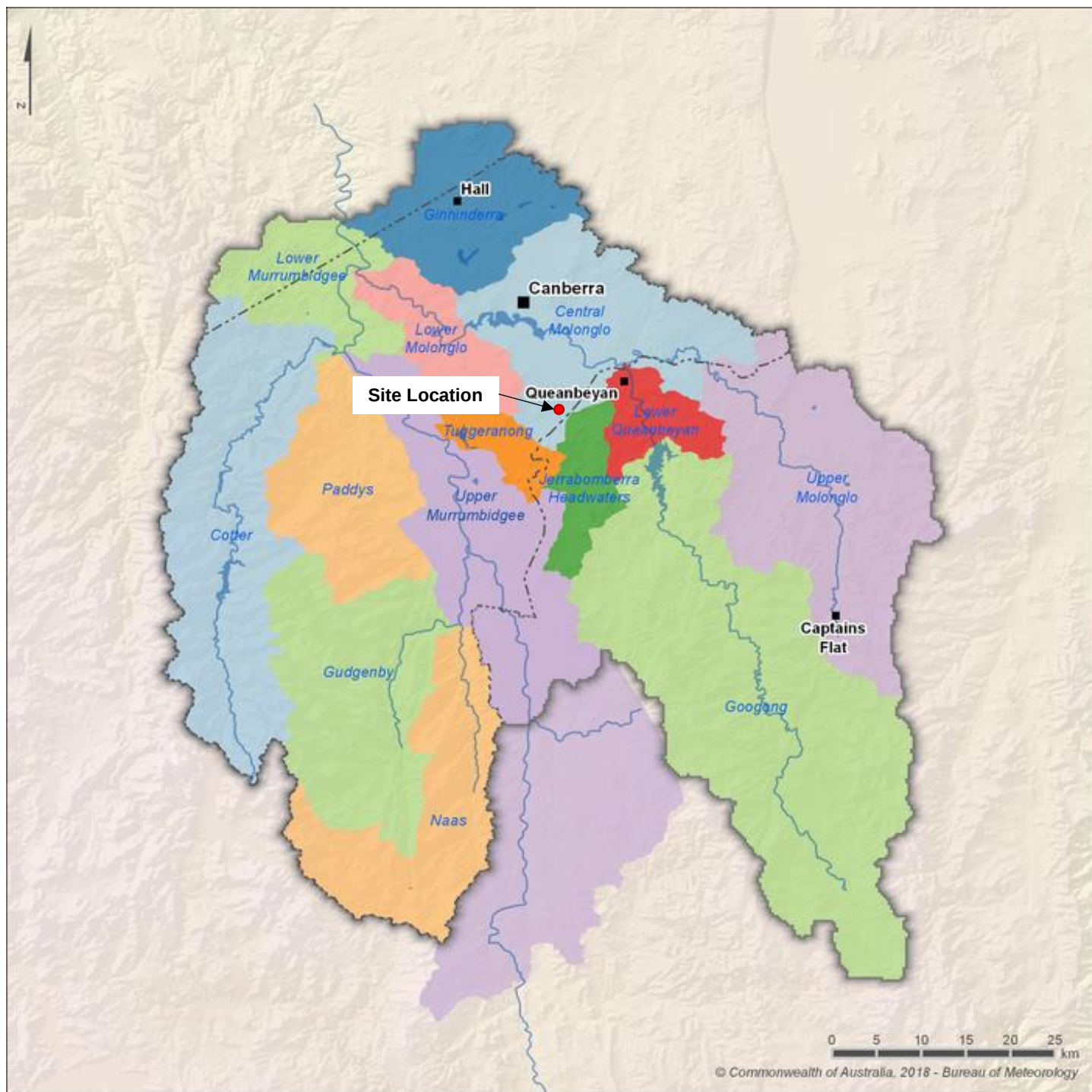
8 Glossary

ACM	Asbestos-containing material
ACT	Australian Capital Territory
AHD	Australian Height Datum
AEC	Area of Environmental Concern
ASC NEPM 2013	National Environment Protection (Assessment of Site Contamination Measure 1999' as amended 2013.
Bgl	Below ground level
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes, Napthathlene
CEMP	Construction Environmental Management Plan
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
EIA	Environmental Impact Assessment
EIL	Ecological Investigation Level
ESL	Ecological Screening Level
EPA	Environment Protection Authority
Forestrack	Forestrack Pty Lrd
HIL	Health Investigation Level
HSL	Health Screening Level
kg	Kilogram
Lanterra	Lanterra Consulting Pty Limited
m ²	Square metres
LOR	Limit of Reporting
mg	milligram
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
QA	Quality Assurance
QC	Quality Control
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PFAS	Per and Polyfluoroalkyl substances
PQL	Practical quantitation limit
PSI	Preliminary Site Investigation
RPD	Relative Percentage Difference
TEQ	Toxic Equivalence Quotient
TRH	Total Recoverable Hydrocarbon
USCS	Unified Soil Classification System

Figures







Location: Block 45 Section 3,
Hume

Figure 3: Water
Management Areas - ACT

Project No: P20023



