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Environmental Management Plan, Goterra Waste Management Facility, Hume, ACT

Report written by:
Dr J.F. Jasonsmith & Dr Jess Drake
Murrang Earth Sciences Pty Ltd

Report written for:
Goterra, Hume

24 June 2020

02 6161 1762

contact@murrang.com.au

www.murrang.com.au
ABN 96 162 928 958

Document details

Report title
Environmental Management Plan, Goterra Waste Management Facility, Hume, ACT

Report number	Version	Review number	Authors	Reviewer	Date submitted
MES2091-R01	Final	1	JJS & JD	Olympia Yarger	24 June 2020

Receiver	Delegate	Format
Goterra	Olympia Yarger	Email

02 6161 1762
contact@murrang.com.au
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Executive summary

Goterra is recognised as a leading start-up in Canberra. Using larvae of the black soldier fly, *Hermetia illucens*, Goterra will divert up to 45,000 t of organic waste from Canberra's landfills at their new waste management facility, located at 12 – 14 Arnott Street, Hume, ACT (the Facility). Valuable commodities frass and animal protein will be created in process.

Goterra are not required to undertake an Environmental Management Plan (EMP) by any part of the ACT Government to operate their facility in accordance with Territory legislation. Instead, this EMP plan has been undertaken to show due diligence and best practice management of food waste in the ACT. It outlines the potential negative impacts to human health and the environment from activities related to and undertaken at the Facility and controls which mitigate these impacts. It also outlines how Goterra operates in accordance with both ACT and NSW environmental legislation and regulations where relevant.

Due to Goterra's food waste management process, leachate and waste water, hazards commonly associated with organic waste facilities, are not considered hazards at the Facility. Instead, key hazards are considered to be odour and noise, with these relating to machinery and waste processing. Odour is managed through same-day processing of waste, hygienic environments, enclosed aerobic and lacto-fermentation processing of waste, and charcoal biofilters were needed. Noise is managed via operating hours and using only one or two pieces of equipment at a time. Additional noise and odour assessments are recommended to identify any additional specific hazards and controls. With all controls in place, the risk of negative impacts to human health and the environment are mitigated to negligible levels.

Disclaimer

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02 6161 1762

contact@murrang.com.au

www.murrang.com.au

ABN 96 162 928 958

02 6161 1762
contact@murrang.com.au
www.murrang.com.au
ABN 96 162 928 958

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02 6161 1762

contact@murrang.com.au

www.murrang.com.au

ABN 96 162 928 958

02 6161 1762

contact@murrang.com.au

www.murrang.com.au
ABN 96 162 928 958

Environmental Management Plan, Goterra Waste Management Facility, Hume, ACT

1. Introduction

Goterra is recognised as a leading entrepreneurial start-up in Canberra. Using the larvae of the black soldier fly, *Hermetia illucens*, to convert food waste into high-value animal protein, Goterra's work sees 200 kg of insect protein and 150kg of fertiliser ingredients created for every 5 tonnes of food waste diverted from Canberra's landfills (Figure 1). Goterra uses a unique modular facility based on shipping containers to process food waste and grow the soldier fly larvae. This conversion process uses less than 1 L of water per kilo of insect protein, and creates a meal or dehydrated larvae that is fed to chickens, fish, and other non-ruminants requiring animal protein in their diet. Soldier fly meal is estimated to the animal feed sector is estimated to have a combined value of 800 million dollars to the animal feed sector.

Goterra is upgrading their Canberra facility. An Environmental Management Plan (EMP) and a License is not required by Environmental Protection Authority ACT (EPA ACT). This is because Goterra's activities are not a listed as Class A or B activities under the Environmental Protection Act 1997 (EP Act 1997). Goterra, however, strive to be environmentally responsible and have engaged Murrang Earth Sciences to complete this EMP as part of demonstrating best practice. The EMP meets the requirements of the ACT Government's "*Environmental guidelines for preparation of an Environmental Management Plan"* dated May 2013, through:

- Describing the proposed activity at the Site (Sections 1)
- Describing the existing activity at the Site (Section 2)

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contact@murrang.com.au
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- Describing the receiving environment (Section 2)
- Presenting an assessment of the risks related to the Site, and activities which occur there, on human health and the environment (Section 5)
- Identifying management strategies which minimise the potential risks to human health and the environment (Section 6)
- Demonstrating the proposed activity is environmentally acceptable (Section 6)

Figure 1. Soldier fly larvae beside the frass they produce

It also meets the requirements of the NSW Governments "*Composting and Related Organics Processing Facilities Environmental Guidelines*" (NSW EPA, 2003) by:

- Describing the proposed activity at the Site (Sections 1)
- Describing the existing activity at the Site (Section 2)
- Describing the receiving environment and preliminary assessments (Section 2 & 4)
- Describing the environmental factors and objectives (Section 3.1)
- Presenting an assessment of the risks related to the Site, and activities which occur there, on human health and the environment (Section 5)
- Identifying management strategies which minimise the potential risks to human health and the environment (Section 6)
- Identifying benchmarks for measuring and monitoring performance, including documentation and categorisation of organics (Section 6)
- Demonstrating the proposed activity meets minimum design requirements (Section 6)

This document will now present a background to Goterra's food waste management facility at Hume and the process for food waste conversion to commodities (Section 1), as well as provide details on the Hume site itself (Section 2). The legislative requirements Goterra should adhere to as part of best practise are then presented, with specific regulations outlined for parts of the environment — including noise, odours, and water — known to be impacted by organic waste facilities such as Goterra's (Section 3). How these parts of the environment, termed environmental factors, will be protected is then the subject of Section 3.1. Hazard preliminary assessments are included in Section 4. An evaluation of the hazards presented to the environment by Goterra's operations and the likelihood that these cause harm — that is the risk — is presented in Section 5, along with the specific regulations which are used by State and Territory governments to manage these risks. Finally, the actions Goterra should undertake to ensure they exercise best practise at their Hume Facility are outlined (Section 6). Murrang Earth Sciences has endeavoured to make this report as far-reaching and useful as possible. The limitations of this EMP are presented in Section 7, however, and followed by recommendations, conclusions, and acknowledgements.

2. Background

Goterra has operated a pilot waste management facility at Geelong Street Fyshwick since 2016 and has begun construction of its innovative new waste management facility at 12 – 14 Arnott Street, a 8,663 m^2 site in Hume, ACT (Figure 2). This facility will house the black soldier flies — *Hermetia illucens* —the eco-engineers that will do the work of converting food waste into valuable products at Goterra. It will address the high food-waste loads currently being disposed of in Canberran landfills that cause the creation of methane, by instead converting this food waste to animal feed and compost ingredients.

In addition, the process Goterra has employed is a partially automated and mostly enclosed system, with only three aspects of the waste management requiring human intervention. Some of the unique automated system include Modular Infrastructure of Biological services (MIBs) that are self-contained and automated for specific waste biological conversion processes. This reduces risks to human health and the environment, and minimises emissions of odour, gases, other aerosols, and waste water.

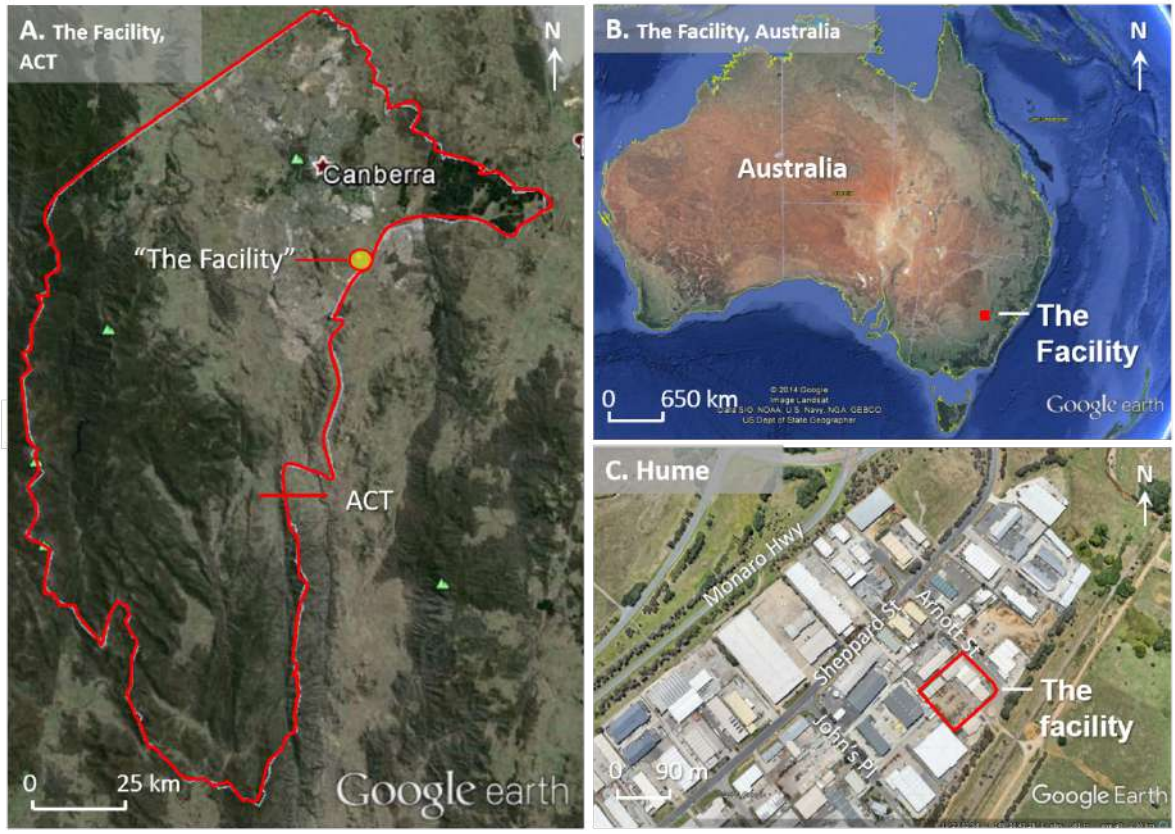


Figure 2. Site location plan

Goterra's facility is aimed at providing a sustainable, long term solution for food waste created in Canberra, with a focus on key tenets of sustainability, including to:

- Minimise the distance which food waste or its decomposition products travel
- Create a valuable product from food waste, placing Canberra's food waste back into the circular economy
- Minimise impacts to the environment as a result of any part of the process of converting food waste to a valuable product
- Minimise energy inputs into the production system
- Avoid the production of greenhouse gases

The ACT Government has committed to both state and national resource recovery targets. Goterra, operating independently of the Government, will help to meet Territory and National targets outlined within:

- ACT Waste Management Strategy 2011 – 2025
- Waste Feasibility Study, Roadmap and Recommendations, May 2018
- National Waste Policy, 2018
- National Waste Policy Action Plan, 2019

Importantly, Goterra's work will divert up to 45,000 t of food waste per year from landfill as a maximum capacity of the facility. Thus, eliminating a major source of methane a powerful and hazardous greenhouse gas from the landfill where it is generated.

The first product generated by the Goterra waste management facility is frass, which is simply the high-nutrient excreta of the soldier fly larvae. Frass contains microbes; chitin, which is type of sugar formed through the breakdown of the larvae's skin; and uneaten food (Schmitt & de Vries, 2020). Its high nitrogen content (approximately 3.4% as a proportion of dry matter, depending on the food substrate and environmental condition) means that of the commercially available fertilisers, it is most similar to chicken manure.

Frass is a highly valuable ingredient for composting as it both increases the nitrogen:phosphorus:potassium (N:P:K) nutrient ratio and increases plant growth as a result of its beneficial, fermenting bacteria. It differs from compost as it is not created by microbes, and does not self-sterilise via thermogenic bacteria. For the frass to be used as a fertiliser, it needs to be pasteurised to kill pathogenic bacteria, any residual larvae or eggs in the process. Whilst Goterra does not undertake pasteurisation or composting of their frass, they only sell to commercial composters who comply to the Australian Standards for Composting (AS4454-2003) and state regulatory requirements, including the need to pasteurise, the frass at the beginning of the composting process. Frass is also considered by NSW EPA as manure, and is an allowed input under the Compost Order 2016, provided it has a 15-day pasteurisation process.

The second product generated by Goterra's ecological engineers is the soldier fly larvae themselves. These larvae are a concentrated form of protein, and therefore a highly valuable commodity in today's market. After converting food waste to frass, 95% of the larvae at Goterra's facility will be converted to feed for omnivorous or insectivorous animals such as fish, pigs and chickens in the livestock industry. The remaining 5% will become parents of the next generation of black soldier flies. The dehydrated larvae sold as animal feed and is labelled as Restricted Animal Material, which cannot be ingested by ruminants in accordance with state and Federal legislation.

Goterra has invested substantially in designing a process which minimises the potential for harm to the environment and has maximum environmental benefits. This process, the pollution control measures and business plan will now be described.

2.1. The food waste conversion process

The process Goterra uses to convert food waste into valuable products starts with waste receival before proceeding to sorting, maceration, pasteurisation, fermentation, and finally conversion to frass and larvae. A flow diagram of this process, including technological interventions, is presented in Figure 3. A more detailed waste cradle to grave flow diagram, considering facility internal operations is presented in Appendix D (Figure 7). We note that significant investment in the development of this process has been undertaken by Goterra, and emphasise that information in this section is commercially confidential in nature. Details regarding pollution control equipment at Goterra's Hume facility is outlined in this section in particular. Please see Section 2.3 for Site Plans, including a detailed internal schematic of the Facility.

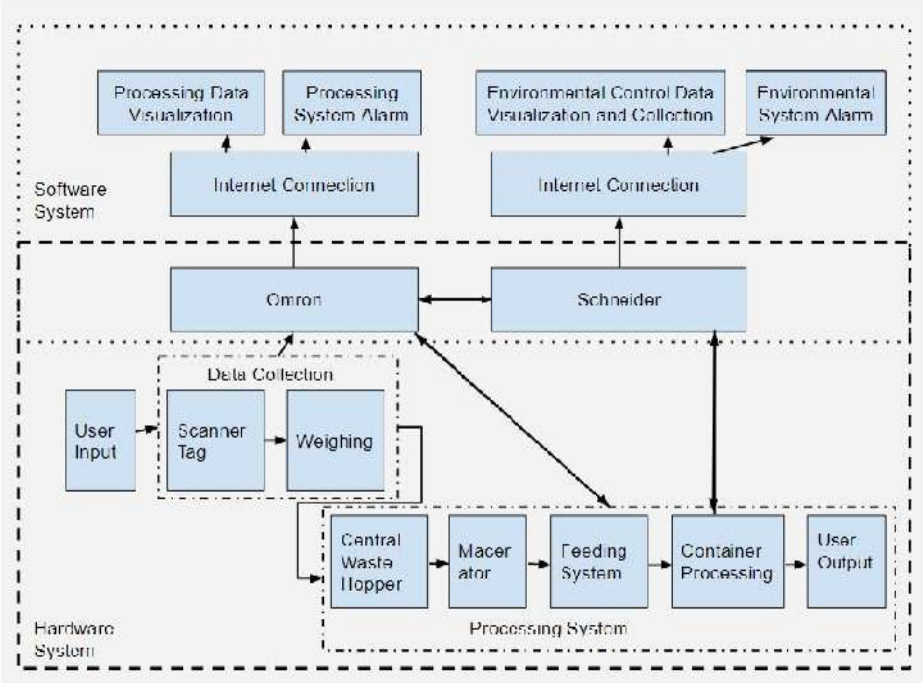
A summary of the key statistics relating to Goterra's food waste process including those related to waste receival, bin use, frass and protein production, waste generation, and operation hours are listed in Table 1 below.

Table 1. Summary of key statistics

Subject	Detail
Max. volume of food waste to be received per day	150 t
Max. volume of food waste to be received per year	45,000 t
Number of food waste bins in use at any one time	0 – food waste goes directly into conversion process
Number of larvae trays used in whole of production cycle	380-4,000
Number of larvae trays used in the Facility at any one time	8000
Waste delivery vehicles	Tipper trucks and skips
Waste for landfill disposal produced per annum	14 kg/t of food waste / year
Frass production	Up to 30 kg for every tonne of food waste
Water use	4.5 ML per annum
Delivery hours	6 am to 1 pm
Office hours	8 am to 4 pm

Waste Mibs Flow Diagram

The Goterra Waste Mibs is an autonomous, industrial waste management system. It consists of two main parts -- hardware takes care of waste management, insect farming and software maintains the system function, manages data and system alarm. The following flow diagram shows each section of the whole system and how the system works.



User Input - Clients contribute food waste.
User Output - Cleaning cycle for production collection.
Data Collection - RFID Tag and Scanner, weight measure (weights).
Schneider to Omron - Alarms to stop omron, respond with environmental relative feeding and alarms environmental issues.
Omron to Schneider - Data collection input and Feeding through Omron then packaged data to give to clients via schneider platform.

Items that are currently not in scope for this build
RFID scanner

Figure 3. Waste process flow diagram, including the movement of waste through the system and the technical process used to manage food waste at Goterra (Diagram sourced by Goterra). A cradle-to-grave diagram is presented in Appendix D

Step 1 — Food waste retrieval

Food waste is retrieved by a third-party supplier and delivered to Goterra in wheelie bins. Food waste is sourced from commercial and residential premises, and is collected weekly from that premises for conversion at Goterra's facility. Collection is undertaken between 6am – 5pm.

In addition, 40 food waste bins are owned by Goterra and are collected weekly or more frequently from that premises. For these 40 bins, Goterra follows their waste transporters' license (License No. R0118) in accordance with the ACT Commercial Waste Industry Code of Practice (1998) and collects waste between 9 am and 12 pm.

No vehicle washing by Goterra is required as all food waste is contained, with only bin washing undertaken on site (discussed below in further detail).

Step 2 — Food waste receival

Food waste will be received at Goterra's Hume facility between the hours of 6 am and 1 pm, Monday to Saturday. The waste will be transported to the Facility in tipper trucks, wheeled bins or in skips on the back of trucks, with trucks driving through the facilities hard-stand area and tipping the food into the Waste Receival area at the South-West corner of the Site. As the truck tips waste into the bay at the Waste Recieval area, it moves away from the waste. The Waste Receival area will be both bunded, sloped and have an apron, with these features preventing the spills of both food waste and leachate. The apron is 15 m long, to provide adequate space for waste receival whilst keeping the vehicles separate from the waste itself. The area has a tap and hose, and tyres will be washed in the bunded area should any food waste accidentally adhere. The Waste Receival area itself will be open to the air, but covered to limit the impact of rain. In NSW, the Goterra units will be fully automated, and the units will accept waste immediately into the system via tipped bins or loads.

After it is received, food waste is then immediately moved onto the conveyor using bobcats. Waste will be processed indoors, with odours from the food waste in this food receival area being vented through the roof and open door. No scrubbing of the vented air is considered necessary at this stage of the Goterra facility's construction. Goterra intends to contract odour monitoring out to an independent contractor in order to corroborate its observations in this area. Odour generation, control and monitoring is discussed in Sections 5 and 6.

After being received, food waste will be moved onto chevron conveyor belts within the processing area to move to the sorting and screening step. The Waste Receival area is concreted, and will be washed down daily after all food waste has been received using high-pressure hosing. A grease trap at the back of the waste receival area will capture all food residues and allow waste water from the cleaning process to enter the sewerage system. No water or waste will enter stormwater.

Step 3 — Sorting and screening

All food waste received at Goterra's Hume facility will be screened and moved onto a chevron conveyor belt for sorting and processing the same day it is received. This is undertaken in the Waste Receival area. On this conveyor belt, plastics and other contamination will be identified and removed by hand. Contaminants will be placed into recycling bins as much as possible, with only unrecyclable material being sent to landfill. The belt conveyor has a drip-trough to prevent leachate movement. The area around the conveyor is bunded and close to the sump drain. Staff will screen the waste from a catwalk to ensure that any waste that accidentally slips through the conveyor or catwalk it is not moved with foot traffic. Leachate in the sump will be returned to the process via a positive displacement pump. Aerosol emissions, including dust and bioaerosols, are unlikely to occur during moving and sorting of the waste, as the food waste is at 50 to 70% moisture.

Step 4 — Macerating

After contaminants have been removed from the food waste, it will be moved through the same conveyor into a mechanical macerator. This macerator sits in the receival area, away from the waste unloading area, and is fully bunded. The belt conveyor has a drip-trough to capture leachate movement. The area around the conveyor is bunded and close to the sump drain. Leachate in the sump and in the drip-trough will be returned to the process at Step 6 via a positive displacement pump. Aerosol emissions, including dust and bioaerosols, are unlikely to result from the macerator process due to the high moisture content of the food waste.

Step 5 — Pasteurisation and fermentation

The food waste will move along the conveyor belts from the macerator (in Waste Area 1) and be pumped with a positive displacement pump to ovens where it will be held at 60°C for 30 minutes for pasteurisation. It will then be moved to an enclosed area for cooling. After food has cooled slightly (to 40°C) it will be transferred to large storage tanks, akin to those used for beer brewing (Figure 4), where it will begin to ferment. These storage tanks are fully contained, with the positive displacement pump minimising the risk of leaks or spills.

The pasteurised waste will be inoculated with a bokashi fermentation mix, otherwise known as a homolactic fermentation mix. Homolactic fermentation is an endothermic reaction, not emitting any energy, and instead converting carbohydrates to lactic acid, a small amount of carbon dioxide, and some other organic acids (FAO, 1998). Homolactic fermentation also creates an anti-pathogenic substrate, through redistribution of bacteria on food surfaces and creating an environment where the desired bacteria become dominant. No methane or other greenhouse gases will be emitted, apart from a small amount of carbon dioxide. Although the tanks have a gas release valve, due to the fast consumption process and regular refilling of the tanks, the use of the gas release is not needed.

Figure 4. Fermentation tanks used for Step 5 and 6 of the food conversion process

The food waste conversion process from Step 2 (receival) to Step 5 (fermentation) occurs on the same day. If necessary, fermentation will be allowed to occur for up to five days in the enclosed vessel.

Step 6 — Food waste conversion

After overnight fermentation, food waste is moved using the positive displacement pump from the Waste Block fermenting tanks into the separated Processing area that house the Modular Infrastructure Biological services (MIBs) where the soldier fly larvae are added. It takes 12 days for the soldier fly larvae to complete their growth cycle within these MIBs, fully converting food waste into frass and protein in the process. The MIB is opened every 12 days for feeding. Digestion of the waste by the larvae will emit some carbon dioxide as part of the aerobic process. No methane or other greenhouse gases will be emitted (See Step 5 for details). However, the extraction fan built into the roof of the MIB has a charcoal biofilter for odour absorption, which will be serviced every month. The intake fan delivers air to the MIBs to ensure the environment

remains aerobic and to supply oxygen to the larvae. No leachate is emitted as part of the fermentation or the conversion process. As the MIB has no humidifier, the moisture is retained in-vessel to create a 70% humidity environment, which is optimal for the feeding conditions of the larvae. As the larvae use this water and leachate for growth, the humidity will decrease to 45% once feeding is completed.

Of the larvae who complete the cycle, 95% will go on to become meal, with 200 kg of dried larvae meal and 150 kg of frass produced from 5 tonnes of food waste sent to a MIB. The remaining 5% of the larvae who complete a growth cycle will be moved to an Aviary MIB as adult soldier flies (Figure 5). Once the frass is removed from the MIB via a robot, any remaining plastics and rubbish are removed by hand leaving negligible quantities of contaminants in the resulting frass product.

Step 7 — Reproduction

In the Aviary MIB, soldier flies will reproduce and grow in complete isolation, with their needs solely attended to by robots. People are not allowed into the area surrounding the aviaries. Wearing any clothing or footwear which has been used in the food processing section of the Facility. As soldier flies are not a vector for disease, this isolation is not for human health and safety reasons, but instead undertaken to protect the soldier flies from any parasites or pathogens carried to them by humans. As insects, the soldier flies get all the hydration they require from food and are not provided water for hydration. Small amounts of water (500 L every 8 months) are used within the Aviary MIBs, to allow for the humidification required as part of the fly reproduction process, with this water supplied via the town-supply. Goterra

Figure 5. Adult black soldier fly (*Hermetia illucens*)

will have ten aviaries at their Hume facility, with 14 kg of soldier fly larvae being produced every week within these aviaries.

Step 8 — Product distribution

Once removed from the Farm MIB at the Goterra waste management facility, frass will be placed outside in low-tear, heavy duty 30 L plastic bags for up to one week. These are stored on pallets on hardstand area in the eastern side of the waste receival area. From here, frass is currently being sent to a composting facility in Newcastle, NSW. Approximately 150 kg of frass will be dispatched with every 5 tonnes of food waste converted.

A mild odour can be detected coming from frass when it is stored in plastic bags outside. It is noticeable within about 4 m of the bags, and smells like sheep dags. This indicates that the odours are created by a combination of chemicals including ammonia, skatole, and dimethyl sulfide (Suffet, 2009) present in the frass. All these chemicals are natural biproducts of food decay.

There is potential for leachate to be generated from the frass storage area at Goterra's Hume facility, as the plastic bags used to contain the frass are not water-proof. Many of the nutrients which make frass so valuable in the composting process are highly soluble, including nitrogen, potassium, and sulfur. Suggestions about alternative management of frass are provided in Section 8.

Step 9 — Washing and decontamination

Approximately 380-4,000 trays will be used within the MIBs for growing larvae at Goterra's Hume facility every 12 days. For every one MIB, 480 trays of larvae are used for the conversion process. These trays are not used for any other purpose. Goterra also have 40 wheeled bins used for collection of food waste from specific clients. However, most of the collection of food waste and the associated bins are managed by third-party provider (see Step 1). When these 40 bins are in use for food collection, they are swapped every 7 days. However, Goterra is working towards having no wheeled bin collection, and it will all be undertaken by a third-party.

All bins will initially be cleaned using a food grade antibacterial wash (vinegar with Agar HC-90 Detergent), before a system is set up within the Facility that allows for automated cleaning of the bins using micro-doses of bleach (NaClO). Agar HC-90 detergent is a non-ionic detergent that can be an irritant. Appropriate occupational health and safety controls should be undertaken within the Facility when these substances are in use, however, a description of such safety requirements is outside the scope of works of this report. In relation to its safety data sheet, Agar HC-90 has no known negative environmental effects and is biodegradable. Washing is undertaken in the Waste Receival bunded concrete area, which is drained via a grease trap and sump, prior to entering the sewerage system. The food waste bins are washed directly into the macerator, and then the bins cleaned as above.

A designated wash-room will be constructed at the Facility for all the protective clothing used by Site workers. All clothing and footwear in the waste processing area must be kept separate from the Aviary MIBs and the Research and Development area adjacent to them, in order to protect the soldier flies from any pests or pathogenic organisms which might be brought to the Site via the food waste.

1.1 Pollution control equipment

The Facility is designed to match the process flow and process steps described in Section 1.3, with the following locations housing different steps of Goterra's food waste management process:

- Waste Receival area: waste receival and sorting
- Waste block (Waste Areas 1 and 2): maceration, pasteurisation and fermentation
- Processing facility: larvae conversion of waste
- Production: soldier fly reproduction
- Laboratory: research and development
- Testing bay: manufacturing and testing
- Tech floor: staff office
- House and education area: outreach and education

Pollution control equipment in the Facility will include a series of bunds, aprons, grease traps, and sumps, to ensure leachate or wash water does not enter stormwater. All wash-water and leachate will enter a grease trap or sump prior to entering sewerage, with leachate from the macerator re-entering the waste conversion process. Odour from MIBs is managed using a charcoal biofilter on outlets, with an air fan inlet for aerobic processing. Further assessment of odour as a hazard is planned in June 2020, although no significant odour has been noticed at the Site by workers. There are no bioaerosol or dust contaminants at the Facility, due to the high moisture content of food. Carbon dioxide, in small amounts not requiring venting, will be the only gas generated as part of the process. Soldier flies and larvae are all contained in enclosed and mostly automated environments, minimising their potential loss to external environments. Noise is managed by only using one piece of plant or equipment at a time. Further discussion of environmental management design and requirements are in Sections 5 and 6.

Goterra has considered a range of potential challenges associated with its waste management operation. Table 1 summarises the type and volume of waste to be received, being solely food waste from commercial and household sources. At this stage, it is planned that a maximum of 45,000 t of food waste a year will be received. The products that are produced are frass a product that helps increase the N:P:K ratio in composts; and soldier fly larvae, which acts as a protein meal for agricultural industries.

2.2. Business plan

When operating in NSW, a waste management facility is required to present their business plans to the NSW EPA as part of the licensing process (NSW EPA, 2003). The information the business plan is required to include is the amount of waste being processed and products or waste produced, cost implications, staffing, development plans, waste transport and ownership, and environmental policy. This will now be discussed below.

In ACT, Goterra plans to utilise 45,000 t of food waste per year instead of this waste being sent to landfill. This is five-times greater than the ACT Government target of 8,000 t for food waste or 26% of the ACT Government target for all waste (ACT Government, 2018). Protein meal and frass are the two outputs of the process, both of which are sold commercially into established markets. Meal is sold as animal feed, and frass is sold to composters as a N:P:K boost at the beginning of their composting process.

2.3. Full cost implications

In the ACT, Goterra will have a range of staff onsite for the operation of the Facility, including technicians moving and sorting the waste, and managing the MIBs, as well as business management, and research and development. In NSW, however, there will only be one service technician at Goterra's sites per MIB every 12 days. These technicians will manage software and

hardware upgrades and servicing; remove insects; and reseed new larvae. All other processes in the Goterra facilities in NSW will be fully automated. All training will be internal via Goterra.

The ACT facility in Hume is currently being completed, with the Fyshwick facility currently in operation. It is unclear of the timelines for timing and staging of the project in NSW due to coronavirus.

During transport, the food waste is owned by the licensed operator. This is either the third-party waste transporter or Goterra for the 40 bins which they manage. In NSW, however, this will be different. Either the waste will not be leaving the Facility in which it is was generated, and thus it will be owned by the generator until it is processed in a Goterra module. Alternatively, the waste will be collected by a third-party waste transporter who will transport it to their own licensed facility. At their facility, they will have a Goterra mobile module. The third-party is responsible for this waste until it is processed in the Goterra module.

Goterra's environmental policy is currently under development. Generally it will consider to undertake best practice at all stages in their process and in management of their sites. They strive to close-the-loop on all waste and protect their environment. They will go above and beyond legislative requirements as part of this best practice, as exemplified in this EMP. All staff are trained in environmental best practice.

Finding an appropriate site for their new Hume facility has been a major part of Goterra's business efforts, with site location a major factor in reducing the potential for negative impacts to human health or the environment. The features of Goterra's new site in Hume will now be presented as part of this EMP's evaluation of potential for environmental and human health harm.

2.4. Site details

This section describes the 12 – 14 Arnott Street Hume site (also known as Block 31, Section 4), on which Goterra's new facility is located (the Site). The section describes the receiving environment for any potentially negative impacts which might occur as a result of Goterra's activities. Specific details on the Site are presented in Table 2. Details of the Site's history, the activities which occur at surrounding sites, and the natural environment in the wider area are detailed in Sections 2.1 to 2.4, below.

Table 2. Site information

Item	Description
Site owner	R. & A. Andriolo Pty Ltd
Site owner's ACN	008 543 744
Site operator	Goterra Pty Ltd
Company owner	Olympia Yarger
Australian business number	97 612 974 688
Correspondence address	14 Arnott St, Hume, ACT
Address	12 – 14 Arnott Street, Hume, ACT
Location	Block 31, Section 4, HUME
Area	6119 m^2
Land use zone	IZ1: General industry

2.4.1. Land use zoning and surrounding land use

Goterra's planned and permitted land uses is presented in this section, with information presented which allows for an assessment as to whether Goterra's Hume facility meets or exceeds government and societal expectations.

The suburb of Hume, within which Goterra is located, is classified as an industrial area. Its evolution into a key location for sustainable and innovative waste conversion and recycling is identified as strategically important in the ACT Planning Strategy 2018[2]. As one of the leading companies in the innovative waste conversion and circular economy space, Goterra's development at 12 – 14 Arnott Street is entirely consistent with the ACT Government's vision for Hume as an innovative waste hub.

The objectives of the IZ1: General industry zone within which Goterra's facility is located, are:

a) Support the diversification and expansion of the ACT's industrial base and employment growth
b) Facilitate investment in a wide range of industrial and related activities, with efficient land utilisation and provision of infrastructure
c) Provide convenient access for ACT and regional residents to industrial goods, services and employment opportunities
d) Make provision for transport-related businesses in locations accessible to major road, rail and air links
e) Encourage the clustering of industrial activities according to the principles of industrial ecology
f) Ensure that industrial development achieves high environmental standards of cleaner production, waste disposal, noise and air quality
g) Encourage the design and construction of industrial and commercial buildings that are energy efficient, functional and flexible
h) Ensure that development along major approach routes and major roads meets appropriate standards of urban design
i) Make provision for manufacturing, warehouse and transport land uses requiring large land areas accessible to main interstate road and rail connections
j) Ensure that the use of the land for predominantly industrial purposes is not jeopardised by the uncontrolled development of higher rent commercial uses such as retailing and offices

k) Provide small-scale services to meet the needs of the local workforce

Companies such as LoPilato Bros, located opposite Goterra; and Canberra Sand and Gravel, located 200 m south-west of Goterra; supply landscaping products, including compost, from open-air storage facilities. Other companies such as Wasteaway, located on the corner of Arnott and Shepherd Streets 100 m north-west of Goterra; and Cleanaway, located 1.5 km south-west of Goterra on Sawmill Circuit; undertake recycling and waste management within enclosed facilities. Goterra's processing of waste within an enclosed facility and its storage of the frass in bags outdoors is entirely consistent with the land-uses being undertaken in the area surrounding the Site.

Based on this Section, Goterra's proposed land use is aligned with surrounding land uses and the ACT's Strategic Plan, along with the objectives of the Facility's IZ1: General Industrial zoning.

2.4.2. Site history

Goterra's new facility, like all locations in mainland Australia, occurs within land once cared for and managed solely by Aboriginal peoples, for whom little history has been recorded in written form. The environment at the Site was almost certainly shaped through this activity, as described in books such as "Dark Emu", by Bruce Pascoe, before these people were forced from their land without ceding sovereignty. Any negative impacts to the environment by Aboriginal peoples as a result of their activity is outside the scope of works of this report. Murrang Earth Sciences acknowledges the role of Aboriginal peoples in shaping the landscape, and its flora and fauna in the area of the Facility, and the important contribution Aboriginal people have and had in sustainably managing Australian landscapes.

A number of businesses have operated the Site since the early 1980s since it was first occupied, including (Appendix A):

- Landscape suppliers
- Garden suppliers
- Timber merchants/sawmill
- Fencing suppliers
- Outdoor furniture retailers
- Playground equipment

These businesses are summarised in Table 2. Supplies such as composts, sands, and fence posts — which were potentially treated with copper chrome arsenate or other hazardous chemicals — were stored outside in the carpark area at the rare of the Facility's warehousing between approximately 1981 and 2004, based on aerial photographs of the Site presented in Appendix A, Table 3. This information indicates that chemicals commonly associated with negative environmental impacts of organic waste management facilities such as nitrogen and phosphorous potentially already occur within the Site. There is also potential for the toxic metals including arsenic, copper, and chromium to have leached into soils at the Facility from treated timber stored outdoors. With all Goterra's food processing occurring within fully contained food tanks and bunded areas at the Facility, any negative impacts considered to arise from the discharge of nutrients or chemicals used to treat timber from 12 – 14 Arnott Street should first consider this Site history.

Historical activities at neighbouring sites include cement merchants; aluminium manufacturers and distributers; steel fabricators and merchants; distributors of nuts, bolts, and rivets; welding suppliers; and wine merchants (Appendix A). These activities are neither affected by, nor affect Goterra's operations at 12 – 14 Arnott Street, Hume.

Table 3. A summary of historical aerial photographs, as presented in Appendix A

Date	Description	Implications
2019	Plastic tubing and various pipes are stored on the eastern edge of 14 Arnott Street amongst light trucks and cars. What appears to be steel shipping containers are stored outside of 12 Arnott Street's warehousing.	N/A
2014	Heavy vehicles for earthworks are parked outside 12 Arnott Street, and appear to enter from the roundabout adjacent 14 Arnott Street. Plastic tubing and various pipes are stored on the eastern edge of 14 Arnott Street amongst cars and light trucks.	N/A
2004	What appears to be different materials for landscaping are stored in the areas behind both 12 and 14 Arnott Streets.	Potential for nutrient containing leachate to be mobilised from stockpiled material
1997	What appears to be different materials for landscaping are stored in the areas behind both 12 and 14 Arnott Streets. Storage of additional materials which are undiscernible in the aerial photography also occurs.	As above
1992	What appears to be different materials for landscaping are stored in the areas behind both 12 and 14 Arnott Streets. Storage of additional materials which are undiscernible in the aerial photography also occurs.	As above
1985	What appears to be different materials for landscaping are stored in the areas behind both 12 and 14 Arnott Streets. Storage of additional materials which are undiscernible in the aerial photography also occurs. No warehousing occurs at the Site, with only one structure occurring on the north-eastern corner of 14 Arnott Street	As above
1981	What appears to be different materials for landscaping are stored in the areas behind both 12 and 14 Arnott Streets. Storage of additional materials which are undiscernible in the aerial photography also occurs. The Site is otherwise empty	As above
1978	The Site and its surrounds are bare, with a road constructed on its northern and eastern boundary.	N/A
1978	The Site is undeveloped, with a dirt road running north-north-west–south-south-east across the north-eastern corner of the Site	N/A
1973	As above	N/A
1967	As above	N/A
1961	As above	N/A
1944	As above	N/A

2.4.3. Contamination

By identifying the potentially contaminating activities which might have occurred at the Facility prior to its operation by Goterra, an understanding of the potential hazards presented to human health and environmental by toxic chemicals and substances emitted during past site operations can be identified. State and Territory governments keep records of contamination incidents and potentially contaminating activities at sites and issue authorisations and agreements for activities which have the potential to cause harm to human health or the environment.

No authorisations or agreements have been issued in relation to the Site by the ACT EPA. This means previous businesses which occupied the Site did not require any formal authorisations or agreements for their operations and processes under the Environmental Protection Act 1997, and as such none were issued by the ACT EPA in relation to the Site. Like all businesses in the ACT, all historical operations at 12 – 14 Arnott Street, Hume were required to adhere to the general environmental duty under the Act from 1997, and to undertake all reasonably practicable steps to prevent harm to the environment. While no authorisations or agreements were required anywhere in the ACT prior to 1997, Murrang considers it unlikely to that potentially harmful activities occurred at the Site prior to this date, based on its history (Section 2.1)

Nine authorisations have been issued for activities within Hume by the ACT EPA, although none have been issued for the Site. Petroleum is currently used and managed as waste at two locations within 1 km of the Site, with the closest facility authorised for such activity occurring approximately 400 m away. Opposite the Site, Cabiria Pty Ltd was authorised to transport controlled waste (Class A activity, Activity 8, under the Environment Protection Act 1997) between 12/02/2015 and 12/12/2017, with this activity now ceased. All six remaining authorisations recorded within Hume have either ceased or expired, and occurring at least 280 m from the Site. Therefore, apart from the two petroleum facilities, no other facilities within 1km of the Site should be operating any Class A or B activities that require authorisations.

No contamination or contaminating activities, including the storage of hazardous wastes or substances, is recorded as occurring, managed, or investigated at the Site within the:

- ACT Register of contaminated sites
- National waste management site database
- National liquid fuel facilities
- Defence PFAS investigation and management program investigation sites
- Airservices Australia National PFAS management program
- Defence 3-year regional contamination investigation program

In addition, no dry cleaners, motor garages, or service stations are known to have occurred at the Site since records began in 1950. This information indicates that no known contaminating activities have been recorded to have occurred at the Site. Together with the historical aerial photography presented in Section 2.2, it indicates that no contaminating activities are likely to have occurred at the Site.

The area immediately to the south-east of the Site is registered as being subject to chemical and physical management of flood and bushfires. Physical removal entailed slashing and physical removal of load, while the chemical management is considered to involve the use of herbicides to suppress weeds. This information means that although there are no indications of contaminating activities having occurred at the Site, there is the potential for persistent herbicides to occur in soils nearby (Appendix A).

2.5.3. Locality and site plan

Goterra's new facility in Hume occurs within an area of pre-existing warehousing, with an open-air carpark at the rear (Figure 6). The internal layout of the Facility is depicted in Figure 7. At the time of this report's writing, the warehouses and facility surrounds were being retrofitted to provide for the following.

Food waste processing begins in the Waste Receival area, which includes Step 2-3 of the process. Food waste arrives on tipper trucks or in skips on the back of trucks, with trucks driving through the Facility's hardstand area and tipping food waste into a concrete bund and apron immediately outside the Waste Receival area in the South-West of the Site. This allows trucks to tip food waste into a contained area which is easily accessible from inside. Food

Figure 6. Layout of the Facility, with the Tech floor occurring in the north-east of the Facility and the Waste receival area in the south-west

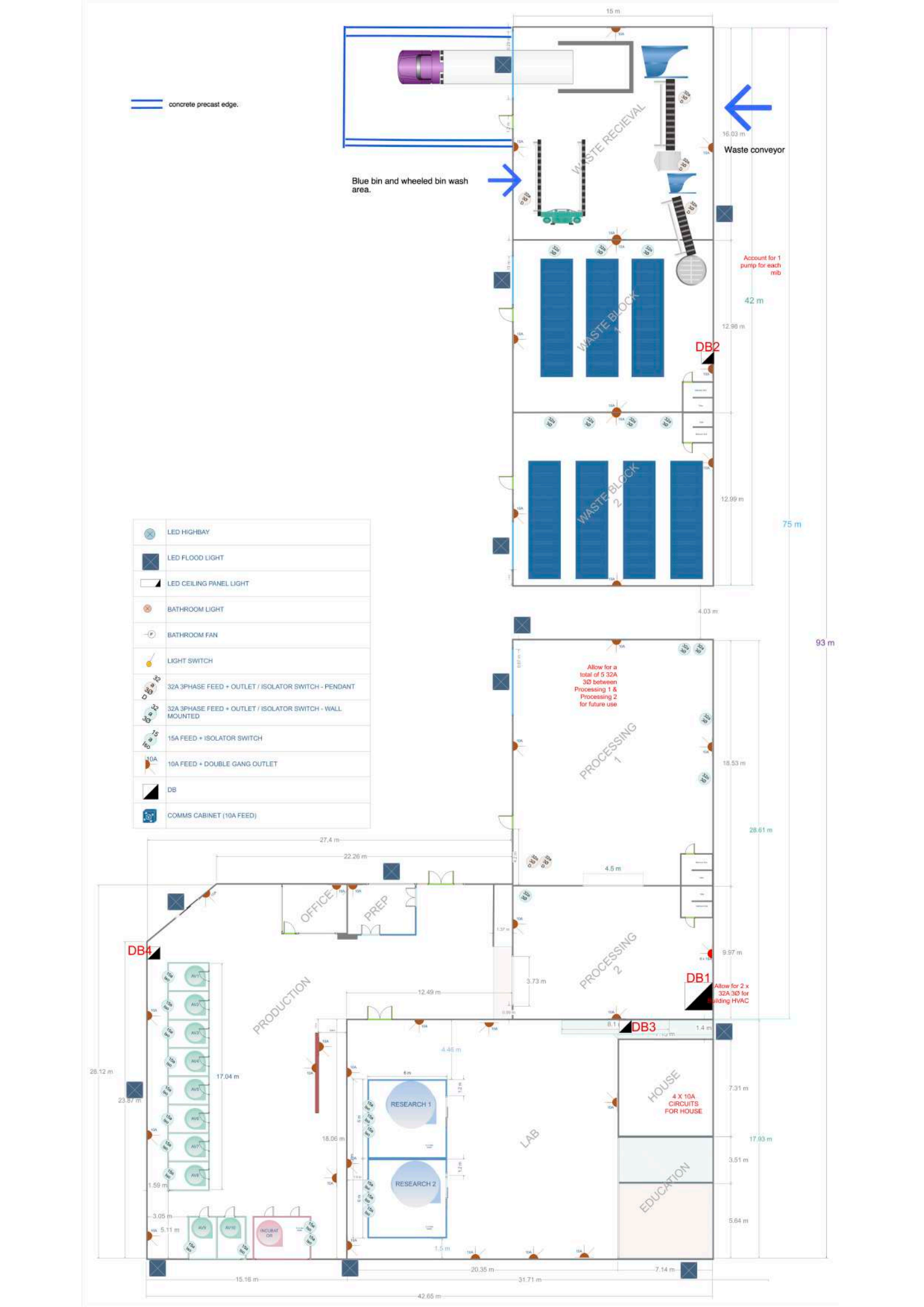

concrete precast edge.
Blue bin and wheeled bin wash area.
WASTE RECIEVAL
Waste conveyor
16.03 m
Account for 1 pump for each mib
42 m
WASTE BLOCK 1
12.96 m
DB2
WASTE BLOCK 2
12.99 m
75 m
4.03 m
93 m
LED HIGHBAY
LED FLOOD LIGHT
LED CEILING PANEL LIGHT
BATHROOM LIGHT
BATHROOM FAN
LIGHT SWITCH
32A 3PHASE FEED + OUTLET / ISOLATOR SWITCH - PENDANT
32A 3PHASE FEED + OUTLET / ISOLATOR SWITCH - WALL MOUNTED
15A FEED + ISOLATOR SWITCH
10A FEED + DOUBLE GANG OUTLET
DB
COMMS CABINET (10A FEED)
Allow for a total of 5 32A 3Ø between Processing 1 & Processing 2 for future use
PROCESSING 1
18.53 m
28.61 m
27.4 m
22.26 m
4.5 m
OFFICE
PREP
DB4
PROCESSING 2
9.97 m
DB1
Allow for 2 x 32A 3Ø for building HVAC
PRODUCTION
12.49 m
3.73 m
DB3
8.1 m
1.4 m
4.46 m
28.12 m
17.04 m
23.87 m
RESEARCH 1
RESEARCH 2
18.06 m
LAB
HOUSE
4 X 10A CIRCUITS FOR HOUSE
7.31 m
17.93 m
3.51 m
EDUCATION
5.64 m
1.59 m
3.05 m
5.11 m
INCUBATOR
1.5 m
20.35 m
7.14 m
15.16 m
31.71 m
42.65 m

Figure 7. Internal layout of the Facility, including waste receival, processing, production, as well as research and development areas.

02 6161 1762
contact@murrang.com.au
www.murrang.com.au
ABN 96 162 928 958

waste is moved onto conveyer belts in the Waste Receival area, screened for rubbish and other contaminants, and moved into Waste Blocks 1 and 2. Waste Block 1 and 2 are used for Steps 4-5 of the process. The waste is then macerated in Waste Block 1. Pre-fabricated tanks for fermentation are installed in Waste Block 1 and 2, with ovens for pasteurising also in this area. The positive displacement pump is then used to pump the fermented waste into the Processing area for Steps 6 and 8 of the process. The soldier fly larvae do their work in the Processing area, where they are grown in one of Goterra's Farm Modular Infrastructure for Biological services (MIBs) — a 100% self-contained item developed and manufactured by Goterra for this purpose. Also in this area, the products of frass and protein meal are completed at the end of the conversion process. In the Production area Step 7 is undertaken, the reproduction of the fly, with 12 aviaries housing the breeding adult soldier flies. These soldier fly aviaries will be completely separate to the waste processing facilities where the larvae are held, to protect the flies from pests and disease.

Two types of drainage are to move waste water away from the Facility. All water which has the potential to contain food waste or any form of leachate, including wash-down water, will drain from the Facility into the sewerage system via grease and silt traps (Figure 8). All other water, mainly stormwater, will move down through the outdoor areas of the Facility in a northly direction and transmitted from the Facility in stormwater drains (Figure 9).

2.5.4. Natural characteristics of site

This section discusses the Site features, otherwise known as the natural characteristics of a site, at and surrounding 12 – 14 Arnott St, Hume. Meteorology (wind and rain), groundwater, surface water, areas of environmental significance and land and soil features are all discussed, as these features have the potential to affect the way any impacts from Goterra's operations manifest in the environment.

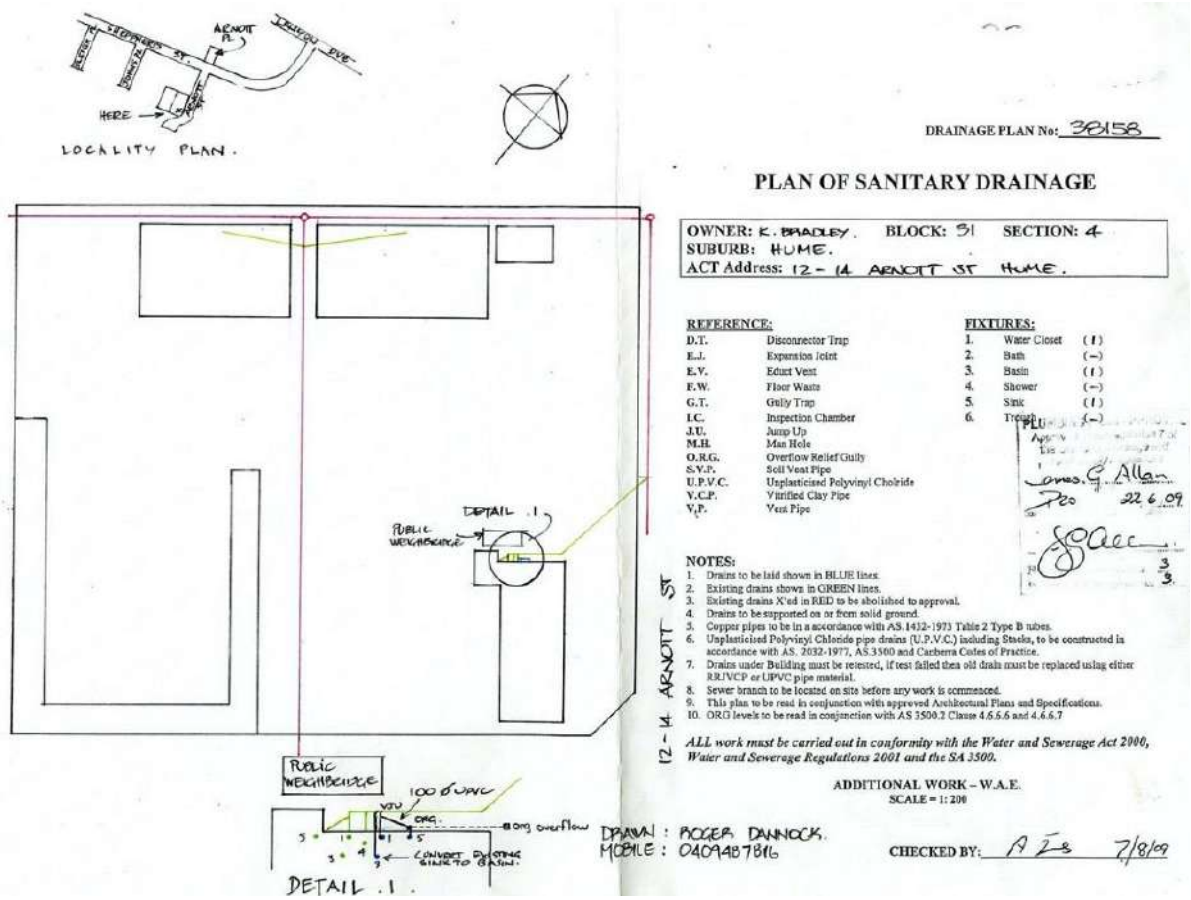


Figure 8. Current facility drainage design

2.5.5. Topography

Goterra's facility is located on flat land near low, unnamed hills which rise to an elevation of around 730 m above sea level to the Site's west. The Site itself has an elevation of 587 m above sea-level, and gently slopes north-east (Figure 5, Appendix A).

2.5.6. Meteorology

The average annual rainfall at the Facility is 615 mm, based on the Bureau of Meteorology Canberra Airport Comparison station located 6.1 km north of the Facility[3]. It Is important to note that average rainfalls in South-Eastern Australia represent a mid-way of extremes. In 1982, for example, 261.6 mm of rainfall was received at the Site, while 1063 mm was received

Figure 9. The Site, with contours

in 1950. This means that the Facility must have processes which can manage surface water generated by the heavy rainfall events which can occur on top of already saturated soils in wet years. While it also means that substantial drying of soils and subsequent cracking and impacts to infrastructure can occur during drought conditions, these impacts are considered by Murrang Earth Sciences as likely to be minor at 12 – 14 Arnott Street due to the nature of the soils at this location, and unlikely to have any environmental impact. Any infrastructure issues resulting from these conditions are the responsibility of the Site owner.

The average annual wind speed at Canberra airport is 8.3 km/h at 9 am and 17.3 km/h at 3 pm[3]. At 9 am the predominant wind direction is from the North-West followed by South-East and South, with winds of 20 to 30 km/h from the North-West occurring 10% of the time (Figure 10). At 3 pm, the dominant wind direction is North-West followed by West, where >20% of the time the wind speed is between 20 and 30 km/h from the North-West. This information means that any airbourne impacts will most often be blown to receptors either East, South-East or North-West of the Site. As dust and bioaerosol emission are unlikely, the EMP will consider this information for odour only.

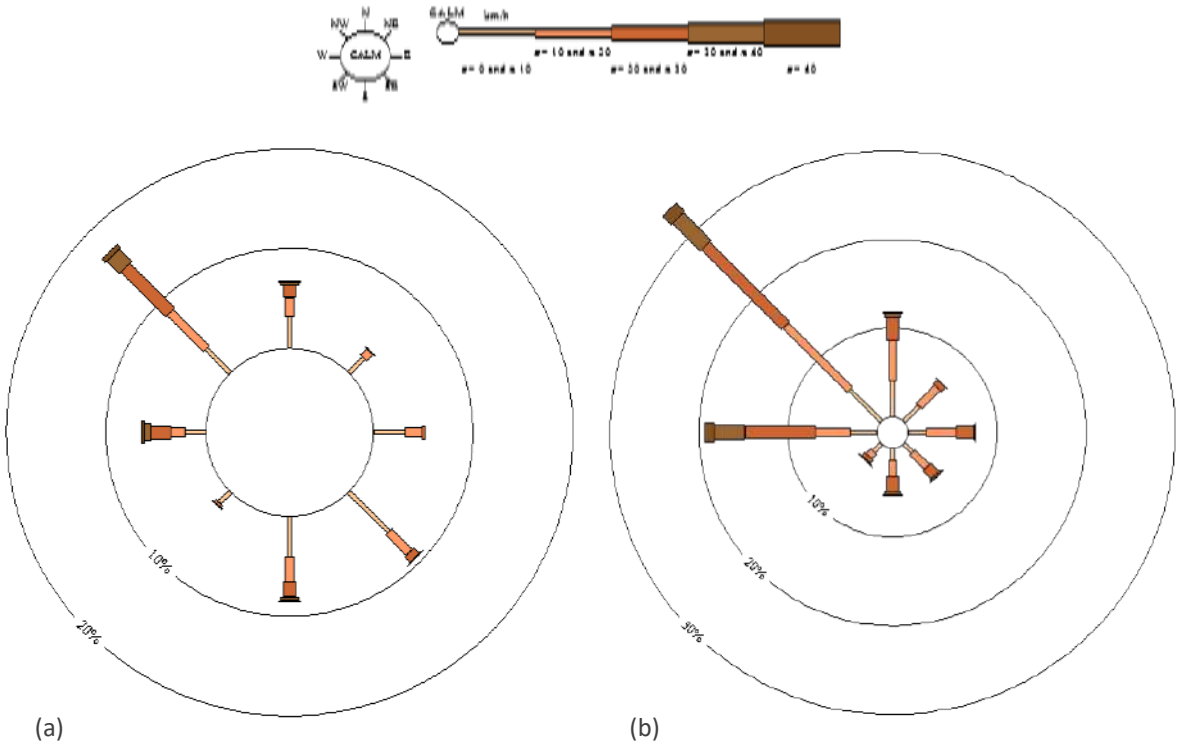


Figure 10. Rose of wind direction at Canberra Airport at (a) 9 am; and (b) 3 pm; with data collected between 1 March 1939 and 15 September 2010[3]

2.5.7. Groundwater

The depth of groundwater in bores indicates whether activities at Sites have the potential to affect groundwater. The type of substrate groundwater occurs within can further inform as to whether connections can occur between that groundwater and the soil above or other aquifers in an area. There are six groundwater bores within 1 km of the Goterra facility. Four of these bores have a depth of 4 to 6 m, and were drilled into regolith including clays and sands (Appendix A). The purpose of these bores is not stated, however, as they are located within or adjacent to a service station, they are considered likely to be groundwater monitoring wells used to detect hydrocarbon (i.e. petroleum) contamination.

Two wells within 1 km of the Goterra facility have a depth of 24 to 40 m. These well were drilled in the 1950s, and may have been used for water supply. This information indicates that spills from the Facility have the potential to impact both a shallow water table (at a depth of between 4 and 6 m) which is potentially perched and ephemeral, and at least one deeper aquifer which occurs in fractured and fissured rock, below 20 m depth (Appendix A). This deeper aquifer is considered likely to have connectivity to the ground surface via fractures and fissures. This section also indicates there is potential for any excavations or structures at the Facility which penetrate a depth greater than 4 m to be affected by groundwater.

2.5.8. Surface water

The potential impact of Goterra's proposed development on surrounding surface water, including ponds, creeks, and rivers is assessed in this section. Jerrabomberra Creek is located 500 m downslope and North-East of the Site and is highly likely to be groundwater dependent, meaning groundwater impacts in the surrounding landscape are likely to also impact Jerrabomberra Creek (Appendix A). This creek is outside the zone within which emissions from the Site are likely to spread, with other sites and a road intercepting run-off from the Site prior to reaching this feature. While Jerrabomberra Creek is not considered a direct receptor of potential hazards which occur at the Site, Facility stormwater is considered likely to drain directly to the Creek via culverts. It is emphasised that any leachate generated by Goterra's operations will be captured on-site and reused, or will enter sewage along with wash-water via a greasetrap or sump system. Stormwater is separate to the waste receival and processing facility.

A tributary of Jerrabomberra Creek, located 280 m North-East of the Site, is connected to the Site via a 3-metre wide sewerage easement (Appendix A). The easement runs East-West through the Site, meaning that any spills within the Site can potentially connect to this tributary via the easement and the fill which surrounds it (Figure 11). Historical information presented in Appendix A shows that this tributary historically occurred in the centre of the Site, and flowed

north-east into Jerrabomberra Creek. This information potentially means that historic flow lines as well as fill placed in the easement has the potential to conduct any spills or leachate from the Site to Jerrabomberra Creek or its tributaries. However, as the receival area is bunded with a sump, and no washing of vehicles or spread of waste on tyres is likely, it is unlikely that waste or contaminated water will enter stormwater and leave the Site.

Figure 11. Depression above sewerage easement located on 14 Arnott Street, looking west. Photograph captured by Murrang Earth Sciences on 29 April 2020

2.5.9. Nature reserves and areas of environmental significance

While the Facility itself is located within an urban and developed area, it is less than 1 km away from the Jerrabomberra East Grassland Nature Reserve and the West Jerrabomberra Nature Reserve, which are north-east and north-west of the Site respectively (Appendix A, Figure 12). No wetlands or significant trees occur within the vicinity of the Site, but Yellow Box Gum Grassy Woodland occurs approximately 900 m west of the Site. Based on the information in Section 2.4.2, these nature reserves have the potential to be affected by airborne hazards. However, no airborne hazards will be emitted from Goterra's Hume facility.

2.5.10. Land and soil

The type of soils at a location and the rock on which it occurs allows an understanding of how environmental impacts such as leachate, spills, or flooding will manifest at a particular location. In the case of Goterra's Hume facility, soils are considered likely to be reasonably shallow, with bores drilled within 2 km intercepting porphyry at a depth of approximately 2 m below ground level. Soils are likely to be a type called kandasols and are of the Williamsdale landscape (Appendix A). This soil type can store a lot of water, is well aerated and weakly structured, but not particularly fertile and can be prone to erosion in some instances[4].

Figure 12. The Site within vegetation communities at the Site

This information means that any spills which may accidentally occur on exposed soils at the Site are potentially easily washed away. These soils are considered not particularly prone to flooding and the ability of these soils to store water and their massive structure will slow the discharge of any leachate spills from the Site that are made onto soils. It is emphasised such leachate spills are highly unlikely, due to Goterra's processes being 100% contained.

3. Legislative framework

How Goterra's facility, process, and operations fit into legislative hierarchies — that is the different laws and requirements — of the ACT and NSW governments are considered in this section, with such legislation produced by governments as the basis for environmental and human health risk management of organic recycling facilities.

While there is ample legislation for waste facilities in NSW, limited legislation is in place for the environmental management of organic recycling facilities in the ACT. As such, Goterra is not required to obtain a license or undertake an EMP for their food waste conversion facility under the Environment Protection Act 1997 (EP Act). Although it is important to recognise that the EP Act itself still applies to the Facility, including the general environmental duty, to protect the environment and minimise harm. Goterra do have a license (License No. AL0059) as a waste management facility under the Waste Management and Resource Recovery Act 2016 (WMRR Act) for their pilot Fyshwick facility, and are in the process of applying for a new license for their Hume facility.

The legislation drawn upon to constrain best practice for this EMP includes, but is not limited to:

- Environment Protection Act 1997 (ACT)
- WMRR Act 2016 (ACT)
- Environmental guidelines for preparation of an Environmental Management Plan, 2013 (ACT)
- Guideline 1588.1 – Designing, constructing and operating composting facilities (Victoria)
- Protection of the Environment Operations Act 1997 (NSW)

- Protection of the Environment Administration Act 1991 (NSW)
- Protection of the Environment Legislation Amendment Act 2011 (NSW)
- Waste Avoidance and Resource Recovery Act 2001 (NSW)
- Protection of the Environment Operations (Waste) Regulation 2014 (NSW)
- Environmental Guidelines: Composting and related organics processing facilities 2003 (NSW)
- Guide to licensing 2016 (NSW)
- EPA licensing guideline: Environmental risk levels 2016 (NSW)

Guidelines are issued by governments to outline how people and organisations can undertake activities in accordance with acts and regulations. Acts and regulations being legally binding, and policies and guidelines being a suggested means of compliance. The ACT Government has not produced organic waste facility guidelines, but has issued general guidelines for EMPs[5]. Guidance issued by other state governments to facilitate the adherence of waste facility operators to legislation is instead drawn upon in this EMP. This is consistent with the general environmental duty requirement outlined in the ACT Environment Protection Act 1997, which requires organisations to take practicable and reasonable steps to prevent or minimise environmental harm.

4. Environmental factors

Environmental factors are aspects of the environment which can be negatively impacted by a development or a premises operation. Legislation outlined in Section 3 requires environmental factors be assessed in new developments or premises in terms of:

- The objective for protection and by describing the environmental outcome
- Design requirements
- Performance requirements
- Performance measurements

Table 4 contains a comprehensive list of the environmental factors and objectives outlined within the ACT's EMP guidelines (EPA ACT 2013) and the NSW EPA Compositing guidelines (EPA NSW, 2003). The environmental factors are required to be assessed and addressed as part of an EMP in ACT or a license application for an organic waste processing facility in NSW. In NSW the type

of assessment that needs to be undertaken is different for each factor and objective, as per the composting guidelines (EPA NSW, 2003) and may include a preliminary site assessment in addition to risk assessment. In ACT, potential hazards and risk mitigation is required for all environmental factors.

Where environmental factors are not present at the Site, this is noted in the table and no further assessment made. These environmental factors are then discussed in terms of preliminary site assessment in Section 4 (where required in NSW), risk and management in Section 5 below, and will include design and performance requirements in terms of management. Performance measurements will be discussed in Section 6, also regarding monitoring, evaluation and adaptive management.

Table 4. Environmental factor and objectives for ACT and NSW

Environmental factors	ACT objectives	NSW objectives
Noise management		
Noise/vibration	Protect the amenity of nearby residents from noise/vibration impacts resulting from activities associated with the proposed/ existing development by ensuring that noise/vibration levels meet statutory requirements and acceptable standards.	Minimise noise emissions.
Water management		
Surface water quality	Not relevant — direct water management not involved. See below for discharges.	Not relevant — direct water management not involved. See below for discharges.
Groundwater quality	Not relevant — direct water management not involved. See below for discharges.	Not relevant — direct water management not involved. See below for discharges.
Wastewater management		
Wastewater reuse	No wastewater reuse onsite.	No wastewater reuse onsite.
Air management		
Air — methane and greenhouse gases	Ensure that potential air pollutants are contained and that activities do not impact on the natural environment.	Minimise emissions of methane to air and diffusion through soil strata such that the risk to humans in confined spaces (such as explosions and suffocation) is minimal. No gas flare or electricity generating equipment will be used on site.
Dust/Particulates/Bioaerosols	Ensure that particulate /dust emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problem.	Minimise particulate matter emissions from the Facility.
Odour	Ensure that operations do not generate odour that causes environmental nuisance.	No emissions of offensive odours outside the boundaries of the premises.

Environmental factors	ACT objectives	NSW objectives
Waste management		
Solid/liquid waste — incoming	Ensure that wastes are contained and isolated from land, ground and surface water surrounds and treatment or collection does not result in long-term impacts on the natural environment.	Ensure that incoming organics do not have negative environmental impacts (such as air quality impacts) or amenity impacts (such as odour).
Solid/liquid waste — storage and outgoing	Ensure that wastes are contained and isolated from land, ground and surface water surrounds and treatment or collection does not result in long-term impacts on the natural environment.	Prevent water pollution and amenity impacts (such as odour and dust). To minimise stockpiling of unprocessed and processed organic materials above that required for processing or to meet market requirements.
Special waste	Will not be present on the Site.	Will not be present on the Site.
Contaminated land		
Land	Ensure that wastes are contained and isolated from land, ground and surface water surrounds and treatment or collection does not result in long-term impacts on the natural environment.	Not included in NSW Objectives
Surface water	Ensure that wastes are contained and isolated from land, ground and surface water surrounds and treatment or collection does not result in long-term impacts on the natural environment.	Prevent water pollution. Surface or underground discharges of leachate and water from the Facility must not pollute groundwater or surface waters.
Groundwater	Ensure that wastes are contained and isolated from land, ground and surface water surrounds and treatment or collection does not result in long-term impacts on the natural environment.	Prevent water pollution. Surface or underground discharges of leachate and water from the Facility must not pollute groundwater or surface waters.

Environmental factors	ACT objectives	NSW objectives
Hazardous materials management		
Scheduled wastes	Will not be present on the Site.	Will not be present on the Site.
Resource storage	Will not be present on the Site.	Will not be present on the Site.
Other		
Pest control, pathogens, plant propagules	Ensure that pest control chemicals are used safely and appropriately.	Not specifically included in NSW objectives.
Litter	Not specifically included in ACT objectives.	The local amenity must not be degraded by litter emanating from the composting and related organics processing facility.
Household chemicals	Ensure residual household chemicals are disposed of in accordance with guidelines.	Not specifically included in NSW objectives.
Compressed/liquid gas	Will not be present on the Site.	Will not be present on the Site.
Underground/above ground storage tanks	Will not be present on the Site.	Will not be present on the Site.
Discharges to land	Will not be present on the Site.	Will not be present on the Site.
Discharges to surface water	Will not be present on the Site.	Will not be present on the Site.

Environmental factors	ACT objectives	NSW objectives
Other		
Discharges to groundwater	Will not be present on the Site.	Will not be present on the Site.
Fire management	Not specifically included in ACT objectives.	To ensure that the Facility is not a fire risk and that the Facility is adequately prepared in the event of fire.
Security on premises	Not specifically included in ACT objectives.	Ensure that the premises are secure.
Closure of premises	Not specifically included in ACT objectives.	To ensure that, after closure, the composting and related organics processing facility does not cause environmental harm.

5. Preliminary site assessment

In this section, the impacts Goterra's waste facility might have on the environment is assessed as part of New South Wales EPA licensing requirements (EPA NSW, 2003). Noise, odour, water, greenhouse gases, particulates, and bioaerosols are all considered. Although preliminary site assessments are not required in the ACT, an odour site assessment will be undertaken at the Facility in June 2020 by Goterra as part of due diligence and to exemplify best practice. The Site assessment for water is included above (Sections 2.4.3 and 2.4.4). Impact assessments for particulates, bioaerosols, and gas emissions are not likely to be required by NSW EPA. This is because the food waste has a high moisture content and internalised waste processing systems that are unlikely to cause dust or bioaerosol emissions. Homolactic fermentation and aerobic waste conversion generate only small amounts of carbon dioxide. In addition, Murrang Earth Sciences also suggest a noise assessment be undertaken in accordance with NSW guidelines to demonstrate best practice.

6. Risk assessment

The processes created by Goterra to convert food waste to valuable products at their Hume facility have the potential to be hazardous to human health and the environment. These hazards may never be realised, however, if exposure to these hazards is appropriately controlled or there is no receptor which can be harmed. An assessment of the potential for a hazard to cause harm, taking exposure and receptors into account, is expressed as risk. An assessment of environmental or human health risks related to a Site and its activities are a requirement of EMPs in the ACT for all Class A facilities under the Environment Protection Act 1997 and in NSW under Schedule 1 of the Protection of the Environment Operations Act 1997. We note that in the ACT, Goterra's facility is not a Class A or B facility.

Due to the lack of guidance on the assessment of risk within an EMP context in the ACT, we have drawn upon other jurisdictional guidance. This includes the NSW EPA licensing guideline where assessment undertaken by the EPA considers risk (EPA NSW, 2016a, b), and the NSW composting and organics processing guidelines (NSW EPA, 2003).

Hazards identified in Section 5 are summarised in Table 5 below using the environmental factors in Table 4 and considering the design and performance requirements for ACT and NSW. This is then followed by a discussion of any identified risks and controls using a risk assessment procedure and management procedure for licensing (EPA NSW, 2016 a, b), including use of site-specific risk assessment tool, and then a monitoring strategy in Section 6. All management controls put in place will follow the ACT EMP guidelines (EPA ACT 2013) and the NSW EPA Compositing guidelines (EPA NSW, 2003). The applicable environmental factors and objectives in Section 3.1 are considered in the risk assessment.

6.1. Noise management

Noise will be assessed and managed in accordance with ACT's Environment Protection Regulations 2005. Sources of noise will include trucks entering and leaving the Facility with waste, bobcats moving the waste onto the conveyor, the macerator, conveyor and triple deck sifter. None of these will be in operation at the same time.

It is expected that the noise generated by the Site will be approximately (based on Purdue, 2000):

- One truck at a time, with noise generation typically ranging between 60 and 100 dB depending on vehicle acceleration
- Machinery which generates noise at levels of between 60 and 110 dB, including conveyor, macerator, sifter, and bobcat

At any one time, there will only be one piece of machinery operating, which generates noise at levels between 60 and 110 dB. An average factory makes 80 dB of noise at any given time (Purdue, 2000).

Schedule 2 of the ACT's Environment Protection Regulations 2005, states that land in an industrial zone is zone A. As the area is in an industrial zone, the limits in this zone have been set at 65 dB from 7 am to 10 pm Monday to Saturday, and between 10 pm and 7 am the limit is 55 dB (Access Canberra, 2020). As per Schedule 2 of the regulations, Part 2.3 Noise Conditions, there are no additional or specific conditions for waste processing facilities. The Regulations stipulate that the noise compliance point is at the boundary of the leased area. Therefore, although the dB of each individual noise emitting machine is above 65 and 55dB, analysis at the boundary of the leased area will need to be undertake to understand its potential effect and appropriate management strategy. We note that the Site is in the middle of an industrial area, and the prevailing wind direction at the Site will influence a receptor in all directions.

Collection of waste follows the ACT Commercial Waste Industry Code of Practice 1998 and Schedule 2 of the Environment Protection Regulation 2005. Waste collected by Goterra or a third-party is done in accordance with ACT Commercial Waste Industry Code of Practice (1998) and collected between 6 am and 5 pm. This is to reduce potential noise pollution in residential, commercial, and industrial locations. As per the Code of Practice, Goterra will manage any complaints regarding noise from waste collection. This will include one or a combination of: rescheduling collection; checking maintenance of vehicles; or relocating waste collection areas. In addition, Goterra will keep records of all complaints including name, phone number, times, dates, and associated action. Any complaints made and the resolved action will be sent to ACT EPA.

In order to stay within acceptable levels, only one piece of machinery or truck will be operating at the Facility at any given time. Noise will be assessed at the Site by a suitably qualified

professional using the NSW EPA framework (NSW EPA, 2003) to demonstrate that they comply with 65 and 55 dB noise limits. If these levels are exceeded, site activities will be adjusted and will adjust accordingly based on the data received. All equipment used will be maintained and operated in accordance with manufacturer's instructions, and noise requirements.

In NSW, a noise complaints policy is required as part of licensing with the EPA. This policy will be developed for Goterra when their operating at a licensed facilities in NSW are commissioned.

6.2. Air management

This section identifies sources and estimates emissions (project wide) for greenhouse gases, particulates and bioaerosols, and odour.

For all aspects of air quality management, the ACT Separation Distance Guidelines for Air Emissions 2018 applies for new developments only and developments listed as Class A and B activities under the EP Act 1997. Goterra is not an Class A or B activity and does not need to lodge a development proposal, and therefore these guidelines do not apply. They will, however, consider best practice as per the General Environmental Duty under the EP Act 1997. Details regarding this are as below.

6.2.1. Air

The ACT's Environment Protection Act 1997 and associated regulations make no specific requirements for air emissions from waste facilities. However, the Air Environment Protection Policy (1999) does set out guidance for fugitive emissions (irregular releases of gases and vapours) and requires compliance with general environmental duty. As the Facility is using aerobic conversion and homolactic fermentation, only a small amount of carbon dioxide will be released between rotations of waste conversion every 12 days. Therefore, the Air Environment Protection Policy guideline requirements for the installation of pollution control equipment is not

appropriate. Goterra's unique conversion process means that all reasonable and practicable measures to avoid emissions have been undertaken, as per the ACT Air Environment Protection Policy.

New South Wales requires that methane emissions in aerobic and anaerobic processes for organic waste processing facilities are considered (EPA NSW, 2003). However, as discussed above, there will be no methane emissions from this facility due to the processes chosen for waste conversion. Management of methane emissions are therefore not applicable to the Goterra facility in Hume.

The NSW guidelines (NSW EPA, 2003) for air emissions are directed at electricity generation from organic waste processing. No gas flare or electricity generating equipment will be used in the Goterra facility, so issues addressed by the NSW guidelines regarding emissions of nitrogen oxides (NO_2 and NO), sulfuric acid mist (H_2SO_4), sulfur oxides (SO_3 and SO_2) and non-methane volatile organic compounds (NMVOC) do not apply. No further action in regards to gad flare or electricity generating equipment is required by Goterra.

6.2.2. Particulates, dust and aerosols

There are no specific requirements for air emissions from waste facilities outlined in the ACT's Environment Protection Act 1997 and its associated regulations. However, the Air Environment Protection Policy (1999) does set out guidance for fugitive emissions and refers to compliance with general environmental duty and guidelines to manage these emissions. As the moisture content of the food waste is high (50 to 70%) dust and bioaerosols are considered highly unlikely to be emitted. Therefore, the process at the Facility is being undertaken with all reasonable and practicable measures to avoid particulate, dust and aerosol emissions, as per the ACT Policy. Therefore, the ACT guidelines for pollution control equipment are not required for this facility.

6.2.3. Odour

In accordance with the Environment Protection Act 1997 and the associated regulations, there are no specific requirements for odour at waste facilities. Access Canberra (2019) state that the ACT is developing odour guidelines, but these were not available at the time of this EMP's development in May and June 2020. In this case, we demonstrate that all reasonable and practicable measures to avoid emissions have been undertaken as per the ACT Policy. In addition, NSW requirements regarding odour in organic processing facilities are adhered to (EPA NSW, 2003).

Odours at the Facility are likely to be generated at receival, screening, maceration, conversion of the waste in MIBs, and at the point of frass production. All other stages along the conversion of the waste are completely enclosed and gases are not vented to the building or environment. The MIBs used for conversion of the waste have carbon biofilters to capture odours, and an air intake to provide oxygen for larvae and to ensure aerobic decomposition. The biofilters are serviced monthly. No other points along the process have odour filters, and only a slight odour is detectable from packaged frass. Goterra will undertake odour assessments in June 2020 through a suitably qualified professional. The assessment will be in accordance with NSW EPA methods. Any odour issues will be identified and associated adaptive management will be used to ensure NSW odour requirements are met accordingly.

We note in NSW, an odour model, impact assessment and management plan are required for EPA licensing (EPA NSW, 2003).

6.3. Waste management

Wastes accepted at the Facility and are outlined in Table 1, with 150 t of food waste a day and up to 45,000 t of food waste accepted at the Facility a year. This is the maximum capacity that the Facility can reach in terms of waste processing. One-hundred and fifty kilograms of frass is

produced from every 5 tonnes of food waste, with a maximum production of 1,350 tonnes per year for 45,000 tonnes of food waste. No waste other than food waste will be accepted at the Site, in accordance with the Facility's NoWaste License. This information is captured electronically as per their flow diagram (Figure 3). Contaminants within the waste, nominally plastics or other co-mingled recyclables or general waste, will be screened out of the food waste upon receival and prior to processing.

Waste at the Facility will be received, screened and macerated within areas of concrete hardstand, aprons, and bunds. Any leachate or water used in washdown will enter a grease trap before entering he sewer, and or captured in the conveyor and macerator drip tray before re-entering the food waste process. Food waste will not be stored on the premises, instead being immediately processed for pastuerisation and fermentation prior to conversion. All pasteurisation, fermentation, and conversion steps of the process will be undertaken within enclosed equipment, with the waste moved between each stage of the process by an automated positive displacement pump to avoid spills and losses. All frass will be packaged and stored in a bunded area before being sent to composters for use at the beginning of the composting process. No more than 150 kg of packaged frass will be stored on site at any given time. Any waste screened from the food waste, approximately 14 kg per year per tonne of food waste, will be disposed of as municipal or recyclable materials using general collection services.

In NSW, frass is considered manure and is thus subject to the Compost Order 2016. Frass, however, must be used at the beginning of a composting process only. Being manure, it must be subject to the higher pasteurisation limits of 55°C or higher for 15 days or longer within a composting process and a windrow turn of at least five times.

Goterra's system closes the loop on the food waste stream, which is in harmony with the objectives of the Waste Avoidance and Resource Recovery Act 2001 in NSW. The objects of the act are to use resources and reduce ecological harm, avoid resource consumption, recover

resources and have appropriate disposal where necessary. The two main outputs of Goterra's food waste conversion process include frass and protein, which are both on-sold for composting and non-ruminant animal feed. Currently wastewater enters the sewer, although Goterra is considering on-site waste water treatment for recycling on site. Based on Goterra's pilot facility in Fyshwick, only 14 kg of recyclable and non-recyclable waste per tonne of food waste per year is generated after food waste screening. This material is sent to appropriately licensed facilities. Therefore, Goterra minimises waste generation and has appropriate disposal or recovery to comply with the NSW Waste Avoidance and Resource Recovery Act 200.

6.4. Land and water

The ACT Environmental Protection Regulations 2005 and the ACT Water Quality Environment Protection Policy 2008 are used to govern the controls and protections for waterways in the ACT. This Regulation and Policy highlight the need for Goterra to ensure that any food waste contaminated water, wash water, or leachate on the Site does not enter waterways or stormwater, and that reasonable and practicable steps are undertaken to limit this hazard.

Vehicular entries and exits, and all waste management areas at the Facility need to occur on ground which has been stabilised with concrete, compacted gravel or other solid material, be able to support vehicles, and comply with the ACT Environmental Protection Regulations and the protection of land. The entry and exit point to the Site are currently the same and are concreted. All water waste and leachate collected at the Goterra Facility will enter grease traps to ensure that it is appropriately discharged into sewer, as per Goterra's Liquid trade waste license with ICON Water (Appendix C). No more than 100 L per year per tonne of waste will be discharged, amounting to 4.5 ML per annum. As all waste management is undertaken in a concrete bunded undercover area, a cut-off drain at the entry and exit to the Site will not be required. This is because wastewater and leachate from waste areas on the Site cannot enter stormwater on the

Site or enter stormwater on the road. Should stormwater inadvertently enter the waste area, it will enter a sump for disposal into the sewer.

All waste processing is undertaken in covered or enclosed, and concreted environments. The conveyor and macerator are on concreted bunded areas designed for all machinery and structure use. A sump with sewer connection will catch any leachate or waste water that makes it to the ground. The macerator and conveyor also have a drip tray that will catch any leachate, and this leachate returned to the waste processing system via the positive displacement pump. After maceration, food waste will be in water-tight containers for the remainder of processing, and automatically moved between processes using a positive displacement pump. The use of the automated pump and water-tight container reduces the likelihood of any spills to negligible. Should any spills occur, these will be inside a bunded area with a sump connected to sewer. Moisture loss from the food waste conversion process is minimal, as the soldier fly larvae need high moisture content to grow. The design of the process, therefore, has maximised maintaining moisture within sealed environments both for the process and for environmental control.

Washdown of waste receival areas and bins will be done inside the waste receival bunded area. This area is connected to a sump, where all water will enter sewage. It is also sheltered from rain and disconnected from stormwater and open land through bunding. Thus it is unlikely any waste water from the process will enter stormwater, waterways or groundwater. Any waste that accidentally sticks to tyres of the waste vehicles will be washed off in the bunded area.

No direct discharges to land or water will be undertaken at this facility. As the Facility is in an enclosed environment, and is separated from stormwater, surface and groundwater, risks of contamination are very low. No ongoing monitoring of water at the Site is recommended, based on the information in this section.

6.5. Other

Other issues raised by the NSW composting and organics waste guidelines (NSW EPA, 2003) and ACT EMP requirements (EPA ACT, 2013) which potentially relate to Goterra's Hume facility include pests, pathogens, plant propagules, litter, household chemicals, fire management, security and closure of premises. These are now discussed below.

6.6. Pest control, pathogens, plant propagules

There are no formal legislative requirements in the ACT for managing pathogens and plant propagules at waste or other facilities. Based on Murrang Earth Sciences prior experience with similar facilities, we consider the pests most likely to occur at the Site to be common blow flies (Family Calliphoridae), rats (*Rattus spp.*), and mice (*Mus spp*). As food waste will be processed immediately, and enter enclosed spaces on the same day, the likelihood of the Faility attracting pests is very low. Furthermore, the waste receival area is washed down every day, reducing the attractiveness for pests. The pasteurisation of waste will remove any common blow-fly fly larvae, which is also essential for the conversion process using soldier flies.

As no green waste or plant waste will be accepted at the Facility, plant propagules will not be present in any waste entering or exiting the Facility. All food waste will be subjected to a two-phase preparation process, including pasteurisation at 60°C for 30 minutes to reduce pathogen load, followed by fermentation. The homolactic fermentation process also results in a displacement of any pathogens that may remain after the pasteurisation. Any residual pathogens in frass will be treated via composting in accordance with the NSW compost order prior to being applied to land.

6.7. Litter

There are no formal legislative requirements in the ACT for the management of litter. However, litter entry into waterways is regulated under the Environment Protection Act 1997, and thus management controls to prevent this should be undertaken, as this section will describe. Any waste generated at the Site through food waste screening or staff activities, will be placed into the appropriate general or recycling bins for collection. Food waste for processing and other waste will not be outside for any periods of time that will allow them to be bourne by wind. All food waste received at the Facility will be immediately brought inside, and other waste and recyclables will be placed into closed bins and skips undercover. Any incidental litter will be cleaned up weekly from The Site to ensure it does not enter stormwater and thus waterways.

As vehicles will be using concreted areas, they are unlikely to distribute mud or waste off-site. The tyres of vehicles can be washed in the bunded waste receival area should there be any accidental adherence of waste to tyres.

6.8. Household chemicals

There are no formal legislative requirements in the ACT for the management of household chemicals that may be stored at the Site. Bleach, vinegar and Agar HC-90 will be used on site for cleaning bins. No other chemicals will be stored or used. All cleaning chemicals will be stored in the bunded and roofed areas of the waste receival area, with any inadvertent spills only entering sewerage. Spill kits are unnecessary, as all cleaning chemicals to be used can enter sewerage. Should a spill occur, these chemicals will be washed into the sump.

6.9. Fire management

There are no formal legislative requirements in the ACT for the management of fire in relation to waste receival facilities. However, the potential for fire to occur at waste receival facilities is

highlighted as an issue under the NSW guidelines, due to composting leading to substantial heat generation, with the potential for spontaneous combustion (EPA NSW, 2003). No composting is undertaken at the Facility, and the normal composting process which generates heat in through decomposition of sugars in food and plant waste does not take place. Instead, these sugars are converted using fermentation and also used as a source of nutrition for soldier fly larvae. There is no potential for fire to occur at the Facility as a result of the waste process which occurs. In NSW, automated units will be used under the same conditions and likelihood of fire is very low. A technician will be at each NSW unit once a fortnight for maintenance, and they will follow Goterra's OHS fire plan during that time.

6.10. Security on premises

There are no formal legislative requirements in the ACT for the management of security at organic processing facilities. In NSW, organic processing facilities need to consider security. Goterra in the ACT will have signs, locks on the Facility at closure times, remote monitoring, and a dog onsite (Figure 3). As there are strict procedures for hygiene between the waste receival areas and the processing and production areas, only authorised and trained staff will be allowed on site. Some of the waste receival will be undertaken using third-party contractors who will only operate the trucks and transport food waste from generators to the facility, and will not enter the waste processing facility.

6.11. Closure of premises

There are no formal legislative requirements in the ACT for a closure plan for an organic processing facility. In NSW, before closure of a facility there must be a closure plan (NSW EPA, 2003). A closure plan will not be undertaken for the purposes of this EMP. However, it is noted that a modular food waste processing system enclosed within shipping containers will be deployed in NSW. This allows for the immediate closure of the modular systems when desired, their removal, and redeployment elsewhere.

6.12. Summary

The key hazards which can present risks — that is the potential to cause harm — to human health or the environment as a result of activities at Goterra's Hume facility are summarised in Table 5. The method used to undertake this assessment is discussed in Section 5 and follows the ACT and NSW EPA guidelines.

Table 5. Risk assessment of key characteristics (from section 3.1) using the method described in Section 5

Item	Hazard/s	Receptor	Drivers and exposure pathways	Management	Risk
Garbage trucks Bobcats Macerator Conveyor and sifter	Noise/vibration	Site workers and workers on neighbouring properties	Number of trucks and/or machinery operating at any given time. Time of day Noise from all equipment Site zoning	Facility situated within appropriately zoned land (IZ1: General industry). Operational hours between 6 am and 6 pm, with collection times as per the Commercial Waste Industry Code of Practice. Noise assessment to be undertaken for adaptive management. Only one piece of machinery operated at any time and all machinery to be maintained in accordance with instructions.	Low

Item	Hazard/s	Receptor	Drivers and exposure pathways	Management	Risk
Air inc.: dust, bio-aerosols, methane, odour and green-house gases	Odour, bioaerosols, dust, methane, or greenhouse gases	Site workers and workers on neighbouring properties People visiting nearby Jerrabomberra nature parks	Time from receival to processing of waste Temperature and wind direction Age of waste when received Site zoning	Facility situated within appropriately zoned land (IZ1: General industry). Odour assessment to be undertaken for adaptive management. Waste is processed as soon as it is received at the Facility, and enters enclosed spaces on the same day. Processes are mostly enclosed and aerobic, thus do not emit odour. Biofilter use on conversion MIBs, with air intake for oxygen, and are serviced monthly Frass has a mild odour, and stored outside.	Low

Item	Hazard/s	Receptor	Drivers and exposure pathways	Management	Risk
Food waste Municipal and recyclables Frass Waste water	Waste	Site workers Surface water Land	Time from receival to processing of waste Screening procedure Waste storage Waste water management	Waste manually screened when received via conveyor. All contaminants removed and placed in recyclable or municipal waste bins with lids undercover. Waste volumes captured electronically and recoded. Waste water caught in bunded areas, enters sump or greasetrap prior to discharge to sewer. Recycling is under consideration. Food waste is not stored on site, but immediately processed. After maceration, food waste is placed in enclosed vessels. Frass is considered manure as per Compost Order 2016 (NSW EPA) and is sent to composters for full processing including 15-day pasteurisation.	Low

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Land	Waste entering land	Land immediately outside facility	Waste on truck wheels or wastewater	Bunding around all waste areas, with sumps and sewerage connection to avoid connection to land. Tyres of vehicles will be washed in bunded area should any waste accidentally adhere.	Low

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Water – surface and groundwater	Leachate Waste water	Surface water Groundwater	Stormwater connection to surface water Exposed land connected to groundwater	Bunding around all waste areas, with sumps and sewage connection to avoid connection between leachate or wastewater source and stormwater Tyres of vehicles will be washed in bunded area should any waste accidentally adhere Leachate collection systems and reintegration into process along conveyor and macerator After maceration, all waste is placed in enclosed vessels with positive displacement pumps moving waste throughout the process Hardstand, bunds, and aprons used in areas where trucks in- and egress, receiving areas and throughout process areas, including areas surrounding sumps/greastraps and sewage discharge.	Low

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Pollution incident from unplanned event (NSW EPA Only, not required in ACT)	Leachate spills, unusual odour, methane	Workers Neigbouring workers Surface water Land Groundwater	Uncontrolled event or spills exiting bunded/controlled areas Conversion process becomes anaerobic or methanogenic by mistake	On vehicle - we have broom, shovel, water, and sand as well as relevant PPE - gloves, facemask and goggles. Should a spill occur either in the vehicle or outside of the vehicle, the protocol for cleaning the spill is as follows:1) Place a barrier of sand around the spill. 2) Use the shovel to collect the spill and return to a bin. 3) Cover the spill area with sand to collect any particles. 4) Shovel the sand into the bin. 5) Wet the area with water and cover again with sand. 6) Allow the sand to soak up the water. 7) Shovel the sand into the bin and then sweep the area clear. On site we have the following measures at the point of processing: 1) All bins are placed on a concrete pad. 2) Broom, shovel, water, and sand as well as relevant PPE - gloves, facemask and goggles. 3) Bleach cleaning agent. We utilise the same process to manage any spills or unintentional drops. Our drainage system has two drain catchments to it, to ensure there are no residual elements going into the sewer. Pollution Incident Plan is required for NSW.	Mod-erate

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Pest control: Blow flies, rats and mice	Pathogens, plant propagules	Soldier flies Site workers	Waste processing providing opportunities for pathogen transmission Poorly managed site hygiene	Same day processing of waste, including enclosed vessel processing after maceration Wash down of waste area daily to remove waste	Low
Litter: food waste screening or staff	Pollution	Surface water	Stormwater, via wind	Waste manually screened when received via conveyor, all contaminants removed and placed in recyclable or municipal waste bins with lids undercover. Site cleaned weekly from any incidental litter. All food waste processed immediately and vehicles tyres washed in bunded area as needed	Low

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Household chemicals: bleach, vinegar, Agar HC-90	Chemical burns	Site workers Soldier flies Surface water, land	Spills	Stored and used in bunded and undercover area, with sump connected to sewer. Chemicals used will be done so in accordance with the label.	Low
Fire Management	Fire caused by organics	Air, water, land Site workers	Fire caused by spontaneous combustion	Processing of waste through fermentation and nutrition for soldier flies means that there is no composting being undertaken at the Facility that could cause a fire. No specific fire management procedures are required.	Low
Security on premises	Unauthorised access to site	Site workers Soldier flies	N/A	Only Goterra staff allowed within the Facility due to strict hygiene rules. Signage, locks, remote monitoring and dog onsite.	Low

Item	Hazard	Receptor	Drivers and exposure pathways	Management	Risk
Closure of premises	Clean up of site to ensure no site contamination at the closure of the premises	Water, land	Leftover waste or infrastructure impacting on land or water	Modular system means everything is contained, and can be removed from site without any impact to site. Any incidental spills or pollution events prior to site closure will be managed using the Pollution Incident Response Management Plan	Low

7. Monitoring, evaluation and adaptive management

Demonstration that activities undertaken within a site are environmentally acceptable and any potential hazards are managed to minimise risks to human health and the environment are a requirement of the ACT's guidelines for EMPs (ACT, 2013) and NSW EPA (EPA NSW, 2003). This section will provide such demonstration, using the ACT and New South Wales' guidance.

7.1. Noise management

An initial noise assessment using the NSW EPA guidance (EPA NSW, 2003) will be undertaken at the Facility to determine any sources of noise and vibration that may occur at the Site above the ACT limits. The assessment will ensure that acceptable standards and an adequate level of public amenity is maintained. This assessment will be used for understanding the specific performance requirement of the Site and adaptive management at the Site, which will be in addition to the control measures discussed in Section 5.1. Goterra will keep records of all complaints including name, phone number, times and dates and associated action. The absence of complaints regarding noise will considered to be the measurement for success of noise management.

7.2. Odour

As discussed in Section 5, odour is the only likely air emission from Goterra. In July 2020, Goterra will undertake an odour assessment of their ACT facility. This will be undertaken using the NSW guidelines Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA 1998). This will be used to determine if any addition controls are required, and that the current process of fermentation, aerobic conversion, biofilters and containerised systems minimises odour.

An odour management plan is required in NSW (EPA NSW, 2003). The odour management plan for Goterra in the ACT includes:

- Odour control equipment and/or testing – biofilters on the MIBs with weekly testing
- Best practice management of food waste to minimise odour – food waste will be processed on the same day it is received, and then enters a fully automated and enclosed system. Waste receival areas will be washed down daily, and all leachate from the conveyor and macerator is collected and put back into the process. After this process, all waste is enclosed with a biofilter on the MIB for larvae conversion of waste.
- Inventory of odour sources – The odour assessment will identify locations of odour, which will then be added to our inventory and regularly inspected in-house.
- Controls- controls include rapid processing, methods designed to reduce odours and emissions (lactic ferments and aerobic conversion), fully enclosed system with no gas release, and charcoal biofilters on MIB vents, and frass stored in enclosed bags under shelter. Frass will be dispatched every 2 months as per the Compost Order.
- Monitoring and recording – odour monitoring will occur yearly using the NSW guidelines IF the initial assessment finds any hazards OR for best management practice, and outcomes recorded and adaptive management undertaken accordingly. Any complaints will be recorded and considered in association with wind and delivery of food waste, and adaptive management undertaken as required.
- Management during upset conditions – see Pollution Incident Response Management Plan
- Maintenance of odour equipment – biofilters will be maintained monthly

All controls as per the odour management plan will be put in place to prevent odour based pollution, and success will be measured by the absence of complaints. Adaptive management at the end of each yearly odour assessment will be undertaken as needed.

7.3. Waste management

Previous sections, including Table 1 and Section 5.5, identify sources of waste received at generated at the Site. It also includes identifying quality, storage and outgoing materials, and consideration of the Waste Avoidance and Resource Recovery Act in NSW with minimal unavoidable waste generated on the Site through recycling and municipal waste from screening or as frass which is reused by composters as per the NSW Compost Order. Wastewater is the only other waste, and currently enters the sewer, with wastewater treatment works and reuse onsite to be considered. The waste flow diagram, Figure 3, includes how waste is being screened and recorded, including user-input Omron system with scanning and weighing of waste entering the Facility.

Appropriate management of waste will have deemed to have been achieved when:

- All waste entering the Site is recorded, including weight, source and correctly identified as food waste. All clients and contaminants are also tracked and recorded.
- All waste entering the Site is screened
- Municipal and recycling generated from screening and staff, and frass, are stored in enclosed spaces (bins and bags) and undercover
- All waste exiting the Site is recorded in terms of weight, and appropriately managed through licensed facilities and frass is dispatched via the Compost Order to a facility licensed to receive it
- When volume of waste and waste type entering the Site matches license conditions
- When food waste is only managed and present in the receival, waste and processing areas
- There are no wastes outside of defined storage areas
- All waste entering and exiting the Site has been appropriately recorded (as above)
- Storage of waste does not exceed design requirements of the Facility e.g. only 150T of organic waste is processed per day on site

7.4. Land and water

Wastewater and leachate are the two biggest hazards to land and water at Goterra. These hazards are controlled by a range of practices and engineering solutions including bunds, aprons, concrete hardstands, sumps and sewage connections, leachate collection drip trays, enclosed waste processing and automated pumps. See Section 5.6 for more details. As the system is internalised and connection to external environment is minimal, it is unlikely that there will be any discharges to land or water. Ongoing monitoring of land and water is not required due to the low risk of discharges. Instead equipment including bunds, sumps and grease traps and leachate systems will be maintained as per design requirements and repaired as required on a quarterly basis or sooner as needed. Management is considered to be successful when ongoing maintenance of wastewater and leachate systems results in no-unintended spills.

In NSW, water assessment reports are written when failure of a leachate management or water management system and there has been an incident. This then follows with a water pollution

remediation plan. This will be included in our Pollution Incident Response Management Plan for NSW facilities.

7.5. Pest control, pathogens, plant propagules

Pest control measures are described in Section 5.8. Goterra's facility will be monitored daily for pest activity as part of site cleaning and hygiene procedures. It is unlikely for any pests to be present on the Site given the hygiene and waste management practices. As these pests can directly interfere in the food conversion process, it is essential that they do not occur on site. If a pest is detected on site, immediate adaptive management will be undertaken. Management of pests is considered successful with no detection of pests.

7.6. Litter

Litter management is described in Section 5.9. Management of litter is deemed successful when it does not go outside the Site boundary of the premises. This is determined as the absence of waste and litter on roads and the absence of litter after a windy work day. If either of these things are detected, waste storage and tyre washing procedures will be reviewed.

7.7. Household chemicals

Management of chemicals is discussed in Section 5.10. The management of chemicals is deemed successful with no incidental spills, and if spills occur that they only happen in bunded areas. No chemicals should leave bunded areas.

7.8. Fire management

As per section 5.11, fire generated by waste on the Site is very unlikely given the form of waste conversion process. This hazard will not be discussed any further. However, Goterra do have a fire management plan as part of their waste license and OHS practices. It includes:

- Emergency evacuation plan, including signposting throughout the site.
- Fire extinguishers and blankets, multiple egress options signposted throughout site
- Front gates to the location are kept open and pinned during work hours.
- Gravel drive is kept hole free and even to ensure smooth passage of vehicles.

7.9. Security on premises

Security is discussed in Section 5.12. This management regime prevents unauthorised entry due to strict hygiene requirements, with the only third-party operators to enter the external sections of the facilities being truck drivers delivering the food waste. Success of security will be in no-unauthorised access at the Site and procedures for preventing access. Should un-authorised access occur, a review of the incident and adaptive management will be undertaken accordingly.

7.10. Closure of premises

Closure plan as per Compost Guidelines NSW is discussed in Section 5.13, and is not a requirement in the ACT. Success of closure in NSW will be in the removal of the Facility with no residual contamination. This is possible through the use of fully-enclosed mobile plant.

8. Limitations

During the assessment of historical use and contamination at the Site, it was found that treated timber and composts are likely to have been stockpiled at the Site. Murrang Earth Sciences assessment of the potential for nutrients and toxic chemicals to be present on the Site from treated timber to occur at Goterra's facility were formed based on desktop research only. The collection of samples and analyses of these at an appropriately qualified laboratory would be required as sound evidence of contamination. Such work is outside Murrang Earth Sciences' scope of works and is considered unnecessary for the safe functioning of the Facility, given its zoning and location.

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9. Recommendations

Murrang Earth Sciences would like to highlight the following considerations for Goterra in their management of the ACT facility and in preparation for applying for an EPA License in NSW:

- ACT EPA would like details or a map regarding the stormwater and sewage flow from the site (i.e. how the two systems are separated) including hardstand areas as per Section 6.4 above.
- Goterra should undertake a noise and odour assessment of their ACT facility to understand any potential hazards and appropriate management strategies as part of best practice management. These assessments should be undertaken by suitably qualified and experienced third-parties, and should use the NSW methods (NSW EPA, 2003) and consider the Victorian EPA Compost Guidelines. This can be used to support works to be undertaken in NSW using a risk reduction approach.
- Should a license or license variation be required in NSW for operations then noise and odour assessments may be required, unless data from ACT can demonstrate a risk proportionate response. If licensing is not required, site specific noise and odour assessments for Goterra in NSW should be considered when the plant is in close proximity to sensitive receptors (e.g. schools, hospitals, residences).
- Advice from EPA NSW on 27th May 2020 stated that a license is not required for onsite processing of food waste, provided there is demonstration that the Facility is only receiving waste from that site. A license variation may be required for any facilities that will use the Goterra process that are licensed to receive food waste, but which are not licensed for that specific processing activity. This issue should be discussed with the licensed operator and the process for undertaking the variation, including by whom, determined.
- If not already completed, the appropriate Council is contacted regarding planning and development consent for all planned Goterra sites in NSW, including already licensed facilities, and that the responses are documented to demonstrate compliance with planning requirements and/or for EPA licensing. Should response not be forthcoming, we suggest seeking legal advice. We note if planning approval is required, an Environmental Impact Statement (EIS) or Statement of Environmental Effects (EES) will likely be required per location.
- The current storage of frass is known to leach and cause a slight odour. We suggest that frass is stored in completely contained bags or containers and/or is undercover where it is not subject to rain and weather.
- We suggest that yearly odour assessments using the NSW EPA method should be undertaken at the ACT facility should any odour hazards be identified during the initial assessment OR for best practice management. Ongoing odour assessments are likely to be required in NSW for licensed facilities unless sufficient evidence demonstrates odour is a low risk.

- Data collection for noise, odour and emissions should hopefully provide evidence for risk proportionate environmental management i.e. non-detection of odour will mean there is evidence for a reduced monitoring regime.
- Confirm in writing from EPA ACT or ACTPLA that the separation distances do not apply, as Goterra are not applying for development or planning approval. Murrang Earth Sciences have lodged a request regarding this issue. If a response is not forthcoming, we suggest seeking legal advice.
- Wastewater from the Facility entering sewage will need a license from ICON water in the ACT, and licenses are also likely for NSW. As the amount of water used in the Facility is substantial, Murrang suggests considering a wastewater treatment facility onsite to reduce water use, recycle water, and close-the-loop. A cost-benefit analysis and consideration of regulation should be undertaken as part of an analysis.
- This EMP can form the basis of EMPs for any facilities in NSW and ACT. However, site specific details will need to be updated for each facility to demonstrate best practice in relation to the NSW and ACT environmental regulation.
- NSW EPA considers both their composting guideline and the Victorian EPA composting guideline as best practice. The Victorian EPA guideline should be used for odour and leachate, and food waste. This Victorian guideline should be incorporated into any EMPs for NSW sites.
- In addition to site specific EMPs, a Pollution Incident Response Management Plan is strongly suggested for each of the NSW facilities. This will be required by law if the Goterra require licensing or a license variation.
- Establish a record, maintenance and monitoring system for water, waste, noise and odour, details of which are in Sections 5 and 6.
- NSW EPA will want to see evidence of emissions from the Site, should licensing or a variation be required. We suggest considering some research on gas emissions from fermentation and waste conversion from larvae to support the carbon-dioxide only and low-emissions seen in the Facility. This could be in the form of a literature review and/or testing of gases released on site.

Murrang Earth Sciences would be glad to assist Goterra with any of the recommendations listed above.

10. Conclusion

Goterra is upgrading their Canberra facility. An Environmental Management Plan (EMP) and a License is not required by Environmental Protection Authority ACT (EPA ACT). This is because Goterra's activities are not a listed as Class A or B activity under the Environmental Protection Act 1997. Goterra, however, strive to be environmentally responsible and have engaged Murrang Earth Sciences to complete this EMP as part of demonstrating best practice. The EMP meets the

requirements of the ACT Government's "*Environmental guidelines for preparation of an Environmental Management Plan"* dated May 2013, and where there is an absence of guidance in ACT, the NSW legislative framework has been consulted. This EMP has described the activity at the Site, the receiving environment, legislative controls, identified environmental factors, hazards and undertaken a risk assessment, including appropriate controls and monitoring strategies. A list of recommendations for the current facility and future facilities planned for NSW are also included.

11. Acknowledgments

We acknowledge Olympia Yarger and her team for the time and effort they have made to contribute information to this report.

12. References

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Appendix A – Lot Search Reports

02 6161 1762

contact@murrang.com.au

www.murrang.com.au

ABN 96 162 928 958

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Address: 12-14 Arnott Street, Hume, ACT 2620

Date: 11 May 2020 12:06:47

Reference: LS012254 EP

Report Buffer: 1000m

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Land Administration Databases	ACT Government	05/02/2020	05/02/2020	Quarterly	-	-	-
Register of Contaminated Sites	ACT Government - Environment Protection Authority	03/04/2020	03/04/2020	Monthly	0	0	0
National Waste Management Facilities Database	Geoscience Australia	12/02/2020	07/03/2017	Quarterly	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	05/02/2020	15/03/2012	Quarterly	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	06/02/2020	06/02/2020	Monthly	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	06/02/2020	06/02/2020	Monthly	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	22/04/2020	22/04/2020	Monthly	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	04/05/2020	04/05/2020	Monthly	0	0	0
EPA Authorisations	Environment Protection Authority	24/04/2020	24/04/2020	Monthly	0	1	9
EPA Agreements	Environment Protection Authority	24/04/2020	24/04/2020	Monthly	0	0	0
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	14	33	37
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	-	3	22
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	-	0	0
Features of Interest	ACT Government	09/04/2020	09/04/2020	Quarterly	0	0	2
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1	1	1
Hydrogeological Landscapes Units	ACT Government - Environment, Planning and Sustainable Development Directorate	04/01/2018	22/11/2017	As required	1	1	1
Groundwater Boreholes (ACT)	ACT Government	09/04/2020	09/04/2020	Quarterly	0	0	2
Groundwater Boreholes (Bureau of Meteorology)	Commonwealth of Australia (Bureau of Meteorology)	20/11/2017	25/08/2017	Annually	0	0	21
Geological Units 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1	-	4
Geological Structures 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	0	-	0
Atlas of Australian Soils	ABARES	19/05/2017	17/02/2011	As required	1	1	1
Soil Landscapes	NSW Office of Environment & Heritage	12/08/2014		None planned	1	-	4
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1	1	1
Territory Plan Zones	ACT Government - Environment, Planning and Sustainable Development Directorate	09/04/2020	09/04/2020	Quarterly	1	2	12

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Territory Plan Overlays (Areas)	ACT Government - Environment, Planning and Sustainable Development Directorate	09/04/2020	09/04/2020	Quarterly	0	0	1
Territory Plan Overlays (Lines)	ACT Government - Environment, Planning and Sustainable Development Directorate	18/03/2019	18/03/2019	Quarterly	0	0	3
Commonwealth Heritage List	Australian Government Department of the Environment and Energy - Heritage Branch	04/02/2020	31/07/2018	Quarterly	0	0	1
National Heritage List	Australian Government Department of the Environment and Energy - Heritage Branch	04/02/2020	20/11/2019	Quarterly	0	0	1
Heritage Sites	ACT Government - Environment, Planning and Sustainable Development Directorate	09/04/2020	09/04/2020	Quarterly	0	0	7
Bushfire Prone Areas	ACT Government - Environment, Planning and Sustainable Development Directorate	09/04/2020	09/04/2020	Quarterly	0	0	1
Bushfire Abatement Zones	ACT Government - Environment, Planning and Sustainable Development Directorate	09/04/2020	09/04/2020	Quarterly	0	0	3
Bushfire Operational Plan - Access Management	ACT Government - Environment, Planning and Sustainable Development Directorate	07/01/2020	07/01/2020	Quarterly	0	0	0
Bushfire Operational Plan - Fuel Management	ACT Government - Environment, Planning and Sustainable Development Directorate	07/01/2020	07/01/2020	Quarterly	0	3	6
Flood 1 percent Annual Exceedance Probability	ACT Government - Environment, Planning and Sustainable Development Directorate	09/03/2018	18/01/2017	As required	0	0	0
Vegetation Communities	ACT Government	05/02/2020	05/02/2020	Annually	2	2	30
Vegetation Subformation	ACT Government	14/01/2019	14/01/2019	Annually	0	0	0
Threatened Woodland	ACT Government	05/02/2020	05/02/2020	Annually	0	0	1
Tree Register	ACT Government	09/04/2020	09/04/2020	Quarterly	0	0	0
Important Wetlands	ACT Government	09/04/2020	09/04/2020	Quarterly	0	0	0
Groundwater Dependent Ecosystems Atlas	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	0	0	1
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	11/05/2020	11/05/2020	Daily	-	-	-

Aerial Imagery 2019

12-14 Arnott Street, Hume, ACT 2620

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 55	Date: 11 May 2020

0 30 60 90 120
Meters

Contaminated Land

12-14 Arnott Street, Hume, ACT 2620

Register of Contaminated Sites

Records from the ACT Register of Contaminated Sites within the report buffer:

Map Id	Site Description	Notification	District	Division	Section	Block	Status	Loc Conf	Dist	Direction
N/A	No records in buffer									

Waste Management and Liquid Fuel Facilities

12-14 Arnott Street, Hume, ACT 2620

National Waste Management Site Database

Sites on the National Waste Management Site Database within the report buffer:

Site Id	Owner	Name	Address	Suburb	Postcode	Landfill	Reprocess	Transfer	Loc Conf	Distance	Direction
N/A	No records in buffer										

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist (m)	Direction
N/A	No records in buffer										

PFAS Investigation and Management Programs

12-14 Arnott Street, Hume, ACT 2620

Defence PFAS Investigation and Management Program Investigation Sites

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation and Management Program Data Source: Department of Defence, Australian Government

Defence PFAS Investigation and Management Program Management Sites

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation and Management Program Data Source: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Location Confidence	Distance	Direction
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

12-14 Arnott Street, Hume, ACT 2620

Defence 3 Year Regional Contamination Investigation Program

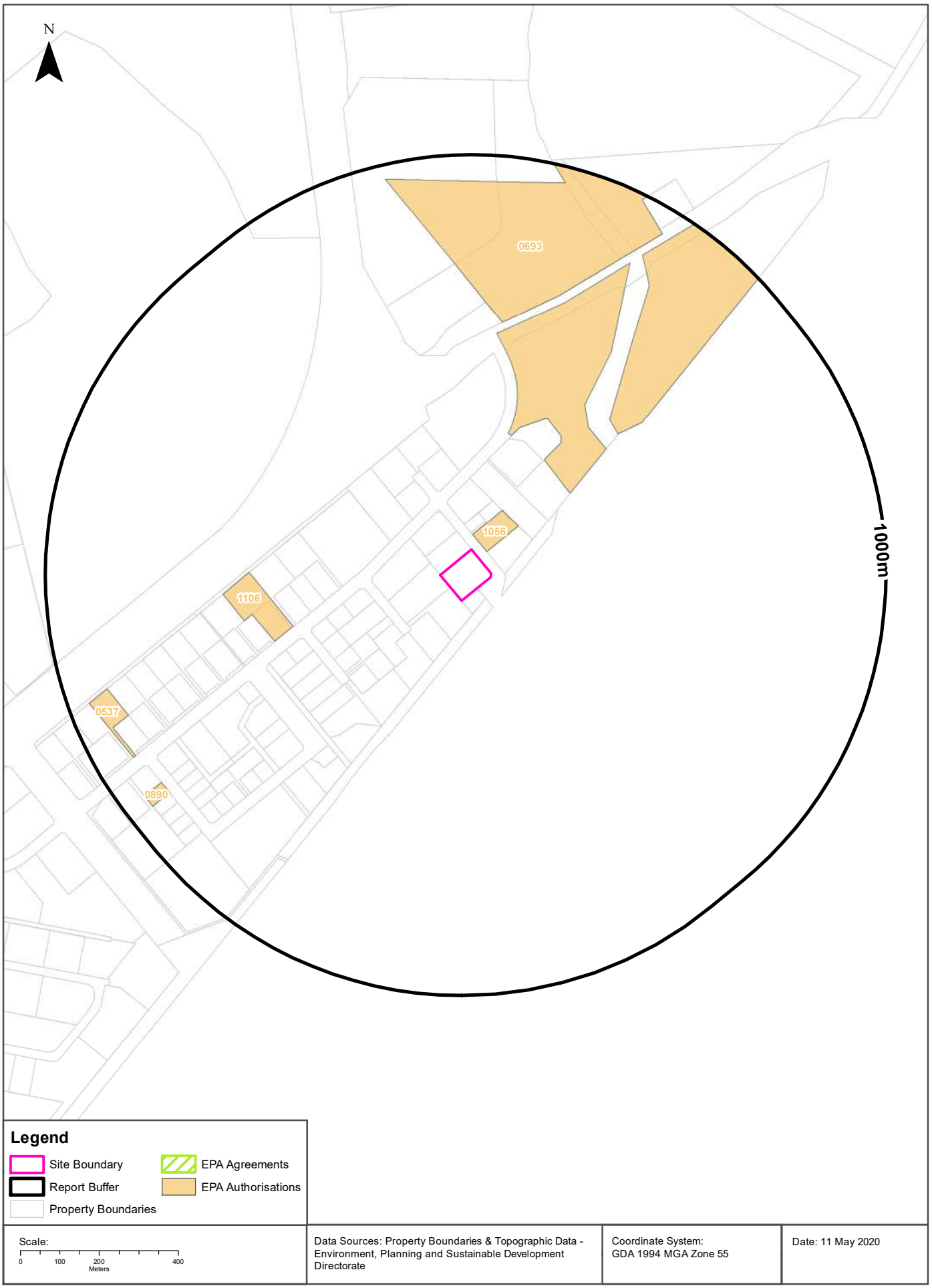
Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

EPA Authorisations and Agreements

12-14 Arnott Street, Hume, ACT 2620



EPA Authorisations & Agreements

12-14 Arnott Street, Hume, ACT 2620

EPA Authorisations

EPA Authorisations within the report buffer:
Note. Please click on ID Number to activate a hyperlink to online documentation. If link does not work, no documentation is accessible via the EPA.

ID Number	Activity	Business / Individual Name	Grant Date	Expiry Date	Status	Loc Conf	Distance	Direction
1056	Transport of Controlled Waste (Activity 8)	Cabiria Pty Ltd	12/2/2015	12/12/2017	Ceased	Premise Match	24m	North East
0693	Extraction of Material from waterways; Greater than 100m3 (Activity 1)	ACT Procurement Solutions	10/3/2009	10/3/2011	Expired	Premise Match	282m	North East
0693	Extraction of Material from waterways; Greater than 100m3 (Activity 1)	ACT Procurement Solutions	10/3/2009	10/3/2011	Expired	Premise Match	282m	North East
1106	Petroleum storage (Activity 30)	Canberra Data Centres Pty Ltd - Hume	11/24/2016		Current	Premise Match	394m	West
0537	Commercial use of chemicals (Activity 29)	Turf Management Australia Pty Ltd	12/20/2005	3/25/2014	Ceased	Premise Match	866m	West
0890	Waste petroleum (Activity 32)	Ampcontrol Services (NSW) Pty Ltd	4/19/2012		Current	Premise Match	880m	South West
0109	Commercial use of chemicals (Activity 29)	Capital Pest Control	9/30/1998	11/16/2006	Ceased	Suburb/Area Match	-	-
0389	Timber (Activity 38)	Integrated Forest Products Pty Ltd	10/18/2002	12/12/2007	Ceased	Suburb/Area Match	-	-
1171	Operation of waste transfer (Activity 48)	Re-Cycle Operations (Canberra) Pty Ltd	11/30/2018		Cancelled	Suburb/Area Match	-	-

EPA Agreements

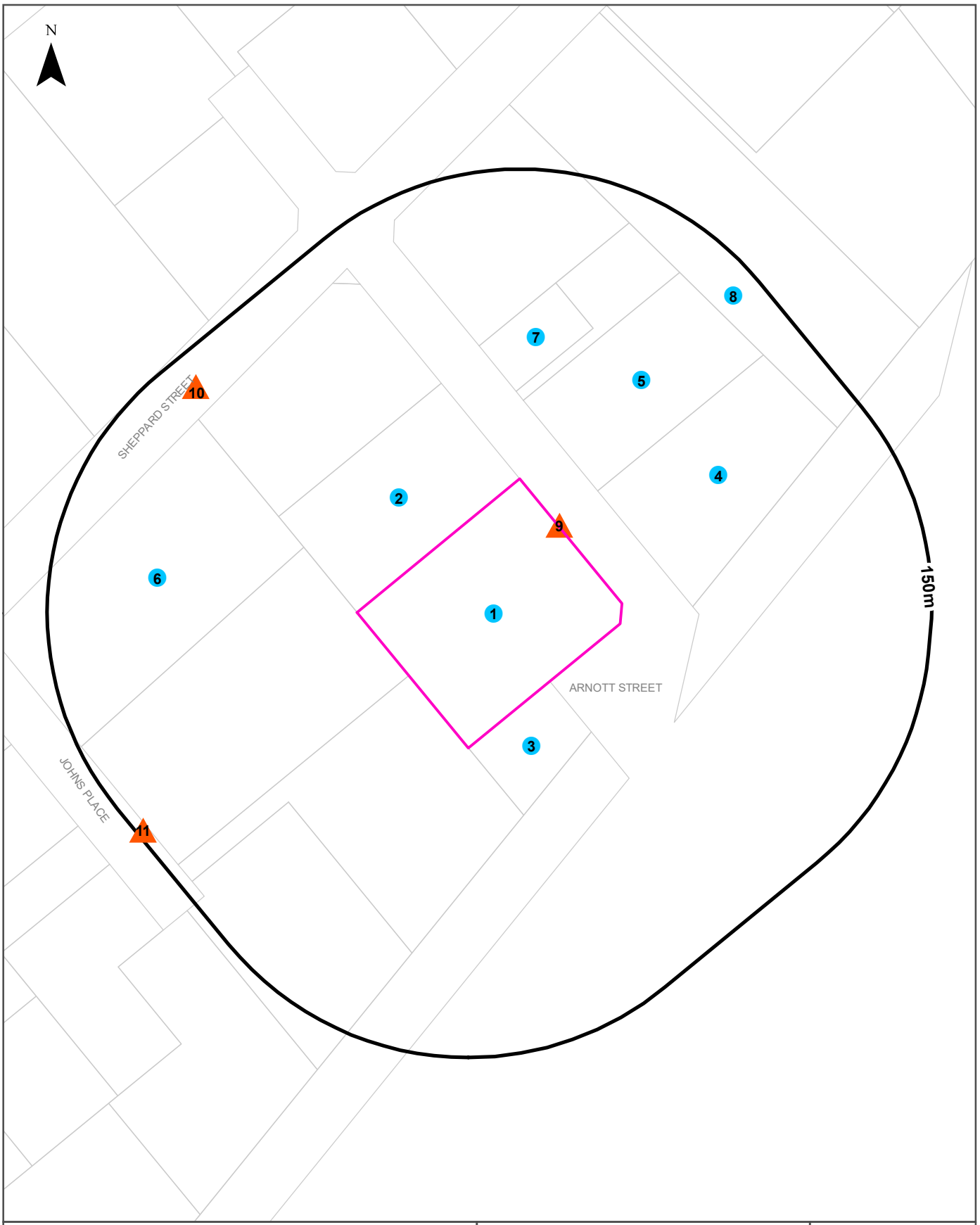
Note. Due to the lack of premise details within the documentation, this list does not include the following agreement:
Land development

EPA Agreements within the report buffer:
Note. Please click on ID Number to activate a hyperlink to online documentation. If link does not work, no documentation is accessible via the EPA.

ID Number	Agreement Type	Business / Individual Name	Grant Date	Expiry Date	Status	Loc Conf	Distance	Direction
N/A	No records in buffer							

Historical Business Directories

12-14 Arnott Street, Hume, ACT 2620



Legend

- Site Boundary
- Buffer 150m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 30 60 90 120 Meters

Coordinate System: GDA 1994 MGA Zone 55

Date: 08 May 2020

Historical Business Directories

12-14 Arnott Street, Hume, ACT 2620

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Universal Business Directory records from years 1950, 1961, 1970, 1982 and 1991, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
1	LANDSCAPERS SUPPLIES.	A. C.T. Mulch Supplies., 12 Arnott Pl Hume	4867	1991	Premise Match	0m	On-site
	GARDEN SUPPLIES - RETAIL.	Canberra Discount Garden Centra., 14 Arnott Pl Hume	2143	1991	Premise Match	0m	On-site
	TIMBER MERCHANTS &/OR SAWMILLERS.	Hume Landscape Cenfre 14 Arnott Pl., Hume	7408	1991	Premise Match	0m	On-site
	FENCING MATERIAL MFRS. &/OR DISTS.	Hume Landscape Centre., 14 Araott Pl Hume	4253	1991	Premise Match	0m	On-site
	FURNITURE RETAIL - OUTDOOR	Hume Landscape Centre., 14 Arnott Pl Hume	2116	1991	Premise Match	0m	On-site
	GRAVEL, SAND &/OR SOIL SUPPLIES.	Hume Landscape Centre., 14 Arnott Pl Hume	5714	1991	Premise Match	0m	On-site
	LANDSCAPERS SUPPLIES.	Hume Landscape Centre., 14 Arnott Pl Hume	4877	1991	Premise Match	0m	On-site
	NURSERYMENS SUPPLIES	Hume Landscape Centre., 14 Arnott Pl Hume	3772	1991	Premise Match	0m	On-site
	LANDSCAPERS SUPPLIES.	Hume Landscape Centre., 14 Arnott St Hume	4865	1991	Premise Match	0m	On-site
	FURNITURE MFRS. &/OR W/SALERS. - OUTDOORS.	Humescape Recreational Equipment., 14 Arnott Pl Hume	4631	1991	Premise Match	0m	On-site
	PLAYGROUND EQUIPMENT MFRS. &/OR DISTS.	Humescape Recreational Equipment., 14 Arnott Pl Hume	8939	1991	Premise Match	0m	On-site
	GARDEN SUPPLIES - RETAIL.	Total Outdoor Improvement Centra The., 14 Arnott St Hume	2163	1991	Premise Match	0m	On-site
	FURNITURE RETAIL - OUTDOOR	Total Outdoor Improvement Centre The., 14 Arnott St Hume	2118	1991	Premise Match	0m	On-site
	NURSERYMEN	Hume Landscape Supplies, 14 Arnott St., Hume., Canberra .(A.C.T.)	5184	1982	Premise Match	0m	On-site
2	CEMENT MERCHANTS &/OR DISTS.	Melcann Ltd., 10 Arnott St Hume	1908	1991	Premise Match	0m	North West
3	TUBE - METAL - MFRS. &/OR DISTS.	Metal Market The., 16 Arnott St Home	7604	1991	Premise Match	0m	South
	STEEL MERCHANTS - GENERAL.	Metal Market The., 16 Arnott St Huma	7961	1991	Premise Match	0m	South
	ALUMINIUM &/OR ALUMINIUM ALLOY MFRS. &/OR DISTS.	Metal Market The., 16 Arnott St Hume	1278	1991	Premise Match	0m	South
	ALUMINIUM FABRICATORS	Metal Market The., 16 Arnott St Hume	1285	1991	Premise Match	0m	South
	ALUMINIUM PRODUCTS MFRS. &/OR DISTS.	Metal Market The., 16 Arnott St Hume	1290	1991	Premise Match	0m	South
	BOLT, NUT &/OR RIVET MFRS. &/OR DISTS.	Metal Market The., 16 Arnott St Hume	87	1991	Premise Match	0m	South
	STAINLESS STEEL FABRICATORS.	Metal Market The., 16 Arnott St Hume	2000	1991	Premise Match	0m	South
	STEEL FABRICATORS.	Metal Market The., 16 Arnott St Hume	7953	1991	Premise Match	0m	South

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
3	WELDING EQUIPMENT &/OR SUPPLIES MFRS. &/OR DISTS.	Metal Market, The, 16 Arnott St., Hume	5588	1991	Premise Match	0m	South
	STEEL MERCHANTS - GENERAL.	The Metal Market., 16 Arnott St	7955	1991	Premise Match	0m	South
4	WINE &/OR SPIRIT MERCHANTS - WHOLESALE	Cawsoy John & Company., 15 Arnott St Hume	5641	1991	Premise Match	25m	North East
	ROOFING MATERIAL MFRS. &/OR DISTS.	Metal Market The., 15 Arnott St Hume	7821	1991	Premise Match	25m	North East
5	CARRIERS &/OR CARTAGE CONTRACTORS.	Lo Pilato Bros Martel Transport Service., 13 Arnott Pl Hume	1840	1991	Premise Match	25m	North East
	GRAVEL, SAND &/OR SOIL SUPPLIES.	Lo Pilato Bros. Marfel Transport Service., 13 Arnott Pl Hume	5715	1991	Premise Match	25m	North East
	EARTH MOVING EQUIPMENT - HIRE	Lo Pilato Bros. Martel Transport Service., 13 Arnott Pl Hume	7297	1991	Premise Match	25m	North East
	HIRE SERVICES.	Lo Pilato Bros. Martel Transport Service., 13 Arnott Pl Hume	6150	1991	Premise Match	25m	North East
6	JOINERY MANUFACTURERS	A.C.T. Advanced Joinery, 1 Johns Pl, Hume., Canberra .(A.C.T.)	4087	1982	Premise Match	41m	West
7	CRANE &/OR TRAVEL TOWER PROPRIETORS &/OR HIRERS	Sherrin M. J Pty. Ltd., 9 Arnott Pl Hume	5467	1991	Premise Match	42m	North
8	ROOF TRUSSES MFRS. &/OR DISTS.	Glenroy Roof Trasses., 17 Sheppard St Hume	7801	1991	Premise Match	125m	North East
	ROOF TRUSSES MFRS. &/OR DISTS.	Glenroy Roof Trusses Pty. Ltd., 17 Sheppard St Hume	7798	1991	Premise Match	125m	North East
	WALL TRUSSES & WALL FRAMES	Glenroy Root Trusses., 17 Sheppard St Hume	5528	1991	Premise Match	125m	North East
	ROOF TRUSSES MFRS. &/OR DISTS	Glenroy Roof Trusses, 17 Sheppard St, Hume., Canberra .(A.C.T.)	6153	1982	Premise Match	125m	North East

Business Directory Records 1950-1991 Road or Area Matches

Universal Business Directory records from years 1950, 1961, 1970, 1982 and 1991, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
9	PLUMBERS SUPPLIES.	Watson & Crane., Amott St Heme	1453	1991	Road Match	0m
	GRAVEL, SAND &/OR SOIL SUPPlIES	Lopilato Bros., Arnott St., Hume., Canberra .(A.C.T.)	3389	1982	Road Match	0m
	CRANES - MOBILE & TRAVEL TOWER - PROPRIETORS &/OR HIRERS	Sherrin, M. J., Arnott St., Hume., Canberra .(A.C.T.)	1832	1982	Road Match	0m
10	WALL FRAMES	Glenroy Wall Framing Pty. Ltd., 9 Sheppard St., Hume., Canberra .(A.C.T.)	7394	1982	Road Match	120m
	ENGINEERS - CIVIL	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hum., Canberra .(A.C.T.)	2568	1982	Road Match	120m
	BUILDERS &/OR BUILDING CONTRACTORS	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hume., Canberra .(A.C.T.)	918	1982	Road Match	120m
	CONTRACTORS GENERAL	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hume., Canberra .(A.C.T.)	1780	1982	Road Match	120m
	BUILDERS &/OR BUILDING CONTRACTORS	Holland, John .(Constructions) Pty. Ltd., 4 Sheppard St., Hume., Canberra .(A.C.T.)	919	1982	Road Match	120m
11	GRAVEL, SAND &/OR SOIL SUPPLIES.	Thomas Soil Supplies., Johns Pl Hume	5719	1991	Road Match	144m

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
11	GARDEN SUPPLIES - RETAIL.	Thomas Sou Supplies., Johns Pl Hume	2162	1991	Road Match	144m
	CEMENT MERCHANTS &/OR DISTS.	Thomos Soli Supplies., Johns Pl Hume	1910	1991	Road Match	144m
	LANDSCAPERS SUPPLIES.	Thomot Soil Supplies., Johns Pl Hume	4880	1991	Road Match	144m
	PIPE &/OR PIPE FITTINGS MFRS. &/OR DISTS.	Tubemakers Metal Centre., Johns Pl Hume	8912	1991	Road Match	144m
	STEEL MERCHANTS - GENERAL.	Tubemakers Metal Centre., Johns Pl Hume	7963	1991	Road Match	144m
	TUBE - METAL - MFRS. &/OR DISTS.	Tubemakers Metal Centre., Johns Pl Hume	7602	1991	Road Match	144m
	GLASS MERCHANTS &/OR GLAZIERS	Dominy & Fletcher, Johns Place, Hume., Canberra . (A.C.T.)	3204	1982	Road Match	144m
	CONCRETE CONTRACTORS - CONSTRUCTIONAL	Ferrobeton Pty. Ltd., Johns St.. Hume., Canberra . (A.C.T.)	1719	1982	Road Match	144m
	CONCRETE PRODUCTS MFRS. &/OR DISTS. &/OR W/SALERS	Ferrobeton Pty. Ltd.. Johns St., Hume., Canberra . (A.C.T.)	1739	1982	Road Match	144m
	CEMENT &/OR LIME MERCHANTS &/OR DISTS	Thomo's Soil Yard, Johns Pl, Hume., Canberra . (A.C.T.)	1439	1982	Road Match	144m
	GARDEN SUPPIIES	Thomo's Soil Yard, Johns Pl, Hume., Canberra . (A.C.T.)	3101	1982	Road Match	144m
	GRAVEL, SAND &/OR SOIL SUPPIIES	Thomo's Soil Yard, Johns Pl, Hume., Canberra . (A.C.T.)	3396	1982	Road Match	144m
	GRAVEL, SAND &/OR SOIL SUPPIIES	Thomo's Soil Yard. Johns Pl, Hume., Canberra . (A.C.T.)	3395	1982	Road Match	144m

Historical Business Directories

12-14 Arnott Street, Hume, ACT 2620

Dry Cleaners, Motor Garages & Service Stations 1950-1991 Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories for years 1950, 1961, 1970, 1982 and 1991, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer						

Dry Cleaners, Motor Garages & Service Stations 1950-1991 Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories for years 1950, 1961, 1970, 1982 and 1991, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
	No records in buffer					

Aerial Imagery 2014

12-14 Arnott Street, Hume, ACT 2620

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 55	Date: 11 May 2020

0 30 60 90 120
Meters

Aerial Imagery 2004

12-14 Arnott Street, Hume, ACT 2620

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 55	Date: 11 May 2020

0 30 60 90 120
Meters

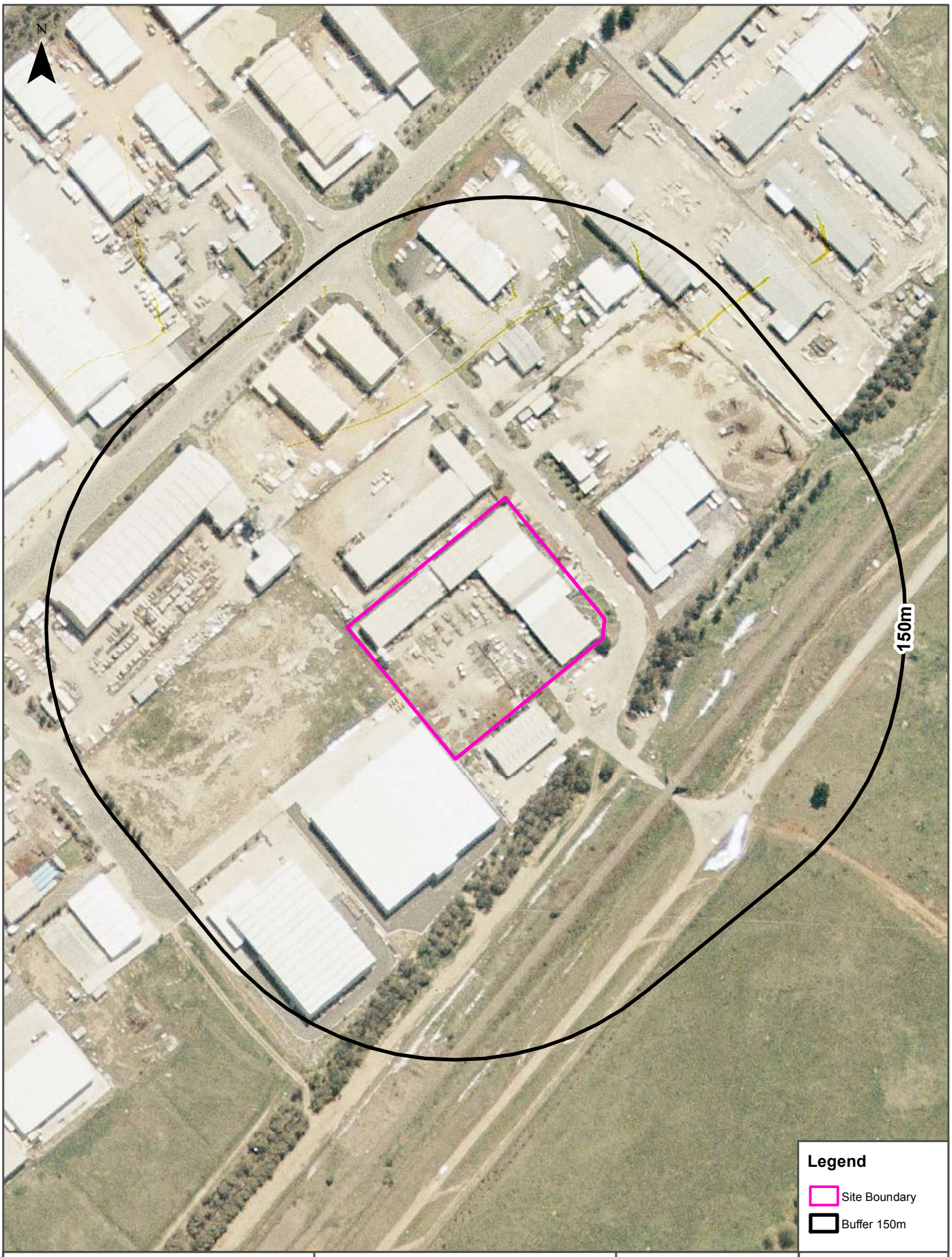
Aerial Imagery 1997

12-14 Arnott Street, Hume, ACT 2620

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 06 May 2020
0 30 60 90 120 Meters	© NSW Department Finance, Services & Innovation	GDA 1994 MGA Zone 55	

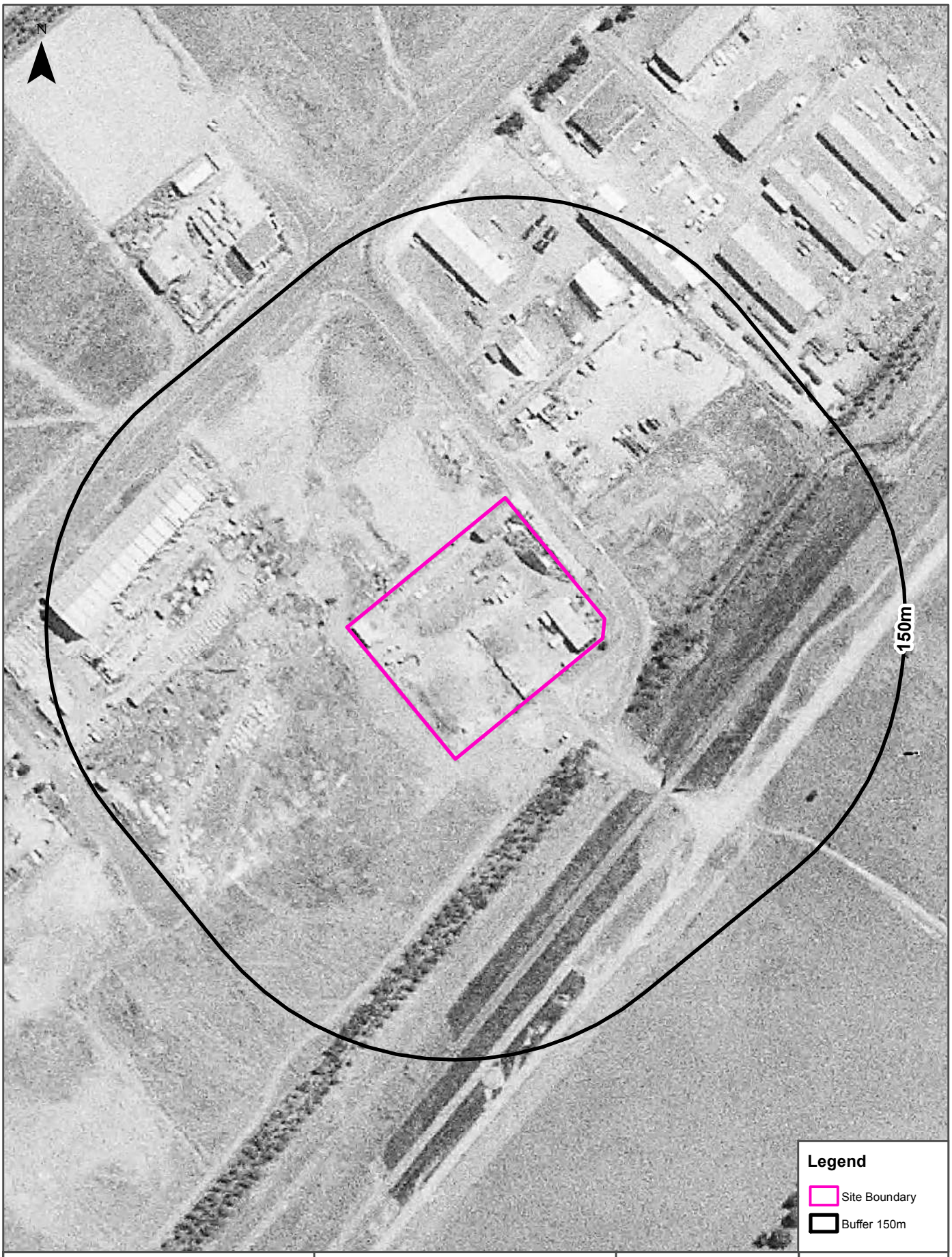
Aerial Imagery 1992

12-14 Arnott Street, Hume, ACT 2620



Aerial Imagery 1985

12-14 Arnott Street, Hume, ACT 2620



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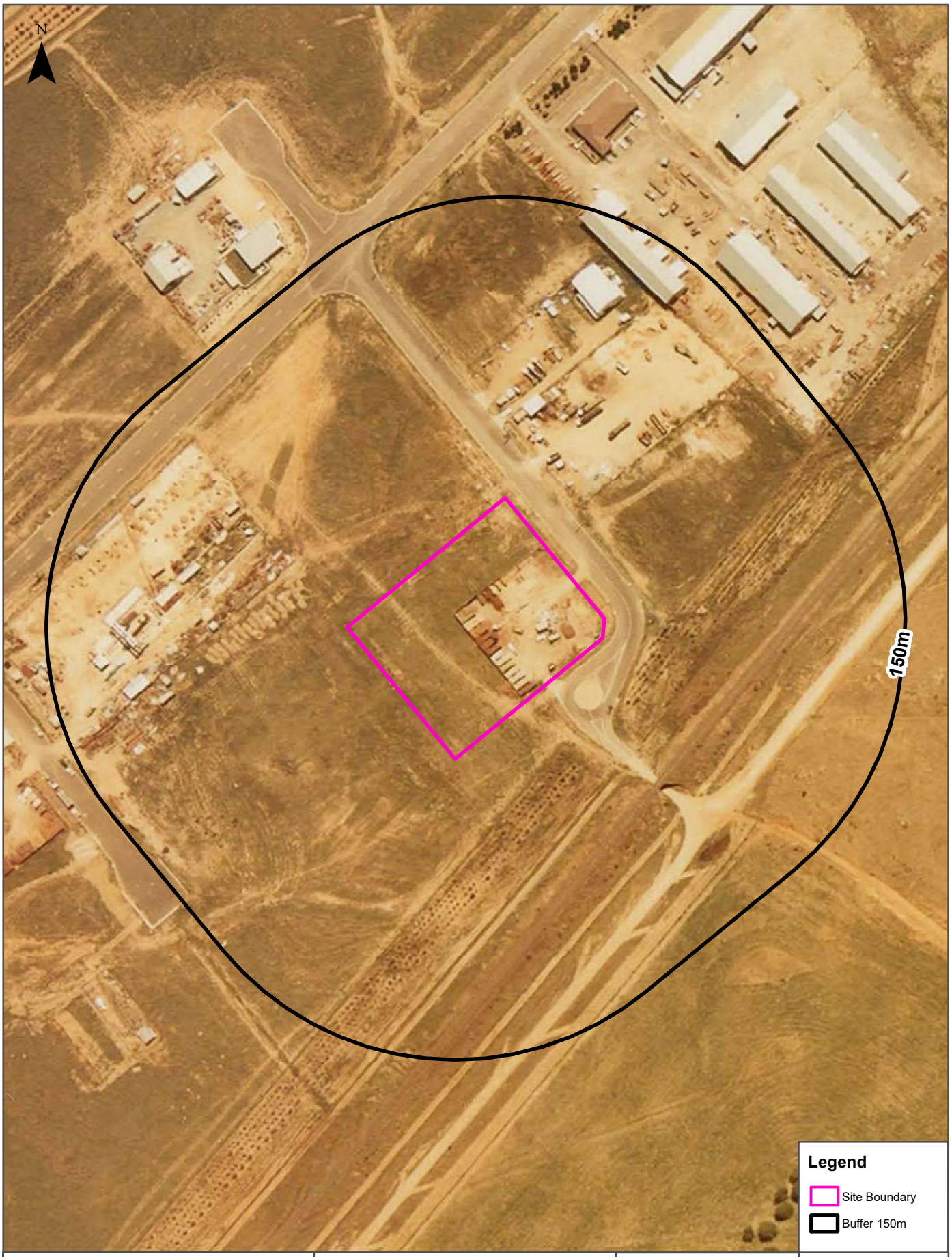
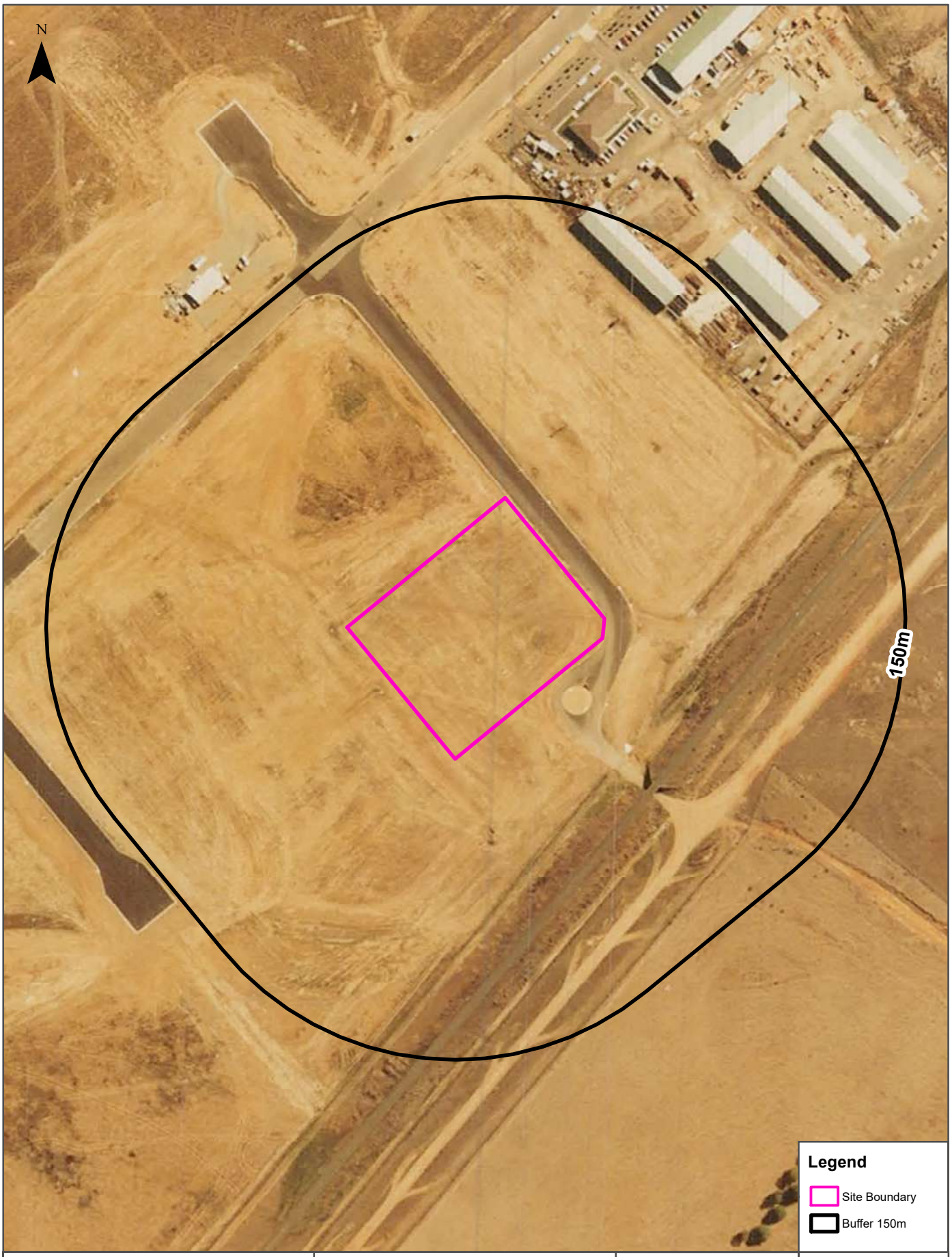
12-14 Arnott Street, Hume, ACT 2620



Aerial Imagery 1978

12-14 Arnott Street, Hume, ACT 2620



Aerial Imagery 1976

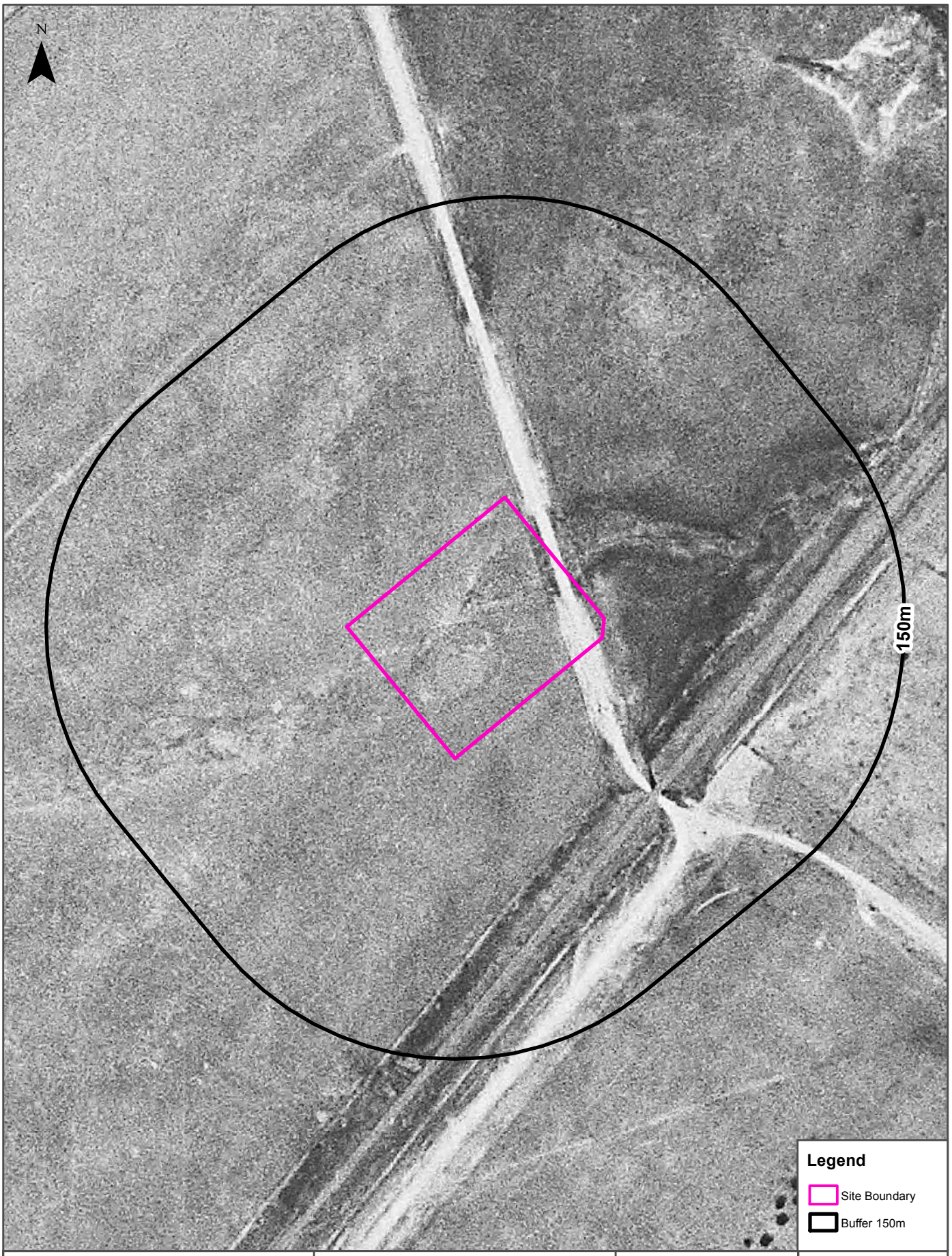
12-14 Arnott Street, Hume, ACT 2620

Aerial Imagery 1973

12-14 Arnott Street, Hume, ACT 2620

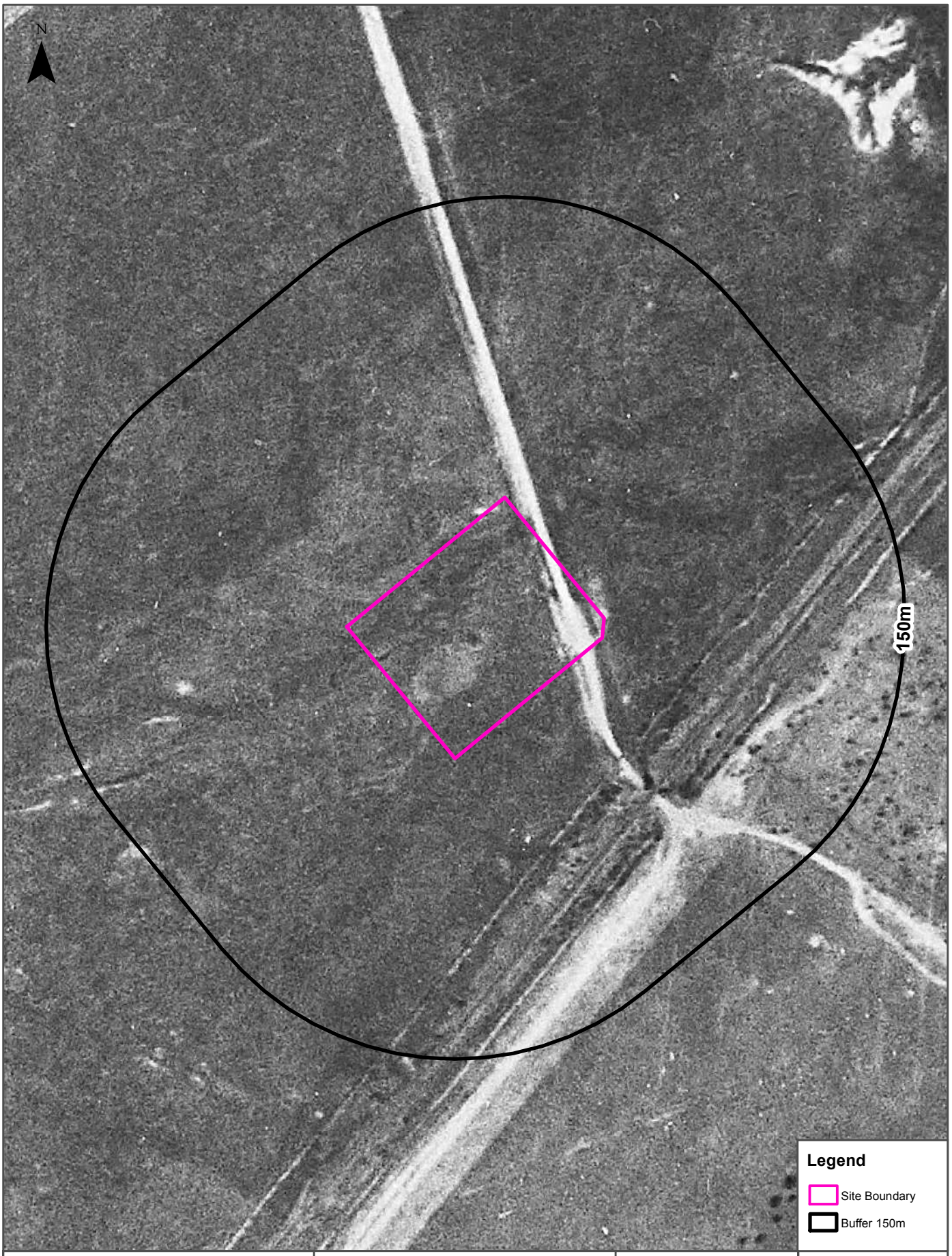
Aerial Imagery 1967

12-14 Arnott Street, Hume, ACT 2620



Aerial Imagery 1961

12-14 Arnott Street, Hume, ACT 2620

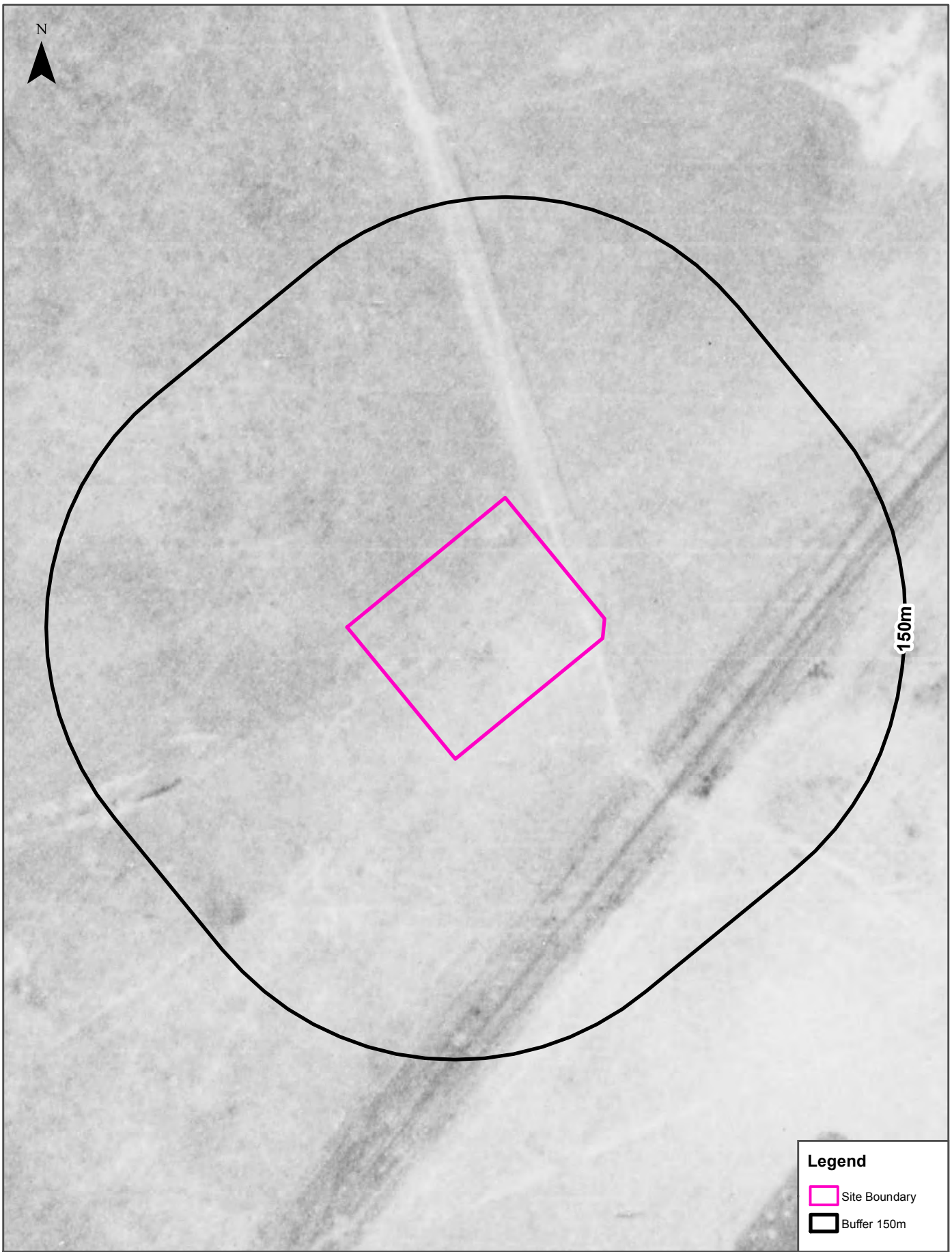


Aerial Imagery 1951

12-14 Arnott Street, Hume, ACT 2620

Aerial Imagery 1944

12-14 Arnott Street, Hume, ACT 2620

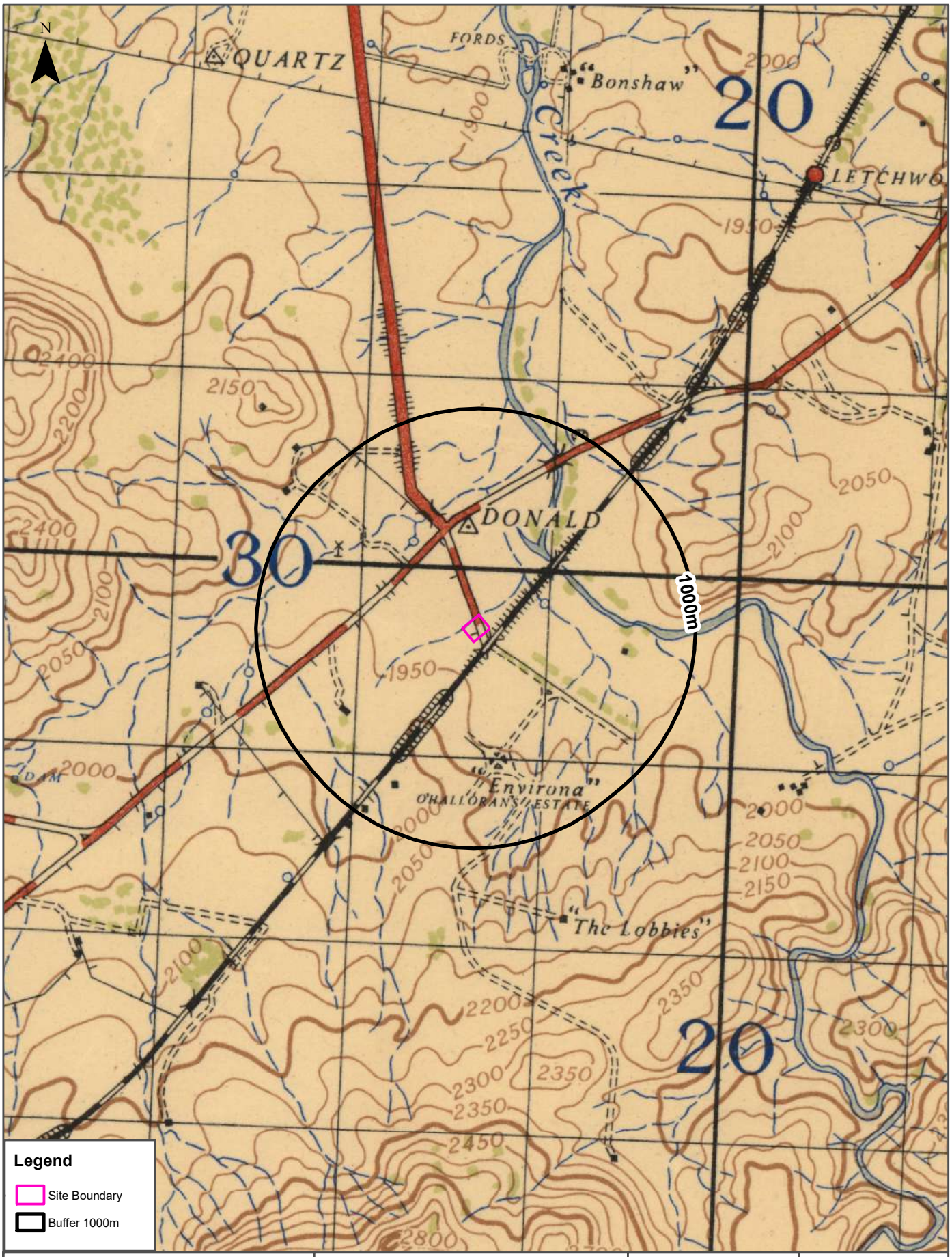


Historical Map 1987

12-14 Arnott Street, Hume, ACT 2620

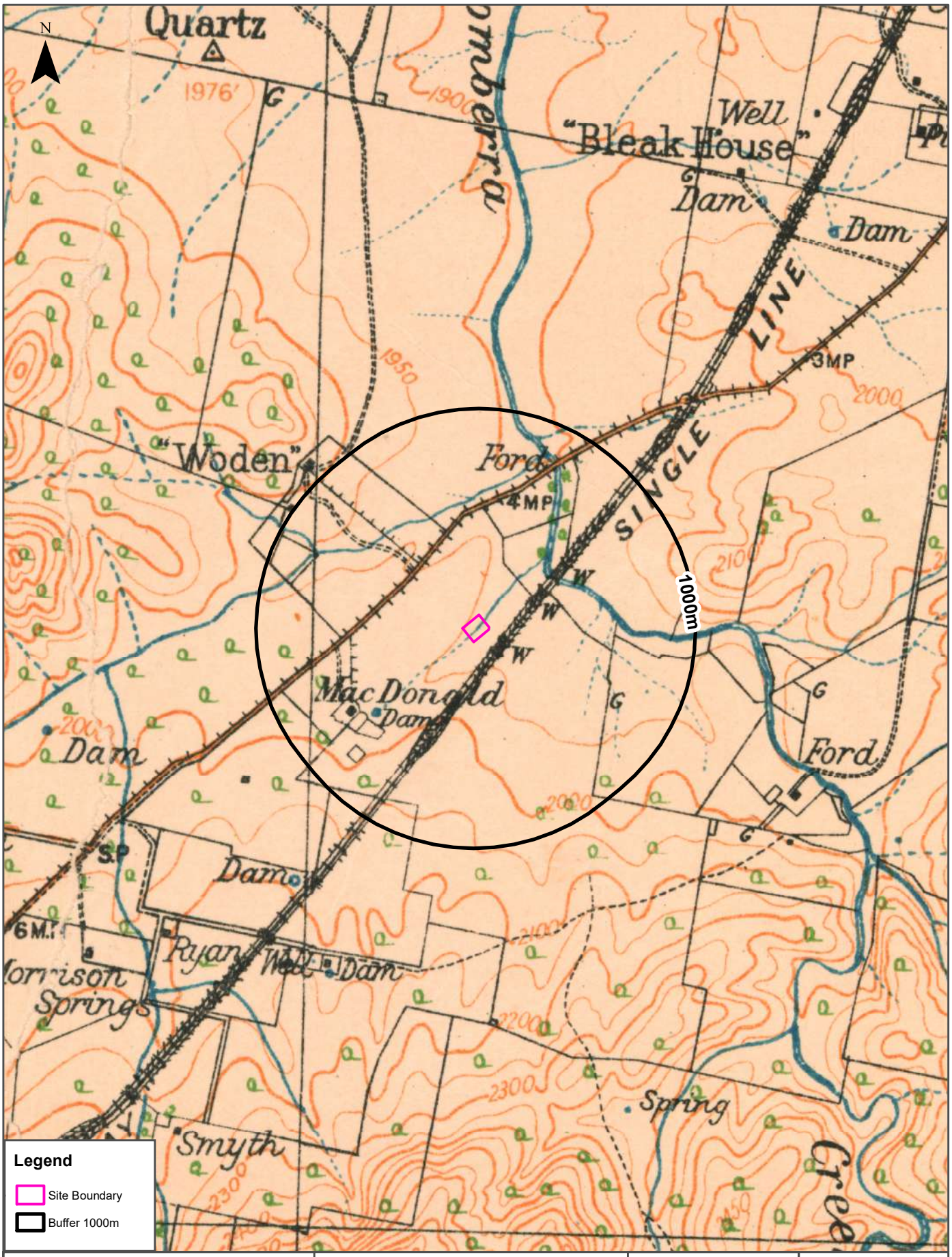
Historical Map c.1942

12-14 Arnott Street, Hume, ACT 2620



Historical Map c.1914

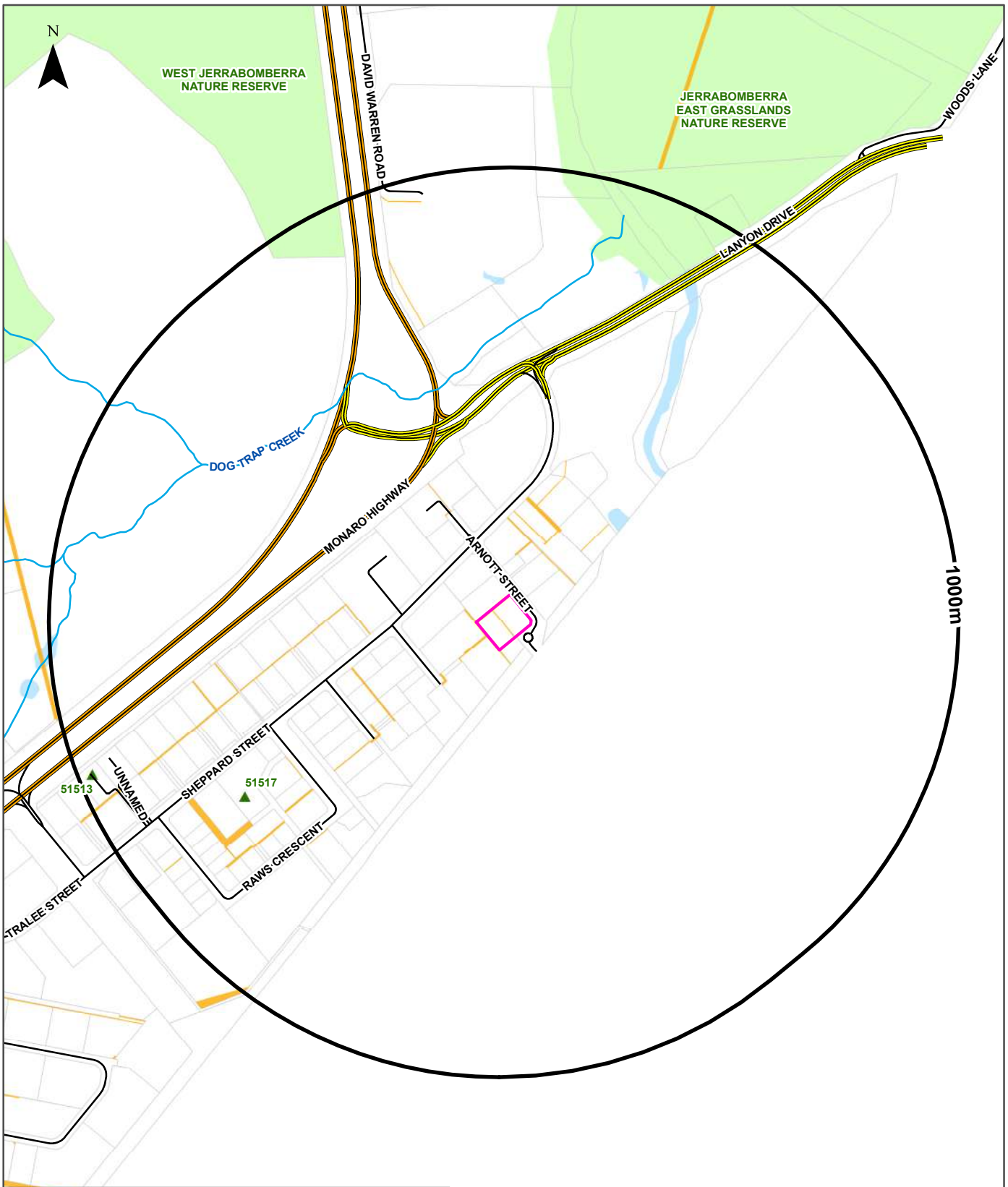
12-14 Arnott Street, Hume, ACT 2620



Scale: 0 200 400 800 1,200 Meters	Data Sources: Canberra, Federal Territory & N.S.W. Commonwealth Department of Defence Prepared by Commonwealth Section, Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 55	Date: 08 May 2020

Topographic Features

12-14 Arnott Street, Hume, ACT 2620



Topographic Features

12-14 Arnott Street, Hume, ACT 2620

Features of Interest

What Features of Interest exist within the report buffer?

Map Id	Feature Type	Name	Description	Distance	Direction
51517	HOMESTEAD, OUTSTATION, OUTCAMP, WOOLSHED	Hill Station	CULTURAL FACILITY - ART GALLERY, LIBRARY, MUSEUM	677m	South West
51513	BUILDING	Hume Estate	OFFICE - CHANCELLERY, DEPARTMENTAL OFFICES	965m	West

Elevation Contours (2015 - 1m)

12-14 Arnott Street, Hume, ACT 2620

Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- Elevation Contour (m)

Automatically generated 1m contours of the ACT derived from 1m hydro-flattened DEM. Major lakes and dams within the ACT were assigned an elevation to produce a hydro-flattened DEM. 1m DEMs derived from 4ppm and 8ppm LiDAR were used as the input DEMs and polygons of major water bodies were used to determine the extent of lakes within the DEM extent. The input DEM defines the classified Australian Height Datum (AHD) LiDAR point cloud data as a 1 meter Digital Elevation Model (DEM). The Water Features data were digitised in 1995 from the following map sources - 1:10,000 Plan Series, 1:2,500 Cadastre, 1:2,500 Detail, 1:1,000 Detail and traced from Topobase. The mean elevation of each of these polygons was used to hydro -flatten the corresponding water bodies in the DEM. Contours were generated from the DEM using ESRI ArcGIS Contour tool.

Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate	Coordinate System: GDA 1994 MGA Zone 55	Date: 08 May 2020

Hydrogeology & Groundwater

12-14 Arnott Street, Hume, ACT 2620

Hydrogeology

Description of aquifers on-site:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Description of aquifers within the report buffer:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

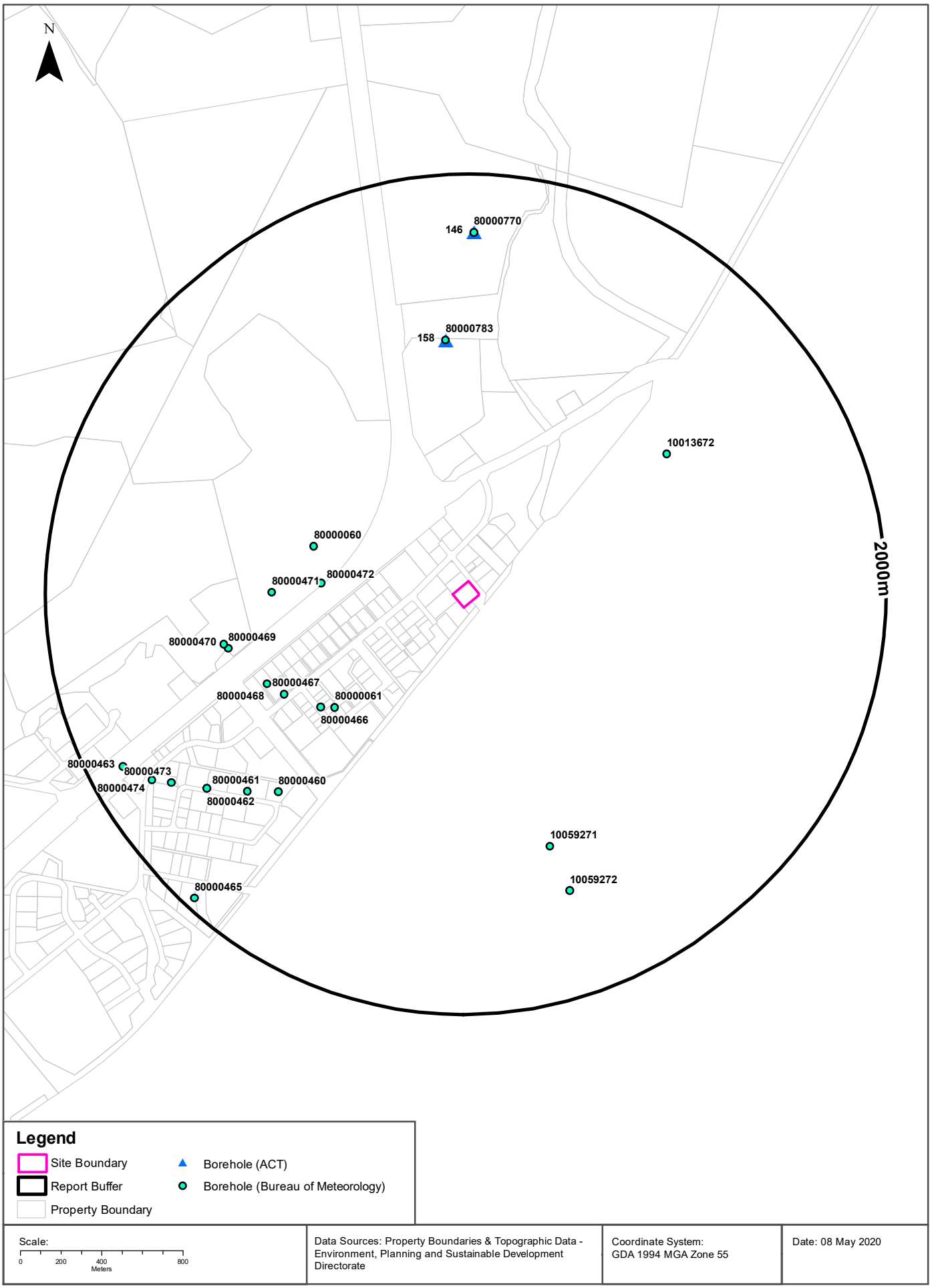
Hydrogeological Landscapes Units

Unit No	Landscape Name	Land Salinity	Stream Salinity	Stream EC	Salt Store	Salt Availability	Salt Mobility	Hazard Impact	Hazard Likelihood	Hazard Overall	Distance	Direction
24	Symonston	Low	Low	Low	Moderate	Moderate	Moderate	Limited	Moderate	Low	0m	Onsite

Hydrogeological Landscapes Units Data Source: ACT Government Creative Commons 4.0 ©

Groundwater Boreholes

12-14 Arnott Street, Hume, ACT 2620



Hydrogeology & Groundwater

12-14 Arnott Street, Hume, ACT 2620

Groundwater Boreholes (ACT)

Please note that this dataset does not include investigation and/or monitoring bores associated with possible contaminated sites in the search area. If you require more information please contact the Environmental Quality team via email environment.protection@act.gov.au or phone via Access Canberra 13 22 81.
Boreholes from an ACT Government Data Source within 2km of the site:

Bore Id	Bore Type	Method	Date	Bore Depth To	Bit Diameter	1st Water Intersection Depth From	1st Water Intersection Depth To	Final Static GW Level IM	1st Est Yield	Final Yield	Dist	Direction
158	Abstraction	Rotary Air	14/07/2010	60.00	180	30.0	32.0	18.00	0.50	1.00	1189m	North
146	Abstraction	Air blade, D	11/12/2007	90.00	250/170	69.0	71.0	4.00	0.90	2.50	1713m	North

Hydrogeology & Groundwater

12-14 Arnott Street, Hume, ACT 2620

Groundwater Boreholes (Bureau of Meteorology)

Boreholes (Bureau of Meteorology) within 2km of the site:

Hydro ID	State Bore ID	Drilled Date	Final Depth	Drilled Depth	Elevevation	Distance	Direction
80000472	629		4.50	4.50	592.43	647m	West
80000060	47	01/01/1952	24.69	24.69	591.14	721m	West
80000061	48	14/08/1954	39.62	39.62	608.17	800m	South West
80000466	623		5.41	5.41	608.41	854m	South West
80000471	628		4.52	4.52	594.88	886m	West
80000467	624		5.71	5.71	607.56	962m	South West
80000468	625		5.75	5.75	607.25	1011m	South West
80000469	626		5.87	5.87	605.35	1134m	West
80000470	627		5.85	5.85	606.13	1148m	West
10013672	410716				597.48	1151m	North East
80000783	798	14/07/2010	60.00	60.00	583.34	1189m	North
10059271	GW043846	01/10/1969	40.50	40.50	634.14	1249m	South
80000460	617		6.83	6.83	621.77	1284m	South West
80000461	618		4.06	4.06	618.17	1393m	South West
10059272	GW043847	01/08/1969	37.70	37.80	650.52	1487m	South
80000462	619		6.84	6.84	620.40	1538m	South West
80000473	630		5.17	5.17	620.60	1662m	South West
80000770	578	11/12/2007	90.00	90.00	578.02	1713m	North
80000474	631		4.58	4.58	620.39	1736m	South West
80000463	620		5.67	5.67	619.37	1827m	South West
80000465	622		4.30	4.30	635.27	1945m	South West

Driller's Logs (Bureau of Meteorology)

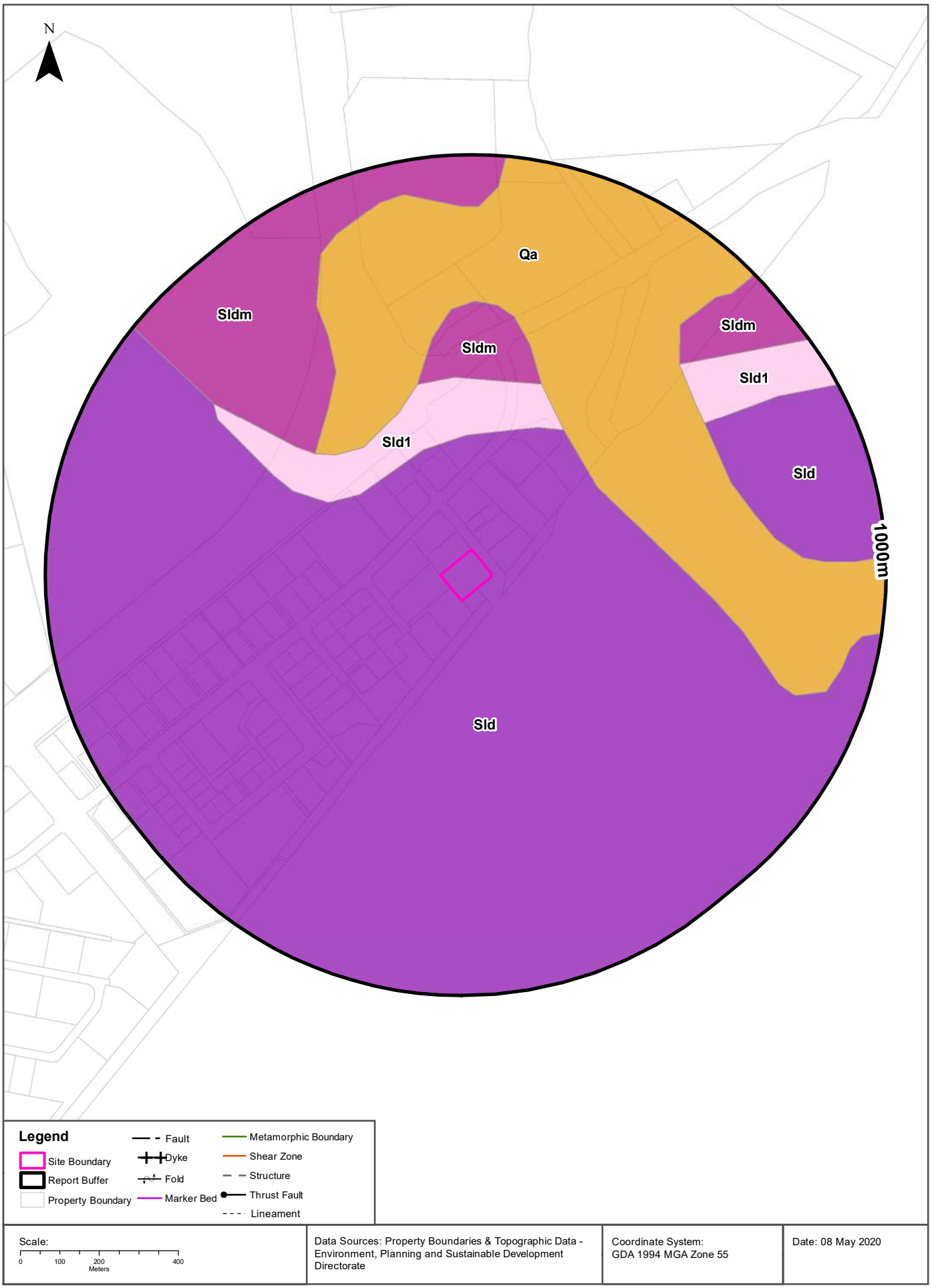
Drill log data relevant to the Boreholes (Bureau of Meteorology) within 2km of the site:

Hydro ID	State Bore ID	Drillers Log	Distance	Direction
80000060	47	0.00m-13.41m Clay or mud 13.41m-16.15m Sands on sandy clay 16.15m-16.46m Bedrock	721m	West

Hydro ID	State Bore ID	Drillers Log	Distance	Direction
10059271	GW043846	0.00m-1.83m Soil subsoil 0.00m-1.83m Clay 1.83m-17.98m Porphyry decomposed 17.98m-30.78m Porphyry very hard 30.78m-40.54m Porphyry hard	1249m	South
10059272	GW043847	0.00m-1.22m Soil subsoil 1.22m-25.30m Porphyry decomposed 25.30m-37.80m Porphyry hard 37.80m-37.81m Bedrock hard water supply	1487m	South

Geology 1:250,000

12-14 Arnott Street, Hume, ACT 2620



Geology

12-14 Arnott Street, Hume, ACT 2620

Geological Units (1:250,000 scale)

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Member	Era	Period	Dataset
Sld	Rhyodacitic ignimbrite and minor volcaniclastic and argillaceous sediments	Deakin Volcanics	Laidlaw Volcanic Suite			Palaeozoic	Silurian	1:250,000

What are the Geological Units within the report buffer?

Symbol	Description	Unit Name	Group	Sub Group	Member	Era	Period	Dataset
Qa	Alluvium, fluvial deposits: gravel, sand, silt and clay	undifferentiated	unknown			Cainozoic	Quaternary	1:250,000
Sld	Rhyodacitic ignimbrite and minor volcaniclastic and argillaceous sediments	Deakin Volcanics	Laidlaw Volcanic Suite			Palaeozoic	Silurian	1:250,000
Sld1	Tuff, tuffaceous sandstone, shale and ashstone	Deakin Volcanics	Laidlaw Volcanic Suite		unnamed member	Palaeozoic	Silurian	1:250,000
Sldm	Rhyodacite lava	Deakin Volcanics	Laidlaw Volcanic Suite		Mugga Mugga Porphyry Member	Palaeozoic	Silurian	1:250,000

Geological Structures (1:250,000 scale)

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

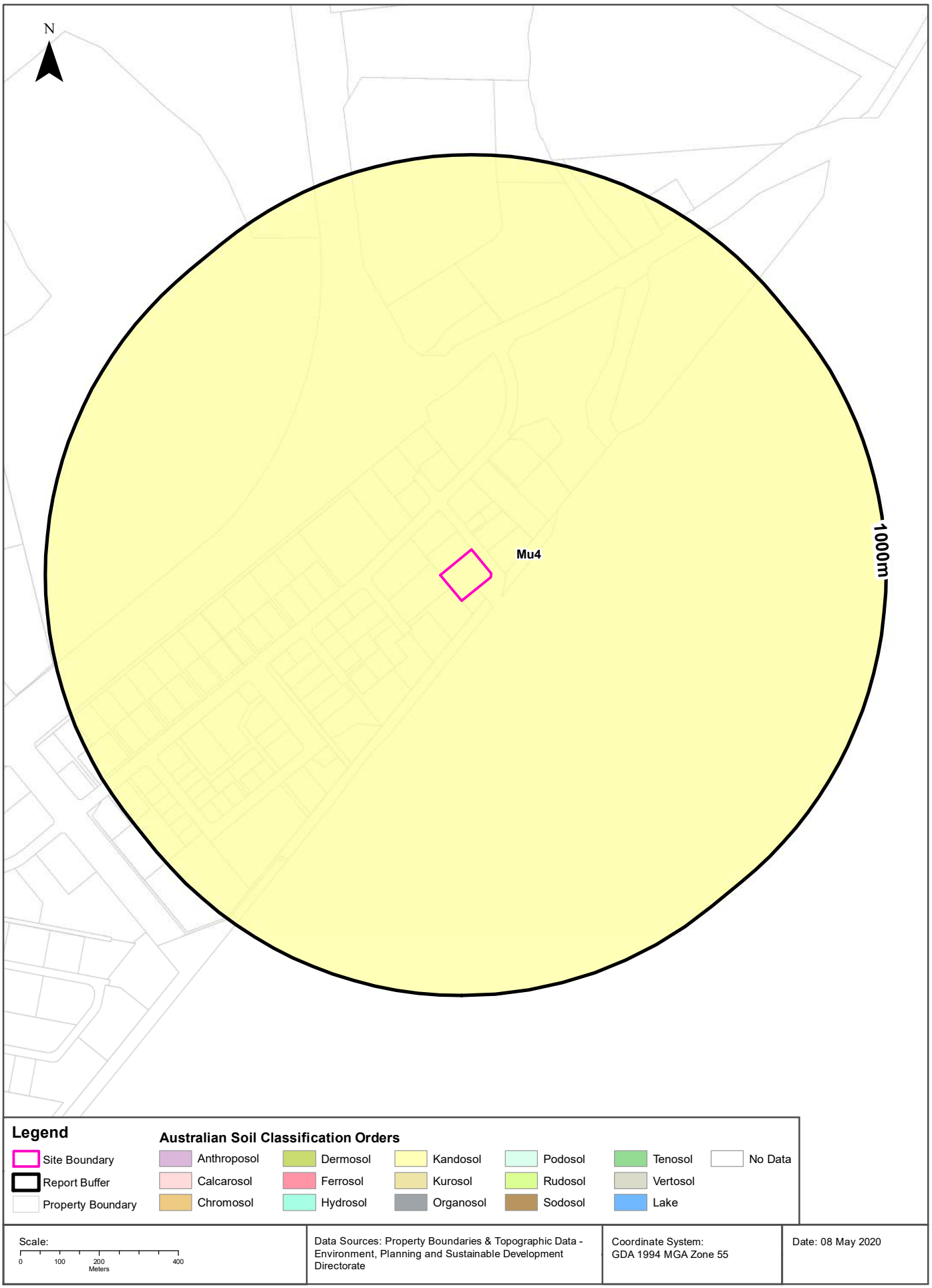
What are the Geological Structures within the report buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Atlas of Australian Soils

12-14 Arnott Street, Hume, ACT 2620



Soils

12-14 Arnott Street, Hume, ACT 2620

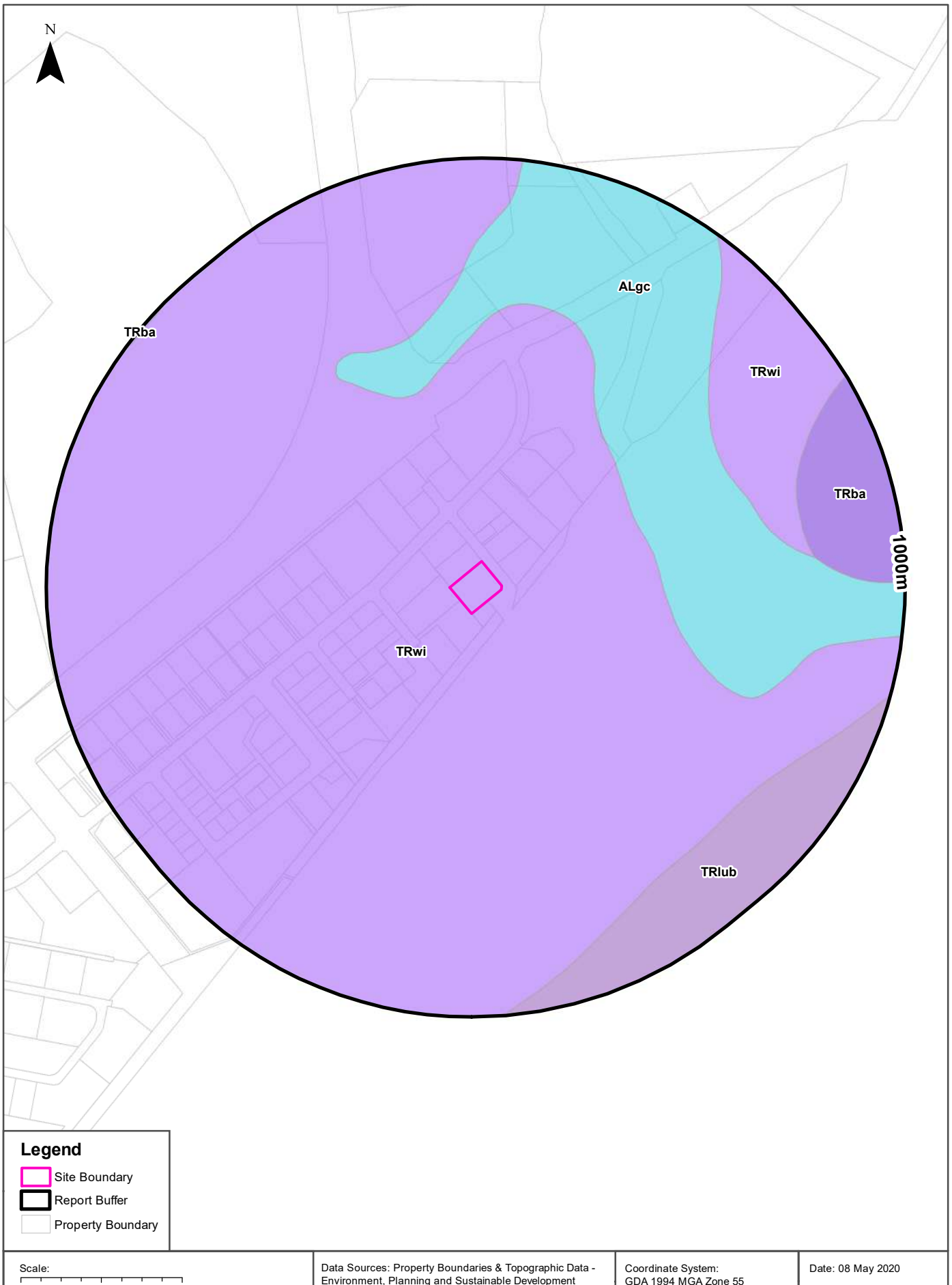
Atlas of Australian Soils

Australian soil types within the dataset buffer:

Symbol	Soil Order	Map Unit Description	Distance
Mu4	Kandosol	Gently to strongly undulating plains at moderate to low elevations (<2000 ft) with basins, stream terraces, and low residual hills and ridges; buried, layered soil materials are present: undulating plains of neutral leached red earths (Gn2.15) in the better-drained sites and yellow earths (Gn2.25) in intermediate drainage situations, with yellow leached earths (Gn2.75) often associated with hard neutral and/or alkaline yellow mottled soils (Dy3.42 and Dy3.43) in poorly drained areas, swampy sites, and seepage situations--all often with heavy clay D horizons below the solum. Associated are: low residual hills and ridges of (Dr2.22 and Dr2.42) or (Dy3.22 and Dy3.42) soils, with small areas of (Um4.2) soils and rock outcrops; basins of (Gn2.15 and Gn2.25) or (Dy3.42) soils; and stream terraces of variable width and development with (Um1) soils on present flood-plains, (Um6.11) soils on the youngest terraces, (Gn2.15, Gn2.25, and Gn2.75) in drainage sequence from well-drained to poorly drained sites on the next, and most extensive, terrace, adjacent to which sand sheets of (Uc1.2) soils may occur; (Dr2.42), (Dy3.42), and (Dy3.43) soils on remnants of the highest terrace, above which gravel fills and ironstone slabs may occur.	0m

Soil Landscapes

12-14 Arnott Street, Hume, ACT 2620



Soils

12-14 Arnott Street, Hume, ACT 2620

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
TRwi	WILLIAMSDALE		TRANSFERRAL	Canberra	1:100,000

What are the Soil Landscapes within the report buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
ALgc	GINNINDERRA CREEK		ALLUVIAL	Canberra	1:100,000
TRba	BURRA		TRANSFERRAL	Canberra	1:100,000
TRlub	LUXOR variant b		TRANSFERRAL	Canberra	1:100,000
TRwi	WILLIAMSDALE		TRANSFERRAL	Canberra	1:100,000

Atlas of Australian Acid Sulfate Soils

12-14 Arnott Street, Hume, ACT 2620

Legend

Site Boundary
Report Buffer
Property Boundary

Probability of occurrence of Acid Sulfate Soils

A. High (>70%)
B. Low (6-70%)
C. Extremely Low (1-5%)
D. No Chance (0%)
No Data

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 08 May 2020

Acid Sulfate Soils

12-14 Arnott Street, Hume, ACT 2620

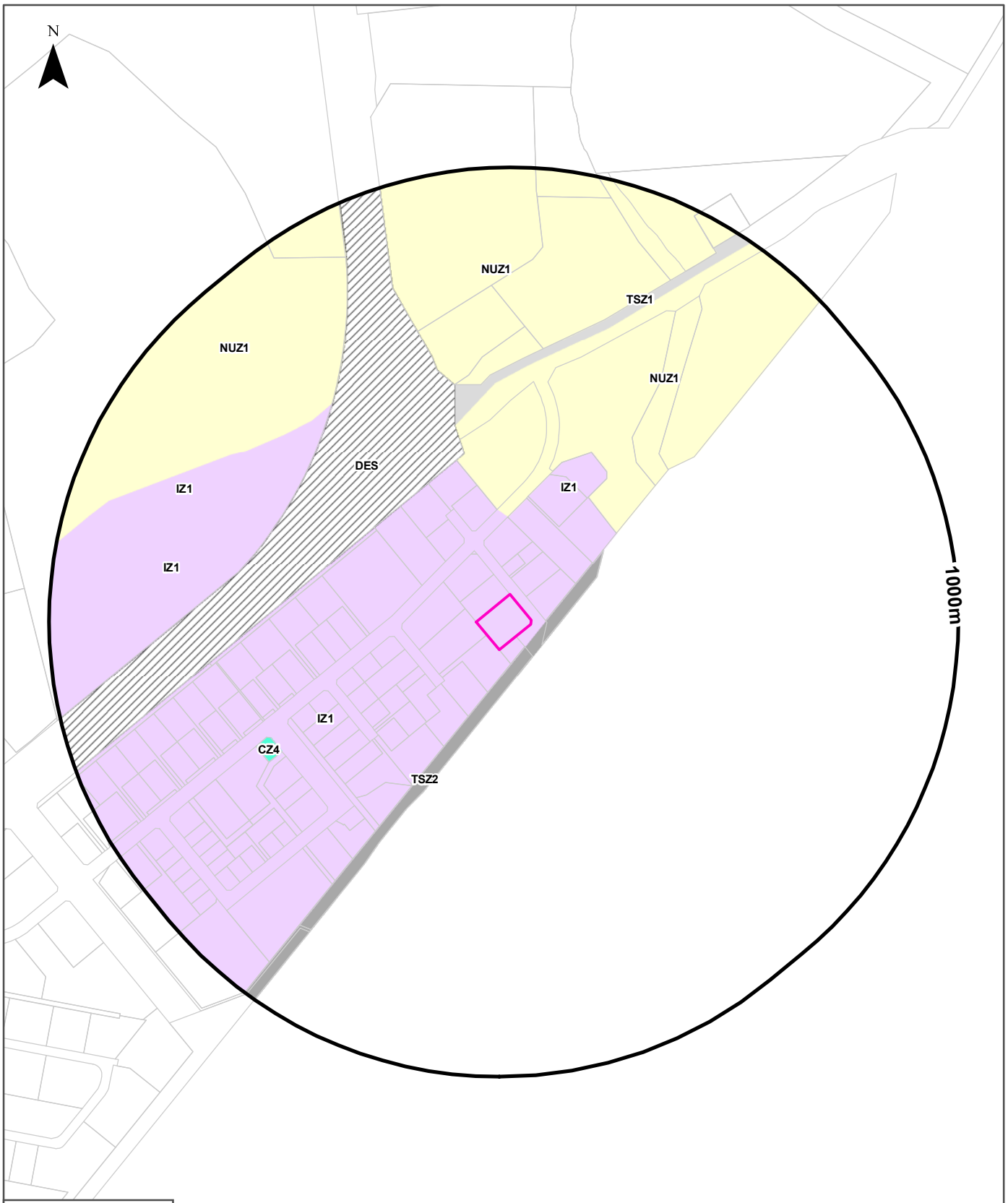
Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

Territory Plan Zones

12-14 Arnott Street, Hume, ACT 2620



Planning

12-14 Arnott Street, Hume, ACT 2620

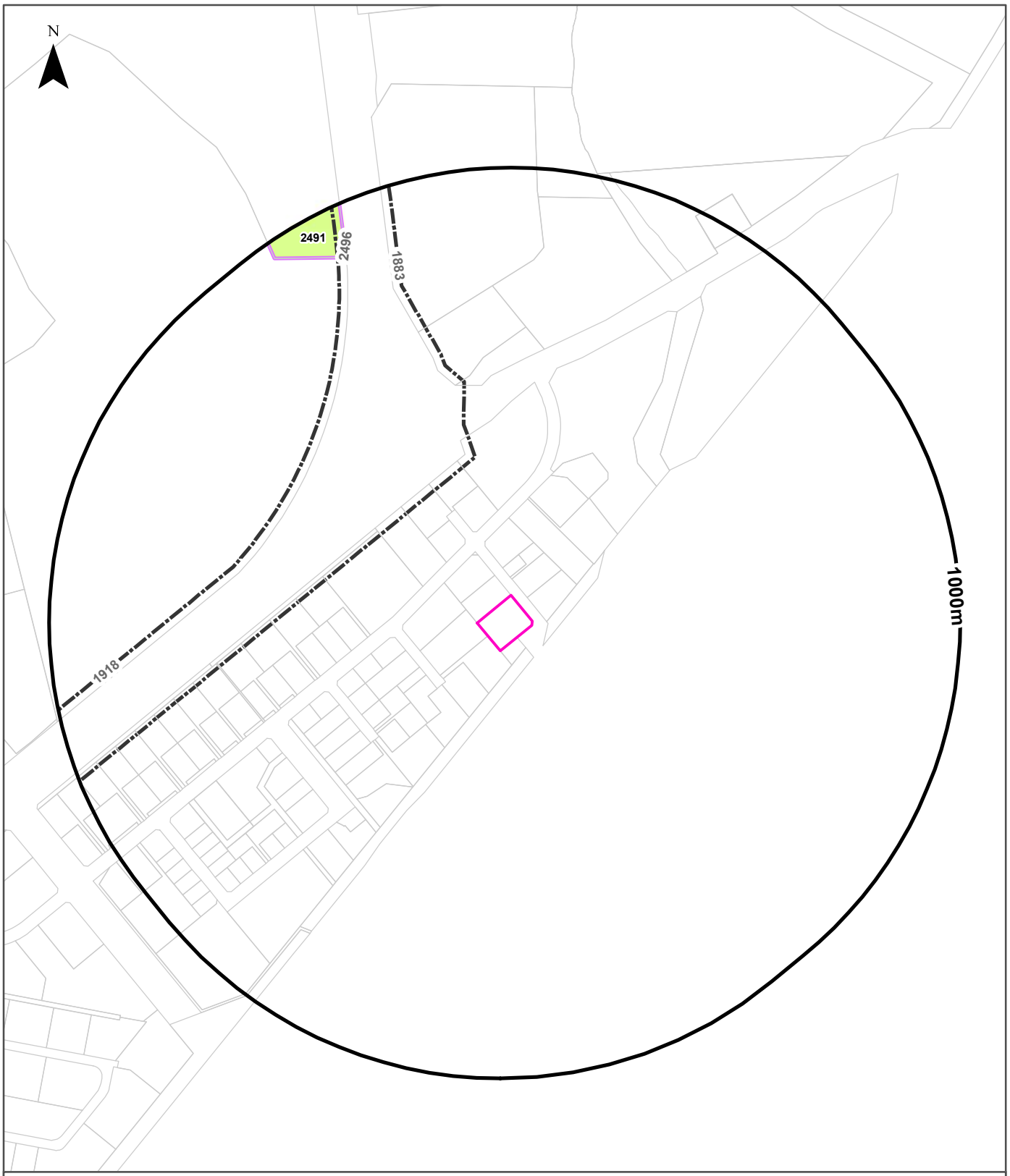
Territory Plan Zones

What Plan Zones exist within the report buffer?

Zone Code	Zone Name	Description	Variation	Gazettal Name	Gazettal Date	Distance	Direction
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	22/01/2010	0m	Onsite
TSZ2	SERVICES		TA2009-26	NI2010-22	22/01/2010	21m	South West
NUZ1	BROADACRE		TA2009-26	NI2010-22	22/01/2010	180m	North East
IZ1	GENERAL INDUSTRY		TA2009-26	NI2010-22	22/01/2010	187m	North East
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	13/11/2009	194m	North East
DES	DESIGNATED		TP 2008	NI2008-27	31/03/2008	322m	North West
TSZ1	TRANSPORT		TP 2008	NI2008-27	31/03/2008	416m	North East
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	495m	North
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	517m	West
CZ4	LOCAL CENTRE		TP 2008	NI2008-27	31/03/2008	546m	South West
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	572m	West
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	609m	North West

Territory Plan Overlays

12-14 Arnott Street, Hume, ACT 2620



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- Inter-town Public Transport
- Main Avenues & Approach Routes
- Future Urban Areas
- Special Requirements
- National Land
- Kingston Foreshore
- Public Land
- Wilderness Area
- National Park
- Nature Reserve
- Special Purpose Reserve
- Urban Open Space
- Cemetery or Burial Ground
- Protection of Water Supply
- Lake
- Sport and Recreation Reserve
- National Land Proposed for Urban Development

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 08 May 2020

Planning

12-14 Arnott Street, Hume, ACT 2620

Territory Plan Overlays (areas)

What Plan Overlays (areas) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
2491	Pc	Nature Reserve.	TP 2008	NI2008-27	878m	North West

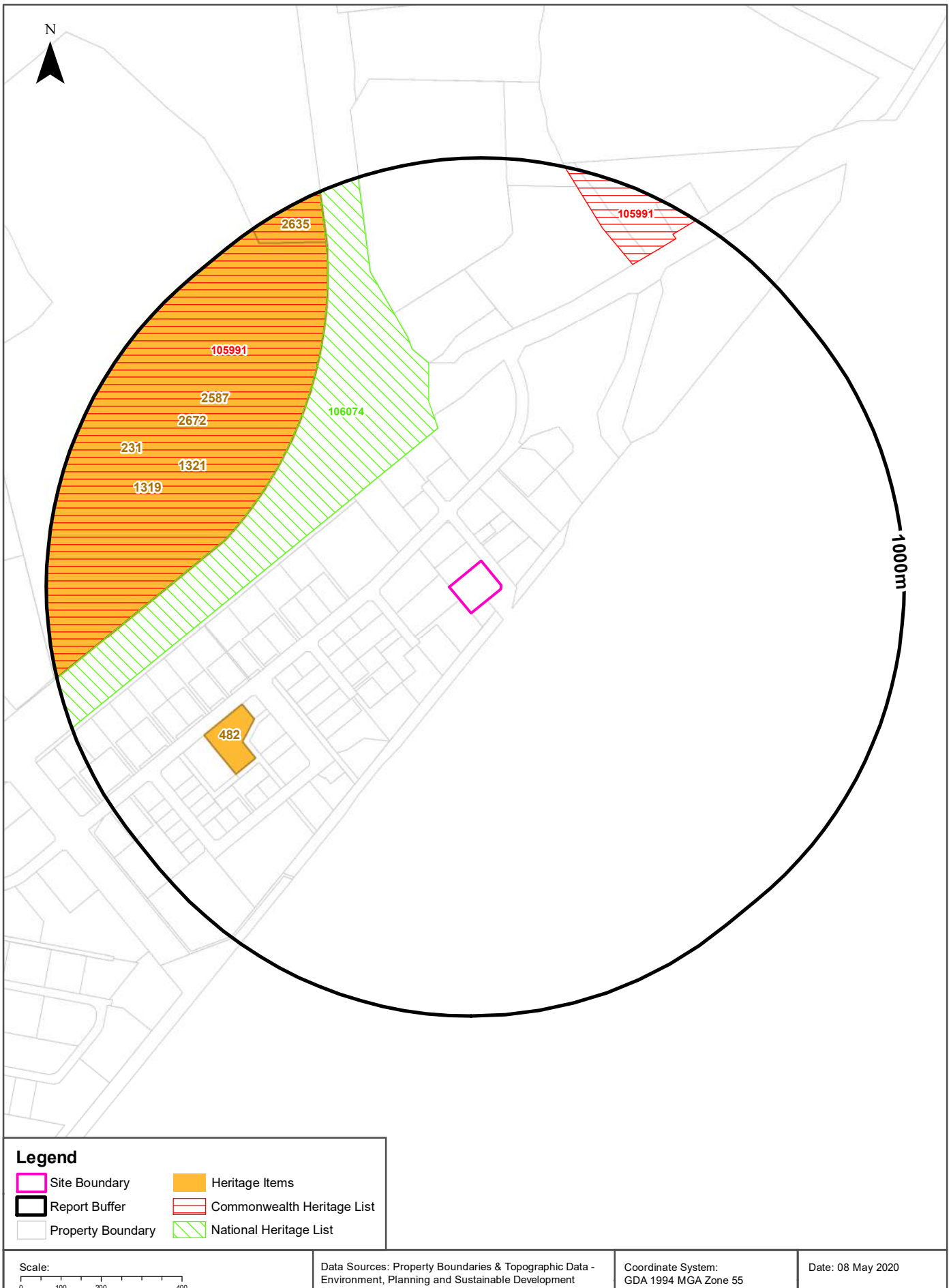
Territory Plan Overlays (lines)

What Plan Overlays (lines) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
1883	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	302m	North West
1918	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	537m	North West
2496	PUBLAN	Public Land	TP 2008	NI2008-27	878m	North West

Heritage Items

12-14 Arnott Street, Hume, ACT 2620



Heritage

12-14 Arnott Street, Hume, ACT 2620

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
105991	Natural Areas around and within Majura, Pialligo and Jerrabomberra	Majuar Rd, Majura ACT	8/01/000/0132	Natural	Nominated place		518m	North

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch
Creative Commons 3.0 © Commonwealth of Australia https://creativecommons.org/licenses/by/3.0/au/deed.en

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
106074	Canberra and Surrounding Areas	Northbourne Av, Canberra ACT	8/01/000/0134	Historic	Nominated place		323m	South West

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch
Creative Commons 3.0 © Commonwealth of Australia https://creativecommons.org/licenses/by/3.0/au/deed.en

Heritage Sites

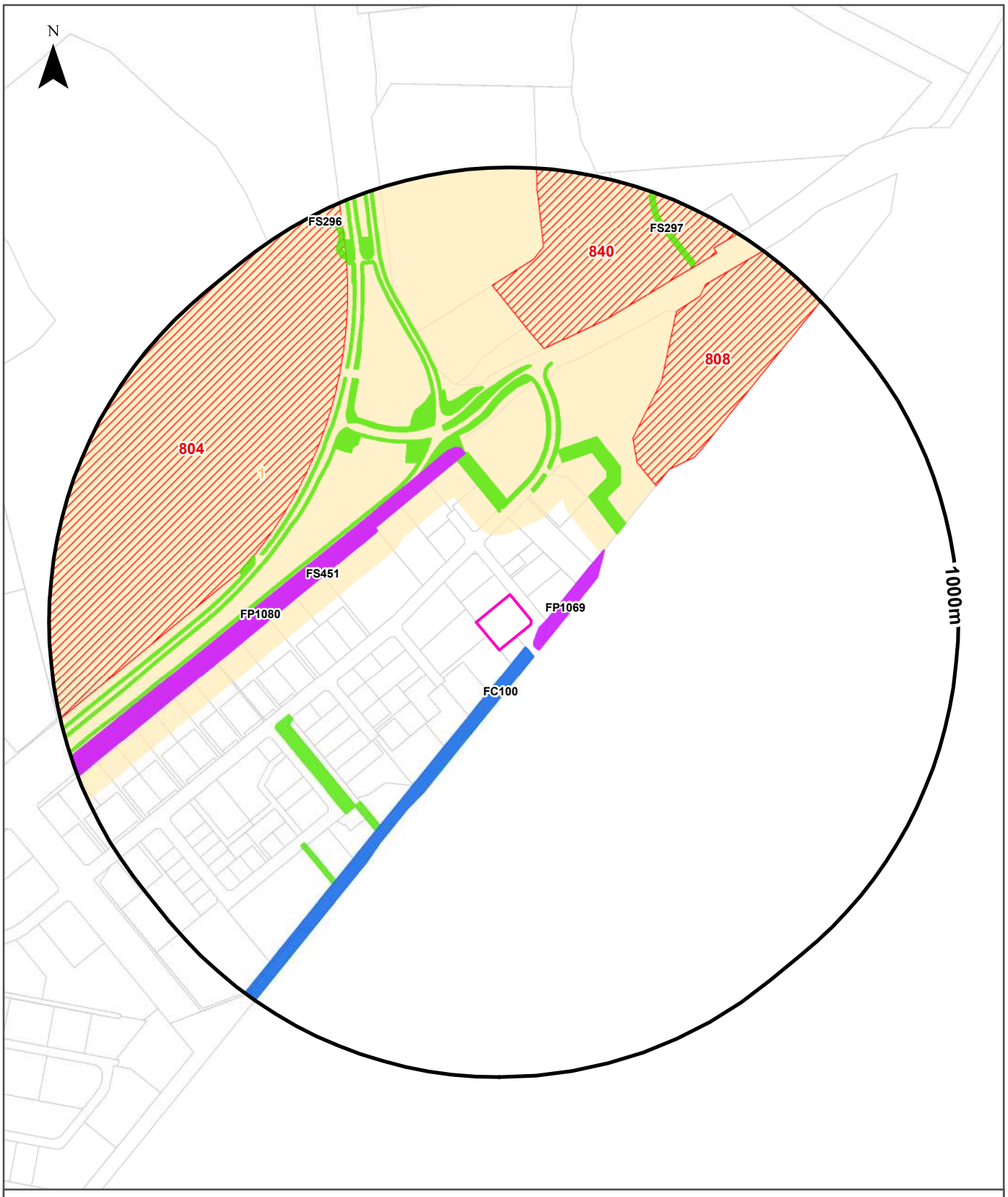
What Heritage SItes exist within the report buffer?

Map Id	Heritage Id	Name	Description	Status	Status Date	Location Type	Block Key	District	Division	Dist	Dir
2672	1166	HA3		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	517m	North West
1319	1166	HA8		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	517m	North West
2587	1166	HA9		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	517m	North West
1321	1166	HUME PAD 3		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	517m	North West
231	139	Woden Homestead and grasslands	Section 17 Block 4 and 6 (part)	Final Registration		Historic		JERRABOMBERRA	HUME	518m	North West
482	466	Hill Station	Section 5 Block 5	Final Registration		Historic		JERRABOMBERRA	HUME	585m	South West
2635	1166	HUME PAD 2		Final Registration	09/03/2005	Restricted	88020170007	JERRABOMBERRA	HUME	878m	North West

Heritage Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Natural Hazards - Bushfire & Flood

12-14 Arnott Street, Hume, ACT 2620



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- Bushfire Prone Area
- Bushfire Abatement Zone
- Flood 1% AEP

Access Management

- Construction
- Maintenance
- Upgrade
- Vegetation Management

Fuel Management

- Chemical
- Cultural Burn
- Ecological Burn
- Grazing
- Physical Removal
- Prescribed Burn
- Prescribed Burn (RFS)
- Slashing

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 08 May 2020

Natural Hazards

12-14 Arnott Street, Hume, ACT 2620

Bushfire Prone Areas

What Bushfire Prone Areas exist within the report buffer?

Feature Id	Description	Distance	Direction
1	Bushfire Prone Areas ACT	140m	South West

Bushfire Prone Area Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Bushfire Abatement Zones

What Bushfire Abatement Zones exist within the report buffer?

Feature Id	Feature	Distance	Direction
808	Bushfire Abatement Zone	424m	North East
804	Bushfire Abatement Zone	517m	North West
840	Bushfire Abatement Zone	579m	North

Bushfire Abatement Zone Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Bushfire Operational Plan - Access Management

What Bushfire Operational Plan - Access Management exist within the report buffer?

Map Id	Treatment	Distance	Direction
N/A	No records within buffer		

Bushfire Operational Plan Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Bushfire Operational Plan - Fuel Management

What Bushfire Operational Plan - Fuel Management exist within the report buffer?

Unique Id	Treatment	Hectares	Distance	Direction
FP1069	Physical Removal	0.69	19m	East
FC100	Chemical	75.72	30m	North West
FS451	Slashing	36.13	51m	West
FP1080	Physical Removal	5.10	315m	West

Unique Id	Treatment	Hectares	Distance	Direction
FS296	Slashing	17.43	864m	North West
FS297	Slashing	6.88	877m	North East

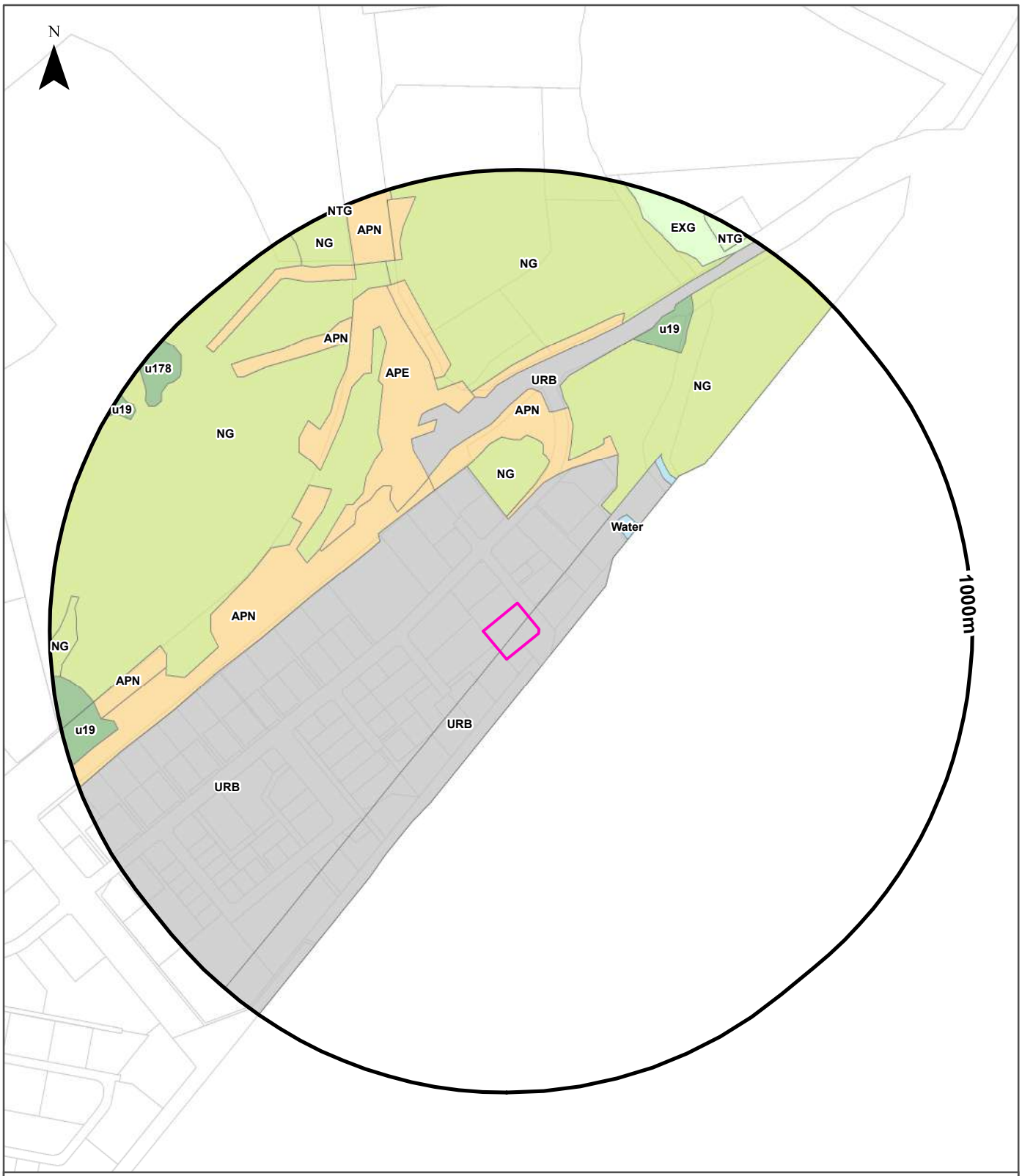
Flood (1 Percent Annual Exceedance Probability)

What Flood zone (1% AEP) exists within the report buffer?

Feature Id	Description	Distance	Direction
N/A	No records within buffer		

Ecological Constraints - Vegetation Communities

12-14 Arnott Street, Hume, ACT 2620



Ecological Constraints

12-14 Arnott Street, Hume, ACT 2620

Vegetation Communities

What Vegetation Communities exist within the report buffer?

UMC Id	Community	Formation	"Keith" Vegetation Class	Mean Height	Canopy Cover	Distance	Direction
URB	Urban and developed areas_URB			8.07	3.22	0m	Onsite
URB	Urban and developed areas_URB			8.28	12.31	0m	Onsite
APN	Amenity planting native_APN			6.47	28.73	194m	North
NG	Native grassland_NG			5.39	0.48	200m	North
Water	Water			3.90	0.57	288m	North East
NG	Native grassland_NG			7.56	0.68	294m	North East
APN	Amenity planting native_APN			7.34	17.88	317m	West
APE	Amenity planting exotic_APE			9.57	40.95	338m	North West
URB	Urban and developed areas_URB			6.60	0.85	355m	North East
NG	Native grassland_NG			8.48	1.24	420m	West
Water	Water			3.53	0.17	441m	North East
APN	Amenity planting native_APN			8.23	44.10	479m	North
APN	Amenity planting native_APN			8.88	43.96	550m	North
u19	Blakely s Red Gum Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	9.63	15.71	664m	North East
APN	Amenity planting native_APN			10.15	41.46	716m	North West
APN	Amenity planting native_APN			5.54	13.44	733m	West
APN	Amenity planting native_APN			8.50	29.25	835m	North West
APN	Amenity planting native_APN			7.61	10.67	836m	North
APN	Amenity planting native_APN			9.21	22.95	839m	North
NG	Native grassland_NG			8.79	1.99	866m	North West
u19	Blakely s Red Gum Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	7.74	16.23	874m	South West
EXG	Exotic grassland_EXG			6.16	0.04	884m	North
u178	Yellow Box ± Apple Box tall grassy woodland_u178	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.88	17.14	913m	North West
u19	Blakely s Red Gum Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.43	21.31	914m	West
NG	Native grassland_NG			7.74	4.16	936m	West
EXG	Exotic grassland_EXG			5.84	0.20	938m	North East
u19	Blakely s Red Gum Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.71	23.00	949m	North West
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	0.00	0.00	957m	North East
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	5.82	0.09	981m	North West

UMC Id	Community	Formation	"Keith" Vegetation Class	Mean Height	Canopy Cover	Distance	Direction
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	4.63	1.66	996m	North East

Ecological Constraints

12-14 Arnott Street, Hume, ACT 2620

Vegetation Subformation

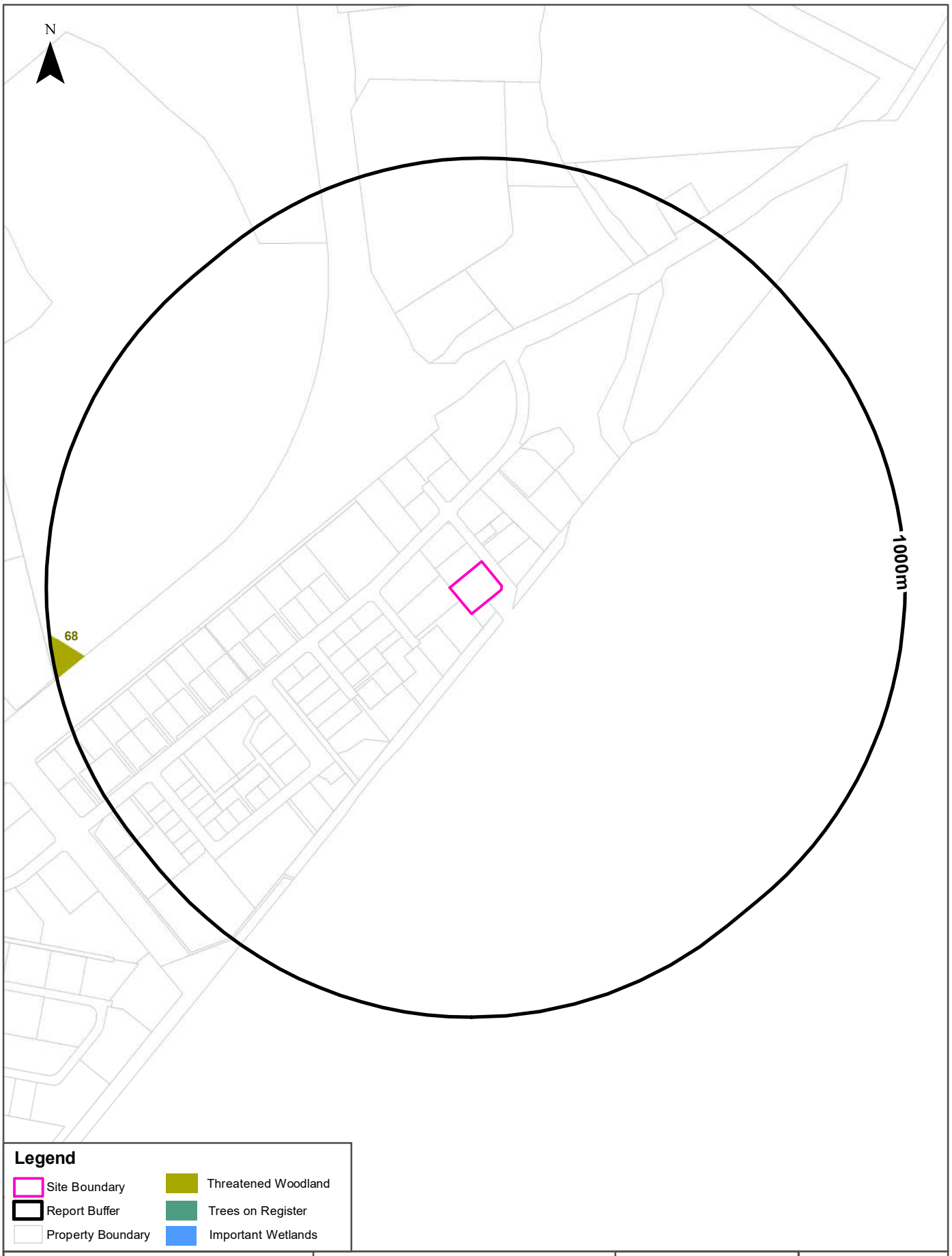
What Vegetation Subformations exist within the report buffer?

Object Id	Subformation	Distance	Direction
N/A	No records within buffer		

Vegetation Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Ecological Constraints - Threatened Woodland, Wetlands &Tree Register

12-14 Arnott Street, Hume, ACT 2620



Ecological Constraints

12-14 Arnott Street, Hume, ACT 2620

Threatened Woodland

What ACT Listed Threatened Woodland exists within the report buffer?

Feature Id	Community	EPBCStatus	ACT Status	Distance	Direction
68	Yellow Box Red Gum Grassy Woodland	Not listed	Endangered Ecological Community	921m	West

Threatened Woodland Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Tree Register

What Trees on the ACT register exists within the report buffer?

Feature Id	Genus	Species	Tree Ref	Tree Height	Status	Date Edit	Distance	Direction
N/A	No records within buffer							

Tree Register Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Important Wetlands

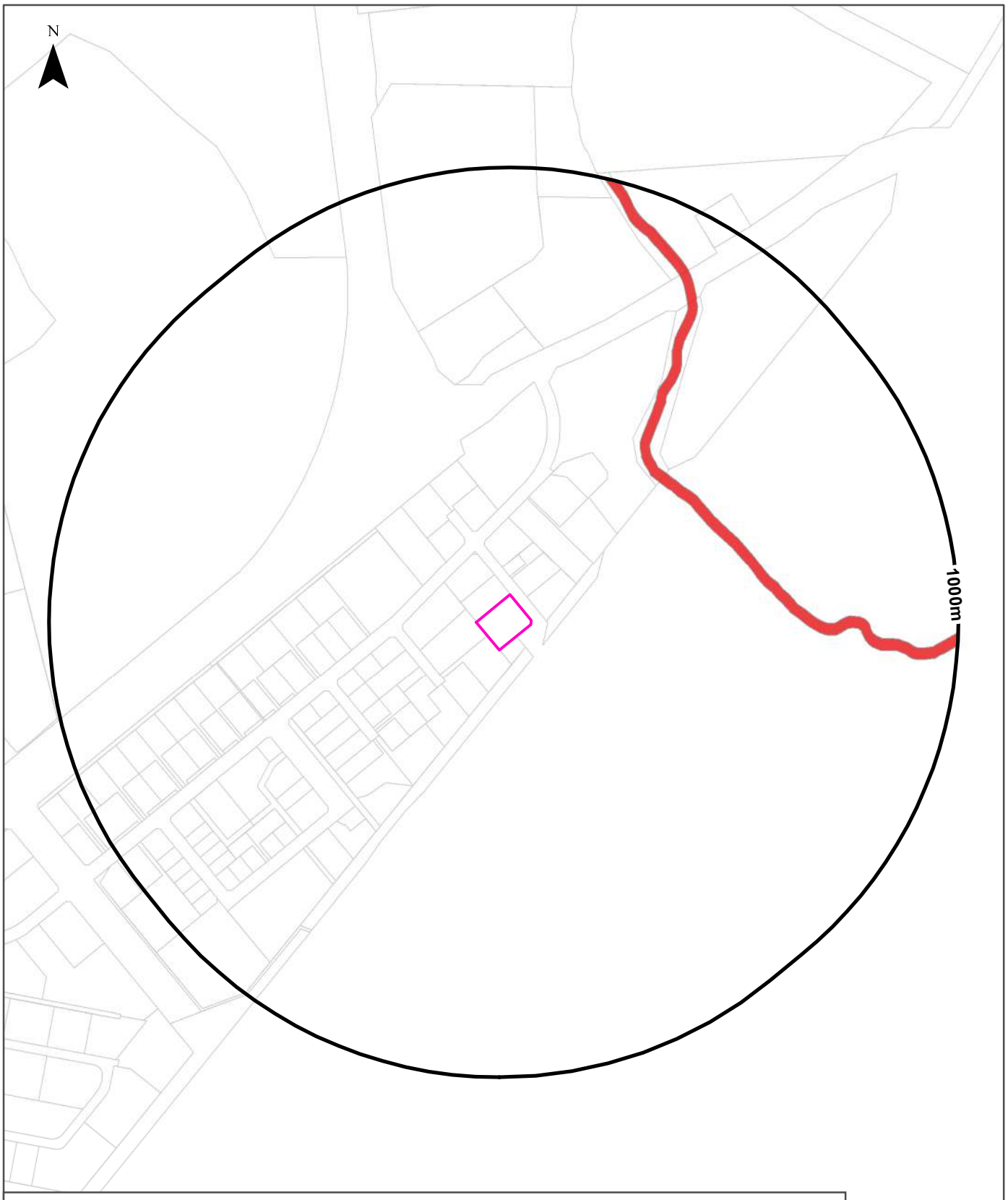
What Wetlands exist within the report buffer?

Feature Id	Name	Distance	Direction
N/A	No records within buffer		

Important Wetlands Data Source: ACT Government Creative Commons 4.0 © https://creativecommons.org/licenses/by/4.0/

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

12-14 Arnott Street, Hume, ACT 2620



Ecological Constraints

12-14 Arnott Street, Hume, ACT 2620

Groundwater Dependent Ecosystems Atlas

GDEs within the dataset buffer:

Type	Name	GDE Potential	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic		High potential GDE - from national assessment	6	Upland plains with separating strike-aligned hills, closed lake basins.	River		429m	North

Ecological Constraints

12-14 Arnott Street, Hume, ACT 2620

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status
Fauna	Amphibia	Litoria aurea	Green and Golden Bell Frog	Endangered, Protected		Vulnerable
Fauna	Amphibia	Litoria raniformis	Southern Bell Frog	Endangered, Protected		Vulnerable
Fauna	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable, Protected		
Fauna	Aves	Circus assimilis	Spotted Harrier	Vulnerable, Protected		
Fauna	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable, Protected		CAMBA
Fauna	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable, Protected		
Fauna	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered, Protected		Endangered
Fauna	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable, Protected		
Fauna	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable, Protected, Category 3 Sensitive Species	Category 3	
Fauna	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable, Protected, Category 2 Sensitive Species	Category 2	
Fauna	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable, Protected		
Fauna	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable, Protected		
Fauna	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered Species, Protected		Critically Endangered
Fauna	Aves	Epthianura albifrons	White-fronted Chat	Vulnerable, Protected		
Fauna	Aves	Grantiella picta	Painted Honeyeater	Vulnerable, Protected		Vulnerable
Fauna	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable, Protected		
Fauna	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable, Protected		
Fauna	Aves	Pachycephala olivacea	Olive Whistler	Vulnerable, Protected		
Fauna	Aves	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable, Protected		
Fauna	Aves	Petroica boodang	Scarlet Robin	Vulnerable, Protected		
Fauna	Aves	Petroica phoenicea	Flame Robin	Vulnerable, Protected		
Fauna	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable, Protected		
Fauna	Aves	Lathamus discolor	Swift Parrot	Endangered, Protected, Category 3 Sensitive Species	Category 3	Critically Endangered
Fauna	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable, Protected, Category 3 Sensitive Species	Category 3	Vulnerable
Fauna	Insecta	Synemon plana	Golden Sun Moth	Endangered		Critically Endangered
Fauna	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable, Protected		Endangered
Fauna	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable, Protected		

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status
Fauna	Mammalia	Phascolarctos cinereus	Koala	Vulnerable, Protected		Vulnerable
Fauna	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable, Protected		Vulnerable
Fauna	Reptilia	Tympanocryptis pinguicolla	Grassland Earless Dragon	Endangered, Protected		Endangered
Fauna	Reptilia	Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable, Protected		Vulnerable
Fauna	Reptilia	Varanus rosenbergi	Rosenberg's Goanna	Vulnerable, Protected		
Flora	Flora	Rutidosis leptorrhynchoides	Button Wrinklewort	Endangered		Endangered
Flora	Flora	Swainsona recta	Small Purple-pea	Endangered		Endangered
Flora	Flora	Caladenia tessellata	Thick Lip Spider Orchid	Endangered, Protected, Category 2 Sensitive Species	Category 2	Vulnerable

Data does not include NSW category 1 sensitive species.

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise match	Georeferenced to the site location / premise or part of site
General area or suburb match	Georeferenced with the confidence of the general/approximate area
Road match	Georeferenced to the road or rail
Road intersection	Georeferenced to the road intersection
Feature is a buffered point	Feature is a buffered point
Land adjacent to geocoded site	Land adjacent to Georeferenced Site
Network of features	Georeferenced to a network of features

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From: Heckenberg, Mark
To: Lotsearch Support
Subject: Contaminated Land Search - Block 31 Section 4 Hume [SEC=UNCLASSIFIED, DLM=Sensitive: Personal]
Date: Friday, 15 May 2020 9:53:00 AM

Dear Dr Le

RE: CONTAMINATED LAND SEARCH

Thank you for your search form request of 06/05/2020 enquiring about:

Block 31 Section 4 Hume Jerrabomberra

Records held by the Environment Protection Authority (EPA) for the above block(s) indicate the following:

The block is not recorded on the EPA's contaminated sites management database or geographic information system.

The block is currently occupied by a commercial/industrial complex. Large commercial/industrial complexes prior to the introduction of natural gas to the ACT in the 1980's utilised boiler heating or similar systems. These systems were generally fuelled by diesel or heating oil which was mainly stored in underground fuel storage tanks.

The ACT EPA Contaminated Sites Environment Protection Policy 2017 lists fuel storage as an activity associated with land contamination which may pose a risk to human health and the environment.

You or your client should contact Access Canberra, Dangerous Substances Licensing, who administer the Dangerous Substances legislation, on 132281 regarding the possible presence and status of any fuel or dangerous substances related facilities at the site.

Other potentially contaminating activities may have also been undertaken at the site associated with current and past uses.

The EPA has not issued any orders under sections 91C (1) or 91D (1), environment protection orders under section 125 (4), requested an audit under section 76(2) or received an audit notification under section 76A (1) of the *Environment Protection Act 1997* (the Act) over the site and as a result the site is not recorded on the Register of contaminated sites under section 21A of the Act.

The information detailed above only relates to records held by the EPA and may not represent the actual condition of the site.

At present the EPA has no information on contamination of the above block(s) other than as detailed above. However, this does not absolutely rule out the possibility of contamination and should not be interpreted as a warranty that there is no contamination.

I appreciate that this does not absolutely rule out the existence of contamination of the soils. If you or your clients wish to be completely sure you, or they, should arrange to conduct independent tests.

Yours sincerely

Mark Heckenberg | Manager, Contaminated Sites
Phone: 02 6207 2151 | Email: mark.heckenberg@act.gov.au
Office of the Environment Protection Authority | Access Canberra | ACT Government
Ground Floor TransACT House, 470 Northbourne Avenue, Dickson 2602

GPO Box 158 Canberra ACT 2601 | http://www.act.gov.au/accesscbr

From: smartforms@act.gov.au [mailto:smartforms@act.gov.au]
Sent: Wednesday, 6 May 2020 5:37 PM
To: Contaminated Sites <ContaminatedSites@act.gov.au>
Subject: Contaminated Land Search - Application, XBRPSTS4, Jung Ho Lee [SEC=UNCLASSIFIED, DLM=Sensitive: Personal]

Contaminated Land Search - Application

Form data summary

Customer details	Jung Ho Lee
Reference code	XBRPSTS4

For issues or questions relating to SmartForms please contact the Payment Services Integration Team on *5 4607 or email smartforms.admin@act.gov.au.

Appendix B – Site Zoning Details

02 6161 1762

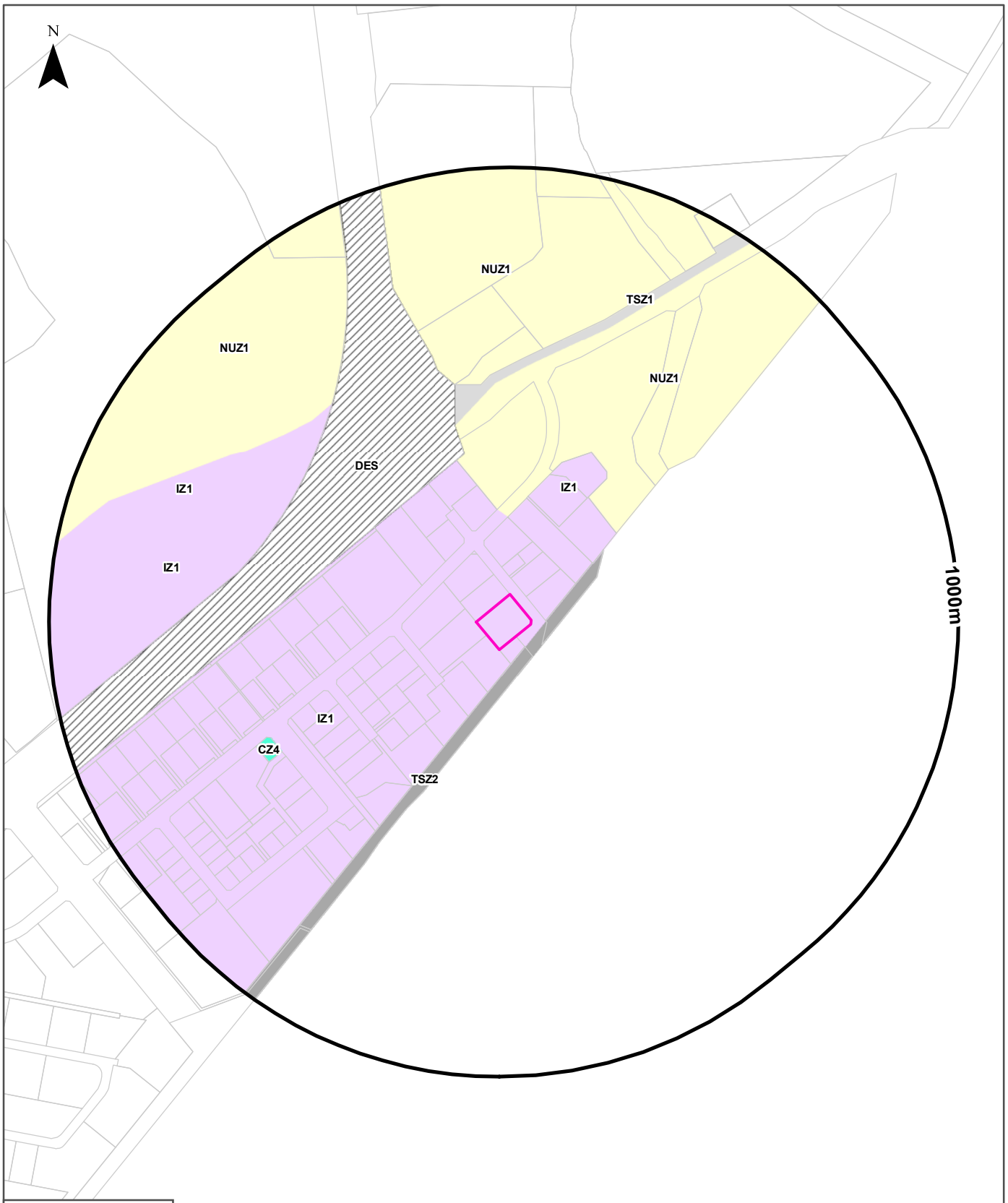
contact@murrang.com.au

www.murrang.com.au

ABN 96 162 928 958

Territory Plan Zones

12-14 Arnott Street, Hume, ACT 2620



Planning

12-14 Arnott Street, Hume, ACT 2620

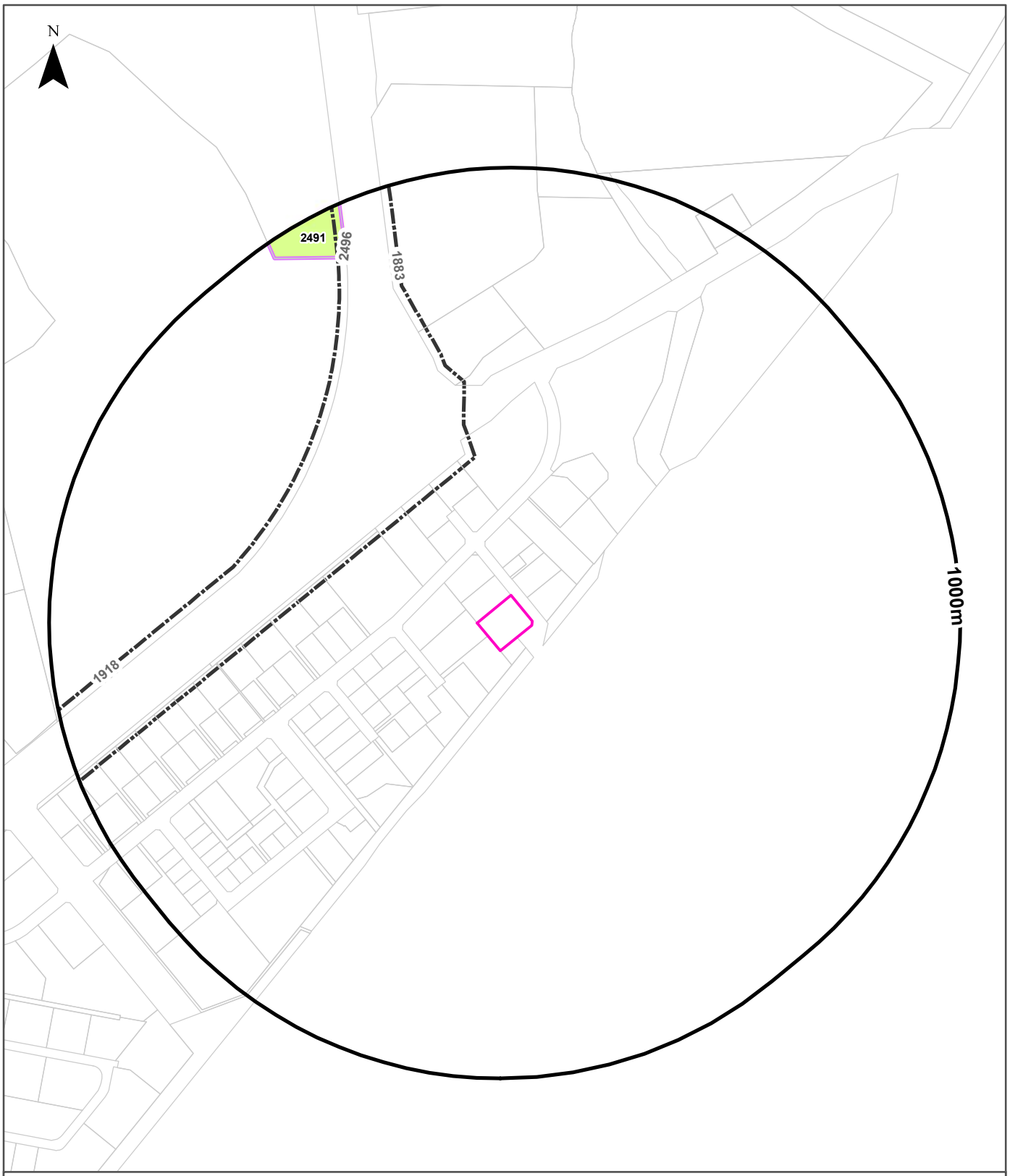
Territory Plan Zones

What Plan Zones exist within the report buffer?

Zone Code	Zone Name	Description	Variation	Gazettal Name	Gazettal Date	Distance	Direction
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	22/01/2010	0m	Onsite
TSZ2	SERVICES		TA2009-26	NI2010-22	22/01/2010	21m	South West
NUZ1	BROADACRE		TA2009-26	NI2010-22	22/01/2010	180m	North East
IZ1	GENERAL INDUSTRY		TA2009-26	NI2010-22	22/01/2010	187m	North East
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	13/11/2009	194m	North East
DES	DESIGNATED		TP 2008	NI2008-27	31/03/2008	322m	North West
TSZ1	TRANSPORT		TP 2008	NI2008-27	31/03/2008	416m	North East
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	495m	North
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	517m	West
CZ4	LOCAL CENTRE		TP 2008	NI2008-27	31/03/2008	546m	South West
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	572m	West
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	609m	North West

Territory Plan Overlays

12-14 Arnott Street, Hume, ACT 2620



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- Inter-town Public Transport
- Main Avenues & Approach Routes
- Future Urban Areas
- Special Requirements
- National Land
- Kingston Foreshore
- Public Land
- Wilderness Area
- National Park
- Nature Reserve
- Special Purpose Reserve
- Urban Open Space
- Cemetery or Burial Ground
- Protection of Water Supply
- Lake
- Sport and Recreation Reserve
- National Land Proposed for Urban Development

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 08 May 2020

Planning

12-14 Arnott Street, Hume, ACT 2620

Territory Plan Overlays (areas)

What Plan Overlays (areas) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
2491	Pc	Nature Reserve.	TP 2008	NI2008-27	878m	North West

Territory Plan Overlays (lines)

What Plan Overlays (lines) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
1883	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	302m	North West
1918	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	537m	North West
2496	PUBLAN	Public Land	TP 2008	NI2008-27	878m	North West

Appendix C – Licenses and agreements

Appendix D – Detailed waste flow and processing diagram, cradle to grave

02 6161 1762

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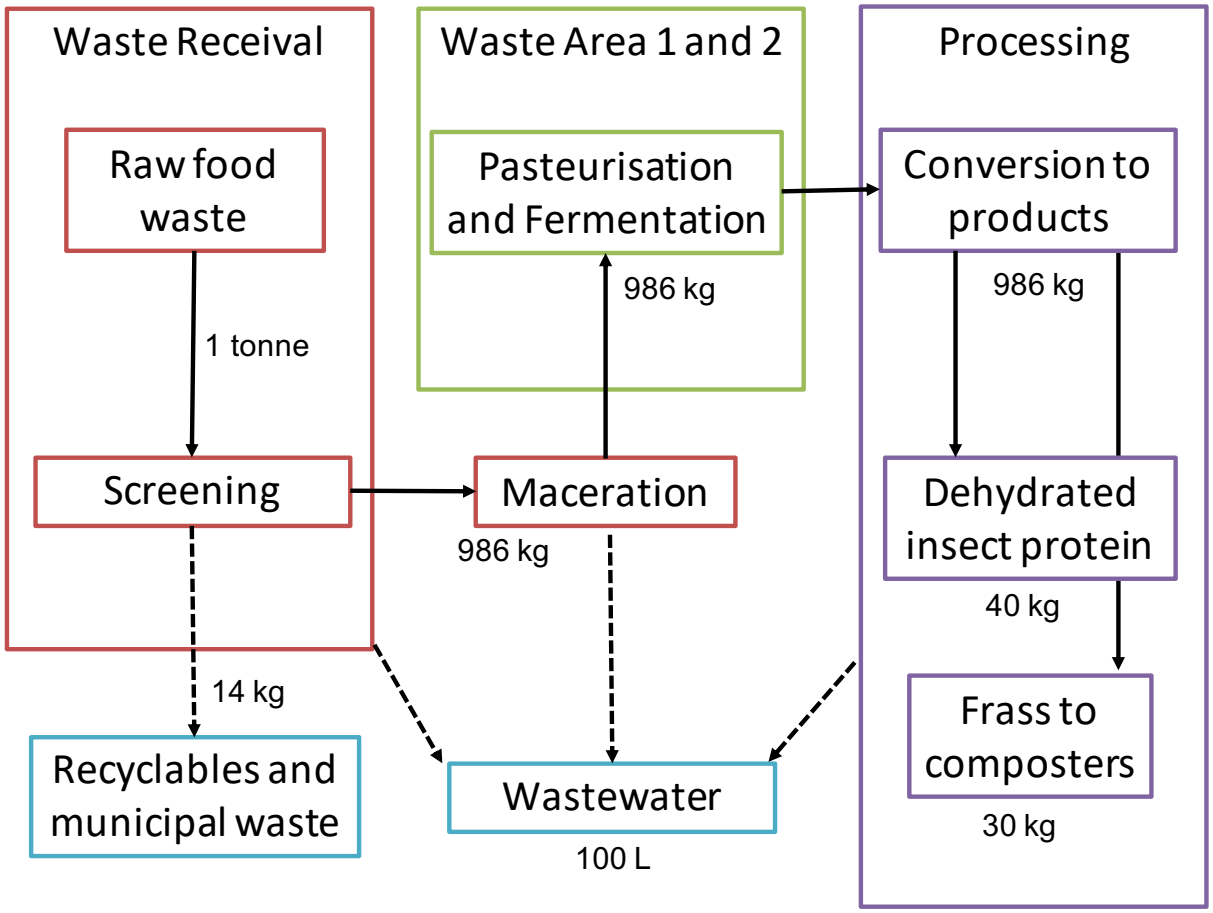

Appendix D – Detailed waste flow and processing, cradle to grave of 1 tonne of food waste through conversion process, including recyclables, municipal waste, wastewater, and products of protein and frass.