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Former Schofields Aerodrome



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1. Introduction

Ramboll Australia Pty Ltd (Ramboll) has been engaged by Defence Housing Australia (DHA) to provide a review of land use suitability in relation to soil and groundwater quality in a site redevelopment stage referred to as the 'Hatched Area' (herein referred to as the 'Hatched Area'; see **Figure 1, Appendix 1**) at the former Schofields Aerodrome, (herein referred to as the Aerodrome site) located off Nirimba Drive, Quakers Hill, New South Wales (NSW).

The former Schofields Aerodrome covers an area of approximately 145 hectares (ha). The Hatched Area occupies approximately 23.5 ha of that footprint. Both are shown on **Figure 1, Appendix 1**.

1.1 Background and Report Overview

The Aerodrome site was used by the Australian Department of Defence between 1942 and 1975 and mainly for recreational aviation uses thereafter until 1993. Since then, Aerodrome site facilities were progressively demolished concurrently with staged investigations and, where required, remediation. The Aerodrome site was formally rezoned in 2012 to a more sensitive land use (including residential and recreational).

The Hatched Area was the first stage of the Nirimba Fields residential redevelopment, constructed between February 2017 and October 2020. Following redevelopment, the public infrastructure and facilities within the Hatched Area was formally dedicated to Blacktown City Council (BCC). It is currently occupied by residential properties and municipal facilities such as parks and related amenities.

The Aerodrome site (including the Hatched Area) has previously been the subject of Section A Site Audits in 2005 (Environ, 2005) and in 2013 (Environ, 2013a). These audits concluded that the whole former Aerodrome site was suitable for residential land use with accessible soil, as well as other similar or less sensitive landuses, such as schools and recreational open space. They did not consider PFAS, however, as it was not widely known as an emerging contaminant at that time.

PFAS containing Aqueous Film Forming Foams (AFFF) were historically used in the former fire training area (the 'FFTA'), located adjacent to the south of the Hatched Area. Accordingly, supplemental PFAS specific investigations (Ramboll, 2017a; Ramboll, 2017b; Ramboll 2021a; Ramboll, 2021b; Ramboll, 2021c; Ramboll, 2021d; Ramboll, 2023a; Ramboll, 2023b; Ramboll, 2024; Ramboll, 2025) were undertaken, focusing on the specific areas where fire training activities had been documented and/or where PFAS impacts had been documented in earlier works. The Aerodrome site history, available documentation and investigative works showed that PFAS use in the form of AFFF was more than likely confined to the former fire training area.

Based on these investigative outcomes, the target areas within the former Aerodrome site were subsequently remediated and validated and multiple Section B Audits were issued in regard to PFAS cleanup. **Figure 1, Appendix 1** presents the boundaries for each previous audit. None of these Section B Audits areas fell within the Hatched Area, as none of the remediation zones were identified therein.

More recently, the wider former Aerodrome site has been the subject of an investigation, focused on a layer of clean fill (VENM) that was imported and placed to raise the development above a design flood level. This investigation is assessing (inter-alia) the potential for PFAS contaminated

soils to have become entrained in the imported material as it was introduced and placed across the Aerodrome site (including the Hatched Area). Direct intrusive investigation is not tenable given the developed nature of the Hatched Area. However, DHA wish to support the site-wide investigation by evaluating soil and groundwater quality within the Hatched Area and assessing its suitability for the current low density residential land use with respect to PFAS and other contaminants of potential concern (CoPC) from historical Aerodrome site usage and during redevelopment works.

1.2 Objective and Scope of Work

The objective of this Hatched Area Suitability Review is to collate existing site-wide and site-specific information and data to develop an informed opinion regarding the suitability of the Hatched Area for its current low-density residential land use. Due to current access and ownership constraints, intrusive works within the Hatched Area are not feasible. Consequently, the assessment is primarily a structured desktop, weight-of-evidence approach. The review utilises the substantial dataset generated across the wider Aerodrome site and aims to contextualise the risk profile and land use suitability of the Hatched Area relative to areas where more direct investigation data is available.

"Specifically, the objectives of the review are to:

1. **Compile and evaluate PFAS investigation, remediation and validation reports** relevant to the Hatched Area to document the absence of residual identified Areas of Environmental Concern (AECs), including addressing the former STP stockpile area through a structured weight-of-evidence assessment.
2. **Assess historical and development-phase land disturbance** through review of aerial imagery to understand earthworks sequencing, material movement, and to support whether the Hatched Area was developed concurrently and consistently with surrounding validated areas.
3. **Review and cross-reference imported material documentation** to evaluate the likely consistency of fill source, quality and placement across the Aerodrome site, including the Hatched Area.
4. **Summarise and interpret soil and groundwater datasets from the broader Aerodrome site**, including assessment of PFAS and other contaminants of potential concern, to determine whether the Hatched Area is expected to show a comparable risk profile.
5. **Integrate groundwater and surface water monitoring information from the Aerodrome site** to contextualise CoPC risks and support alignment with established conceptual site models.

The assessment is limited to the underlying land within the Hatched Area and the materials used to form the development platform. It does not assess contamination risks associated with the construction or occupation of residential dwellings. Any contamination arising from house construction such as utility installation, service trenches, landscaping including importation of mulch or other post-subdivision works is outside the scope of this review.

1.3 Regulatory Framework

The legislative framework for the assessment works is based on guidelines that have been issued and/or endorsed by the NSW Environment Protection Authority (EPA) under the following Acts, Regulations and policies:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- Contaminated Land Management Act 1997

- Contaminated Land Management Regulation 2013
- Protection of the Environment Operations Act 1997 (POEO Act)
- Protection of the Environment Operations (Waste) Regulation 2014
- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2017.

The relevant guidelines issued under the provisions of the above-mentioned acts/policies include:

- National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013 (ASC NEPM, 2013)
- NSW Environment Protection Authority (NSW EPA), *Sampling Design Guidelines* (NSW EPA, 2022)
- NSW EPA, *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (NSW EPA, 2017)
- NSW EPA, *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA, 2020).
- Australian and New Zealand guidelines for freshwater quality (ANZG, 2018)
- NEPM Health Screening Levels (HSL) for Groundwater Vapour Intrusion – Low to High Density Residential (NEPM, 2013)

The following guidance is also relevant, although is not enforced under NSW legislation:

- National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA). (2025). *PFAS National Environmental Management Plan version 3.0*. Department of Climate Change, Energy, the Environment and Water.

2. Background Information

The Hatched Area particulars are presented in **Table 2-1** and the Hatched Area location is shown in **Figure 1, Appendix 1**.

Table 2-1 Former Schofields Aerodrome – Hatched Area Details

Identifier	Hatched Area
Street Address	Multiple, access off Aerodrome Drive, Nirimba Fields, NSW 2763
Legal Description (Lot and DP)	Multiple lots
Geographical Coordinates (AMG)	E: 303083, N: 6267590
Owner	Multiple private residences and Defence Housing Australia (DHA)
Size	Approx. 23.42 ha
Elevation	Approx. 20-25 m AHD
Zoning	Former zoning for the Hatched Area: • 5(a) – Commonwealth Uses Current zoning ¹ is a mix of: • R2 - Low Density Residential • SP2 - Infrastructure (Classified road, drainage, footpath, local road)
Previous Land Use	Former airfield and technical training centre from 1942 to 1993.
Current Land Use	Both developed and undeveloped residential properties and drainage swale in north of the Hatched Area.
Local Government Area	Blacktown City Council
Location and Layout	Figure 1, Appendix 1

Notes:

AMG – Australian Map Grid

AHD – Australian Height Datum

2.1 Site Conditions and Surrounding Environment

The Aerodrome site is approximately 35 km northwest of the Sydney CBD. The boundaries are defined by developed property lines from 2021 and the Richmond-Blacktown Railway Line corridor to the east. The location and layout of the Aerodrome site is shown in **Figure 1, Appendix 1**.

¹ State Environmental Planning Policy (Precincts—Central River City) 2021, 12 December 2025 to date (accessed 4 March 2026 at 14:03)

Table 2-2: Site Description Summary

Condition	Source	Description
Current Land Use	Visual observations	The hatched area is currently both developed and undeveloped residential properties consisting of lots in various stages of preparation, along with associated road and drainage infrastructure.
Topography and Drainage	Visual observations; Google Earth™;	Prior to the residential development works, the former Aerodrome site was relatively flat, gently sloping from the southeast at approximately 25 mAHD to the north and northwest at approximately 19 mAHD. A drainage swale is present on the north of the Hatched Area.
Surface Water	Visual observations; site plans	Prior to development, the former drainage channels discharged into an unnamed tributary of Eastern Creek in the eastern portion of the Aerodrome site, in addition to directly discharging into Eastern Creek along the western boundary. Drainage channels were located either side (east and west) of the FFTA which both flowed in a northerly direction. These drainage lines no longer exist as they have been covered with approximately 3.0 to 6.0 m of VENM as part of the Aerodrome site development works. A detailed plan of the cut to fill profile is provided in Appendix 3. Eastern Creek, which upgradient passes several industrial sites including Eastern Creek Landfill, forms the western boundary of the wider redevelopment of the former aerodrome and flows north into the Hawkesbury River approximately 12.8 km north-northwest, which in turn flows into the sea approximately 46 km east-northeast of the Aerodrome site. The Creek is approximately 250m west of the Hatched Area.
Geology/ Previous Borehole/ Test Pit Logs	Environ, 2013; visual observations Ramboll 2017, 2021b; Ramboll 2024; Ramboll 2025; Ramboll 2026b	The majority of the wider redevelopment is underlain by alluvial sediments consisting of gravel, sand, silt and clay. These sediments overlie Bringelly Shales of the Wianamatta Group. Extending over the majority of the former Aerodrome site, the bedrock shale is at a depth of 4 to 6 metres below the former ground surface. The Aerodrome site comprises 2-3 m of VENM generally comprising gravelly/sandy clay, brown, with sandstone and shale gravels, cobbles and boulders, moderate plasticity, dry, and hard, then 1-2 m of natural alluvial sediments comprising dark brown silty clay of low to moderate plasticity with minor rootlets present, then becoming orange/brown clay of moderate to high plasticity, moist at a depth of 4 to 7 m below current ground level.

Condition	Source	Description
On-site wells / Depth to Groundwater	Visual observations; Ramboll 2017; Ramboll 2021b; Ramboll 2024; Ramboll 2025; Ramboll 2026b	Eleven groundwater wells were installed and sampled at the former Aerodrome site in the vicinity of the FFTA during the 2017 PFAS assessment. Depth to groundwater was measured at approximately 1.305 to 2.410 metres below top of casing in August 2017. Based on the new ground level after the placement of VENM fill, the depth to groundwater at the Aerodrome site is expected to be approximately 5 m below the ground surface of the residential development (around 25 mAHD with a standing water level (SWL). During an investigation of the 'Remaining Site Area' in 2021, 12 monitoring wells were installed with depths to groundwater ranging from 0.88 mbTOC to 5.74 mbTOC, consistent with previous monitoring events (Ramboll 2021b). A subsequent investigation of the Aerodrome site in 2024 indicated that nine out of the thirteen existing wells were serviceable. No groundwater wells were installed within the Hatched Area during the 2021 PFAS assessment. The closest well (MW02) approximately 40 m hydraulically upgradient of the Hatched Area was gauged in 2021 at 2.98 mbTOC. A groundwater monitoring network of 15 groundwater wells has been installed to investigate groundwater for the Aerodrome site. This network includes installation of 5 groundwater loggers within 5 wells and is proposed to be sampled every 6 months over the next 2 years during development works.
Direction Groundwater Flow	Visual observations; Ramboll 2017; Ramboll 2021b; Ramboll 2024; Ramboll 2025; Ramboll 2026b	Based on Ramboll 2017, Ramboll 2021b, Ramboll 2024, Ramboll 2025 and Ramboll 2026b, groundwater flows towards the west / northwest towards Eastern Creek. Eastern Creek is considered to be the primary receptor.
Background Groundwater Quality	Environ 2013; Ramboll 2017; Ramboll 2021b; Ramboll 2024; Ramboll 2025; Ramboll 2026b; WaterNSW bore search	Based on the topography and geology and results from Ramboll 2017, Ramboll 2021b, Ramboll 2024, Ramboll 2025 and Ramboll 2026b the local groundwater can be expected to be shallow, saline (conductivity measured up to 28,000 microsiemens per centimetre), mildly oxidising to non-oxidising conditions (redox potential measured between -123 and 215 millivolts) and mildly aerobic conditions (dissolved oxygen measured between 0.0 and 4.18 mg/L) on-site. The WaterNSW database does not identify any groundwater bores within 1 km of the Aerodrome site.

Condition	Source	Description
Site Boundaries and Surroundings	Nearmap™; Google Earth™	North – To the north of the Hatched Area, recently developed residential houses are present. Agricultural land with isolated residential properties are also present 1.2 km to the northwest on the other side of Eastern Creek. East – The Blacktown Richmond Railway line is located 20 m to the east running north-south. Rural residential properties are located further east. Towards the southeast is the Oppy Reserve and low-density residential houses. South – Vacant undeveloped land including a former Aerodrome runway area. Followed by The University of Western Sydney, Nirimba TAFE College and residential accommodation 650 m south (formerly part of the Schofields Aerodrome). Beyond is the residential suburb of Quakers Hill; and West – Additional developed and undeveloped residential land, followed by Eastern Creek to the west, beyond which lies Stonecutters Ridge Golf Club on the western side of Eastern Creek. A new residential development is located further to the west. To the northwest on the other side of Eastern Creek is agricultural land with isolated residential properties. The most notable sensitive receptor to the Hatched Area in respect to human health is the onsite residential properties. The closest sensitive ecological receptor is Eastern Creek located approximate 270 m to the west of the Hatched Area. The previous drainage channels have been filled and newly constructed drainage channels onsite flow into Eastern Creek. Eastern Creek forms part of the South Creek Catchment that flows into the Hawkesbury River. City of Blacktown Eastern Creek Catchment land use comprises industrial, commercial, residential, open space, pasture and bush/nature.
Closest Sensitive Receptor	Visual observations; Google Earth™	Other receptors include: 40 m west of the Hatched Area adjacent to Eastern Creek, recreational users of Stonecutters Ridge Golf Club, whilst approximately 250 m further west is a new residential development. Along the southern Aerodrome site boundary lies the educational precinct of the Nirimba Campus of Western Sydney University, with residential properties located further east across the railway line on the eastern Aerodrome site boundary, and a new residential developments across a swale adjacent to the northern Aerodrome site boundary.

2.2 Summary of Site and Investigation History

A summary of the Aerodrome site history was contained in previous reports prepared by Ramboll (Environ 2013; Ramboll 2017) by review of aerial photographs between 1942 to the present, a title search, plans provided by DHA, and interviews with long term employees. Additionally, information from 2017 to present was based on aerial photographs and information provided by DHA. A detailed discussion of the Aerodrome site history and the associated risk from PFAS was provided in an Overview Letter (Ramboll, 2021a). The significant events noted from the Aerodrome site history are summarised below:

- **Pre-1851:** Greenfield site
- **1851 – 1942:** Agricultural use (dairy and orchards)
- **1942 – 1946:** Occupation by Royal Australian Air Force (RAAF) and Royal Australian Navy (RAN) as part of a dispersal airfield where aircraft were dispersed under camouflaged hideouts. Hideouts were near refuelling points and dispersed bomb dumps

- **1944:** Runways and buildings were constructed from 1944 and main use of the aerodrome involved aircraft maintenance and aircrew training. An aircraft apron area and part of a taxiway was located on the site.
- **1946 – 1951:** The aerodrome was mainly used as a RAAF base
 - Most prominent structures on the aerodrome included: sleeping huts, repairs stores, headquarters office, photographic section, machine gun test butt and a sewage treatment plant (STP)
 - Main activities included training ground for fighter and transport pilots, aircraft maintenance and repair
 - In 1949, a segregated part of the aerodrome was used as sleeping quarters for a migrant hostel. It was closed in 1951
- **1952 – 1975:** Royal Australian Navy (RAN) use
 - The aerodrome was used by the RAN Fleet Air Arm and established an aircraft repair yard, however, this was short lived and was shut down in 1955²
 - The aerodrome was commissioned as HMAS Nirimba as an apprentice training establishment in 1956
 - A sports field and weapons electrical engineering school were constructed
 - A piggery was set up
 - The site layout remained the same with part of an aircraft apron area and taxiway evident.
- **1975 – 1993:** Schofields Flying Club began using the aerodrome. Light planes were housed and maintained
 - Piggery ceased to operate and was demolished in 1986
 - Airship (blimp) hanger constructed in 1986 and was operational until the early 1990s
- **1993 – 2017:** Vacant, miscellaneous uses of the wider aerodrome, e.g. go-cart track, driver training, and filming
 - Part of the aerodrome was leased to Sydney Organising Committee for the Olympic Games (SOCOG) and used for rehearsing for the Sydney 2000 Olympics closing ceremony
 - Demolition of some structures in the surrounding aerodrome
 - Use of northern part of the aerodrome as staging area for construction of rail line duplication
 - Following a site investigation, hydrocarbon surface staining and dumped piles of waste soils containing ash and drums along the edge of the on-site drainage channel associated with the FFTA were reportedly scraped and removed to landfill undergoing subsequent validation.
 - At the time of a JBS due diligence assessment (JBS, 2012), the surface of the FFTA area was described as partially sealed with a thin bituminous concrete pavement overlying a lateritic gravel layer. The bituminous layer was in poor condition across most of the site. The roadway to the FFTA was covered with mostly weathered asphalt, with some areas repaired and other areas covered with grass [This is consistent with site conditions observed by Ramboll during the 2017 assessment].
 - The 2017 Ramboll assessment identified a 'No Scrape Area' which comprised PFAS impacted soils in the vicinity of the FFTA.
- **May 2012:** The site was rezoned for urban development in May 2012 as part of the rezoning of the Schofields Precinct.
- **2013:** A Section A Audit was undertaken on the site (Environ, 2013).
- **2015:** DHA purchased the site from the Department of Defence.
- **February/March 2017 – present:** Residential and recreational redevelopment of the former Aerodrome site commenced in 2017 which involved significant land raising earthworks across the entire site to mitigate the risk of flooding from Eastern Creek.
 - As part of the development works in 2017, the PFAS impacted topsoils in the 'No Scrape Area' around and including the FFTA were excavated, mixed with more geotechnically

² Source: Nepean Naval and Maritime Museum, Penrith: <http://www.nepeannaval.org.au/Museum/Shore-Bases/HMAS-Nirimba.html>

suitable soils (VENM) and placed at depth (>3 m below the then existing ground level) in the PFAS Material Emplacement Area (MEA) before being covered with imported VENM.

- **November 2017:** Ramboll conducted a targeted Phase 2 PFAS site investigation across the FFTA area
- **May 2021:** Ramboll produced the PFAS Assessment Overview Letter for AEC other than the FFTA throughout the entire former Aerodrome site.
- **June 2021:** Ramboll produced the PFAS validation report for the No Scrape Area, North of Swale
- **October 2021:** Ramboll produced the PFAS Validation Report for the Remaining Site Area
- **March 2022:** Ramboll produced a final Remediation Action Plan for the No Scrape South Area.
- **December 2021 – June 2022:** Remediation works at the No Scrape South Area
- **July 2023:** Ramboll produced the PFAS Validation Report for the No Scrape South Area.
- **October 2024:** Ramboll produced a Groundwater Monitoring Well Network Review involving resampling of the serviceable existing groundwater wells.
- **December 2025:** Ramboll produced a DSI for the Reserve 980 area targeting CoPC within the bulk earthworks filling material.
- **March 2026:** Ramboll produced a groundwater and surface water monitoring report for the monitoring round in November 2025 that supports the site-wide groundwater monitoring program.

Previous investigations for the former Schofields Aerodrome site extend as far back as 1997 and a summary of the previous relevant reports undertaken are included in **Appendix 9**.

3. Site Development Chronology and Data Gaps Identification

3.1 Site Development Stages Review and Data Compilation

The Aerodrome site has undergone development in multiple stages, during which a substantial amount of information has been gathered from numerous investigations. These investigations have provided data relating both to the natural soils present on the Aerodrome site and to the imported materials, which have been reported as VENM (Virgin Excavated Natural Material).

Table 3-1 below serves to assemble these various data sources in a chronological context, assisting in the identification of areas where residual data gaps remain.

Table 3-1 Chronology and Data Gaps

Chronology of Aerodrome Site Development	Outcome (Soil Quality – Natural Soils)		Outcome (VENM Filling)	Residual Data Gaps for Hatched Area
May 2012: The Aerodrome site was rezoned for urban development in May 2012 as part of the rezoning of the Schofields Precinct.	-		-	-
2013: A Section A Audit was undertaken on the Aerodrome site (Environ, 2013).	The Aerodrome site is considered suitable for proposed residential development (excluding PFAS).		-	PFAS not considered as a potential contaminant of concern.
February/March 2017: Residential and recreational redevelopment commenced involving material importation to raise surface levels across the majority of the Aerodrome site.	Physical barrier of the layer of clean imported material between residual Aerodrome soils and residential developments.		Documentation including VENM Certificates, CMW Geoscience Summary of VENM Classification Reports and Construction Sciences Bulk Earthworks Reports indicates imported material is from reputable sources and comprises VENM / Clean Fill. No external PFAS sources indicated. Documentation indicates that similar sources have been placed across the entire Aerodrome Site during development phase.	Material document tracking of a lower standard than necessary for a Section A Audit.
November 2017: Targeted Phase 2 PFAS site investigation across the FFTA area	Sampling completed at the northern extent confirms PFAS in the FFTA is not extensive into the Hatched Area.		-	Sampling targeted near the FFTA area, no sampling throughout the Hatched Area.
May 2021: PFAS Assessment Overview Letter for AEC other than the FFTA throughout the entire former Aerodrome site.	Assessment indicates specific areas of PFAS concern associated with former land use were not located in the Hatched Area, with the exception of Former STP Stockpile Footprint. Former STP Stockpile footprint risk was closed out as low.		-	Phase 1 only, no sampling was conducted.
June 2021: PFAS validation report for the No Scrape Area, North of Swale and associated SAR/SAS	Report confirms that PFAS contamination from fire-fighting training activities was largely confined to the FFTA, with no evidence of northward migration or cross contamination into the Hatched Area.		Lithology and field observations did not provide any reason to suggest the material would not be considered VENM.	Sampling targeted No Scrape Area, North of Swale. No sampling conducted in Hatched Area.
October 2021: Ramboll produced the PFAS Validation Report for the Remaining Site Area and associated SAR/SAS	Underscores that while AECs with regard to PFAS have been identified, none of these are considered significant sources for or within the Hatched Area.			Sampling targeted Remaining Site Area. No sampling conducted in Hatched Area.
March 2022: Ramboll produced a final Remediation Action Plan (RAP) for the No Scrape South Area.	Works confirm that while PFAS contamination has occurred in the FFTA, the source materials have been effectively removed off-site and potential for migration or transference from FFTA onto the Hatched Area is minimal to negligible.			Sampling targeted No Scrape South Area. No sampling conducted in Hatched Area.
December 2021 – June 2022: Remediation works at the No Scrape South Area				
July 2023: Ramboll produced the PFAS Validation Report for the No Scrape South Area.				
October 2024: Ramboll produced a Groundwater Monitoring Well Network Review involving resampling of the serviceable existing groundwater wells.	While detectable concentrations of PFAS and metals, likely related to former PFAS use on the Aerodrome site, no evidence of risk to human health or environment is identified. Concentrations in groundwater beneath or down gradient of the Hatched Area are generally lower than the Remaining Site Area, supporting a lack of plausible historical sources on the Hatched Area.		No wells in Hatched Area, though comprehensive assessment downgradient of Hatched Area was completed.	
December 2025: Ramboll produced a DSI for the Reserve 980 area targeting CoPC within the bulk earthworks filling material	-	This additional data, whilst outside of the Hatched Area, provides useful data for assessment of site wide VENM quality, and ultimately supports that while VENM contains detectable concentrations of PFAS, none present a risk to human health of the environment. Reserve 980 is directly down gradient of the Hatched Area – No evidence presented that significant sources of PFAS contamination remain on, or beneath, the Hatched Area.	No sampling conducted in Hatched Area.	
March 2026: Ramboll produced a groundwater and surface water monitoring report for the monitoring round in November 2025 that supports the site-wide groundwater monitoring program	While detectable concentrations of PFAS and metals, likely related to former PFAS use on the Aerodrome site, no evidence of risk to human health or environment is identified. Concentrations in groundwater beneath or down gradient of the Hatched Area are generally lower than the Remaining Site Area, supporting a lack of plausible historical sources on the Hatched Area.		No wells in Hatched Area, though comprehensive assessment downgradient of Hatched Area was completed.	
December 2025: Ramboll completed site-wide investigations of the ‘Work Land and Subdivision Stage Areas’ targeting the bulk eartwork material to inform the development of Section A Audits. The reports for these works are currently being drafted, but the relevant data is appropriate for consideration	-	This additional data, whilst outside of the Hatched Area, provides useful data for assessment of site-wide VENM quality, and ultimately supports that while VENM contains detectable concentrations of PFAS, none present a risk to human health of the environment. No evidence presented that significant sources of PFAS contamination remain on, or beneath, the Hatched Area.	No sampling conducted in Hatched Area.	

3.2 Data Gaps

The primary data gaps identified within the Hatched Area reporting can be summarised as follows:

- No formal (i.e., Phase 1) documentation contextualizing the apparent absence of PFAS sources within the standalone Hatched Area or associated appraisal of the need for sampling thereafter (Phase 2).
- While there is a surfeit of information pertaining to the imported material and Level 1 Earthworks Supervision occurred for the full duration of importing materials (AS3798-2007 guidelines), material tracking was suboptimal and there are no analytical results of fill imported and placed during bulk earthworks within the Hatched Area.

Accordingly, the following sections look to identify and consider alternate evidence sources and present them in a weight-of-evidence approach to support a more robust appraisal of soil and groundwater quality in the Hatched Area.

4. Lines of Evidence Assessment

The data-gap review described above has identified some contaminated land site assessment components that are lacking in the appraisals completed to date, or which are available but not yet been documented in a consolidated standalone approach.

This section identifies where pertinent information is available, or, where alternate evidence can be presented in lieu of routine intrusive Hatched Area investigation outputs.

The Conceptual Site Model (CSM) framework, as promulgated through the Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure for contaminated site characterisation is employed for this purpose.

A CSM is a recognised approach for collating site information and data into a format that readily describes site conditions but also the interconnectedness of parameters pertinent to human health and ecological risk (i.e. pollutant linkages).

This section sets out a structured *weight-of-evidence* approach to compile, evaluate and synthesise all available information relevant to the Hatched Area, in order to address data gaps, inform a Conceptual Site Model (CSM) and inform an opinion on land use suitability. It presents the information under two broad headings being:

- The activities on the Aerodrome site during the former land use and the potential linkages to areas of concern where PFAS contamination of natural materials may be expected to have occurred; and
- The placement of a layer of fill across the Aerodrome site during redevelopment and the potential for these activities to have inadvertently spread PFAS into the Hatched Area.

4.1 Natural Soils Beneath Imported Material

4.1.1 CoPC (excluding PFAS)

The 2013 Environ SAR provides a comprehensive pre-development assessment of CoPC across the former Schofields Aerodrome, including multiple investigation locations situated within the Hatched Area. Thirty-seven sample locations from the Environ 2013 investigation fell within the Hatched Area footprint, covering historical AECs such as former building footprints, road and runway areas, the former STP precinct, and surrounding areas (**Figure 2, Appendix 1**).

Across these locations, Environ assessed a suite of conventional contaminants (metals, hydrocarbons, PAHs, pesticides, PCBs and asbestos). The SAR concluded that all CoPC had been adequately addressed through investigation and, where applicable, remediation and validation works. Key findings relevant to the Hatched Area included:

- No detections above adopted criteria were reported for building footprints, roads/runways and adjacent areas, or the "Remaining Site Area," confirming that these areas did not present unacceptable risks to human health or the environment.
- AECs subject to historical remediation—including the caretaker's compound, go-cart track, nursery, piggery, STP and landfill areas—were each validated and confirmed by the Auditor to meet residential criteria for relevant CoPC.
- Residual risks from undetected contamination were assessed as low, supported by broad site coverage, reliable historical information, and implementation of an unexpected-finds protocol to manage residual isolated occurrences encountered during redevelopment.

- Groundwater sampling undertaken as part of the audit did not identify impacts attributable to soil contamination, with metals and TPH detections limited, isolated, and not considered indicative of site-wide risk.

Based on these outcomes, Environ (2013) concluded that all identified AECs within and adjacent to the Hatched Area had been successfully closed out with respect to conventional CoPC (excluding PFAS, which was not part of the audit scope). The Auditor determined the Aerodrome site to be suitable for residential land use with accessible soil. Accordingly, for the purposes of this Hatched Area Suitability Review, historical CoPC other than PFAS are considered fully addressed, with no residual AECs or incomplete exposure pathways remaining within the Hatched Area.

4.1.2 PFAS relating to former Aerodrome Operations

Although PFAS was not included in the scope of the 2013 Environ Site Audit, multiple subsequent investigations completed outside, or at the peripheries of, the Hatched Area between 2017 and 2025 provide a useful basis for understanding PFAS distribution across the former Schofields Aerodrome and for assessing likely conditions within the Hatched Area. As intrusive investigation within the Hatched Area is not currently feasible, PFAS risk assessment relies more on comparison to surrounding validated areas, documented historical PFAS sources, and established contaminant behaviour across the wider Aerodrome site.

Ramboll's 2021 PFAS Assessment Overview Letter (Phase 1) identified the former Fire Fighting Training Area (FFTA) as the primary historical PFAS source and confirmed that PFAS impacts across the wider aerodrome were generally low, isolated, and confined to known source areas. Eight additional historical locations were identified and evaluated (Landfill 1, Landfill 2, Piggery Landfill, Radio Lab, Former Hangar, Blimp Hangar, STP and the former stockpiled STP media), with risk assessments concluding that none were likely to represent significant PFAS sources.

The overview letter determined that all areas outside the defined PFAS management zones—including the land now comprising the Hatched Area—were suitable for low-density residential use with respect to PFAS, noting only that any future groundwater use would require separate assessment.

Ramboll 2021 Remaining Site Area Validation provided the closest direct PFAS dataset to the Hatched Area. Across more than 150 soil samples taken from background areas, natural soils, former infrastructure footprints, historical AECs and infilled drainage lines, PFAS concentrations were predominantly below LOR and below adopted ecological and human health criteria.

A portion of the former Sewage Treatment Plant (STP) stockpile footprint extends into the "Remaining Site Area" assessed during the 2021 PFAS investigation. Although the full historical STP footprint could not be completely assessed due to access and ownership constraints, seven boreholes were advanced within the accessible portion of the STP stockpile footprint area. These boreholes targeted the underlying natural soils to evaluate whether the former STP media stockpiling area may have been a secondary source of PFAS. PFAS was not detected above the adopted criteria and/or the laboratory LOR in any sample from these locations. These findings support the conclusion reached in the 2021 Overview Letter that the former STP and former stockpiled STP media do not represent significant PFAS sources. The absence of detections across all seven boreholes provides additional confidence that the STP-related AEC does not present a credible PFAS risk linkage to the Hatched Area in its current form. Additionally, the stockpile was removed before the importation of VENM filling material. Therefore, potential impact (if present)

would be at depth, with no feasible method for the site owner to contact with it under the current land use scenario.

4.2 Imported Filling Material and Construction Works

Key lines of evidence for assessing soil quality, and therefore the suitability, of the Hatched Area are the quality, source consistency, and representativeness of the imported fill (documented as Virgin Excavated Natural Material, VENM) placed across the former Schofields Aerodrome during bulk earthworks. The Aerodrome site was filled in a sequenced approach (i.e., separable portions) that is apparent in the figures presented in **Appendix 8**. The separable portions (SP1 and SP2) are applicable to the Hatched Area, as depicted in **Figure A** below. It serves to illustrate that the Hatched Area was subject to the same cut-to-fill design and land raising program as the surrounding development areas. Therefore, verification of the filling sequence and quality control information package for the whole former Aerodrome is directly relevant to the Hatched Area. These themes are developed in the following sections.

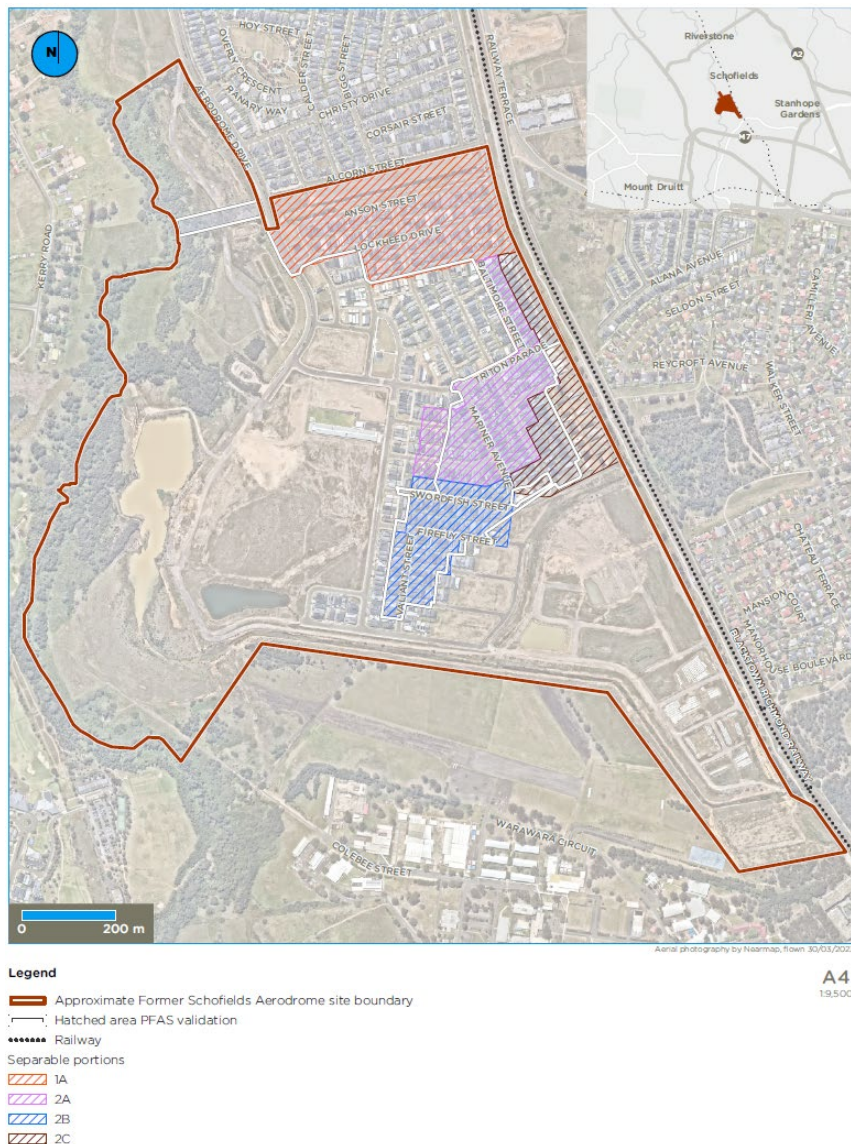


Figure A Separable Portions Applicable to the Hatched Area

4.2.1 VENM Certification

During the 2018–2020 redevelopment, the majority of the former aerodrome, including the Hatched Area, was built up using imported material classified as VENM. DHA provided a comprehensive set of VENM certificates (**Appendix 4**) covering the principal fill sources used during these earthworks. These certificates demonstrate that:

- Filling material was sourced (excavated) from over 30 offsite locations;
- The VENM certification process was adequate to demonstrate an acceptable level of confidence that former industrial, commercial, agricultural or waste-handling processes had not occurred, or where they had occurred, that impacts were unlikely to have resulted (i.e., from vacant vegetated land, land with open space uses such as carparking or previous residential dwellings)
- where tested, organic compounds (TPH, BTEX, PAHs, OCPs, PCBs and phenols) were either not detected or reported below relevant adopted guidelines
- where tested, metal concentrations were consistent with natural background ranges
- no acid sulfate soils or anthropogenic inclusions were identified
- materials complied with NSW EPA Waste Classification Guidelines (2014) requirements for VENM classification

While PFAS was not typically included in the analytical suite, it is worth noting that the identification of contaminants of concern in the VENM assessment approach is largely driven by an initial appraisal of former land uses and processes. Given the identified land use settings of the sites from which the VENM was extracted, it is considered reasonable that these VENM appraisals would not have plausibly identified PFAS as a contaminant of concern and therefore not tested for them.

Collectively, the documentation indicates that importation of chemically compliant natural soils occurred consistently across the Aerodrome site, including within the Hatched Area.

4.2.2 Network Geotechnics Bulk Earthworks Reports

Network Geotechnics Pty Ltd (NG), a Construction Sciences Company (CS), acting as the Geotechnical Inspection and Testing Authority during bulk earthworks across the former Schofields Aerodrome, provided two Bulk Earthworks Reports (**Appendix 5**) for Separable Portions SP1 and SP2.

These reports provide a robust line of evidence regarding the quality and suitability of fill placed in and adjacent to the Hatched Area.

NG conducted Level 1 supervision in accordance with AS3798-2007, stating that:

- Both site-won and imported materials were placed in 250 mm lifts and consistently achieved $\geq 98\%$ Standard Compaction.
- No deleterious materials, staining, odours or anthropogenic inclusions were observed during placement, and stripping inspections confirmed that subgrades were clean and suitable to receive fill.
- Imported fill volumes for SP1 and SP2 were sourced from multiple offsite locations certified as Virgin Excavated Natural Material (VENM).
- Across both stages, no unexpected contamination was encountered, except for a single ACM pipe uncovered in SP2. This was removed by specialist contractors and subsequently validated by NG, with remediation confirmed to be successful and confined to the excavation footprint.

- reaffirm that historical contamination issues had been addressed under previous Site Audits (2005, 2013) and that no outstanding contamination concerns remained within the development areas assessed

NG reviewed the VENM documentation provided by Western Earthmoving and concluded that *"all imported fill sources have been validated and are free from contamination"*. Field observations from NG during placement corroborated this assessment.

Based on the earthworks observations, compaction results, and VENM validation, NG considered that in Separable Portion SP1 and Separable Portion SP2 are *"suitable, from a contamination perspective and in accordance with NEPM (2013), for the proposed low density residential land use"*.

In the context of the Hatched Area, these findings demonstrate that the fill placed across the broader Aerodrome – including areas contiguous with the Hatched Area – was clean fill, validated, and consistent with VENM specifications, with no visual evidence of contamination introduced during bulk earthworks.

4.2.3 CMW Geoscience Summary of VENM Classification Reports

CMW Geosciences (CMW) prepared a summary of VENM classification reports compiled by various consultants for all imported fill used across Separable Portions SP1, SP2 (A–C), SP3 and SP4 of the former Schofields Aerodrome redevelopment (**Appendix 6**). This report corresponds to the same bulk-earthworks program that established the fill platform across the wider Aerodrome site, including the Hatched Area.

CMW's review confirms that CS/Network Geotechnics acted as the independent Geotechnical Inspection and Testing Authority, providing Level 1 supervision in accordance with AS3798-2007, and overseeing placement of imported materials and associated compaction controls. VENM classification reports for more than 30 separate source sites were reviewed. Across all accepted materials:

- Imported soils were classified as Virgin Excavated Natural Material (VENM) in accordance with NSW EPA Waste Classification Guidelines.
- Where tested, TPH, BTEX, PAHs, OCPs, PCBs and heavy metals were below relevant criteria or laboratory reporting limits.
- Salinity and pH testing was completed and accepted for the majority of imported sources, with results consistent with natural soils.
- Existing fill, demolition material, or disturbed soils at source sites were explicitly excluded from VENM certification.
- One source (Job 18) was noted as not being VENM by visual inspection at the time of delivery, and was therefore not accepted for importation.

CMW also noted that the broader Schofields Aerodrome precinct had undergone extensive contamination assessment, remediation and validation under two NSW EPA Site Audits (2005 and 2013), with the 2013 Auditor concluding the Aerodrome site was suitable for residential land use with accessible soils, subject to an unexpected finds protocol. CMW confirmed that imported materials for SP1–SP4 align with this suitability outcome.

Based on the combined VENM documentation, historical Site Audit findings and earthworks supervision records, CMW concluded that all imported materials used in SP1–SP4 were chemically compliant, geotechnically suitable, and appropriate for low-density residential development.

In the context of the Hatched Area, these findings support that the imported fill placed across the aerodrome was consistently validated, sourced from compliant VENM sites, and not associated with contamination risks, reinforcing the reliability of fill quality inferred for the Hatched Area.

4.2.4 Laboratory Data Relevant to the Imported Material

The following sections presents laboratory data relevant to the imported material. Where new data is provided (i.e., data not previously reported in other Ramboll reports) results are included in **Appendix 2** and have been assessed against the adopted guidelines outlined in **Appendix 10**. All additional laboratory results cited in this section that are relevant to previous assessments are presented in the reports referenced.

4.2.4.1 Remaining Site Area Validation (2021)

Adjacent PFAS-specific assessments included sampling of topsoil material in the area known as the Remaining Site Area. PFAS was generally below criteria adopted at the time of assessment and/or less than the laboratory LOR in the topsoil layer. This supports that the topsoil placed during the bulk earthworks is unlikely to contain significant PFAS contamination and therefore fill-related PFAS pathways are unlikely to be present. Additionally, field observations during drilling and borehole works supported that the material encountered was consistent (in colour, texture, grain size etc.) with the descriptions of imported VENM from earlier reports, further supporting the chemical and physical integrity of the fill in this area and across the wider Aerodrome site.

The Remaining Site Area topsoil was assessed against guidelines that have since been superseded (NEMP 2.0). Under these outdated guidelines, the laboratory limit of reporting (LOR) was set at a higher threshold of 0.005 mg/kg. This means that the analytical results from these samples cannot be reliably compared to the newly adopted, more stringent criteria, as the revised guidelines require a lower LOR to ensure accurate detection and assessment. Consequently, the ability to directly evaluate compliance with the updated standards is limited, as the original testing did not possess the sensitivity now required.

In practical terms, this means that while the historic data provides some indication of contaminant levels in topsoil, it does not allow for a full and precise comparison against the current residential and ecological criteria.

4.2.4.2 Shallow Fill Sampling – 7 Properties (2024)

DHA engaged Ramboll to collect and analyse shallow fill samples from eight hand augered boreholes to assess contamination related to earthworks near seven properties proximal to the Hatched Area in August 2024. Results are presented in **Table 1 and 2, Appendix 2**.

A total of eight samples were analysed from the hand auger boreholes. All analysed CoPC, including metals, hydrocarbons and PFAS, were recorded below adopted residential criteria and/or below LOR. No anthropogenic debris or unexpected materials were logged during augering. These results support that the fill in the Hatched Area is consistent with typical VENM quality.

4.2.4.3 Reserve 980 DSI (2025)

Reserve 980, located immediately adjacent to part of the Hatched Area and noted to have been placed during the same earthworks campaign, was investigated through borehole drilling. Ninety-four soil and five groundwater samples were analysed for a broad suite of CoPC including PFAS. All soil results were below human health and ecological criteria, with no asbestos detected (aside from a small quantity of illegally dumped bonded ACM subsequently removed and validated). No PFAS exceedances were reported in soils. Visually, the material encountered was

consistent with the descriptions of VENM observed in the Hatched Area, with the exception of a single location where a piece of plastic tape was identified. This isolated finding was considered likely to have been introduced incidentally during the construction import works, rather than originating from the VENM source. These results demonstrate that the VENM placed in comparable development areas is of appropriate chemical quality and does not presents unacceptable risks.

4.2.4.4 Interim Sampling Results for Site-wide Audit Program

Ramboll is currently completing Detailed Site Investigations (DSIs) across the remaining Work Land and Subdivision Stage areas to support future Section A Site Audit Statements. Although reporting is ongoing, laboratory analysis for soil samples collected to date provides a relevant additional line of evidence for understanding fill quality within the broader development footprint including the Hatched Area. Laboratory results are provided in **Table 3 and Table 4, Appendix 2**.

A total of 196 samples were analysed for BTEXN, Metals, OCP/OPP, PAH, PCB, PFAS, TRH and VOC and 30 additional samples were analysed for PFAS.

Across all areas investigated, CoPC results were predominantly below adopted human health and ecological criteria and/or below laboratory reporting limits, consistent with previous validation findings from the Former Schofields Aerodrome, with the exception of the following:

- One sample (S7_BH13_0.0-0.1 at 590 mg/kg) exceeded adopted ecological guidelines for copper (180 mg/kg). This was only noted in one location, therefore is not considered to be a widespread issue throughout the bulk filling material.
- One sample (S6H2_BH02_0.9-1.0 of 440 mg/kg) exceeded adopted ecological guidelines for zinc (430 mg/kg). This was considered to be a minor exceedance and was only noted in one location, and therefore was not considered to be a widespread concern throughout the bulk filling material.
- Seven samples marginally exceeded adopted human health (0.003 mg/kg) and ecological (0.003 mg/kg) guidelines for PFOS. These are summarised below and a statistical summary is presented in
- **Table 4-1.**
 - Two exceedances were noted in surficial soils in Stage S6H2 (S6H2_BH01_0.0-0.1 of 0.0059 mg/kg and S6H2_BH02_0.0-0.1 of 0.0083 mg/kg). These were considered to be associated with landscaped garden/mulch material placed during residential development. These materials are not considered to be representative of the underlying VENM fill layer, and the elevated concentrations are consistent with typical organic landscaping products. As such, they do not indicate a source-area issue or an impact from historical aerodrome operations or bulk earthworks.
 - Four minor exceedances were noted in surficial soils within Stage 7 (S7_BH02_0.0-0.1 for 0.0032 mg/kg, S7_BH05_0.0-0.1 for 0.0054 mg/kg, S7_BH11_0.0-0.1 for 0.0046 mg/kg and S7_BH17_0.0-0.1 for 0.0039 mg/kg) These exceedances were marginally above the relevant criteria but did not form a contiguous or spatially coherent pattern as would suggest an wider area of impact (i.e. a hotspot or plume). When assessed statistically across the Stage 7 dataset, the detections are considered more likely to represent isolated outliers within an heterogenous data set.
 - Additional sampling was conducted in Stage 7 surficial soils as a result of the four exceedances. An additional 30 samples were analysed and only one (S7_SS02_0.0 for 0.0037 µg/kg) marginally exceeded criteria.

- A 95% UCL was calculated on PFOS in the surficial soils in Stage 7 and results are included in **Table 4, Appendix 2** and output is included in **Appendix 11**. PFOS UCL results were below adopted human health and ecological criteria.

This additional sampling provided more robust statistical confidence that while there are low level detections of PFAS in the VENM placed in Stage 7/7a, they are not symptomatic of spatially continuous plumes or wide areas of impact and are more likely reflective of sporadic occurrences, caused by entrainment of fugitive materials during placement. It is noteworthy that these minor detections occur in the fill placed above the former FFTA remediation zone. Notwithstanding, these detections, the statistical analysis and comparison with the guidelines indicate they are not a risk to human health of the environment.

Given the absence of any observable staining, odour, anthropogenic material, or exceedance patterns, and noting the conservative nature of Tier 1 screening values, these results are considered low-level, residual variability within imported natural soils, rather than evidence of systemic contamination.

When evaluated in the context of:

- extensive VENM certification and Level 1 earthworks supervision,
- conformity of the broader dataset with adopted criteria,
- previous PFAS and CoPC validation works (2013–2025),
- lack of plausible contaminant sources in the investigated areas, and
- the isolated, low-magnitude nature of the exceedances,

the seven exceedances do not materially alter the risk profile of the Work Land and Subdivision Stage areas. No complete source–pathway–receptor linkages are identified as a result of these findings, and the results do not preclude the proposed low-density residential land use.

Overall, the interim sampling results provide further support that the imported filling material across the Aerodrome site is chemically consistent, compliant with VENM expectations, and unlikely to pose unacceptable risks to human health or the environment.

4.2.4.5 Statistical Summary of PFAS within Bulk Fill Material

The following section presents a detailed statistical overview of laboratory results obtained for PFOS concentrations within the bulk fill material sampled across the Aerodrome site. The analysis provides insights into the distribution, frequency, and magnitude of isolated PFOS detections, as well as their compliance with the applicable assessment criteria.

The statistical summary covers results from multiple comparable sampling campaigns, including those from the Reserve 980 DSI and additional interim sampling events. The intent of collating PFOS concentrations in a wider data set is to inform a comprehensive appraisal of PFOS distribution throughout the extensive imported fill layer, further supporting the evidence-based assessment of conditions in the Hatched Area.

Table 4-1 PFOS Statistical Summary

	Reserve 980 DSI	Interim Sampling Results	Total
No. of Locations	47	103	150
No. of Samples	94	210	304
Exceedances of residential criteria (0.003 mg/kg)	0	7 (3.33%)	7
Exceedances of ecological criteria (0.003 mg/kg)	0	7 (3.33%)	7

Detections above LOR (0.0001 mg/kg)*	26 (28%)	101 (48%)	127 (42%)
Minimum Detection (mg/kg)	0.0001	0.0001	0.0001
Maximum Detection (mg/kg)	0.0015	0.0083	0.0083
Average Detection (mg/kg)	0.00032	0.00096	0.00064

*We note that a relatively high proportion of the samples detected 'trace' PFOS concentrations. As PFAS is not routinely included in standard VENM analytical suites, the potential for PFAS to have been present in the imported fill cannot be verified. Equally, the pattern and distribution of the concentrations do not point to a singular source. Given the widespread occurrence of low-level PFAS in the environment, and the documented occurrence of low levels of PFAS in 'clean' fill more widely, the reported concentrations are not considered consistent with significant contamination. All detections are below applicable guideline values and are therefore unlikely to pose a risk to human health or the environment, nor do they constrain the current land use.

4.2.5 Historical Aerial Imagery

An historical aerial image photographic log of 33 photographs at varied time intervals between 11 Feb 2017 and 21 April 2022 (**Appendix 8**) provides a time series visual document of the sequencing of the earthworks undertaken within the Hatched Area and across the wider Aerodrome site. A thorough review of these images shows no clear or direct evidence of activities typically associated with contamination risk, such as uncontrolled boundaries allowing fly tipping, stockpiles of materials showing markedly different colouration or texture than expected from the descriptions in the reports or unexpected haul routes to peripheral desposition zones.

While an aerial photographic record is limited to the information presented, when considered in combination with the VENM importation history outlined above, the imagery supports the conclusion that this early stage of construction work was consistent with the expected, controlled Aerodrome site development practices, and there are no visual indicators of unauthorised or contaminating activities during the relevant periods.

- More specifically, the Hatched Area underwent the same bulk-earthworks sequencing—scrape, mixing, placement, and final level construction—as surrounding validated stages, as evidenced by the consistent patterns and absence of irregularities in the photographic record.
- VENM was placed in consistent 'lifts' (generally 2–3 m thick) across the Hatched Area prior to residential subdivision, with aerial images suggesting uniform layering and no signs of disparate or foreign material introduction.
- There is no indication from the imagery of stockpiling, deep excavation, or material re-handling within the Hatched Area that would elevate the risk of heterogeneous fill or inclusion of unclassified materials.
- Overall, the photographic log shows a methodical, controlled approach to earthworks, with no obvious visual evidence that would suggest deviation from approved fill management protocols.

These observations support requirements for representativeness and comparability. They demonstrate that fill placed in the Hatched Area is consistent with fill validated elsewhere across the aerodrome and, importantly, that there is no photographic or documentary evidence to suggest that contaminating works occurred during this stage of the development process.

4.3 Groundwater

The groundwater and surface water monitoring report (**Appendix 7**) for the Nirimba Fields Aerodrome site found that concentrations of PFAS and other CoPC in groundwater were generally

low, with measured values below key protection guidelines protective of identified receptors (namely ecosystems and – although unlikely – recreational users of the Eastern Creek).

4.3.1 Human Health

There is no viable pathway for groundwater contaminants to impact human health for occupants of the Hatched Area, as there is no direct access to groundwater and therefore no need for comparison to drinking water guidelines. The only plausible human health exposure is through recreational use of Eastern Creek, which is considered unlikely but has been adopted as a conservative scenario; in any case, monitoring confirms there are no exceedances of recreational water guidelines. This supports the conclusion that human health risk to site occupants is low and acceptable under current conditions.

4.3.2 Ecological Health

Groundwater beneath the wider Former Schofields Aerodrome continues to display low-yield, saline, slow-moving conditions, which inherently limit contaminant migration.

For non-PFAS CoPC, detections are sporadic and at relatively low concentrations, with exceedances limited to metals (copper, nickel, zinc) that are consistent with natural background geochemistry of the clay/shale aquifer and have been observed in historical datasets across the Aerodrome site. There is no evidence of soil-derived CoPC mobilising from the Hatched Area or toward Eastern Creek.

For PFAS, the application of updated ANZG (2026) PFOS default guideline values (99% species protection = 0.02 µg/L) shows that groundwater detections across the Aerodrome site are low, with data from one well marginally exceeding this value. This exceedance is noted to be located in an area that is hydraulically connected to Eastern Creek and but may also be influenced by a temporary basin. All PFOS concentrations remain below the 95% species protection value (0.9 µg/L), from which low and acceptable direct aquatic toxicity risk is inferred. Surface water in Eastern Creek shows PFOS below the ANZG (2026) 99% guideline, with upstream concentrations slightly higher than downstream, indicating background catchment influence rather than site-derived impact.

Hydrogeological evidence (including potential periodic losing-stream behaviour, reverse gradients in the riparian zone, and extremely low groundwater velocities) suggests there are fewer viable groundwater–surface water pathways for PFAS or other CoPC to reach Eastern Creek.

Overall, when considering contaminant concentrations, hydrogeological conditions, updated ecological guidelines, and surface-water quality data, groundwater emanating from the Hatched Area does not represent a complete or meaningful source–pathway–receptor linkage. PFAS and other CoPC in groundwater are therefore not a constraint to the Hatched Area's suitability for low-density residential land use.

5. Conceptual Site Model

A Conceptual Site Model (CSM) is a site-specific qualitative description of the source(s) of contamination, the pathway(s) by which contaminants may migrate through the environmental media, and the populations (human and / or ecological) that may be potentially exposed. This relationship is commonly known as a Source-Pathway-Receptor (SPR) linkage. Where one or more elements of the SPR linkage are missing, the exposure pathway is incomplete, and no further assessment is required.

Based on the weight of evidence review in **Section 4** and the understanding of potential contamination associated with the historical use of the Aerodrome site, an evaluation of source-pathway-receptor linkages associated with the Hatched Area is provided in **Table 5-1**.

Table 5-1 Conceptual Site Model

Source and CoPC	Potential Transport Pathway	Potential Receptor	Potentially Complete SPR Linkages
Historical Aerodrome Operations and Remediation; TRH, BTEX, Heavy Metals, PAHs, OCPs, PCBs, asbestos and PFAS Imported material (VENM); TRH, BTEX, Heavy Metals, PAHs, OCPs, PCBs, asbestos and PFAS Construction works / bulk earthworks conducted on the Aerodrome site; TRH, BTEX, Heavy Metals, PAHs, OCPs, PCBs, and PFAS	Incidental ingestion and dermal contact Inhalation of dust and/or vapours Surface water run-off Leaching of contaminants and vertical migration in groundwater Lateral migration of groundwater to surface water bodies Uptake by terrestrial ecology	Future site users (recreational) Current and future construction and maintenance workers Adjacent site users Onsite ecology Offsite ecology	No risk identified for SPR Linkages for soil. PFAS in Natural Soils Ramboll 2021a identified areas of concern for potential sources of PFAS from potential associated activities from point sources of PFAS contamination listed in Appendix B of NEMP 2.0, 2020. One of the areas identified in this report was the Former Stockpiled Sewerage Treatment Plant (STP) Media. The report concluded that, it is considered unlikely that the former stockpiled STP media would have been significantly impacted by PFAS. Although natural soils beneath the Hatched Area have not been directly sampled, the absence of plausible PFAS sources within the Hatched Area, the location of identified PFAS impacts relative to groundwater flow direction, and the reported low risk from PFAS in natural soils immediately adjacent to the Hatched Area indicate that the risk of contamination in natural soils is low. On this basis, no complete source–pathway–receptor linkage is expected for natural soils beneath the Hatched Area. Imported Material Bulk earthworks for the wider Aerodrome redevelopment involved placement of imported Virgin Excavated Natural Material (VENM) across all development areas, including the Hatched Area. Comprehensive VENM certification packages, independent Level 1 supervision (AS3798), and construction-phase inspections by Construction Sciences and CMW confirmed that imported materials complied with VENM requirements, contained no anthropogenic inclusions, and met salinity, pH, and chemical quality expectations. Laboratory results from adjacent stages (including Reserve 980 and interim sampling results), together with eight shallow samples collected adjacent to the Hatched Area in 2024, showed all contaminants of potential concern—including PFAS—below adopted residential and ecological criteria. No fill-related AECs were identified, and no evidence exists of unclassified or variable-quality material being used in the Hatched Area. The multi-tiered 'weight-of-evidence' assessment of imported material used in the development of the Hatched Area indicates a low potential for significant PFAS impact to be present in the VENM fill layer. Accordingly, unacceptable risks to human health or ecological receptors were not

Source and CoPC	Potential Transport Pathway	Potential Receptor	Potentially Complete SPR Linkages
			identified. Comprehensive information sources have been collated regarding the quality of the fill. While minor chemical exceedances were identified in areas comparable to the Hatched Area, assessment has indicated there are no viable mechanisms for contaminant transport or complete exposure pathways. Therefore, based on the available evidence, a complete source–pathway–receptor linkage between potential PFAS contamination in the fill layer and the identified Hatched Area receptors has not been identified Potential SPR linkages for groundwater Concentrations of CoPC in groundwater wells located downgradient of the Hatched Area in a recent monitoring report (Ramboll 2026b) were well below the human health criteria adopted for recreational users of Eastern Creek. A complete SPR linkage for human health exposure to groundwater has not been identified. The potential beneficial reuse of drinking water pathway is considered incomplete given that groundwater reuse (such as extraction for irrigation) post development is unlikely given poor yields from natural clays. Concentrations of PFAS in groundwater exceeded the 99% species protection level in one location downgradient of the Hatched Area, however this guideline is intended for application in surface water environments and the characteristics of the groundwater system at the site make it unlikely that PFAS impacted groundwater will reach Eastern Creek. The SPR linkage for ecological exposure to groundwater is therefore considered to be incomplete. Direct dermal contact or incidental ingestion of contaminants in groundwater during subsurface works is considered to be low as groundwater on the site is between 3 – 5 mbgl and hence an incomplete SPR linkage. Previous investigations (Environ, 2013; Ramboll, May 2021; Ramboll, 2024; Ramboll 2025) indicated the contamination risk to groundwater for CoPC from the aerodrome operations and remediation are low and acceptable. Notwithstanding, the sitewide groundwater monitoring program supports the previous conclusion. No SPR linkages for surface water Currently, it is considered likely that surface water will infiltrate unsealed site soils during low to moderate rainfall events, with any excess runoff conveyed via overland flow to the surrounding road network and captured by the existing municipal stormwater drainage system, which

Source and CoPC	Potential Transport Pathway	Potential Receptor	Potentially Complete SPR Linkages
			ultimately discharges to Eastern Creek. There are no permanent surface water features within the Hatched Area and no direct discharge point to the creek from the Hatched Area area. Mobilisation of site-derived contaminants in stormwater runoff is not likely. Given the physical distance and the construction of the intervening stormwater infrastructure, together with expected attenuation/dilution during conveyance, surface water from the Hatched Area is not anticipated to result in a measurable impact to Eastern Creek. Accordingly, the surface water SPR linkage is considered incomplete. No SPR linkages for sediment There is no sediment identified on the developed Hatched Area land, therefore this SPR linkage is considered to be incomplete.

6. Conclusions

This Hatched Area Suitability Review has evaluated the Hatched Area using a structured desktop based weight-of-evidence approach, integrating historical investigations, VENM documentation, laboratory results from adjacent areas, groundwater and surface water monitoring, and refined conceptual site modelling. Although intrusive investigation was not feasible within the Hatched Area, the available evidence base is extensive, site-specific, and of sufficient quality to support an assessment of land-use suitability.

6.1 Soil – Natural Soils and Imported Material

All identified Areas of Environmental Concern (AECs) relevant to the Hatched Area were previously addressed through the Environ (2013) Site Audit, which concluded that conventional CoPC – including metals, hydrocarbons, PAHs, pesticides, PCBs and asbestos – had been adequately investigated, remediated where required, and validated as suitable for residential use. No residual AECs or incomplete exposure pathways relating to these CoPC remain.

For PFAS, while the Hatched Area itself could not be intrusively assessed, multiple investigations undertaken between 2017 and 2025 in surrounding areas confirm that PFAS impacts across the former aerodrome are limited, isolated and confined to known source areas associated with the former Fire Fighting Training Area (FFTA). Adjacent assessments – including the No Scrape Area investigations, Remaining Site Area PFAS validation, Reserve 980 DSI and the 2023 No Scrape South remediation – demonstrate that PFAS concentrations in imported fill and natural soils outside the FFTA are consistently not detected (above the LOR) or below adopted human health and ecological criteria. No plausible residual PFAS sources remain within the Hatched Area, and monitoring results do not indicate lateral migration towards it.

Imported fill used to raise the Aerodrome site profile to required development levels during bulk earthworks was documented as Virgin Excavated Natural Material (VENM). Review of aerial photographs, in the context of engineering quality control documentation, indicates the wider Aerodrome site was filled with similar sources using similar civil engineering approaches, which would have identified (and rejected) significant volumes of spurious deleterious materials. Laboratory data from adjacent development stages supports that the fill is chemically compliant, free of anthropogenic inclusions, and does not contain CoPC (including PFAS) at concentrations of concern. These results align with documented VENM certification, earthworks sequencing, and field observations, indicating it is reasonable to conclude that the fill profile across the Hatched Area is consistent with validated areas elsewhere on the wider Aerodrome site.

6.2 Groundwater and Surface Water

Groundwater beneath the wider aerodrome is shallow, low-yielding and characterised by slow seepage velocities. PFAS detections observed across monitoring wells are generally low and spatially variable, with exceedances of the most conservative 99% species protection level limited to isolated upgradient wells. All measured concentrations are below the ANZG PFOS default guideline value, and multiple assessments have concluded that any PFAS present in groundwater is unlikely to reach Eastern Creek at concentrations of concern due to attenuation and dilution.

No groundwater wells are located within the Hatched Area, and no exposure pathway exists for beneficial reuse of groundwater. The refined conceptual site model identifies groundwater related human health pathways as 'incomplete'.

6.3 Overall Conclusion

Based on the integration of all available identified lines of evidence – including historical AEC closure, PFAS investigations, VENM quality documentation, laboratory results, earthworks

sequencing, and groundwater monitoring – it is reasonable to conclude conditions within the Hatched Area are similar to those that have been exhaustively characterised across the wider Aerodrome site and that the potential for significant areas of residual PFAS in the Hatched Area are low. On this basis, the Hatched Area is considered suitable for its low-density residential land use.

7. General Limitations and Reliance

This report has been prepared by Ramboll Australia Pty Ltd ("Ramboll") exclusively for the intended use by the client Defence Housing Australia in accordance with the agreement (Nirimba Fields Ramboll Hatched Area Site Suitability Review V2.0 dated 23 February 2026) between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will continue to be used for its current purpose and end-use without significant changes either on-site or off-site.

Ramboll's scope of services for this assignment did not include collecting samples of any environmental media. As such, Ramboll cannot rule out the existence of conditions, including, but not limited to, contamination not identified and defined by the data and information available to and/or obtained by Ramboll. As an example, this assessment must not be considered as an asbestos survey (whether in built structures, waste, soils, etc.), even though the subject of asbestos-containing materials may have been discussed in the report.

Some of the data reviewed in this assessment was collected under previous guidelines and criteria which have since been superseded. Consequently, direct comparison of these historical results with current standards is not always possible, particularly where laboratory limits of reporting for certain analytes do not meet the requirements of the updated criteria. This limitation means that while the available evidence provides a useful indication of site conditions, caution should be exercised when interpreting historical data in the context of present-day regulatory benchmarks.

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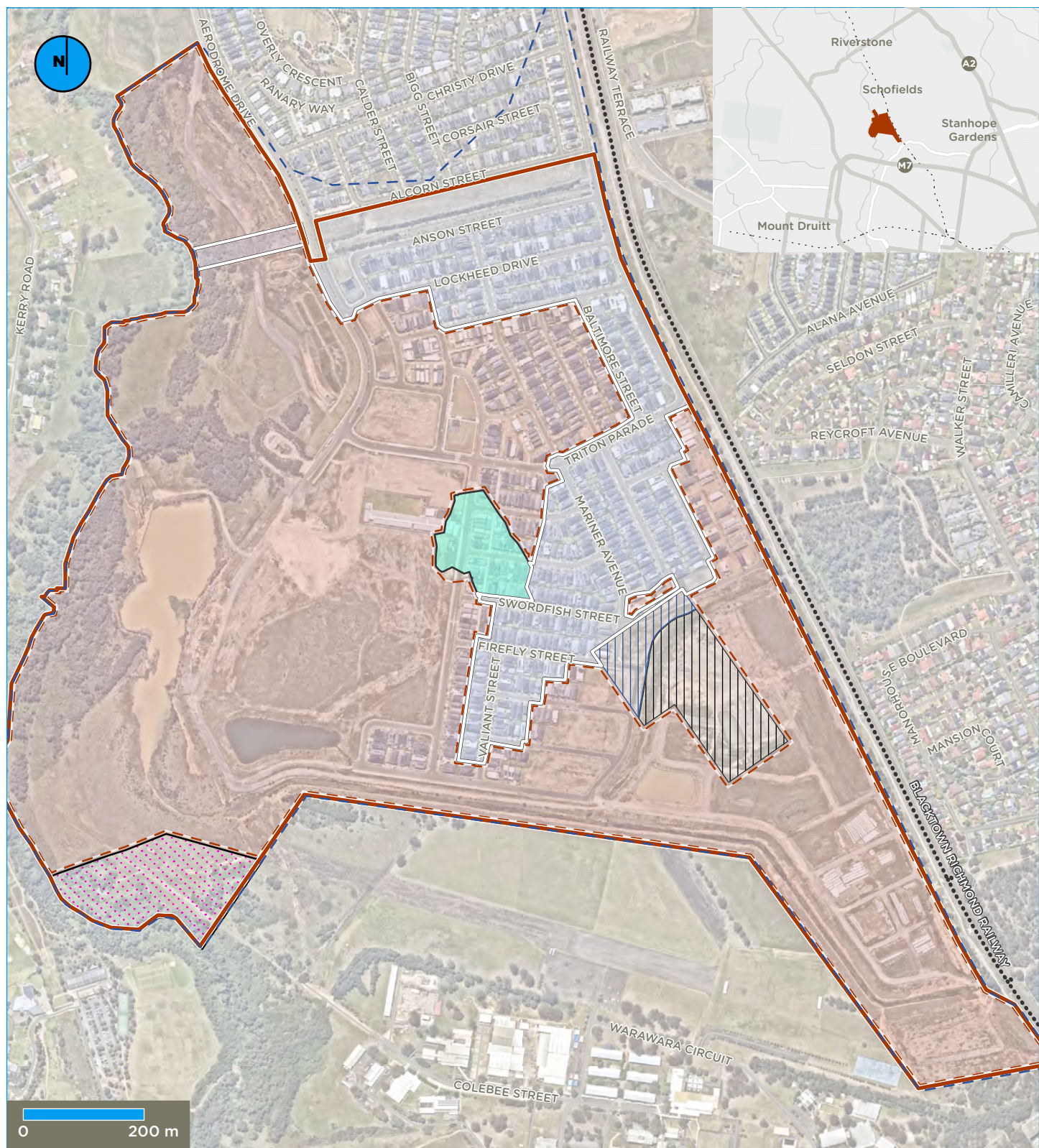
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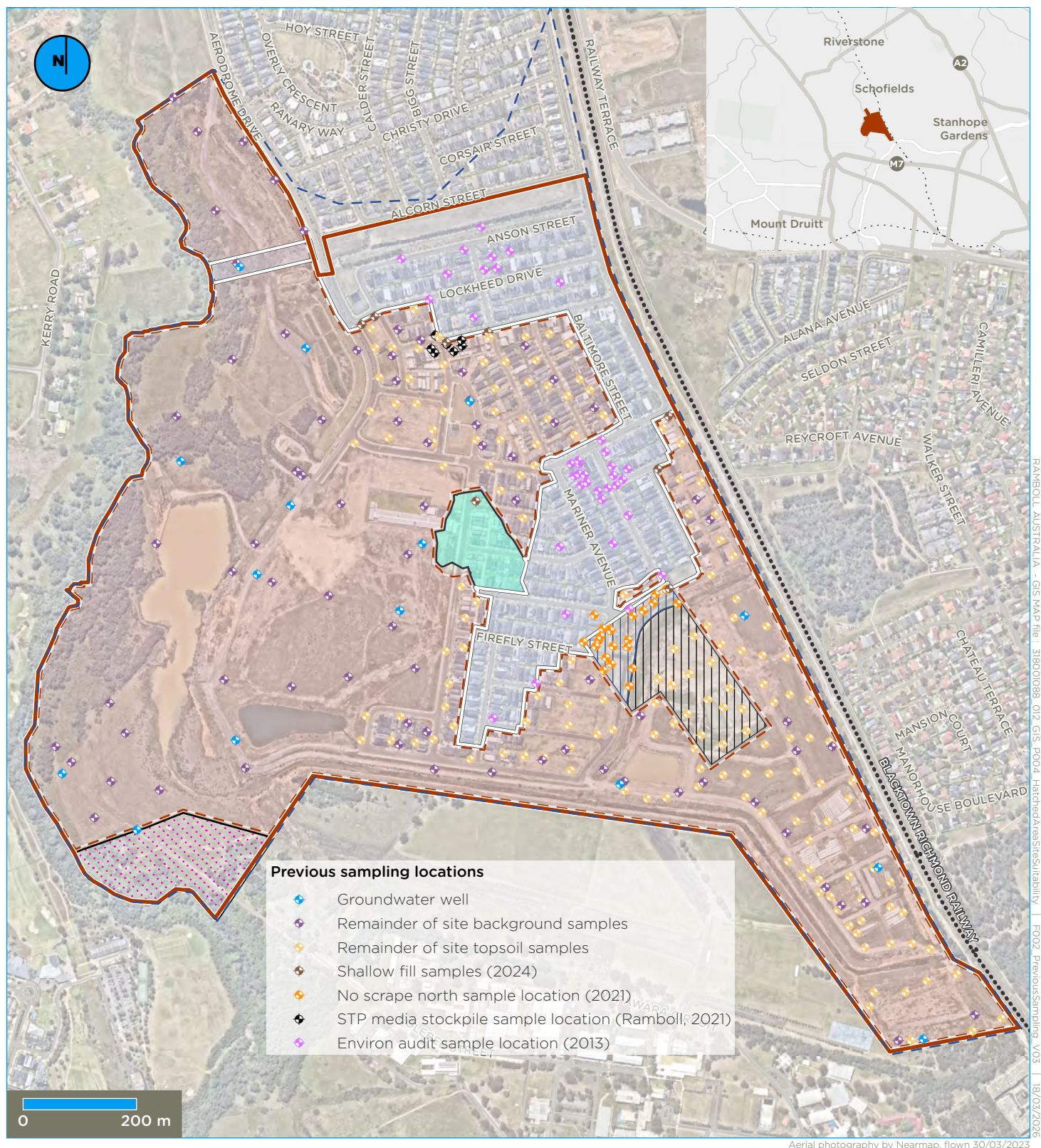
Appendix 1 Figures



Legend

- Approximate Former Schofields Aerodrome site boundary
- Hatched area PFAS validation
- Railway
- Previous SAR/SAS Audit Areas
- Site Audit (Environ, 2013)
- Remainder of site SAR/SAS site boundary (Ramboll, 2021)
- PFAS material emplacement area (MEA) SAR/SAS site boundary (Ramboll, 2021)
- North of Swale "No Scrape" Area SAR/SAS site boundary (Ramboll, 2021)
- No scrape area south SAR/SAS site boundary (Ramboll, 2023)
- STP and LF2 SAR/SAS site boundary (Ramboll, 2023)

Figure 1 : Site Location and Layout
Site Suitability Review, Hatched Area



Legend

- Approximate Former Schofields Aerodrome site boundary
- Hatched area PFAS validation
- Railway
- Previous SAR/SAS Audit Areas
- Site Audit (Environ, 2013)
- Remainder of site SAR/SAS site boundary (Ramboll, 2021)
- PFAS material emplacement area (MEA) SAR/SAS site boundary (Ramboll, 2021)
- North of Swale "No Scrape" Area SAR/SAS site boundary (Ramboll, 2021)
- 'No Scrape Area' - Area not suitable for top soil re-use (moved to placement area)
- STP and LF2 SAR/SAS site boundary (Ramboll, 2023)

Figure 1 : Site Location and Layout

Site Suitability Review, Hatched Area