



Site Audit Report

No Scrape Area South, Former Schofields Aerodrome, Triton Parade,
Nirimba Fields NSW 2763

Audit Number: MP169_05_R1

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Document Information

Site Audit Report, No Scrape Area South, Former Schofields Aerodrome, Triton Parade, Nirimba Fields NSW 2763

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Senversa acknowledges the traditional custodians of the land on which this work was created and pay our respect to Elders past and present.



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List of Acronyms

Acronym	Definition	Acronym	Definition
Measures		CLM Act	NSW Contaminated Land Management Act 1997
%	per cent	COC	Chain of Custody
µg/L	Micrograms per Litre	COPC	Contaminants of Potential Concern
ha	Hectare	Council	Blacktown City Council
km	Kilometres	CSM	Conceptual Site Model
m	Metre	DGV	Default Guideline Value
mAHD	Metres Australian Height Datum	DHA	Defence Housing Australia
mbgl	Metres below ground level	DP	Deposited Plan
mbtoc	Metres below top of casing	DQI	Data Quality Indicator
mg/kg	Milligrams per Kilogram	DQO	Data Quality Objective
mg/L	Milligrams per Litre	EMP	Environmental Management Plan
mm	Millimetre	EPA	Environment Protection Authority (NSW)
General		FFTA	Former Fire Training Area
AECs	Areas Of Environmental Concern	GME	Groundwater Monitoring Event
AFFF	Aqueous Film Forming Foam	GPS	Global Positioning System
ALS	Australian Laboratory Services	HEPA	Heads of EPAs Australia and New Zealand
ANZECC	Australian and New Zealand Environment and Conservation Council	HIL	Health Investigation Level
ANZG	Australian and New Zealand Governments and Australian State and Territory Governments	IAA	Interim Audit Advice
ASLP	Australian Standard Leaching Procedure	LF2	Landfill 2
CEMP	Construction Environmental Management Plan	MEA	Material Emplacement Area
		NATA	National Association of Testing Authorities



Acronym	Definition
NEMP	National Environmental Management Plan
NEPM ASC	National Environment Protection (Assessment of Site Contamination) Measure
PFAS	Per-and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PID	Photo-Ionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RAAF	Royal Australian Air Force
Ramboll	Ramboll Australia Pty Ltd
RAN	Royal Australian Navy
RAP	Remediation Action Plan

Acronym	Definition
RPD	Relative Percent Difference
SAQP	Sampling, Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SEPP	State Environmental Planning Policy
STP	Sewage Treatment Plant
SWL	Standing Water Level
TCLP	Toxicity characteristic leaching procedure
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
VAC	Validation Acceptance Criteria
VENM	Virgin Excavated Natural Material
—	On tables is "not calculated", "no criteria" or "not applicable"



1.0 Introduction

A site contamination audit (the audit) has been conducted in relation to an area known as 'No Scrape Area South' (the site or audit site) located within a new residential development at the new suburb of Nirimba Fields (the Nirimba Fields), NSW 2763.

As shown in Attachment 1 and 12 (Appendix A), the No Scrape Area South audit site is located approximately in the centre of the Nirimba Fields housing estate. The larger Nirimba Fields housing estate has an approximate total area of 135 hectare and forms part of the former Schofields Aerodrome.

The 'No Scrape Area' is approximately 4.4 ha and was the Former Firefighting Training Area (FFTA) of the former aerodrome that has been divided into two subareas:

- North of Swale (approximately 1.15 ha) – Subject of a previous Site Audit Statement (SAS)(MP169_2_R).
- South of Swale (approximately 3.25 ha) – This is the current audit site and subject of the current SAS MP169_5_R.

External to the audit site (i.e., No Scrape Area South), the former Schofields Aerodrome comprises of the following areas:

- Already developed/sold residential lots.
- Per- and polyfluoroalkyl substances (PFAS) Material Emplacement Area (MEA).
- Former fire flight training area (FFTA).
- No Scrape Area, North of Swale.
- Former Sewage Treatment Plant (STP) and Landfill 2 (LF2)
- PFAS Remaining Site Area.

1.1 Audit Objective

The audit was conducted to provide an independent review by an EPA-accredited site auditor of whether the nature and extent of per-and poly-fluoroalkyl substances (PFAS) contamination at the audit site has been appropriately determined and to assess the suitability and appropriateness of the validation report prepared for the audit site, i.e. a "Site Audit" as defined in Section 4 (1) (b) (i and v) of the NSW Contaminated Land Management Act 1997 (the CLM Act).

Blacktown City Council (Council) issued a Development Consent (DA 21-00925) dated 20 July 2022 (also referred to as Stage 6G) for proposed subdivision within the site audit area before the completion of this site audit. The Development Consent was provided to the Auditor on 5 February 2025. It is understood that the Development Consent description of 'Procedural 5 lot subdivision with dedication of 3 proposed lots to Blacktown City Council' has not yet commenced. The consent condition relevant to the audit was as follows:

Section 3.11 Site contamination

Section 3.11.1 'A NSW Environment Protection Authority accredited Site Auditor shall review the validation report and submit to Council a Site Audit Statement. The Site Audit Statement shall verify that the investigation, remediation and validation was carried out in accordance with the aforementioned guidelines and that the site is suitable for proposed use'.

A Site Audit Notification was sent to EPA. Note that SAR and SAS were re-issued as R1 to reflect minor changes associated with the now statutory nature of the audit. Note that the contamination or status of the site since the completion of the audit have not been taken into account in the re-issued audit.



1.2 Scope of the Audit

Details of the Audit are:

Requested by: [REDACTED] (previously [REDACTED] on behalf of Defence Housing Australia (DHA)

Request/Commencement Date: 12 February 2021

Auditor: [REDACTED]

Accreditation No.: [REDACTED]

The scope of the Audit included:

- Review of the following reports:
 - Remediation Action Plan, Former Schofields Aerodrome – No Scrape Area, South, draft revision D1, prepared by Ramboll Australia Pty Ltd (Ramboll) dated 24 September 2021 (referred to as 'Ramboll 2021a').
 - Remediation Action Plan, Former Schofields Aerodrome – No Scrape Area, South, draft revision D2, prepared by Ramboll dated 28 October 2021 (referred to as 'Ramboll 2021c').
 - Remediation Action Plan, Former Schofields Aerodrome – No Scrape Area, South, draft revision D3, prepared by Ramboll dated 12 January 2022 (referred to as 'Ramboll 2022').
 - PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South, draft, revision D2, prepared by Ramboll dated 15 May 2023 (referred to as 'Ramboll 2023a').
 - PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South, draft, revision F1, prepared by Ramboll dated 28 June 2023 (referred to as 'Ramboll 2023b').
 - PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South, final, revision F2, prepared by Ramboll dated 20 July 2023 (referred to as 'Ramboll 2023c').
- The following reports were provided to the auditor for information only as it was prepared either prior to the auditor's engagement for the larger Nirimba Fields; or prepared for areas outside of the audit site:
 - Site Contamination Due Diligence Assessment, Former Schofields Aerodrome, Schofields NSW, prepared by JBS Environmental Pty Ltd (JBS) dated October 2012 (referred to as 'JBS 2012').
 - Site Audit Report – Part of Former Schofields Aerodrome, Lot 400 in DP1171596, audit number GN481, prepared by ENVIRON Australia Pty Ltd (Environ) dated September 2013 (referred to as 'Environ 2013').
 - Targeted Phase 2 PFAS Site Investigation, Former Schofields Aerodrome Quakers Hill NSW, prepared by Ramboll Environ Australia Pty Ltd dated November 2017 (referred to as 'Ramboll 2017').
 - PFAS Leachate Analysis – Former Schofields Aerodrome, prepared by Ramboll Australia Pty Ltd (Ramboll) dated 31 May 2018 (referred to as 'Ramboll 2018').
 - Former Schofields Aerodrome, Quakers Hill, NSW: Screening Assessment of Potential Risks from the PFAS Impacted Soil Layer, final, revision F2, prepared by Ramboll dated 16 April 2021. (This is provided as Appendix 8 of the final PFAS Material Emplacement Area [MEA] Validation Report and referred to as 'Ramboll 2021a').
 - PFAS MEA Validation Report, Former Schofields Aerodrome, final, revision F1, prepared by Ramboll 21 May 2021 (referred to as 'PFAS MEA Validation Report' or 'Ramboll 2021b').
 - PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D5, prepared by Ramboll dated 21 May 2021. This is hereafter referred to as the Overview Letter or 'Ramboll 2021c'.
 - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil, draft v2, prepared by Ramboll dated 12 April 2021. This is provided as Appendix 2 of the Overview Letter.



- PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area, North of Swale, final, revision F1, prepared by Ramboll dated 22 June 2021 (referred to as 'Ramboll 2021d').
- PFAS Validation Report - Former Schofields Aerodrome Remaining Site Area, final F1, prepared by Ramboll dated 21 October 2021 (referred to as 'the PFAS Remaining Site Area Validation Report' or 'Ramboll 2021e').
- PFAS Validation Report - Former Schofields Aerodrome Sewage Treatment Plant and Former Landfill 2, Revision F1, prepared by Ramboll dated 7 February 2023 (referred to as 'Ramboll 2023d')
- A site visit by the Auditor on 26 April 2021 and 3 March 2023.
- Discussions with DHA and with Ramboll who undertook the investigation and validation works.

During the course of the audit, letters of Interim Audit Advice (IAA) were issued by the auditor. IAA specific for the audit site only are provided in **Appendix C**:

- Interim Site Audit Advice No. 20 dated 21 October 2021.
- Interim Site Audit Advice No. 22 dated 8 November 2021.
- Interim Site Audit Advice No. 27 dated 24 May 2023.
- Interim Site Audit Advice No. 28 dated 5 July 2023.

1.3 Audit Exclusions

The following aspects of the environment or items are excluded from this Section B site contamination audit:

- Only the nature and extent of PFAS contamination at the No Scrape Area South (the audit site) associated with historical site activities and site use as an aerodrome, is assessed as part of this audit. All other contaminants are excluded as a Section A Site Audit Report was completed for the entire former Schofields Aerodrome (refer to **Section 1.4**).
- Only the No Scrape Area South portion of the former aerodrome (the audit site) is assessed as part of this audit. All other areas within the wider Nirimba Fields housing estate are excluded such as:
 - Already developed/sold residential lots.
 - PFAS MEA.
 - No Scrape Area, North of Swale.
 - Former Sewage Treatment Plant (STP) and Landfill 2 (LF2)
 - PFAS Remaining Site Area.
- This audit does not include the suitability of the fill material (being Virgin Excavated Natural Material [VENM]) overlying the former site surface at the audit site for the proposed residential development.
- The validation and review of the surplus or waste material generated or removed from the audit site.



1.4 Previous Site Audit

The former Schofields aerodrome (including the audit site, PFAS MEA, FFTA, 'No Scrape Area' and PFAS Remaining Site Area) were previously audited by another auditor and a Section A Site Audit Report and a Site Audit Statement (GN481) were issued in September 2013:

- Site Audit Report – Part of Former Schofields Aerodrome, Lot 400 in DP1171596, audit number GN481, prepared by ENVIRON Australia Pty Ltd (Environ). This is referred to as 'Environ 2013'.

In the wider Nirimba Fields housing estate, three Site Audit Reports and Site Audit Statements have recently been completed by the auditor for areas external to the audit site to date:

- Site Audit Report, PFAS MEA, Former Schofields Aerodrome, off Mariner Avenue, Schofields, NSW 2762 and Site Audit Statement dated 22 June 2021 (reference: MP169_01).
- Site Audit Report, No Scrape Area, North of Swale, Former Schofields Aerodrome, off Mariner Avenue, Schofields NSW 2762 and Site Audit Statement dated 25 June 2021 (reference: MP169_02).
- Site Audit Report, Remaining Site Area, Former Schofields Aerodrome, off Mariner Avenue, Schofields NSW 2762 and Site Audit Statement dated 22 October 2021 (reference: MP169_03).
- Site Audit Report, Former Sewage Treatment Plant and Landfill 2, Former Schofields Aerodrome, Triton Parade, Nirimba Fields NSW 2763 and Site Audit Statement dated 6 March 2023 (reference: MP169_04).



2.0 Site Details

2.1 Location

The audit site locality is shown on Attachment 1 and 12 (**Appendix A**).

The site details are as follows:

Street address: Former Schofields Aerodrome, Triton Parade, Nirimba Fields NSW 2763.

Identifier: Part Lot 2 Deposited Plan (DP) 1285594

Local Government: Blacktown City Council

Owner: DHA

Audit Area: Approximately 3.25 ha

A survey plan of the audit site is provided as Attachment 22 (**Appendix A**).

2.2 Zoning

In accordance with the Blacktown Local Environmental Plan 2015 (current version for 26 April 2023 to date), the current zoning of the site is:

- R2 – Low density residential.
- SP2 – Infrastructure.
- RE1 – Public recreation.

2.3 Adjacent Uses

Based on the information provided in the Validation Report, the surrounding site uses include:

- North – Newly constructed access road and residential properties (part of the Nirimba Fields housing estate).
- East – Vacant land which is part of the former Schofields Aerodrome, followed by Blacktown Richmond Railway line and then residential properties further east.
- South – Vacant land which is part of the former Schofields Aerodrome awaiting development.
- West – A newly constructed swale and access roads, sediment ponds and Eastern Creek (located approximately 950 m west of the audit site).

The closest sensitive ecological receptor is Eastern Creek located along the western boundary of the former Schofields Aerodrome. A tributary of Eastern Creek is located approximately 500 m south of the site. As the tributary is located up-gradient or cross-gradient to the site, it is not considered to be a receptor in relation to the site.

Previous site drainage channels of the former aerodrome had been filled in. Eastern Creek forms part of the South Creek Catchment that flows into the Hawkesbury River approximately 12.8 km north-northwest of the site.



2.4 Current Site Condition

The Validation Report indicated that the audit site was previously a construction site for residential development in March-April 2021 and provided the following description:

- Construction of residential houses had commenced, and filling of the site (reportedly with VENM) had been undertaken to raise the site surface above the flood plain.
- Temporary drainage channels were constructed, and they drained into a temporary sediment basin (adjacent to Eastern Creek) in the western portion of the Nirimba Fields.

Site photographs were provided in Appendix F of the Validation Report that confirmed that the site had been cleared and that new residential properties were being constructed nearby at the time. A swale is located through the northern portion of the site. The swale drains surface run-off from the off-site area in the east and from the site. There is no surface water body present at the site.

The site surface appeared to be topographically flat and covered by fill. The site generally slopes down gently towards north-west towards the swale.

2.5 Proposed Development

As shown in Attachment 19 to 21 (Appendix A), the former Schofields Aerodrome is being developed into a new residential estate called Nirimba Fields. The development master plan (Attachment 21) for the Nirimba Fields comprised residential lots, a primary school, playing fields, netball courts, parks and commercial/retail facilities.

The audit site is proposed to be developed into low density residential properties (mainly in the western and southern portion), a playground/recreation area in the northern portion and new network of access roads (orientated roughly north-south and east-west) as part of the overall development of the Nirimba Fields housing estate.

For the purposes of this audit, the following land use scenario has been assumed as 'low density residential with accessible soil' because it is the most sensitive of the land use proposed in the site.



3.0 Site History

The high-level site history of the former Schofields Aerodrome was summarised in the Validation Report (Ramboll 2023) and PFAS Assessment Overview Letter (Ramboll 2021a) as follows:

- Pre-1851 – Greenfield site.
- 1851 to 1942 – Agricultural land (dairy and orchards).
- 1942 to 1975 – Training base and airfield by Royal Australian Air Force (RAAF) and Royal Australian Navy (RAN). The site included runways, repair stores, sleeping huts, offices, sewerage treatment plant, machine gun test butt and a fire training area. Aqueous film forming foam (AFFF) were used for firefighting purposes at the FFTA. A separate section of the former aerodrome was used as a migrant hostel. A piggery, sports field and weapons electrical engineering school were present from 1952 to 1975.
- 1975 to 1993 – Former aerodrome was used by Schofields Flying Club where light planes were housed and maintained.
- 1986 – The piggery was demolished, and an airship (blimp) hangar was constructed.
- 1993 to 2017 – Vacant and miscellaneous use (such as go-cart track, driver training, film set, training facility for Sydney 2000 Olympics). Demolition of some structures. The northern part of the former aerodrome was used as a staging area for the Blacktown-Richmond rail line duplication.
- 1999 – Demolition of the former infrastructures at STP.
- 2002 – Remediation works undertaken at STP and three former landfills, including LF2. LF2 waste was excavated, screened and removed off-site to a licensed landfill.
- 2018 to current – Land clearing to facilitate construction of the Nirimba Fields residential estate which included land surface raising earthworks to mitigate flooding risk from Eastern Creek.

Furthermore, as part of the construction of the Nirimba Fields housing estate post-2018, the top 100 to 200 mm of topsoil (of the original site surface) was scraped, stockpiled and reused to 'finish' the new ground surface (i.e. current site surface) on top of the bulk placement of imported VENM to raise the ground level of the entire housing estate. Therefore, the 'finished' new ground surface and any stockpiles of scraped topsoil are media that also required further consideration with regard to PFAS and as such were investigated.

The audit site was previously part of the FFTA, two drainage channels and a roadway. AFFF containing PFAS chemicals were used at FFTA.

In the auditor's opinion, the site history review conducted provides an adequate indication of past activities. In relation to PFAS contamination, previous site use as a FFTA confirmed the presence of PFAS contamination sources within the audit site.



4.0 Summary of Previous Audit and Environmental Investigations

Table 4-1 provides a summary of the audit and environmental investigations conducted to date that are relevant to the audit site (as well as the wider former Schofields Aerodrome).

Table 4-1: Summary of audit and assessment events

Date	Description	Reference
2005	Section A Site Audit Report for the entire former Schofields Aerodrome was completed by [REDACTED] (ref: Site Audit Report, Lot 4 DP853847 Part of Schofields Aerodrome and Site Audit Statement [SAS] GN 6-1 dated 16 May 2005. The SAS stated that the former aerodrome (including PFAS MEA) was suitable for sensitive use including "residential with accessible soil, including garden...excluding poultry" and "day care centre, preschool, primary school".	Environ 2005 (as referenced in JBS 2012 and Environ 2013).
2012	JBS conducted due diligence assessment to identify risk of unexpected finds and residual contamination as a burial pit containing asbestos, stockpiles, hazardous building material and minor unexploded ordnance were identified. This investigation focused on previous locations of buildings and infrastructure, underground structures, areas covered by bitumen and stockpiles. No sampling and laboratory analysis of soil, sediment or groundwater was conducted. This assessment concluded that generally, the former aerodrome is suitable for the proposed redevelopment for mixed uses however, recommended further remediation works to be conducted where residual contamination was identified. It was also recommended that a construction environmental management plan (CEMP) be developed.	JBS 2012.
2013	Section A Site Audit Report for the entire former Schofields Aerodrome was completed by [REDACTED] (ref: Site Audit Report – Part of Former Schofields Aerodrome, Lot 400 in DP1171596 and Site Audit Statement [SAS] GN481 dated 25 September 2013. This 2013 audit was conducted to incorporate results of investigation and remediation conducted and the changes in guidelines and legislation since 2005. An environmental management plan (EMP) was prepared to identify and manage unexpected finds. No significant contamination was found in groundwater and the audit recommended that if groundwater was abstracted, its suitability for use be assessed. The audit also indicated that the major sources of contamination have been removed from the former aerodrome. The SAS stated that the former aerodrome was suitable for sensitive use including "residential with accessible soil, including garden...excluding poultry" and "day care centre, preschool, primary school".	Environ 2013
May to October 2017	<u>No Scrape Area (FFTA) including the No Scrape Area South</u> A targeted PFAS environmental assessment was conducted at the FFTA because Aqueous Film Forming Foam (AFFF) was used. This included soil, sediment and shallow groundwater testing within and around the FFTA. Groundwater monitoring events (GME) were conducted in May, June and August 2017 at eleven groundwater monitoring wells (BH101 to BH111) located within and outside of No Scrape Area South (audit site). These bores have since been destroyed. Isolated PFAS impacts in top-soil, sediment and shallow groundwater were found at and in the vicinity of the FFTA. The PFAS soil impacts were delineated with two areas highlighted: • Soil within FFTA that are not suitable for re-used due to contamination (shown as orange polygon in Figure 1 to 5 of Ramboll 2017). This material was placed in PFAS MEA. • Shallow surface soil within the No Scrape Area that are not suitable for reuse as topsoil (shown as purple polygon in Figure 8 of Ramboll 2017). This material was also placed in PFAS MEA.	Ramboll 2017; Attachment 18 (Appendix A)



Date	Description	Reference
May 2018	<u>No Scrape Area (FFTA) including the No Scrape Area South</u> Additional PFAS leachate analysis was conducted on the PFAS-contaminated top-soil within the No Scrape Area for the purpose of assessing whether the material can be excavated, mixed with geotechnically suitable VENM soil (because of its high organic content) and placed at PFAS MEA. Toxicity characteristic leaching procedure (TCLP) was conducted on soil PFAS.	Ramboll 2018
May 2018 to March 2021	<u>No Scrape Area (FFTA) including No Scrape Area South, and PFAS MEA</u> Excavation of material from No Scrape Area (which encompasses FFTA) and placement of material into PFAS MEA. Limited information is provided in the PFAS MEA Validation Report about the 'construction' of PFAS MEA. The volume of PFAS impacted soil excavated from No Scrape Area (including the audit site) is reported as 4,600 m³. Following this, VENM fill material was imported into the audit site as part of the bulk site leveling earthworks for Nirimba Fields. As the material from No Scrape Area has been removed from the audit site, they are not discussed further in this report.	Ramboll 2021b
December 2020	<u>PFAS MEA</u> Validation works conducted of PFAS MEA on 9 and 10 December 2020. This included advancement of 14 soil bores (via push tubes drilling method) within PFAS MEA and collection and analysis of soil validation samples for PFAS compounds. The PFAS MEA Validation Report conducted a screening assessment of potential risks associated with the PFAS MEA and concluded that "the PFAS MEA is considered suitable for future low-density residential with garden and accessible soil with respect to the PFAS material placement layer".	Ramboll 2021b
March to April 2021	<u>No Scrape Area North of Swale</u> Validation works conducted on 'No Scrape Area North of Swale' area on 30 March and 1 April 2021. This includes: • Drilling of 17 validation soil bores (16 on-site and one off-site bores) via push tubes drilling method. • Collection and analysis of soil validation samples for PFAS compounds. • Review of groundwater monitoring data collected from 2017. • Review of available survey data associated with the site leveling works undertaken. Australian Standard Leaching Procedure (ASLP) was undertaken on one soil sample only which reported elevated PFAS concentrations. No groundwater monitoring was conducted as part of the validation activity.	Ramboll 2021d
March to June 2021	<u>PFAS Remainder Area</u> A desktop site history review was conducted to identify potential PFAS-associated activities or PFAS sources at the Former Schofield Aerodrome (external to the audit site). This work identified eight areas of environmental concern (AECs) which warranted further investigation: Blimp hangar; Former drainage lines; Go-cart club area; Hangar building; Landfill 1; Piggery landfill; Radio laboratory; and STP media stockpile. A Sampling and Analysis Quality Plan (SAQP) was prepared to detail the soil and groundwater assessment and validation program.	Ramboll 2021c



Date	Description	Reference
March to August 2021	<u>Audit Site (No Scrape Area South)</u> Preliminary assessment works conducted between 30 March and 1 April 2021 to assess and delineate the PFAS contamination in the imported VENM and underlying natural soil. This comprised: • Drilling of 30 validation soil bores via push tubes drilling method (NSS_BH# prefix boreholes). • ASLP using neutral pH leaching conditions, was undertaken on selected soil samples. Additional preliminary assessment works was later conducted between 12 and 17 August 2021 to assess the potential for contamination at the 'finish' topsoil (ground surface). This included collection of analysis of surface grab samples from 14 locations (TS_SS## sampling locations). This work indicated that there was a layer of approximately 3 to 5 m of clay fill (i.e., imported VENM to raise the site level) present over majority of the site, except for the swale area where a minimum thickness of 0.3 m fill was observed. No PFAS contamination were observed in the impacted VENM fill horizon or at the surface topsoil. However, PFAS impacts were identified in the in-situ natural soil/fill interface at depth (refer to Table 8-1).	Ramboll 2023c
June to September 2021	<u>PFAS Remainder Area</u> Validation works conducted on at PFAS remainder area (external to the audit site) between 28 June 2021 and 2 September 2021. This included collection and analysis of the following samples for PFAS compounds: • Soil samples at 407 locations (including 206 new soil bores and 12 new groundwater monitoring bores) across eight AECs, background areas, 'finished' topsoil (at current site surface) and stockpiles of scraped topsoil (from former site surface). • 13 groundwater samples from 12 newly-installed groundwater monitoring bores (MW01 to MW12) and one existing monitoring bore (MW13). Soil bore PLF_BH100 was converted into MW12. The existing bore MW13 was not installed by Ramboll and it is an unknown bore as there is no documentation or information available for this bore. Ramboll considered MW13 to be serviceable and it was gauged and sampled.	Ramboll 2021e
September 2021 to January 2022	<u>Audit Site (No Scrape Area South)</u> Based on the findings of the assessment works conducted in 2021, a remediation action plan (RAP) was prepared to remove PFAS impacted material identified. The RAP is to detail the remedial and validation strategy to make the site suitable for use as a low-density resident with respect to PFAS contamination. The proposed remediation strategy comprised: • Excavation and stockpiling of imported fill soil (VENM) currently overlying the PFAS-impacted natural soil (estimated at an average depth of 3.5 m). • Excavation and off-site disposal of PFAS-impacted material to licensed landfills. • Collection and laboratory analysis of validation samples from the walls and base of the excavation(s) to compare against validation acceptance criteria (VAC). • Backfill of remediation excavation with stockpiled fill soil previously scraped from the site and new imported VENM.	Ramboll 2022
December 2021 to April 2022	<u>Former STP and LF2</u> Further soil assessment works conducted at former STP and LF2, and four rounds of surface water grab sampling at Eastern Creek (external to audit site) to ascertain the PFAS contamination at the former STP and LF2.	Ramboll 2023d



Date	Description	Reference
September 2021 to June 2022	<u>Audit Site (No Scrape Area South)</u> Validation works conducted of the audit site between September 2021 and June 2022 to validate the remedial excavations. This includes: • Collection and laboratory analysis of validation samples from the footprint of stockpiles present at the site. • Excavation of remedial extent. Collection and analysis of validation samples from the walls and base of the excavation (Round 1 on 20 December 2021). • Test pits at eight locations where elevated PFAS results were identified (one further location of contamination was assessed in Round 3). Collection and analysis of validation samples from the base of the test pits (Round 2 on 18 February 2022). • Excavation of area around two locations from test pitting and one location not assessed in Round 2. All located within the southern area of the audit site. Collection and analysis of validation samples from the walls and base of the excavation (Round 3 on 14 to 16 April 2022). • Backfill of validated northern portion of the audit site. • Further excavation within the southern area of the audit site where PFAS contamination was still measured. Collection and analysis of validation samples from walls and base of excavations (Rounds 4 on 4 May 2022 and Round 5 on 6 May 2022). • Collection and analysis of final validation samples from walls and base of the test pits and excavation pits (Round 6 on 10 June 2022). • Validation sampling of VENM imported to backfill the remediation excavation. Ramboll communicated to the auditor that it was not practicable to conduct further remedial excavation due to logistics (depth of approximately 4 to 5 mbgl) and extensive volume of water ingress due to rain events. In addition, Ramboll also conducted stockpile footprint validation sampling.	Ramboll 2023c



5.0 Environmental Setting

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

Ramboll (2023c) reported that the geology at the audit site comprised alluvial sediments consisting of gravel, sand, silt and clay at the surface (around 4 to 6 m thick) overlying Bringelly Shales of the Wianamatta Group. This is consistent with the sub-surface stratigraphy encountered during validation works as summarised in **Table 5-1**.

Table 5-1: Generalised Stratigraphy

Approximate Depth (mbgl)	Subsurface Profile
0.0 to 3.5	FILL (reinstated VENM): gravelly clay, brown, dry, fine gravels with minor organic matter.
3.5 to 4-5	CLAY: brown, some silt, minor shale gravel, high plasticity, dry to very moist and hard.

The auditor notes that weathered shale was logged around 3.3 m and 3.8 m below the former natural surface.

5.2 Hydrogeology

As indicated in **Table 4-1**, eleven groundwater monitoring bores were located at the FFTA (including the audit site) in 2017 but they have since been destroyed.

Groundwater monitoring bores later installed in 2021 within the wider Nirimba Fields, together with a previously unidentified bore were gauged in July 2021. Although none of these wells are located on-site, an overall understanding of the groundwater regime was obtained through review of the groundwater data from the wider Nirimba Fields. Summary of hydrogeological setting is presented in **Table 5-2**.

Table 5-2: Site-Specific Hydrogeology for Nirimba Fields

Aspect	Details
Saturated Geological Layers	Clay, silty clay, weathered shale.
Depth to Water	0.88 mbtoc to 5.74 mbtoc (in some locations groundwater was encountered beyond that at between 6.6 mbtoc and 8.6 mbtoc).
Groundwater elevation	15.51 mAHD to 25.54 mAHD.
Hydraulic Conductivity	0.0002 m/day (average literature value for clay materials based on Domenico and Schwartz 1990).
Effective Porosity	6% (literature value for clay materials based on Heath 1983).



Aspect	Details
Groundwater calculated velocity	0.00004 m/day.
Interpreted Flow Direction	Overall, west towards Eastern Creek (with a north-westerly flow inferred at the audit site). Refer to Attachment 17 (Appendix A).
Groundwater Quality	- Dissolved oxygen ranged from 0.28 mg/L to 3.88 mg/L. - Electrical conductivity ranged from 619 $\mu\text{S}/\text{cm}$ to 28,134 $\mu\text{S}/\text{cm}$. Calculated total dissolved solids ranged from 403 mg/L to 18,284 mg/L – average 9,325 mg/L and median 10,569 mg/L which indicated that the groundwater is too saline to be used for drinking water purposes. - Redox potential ranged from 96.4 mV to 124.2 mV. - pH ranged from 6.31 to 7.33. - Temperature ranged from 14.3 °C to 20.2 °C.

Note:

Data from July 2021 groundwater assessment conducting at the wider Nirimba Fields (Ramboll 2021e)

A review of NSW registered bore database conducted by Ramboll in March 2021 identified that no registered groundwater extraction bores were documented within a 1 km of the audit site boundary. All registered bores within 1 km are understood to have been installed for monitoring purposes. The search conducted by Ramboll reported similar results in July 2023.

The auditor notes that:

- Groundwater elevations measured in July 2021 at Nirimba Fields are generally consistent with the elevations observed in 2017 at the FFTA.
- The lowest salinity measured, based on total dissolved solids, were reported in groundwater encountered adjacent to Eastern Creek. This suggests that the groundwater/surface water interaction may be occurring at the riparian area beside Eastern Creek. Ramboll (2021e) inferred that the low salinity may be because Eastern Creek is a losing stream.
- The auditor acknowledges that groundwater is unlikely to be extracted for use at Nirimba Fields due to the high salinity and low yield of the aquifer, and the availability of reticulated tap water.

5.3 Auditor's Opinion

The auditor considers that adequate stratigraphic, hydrogeological and hydrological information has been provided to provide context for the audit to characterise the audit site.



6.0 Evaluation of Quality Assurance and Quality Control

The auditor has assessed the overall quality of the data by reviewing information presented in the following reports supplemented by field observations:

- The Validation Report (Ramboll 2023).
- PFAS Validation Report - Former Schofields Aerodrome Remaining Site Area (Ramboll 2021e).

Table 6-1 presents a summary of the field investigation undertaken for this audit.

Table 6-1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
PFAS Validation Report - Former Schofields Aerodrome Remaining Site Area, final F1, prepared by Ramboll dated 21 October 2021 (Ramboll 2021e)	Groundwater (only the groundwater data from this investigation is relevant for this audit)	PFAS
PFAS Validation Report – No Scrape Area South - Ramboll (2023c)	Soil and Leachate	PFAS

At the time of sampling, the NSW EPA 1995 Sampling Guideline was current and was applied accordingly. The auditor notes that since that time, the new NSW EPA Sampling Guidelines (August 2022) were issued in August 2022.

The auditor's assessment specific to PFAS data from the audit site (and the wider PFAS Remaining Site for groundwater data as relevant) are discussed in **Table 6.2** and **Table 6.3**.

Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) Ramboll (2023) defined DQOs in accordance with the US EPA seven steps process, which was endorsed in Section 5 of Australian Standard guideline AS4482.1-2005.	The DQOs presented in Ramboll (2023c) reports are considered appropriate for the investigations undertaken.
Sampling pattern, locations, and sampling density <u>No Scrape Area South</u> Soil: A sampling density of 30 boreholes and 14 topsoil locations spread across a site approximately 3.25 ha in size exceed the minimum recommended by the EPA (1995) (43 locations for a 3.3 ha site). The locations were developed with respect to the objectives of the targeted preliminary validation works. ASLP: Six primary samples and one intra-laboratory duplicate sample taken from borehole locations were submitted for PFAS testing. Selected samples were collected from locations that exceeded the soil validation criteria. <u>Remaining Site Area</u> Groundwater: 12 newly installed wells and one existing well were sampled up and down the site-specific hydraulic gradient in the wider Nirimba Fields.	The investigation locations adequately target the various strata in the audit site, in line with the objectives of the validation works. The auditor considers the sampling pattern, locations, and density are acceptable. The auditor notes that the results for samples 'QC23' (blind duplicate of NS_BH32_3.3) and 'NS_BH32_3.8' were swapped around in Table 1b in the Validation Report. While this is not ideal, the auditor has independently checked the RPDs and notes that the findings of the leachability testing are not affected by the data transcription error. Groundwater information for up and down-hydraulic gradient of the audit site is available.



Sampling and Analysis Plan and Sampling Methodology

Auditor's Opinion

Sample depths

No Scrape Area South

Soil: Borehole samples were collected based on the anticipated depth of the former site surface and when a change in strata was evident – from the VENM fill material immediately above the natural soil. Samples were also collected in the overlying VENM near the interface and approximately 0.5 m in the underlying natural soil beneath the interface. Borehole sample depths ranged from 0.0 mbgl to 5.9 mbgl. Topsoil samples were also collected from the surface soil across the site.

ASLP: Samples were between depths of 3.0 mbgl and 4.1 mbgl.

Remaining Site Area

Groundwater: Monitoring bores were installed to depths ranging between 3.3 and 5 mbgl to assess shallow groundwater conditions.

The overall sampling strategy is appropriate and adequate to characterise the various media in the No Scrape Area.

Well construction

Remaining Site Area

The monitoring bores were installed to depths of 4 to 8.6 mbgl, with screen intervals of 2.5 to 3 m placed in graded filter sand. Bores were constructed of 50 mm diameter uPVC pipe with 0.5 mm slotted screen fitted with an end cap. A bentonite seal of approximately 0.5 m thickness was placed above the screen and the well backfilled with drilled spoil to the ground surface.

Acceptable.

Sample collection method

No Scrape Area South

Soil: Sample collection for the boreholes was from the disposable push tube sleeve of the soil boreholes advanced using a drill rig. No further information was provided surrounding sample collection for the borehole or topsoil samples.

Remaining Site Area

Groundwater: The monitoring bores were installed by solid flight augers. They were developed between 30 June 2021 and 5 July 2021 by purging groundwater until the bores were dry and left for a minimum of one week to stabilise prior to sampling (Ramboll, 2021f). Samples were collected with low flow peristaltic pump.

Detailed sample collection methods were not provided for the preliminary validation site assessment sampling. This is not considered to significantly affect the reliability of the data as the area was subsequently remediated as discussed in **Section 10.0**, and sample collection methods for the validation works were provided and discussed in **Section 11.4**. Overall, the soil and groundwater sample collection methods are considered acceptable.

Decontamination procedures

Ramboll indicated that sampling equipment (including interface meter and water quality meter) was decontaminated by rinsing with a dilute solution of Alconox® (PFAS-free detergent) followed by rinsing with deionised water (PFAS-free water) provided by the laboratory. The hand auger for soil sampling was also decontaminated between locations. Dedicated disposable nitrile gloves were reportedly used for each new sample.

Acceptable.

Sample handling and containers

Soil and groundwater samples were placed in laboratory-supplied plastic jars and bottles (comprised of polypropylene or high-density polyethylene). Samples were chilled in non-chemical-based ice which had been double-bagged (polyethylene plastic) and secured to avoid meltwater from contacting sample containers in the Esky™ during storage and subsequent transport to the laboratory.

Acceptable.

Chain of Custody (COC)

Completed chain of custody forms were provided in the reports. The secondary laboratory reports for samples in Ramboll (2023) were not provided.

The absence of the secondary laboratory reports (Ramboll (2023)) is not considered significant as the calculated relative percentage differences (RPDs) were within an acceptable range. A spot check of COC was conducted and the COCs were found to be filled-in appropriately.



Sampling and Analysis Plan and Sampling Methodology

Auditor's Opinion

Detailed description of field screening protocols

Acceptable

Groundwater: Field parameters were measured during well purging and sampling.

Calibration of field equipment

Acceptable.

Calibration certificates were provided for the water quality meter and photo-ionisation detector (PID), dated 6 July 2021 and 25 June 2021.

Sampling logs

Acceptable.

Soil: Borehole logs were provided within the reports (Ramboll 2023c) indicating sample depth, lithology and contamination (odour and staining, as observed). No sampling records were provided for the topsoil samples in Ramboll 2023c, but they are provided in Ramboll 2021e.

Groundwater: Field sampling records were provided, indicating water levels, field parameters, methodology and observations.

Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC

Auditor's Opinion

Field quality control samples

Overall, the auditor considers the field quality control samples adequate for the investigation.

Soil: For borehole locations, 65 primary samples (16 for North of Swale and 49 for No Scrape Area South), 10 intra-laboratory and 8 inter-laboratory duplicate samples, 6 field blanks and 10 rinsate blanks were collected. The two audit sites was not able to separately reported as the field program are conducted together.

For topsoil locations, 14 primary samples, one intra-laboratory and one inter-laboratory duplicate sample was collected, all within No Scrape Area South.

The frequency of field quality control samples complies with PFAS NEMP.

ASLP: One intra-laboratory duplicate sample was submitted for laboratory analysis.

Water: Thirteen primary groundwater samples, two blind and two split duplicate samples were collected. This is above the PFAS NEMP acceptance criteria.

Field quality control results

Overall, in the context of the dataset reported, the elevated RPD results are not considered significant and the field quality control results are acceptable.

The results of field quality control samples were generally within appropriate limits. The following exceptions are noted:

Soil: Three RPDs (74.5% to 150%) for two soil intra-laboratory and one inter-laboratory duplicate samples for PFOS and sum of PFHxS and PFOS were outside the acceptable limits. Ramboll indicated that the exceedances in soil are likely due to the heterogeneous nature of the fill materials mixing with natural soil at the interface.

The rinsate and field blank samples analysed reported concentrations below the practical quantitation limit (PQL) for all analytes.

Groundwater: The results of field quality control samples were generally within appropriate limits, except for RPDs for the inter-laboratory groundwater duplicate sample QC422 for PFOS (108%) and PFHxS (67%). Due to the differences in laboratory extraction, analysis and calibration techniques between primary and secondary laboratories, and the low concentrations of the analyte pairs, Ramboll considered this outlier to not significantly affect data quality.



Field and Lab QA/QC

Auditor's Opinion

National Association of Testing Authorities (NATA) registered laboratory and NATA endorsed methods

Acceptable.

Laboratories used included: Australian Laboratory Services (ALS) Environmental, Eurofins MGT and Envirolab. Laboratory certificates were NATA stamped.

Eurofins is not NATA accredited for PFAS summations (which is a calculation); however, it is noted that individual PFAS analytes are NATA accredited.

Analytical methods

Acceptable

Analytical methods were included in the laboratory test certificates. Envirolab, Eurofins and ALS Environmental provided brief method summaries of in-house NATA accredited methods used based on United States Environmental Protection Agency (USEPA) for extraction and analysis in accordance with the NEMP 2.0.

Holding times

Acceptable.

Review of the COCs and laboratory certificates indicate that the holding times had been met. Ramboll also reported that holding times were met.

Practical Quantitation Limits (PQLs)

Soil: PQLs were less than the threshold criteria for the contaminants of concern.

Groundwater: PQLs were less than the threshold criteria for the contaminants of concern with exception of Perfluorooctane sulfonate (PFOS) PQL of 0.01 µg/L, which was above the NEMP 2.0 99% species protection guideline value of 0.00023 µg/L.

Overall, these discrepancies do not materially affect the outcome of the audit as the Validation Report and the auditor evaluated the groundwater results against NEMP and other ecological guidelines values for a holistic assessment.

Laboratory quality control samples

Majority of the laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory at the appropriate frequency except for one matrix spike frequency that was below guideline recommendation.

One minor non-compliance from laboratory control sample is not considered to be significant in the context of the audit overall.

Laboratory quality control results

Soil: The results of laboratory quality control samples were within appropriate limits, with the exception of five batches that reported surrogate recovery exceedances.

Groundwater: In one batch of samples, MS recoveries for PFHxS and PFOS could not be determined as the background level was greater than or equal to 4x spike level.

In the context of dataset reported, the number of samples collected and the relative consistency of results between sampling events, the non-conformances are not considered significant, and the laboratory quality control results are acceptable.

Data Quality Indicators (DQIs) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy)

Predetermined DQIs were set in the Ramboll report for laboratory analyses including field blanks, field duplicates, internal laboratory QC samples, COC documentation and laboratory NATA accreditation. These were discussed with regard to the five category areas. There was limited discussion regarding actions required if data do not meet the expected objectives.

An assessment of the data quality with respect to the five category areas has been undertaken by the auditor and is summarised below.



In considering the data as a whole, the auditor concludes that:

- While minor variations in field duplicates, laboratory control samples and omissions in documentation were identified, the results were generally consistent indicating the data is likely to be representative of the overall conditions on the audit site.
- It is noted that it is not ideal that documentation such as secondary laboratory reports and field sampling of topsoil locations, and details of field sampling practices were not provided (Ramboll (2023c)), the auditor notes that some of the information (especially for data reported previously) were provided in older reports.
- The primary and secondary laboratories provided sufficient information to conclude that the dataset was generally precise. Ramboll adopted the higher of the duplicate results in their assessment and interpretation of contamination.
- Samples were collected using suitable procedures, and field rinsate and blank samples were all considered acceptable; therefore, the data is likely to be accurate.
- Overall, the dataset is considered to adequately characterise the site condition and was relied upon for this audit.



7.0 Environmental Quality Criteria

The overall environmental objectives of the assessment and validation of the audit as documented in the Validation Report are to:

- “assess whether the remediation action(s) completed in the No Scrape Area South have been adequate to render it suitable for future low-density residential land use with respect to PFAS and whether it is adequately protective of the environment following removal of PFAS impacted soil”.

This is achieved by evaluating the contamination status of the soil profile and the thickness of the barrier layer (VENM fill material) placed above the former site surface against:

- Environmental quality criteria protecting human health and ecosystem (refer to **Section 7.1** and **7.2**).
- The separation distance, vertically and laterally, between the contamination to human receptors (e.g., residents living on the current raised site surface) and ecological receptors (e.g., surface water and groundwater beneath and down-gradient of the audit site).
- Leachability potential for residual PFAS contamination to migrate from the soil into the water table.

The auditor has assessed the PFAS contamination status with reference to the PFAS NEMP 2.0 (Heads of Environment Protection Authorities [HEPA] 2020). This guideline is referred to as ‘the PFAS NEMP’ or ‘the NEMP’.

7.1 Soil

Based on the proposed development the criteria for ‘residential with garden/accessible soil’ was referred to as it is the most sensitive land use proposed at the audit site.

The auditor has assessed the **soil** data provided with reference to Tier 1 (screening) criteria from the following (refer to **Table 7-1**):

- Human health guideline values:
 - Residential with garden/accessible soil (health investigation level [HIL] A) (Table 2 of the NEMP).
- Ecological guideline values:
 - Ecological direct exposure and ecological indirect exposure for all land uses (Table 3 of the NEMP).

The auditor notes that draft PFAS NEMP 3.0 has been released for public consultation. While it is not finalised or formally adopted by NSW EPA, the draft PFAS NEMP 3.0 is considered in the audit when interpreting the audit conclusions. The new guideline value sourced from the draft PFAS NEMP 3.0 that has been considered is for perfluorooctanoic acid (PFOA) of 0.005 mg/kg for the assessment of ecological indirect exposure and for the assessment of the protection of reptiles via direct contact.

**Table 7-1: Soil Environmental Quality Criteria**

Chemical of Concern	NEMP HIL A – Residential with garden (mg/kg)	NEMP Ecological Direct Exposure (mg/kg)	NEMP Ecological Indirect Exposure (mg/kg)	Draft NEMP 3.0 Ecological Direct/Indirect Exposure (mg/kg)
Sum of perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS)	0.01	—	—	—
PFOA	0.1	10	—	0.005
PFOS	—	1	0.01	(No change from NEMP 2.0)

Notes:

HIL- Health investigation level.

mg/kg - milligram/kilogram.

— = no applicable criterion.

7.2 Water

The auditor has assessed the **groundwater** data provided with reference to Tier 1 (screening) criteria from the following (refer to **Table 7-2**):

- Human health guideline values:
 - Recreational water quality guideline values (Table 1 of the NEMP).
- Ecological guideline values:
 - 99% freshwater species protection (Table 5 of the NEMP). The auditor adopted the conservative approach and considered Eastern Creek to be a slightly to moderately disturbed ecosystem. Therefore, in line with guidance from Australian and New Zealand Guidelines for Fresh and Marine Water Quality framework and Section 8.6.3 of PFAS NEMP, due to bioaccumulation and biomagnification nature of PFAS, the next higher level of protection was adopted (i.e. 99% instead of 95%). As indicated in Table 5 of the NEMP, for this audit, the laboratory detection limit for PFOS can be adopted 'as default', as the guideline value for 99% species protection, is generally below the PQL.
 - As the NEMP 99% value is likely to be conservative, consideration was also given to the draft Australian and New Zealand Guidelines for Fresh and Marine Water Quality default guideline value (DGV) of 0.0091 µg/L PFOS for 99% species protection level¹. This ecological protection value is in draft and has not been endorsed by EPA.

As leachate concentrations were also used to assess the potential risk to human health and ecosystems, the same groundwater guideline values are adopted to assess leachate.

¹ PFOS in freshwater, toxicant default guideline values for protecting aquatic ecosystems, accessed 4 July 2023: [Perfluorooctane sulfonate \(PFOS\) in freshwater, toxicant default guideline values for protecting aquatic ecosystems \(waterquality.gov.au\)](https://www.waterquality.gov.au/assessing/assessing-quality/assessing-quality-guidelines/assessing-quality-guidelines-for-pfas)

**Table 7-2: Groundwater Environmental Quality Criteria**

Chemical of Concern	NEMP Ecological – Freshwater 99% Species Protection (µg/L)	NEMP Ecological – Freshwater 95% Species Protection (µg/L)	NEMP – Recreational Water Quality Guideline Value (µg/L)	Draft Default Guideline Value for PFOS ^{Error!} Bookmark not defined. _ Freshwater 99% Species Protection (µg/L)
Sum of PFOS and PFHxS	—	—	2	—
PFOA	19	220	10	—
PFOS	0.00023	0.13	—	0.0091

Notes:

µg/L – microgram/litre

— = no applicable criterion.

The auditor notes that there are no new ecological and human health and guideline values for groundwater in the draft PFAS NEMP 3.0.

7.3 Consultants Environmental Quality Criteria

The environmental quality criteria referenced by the auditor are consistent with those adopted by Ramboll except for the following:

- The draft PFOA indirect ecological soil guideline value from draft PFAS NEMP 3.0 was mentioned in Section 9.2.4 of the Validation Report, but it was not assessed against.
- The draft Australian and New Zealand Guidelines for Fresh and Marine Water Quality default guideline value for PFOS was not considered or discussed. Ramboll instead referred to PFOS freshwater ecological levels reported in Batley et al. 2018.

The auditor notes that Ramboll has conservatively applied the criterion for 'Sum of PFOS and PFHxS' as for the individual criterion for PFOS and for PFHxS. This has not resulted in any material change in the conclusion of the Validation Report.



8.0 Assessment of PFAS Contamination (Pre-remediation)

8.1 Soil Analytical Results

As indicated in **Table 4-1**, the soil from No Scrape Area (encompassing No Scrape Area South) which included the FFTA were excavated and placed into PFAS MEA. The results from soil testing conducted post-2018 are considered to be representative of the site condition pre-remediation.

Table 8-1 below summarises the analytical soil results from the soil bores and topsoil surface grab samples which help delineate the PFAS contamination (i.e., identify area for remediation).

The soil bores were drilled to intersect:

- VENM layer immediately above the former site surface (natural soil).
- The former site surface (natural soil) at the interface with overlying VENM.

The results have been assessed against the environmental quality criteria. Soil sampling locations are shown as Attachment 2 (**Appendix A**).

Table 8-1: Summary of Soil Analytical Results

Analyte	No. of samples	No. of detections	Maximum concentration (mg/kg)	No. of samples exceed NEMP ecological guideline value	No. of samples exceed NEMP human health investigation level (HIL A)
PFOS	99 ¹	22	0.28	0 (for direct ecological exposure) 11 (for indirect ecological exposure)	—
PFOA	99 ¹	4	0.02	0 (for direct exposure) 0 (for indirect exposure ²)	0
Sum of PFOS and PFHxS	99 ¹	23	0.28	—	12

Notes:

1. 63 primary samples and 20 duplicate samples from delineation boreholes, and 14 primary samples and 2 duplicate samples from additional topsoil sampling.
2. Draft PFAS NEMP 3.0 ecological guideline value (0.005 mg/kg PFOA).

In summary, elevated soil concentrations above the adopted PFOS and sum of PFOS and PFHxS were measured at five locations at depths of approximately 3 to 4 m bgl. The area encompassing these five locations is the remedial extent (refer to the hatched polygon shown in Attachment 2, **Appendix A**) for which further remediation was undertaken (refer to **Section 10.0**).



8.2 Leachate Analytical Results

ASLP analysis were conducted on six primary and one duplicate soil samples from the delineation soil bores in March and April 2021 to assess the potential for leaching of PFAS from soil at the site.

The auditor notes that the PFOS leachate concentrations (ranging from 0.17 to 4.6 µg/L) are above the PFAS NEMP 2.0 (and draft version 3.0) ecological 95% and 99% freshwater guideline levels of 0.13 µg/L and 0.00023 µg/L. This indicates some potential for PFOS to leach from the soil. This is considered further in review of the groundwater results in **Section 8.4**.

8.3 Groundwater Levels

The groundwater levels measured at the two groundwater bores closest to the audit site are presented in **Table 8-2**.

Table 8-2: Summary of Groundwater Levels

Bore ID	Hydraulic Gradient	Groundwater level (mBTC)	Groundwater elevation (mAHD)
MW12	Up-gradient	8.6	22.01
MW10	Down-gradient	6.6	19.4

8.4 Groundwater Analytical Results

Groundwater from the two closest wells (within Nirimba Fields) was sampled in July 2021 with the results summarised below in **Table 8-3** and locations shown as per Attachment 16 (**Appendix A**).

Table 8-3: Summary of Groundwater Analytical Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (µg/L)	No. of samples exceed NEMP ecological freshwater 99% species protection	No. of samples exceed NEMP ecological freshwater 95% species protection	No. of samples exceed draft DGV for PFOS – Freshwater 99% Species Protection (µg/L)	No. of samples exceed NEMP Recreational Water Quality Guideline Value
Sum of PFHxS and PFOS	2	1	0.0047	—	—	—	0
PFOS	2	2	0.0017	2	0	0	—
PFOA	2	0	<0.001	0	0	—	0

Notes:

1. Two primary samples.

µg/L – microgram/litre.

— = no applicable criterion.



PFOS concentrations above the NEMP ecological guideline value (99% species protection) were measured in both wells. This NEMP ecological value is likely to be conservative. The groundwater concentrations are noted to be below the draft DGV for 99% species protection level of 0.0091 µg/L recently released in 2023 (and considered to represent the current state of knowledge).

All other concentrations were below the adopted ecological and human health recreational water guideline values.

It should be noted that the locations of the two wells, both located near the eastern site boundary of the wider Nirimba Fields as shown in Attachment 16 and 17 (**Appendix A**), are considered to indicate the 'background' condition of up-gradient groundwater migrating from the east onto Nirimba Fields. The auditor notes that the highest PFOS concentration measured at Nirimba Fields was 0.01 µg/L measured at one of these wells in July 2021 (Ramboll 2021e). This suggests the PFOS levels observed at the audit site may be associated with background PFAS concentrations in area.

The elevated PFOS leachability results from soil samples discussed in **Section 8.2** were not observed in the groundwater concentrations.

8.5 Auditor's Opinion

In the auditor's opinion, the soil analytical results are consistent with the site history and field observations. PFAS contamination has been adequately characterised, and five areas of impacts were identified and subsequently, these five areas of impacts have been the subject of further remediation (refer to **Section 10.0**).

In terms of groundwater, the auditor notes the water table was measured to be deeper than 6 m at the audit site. Leachability testing indicated that there is a potential for PFOS to be leached from the soil and migrate into the groundwater, however the measured groundwater concentrations have not indicated this to be the case. Gross migration of PFOS to groundwater has not been observed and as the majority of the contaminated soil has now been excavated and removed from the site, there is low potential for leachate contamination to impact the groundwater.

Based on the concentrations measured up-hydraulic and down-hydraulic gradient of the audit site, the PFAS levels observed at the audit site are likely to reflect 'background' concentrations migrating onto Nirimba Fields from the east. The auditor considers that no further investigation or remediation of groundwater is required.



9.0 Evaluation of Conceptual Site Model

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. A CSM was developed by Ramboll (2023c) for the audit site. **Table 9-1** provides the auditor's review of the CSM.

Table 9-1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Discussion on the potential sources of PFAS contamination are presented in Ramboll (2021c) Overview Letter. The sources of PFAS contamination are not listed in the CSM presented in Table 4-1 and Table 10-1 of the Validation Report.	Overall, the sources of contamination were adequately identified. A detailed site history was compiled and reviewed to identify potential sources of PFAS contamination in line with the approach suggested in PFAS NEMP 2.0 (and draft NEMP 3.0). The sources of PFAS contamination were found to be due to historical activities undertaken during the site use as a FFTA (refer to Section 3.0). Transport mechanisms such as overland runoff and leaching (from soil to groundwater) were identified.
Affected media	• Soil. • Soil vapour. • Sediment. • Surface water. • Groundwater.	Adequately identified. Soil vapour is listed but it is not considered to be an issue as PFAS is not volatile under normal environmental conditions.
Exposure pathways	• Direct contact/ingestion. • Inhalation. • Overland run-off. • Leaching.	Adequately identified for PFAS contamination in soil, sediment, groundwater and surface water.
Receptor identification	• Residents (on-site and off-site). • On-site groundwater user. • On-site and off-site construction and maintenance worker. • Ecological receptors: ▪ Flora and fauna. ▪ Eastern Creek. ▪ Groundwater	The human and ecological receptors have been generally identified. Future recreational users were not listed, but this is not material to the audit as the more sensitive on-site and off-site residents were listed.



10.0 Evaluation of Remediation Works

The auditor has assessed the RAP (Ramboll 2022) by comparison with the checklist included in NSW EPA (2020) Consultants Reporting on Contaminated Land Contaminated Land Guidelines. The RAP was found to address the required information. The proposed remediation strategy of excavation and off-site disposal at a licensed facility of the PFAS impacted soil was adopted.

Remediation was undertaken between November 2021 and June 2022 as summarised in **Table 10-1**. After each round of excavation, validation sampling of the walls and base of the excavations was conducted in accordance with the RAP. The findings of the remedial validation sampling are also discussed in **Table 10-1** as they explain why multiple rounds of excavation were conducted to 'chase out' the PFAS contamination.

It should be noted that the sampling locations are shown in Ramboll's drawings (Attachment 3 to 8, **Appendix A**).

Table 10-1: Rounds of Remediation and Validation Works Undertaken

Events	Remediation Undertaken	Shown in Appendix A	Validation Sampling Date	Validation Sampling (Wall and Base of Excavation/s)
Round 1	Excavation down to 3.7 to 4.2 mbgl.	Attachment 3	20 December 2021	43 primary samples and five field duplicates tested. Identified nine locations with PFAS concentrations above the adopted criteria.
Round 2	Additional 1 m x 1 m box/test pit excavations at seven out of the nine locations identified with contamination from Round 1. Excavation at one location was not able to be conducted due to presence of water.	Attachment 4	18 February 2022	Eight primary samples and two field duplicates tested. Identified three locations with PFAS concentrations above the adopted criteria.
Round 3	Irregularly shaped excavation down to approximately 4.2 to 4.7 m. Further excavation at test pits from Round 2 to collect wall and base samples.	Attachment 5	14 to 26 April 2022	45 primary samples and five field duplicates tested. Identified seven locations with PFAS concentrations above the adopted criteria.
Round 4	Further 1 m excavation at two pit walls. Excavation of new 1 m x 1 m pit at three floors locations. Further 1 m excavation at 3 walls locations.	Attachment 6	4 May 2022	Twenty primary samples and two field duplicates tested. Identified five locations with PFAS concentrations above the adopted criteria.
Round 5	Further 1 m excavation at walls. Extend test pits to 3 m x 3 m. Further 2m excavation at wall.	Attachment 7	6 May 2022	Ten primary samples and one field duplicate tested. Identified seven locations with PFAS concentrations above the adopted criteria.



Events	Remediation Undertaken	Shown in Appendix A	Validation Sampling Date	Validation Sampling (Wall and Base of Excavation/s)
Round 6	After Round 5, DHA and Ramboll agreed that further excavation was not practical to be undertaken due to the depth (approximately 5 m or more) and the extensive volume of water (from rain events) in the open excavation. Instead, a final round of validation sampling of the excavation surfaces was conducted.	Attachment 8	10 June 2022	Twenty primary samples and two field duplicates tested. Refer to Section 11.5.1 for further discussion.

After Round 3, the remedial excavations were focussed on the southern portion and the validated northern portion of the excavation was progressively backfilled.

Based on the survey of the final remedial excavation (presented in Attachment 13 and 14 of **Appendix A**) and the northern part of the excavation was approximately 3.5 m deep and the approximately 4.5 to 5 m deep in the southern part.

In the auditor's opinion, remediation works undertaken were appropriate and in accordance with the RAP. The auditor concurs that further excavation was not feasible to be conducted due to logistical reasons.



11.0 Evaluation of Validation Works

11.1 Overview

The key validation elements presented by Ramboll are outlined in **Table 11.1**.

Groundwater or leachate sampling data (discussed in **Section 8.0**) are considered to represent the final site condition as no further sampling was undertaken following the validation works.

Table 11.1: Auditor's Review and Verification of Key Elements

Element	Multiple lines of evidence	Key outcomes and comments
Thickness of VENM layer overlying former site surface	Survey and cut & fill data (refer to Section 11.2). Stratigraphic information from the delineation soil boreholes (refer to Section 11.3). Ramboll indicated that the area with less than 3 m of overlying VENM is located at the side of the swale. The auditor considers that accessibility to the swale for human health would be limited. All analytical results for PFAS from the delineation sampling in the swale area were reported below the adopted criteria.	Average VENM thickness: 3.9 m (residential and recreational area) 1.2 m (swale area) The auditor considers that the thickness of the overlying VENM meets the separation distance requirement (Ramboll 2018).
Nature of PFAS impacted soil – validation of remedial extent required	Remediation works undertaken to the extent practicable (Section 10.0). Data quality discussion for validation works (Section 11.4). Soil results (refer to Section 11.5). Leachate results (refer to Section 8.2 and 8.5).	Validation works were conducted in general accordance with the RAP. The remedial excavation was extended to the extent practicable. The validation works identified residual PFAS contamination remaining at depth greater than 4 mbgl within the southern portion of the site. The residual material was considered further through a risk assessment (refer to Section 12.0).
Depth to groundwater from former site surface	Survey and cut & fill data (refer to Section 11.2). Stratigraphic information from the validation soil boreholes (refer to Section 11.3). Groundwater levels (refer to Section 8.3).	PFAS impacted soil remains at the depth of 4 m or deeper. Groundwater level was inferred to be between 6.6 and 8.6 mbtoc (equates to roughly mbgl), suggesting that there is potential for PFAS impacted soil to be less than 2 m above the water table. The risk that the retained PFAS impacted soil poses to groundwater was further assessed (refer to Section 12.0).
Nature of groundwater	Groundwater analytical results (refer to Section 8.4 and 8.5).	PFAS concentrations were reported in groundwater above the human health guideline value up and down-hydraulic gradient of the audit site. Further evaluation was conducted to assess the potential risk (refer to Section 12.0).



11.2 Survey Data

The earthworks contractor for the Nirimba Field development prepared a cut and fill plan dated 23 March 2021 (presented as Attachment 12, **Appendix A**) that indicates that greater than 3 m of VENM was placed over the majority of the site (areas proposed for residential and recreational use) and that the thickness of VENM decreases towards the swale (located near the north-eastern site boundary).

Following the completion of the VENM placement, the final site surface was surveyed (refer to Appendix N of the Validation Report provided as Attachment 15 (**Appendix A**)). The data confirms that the elevation of the site is approximately 25 mAHD or higher and drops to approximately 21.5 to 23 mAHD along the swale, noting that the swale slopes from north-east to south-west.

Overall, the auditor considers the available survey data to be adequate.

11.3 VENM Thickness

Table 11.2 is a compilation of the VENM thickness based on stratigraphy observed in the soil boreholes advanced in March 2021 (based on bore logs in Appendix B of the Validation Report).

Table 11.2: Summary of VENM thickness observed

Bore ID	Thickness of VENM observed (m)
NSS_BH06	2.7 (near the Swale)
NSS_BH07	0.4 (at the Swale)
NSS_BH08	0.7 (at the Swale)
NSS_BH11	0.9 (near the Swale)
NSS_BH12	1.0 (near the Swale)
NSS_BH13	0.5 (near the Swale)
NSS_BH14	0.4 (near the Swale)
NSS_BH15	4 (near the Swale)
NSS_BH16	0.5 (near the Swale)
NSS_BH17	2.6 (near the Swale)
NSS_BH18	0.5 (at the Swale)
NSS_BH19	2.7
NSS_BH20	5.4
NSS_BH21	3.5
NSS_BH22	0.3 (near the Swale)



Bore ID	Thickness of VENM observed (m)
NSS_BH23	4.3
NSS_BH24	3.9
NSS_BH25	3.8
NSS_BH26	3.1
NSS_BH27	4.9
NSS_BH28	4.3
NSS_BH29	4.1
NSS_BH30	3.7
NSS_BH31	3.6
NSS_BH32	3.3
NSS_BH33	3.4
NSS_BH34	4.0
NSS_BH35	4.0
NSS_BH36	4.7
NSS_BH37	3.6

This table shows that VENM thickness greater than 3 m were recorded (with an average thickness of 3.9 m) away from the swale and within the swale area, 0.3 to 2.7 m thick imported VENM was observed (with an average thickness of 1.2 m).



11.4 Evaluation of Quality Assurance and Quality Control

The auditor has assessed the overall quality of the data in **Table 11.3** by review of the information presented in the validation report.

Table 11.3: QAQC Summary

QAQC	Validation Report	Auditor Comments
Sampling and Analysis Methodology Assessment	- DQOs and DQIs were predetermined by Ramboll (2023c) for the validation assessment. - Validation excavation samples: 163 samples across the multiple mobilisations were collected across the base and walls of the excavation. Base and wall samples were collected per the frequency outlined in the RAP. Additional samples were collected within a change of lithology or every 1 m vertically. Validation sampling observations provided. - Excavation samples were collected directly from the excavator bucket (within the centre to avoid cross-contamination) or with a hand trowel. - Validation stockpile footprint samples: 42 samples were collected from the stockpile footprints. Sample densities were in accordance with the NSW EPA sample design guidelines (2022). Samples were collected within the top 100 mm of the surface soil using hand trowels or with assistance from the excavator. Validation sampling observations provided. - Disposable gloves were reported as being used for each sample event. - Ramboll indicated that sampling equipment including the hand trowel was decontaminated using Alconox® (PFAS-free detergent) and deionised water (PFAS-free water). - Soil samples were placed in laboratory-supplied plastic jars and bottles (comprised of polypropylene or high-density polyethylene). Samples were chilled in non-chemical-based ice which had been double-bagged (polyethylene plastic) and secured to avoid meltwater from contacting sample containers in the Esky™ during storage and subsequent transport to the laboratory.	Overall, the sampling and analysis methodology assessment is acceptable.
Field Quality Assurance and Quality Control	- NATA accredited laboratories Eurofins mgt and Envirolab were used. - Field replicates (15 intra-laboratory and 3 inter-laboratory duplicates for the validation excavation, and 5 intra-laboratory and 4 inter-laboratory duplicates for stockpile footprints validation), field blanks (10 for excavation sampling and 5 for stockpile footprint sampling), and rinsate blanks (11 for excavation sampling and 5 for excavation sampling) were collected. - The expected frequencies for inter-laboratory duplicates and field blanks for the first excavation mobilisation were not met. - Elevated RPDs were reported for two intra- and two inter-laboratory duplicate samples. - No trip blanks were collected with does not comply with the RAP.	In the context of the dataset reported, the lower than expected number of inter-laboratory duplicates and field blanks were not considered to be significant as it was for one round of sampling only. It is noted that Ramboll attribute the RPD exceedances to sample heterogeneity as the concentrations were all within the same order of magnitude. The absence of trip blank samples as required in the RAP is not considered significant since rinsate and field blank samples were taken at a generally acceptable rate, and all results were below the PQL. Overall, the field and lab quality assurance and quality control is acceptable.



QAQC	Validation Report	Auditor Comments
Laboratory Quality Assurance and Quality Control	- NATA accredited laboratories Eurofins mgt and Envirolab were used. - Laboratory quality control sampling was conducted (with the exception of some duplicates for Envirolab) and results indicate some elevated RPDs for several PFAS analytes, as well as matrix spike and surrogate recoveries outside the DQIs.	The non-compliances reported for elevated RPDs, matrix spike, surrogate recoveries are only for a small number of samples. Overall, the field and laboratory quality control results are acceptable.

Overall, the auditor considers the quality assurance and quality control acceptable for the validation undertaken.

11.5 Summary of Validation Works

The soil validation for the audit site included two components:

- 1) Validation of residual 'final' remediation excavation (as discussed in **Section 11.5.1**).
- 2) Validation of the ground surface in the footprint areas of previous stockpiles of PFAS-impacted material (as discussed in **Section 11.5.2**).

11.5.1 Remedial Excavation Validation

The validation of the remedial excavations were conducted over multiple rounds as the excavation extent was progressed to 'chase out' contamination laterally and at depth during each additional round.

Table 11.4 lists the soil concentrations of PFAS compounds recorded above the environmental quality criteria from the final round of validation sampling (Round 6). Their locations are shown as Attachment 8 (**Appendix A**).

Table 11.4: Residual Soil Validation Results (mg/kg)

Sample ID	Final Depth (mbgl) [#]	PFAS COPC	Concentration (mg/kg)	Criterion exceeded
NSS_VAL_19_W1TP02_1.0	5	Sum of PFOS and PFHxS	0.0103	NEMP HIL-A of 0.01 mg/kg
NSS_VAL_19_W4TP01_1.0	5	Sum of PFOS and PFHxS	0.065	NEMP HIL-A of 0.01 mg/kg
NSS_VAL_19_W4TP02_1.0	5	Sum of PFOS and PFHxS	0.1009	NEMP HIL-A of 0.01 mg/kg
NSS_VAL_21_W4TP01_1.0	4.5	PFOS	0.04	NEMP Ecological Indirect Exposure of 0.01 mg/kg
		Sum of PFOS and PFHxS	0.139	NEMP HIL-A of 0.01 mg/kg



Sample ID	Final Depth (mbgl) [#]	PFAS COPC	Concentration (mg/kg)	Criterion exceeded
NSS_VAL_21_W4TP02_1.0	4.5	PFOS	0.037	NEMP Ecological Indirect Exposure of 0.01 mg/kg
		Sum of PFOS and PFHxS	0.197	NEMP HIL-A of 0.01 mg/kg
NSS_VAL_24B_BOX2_W2_1.0	4	PFOS	0.25	NEMP Ecological Indirect Exposure of 0.01 mg/kg
		Sum of PFOS and PFHxS	0.265	NEMP HIL-A of 0.01 mg/kg
NSS_VAL_24B_BOX2_W3_1.0	4	Sum of PFOS and PFHxS	0.0126	NEMP HIL-A of 0.01 mg/kg
QC100_100622 (NSS_VAL_43)	4	Sum of PFOS and PFHxS	0.0228	NEMP HIL-A of 0.01 mg/kg

Note:

[#] Approximate depth below final ground elevation based on survey data presented in Attachment 13 and 14 (**Appendix A**).

The auditor notes that all remaining PFAS contamination from Round 6 was sourced from the Round 5 validation area at depths of greater than 4 m where Ramboll considered further excavation to be impracticable. It is understood that the excavation will be backfilled with at least 4 m of VENM. The auditor considers that at such depth, it is unlikely that direct contact/ingestion of the PFAS-impacted soil would occur i.e., no viable exposure pathway.

No PFOA concentration above the draft NEMP 3.0 ecological direct/indirect exposure screening level was reported.

In the auditor's opinion, validation of the remedial excavation works undertaken was generally appropriate and in accordance with the RAP.

11.5.2 Stockpile Footprints Validation

Stockpiles of topsoil and PFAS-impacted soil from the site and other parts of Schofields Aerodrome were placed within the audit site. In accordance with the RAP, "validation of stockpile footprints is to be conducted post removal of material to ensure that ground surfaces have not been inadvertently impacted by potentially contaminated stockpile materials" (page 18, Ramboll 2022).

There were four stockpiles present in the audit site. Validation sampling was undertaken below four stockpiles, once removed, with samples collected from 0 to 0.1 m. The results are tabulated in **Table 11.5**.

**Table 11.5: Stockpile Removal Footprint Validation**

Stockpile ID	Validation Sampling	Shown in Appendix A	Validation Sampling Date	Summary of Analytical Results
Stockpile A9 (renamed SP01)	Tested with 6 primary samples and 1 field duplicate.	Attachment 9	17 November 2021	All results below adopted criteria.
Stockpile SP02	Tested with 10 primary samples and 2 field duplicates at a 10 m x 10 m grid sampling.	Attachment 9	20 September 2022	One sample (QC200_200922 which is inter-laboratory duplicate for SP02_SS07) reported PFOS and sum of PFOS and PFHxS above the adopted criteria. It is noted that the corresponding primary sample and intra-laboratory duplicate sample did not report results above the adopted criteria. 95% upper confidence limit (UCL) on the mean concentrations were calculated as follows: • PFOS - 0.005 mg/kg • Sum of PFOS and PFHxS - 0.01 mg/kg This indicated that 95% UCL concentrations for the two COPC did not exceeding the adopted criteria.
Stockpile SP03	Tested with 8 primary samples and 2 field duplicates at a 10 m x 10 m grid sampling.	Attachment 9	3 November 2022	Three samples from November 2022 measured PFOS and sum of PFOS and PFHxS concentrations above the adopted criteria: • QC100_031122 • SP03_VAL_02 • SP03_VAL_07 Therefore, in February 2023, portions of stockpile SP03 footprint was removed/excavated and further validation testing was conducted (refer to row below).
	Tested with 10 primary samples and 2 field duplicates in a grid pattern.	Attachment 10	16 February 2023	All results below adopted criteria.
Stockpile SP03a	Tested with 8 primary samples and 2 field duplicates at a 10 m x 10 m grid sampling.	Attachment 9	3 November 2022	One sample (SP03A_VAL_01) reported PFOS (0.014 mg/kg) and sum of PFOS and PFHxS (0.014 mg/kg) above the adopted criteria. It is noted that the same concentrations were reported for PFOS and sum of PFOS and PFHxS. 95% UCL on the mean concentration was calculated as follows: • PFOS, and sum of PFOS and PFHxS - 0.01 mg/kg This indicated that 95% UCL concentrations for the two COPC did not exceeding the adopted criteria.

The auditor notes that there is no indication of PFAS contamination at the surface soil in the footprint areas of former stockpiles of PFAS-impacted soil.

In the auditor's opinion, the validation of the footprint areas of former stockpiles was conducted adequately and in accordance with the RAP.



12.0 Assessment of Risk

The majority of the PFAS soil contamination has been excavated and removed from the site with some. PFAS impacted soil has been retained at depth (greater than 4 m below the proposed ground levels) at isolated locations.

The auditor considers that the impacts do not pose a risk to human health as the elevated concentrations are located beneath 4 m (or more) of VENM and as a result direct and/or indirect exposure pathways are unlikely to be complete. Ramboll (2023c) state that development approval would be required for any excavation deeper than 3 m.

The auditor considers that the ecological risk associated with PFOS in soil is low due to the sporadic and localised low-level of PFOS contamination. No direct harm to terrestrial organisms was identified.

The auditor considers that as no groundwater concentrations of PFAS were reported above the adopted human health recreational screening levels and as groundwater is unlikely to be extracted for use at the site due to the depth of the water table (deeper than 6 m) and the availability of reticulated water, that the risk to human health from groundwater is low.

Given that the extent of PFAS impacted soil is limited, the auditor considers that the potential for leachate contamination to be generated is limited and therefore unlikely to impact groundwater quality or pose a risk to aquatic ecosystems. Overall, the auditor considers that the potential for PFAS contamination at the audit site to migrate to a tributary of Eastern Creek located approximately 500 m to the south, is low.



13.0 Contamination Migration Potential

With the isolated and localised low concentrations of residual PFAS remaining in the soil, the potential for migration from the audit site or vertically to groundwater would be even lower. Furthermore, groundwater flow was identified to be slow based on clay-dominated natural geology at the site.

Potential transport pathways via dust and surface erosion are not of concern as elevated concentrations of PFAS were not measured at depths deeper than 4 m.

In the auditor's opinion, there is no evidence of significant migration of contamination and little potential for future migration.



14.0 Compliance with Regulatory Guidelines and Directions

The auditor has used guidelines currently approved by the EPA under section 105 of the NSW Contaminated Land Management Act 1997 (**Appendix B**).

The investigation was generally conducted in accordance with State Environmental Planning Policy (SEPP) 55 Remediation of Land² (which was current at the time of investigation) and reported in accordance with the NSW EPA (2020) Consultants Reporting on Contaminated Sites Contaminated Land Guidelines. The checklist included in that document has been referred to. The EPA's Checklist for Site Auditors using the EPA Guidelines for the NSW Site Auditor Scheme 2017 (October 2017) has also been referred to.

14.1 Notification

Ramboll did not indicate in the Validation Report whether the validation works (which was investigative in nature) required any consent from regulatory authorities.

14.2 Development Approvals

The Development Consent (DA 21-00925) include the following consent condition for the subdivision:

Section 3.11 Site contamination

Section 3.11.1 'A NSW Environment Protection Authority accredited Site Auditor shall review the validation report and submit to Council a Site Audit Statement. The Site Audit Statement shall verify that the investigation, remediation and validation was carried out in accordance with the aforementioned guidelines and that the site is suitable for proposed use'.

The auditor confirms that this Site Audit Report and the associated Site Audit Statement are considered to address this condition with respect to investigation, remediation and validation undertaken with respect to PFAS contamination.

14.3 Waste Disposal

Waste disposal is excluded from this audit (refer to **Section 1.3**) and the auditor notes that information about waste disposal was documented in the Validation Report.

14.4 VENM and Other Imported Materials

As stated in **Section 1.3**, this site audit does not include the review of VENM or any other material imported to the site.

14.5 Licenses

The Validation Report did not indicate that licences were required for works associated with the audit site.

² SEPP 55 has been repealed and is now superseded by the State Environmental Planning Policy (Resilience and Hazards) 2021.



15.0 Conclusions and Recommendations

Ramboll (2023c) considers that the:

- “Potential risks to human-health are not present as exposure pathways are not complete and risk from potential future disturbance of PFAS impacted material is low and acceptable.”
- “Potential direct and indirect exposure risks to terrestrial and aquatic ecological receptors are low and acceptable.”
- “...an Environmental Management Plan (EMP) is not required for the site.”
- “With respect to the remediation of PFAS contamination associated with historical aerodrome land use and based on the assessment of the available data set presented herein, the No Scrape Area South is considered suitable for;
 - Future low-density residential with garden and accessible soil.
 - Future public recreational areas.
 - Future drainage infrastructure uses.”

Based on the information presented in the Validation Report and the auditor’s review of the other parts of Schofields Aerodrome external to the audit site, the auditor concludes that:

- The nature and extent of the PFAS contamination has been appropriately determined.
- The remedial works have removed the majority of the PFAS impacted material, such that the risk to human health and the environment of residual isolated PFAS impacts retained at depths of greater than 4m, are considered to be low, for the proposed residential, recreational/public open space and drainage infrastructure use.

The site audit statement will be provided to the Blacktown City Council and as a result the presence of the site audit statement will be noted on the Planning Certificate.



16.0 Other Relevant Information

This audit was conducted on the behalf of Defence Housing Australia for the purpose of assessing whether the nature and extent of per-and poly-fluoroalkyl substances (PFAS) contamination has been appropriately determined to assess the suitability and appropriateness of the validation report prepared for the No Scrape Area South i.e., a “Site Audit” as defined in Section 4 (definition of a ‘site audit’ (b) (i and v)).

This summary report may not be suitable for other uses. Ramboll Australia Pty Ltd included limitations in their report. The audit must also be subject to those limitations. The auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the auditor had some control or is reasonably able to check.

In drawing conclusions, the auditor used reasonable care to avoid reliance upon data and information that may be inaccurate, however a degree of uncertainty is inherent in all subsurface investigations and there remains the possibility that variations may occur between sample locations. The Audit and this report are limited by and rely upon the scope of the review, and the information provided by the Client and their consultants and representatives through documents provided to the auditor. The Audit is based on a review of the subsurface condition of the site at the time of assessment, as described in the assessment reports attached to the Audit report and site inspections conducted by the auditor and their representatives. The auditor’s conclusions presented in this report are therefore based on the information made available to them and arising from their own observations conducted during the audit. If the auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.



Appendix A: Attachments

Attachment 1: Site Location and Layout (May 2022)

Attachment 2: Criteria Exceedances From Previous Investigations and Remedial Extent

Attachment 3: Post Round 1 Excavation Validation Sampling Locations and Exceedances

Attachment 4: Post Round 2 Test Pitting Validation Sampling Locations and Exceedances

Attachment 5: Post Round 3 Test Pitting and Further Excavation Sampling Locations and Exceedances

Attachment 6: Post Round 4 Further Excavation Sampling Locations and Exceedances

Attachment 7: Post Round 5 Further Excavation Sampling Locations and Exceedances

Attachment 8: Post Round 6 Further Excavation Sampling Locations and Exceedances

Attachment 9: Stockpiles of Excavated Material and Sampling Locations

Attachment 10: Further Excavation of SP03 and Validation Sampling

Attachment 11: Existing Topsoil Stockpile Locations

Attachment 12: No Scrape South Cut/Fill Plan

Attachment 13: Final Excavation Surface Levels Survey (Ref: 1784G i07 [00] PFAS – Plan 1 (RL))

Attachment 14: Final Excavation Surface Levels Survey (Ref: 1784G i07 [00] PFAS – Plan 2 (VAL))

Attachment 15: Final Site Surface Level Survey

Attachment 16: Former Schofields Aerodrome Groundwater Monitoring Well Locations and Groundwater Guideline Exceedances

Attachment 17: Former Schofields Aerodrome Contoured Groundwater Elevations

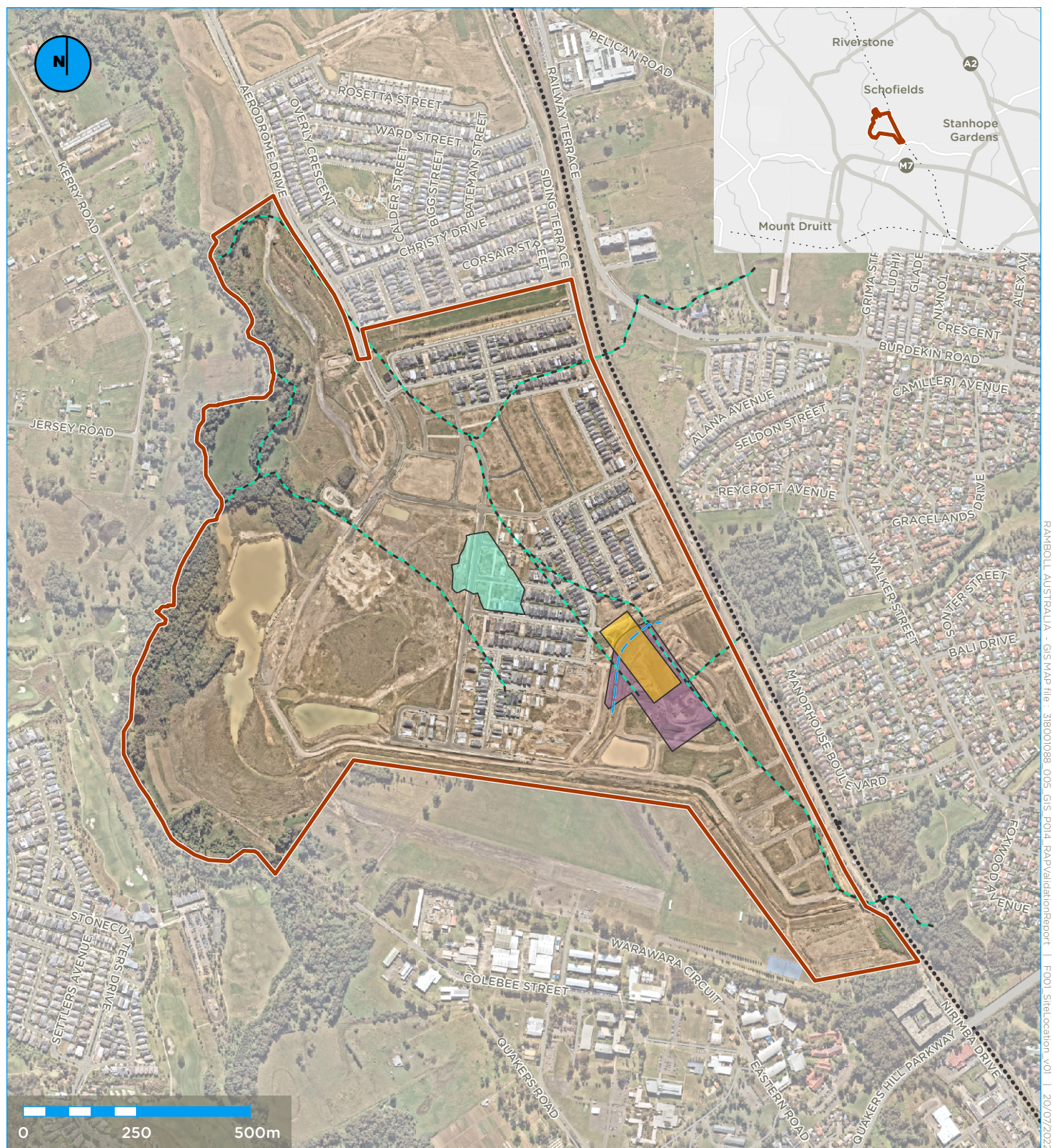
Attachment 18: Masterplan

Attachment 19: Staging Plan – Current Zoning Aerial

Attachment 20: Staging Plan – Proposed Zoning Aerial

Attachment 21: Akuna Vista, Nirimba Fields, Master Plan

Attachment 22: Survey Plan of 'No Scrape Area South' Audit Site



Esri, HERE, Garmin, Foursquare, METI/NASA, USGS and Aerial photography by Nearmap, flown 19/05/2022

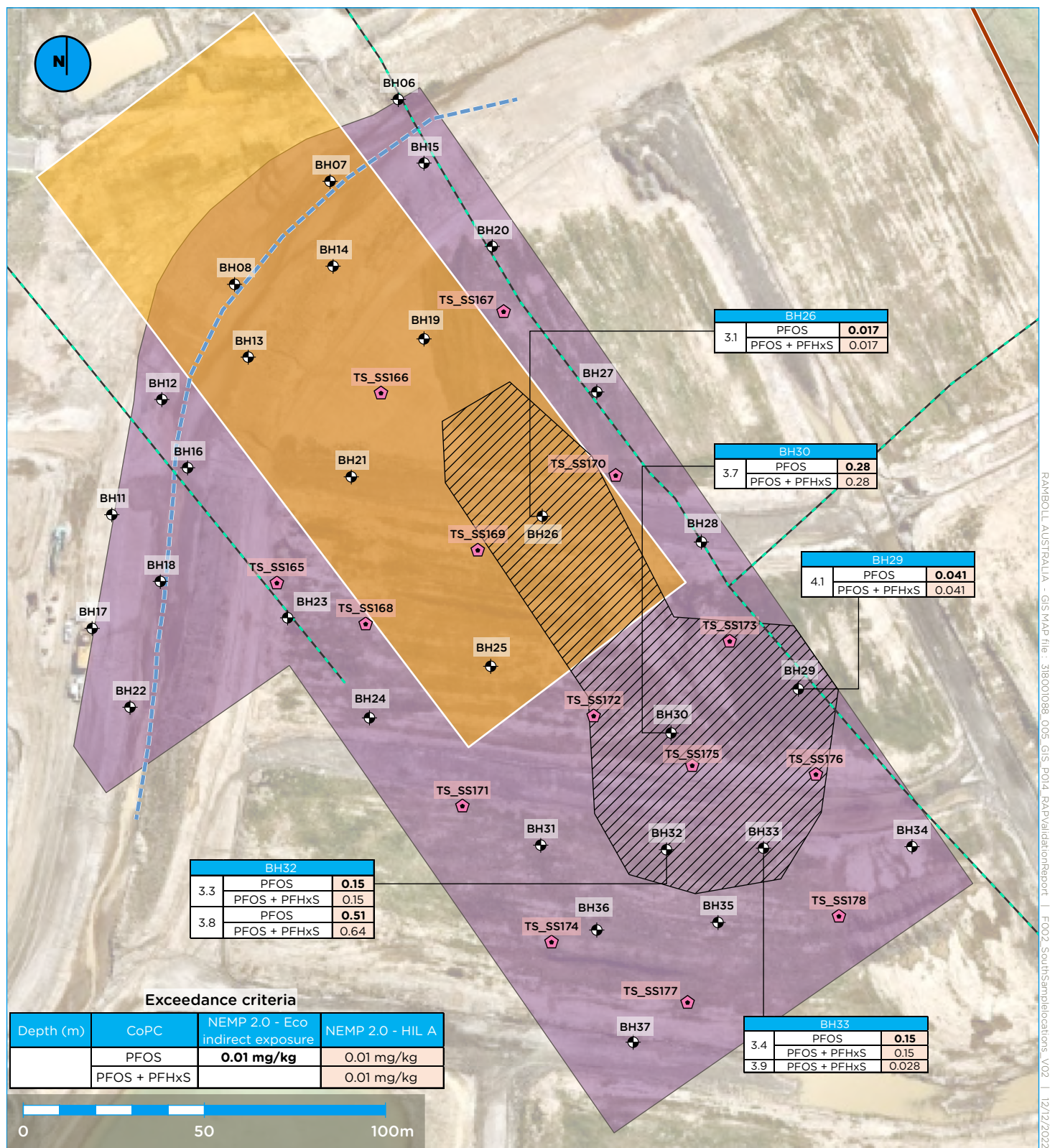
Legend

- Approximate Former Schofields Aerodrome site boundary
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- PFAS material emplacement area at depth
- Swale
- Former drainage channel
- Railway

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Figure 1: Site Location and Layout (May 2022)

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

- Approximate Former Schofields Aerodrome site boundary
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- Planned remedial extent
- Swale
- Former drainage channel

Sample locations (April 2021)

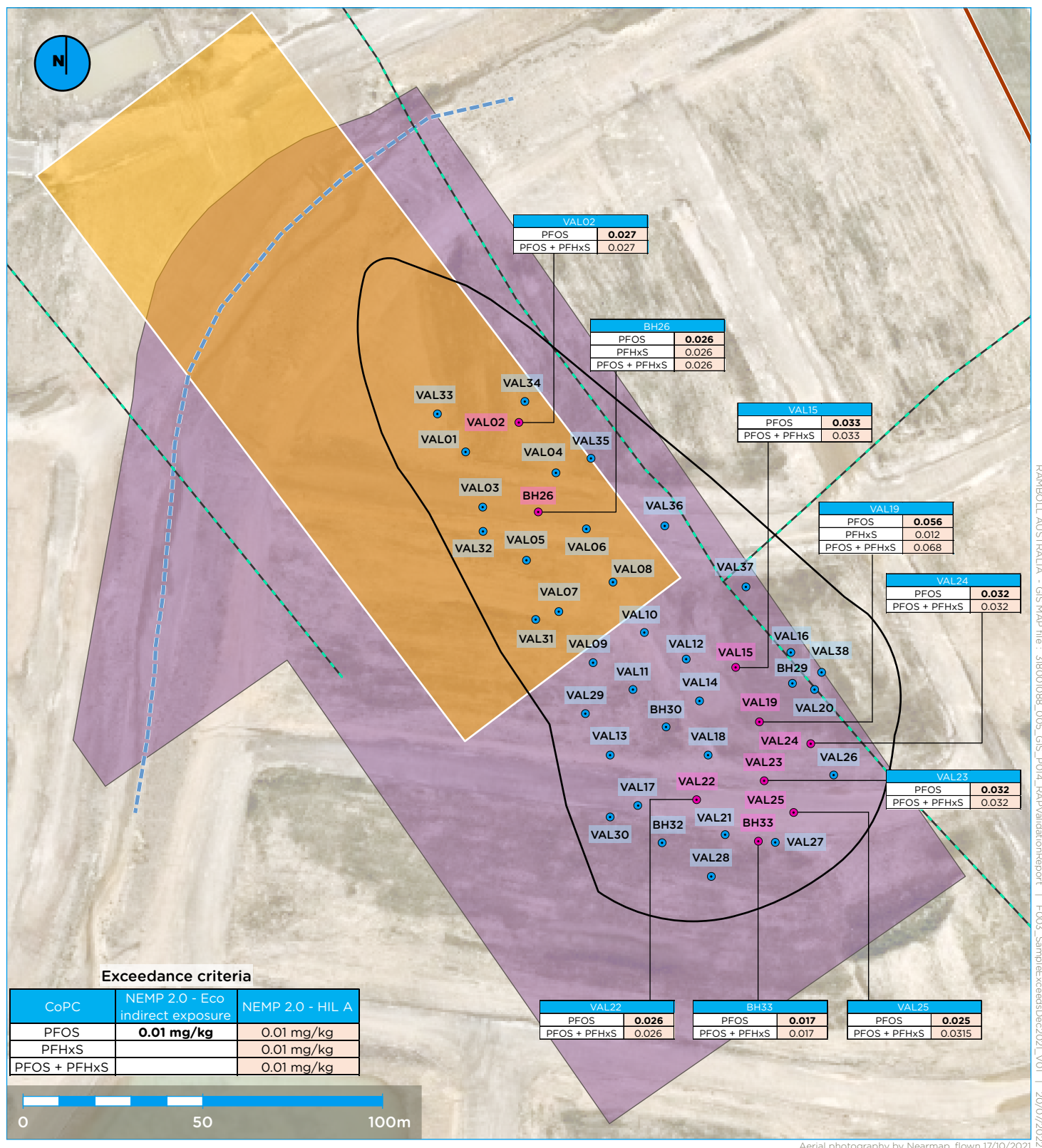
- Borehole sample location (prefix "NS_")

Sample locations (August 2021)

- Topsoil sample location

Figure 2: Criteria Exceedances From Previous Investigations and Remedial Extent

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

- Approximate Former Schofields Aerodrome site boundary
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- Remediation extent 3.2m to 3.7m - November to December 2021
- Swale
- Former drainage channel

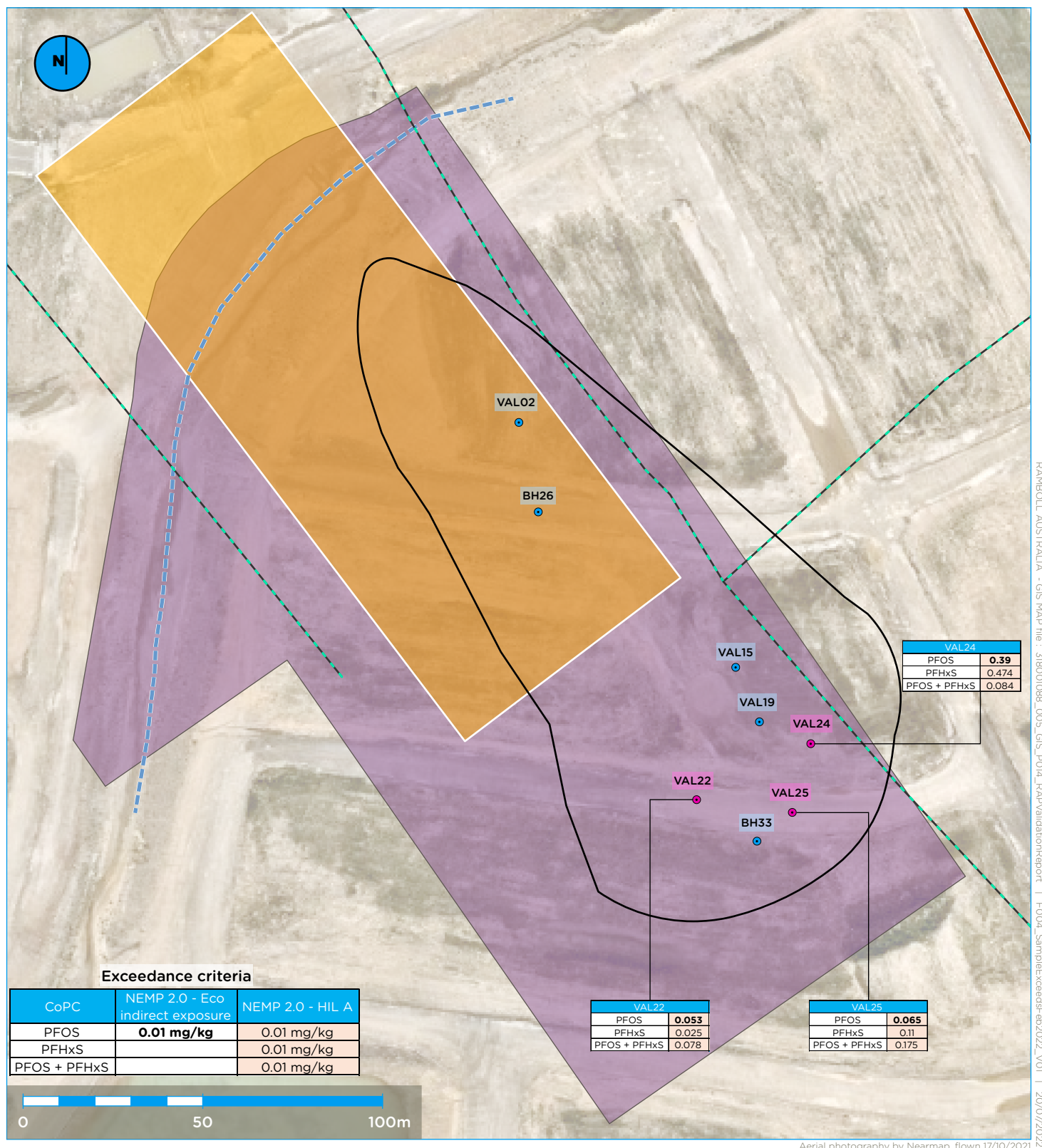
Sample locations (20 December 2021)

- Validation sample location
- PFOS+PFHxS sample location exceeding HIL A

A4
1:1,500

Figure 3: Post Round 1 Excavation Validation Sampling Locations and Exceedances

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

- Approximate Former Schofields Aerodrome site boundary
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- Remediation extent 3.2m to 3.7m - November to December 2021
- Swale
- Former drainage channel

Sample locations (18 February 2022)

- Validation sample location
- PFOS+PFHxS sample location exceeding HIL A

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Figure 4: Post Round 2 Test Pitting Validation Sampling Locations and Exceedances
No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome

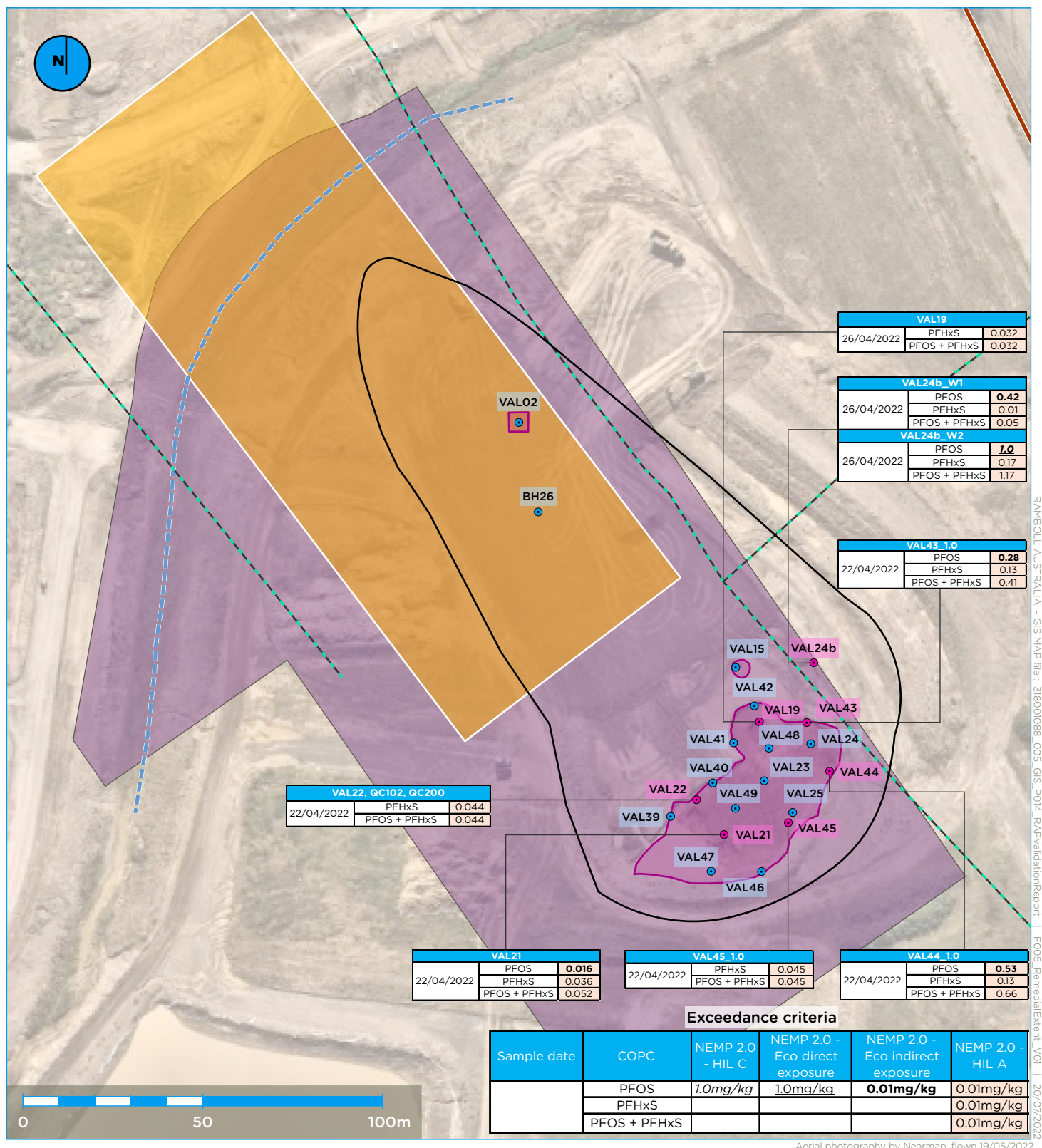
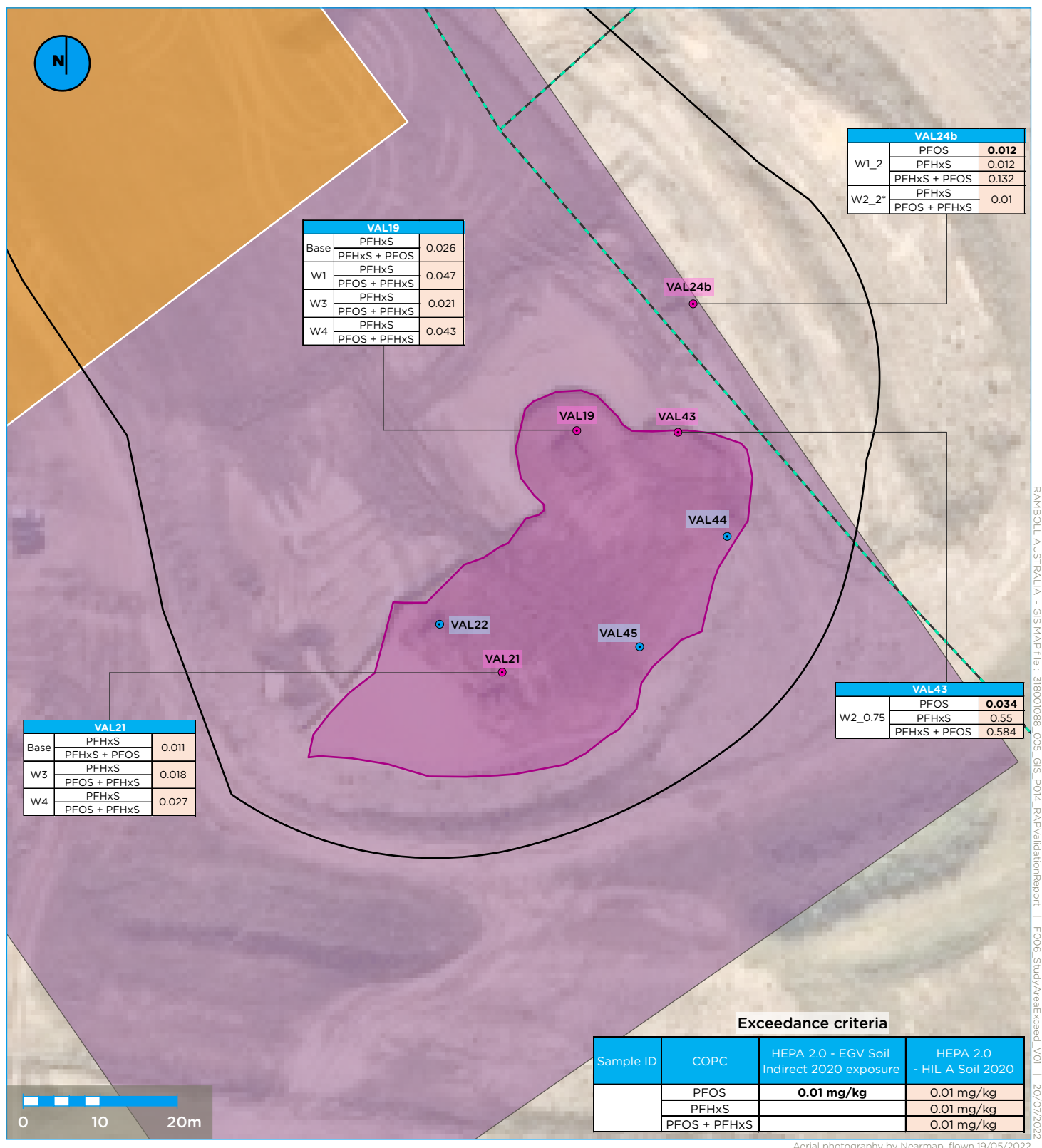


Figure 5: Post Round 3 Test Pitting and Further Excavation Sampling Locations and Exceedances
 No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

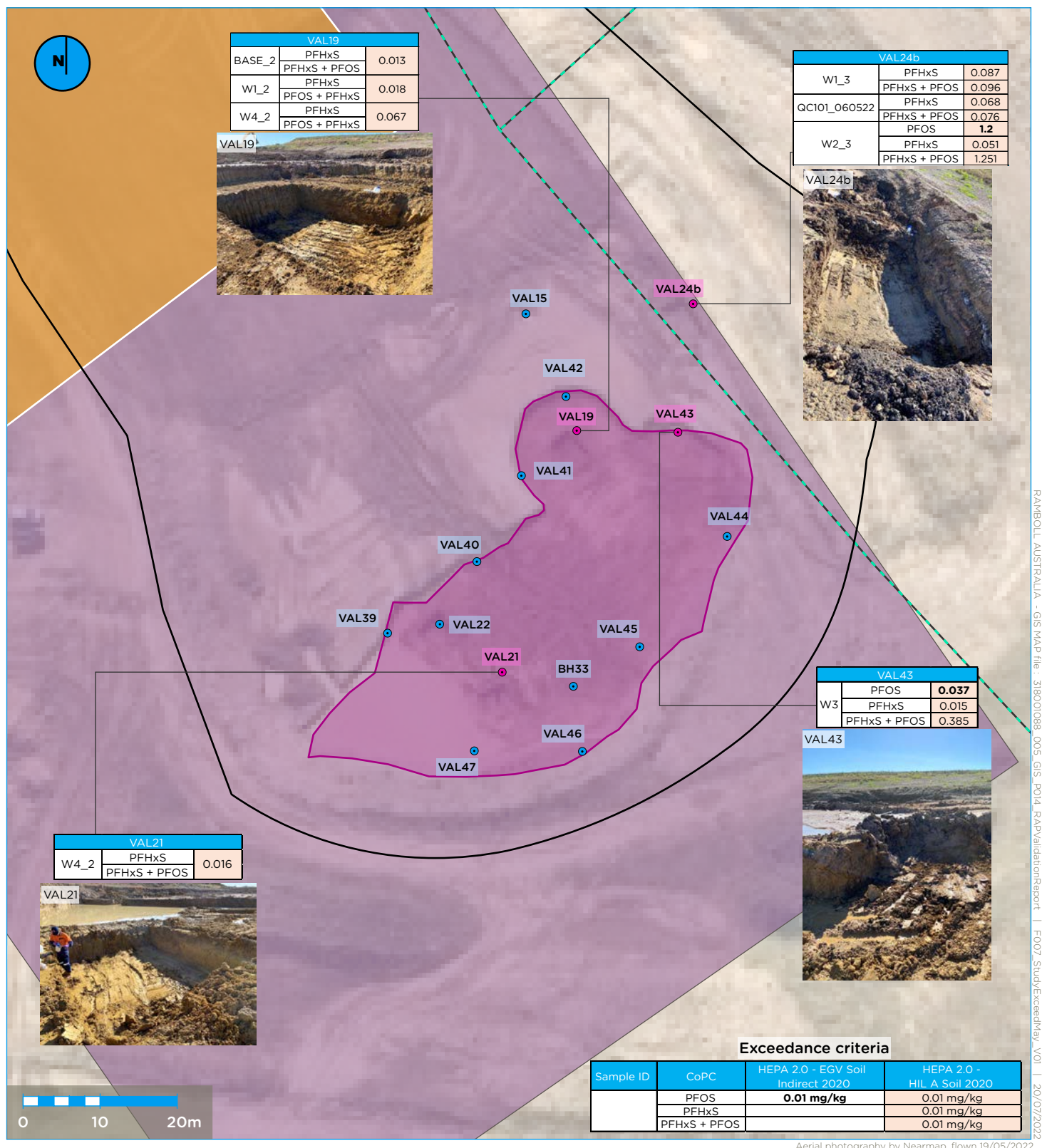
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- Remediation extent 3.2m to 3.7m - November to December 2021
- Remediation focus area 4.2m to 4.7m - February to March 2022
- Former drainage channel

Sample locations (4 May 2022)

- Validation sample location
- PFOS+PFHxS sample location exceeding HIL A
*exceedance only in field duplicate at location

Figure 6: Post Round 4 Further Excavation Sampling Locations and Exceedances

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

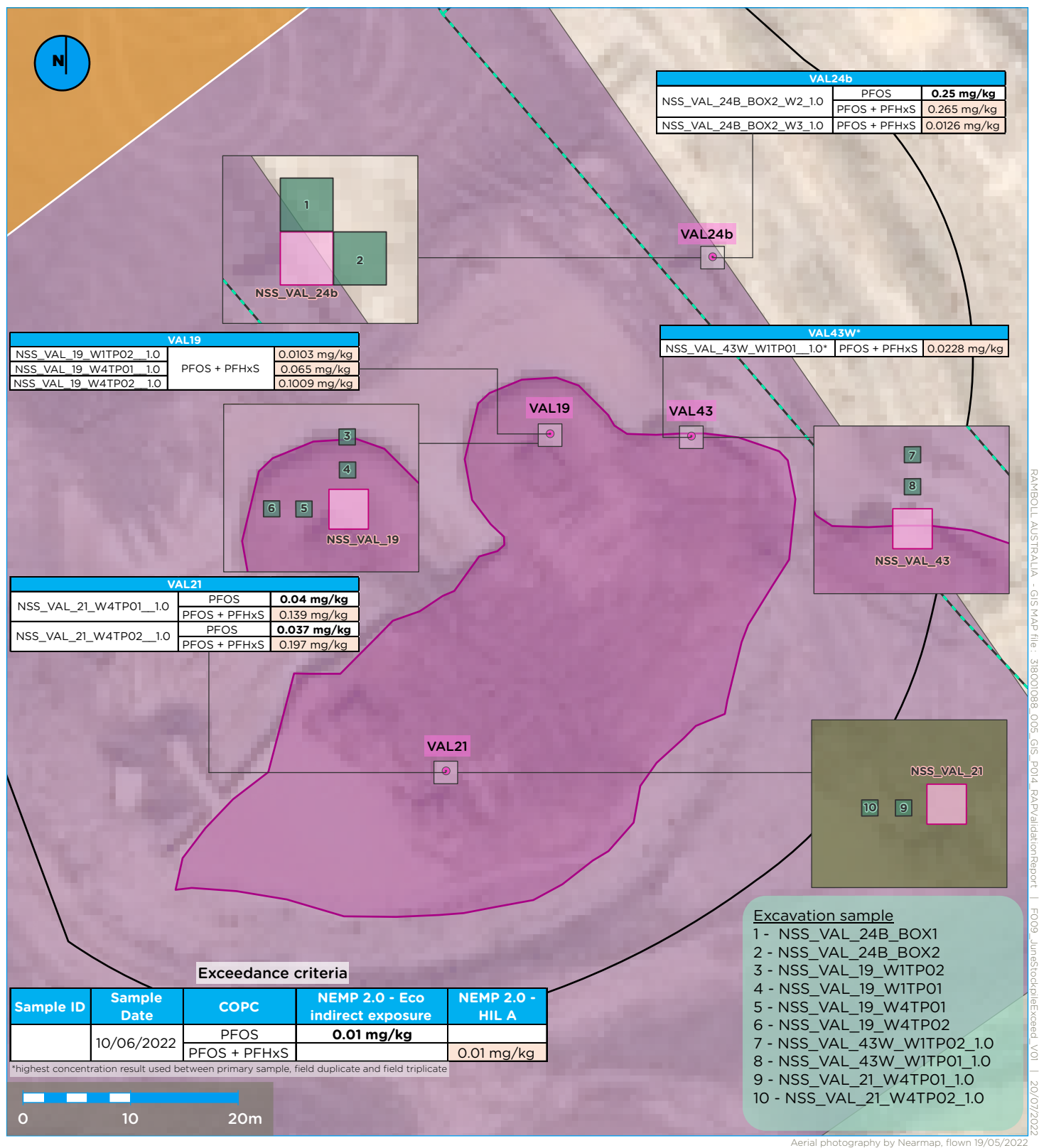
- No scrape area south
- Approximate location of remediation former Fire Fighting Training Area (FFTA)
- Remediation extent 3.2m to 3.7m - November to December 2021
- Remediation focus area 4.2m to 4.7m - February to March 2022
- Former drainage channel

Sample locations (6 May 2022)

- Validation sample location
- PFOS+PFHxS sample location exceeding HIL A

Figure 7: Post Round 5 Further Excavation Sampling Locations and Exceedances

No Scrape Area South PFAS Remedial Action Plan – Former Schofields Aerodrome



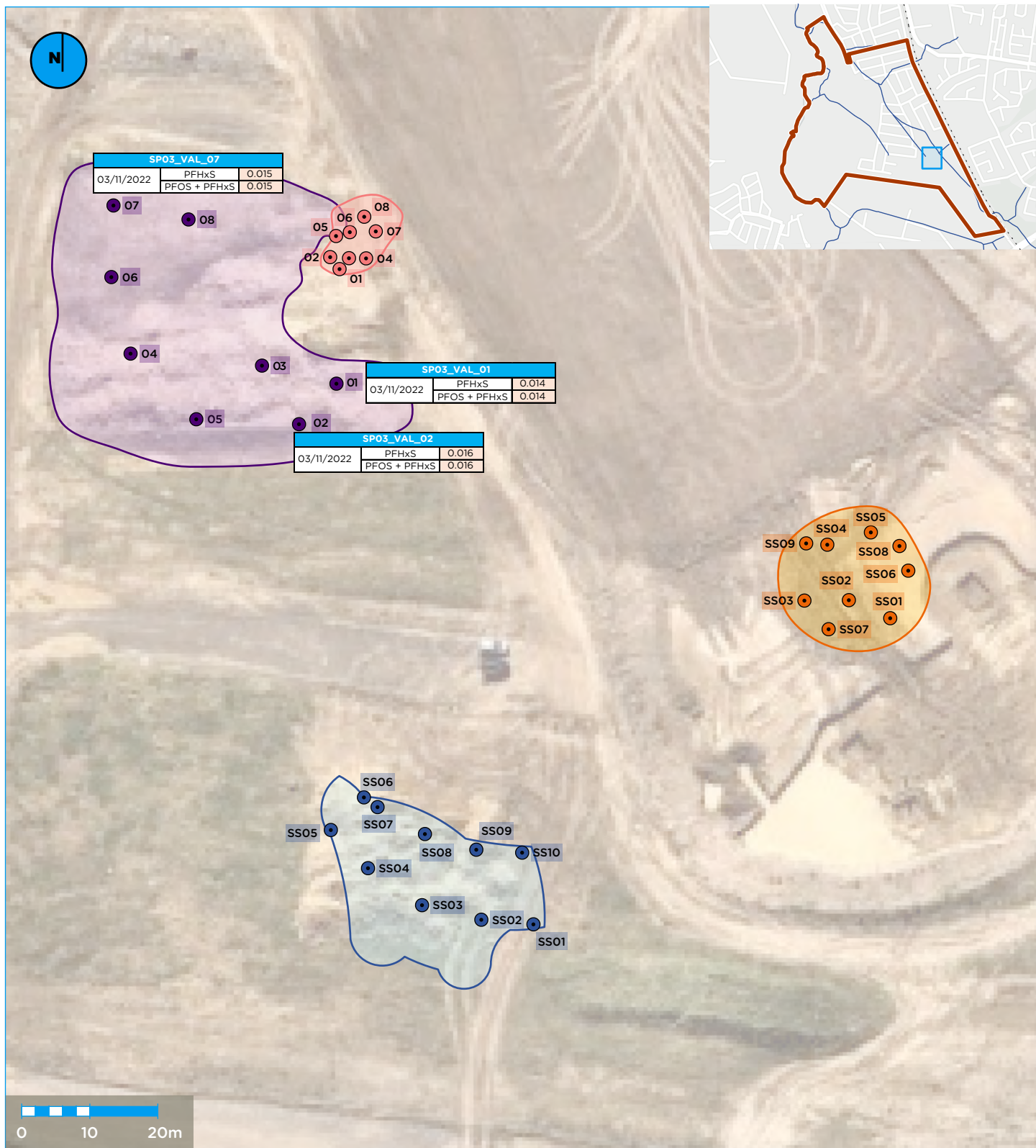


Figure 9: Stockpiles of Excavated Material and Sampling Locations
No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

- SP03
- SP03 Further Excavation

Post removal sample validation sample location

- Stockpile 3 (prefix "SP03_VAL_")

Figure 10: Further Excavation of SP03 and Validation Sampling
 No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Legend

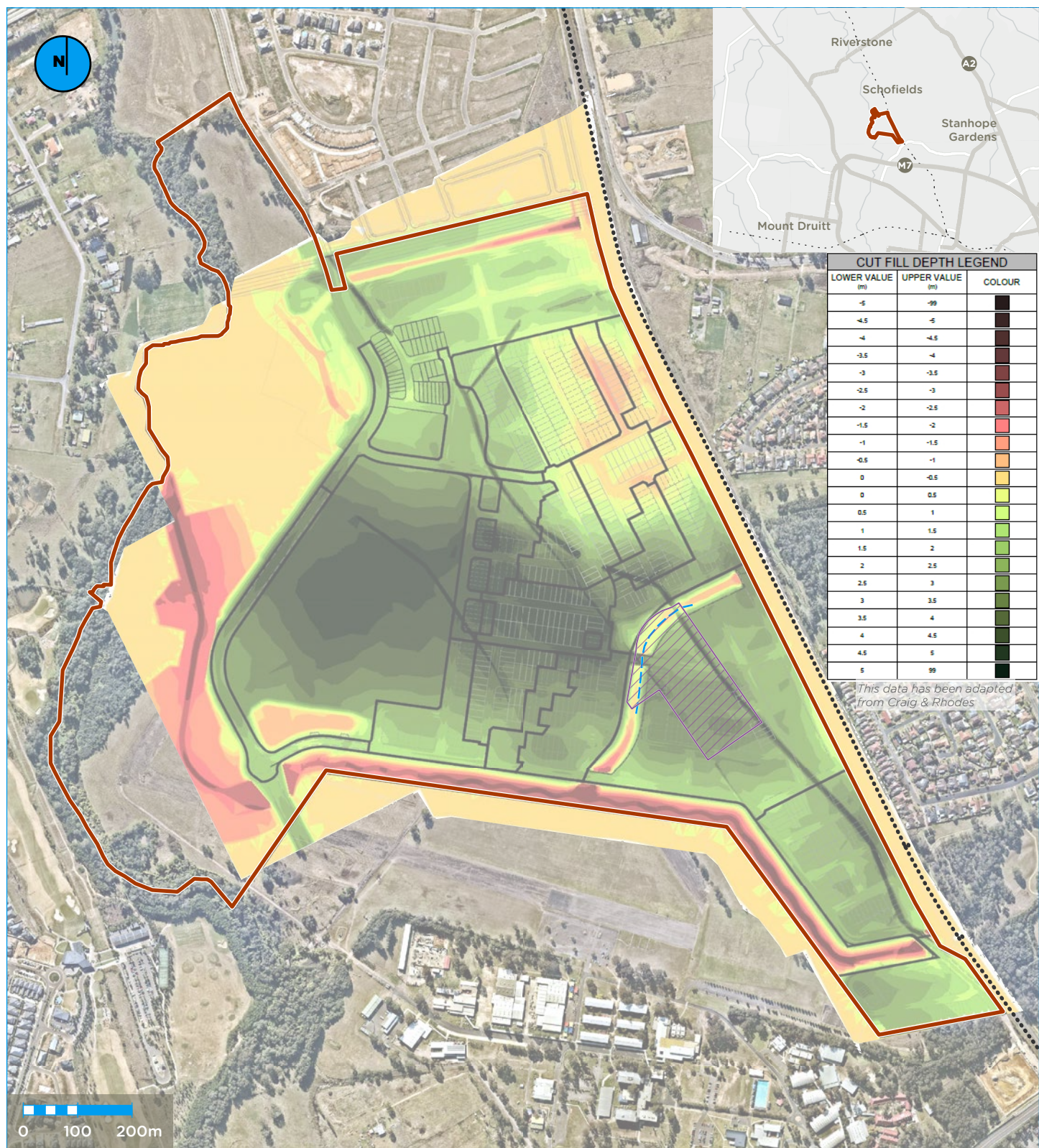
Approximate Former Schofields Aerodrome site boundary

Stockpiles

 A1, 101m ³	 A6, 456m ³
 A2, 2516m ³	 A7, 483m ³
 A3, 2440m ³	 A8, 1606m ³
 A4, 696m ³	 A9 (SP01), 733m ³
 A5, 939m ³	

Figure 11: Existing Topsoil Stockpile Locations

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



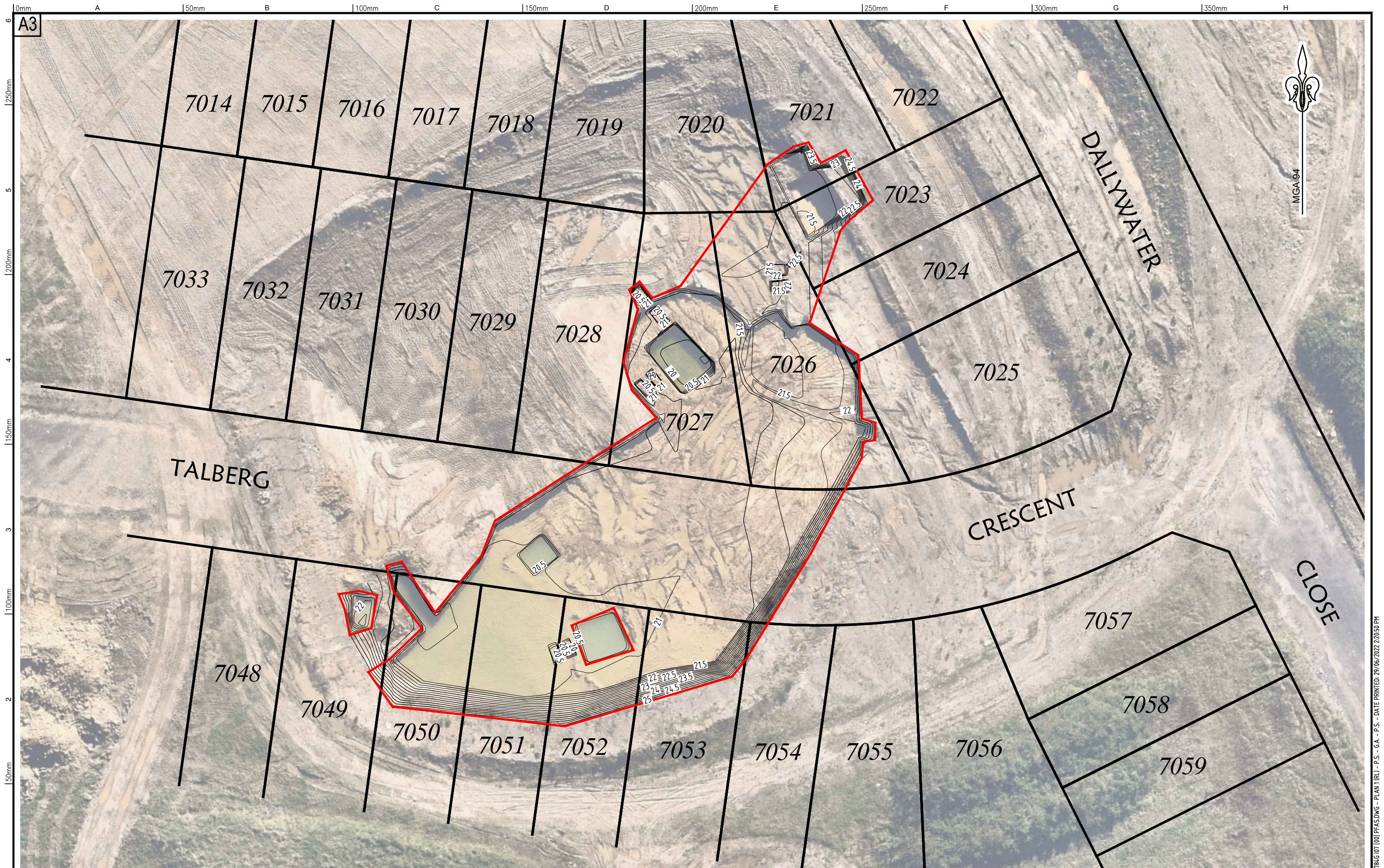
Legend

-  Approximate site boundary (comprising majority of Former Schofields Aerodrome)
-  No scrape area south
-  Swale
-  Railway

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Figure 12: No Scrape South Cut/Fill Plan

No Scrape Area South PFAS Remedial Action Plan - Former Schofields Aerodrome



Project:

Principal: DEFENCE HOUSING AUSTRALIA					
Scale 1:400		Date 29/06/2022		Council Ref.	
		Datum		L.G.A. BLACKTOWN	
Calc's	P.S.	Drawn	G.A.	Proj.Man	P.S.
				Client Ref:	

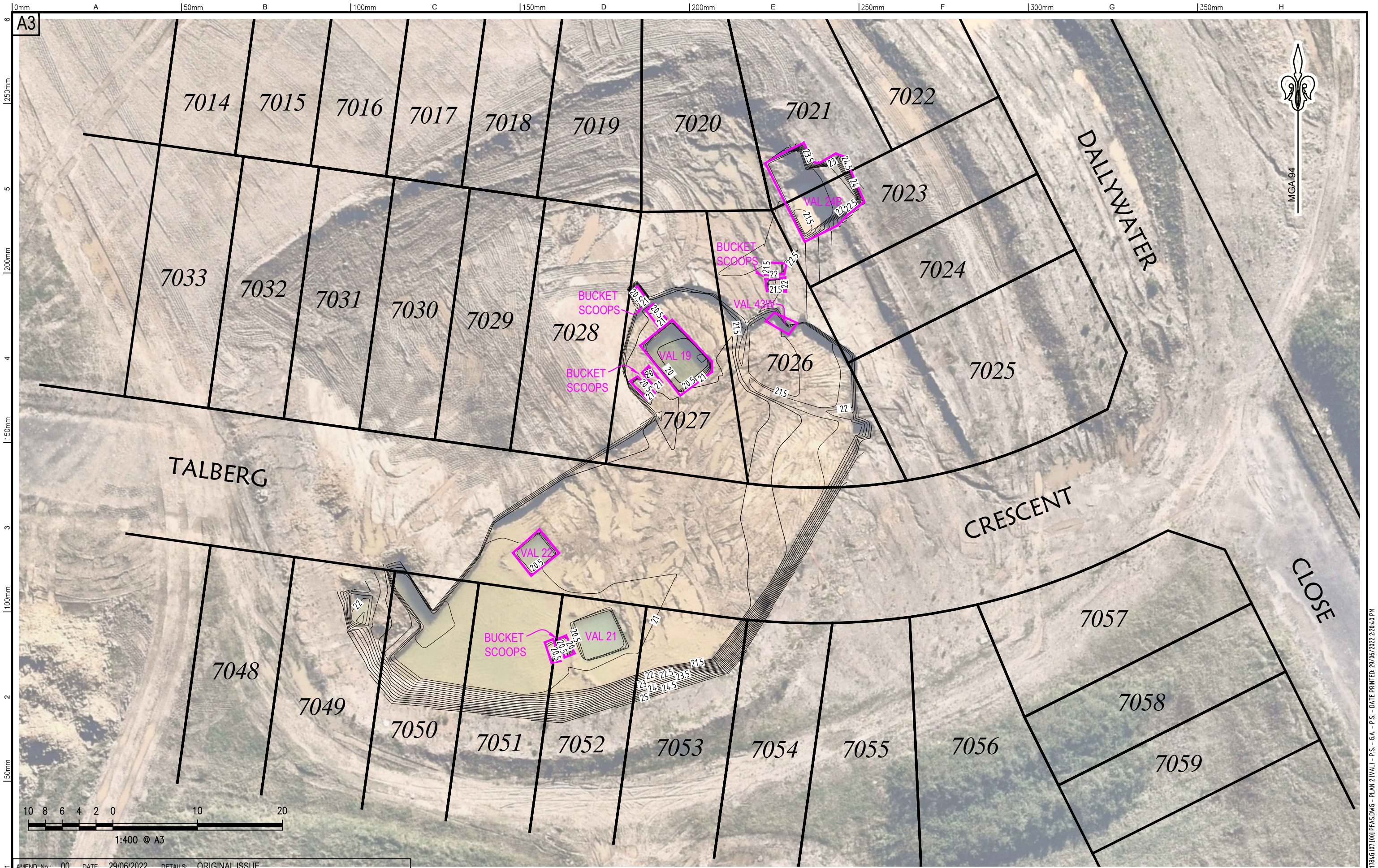


CRAIG & RHODES
TAKE THE LEAD

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Our Ref.	1784
Dwg File Ref. [Rev] - Sheet Ref.	1784G i07 [00] PFAS
	- PLAN 1 (RL)

CAD REF: 21784-CR-PLANS1784G i07 [00] PFAS.DWG - PLAN 1 (RL) - P.S. - G.A. - DATE PRINTED: 29/06/2022 2:20:50 PM

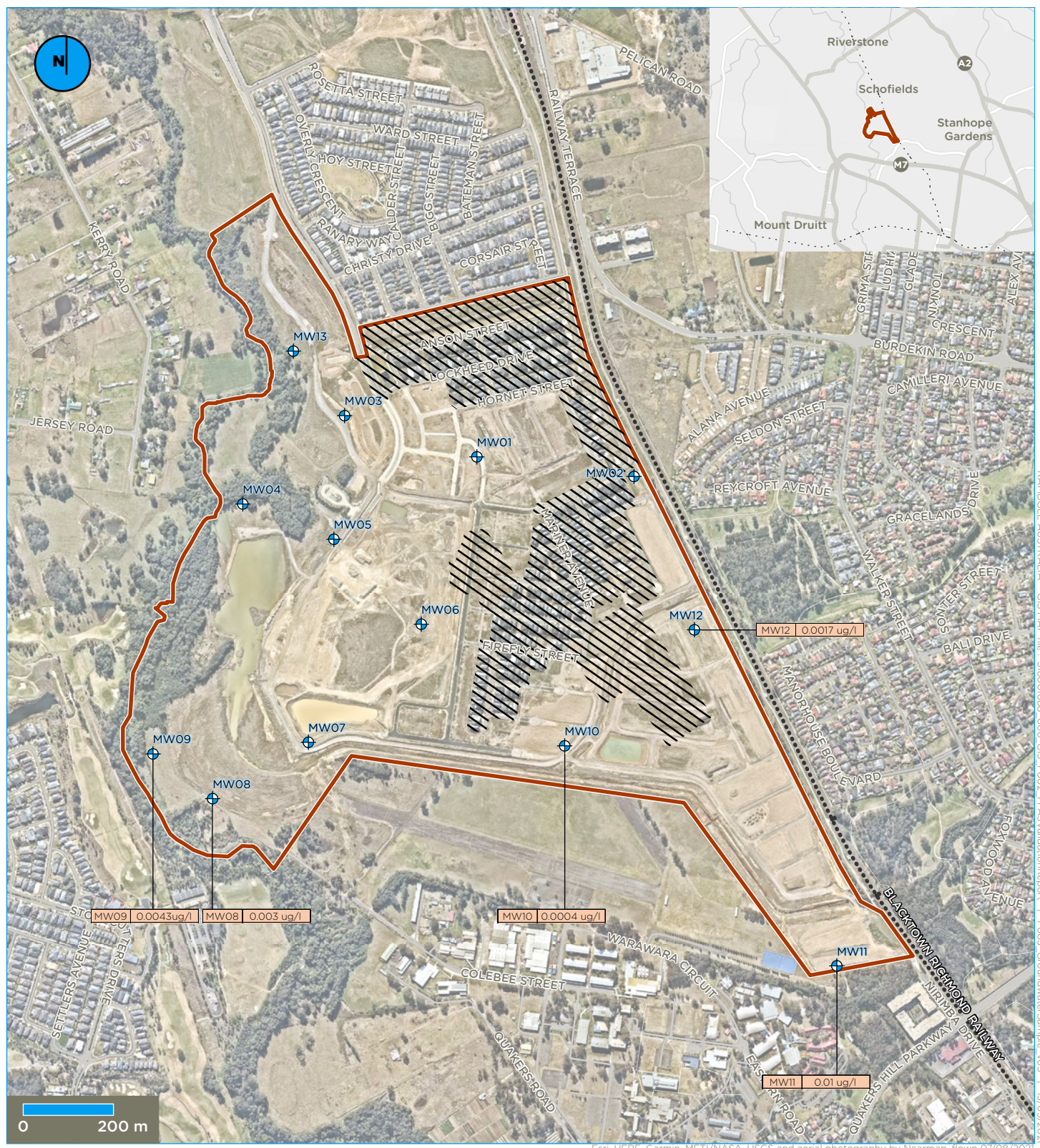


AMEND. No.: 00 DATE: 29/06/2022 DETAILS: ORIGINAL ISSUE				Principal: DEFENCE HOUSING AUSTRALIA				 CRAIG & RHODES TAKE THE LEAD		ABN 77 050 209 991 ACN 050 209 991 Suite 701, Level 7, 3 Rider Boulevard, Rhodes, NSW, 2138 PO Box 3220, Rhodes NSW 2138 Tel. 9869-1855 reception@craigandrhodes.com.au www.craigandrhodes.com.au © Craig & Rhodes		Our Ref. 1784	
Project:				Scale 1:400		Date 29/06/2022				Council Ref.		Dwg File Ref. [Rev] - Sheet Ref. 1784G i07 [00] PFAS - PLAN 2 (VAL)	
				Datum		L.G.A. BLACKTOWN							
Calc's P.S.				Drawn. G.A.		Proj.Man. P.S.		Client Ref:					



CAD REF: Z:\1784\CR - PLANS\1784G i07 [00] PFAS.DWG - PLAN 2 (VAL) - P.S. - G.A. - DATE PRINTED: 29/06/2022 2:20:40 PM





Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- + Monitoring well

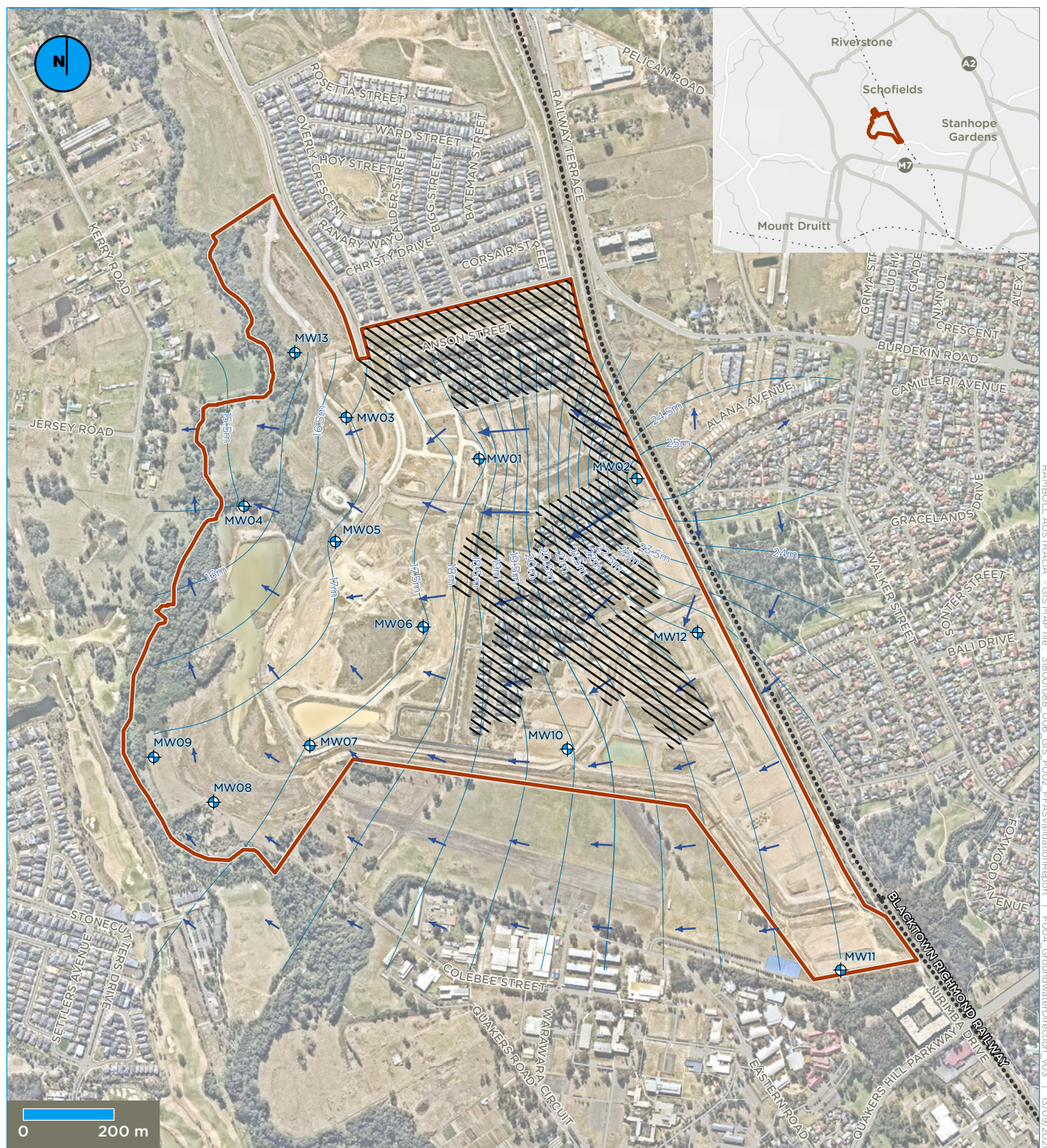
Exceedance Criteria

Sample ID	Sample Date	CoPC	Adopted Criteria Exceeded	Reported concentration
	8/07/2021	PFOS	DOEE 2016 FRESHWATER 99%	0.00023 ug/l

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Figure 5: Former Schofields Aerodrome Groundwater Monitoring Well Locations and Groundwater Guideline Exceedances

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome

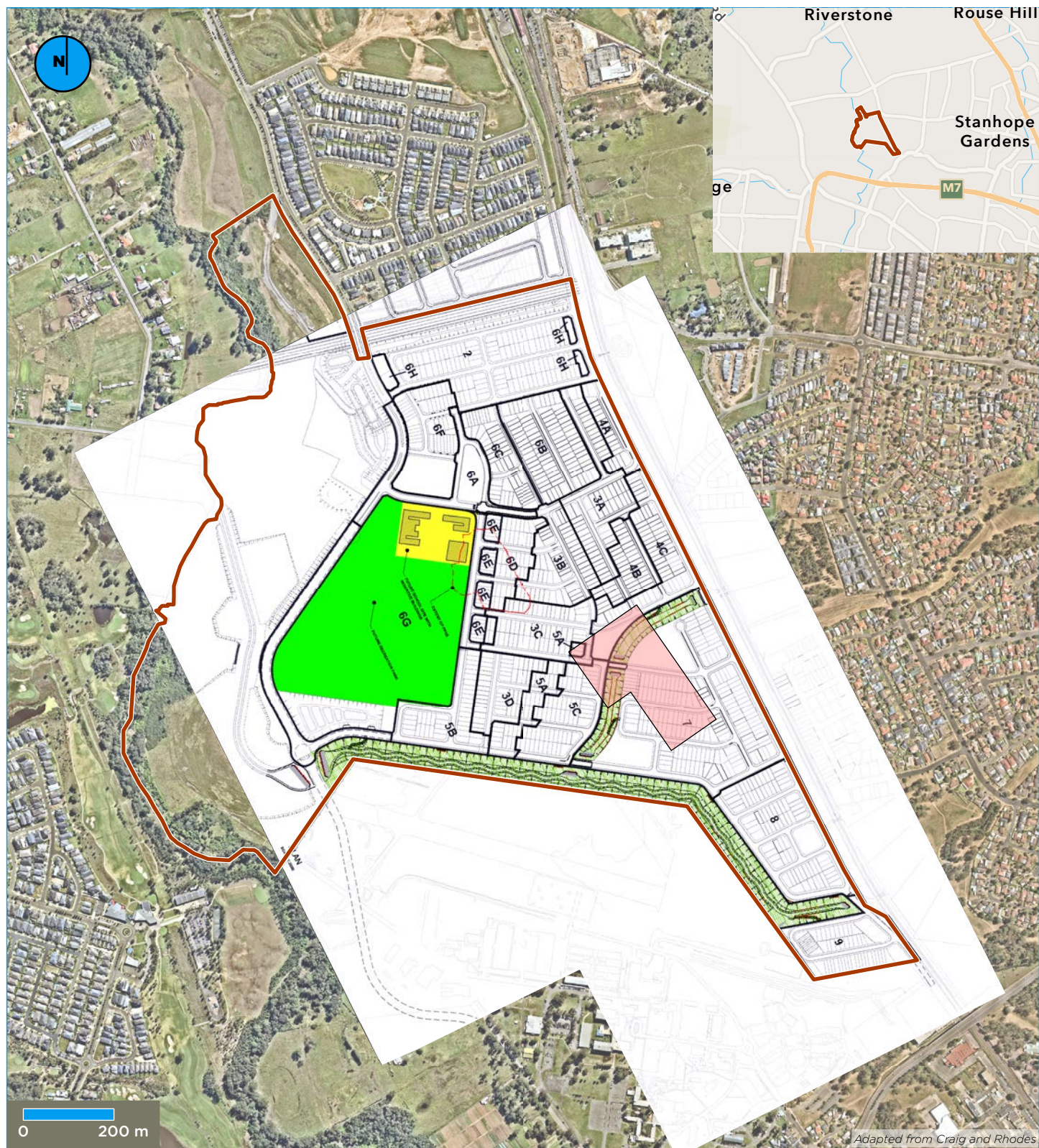


Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- ▨ Excluded area
- ⊕ Monitoring well
- 0.5m AHD contour

Figure 6: Former Schofields Aerodrome Contoured Groundwater Elevations

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



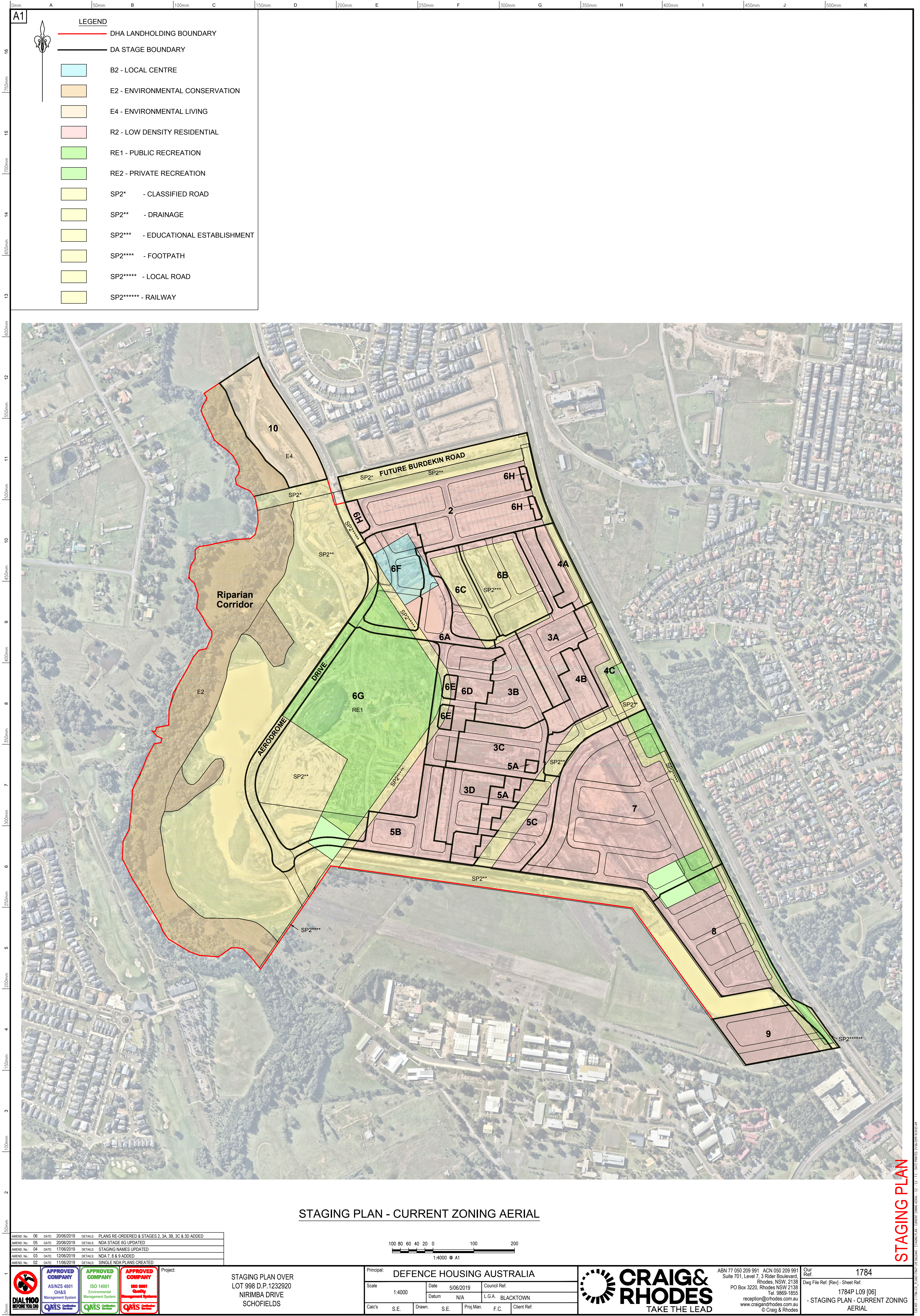
Legend

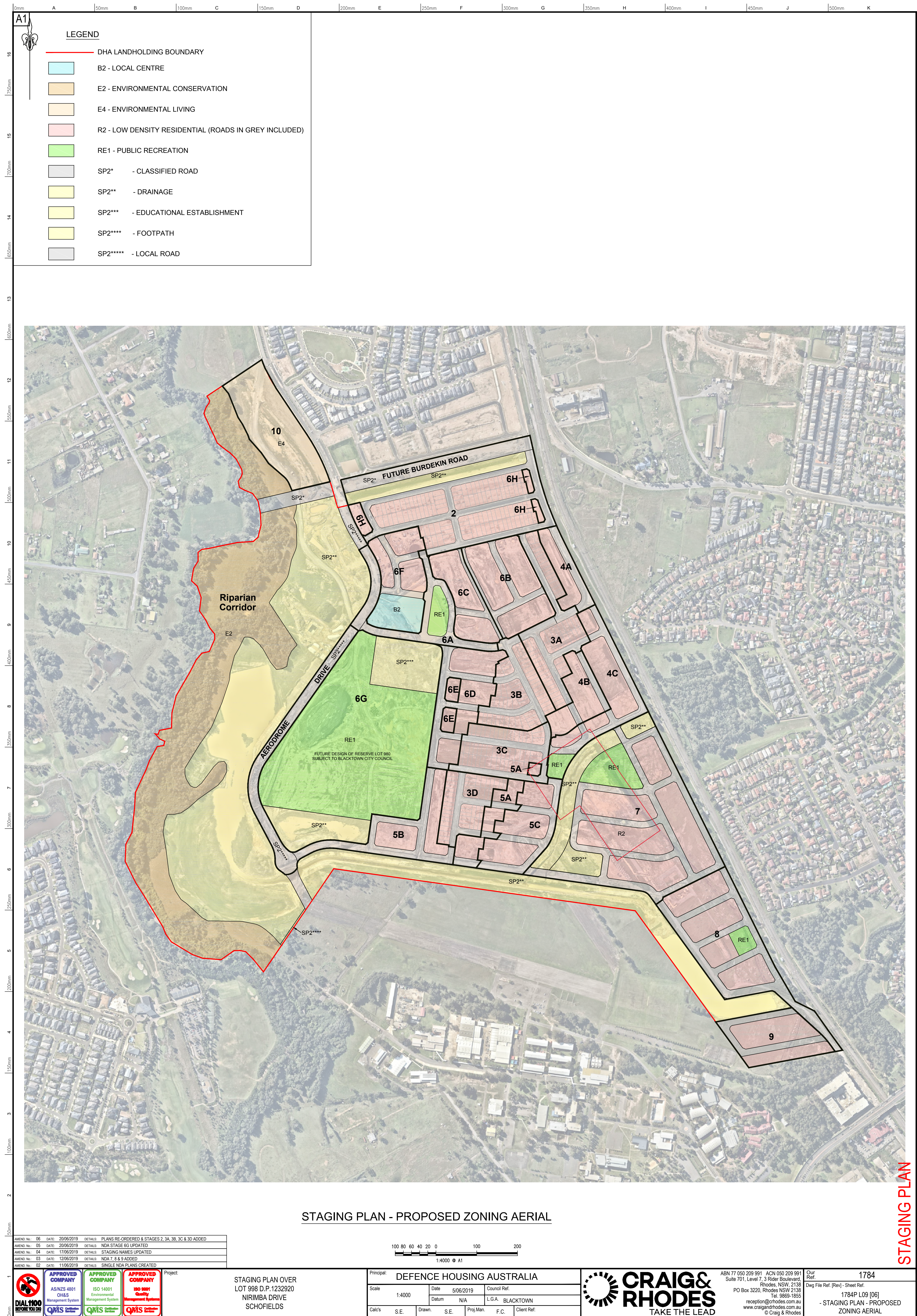
- 'No Scrape Area' - Area not suitable for top soil re-use (moved to placement area)
- Approximate Former Schofields Aerodrome site boundary

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1:12,000

Appendix 7: Masterplan

No Scrape Area, North of Swale PFAS Validation Report - Former Schofields Aerodrome







AKUNA VISTA

NIRIMBA FIELDS

- Release 1
- Release 2
- Release 3
- Release 4
- Release 5
- Release 6
- Release 7
- Release 8
- Smaller Lot Residential
- Future Residential
- Environmental Living Lots

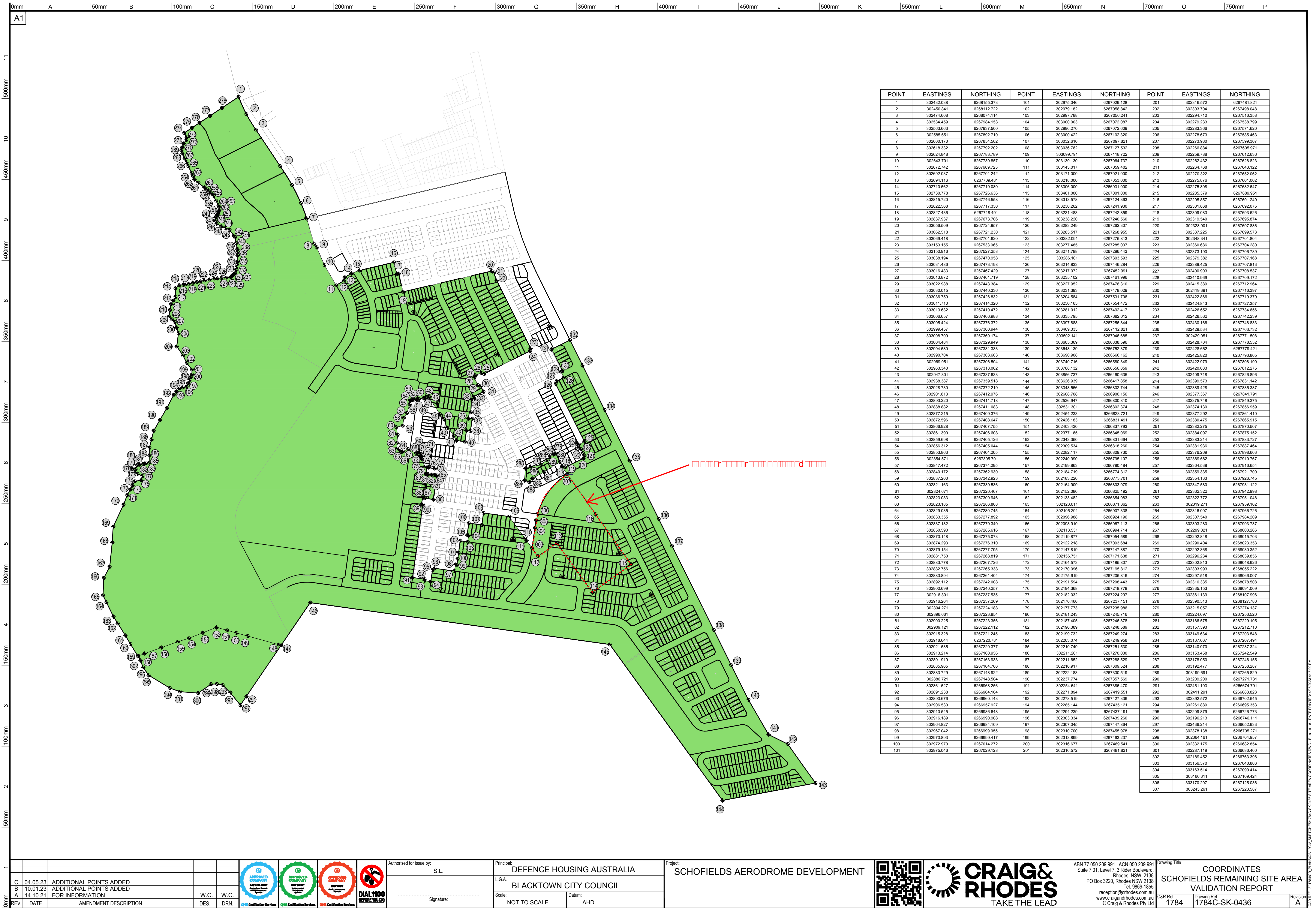
- 1 Proposed Primary School
- 2 Playing Field
- 3 Netball Courts
- 4 Playgrounds
- 5 Stormwater
- 6 Environmental Living Lots
- 7 Recreation Facility Carpark
- 8 Akuna Vista Local Centre
- 9 Eastern Creek
- 10 Nature Reserve
- 11 Park

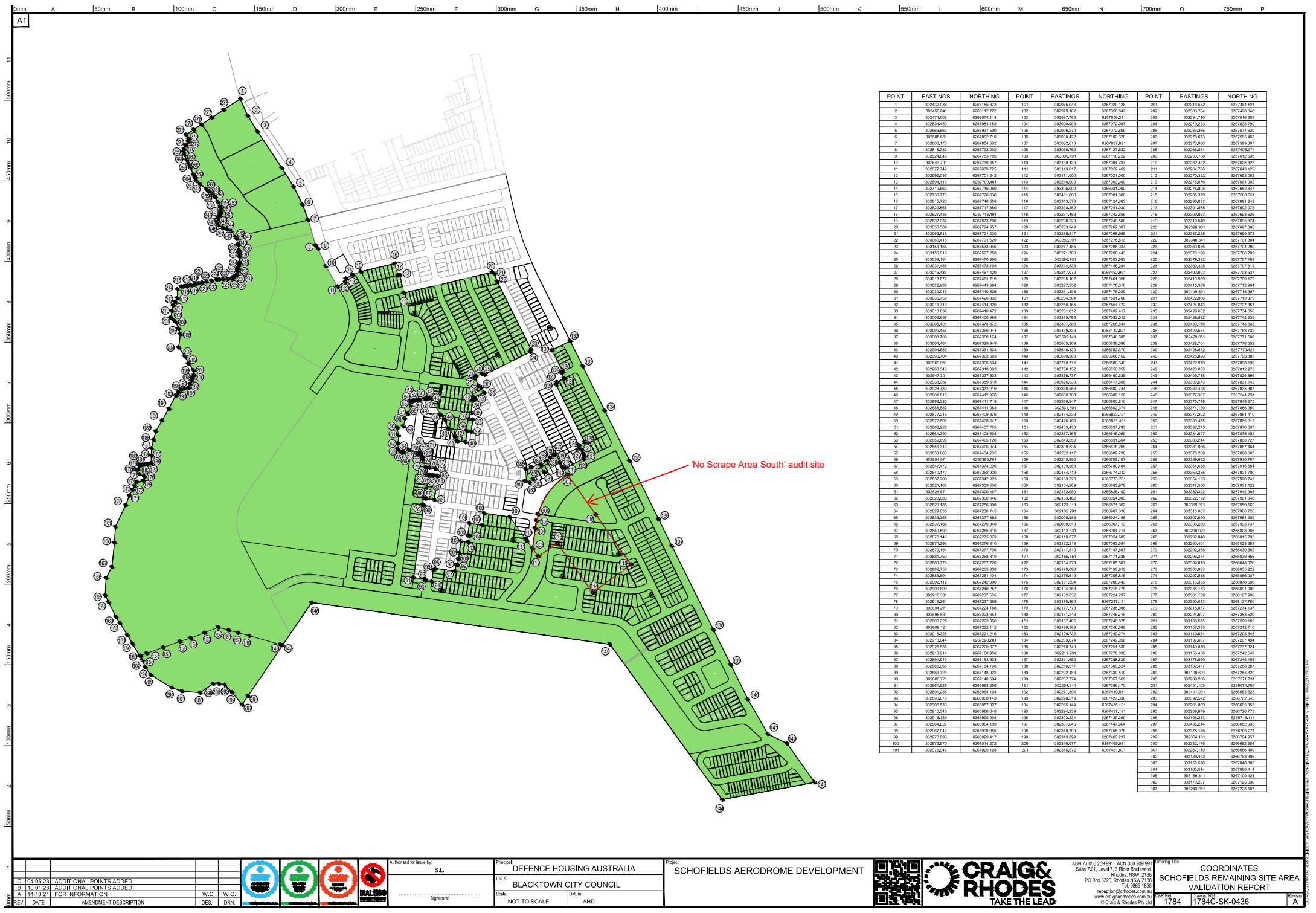
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POINT	EASTINGS	NORTHING	POINT	EASTINGS	NORTHING	POINT	EASTINGS	NORTHING
1	302432.038	6208185.373	101	302975.040	6207028.126	201	302516.572	6207481.211
2	302450.841	6208113.722	102	302978.182	6207028.842	202	302503.734	6207480.548
3	302474.608	6208074.114	103	302987.788	6207056.241	203	302524.710	6207416.358
4	302434.459	6207984.153	104	303000.603	6207072.287	204	302579.233	6207395.799
5	302563.663	6207933.509	105	303008.273	6207072.669	205	302583.366	6207371.420
6	302595.651	6207892.710	106	303000.422	6207102.320	206	302728.673	6207385.463
7	302600.170	6207854.502	107	303032.610	6207107.821	207	302731.980	6207399.307
8	302618.353	6207792.203	108	303038.762	6207117.532	208	302666.884	6207365.271
9	302624.648	6207753.789	109	303095.791	6207118.722	209	302595.789	6207312.636
10	302643.751	6207737.857	110	303139.130	6207098.237	210	302624.432	6207328.623
11	302672.742	6207689.725	111	303145.517	6207098.402	211	302634.788	6207343.122
12	302692.037	6207701.242	112	303171.000	6207091.200	212	302570.322	6207352.062
13	302694.116	6207709.481	113	303218.000	6207093.000	213	30276.876	6207391.022
14	302711.550	6207713.080	114	303246.000	6207091.000	214	302715.828	6207392.447
15	302735.778	6207725.636	115	303401.000	6207091.200	215	302585.379	6207399.951
16	302815.720	6207746.535	116	303331.578	6207124.363	216	302585.857	6207391.248
17	302822.568	6207711.250	117	303281.262	6207141.530	217	302611.688	6207392.275
18	302827.436	6207715.481	118	303231.453	6207242.259	218	302603.083	6207393.626
19	302837.837	6207873.357	119	303238.220	6207240.260	219	302318.540	6207395.874
20	302856.558	6207774.857	120	303246.240	6207250.257	220	302328.801	6207397.496
21	302902.518	6207721.230	121	303285.517	6207258.655	221	302337.225	6207398.573
22	303069.416	6207701.620	122	303282.891	6207275.813	222	302348.341	6207391.804
23	303153.150	6207533.965	123	303271.485	6207285.037	223	302360.688	6207374.280
24	303150.616	6207521.258	124	303271.788	6207284.443	224	302373.190	6207376.189
25	303038.194	6207470.958	125	303286.101	6207303.593	225	302378.382	6207397.168
26	303031.486	6207473.138	126	303274.833	6207448.284	226	302389.425	6207397.813
27	303016.483	6207461.459	127	303271.722	6207452.961	227	302400.803	6207398.037
28	303013.872	6207465.179	128	303255.102	6207481.896	228	302410.989	6207395.172
29	303022.988	6207443.384	129	303227.852	6207473.310	229	302415.369	6207371.864
30	303030.015	6207445.336	130	303231.380	6207472.629	230	302419.397	6207375.937
31	303036.759	6207430.832	131	303204.584	6207511.706	231	302422.896	6207378.379
32	303111.710	6207414.320	132	303201.185	6207523.472	232	302434.843	6207377.257
33	303133.833	6207410.472	133	303201.012	6207462.417	233	302436.852	6207374.669
34	303006.657	6207406.988	134	303335.795	6207382.012	234	302426.532	6207372.239
35	303035.424	6207376.372	135	303397.880	6207258.844	235	302430.166	6207374.633
36	302994.457	6207362.844	136	303463.333	6207152.611	236	302434.534	6207373.132
37	302908.709	6207360.174	137	303502.141	6207048.685	237	302429.051	6207371.508
38	302904.484	6207325.949	138	303505.369	6206983.596	238	302426.754	6207376.552
39	302904.580	6207331.333	139	303504.188	6206975.270	239	302434.862	6207374.611
40	302990.704	6207303.603	140	303600.000	6206866.162	240	302425.820	6207373.805
41	302899.261	6207306.504	141	303740.716	6206850.349	241	302422.879	6207398.130
42	302963.340	6207315.852	142	303738.152	6206855.469	242	302430.083	6207372.273
43	302947.301	6207337.633	143	303688.737	6206840.635	243	302405.718	6207326.896
44	302938.387	6207355.518	144	303632.939	6206841.758	244	302395.573	6207331.142
45	302920.730	6207372.219	145	303520.568	6206850.744	245	302389.425	6207332.887
46	302901.813	6207412.976	146	303608.708	6206866.168	246	302377.387	6207341.291
47	302893.220	6207411.716	147	303587.847	6206860.810	247	302375.748	6207349.375
48	302888.882	6207411.883	148	303531.301	6206861.314	248	302374.120	6207350.959
49	302877.215	6207400.378	149	303454.233	6206862.721	249	302377.292	6207381.410
50	302872.596	6207408.647	150	303428.183	6206861.451	250	302380.475	6207395.915
51	302868.058	6207403.151	151	303403.630	6206861.730	251	302382.275	6207396.959
52	302861.306	6207406.088	152	303377.185	6206864.569	252	302384.097	6207375.152
53	302859.098	6207405.125	153	303343.350	6206861.854	253	302383.214	6207383.727
54	302850.512	6207402.044	154	303328.524	6206861.268	254	302381.806	6207384.864
55	302853.363	6207404.305	155	303282.117	6206868.730	255	302376.289	6207398.603
56	302854.271	6207395.761	156	303248.980	6206876.107	256	302369.662	6207392.767
57	302847.472	6207393.326	157	303218.803	6206876.484	257	302364.238	6207394.864
58	302840.172	6207392.930	158	303184.710	6206874.312	258	302359.335	6207392.1700
59	302837.200	6207394.923	159	303183.220	6206873.701	259	302354.133	6207395.745
60	302821.163	6207393.536	160	303160.980	6206869.919	260	302347.580	6207391.122
61	302824.671	6207395.487	161	303152.080	6206865.192	261	302355.322	6207342.588
62	302823.083	6207390.346	162	303143.482	6206864.083	262	302322.772	6207391.648
63	302823.185	6207390.808	163	303126.511	6206867.362	263	302319.221	6207393.142
64	302826.035	6207392.745	164	303105.291	6206867.538	264	302316.007	6207396.726
65	302833.355	6207377.892	165	303096.080	6206866.198	265	302307.540	6207394.209
66	302837.162	6207376.340	166	303086.610	6206867.113	266	302303.280	6207393.727
67	302850.500	6207395.616	167	303133.531	6206894.714	267	302299.021	6206893.266
68	302870.148	6207375.073	168	303149.877	6207094.480	268	302292.848	6206815.703
69	302873.283	6207376.310	169	303122.210	6207093.684	269	302296.404	6206823.353
70	302875.176	6207377.795	170	303147.819	6207141.287	270	302292.368	6206830.352
71	302881.750	6207398.819	171	303159.751	6207171.838	271	302296.234	6206830.856
72	302882.718	6207377.726	172	303146.573	6207185.807	272	302292.813	6206836.808
73	302882.756	6207395.338	173	303175.096	6207199.612	273	302303.983	6206855.222
74	302883.894	6207391.404	174	303175.619	6207226.816	274	302297.518	6206860.027
75	302892.112	6207402.044	175	303184.260	6207242.440	275	302292.813	6206861.548
76	302900.696	6207402.267	176	303186.360	6207216.770	276	302305.153	6206891.099
77	302910.301	6207337.535	177	303182.032	6207224.207	277	302311.539	6206870.596
78	302916.284	6207331.296	178	303170.480	6207217.151	278	302303.813	6206872.780
79	302904.271	6207324.188	179	303171.773	6207235.980	279	302315.897	6207274.337
80	302896.661	6207223.854	180	303181.243	6207245.716	280	302324.687	6207253.520
81	302900.229	6207223.596	181	303187.405	6207246.878	281	302318.575	6207229.108
82	302906.121	6207222.112	182	303186.360	6207246.269	282	302317.383	6207312.710
83	302915.328	6207221.245	183	303189.732	6207248.274	283	302314.834	6207203.548
84	302916.644	6207220.791	184	303201.074	6207249.898	284	302317.687	6207207.404
85	302921.535	6207220.377	185	303215.748	6207251.530	285	302316.070	6207237.824
86	302913.214	6207160.956	186	303211.201	6207270.030	286	302315.458	6207242.549
87	302891.919	6207163.933	187	303211.852	6207288.629	287	302317.850	6207264.155
88	302895.895	6207166.796	188	303219.917	6207295.524	288	302315.477	6207258.887
89	302883.729	6207146.922	189	303222.183	6207330.519	289	302318.891	6207255.829
90	302886.721	6207145.524	190	303227.774	6207378.259	290	302320.200	6207271.731
91	302891.527	6206995.295	191	303235.441	6207378.470	291	302315.103	6206924.791
92	302891.238	6206994.154	192	303227.894	6207415.551	292	302311.291	6206963.823
93	302906.376	6206995.143	193	303227.519	6207427.238	293	302302.572	6206970.545
94	302906.530	6206995.627	194	303228.144	6207435.511	294	302311.889	6206955.953
95	302910.345	6206996.048	195	303226.239	6207437.181	295	302298.879	6206975.273
96	302916.189	6206995.008	196	303230.334	6207439.260	296	302316.213	6206974.111
97	302944.827	6206994.109	197	303247.240	6207447.486	297	302316.314	6206970.853
98	302967.242	6206996.950	198	303265.760	6207455.978	298	302318.136	6206970.271
99	302970.893	6206999.417	199	303271.399	6207463.237	299	302344.161	6206974.957
100	302972.970	6207014.272	200	303274.677	6207466.541	300	302313.175	6206972.854
101	302975.040	6207028.126	201	303278.572	6207481.821	301	302287.119	6206966.400
						302	302186.452	6206963.396



Appendix B: EPA Guidelines



Guidelines made or approved by the EPA under section 105 of the Contaminated Land Management Act 1997

(EPA webpage last updated 12 August 2022)

Section 105 of the CLM Act allows the EPA to make or approve guidelines for purposes connected with the objects of the Act. The EPA must consider these guidelines whenever they are relevant. Other people must also consider the guidelines, namely, accredited site auditors when conducting a site audit; contaminated land consultants when investigating, remediating, validating and reporting on contaminated sites; and those responsible for land contamination with a duty to notify the EPA.

A current list of guidelines made or approved by the EPA under the CLM Act appears below.

Guidelines made by the EPA

- Assessment and management of hazardous ground gases: Contaminated land guidelines (PDF 4MB)
- Guidelines for the vertical mixing of soil on former broad-acre agricultural land (PDF 148KB)
- Contaminated land sampling design guidelines part 1 – application (PDF 3.3MB)
- Contaminated land sampling design guidelines part 2 – interpretation (PDF 1MB)
- Guidelines for assessing banana plantation sites (PDF 586KB)
- Consultants reporting on contaminated land: Contaminated land guidelines (PDF 1MB)
- Guidelines for assessing former orchards and market gardens (PDF 172KB)
- Guidelines for the NSW Site Auditor Scheme, 3rd edition (PDF 999KB)
- Guidelines for the assessment and management of groundwater contamination (PDF 604KB)
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (PDF 412KB)

Guidelines that refer to the:

- Australian Water Quality Guidelines for Fresh and Marine Waters (Australia and New Zealand Environment Conservation Council [ANZECC], October 2000), are replaced as of 29 August 2018 by the Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality (ANZG, August 2018), with the exception of the water quality for primary industries component, which still refer to the ANZECC & Agriculture and Resources Management Council of Australia and New Zealand (ARMCANZ) (2000) guidelines
- National Environment Protection (Assessment of Site Contamination) Measure 1999 are replaced as of 16 May 2013 by the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013) (ASC NEPM).

Guidelines approved by the EPA

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZG (August 2018)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Primary Industries - Rationale and Background Information (ANZECC & ARMCANZ (October 2000)
- Composite sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide. Email enHealth.Secretariat@health.gov.au for a copy of this publication.
- Environmental health risk assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (June 2012)
- National Environmental Protection (Assessment of Site Contamination) Measure 1999, (April 2013)* (ASC NEPM 1999)
- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental (February 1996)



- Australian Drinking Water Guidelines, National Health and Medical Research Council and Natural Resource Management Ministerial Council of Australia and New Zealand (2011)

*The ASC NEPM was amended on 16 May 2013.



Appendix C: Interim Site Audit Advice

22 October 2021

██████████
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear ██████████

Re: Interim Site Audit Advice No. 20: Remediation Action Plan (draft D1)

'No Scrape Area, South', Former Schofields Aerodrome, Nirimba Fields

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Land Management Site Auditor, I have been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the 'No Scrape Area, South' (the site), which is located within the former Schofields Aerodrome. The site is approximately 3.25 hectare.

The former Schofields aerodrome is approximately 135 hectares and it has been developed into a new low density residential estate with suburban road network, retail/business, a school and recreational areas called Nirimba Fields. It is located within the Blacktown City Council (Council) area. Due to its historical use as a former aerodrome, it was identified to be impacted with per- and polyfluoroalkyl substances (PFAS) contamination.

2. Background

The entire former aerodrome (including the site, PFAS MEA and 'No Scrape Area North of Swale') were previously audited by another auditor and a Section A Site Audit Report and a Site Audit Statement (GN481) were issued in September 2013.

Ramboll Environ Australia Pty Ltd (Ramboll) were engaged by DHA to undertake investigations to assess and characterise the nature and extent of PFAS contamination at the site, and to draw conclusions regarding the suitability of the site for low density residential land uses.

Given that the remainder of the former aerodrome external to 'No Scrape Area, South' (including PFAS MEA, PFAS Remaining Area and 'No Scrape Area North of Swale') are assessed, reported and audited separately, they are not discussed further in this letter.



The auditor was provided with the following document prepared by Ramboll for review:

- *Remediation Action Plan, No Scrape Area South*, draft D1 dated 24 September 2021. This is hereafter referred to as 'the RAP'.

The purpose of this letter is to provide comments on the draft RAP.

3. Auditor's Comments

The auditor has completed a review of the RAP (draft D1) against:

- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA 2020).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).

Based on a review conducted, the following items require clarification or amendments:

1. **Site Name:** The name of the site is listed in Section 1.2, Table 2-1 and RAP's front cover page as 'No Scrape Area, South'. However, Section 1 and Figures (Appendix 1) stated 'No Scrape Area, South of Swale'. Please adopt the same site name and be consistent throughout the RAP.
2. **Zoning:** Footnote 1 for Table 2-1 referred to Appendix 5, but there is no Appendix 5 attached to this document.
3. **Topography and Drainage:** Table 2-2 referred to Appendix 7 (final site contours), but there is no Appendix 7 attached to this document.
4. **Topography and Drainage:** Please discuss the topography of the current site surface – is it sloping to the north-west towards the new swale or sloping west towards Eastern Creek?
5. **Background Groundwater Quality:** Table 2-2 referred to Appendix 6 (groundwater bore search), but there is no Appendix 6 attached to this document.
6. **Site Boundaries and Surroundings:** Please discuss what is immediately east of the site.
7. **Closest Sensitive Receptor:** Please indicate what is the distance to the new swale located south of the site.
8. **Site History:** The information provided is the general site history for the entire former aerodrome. Please provide some discussion of the site history of the site (i.e. No Scrape Area, South) itself.
9. **Summary of 2021 Results:** As the information presented in the RAP about the March/April 2021 field program is very limited, is a separate report (e.g. DSI) going to be presented? For example: No QAQC information, laboratory certificates, methodology discussion, etc. As the RAP is based on remediating the identified impacts, we recommend that all the assessment data that the RAP is based on be presented.
10. **Summary of 2021 Results:** Please amend Table 2-3 to show the "sample description" (e.g. fill above natural soil / natural interface / natural soil below interface) as listed in Table 2 (Appendix 2).
11. **Summary of 2021 Results:** The auditor is not able to verify the PFAS results presented in Table 2-3 and Figure 3 as Table 2 (Appendix 2) only shows the analytical results for NS_BH06 to NS_BH28. Please provide ALL analytical results.
12. **Summary of 2021 Results:** Have any testing conducted in March/April 2021 targeted the former drainage lines present in the site? There is no discussion to indicate whether there is any soil contamination was identified in the former drainage lines. Please note that sediment results from



Ramboll's 2017 sampling program reported results above the adopted criteria within No Scrape Area, South (SS103 and SS107/QC08).

13. **Summary of 2021 Results:** Please update 'Error reference source not found' in Section 2.4.1 and note that there is no Table 1 in Appendix 2.
14. **Table 3-1 CSM:** Please check as text appears to be cut off after "direct contact".
15. **Table 3-1 CSM:** Given that elevated sediment results were identified in the 2017 Ramboll's sampling conducted at the FFTA, the auditor notes that there has been no data to support the CSM's interpretation that there is no human health or ecological risks posed by sediment in this report. (If this is not discussed in the RAP, it must be presented in the Validation Report for this site.)
16. **Table 3-1 CSM:** Please also consider the most recent 2021 groundwater assessment conducted by Ramboll (for PFAS Remaining Area). What do the results indicate about groundwater contamination at the site?
17. **Table 3-1 CSM:** "*use of groundwater is not permitted at the new development for any purpose*". Please confirm this as the PFAS Validation Report for PFAS Remaining Area indicated that a groundwater reuse is permitted subject to approval.
18. **Extent of Remediation Required:** The excavation was proposed to extent to 0.2 m beyond the depth of each exceedance. We recommend that this be at least 0.5 m as a precaution.
19. **Extent of Remediation Required:** The lower portions of the VENM overburden to be removed with the PFAS impacted natural soil must be defined. The auditor recommends that it is at least 0.5 m above the fill/natural soil interface (given that Ramboll previously indicated in their responses to IAA19 that "*in the significant majority of locations the material that was encountered was not readily identifiable as fill or imported material. This is likely due to the consistency of the material required for geotechnical purposes and the manner in which it was laid down and compacted.*")
20. **Site Preparation:** Please indicate whether any approval or permitting is required.
21. **Waste Classification:** It is recommended that for any stockpile (especially those smaller than <250 m³) a minimum of 3 samples be taken.
22. **Contaminated Soil Excavation:** Please specify where appropriate that an environmental consultant should supervise or at least make regular inspection during the removal and stockpiling of unimpacted and impacted soil to ensure that no materials are mixed during excavation and stockpiling.
23. **Contaminated Soil Excavation:** Please outline sampling procedures including sample collection technique, decontamination procedure, etc.
24. **Contaminated Soil Excavation:** The footprints of all temporary stockpiles (of excavated material) are also required to be validated.
25. **Excavation Surfaces and Extent:** It is recommended that the wall samples be collected one every 20 m (instead of 50 m).
26. **Contingency:** Please note that PFAS contamination is not visually or olfactorily identifiable. The backfill excavation is best conducted after the validation laboratory results are received. Or else, a contingency action may be to re-excavate to remove any PFAS contamination identified.
27. **Validation Acceptance Criteria:** The validation acceptance criteria discussed in Section 6 is only PFAS NEMP criteria. Is Ramboll going to consider the "*soil reuse criteria defined in the NEMP*" (as discussed in Ramboll 2018)?
28. **Remediation Site Management:** Please include indicative remediation schedule if available.
29. **Appendix A:** Please include in Figure 3 the results of boreholes BH19, 21, 25, 27, 28, 31 and 34 on figure. Generally, as a conservative approach the remediation extent is to the next sample location without impact.
30. **Appendix 1:**



- Please provide a figure showing the topsoil sampling locations (TS_SS165 to TS_SS178).
- Please add the former drainage lines to Figure 2 and Figure 3.

31. **Appendix 2:** Please amend:

- There are two 'Table 2' titled Leachate Validation Sampling Results.
- The shading/highlighting of soil results above the adopted criteria; e.g. NS_BH26_3.1; PHxS 9.3mg/kg for NS_BH16_0.5.

4. Closure

Please revise the RAP (draft D1) and address the comments above.

If you have any comments or questions, please do not hesitate to contact the undersigned at [REDACTED] or via mobile on [REDACTED]

Yours sincerely,

[REDACTED]

[REDACTED]
[REDACTED]

ES/SYS/MP

Technical Limitations and Uncertainty – Ramboll Environ Australia Pty Ltd included limitations in their report. The Interim Audit Advice must also be subject to those limitations. The Auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check. The Auditor has relied on the documents referenced in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change. It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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8 November 2021

██████████
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear ██████████

Re: Interim Site Audit Advice No. 22: Remediation Action Plan (draft D2) No Scrape Area South, Former Schofields Aerodrome, Nirimba Fields NSW

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Land Management Site Auditor, I have been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the 'No Scrape Area South' (the site), which is located within the former Schofields Aerodrome. The site is approximately 3.25 hectare.

The former Schofields aerodrome is approximately 135 hectares and it has been developed into a new low density residential estate with suburban road network, retail/business, a school and recreational areas called Nirimba Fields. It is located within the Blacktown City Council (Council) area. Due to its historical use as a former aerodrome, it was identified to be impacted with per- and polyfluoroalkyl substances (PFAS) contamination.

2. Background

The former Schofields aerodrome (including the site, PFAS MEA, Remaining Site Area and 'No Scrape Area North of Swale') were previously audited by another auditor and a Section A Site Audit Report and a Site Audit Statement (GN481) were issued in September 2013.

Ramboll Environ Australia Pty Ltd (Ramboll) were engaged by DHA to undertake investigations to assess and characterise the nature and extent of PFAS contamination at the site, and to draw conclusions regarding the suitability of the site for low density residential land uses.

Given that the remainder of the former aerodrome external to No Scrape Area South (including PFAS MEA, Remaining Site Area and No Scrape Area North of Swale) are assessed, reported and audited separately, they are not discussed further in this letter.

The table below lists the documents for the site provided to the auditor for review:



Document	Corresponding Auditor's Interim Advice
Ramboll (2021a) <i>Remediation Action Plan, No Scrape Area South</i> , draft D1, prepared by Ramboll dated 24 September 2021	Interim Site Audit Advice No. 20: Remediation Action Plan (draft D1), dated 22 October 2021 (ref: S18612_LET20_Rev0)

Subsequently, the Remediation Action Plan listed in the table above was revised and the auditor was provided with the following document for review:

- Ramboll (2021c) *Remediation Action Plan, Former Schofields Aerodrome - No Scrape Area South*, draft D2 dated 28 October 2021. This is hereafter referred to as 'the RAP'.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 20, provided in spreadsheet titled 'Auditor Comments Register_DHA Schofields No Scrape South RAP_28Oct21.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the RAP (draft D2) and Ramboll's Responses.

3. Auditor's Comments

The auditor has completed a review of the RAP (draft D2) against:

- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA 2020).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).

Based on a review of the RAP (draft D2), the following items require clarification or amendments:

1. **Site Name:** Please amend as the name of the site is still listed in Table 1 and Table 3 of Appendix 2 as 'No Scrape Area, South of Swale'. Please adopt the same site name (i.e. No Scrape Area South).
2. **Zoning:** Appendix 5 is now included in the RAP. However, please check as the first figure is titled 'Appendix 7 Masterplan, No Scrape Area, North of Swale PFAS Validation Report'.
3. **Topography and Drainage:** Appendix 7 is now included in the RAP. However, please amend this figure to highlight No Scrape Area South (instead of North of Swale "No Scrape" Area/Validation Area).
4. **Summary of 2021 Results:** The auditor notes that Ramboll will be presenting the data and supporting information about the March/April 2021 field program in the future Validation Report (and not in the RAP).
5. **Summary of 2021 Results:** The ALSP leachate results presented in Table 3 of Appendix 2 are not discussed.
6. **Previous Investigations and Remediation:** The information provided in Ramboll's Responses for Item 12 is helpful as it discusses the fate of the PFAS-impacted sediment (SS103 and SS107/QC08 in former drainage lines) identified in 2017. Please include this discussion in Section 2.4. It will also support the CSM in Table 3-1.
7. **Extent of Remediation Required:** As suggested by Ramboll in Item 18 of Ramboll's Responses, the auditor concurs and requests that the validation sampling density be increased and additional validation samples targeting the same location of the original exceedance be conducted. Please amend Section 5.4.2.



8. **Site Preparation:** Please clarify what is the 'sediment placement area' shown in Figure 3 (Appendix 1).

9. **Remediation Extent (Figure 3 Appendix 1):** Ramboll indicated that the initial remediation/excavation extent is selected as halfway to the nearest location that meets the validation criteria. Please check as this does not appear to be case between BH32 and BH31; BH33 and BH34; and BH29 and BH34..

10. Appendix 1:

- The legend for Figure 1, 2 and 3 indicated that the validation area is 'north of swale "no scrape" area'. Please amend this to 'No Scrape Area South' to avoid confusion.
- Figure 3 indicated 18 µg/kg PFOS and Sum PFOS + PFHxS reported for NS_BH29_4.1. This is inconsistent with the concentrations shown in Table 1 for this sample.
- Adopting the conservative approach whereby the highest concentrations measured amongst the primary and duplicate samples are shown in Figure 3:
 - The results for NS_BH35_4.0 should be the highest concentrations measured at QC20 (split duplicate sample).
 - The sum of PFOS and PFHxS result for MW_BH36_4.7 should be the highest concentration measured at QC26 (split duplicate sample).

11. Appendix 2: Please amend:

- The shading/highlighting of soil results above the adopted criteria in Table 1 is still not amended; e.g. Elevated concentrations at NS_BH26_3.1 are not highlighted; PHxS 9.3mg/kg for NS_BH16_0.5 is incorrectly highlighted.
- The shading/highlighting of ALSP leachate results above the adopted criteria in Table 3 is not consistent as only one results was highlighted.

4. Closure

Please address the comments above and finalise the RAP.

If you have any comments or questions, please do not hesitate to contact the undersigned at

██████████ or via mobile on ██████████

Yours sincerely,

████████████████████

██████████
████████████████████

SYS/MP

Technical Limitations and Uncertainty – Ramboll Environ Australia Pty Ltd included limitations in their report. The Interim Audit Advice must also be subject to those limitations. The Auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check. The Auditor has relied on the documents referenced in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change. It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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24 May 2023

██████████
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear ██████████

Re: Interim Site Audit Advice No. 27: PFAS Validation Report (draft D2) No Scrape Area – South of Swale, Former Schofields Aerodrome, Nirimba Fields NSW

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Land Management Site Auditor, I have been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the No Scrape Area – South of Swale (the site), which is located within the former Schofields Aerodrome.

The former Schofields aerodrome is approximately 135 hectares, and it has been developed into a new low density residential estate with suburban road network, retail/business, a school and recreational areas called Nirimba Fields. It is located within the Blacktown City Council (Council) area. Due to its historical use as a former aerodrome, it was identified to be impacted with per- and polyfluoroalkyl substances (PFAS) contamination.

2. Background

The site is currently open space and riparian zone adjacent to Eastern Creek and it is proposed to remain as such (i.e., recreational public open space land use).

The former Schofields aerodrome (including the site, PFAS MEA, Remaining Site Area, 'No Scrape Area South of Swale' and 'No Scrape Area North of Swale') were previously audited by another auditor and a Section A Site Audit Report and a Site Audit Statement (GN481) were issued in September 2013.

Ramboll Environ Australia Pty Ltd (Ramboll) were engaged by DHA to undertake investigations to assess and characterise the nature and extent of PFAS contamination at the former Schofields aerodrome and to draw conclusions regarding the suitability of the site for low density residential land uses.

Given that the remainder of the former Schofields aerodrome external to No Scrape Area – South of the Swale (including former STP and Landfill 2, PFAS MEA, Remaining Site Area and No Scrape Area North of Swale) are assessed, reported and audited separately, they are not discussed further in this letter.



The below document for the site was provided to the auditor for review:

- Ramboll (2023a) PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South, draft D2 dated 15 May 2023.

The purpose of this letter is to provide comments on the draft Validation Report (Ramboll 2023).

3. Auditor's Comments

The auditor has completed a review of the draft Validation Report (Ramboll 2022b) against:

- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA 2020).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).

Based on a review of the draft Validation Report (draft D2), the following items require clarification or amendments:

1. **Section 1.4 and 5.5:** It is worth mentioning that draft PFAS NEMP 3.0 has been released for consultation.
2. **Section 4. Table 4-1.** Confirm groundwater extraction at the site is permitted. The auditor understands this was not permitted within the No Scrape Area North of Swale.
3. **Section 6.** Confirm remediation and validation undertaken in accordance with the RAP (e.g. sampling density etc). List any deviations preferably in a separate sub-section and include discussion on these if required.
4. **Section 6.1.2.**
 - Please confirm location to which stockpiles were removed. Confirm A9 is SP01 here.
 - Clearly state final depth of remedial excavation across the remedial area (i.e. for the northern and the southern area).
5. **Section 6.3. Table 6-2.** Confirm what hand tools (e.g. trowel) were used for stockpile footprint sampling and stockpile sampling.
6. **Section 7.2.1.** Please include a discussion on the stockpile footprint results. The auditor notes exceedences of the validation criteria were reported in the footprints of SP02 and SP03a.
7. **Section 7.2.2.** Discuss leachability of PFAS remaining at the base of the southern area excavation. Please close this out here or in Section 9. It is noted that groundwater levels are possibly at a similar depth to residual PFAS impacted soil. Confirmation that there is no unacceptable impact or risk to groundwater from the residual PFAS impacted soil is required.
8. **Section 9:** While it is acknowledged that draft PFAS NEMP 3.0 is released for public consultation and it is not finalised nor endorsed by NSW EPA, it is a new state of knowledge and therefore, adopting a conservative approach, the draft guideline values should be considered when interpreting the results and conclusions. This is to prevent any issues from arising in the future.
9. **Section 9.2.** The current discussion of risk from residual PFAS impacted soil in the southern end is unclear. Please provide a qualitative risk assessment more in line with that provided in the No Scrape Area North Validation Report separating out human health and terrestrial/aquatic ecology.
10. **Figures.** It would be helpful to label the remedial excavation sample location figures with Round 1 to 6 as applicable.



11. Tables. For the remedial excavation sampling events, please clearly label which samples are from walls and which are from the base of the excavation/test pit/box. It would also be helpful to label each table with Round 1 to 6 as applicable.

12. Survey plan: Please include the proposed cut and fill plan (similar to that presented in the North of Swale Validation Report) and the final site surface survey.

4. Closure

Please address the comments above and finalise the Validation Report.

If you have any comments or questions, please do not hesitate to contact the undersigned at [REDACTED] or via mobile on [REDACTED]

Yours sincerely,

[REDACTED]

[REDACTED]
[REDACTED]

ES/MP

Technical Limitations and Uncertainty – Ramboll Environ Australia Pty Ltd included limitations in their report. The Interim Audit Advice must also be subject to those limitations. The Auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check. The Auditor has relied on the documents referenced in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change. It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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5 July 2023

██████████
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear ██████████

Re: Interim Site Audit Advice No. 28: PFAS Validation Report (final F1) No Scrape Area – South of Swale, Former Schofields Aerodrome, Nirimba Fields NSW

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Land Management Site Auditor, I have been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the No Scrape Area – South of Swale (the site), which is located within the former Schofields Aerodrome.

The former Schofields aerodrome is approximately 135 hectares, and it has been developed into a new low density residential estate with suburban road network, retail/business, a school and recreational areas called Nirimba Fields. It is located within the Blacktown City Council (Council) area. Due to its historical use as a former aerodrome, it was identified to be impacted with per- and polyfluoroalkyl substances (PFAS) contamination.

2. Background

The site is currently open space and riparian zone adjacent to Eastern Creek and it is proposed to remain as such (i.e., recreational public open space land use).

The former Schofields aerodrome (including the site, PFAS MEA, Remaining Site Area, 'No Scrape Area South of Swale' and 'No Scrape Area North of Swale') were previously audited by another auditor and a Section A Site Audit Report and a Site Audit Statement (GN481) were issued in September 2013.

Ramboll Environ Australia Pty Ltd (Ramboll) were engaged by DHA to undertake investigations to assess and characterise the nature and extent of PFAS contamination at the former Schofields aerodrome and to draw conclusions regarding the suitability of the site for low density residential land uses.

Given that the remainder of the former Schofields aerodrome external to No Scrape Area – South of the Swale (including former STP and Landfill 2, PFAS MEA, Remaining Site Area and No Scrape Area North of Swale) are assessed, reported and audited separately, they are not discussed further in this letter.



The table below lists the document for the site provided to the auditor for review:

Document	Corresponding Auditor's Interim Advice
Ramboll (2023a) PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South, draft D2 dated 15 May 2023	Interim Site Audit Advice No. 27: PFAS Validation Report (draft D2), dated 24 May 2023 (ref: S18612_LET27_Rev0)

Subsequently, the report listed in the table above was revised and the auditor was provided with the following document for review:

- Ramboll (2023b) *PFAS Validation Report, Former Schofields Aerodrome – No Scrape Area South*, final F1 dated 28 June 2023. This is hereafter referred to as 'the Validation Report'.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 27, provided in spreadsheet titled 'Auditor Comments Register NSS Validation Report_24 May 2023.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the Validation Report (Ramboll 2023b).

3. Auditor's Comments

The auditor has completed a review of the Validation Report (Ramboll 2023b) against:

- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA 2020).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).

Based on a review of the Validation Report (Ramboll 2023b), the following items require clarification or amendments:

1. **General:** Please check the title of the Validation Report as it only refers to "No Scrape Area" on the cover page.
2. **Section 2:** Please check:
 - Part Lot 2/DP 1285594 is the current cadastral information for the audit site and in accordance with SixMap (accessed on 3 July 2023), it has a street address of Triton Parade, Nirimba Fields NSW 2763.
 - The current site's zoning information, noting that the current Blacktown Local Environmental Plan is dated 2015.
3. **Table 3-1, On-site wells / depth to groundwater:** Appendix N (not Appendix E) shows the final site levels (surface elevation).
4. **Table 3-1, Background groundwater quality:** It is recommended that a more recent registered groundwater bore search be conducted as the last search was conducted on 5 March 2021.
5. **Section 3.3.1:** Table 1b Leachate sampling results shows that the LOR for approximately half the ALSP analyses was higher than the adopted criteria, therefore, the discussions about samples with PFOS leachate results above criteria are incomplete. Furthermore, why is 95% species protection level adopted (instead of 99% protection level)?



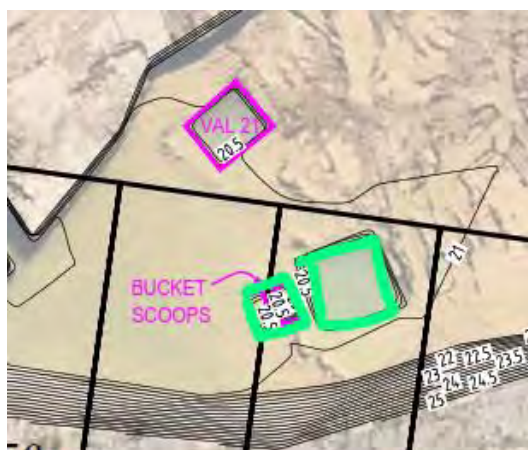
6. Section 3.3.1: Please be consistent with the sampling location ID:

- NS_BH## is listed in Table 3-2, Section 3.3.1 and 6.1.2
- Table 1a and 1b indicated NSS_BH##.
- Figure 2 indicated BH##.

7. Section 4, Table 4-1: The auditor notes that Table 11-1 of the Ramboll's Validation Report for the remaining site areas of the former aerodrome dated 21 October 2021 provided more discussion on the potential reuse of groundwater and an administrative control involving communication with NSW EPA. Will this be the case for No Scrape Area South?

8. Section 6.1.2, Stockpile Removal Footprint Validation: Further excavation of the footprint of stockpile SP03 conducted on 16 and 17 February 2023 was to what depth?

9. Section 6.1.2, Excavation Surfaces Validation: There appears to be two excavations south-southeast of VAL21 shown in Craig & Rhodes plans provided as Appendix L (marked with green in screenshot below). Please clarify what are they are they are not shown in Figure 6 to 8 or discussed in Section 6.1.2.



10. Section 7.2.2: *"from the 20 December 2021 to 10 June 2020 are presented..."* Please check the dates.

11. Section 7.2.3: *"Contractors WEM removed the material on the 20 February 2022 and a further 15 footprint validation samples were taken once this was removed ..."* Should this be 20 February 2023 and further 10 footprint validation samples?

12. Section 8.1: As indicated in Table 1b Leachate sampling results, LOR of 5 µg/L was higher than the adopted criteria. This needs to be discussed Table 8-2.

13. Section 9.2.1: The use of statistics/ratios on the validation and assessment samples are not very helpful as these are not random samples and the aim is to get no 'dirty' samples. Also, ratio is not expressed in %. It is recommended that the ratio discussion be removed and other multiple line of evidence be presented.

14. Section 9.2.2, Human Health: *"It is understood that no groundwater abstraction for beneficial re-use under a residential scenario will be permitted."* This is in consistent with Table 4-1 where beneficial groundwater use is indicated to be subject to approval. (Refer to Item 2 of IAA27 and Item 5 above).



- 15. Section 9.2.2, Human Health:** Please note that the northern end of the remediation excavation was approximately 3.5 m deep therefore, PFAS residual impacts could be as shallow as 3.5 m. To support Ramboll's argument that the PFAS validation samples with elevated results are beneath 4 to 5 m of VENM, could Table 7-1 be amended to include the approximate depth below the final ground elevation of the eight samples based on survey data from Appendix L? At the moment, the sample IDs are shown with "_1.0" which is confusing.
- 16. Section 9.2.2, Human Health:** It is recommended that comparison against HIL B (high density residential) be removed as high-density residential land use is not relevant to the audit site.
- 17. Section 9.2.2, Aquatic Ecology:** Consideration should now be given to the draft PFAS default guideline value for PFOS in freshwater aquatic ecosystem currently released for public consultation (via Australia and NZ Guidelines for Fresh and Marine Water Quality website).
- 18. Section 9.2.2, Aquatic Ecology:** The closest distance to Eastern Creek is listed as 500 m south of the site. Is this actually Eastern Creek? It was stated to be a tributary to Eastern Creek in the former STP and Landfill 2 Validation Report.
- 19. Section 9.2.3:** The auditor notes that while the validation report has acknowledged that draft PFAS NEMP 3.0 is released, Ramboll has not compared the soil concentrations against the new draft PFOA ecological guideline values from draft PFAS NEMP version 3.0 as a conservative approach.
- 20. Section 9:** Similar to the Validation Report for No Scrape North of Swale, it is recommended that discussions be added to discuss how the remediated/validated No Scrape Area South (audit site) is meeting the four site redevelopment conditions listed on page 6 of Ramboll's 'PFAS Leachate Analysis – Former Schofields Aerodrome' dated 31 May 2018.
- 21. Table 10-1:** Please amend as text seems to be missing with *"PFAS impacted soil were successfully from the No Scrape Area South."*
- 22. Table 10-1 and Section 11.2:** Section 9.2.1 indicated that there are more than four 'locations' with PFAS impacted soils retained on-site. Please be consistent with terminology.
- 23. Section 11.3:** Given that the audit site is to be developed into (1) low density residential; (2) a recreational parkland; and (3) a swale (i.e. drainage infrastructure) as discussed in Section 2 of the Validation Report, it is recommended that a statement about site suitability be made for each of the different types of land use.
- 24. Figures:** Sediment placement area (green polygon) are shown in Figure 2 to 8. What is this related to as it is not discussed in the Validation Report?
- 25. Figure 12:** The heat map/cut and fill depth legend colours are not legible in the No Scrape Area South due to the purple solid colour infill. Please amend so that only the outline of No Scrape Area South is shown; and remove PFAS MEA, former drainage channel and FFTA as they are not relevant to the figure.
- 26. Survey Plan:** Please provide a registered survey plan showing the audit site, i.e. No Scrape Area South and the coordinates of all of boundary points/corners. This is required as an attachment to the SAS. The survey plan provided in Appendix E is not relevant to No Scrape Area South.
- 27. Appendix G:** Please check and include as the laboratory reports for the ASLP leachability analysis conducted in March/April 2021 (NSS_BH## samples) are missing.



4. Closure

Please address the comments above and finalise the Validation Report.

If you have any comments or questions, please do not hesitate to contact the undersigned at [REDACTED] or via mobile on [REDACTED]

Yours sincerely,

[REDACTED]

[REDACTED]
[REDACTED]

SYS/MP

Technical Limitations and Uncertainty – Ramboll Environ Australia Pty Ltd included limitations in their report. The Interim Audit Advice must also be subject to those limitations. The Auditor has prepared this document in good faith but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check. The Auditor has relied on the documents referenced in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change. It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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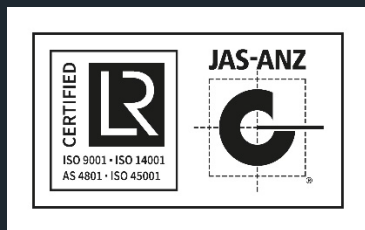
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