



Site Audit Report

Remaining Site Area, Former Schofields Aerodrome, off Nirimba Drive,
Quakers Hill, NSW 2763

Audit Number: MP169_03

22 October 2021



Document Information

Site Audit Report

Remaining Site Area, Former Schofields Aerodrome, off Nirimba Drive, Quakers Hill, NSW 2763

Audit Number: MP169_03

Prepared by:

Senversa Pty Ltd

ABN: 89 132 231 380

Level 24, 1 Market St, Sydney 2000

tel: + 61 2 8252 0000; fax: + 61 3 9606 0074

www.senversa.com.au

Prepared for:

Defence Housing Australia

Suite 2, Level 2/287 Elizabeth Street

Sydney NSW 2000

CC: Blacktown City Council

Disclaimer and Limitations:

This document is confidential and has been prepared by Senversa for use only by its client and for the specific purpose described in our proposal which is subject to limitations. No party other than Senversa's client may rely on this document without the prior written consent of Senversa, and no responsibility is accepted for any damages suffered by any third party arising from decisions or actions based on this document. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and the use of professional judgement for the purposes of Senversa's work means that matters may have existed that would have been assessed differently on behalf of third parties.

Senversa prepared this document in a manner consistent with the level of care and skill ordinarily exercised by members of Senversa's profession practicing in the same locality under similar circumstances at the time the services were performed.

Senversa requires that this document be considered only in its entirety and reserves the right to amend this report if further information becomes available.

This document is issued subject to the technical principles, limitations and assumptions provided in Section 15.0.

© Senversa Pty Ltd 2021

Senversa acknowledges the traditional custodians of the land on which this work was created and pay our respect to elders past and present. Senversa is a carbon neutral company and accredited BCorp.



Contents

List of Acronyms	v
1.0 Introduction.....	1
1.1 Audit Objective	1
1.2 Scope of the Audit.....	2
1.3 Audit Exclusions	4
1.4 Previous Site Audit.....	4
2.0 Site Details.....	5
2.1 Location.....	5
2.2 Zoning.....	5
2.3 Adjacent Uses.....	5
2.4 Current Site Condition.....	6
2.5 Proposed Development.....	6
3.0 Site History	7
4.0 Summary of Previous Audits and Environmental Investigations	9
5.0 Evaluation of Quality Assurance and Quality Control	11
6.0 Environmental Quality Criteria.....	15
6.1 Soil.....	15
6.2 Water	15
6.3 Consultants Environmental Quality Criteria.....	16
7.0 Stratigraphy and Hydrogeology	17
7.1 Stratigraphy.....	17
7.2 Thickness of VENM Layer	17
7.3 Hydrogeology	18
7.4 Auditor's Opinion	19
8.0 Evaluation of Soil Analytical Results	20
8.1 Soil Analytical Results.....	20
8.1.1 Topsoil.....	20
8.1.2 Stockpiles of Topsoil	20
8.1.3 Sub-surface Soil	21
8.1.4 Blimp Hangar	22



8.1.5	Former Drainage Lines.....	23
8.1.6	Go-cart Club.....	23
8.1.7	Hangar Building.....	24
8.1.8	Landfill 1	25
8.1.9	Piggery Landfill.....	25
8.1.10	Radio Laboratory	26
8.1.11	Sewage Treatment Plant (STP) Media Stockpile	26
8.2	Auditor's Opinion	27
9.0	Evaluation of Groundwater Analytical Results	28
9.1	Groundwater Analytical Results	28
9.2	Auditor's Opinion	29
10.0	Conceptual Site Model.....	30
11.0	Assessment of Risk.....	31
12.0	Contamination Migration Potential	32
13.0	Compliance with Regulatory Guidelines and Directions	33
13.1	Notification.....	33
13.2	Development Approvals.....	33
13.3	Waste Disposal	33
13.4	VENM and Other Imported Materials	33
13.5	Licenses.....	33
14.0	Conclusions and Recommendations	34
15.0	Other Relevant Information	35
Table 4-1: Summary of audit and assessment events.....		9
Table 5-1: QA/QC – Sampling and Analysis Methodology Assessment.....		11
Table 5-2: QA/QC – Field and Lab Quality Assurance and Quality Control		13
Table 6-1: Soil Environmental Quality Criteria.....		15
Table 6-2: Groundwater Environmental Quality Criteria.....		16
Table 7-1: Generalised Stratigraphy (Ramboll 2021e).....		17
Table 7-2: Summary of VENM Fill Thickness		18
Table 7-3: Site-Specific Hydrogeology.....		18
Table 8-1: Summary of Topsoil Surface Validation Results.....		20
Table 8-2: Soil Results from Stockpile A8 Above the Adopted Criteria (mg/kg).....		21
Table 8-3: Summary of Sub-surface Soil Validation Results.....		22



Table 8-4: Summary of Blimp Hangar Soil Validation Results.....	23
Table 8-5: Summary of Former Drainage Lines Soil Validation Results	23
Table 8-6: Summary of Go-cart Club Soil Validation Results.....	24
Table 8-7: Summary of Hangar Building Soil Validation Results	24
Table 8-8: Summary of Landfill 1 Soil Validation Results.....	25
Table 8-9: Summary of Piggery Landfill Soil Validation Results.....	25
Table 8-10: Summary of Radio Laboratory Soil Validation Results	26
Table 8-11: Summary of STP Media Stockpile Soil Validation Results.....	26
Table 9-1: Summary of Groundwater Analytical Results	28
Table 10-1: Review of the Conceptual Site Model	30
Appendix A: Attachments	
Appendix B: EPA Guidelines	
Appendix C: Interim Site Audit Advice	



List of Acronyms

Acronym	Definition
Measures	
%	per cent
µg/L	Micrograms per Litre
ha	Hectares
km	Kilometres
m	Metres
mAHD	Metres Australian Height Datum
mbgl	Metres Below Ground Level
mbtoc	Metres Below Top of Casing
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mm	Millimetres
mV	Millivolts
uS/cm	Micro Siemens per Centimetre
General	
6:2 FTS	6:2 Fluorotelomer Sulfonate
AEC	Area of Environmental Concern
AFFF	Aqueous Film Forming Foam
BG	Background
BH	Borehole
BLH	Blimp Hangar Building
CEMP	Construction Environmental Management Plan

Acronym	Definition
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of Custody
CoPC	Contaminant of Potential Concern
DHA	Defence Housing Australia
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
DR	Drain
EMP	Environmental Management Plan
EPA	Environment Protection Authority (NSW)
FFTA	Former Fire Training Area
GC	Go-cart Club
GME	Groundwater Monitoring Event
GSW	General Solid Waste
HB	Hangar Building
HDPE	High-Density Polyethylene
HEPA	Heads of EPAs Australia and New Zealand
HIL	Health Investigation Level
IAA	Interim Audit Advice
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ITRC	Interstate Technology and Regulatory Council
LF	Landfill



Acronym	Definition
LOR	Limit of Reporting
MEA	Material Emplacement Area
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NHMRC	National Health and Medical Research Council
NSW	New South Wales
PFAS	Per- and poly-fluoroalkyl substances
PFBA	Perfluorobutyrate
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation detector
PLF	Piggery Landfill
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control

Acronym	Definition
RAAF	Royal Australian Air Force
RAP	Remediation Action Plan
RL	Radio Lab
RPD	Relative Percent Difference
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SP	Stockpile
SMS	Sewage Treatment Plant Media Stockpile
SS	Surface Soil
STP	Sewage Treatment Plant
SWL	Standing Water Level
TAFE	Technical and Further Education
TS	Topsoil
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
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 a portion of the former Schofields Aerodrome, located off Nirimba Drive, Quakers Hill, NSW 2763. The former Schofields aerodrome is approximately 135 hectares and it is being developed into a new residential housing estate and a new suburb called 'Nirimba Fields'.

The audit site or 'the site', known as Remaining Site Area, is shown in Attachment 1 and 2 (**Appendix A**) and it is approximately 101.9 hectare. It comprises the former Schofields aerodrome excluding the following areas:

- Already developed/sold residential lots.
- PFAS Material Emplacement Area (MEA).
- Former fire flight training area (FFTA).
- No Scrape Area.
- Former sewage treatment plant (STP).
- Landfill 2.

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 the following Development Consents:

- Development Consents (DA 20-00149) dated 16 February 2021 (also referred to as stages 4C) for proposed subdivision.
- Development Consents (DA 20-001496) dated 29 June 2020 (also referred to as stages 5A) for proposed subdivision.
- Development Consents (DA 19-01714) dated 25 June 2020 (also referred to as stages 5B) for proposed subdivision.
- Development Consents (DA 20-001282) dated 23 December 2020 (also referred to as stages 5C) for subdivision works.
- Development Consents (DA-20-00224) dated 2 December 2021 (also referred to as stages 7A) for subdivision works.
- Development Consents (DA-20-01199) dated 25 January 2022 (also referred to as stages 7B) for subdivision works.
- Development Consents (DA-22-00665) dated 17 July 2023 (also referred to as stages 7C) for subdivision works.
- Development Consents (DA-20-01220) dated 01 March 2021 (also referred to as stages 8B) for subdivision works.



The condition stated for these development consents is as follows:

Site Contamination

Prior to the issue of a Subdivision Certificate, an EPA recognised accredited geoscientist is to validate the site as suitable for residential development in accordance with the strict residential use criteria as set out in the National Environment Protection (Assessment of Site Contamination) Measures (NEPM) 1999 as amended 2013.

The auditor considers the above conditions do not clearly request a “Site Audit” as defined in the NSW Contaminated Land Management Act 1997 (the CLM Act) and in any case remediation and validation was not required. However, as Blacktown Council interpret these conditions to mean that the audit is required for statutory purposes, the auditor listed them on the Site Audit Notification (SAN) was sent to EPA.

The SAN (MP169_03) was issued on 19 February 2025 to the EPA. Note that the Development Consents were provided to the Auditor on 5 February 2025.

Please note that:

- SAR and SAS were re-issued as R1 to reflect minor changes associated with the now statutory nature of the audit.
- 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] on behalf of Defence Housing Australia (DHA)

Request/Commencement Date: 11 February 2021

Auditor: [REDACTED]

Accreditation No.: [REDACTED]

The scope of the Audit included:

- Review of the following reports:
 - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil, draft v1, prepared by Ramboll Australia Pty Ltd (Ramboll) dated 11 March 2021.
 - PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D2, prepared by Ramboll dated 16 March 2021.
 - PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D3, prepared by Ramboll dated 31 March 2021.
 - 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 PFAS Assessment Overview Letter.
 - PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D4, prepared by Ramboll dated 6 May 2021.
 - PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D5, prepared by Ramboll dated 21 May 2021 (referred to as ‘Ramboll 2021a’).
 - Nirimba Drive, Schofields: Contamination Assessment, Management & Remediation of Stockpiles, draft, prepared by Geotechnique Pty Ltd (Geotechnique) dated 25 May 2021.
 - Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome, draft D1, prepared by Ramboll dated 18 June 2021.



- Remedial Action Plan, Part Lot 4100 in DP1261628, Nirimba Drive, Schofields, draft 1, prepared by Geotechnique dated June 2021.
- Part Lot 4100 in DP1261628 - Nirimba Drive, Schofields: Sampling, Analysis and Quality Plan (SAQP) for Proposed Data Gap Assessment, prepared by Geotechnique dated July 2021.
- Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome, draft D3, prepared by Ramboll dated 14 July 2021.
- Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome, draft D4, prepared by Ramboll dated 21 July 2021 (referred to as 'Ramboll 2021d').
- Nirimba Drive, Schofields: Revised Contamination Assessment, Management & Remediation of Stockpiles, prepared by Geotechnique dated July 2021 (referred to as 'Geotechnique 2021a').
- Proposed Residential Development, Part Lot 4100 in DP1261628 - Nirimba Drive, Schofields: Validation of Footprints of Former Asbestos Contaminated Stockpiles, prepared by Geotechnique dated October 2021 (referred to as 'Geotechnique 2021b').
- Revised Remedial Action Plan, Part Lot 4100 in DP1261628, Nirimba Drive, Schofields, prepared by Geotechnique dated August 2021.
- PFAS Validation Report - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D3, prepared by Ramboll dated 9 September 2021.
- PFAS Validation Report - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D4, prepared by Ramboll dated 28 September 2021.
- PFAS Validation Report - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D5, prepared by Ramboll dated 13 October 2021.
- PFAS Validation Report - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, final, prepared by Ramboll dated 21 October 2021. This is hereafter referred to as 'the Validation Report' or 'Ramboll 2021e'.
- The following reports were provided to the auditor for information only as these were prepared either prior to the auditor's engagement for the larger Nirimba Fields; or prepared for areas external to 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').
 - 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').
 - PFAS MEA Validation Report, Former Schofields Aerodrome, final, revision F1, prepared by Ramboll 21 May 2021 (referred to as 'Ramboll 2021b').
 - 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 2021c').
- Two site visits by the auditor conducted on 26 April 2021 and 20 October 2021.
- Discussions with DHA, and with Ramboll and Geotechnique who undertook the investigation and validation works.

During the course of the audit, letters of Interim Audit Advice (IAA) were issued by the auditor and they are provided in **Appendix C**:

- Interim Site Audit Advice No. 3 dated 18 March 2021.
- Interim Site Audit Advice No. 4 dated 22 March 2021.
- Interim Site Audit Advice No. 5 dated 1 April 2021.
- Interim Site Audit Advice No. 7 dated 16 April 2021.
- Interim Site Audit Advice No. 10 dated 5 May 2021.



- Interim Site Audit Advice No. 12 dated 17 May 2021.
- Interim Site Audit Advice No. 15 dated 6 July 2021.
- Interim Site Audit Advice No. 16 dated 16 July 2021.
- Interim Site Audit Advice No. 17 dated 30 July 2021.
- Interim Site Audit Advice No. 19 dated 17 September 2021.
- Interim Site Audit Advice No. 21 dated 10 October 2021.

1.3 Audit Exclusions

The following aspects of the environment or items are excluded from this Section B1 and B2 site contamination audit:

- Only the nature and extent of PFAS contamination at the Remaining Site Area (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 Remaining Site Area (the audit site) is assessed as part of this audit. All other areas within the larger Nirimba Fields housing estate are excluded.
- 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 and 'No Scrape 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, two Site Audit Reports and Site Audit Statements have recently been completed by the auditor for areas external to the audit site:

- 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).



2.0 Site Details

2.1 Location

The audit site locality is shown on Attachment 1, 2, and 3 (**Appendix A**).

The site details are as follows:

Street address:	Former Schofields Aerodrome, off Nirimba Drive, Quakers Hill, NSW, 2763.
Identifier:	Part Lot 4100 Deposited Plan (DP) 1261628, Lot 217 DP1241538, Lot 218 DP1241538, Lot 2447 DP1252017, Lot 2191 DP1262955 and Lot 2192 DP1262955
Local Government:	Blacktown City Council
Owner:	DHA
Audit Area:	Approximately 101.9 ha

A survey plan of the audit site is provided as Attachment 2 (**Appendix A**).

2.2 Zoning

In accordance with the Blacktown Local Environmental Plan 2015 (current version for 14 July 2021 to date), the current zoning of the site is:

- R2 - Low Density Residential
- RE1 - Public Recreation
- RE2 – Private Recreation
- SP2 - Infrastructure
- B2 - Local Centre
- E2 – Environmental Conservation
- E4 – Environmental Living

2.3 Adjacent Uses

Based on the plans provided in the Validation Report, the surrounding site uses included:

- North – New residential development (Altrove development) and vacant land. Agricultural land is located further to the north-west.
- East – Blacktown-Richmond Railway line corridor followed by low density residential properties and parkland.
- South – Industrial properties, Nirimba Education Precinct (university/TAFE and high school) and associated residential houses (part of former Schofields Aerodrome).
- West – Eastern Creek, Stonecutters Ridge Golf Club and a new residential development.

The closest sensitive ecological receptor was Eastern Creek located along the western site boundary. Previous site drainage channels had been filled and newly constructed drainage channels on-site flowed into Eastern Creek. Eastern Creek forms part of the South Creek Catchment that flows into the Hawkesbury River.



2.4 Current Site Condition

The Validation Report indicated that the audit site was a construction site for residential development in September 2021. An aerial photograph of the site dated August 2021 is provided as the background of Attachment 6, 11 and 12 (**Appendix A**). As indicated, there are low-density residential houses and suburban access roads already constructed at the Nirimba Fields mainly in the northern and central areas of the housing estate and these are external to the audit site.

Site photographs from June to September 2021 are provided in Appendix D of the Validation Report and they confirmed the site had been cleared and new residential properties were being constructed nearby. The site surface appeared to be relatively flat with the overall slope from southeast (approximately 25 mAHD) down to north and northwest (approximately 19 mAHD). The site has been cut and filled with imported VENM.

Prior to bulk earthworks, there were drainage channels (tributaries of Eastern Creek) present at the site which flowed in a northerly direction, as shown in Attachment 6 (**Appendix A**). 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. There are two permanent basins located at the southern portion of the site and a large drainage channel along the southern edge of the foundation terrace.

The description of the site presented in the Validation Report was generally consistent with the auditor's observations from the site visit conducted on 20 October 2021. Various stockpiles were observed across the site. These were noted by a DHA representative to be associated with road excavations or road material import. The temporary drainage basin adjacent to Eastern Creek was present during the site inspection.

2.5 Proposed Development

As shown in Attachment 16 and 17 (**Appendix A**), the former Schofields Aerodrome was being developed into a new residential estate called Nirimba Fields. The development master plan (Attachment 17, **Appendix A**) for the Nirimba Fields comprised residential lots, a primary school, playing fields, netball courts, parkland and commercial/retail facilities.

For the purposes of this audit, the land use scenarios were assumed as 'residential with garden/accessible soil' and 'public open space' land use scenarios.



3.0 Site History

The high-level site history of the former aerodrome was summarised in the Validation Report 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 former fire training area (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.
- 2018 to current – Land clearing to facilitate construction of new residential estate Nirimba Fields which included “significant land raising earthworks” to mitigate flooding risk from Eastern Creek.

As noted previously, the main areas of concern with regard to PFAS, including the FFTA and the PFAS MEA have been considered in Site Audit Reports prepared by the auditor.

In addition, Ramboll (2021a) conducted a desktop site history review of potential activities (or sources) associated with PFAS contamination as specified in Table B2 of Appendix B of the PFAS National Environmental Management Plan Version 2 [PFAS NEMP or NEMP] (HEPA 2020). The following eight historical site features or Areas of Environmental Concern (AEC) were identified (refer to Attachment 4, **Appendix A**):

- Blimp hangar.
- Former drainage lines.
- Go-cart club area.
- Hangar building.
- Landfill 1.
- Piggery landfill.
- Radio laboratory.
- STP media stockpile.

These former site features or AECs were further investigated (refer to discussions in **Section 4.0** and **Section 8.1** below).

Furthermore, as part of the construction of the Nirimba Fields housing estate, 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 (‘foundation VENM’ as termed in the Validation Report) to raise the ground level of the entire housing estate. Therefore, the ‘finished’ new ground surface (i.e. re-instated topsoil) and any stockpiles of scraped topsoil are media that also required further consideration with regard to PFAS and as such were investigated.



In the auditor's opinion, the site history review conducted provides an adequate indication of past activities. In relation to PFAS contamination, the previous site use as aerodrome and other historical site features (namely the AECs) confirmed the presence of PFAS contamination sources within the audit site.



4.0 Summary of Previous Audits and Environmental Investigations

Table 4-1 below provides a summary of the audit and environmental investigations conducted to date that are relevant to the former aerodrome.

Table 4-1: Summary of audit and assessment events

Date	Activity	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 was 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)</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. The PFAS impacted soil from FFTA has been placed in PFAS MEA external to the current audit site.	Ramboll 2017.
May 2018	<u>No Scrape Area (FFTA)</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 could be excavated, mixed with geotechnically suitable VENM soil (because of its high organic content) and placed at PFAS MEA.	Ramboll 2018.
May 2018 to December 2020	<u>No Scrape Area and PFAS MEA</u> Excavation of material from FFTA and ‘No Scrape Area’ and placement of material into PFAS MEA.	Ramboll 2021b.



Date	Activity	Reference
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) and collection and analysis of soil validation samples for PFAS compounds.	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 included advancement of 17 soil bores (via push tube drilling method) and collection and analysis of soil validation samples for PFAS compounds.	Ramboll 2021c.
March to June 2021	<u>Audit Site</u> A desktop site history review was conducted to identify potential PFAS-associated activities or PFAS sources at the former aerodrome. This work identified eight AECs (listed in Section 3.0) within the audit site which warranted further investigation. A Sampling and Analysis Quality Plan (SAQP) was prepared to detail the soil and groundwater assessment and validation program.	Ramboll 2021a and 2021d.
July to September 2021	<u>Audit Site</u> Stockpiles sourced from excavation of unexpected finds (underground storage tank and asbestos impacted soils) south of the Hangar Building were assessed for remediation. The source areas had previously been assessed for PFAS by Ramboll. Asbestos impacted stockpiles were analysed for a broad range of analytes, including PFAS, and disposed off-site. Non-asbestos impacted stockpiles were not further analysed, and were contained below proposed roads on-site. PFAS results were consistent with Ramboll 2021e, with all PFAS concentrations in asbestos-impacted stockpiles below the adopted assessment criteria. The stockpile footprints were validated for asbestos following disposal of the stockpiles and concentrations were all reported below the adopted assessment criteria for residential land use. Note that this Audit is limited to the assessment of PFAS impacts associated with historical uses.	Geotechnique 2021a and 2021b
June to September 2021	<u>Audit Site</u> Validation works conducted on audit site between 28 June 2021 and 2 September 2021. The auditor notes that the investigation area (approximately 105.6 hectares) of the Validation Report (refer to Attachment 3, Appendix A) covered an area larger than the audit site as it included STP and Landfill 2. 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.



5.0 Evaluation of Quality Assurance and Quality Control

The auditor has assessed the overall quality of the data by reviewing information presented in the PFAS Validation Report (Ramboll 2021e), supplemented by field observations. The auditor's assessment is summarised in **Table 5-1** and **Table 5-2**.

Table 5-1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) Ramboll (2021d) defined specific DQOs in accordance with the seven steps process outlined in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme.	The DQOs presented in the Ramboll (2021d) report are considered appropriate for the investigations undertaken.
Sampling pattern, locations, and sampling density Soil and groundwater sampling was undertaken in accordance with the SAQP for the site (Ramboll 2021d). <u>Soil:</u> Background soil samples were analysed based on fill thickness and area, with 112 primary samples analysed from 52 locations over the 93 ha. Topsoil samples were analysed at a rate of 4 samples per 1 ha, with 165 samples in total over the 41 ha. Drainage and riparian areas were analysed at a rate of 1 sample per 5 ha, with 26 samples in total. AECs were analysed based on area: • Blimp hanger: 18 samples over 0.3 ha. • Go-cart club: 13 samples over 0.17 ha. • Hangar building: 14 samples over 0.2 ha. • Landfill 1: 36 samples over 3.5 ha. • Piggery landfill: 30 samples over 2.1 ha. • Radio laboratory: 11 samples over 0.1 ha. Stockpiles were analysed at a rate of 1 sample per 150 m³. 64 samples were collected in total over the 9 stockpiles. <u>Groundwater:</u> 12 newly installed wells and one existing well were sampled up and down the site-specific hydraulic gradient and in the vicinity of potential areas of PFAS impact.	The number of sampling locations specified in the SAQP was met during validation. In the auditor's opinion these investigation locations and density adequately target the main areas of concern.
Sample depths <u>Soil:</u> Hand auger holes were advanced to 1 mbgl, and boreholes at least 0.5 m past the natural soil horizon. Samples were collected from the current ground surface, imported fill/natural soil interface (original site surface), and natural soil (beneath the imported fill). Samples were analysed from the fill/natural soil interface and the natural soil layers at each location. <u>Topsoil:</u> Topsoil samples were collected from 0 to 0.1 mbgl. <u>Groundwater:</u> Monitoring bores were installed to depths ranging between 3.3 and 5 mbgl to assess shallow groundwater conditions.	In the auditor's opinion, this sampling strategy was appropriate and adequate to characterise the stratigraphy and presence of PFAS contamination at the audit site.
Well construction The 12 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.	In the auditor's opinion the well construction was acceptable.



Sampling and Analysis Plan and Sampling Methodology

Auditor's Opinion

Sample collection method

Acceptable.

Soil: Bore advancement was via a Geoprobe and hand auger. Samples were collected with a sampler tube fitted with clear PVC sleeves and sand catchers were used to prevent loss of sample. Soil samples were collected from either the hand auger cutting blades, or from within the push tube liner.

Topsoil samples were collected using hand tools to 100 mm below ground surface.

Samples from stockpiles A2, A3 and A8 were collected using an excavator. Samples were collected from the centre of the excavator bucket to avoid cross-contamination. The remaining stockpile samples were collected using hand tools. All stockpile samples were collected at the surface and at least 900 mm below the stockpile surface.

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.

Decontamination procedures

Acceptable.

Ramboll indicated that sampling equipment (including interface 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.

Sample handling and containers

Acceptable.

Soil and groundwater samples were placed in laboratory-supplied plastic jars and bottles (comprised polypropylene or high-density polyethylene, HDPE). 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 (Ramboll, 2021f).

Chain of Custody (COC)

Acceptable.

Completed chain of custody forms were provided in the Validation Report.

Detailed description of field screening protocols

Acceptable.

Groundwater: Field parameters were measured during well sampling using a water quality meter, and organic vapours measured within the well prior to sampling using a photoionisation detector (PID).

Calibration of field equipment

Acceptable.

Calibration certificates were provided for the water quality meter and PID, dated 6 July 2021 and 25 June 2021.

Sampling logs

Acceptable.

Soil logs and surface soil sampling register were provided within the report, indicating sample depth and lithology/soil description. The records report no indications of contamination were found.

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

**Table 5-2: QA/QC – Field and Lab Quality Assurance and Quality Control**

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples <u>Soil:</u> 531 primary samples were collected, 60 blind and 59 split duplicate samples, which is above the PFAS NEMP acceptance criteria of one duplicate sample per 10 primary PFAS samples. <u>Water:</u> Thirteen primary groundwater samples, two blind and two split duplicate samples were collected. This is above the PFAS NEMP acceptance criteria. Sampling was conducted over 15 days. 15 field blanks and 15 reagent blanks were collected during the investigation. A rinsate blank was collected during each day of sampling, with the exception of 9 July 2021 and 17 August 2021. 60 rinsate blanks were collected during the investigation, a rate of one per nine primary samples	Overall, the auditor considers the field quality control samples adequate for the investigation. The auditor notes that there were inconsistencies in the number of soil rinsate and duplicate samples listed in the Validation Report. This is considered to be a minor issue and does not affect the outcome of the audit.
Field quality control results The results of field quality control samples were generally within appropriate limits. The following exceptions were noted: 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. PFBA was detected in 5 out of 60 rinsate blank samples and 6:2 FTS were detected in 2 out of 15 field blank samples. As criteria are not available for these contaminants and they are not considered CoPC, Ramboll considered these outliers to not significantly affect data quality.	Overall, in the context of the dataset reported, the elevated RPD results and minor blank detections are not considered to affect the audit conclusions and the field quality control results are acceptable.
NATA registered laboratory and NATA endorsed methods NATA registered laboratories used were Eurofins mgt (primary) and Envirolab (secondary). Laboratory certificates were all NATA stamped.	Acceptable.
Analytical methods Analytical methods were included in the laboratory test certificates. Both Envirolab and Eurofins 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.	Acceptable.
Holding times Review of the COCs and laboratory certificates indicate that the holding times had been met. Ramboll also reported that holding times were met.	Acceptable.
Practical Quantitation Limits (PQLs) <u>Soil:</u> PQLs were less than the threshold criteria for the contaminants of concern. <u>Groundwater:</u> PQLs were less than the threshold criteria for the contaminants of concern for the majority of analytes, with the following exception: Perfluorooctane sulfonate (PFOS) PQL was 0.01 µg/L, above the PFAS NEMP 99% species protection guideline value of 0.00023 µg/L. Ramboll noted this discrepancy was due to a laboratory error.	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.
Laboratory quality control samples The laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the primary and secondary laboratory at the appropriate frequency.	Acceptable.



Field and Lab QA/QC

Auditor's Opinion

Laboratory quality control results

The results of the laboratory quality control samples were within appropriate limits, with the following exceptions:

Soil:

- In three batches of samples, matrix spike (MS) recoveries for selected PFAS compounds could not be determined as the background level was greater than or equal to 4x spike level.
- In one batch of samples, surrogate recoveries were less than the lower data quality objective.

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 the dataset reported and the number of samples analysed, the non-conformances are not considered significant, and the laboratory quality control results are acceptable.

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

Predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and internal standards. These were discussed with regard to the five category areas in Section 9.2 of the Validation Report.

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:

- Samples were collected using suitable procedures with appropriate field quality control samples (such as rinsate and field blanks).
- The results of field quality control samples were generally consistent, indicating the data is likely to be representative of the overall conditions on the audit site. Ramboll adopted the higher of the duplicate results in their assessment and interpretation of contamination.
- The laboratory analysis was undertaken by NATA registered laboratories using accredited analytical methods. Primary and secondary laboratories have provided sufficient information to conclude that the dataset is generally precise.
- Samples were collected using suitable procedures and met the sampling density specified in the SAQP. The data was generally considered accurate and was relied upon for this audit.



6.0 Environmental Quality Criteria

The auditor has assessed the PFAS contamination status with reference to the PFAS NEMP 2.0 (HEPA 2020).

6.1 Soil

Based on the proposed development, the environmental quality criteria adopted in this audit are presented in **Table 6-1** and they are derived from:

- Human health guideline values:
 - Residential with garden/assessable soil health investigation level (HIL A) and public open space (HIL C) (Table 2 of NEMP).
- Ecological guideline values:
 - Ecological direct exposure and ecological indirect exposure for all land uses (Table 3 of NEMP).

Table 6-1: Soil Environmental Quality Criteria

Chemical of Concern	NEMP HIL A – Residential with garden/accessible soil (mg/kg)	NEMP HIL C – Public Open Space (mg/kg)	NEMP Ecological Direct Exposure (mg/kg)	NEMP Ecological Indirect Exposure (mg/kg)
Sum of PFOS and PFHxS	0.01	1	—	—
PFOA	0.1	10	10	—
PFOS	—	—	1	0.01

Notes:

HIL- Health investigation level.

mg/kg – milligram/kilogram.

— = no applicable criterion.

6.2 Water

The groundwater environmental quality criteria adopted in this audit are presented in **Table 6-2** and are derived from:

- Human health guideline values:
 - Recreational water quality guideline value (Table 1 of NEMP) – refer to discussion on salinity in **Section 7.3**.



- Ecological guideline values:
 - 99% freshwater species protection (Table 5 of 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 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.
 - Furthermore, the auditor notes that the NEMP 99% value is likely to be conservative and consideration was also given to an updated 0.05 µg/L PFOS for 99% species protection level derived by Batley et. al. (2018)¹ in this audit, however, it must be noted that this ecological protection value is in draft and has not been endorsed by EPA.

Table 6-2: 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)	Batley et al. 2018 ¹ – Freshwater 99% Species Protection (µg/L)
Sum of PFOS and PFHxS	—	—	2	—
PFOA	19	220	10	—
PFOS	0.00023	0.13	—	0.04

Notes:

µg/L – microgram/litre

— = no applicable criterion.

6.3 Consultants Environmental Quality Criteria

The environmental quality criteria referenced by the auditor are consistent with those adopted by Ramboll in the Validation Report.

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.

¹ Batley, G.E., van Dam, R.A., Broadgate, K.E., et al, *Application of revised methodologies for default guideline value derivations: PFOS in freshwater*, Presented at SETAC North America 39th Annual Meeting. Abstract book available from: <https://www.setac.org/store/ViewProduct.aspx?id=13373145>



7.0 Stratigraphy and Hydrogeology

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

7.1 Stratigraphy

Ramboll (2021e) 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 7-1**.

Table 7-1: Generalised Stratigraphy (Ramboll 2021e)

Approximate Depth (mbgl)	Subsurface Profile
0.0 – 0.1	FILL (reinstated topsoil): sandy CLAY, fine gravels, low plasticity, brown, dry, minor organic matter.
0.1 – 0.5 to 5.5	FILL (Imported VENM): gravelly to sandy CLAY, moderate plasticity, brown, dry, with sandstone and siltstone gravel, cobbles, and boulders.
0.5 to 5.5 - 8	Silty CLAY, low to moderate plasticity, light to dark brown, some fine sands.
2.4 to 5.5 - 8	SHALE, weathered to fresh shale, hard.
3.5 to 8.6 (maximum depth of assessment)	Gravelly CLAY, light brown, high plasticity, fine to medium grained gravels, may contain weathered shale fragments.

The auditor notes that not all horizons listed in **Table 7-1** are present at all locations within the audit site given the size of the site (101.9 hectare) and the natural heterogeneity. Ramboll clarified that in some areas, the imported fill could not be readily differentiated from the VENM. This was due to consistency and compaction of the imported material (required for geotechnical purposes).

7.2 Thickness of VENM Layer

The earthworks contractor for the Nirimba Field development prepared a cut and fill plan of the bulk filling of VENM dated 23 March 2021 for the audit site (Ramboll 2021c). This is provided as Figure 3 of the Validation Report (presented as Attachment 5, **Appendix A**).

Table 8-1 of the Validation Report is a summary table of the thickness of VENM encountered during the intrusive works conducted in June and July 2021. A spot check of the data presented in Table 8-1 of the Validation Report against the bore logs in Appendix E of the Validation Report conducted by the auditor indicated minor inconsistencies and missing information for Landfill 1. **Table 7-2** is a table of VENM thickness compiled by the auditor and it indicates that the imported VENM is generally 0.5 to 2 m thick at the audit site.

**Table 7-2: Summary of VENM Fill Thickness**

Area	VENM Thickness (m)		
	Minimum	Maximum	Average
Background areas	0	4.8	1.6
Blimp hangar	0.7	3.1	2.0
Filled in drainage lines	0	5.5	2.2
Go-cart club	0.0	1.7	0.7
Hangar building	1.3	2.5	2.0
Landfill 1	0	2.1	0.4
Piggery landfill	1.7	4.5	2.6
Radio laboratory	0.9	2.9	2.0
STP media stockpile	1.5	2.3	1.8

7.3 Hydrogeology

As indicated in **Table 4-1**, twelve new groundwater monitoring bores (MW01 to MW12) were installed in 2021 within the audit site. Together with a previously unidentified bore (labelled as MW13 by Ramboll), a total of 13 bores were gauged and sampled. Groundwater information collected during the validation works in July 2021 (Ramboll 2021e) is summarised in **Table 7-3**.

Table 7-3: Site-Specific Hydrogeology

Aspect	Details
Saturated Geological Layers	Clay, silty clay, weathered shale.
Depth to Water	0.88 mbtoc in MW03 to 5.74 mbtoc in MW11.
Groundwater elevation	15.51 mAHD in MW04 to 25.54 mAHD in MW02.
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).
Groundwater calculated velocity	0.000002 m/day.
Interpreted Flow Direction	West towards Eastern Creek (refer to Attachment 12, Appendix A).



Aspect	Details
Groundwater Quality	- Dissolved oxygen ranged from 0.28 mg/L (MW08) to 3.88 mg/L (MW02). - Electrical conductivity ranged from 619 $\mu\text{S}/\text{cm}$ (MW08) to 28,134 $\mu\text{S}/\text{cm}$ (MW03). Calculated total dissolved solids ranged from 403 mg/L (MW08) to 18,284 mg/L (MW03) – 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 (MW08) to 124.2 mV (MW03). - pH ranged from 6.31 (MW05) to 7.33 (MW08). - Temperature ranged from 14.3 °C (MW09) to 20.2 °C (MW05).

The auditor notes that:

- The groundwater elevations (approximately 16 to 26 mAHD) measured in July 2021 were generally consistent with the elevations observed in 2017 (approximately 18 to 21 mAHD).
- A westerly groundwater flow direction towards Eastern Creek was inferred and this is consistent with previous groundwater gauging data which indicated a west/north-west groundwater flow direction (Ramboll 2017, 2021b and 2021c).

A review of NSW registered bore database was conducted by Ramboll and registered groundwater bores were encountered within a 1 km of the audit site boundary (refer to Appendix H of the Validation Report). All registered bores within 1 km were for monitoring purposes and not for groundwater extraction use.

7.4 Auditor's Opinion

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



8.0 Evaluation of Soil Analytical Results

8.1 Soil Analytical Results

Soil results from the validation works have been assessed against the environmental quality criteria. No sign of contamination (such as staining or odour) was observed by Ramboll (2021e).

8.1.1 Topsoil

The topsoil at the current site surface (which was scraped topsoil from the original site surface prior to the bulk VENM importation) in the proposed residential areas, approximately 41 hectares, within the audit site was tested for PFAS contamination. The samples were collected between 0 and 0.1 mbgl.

Table 8-1 summarises the analytical soil results from the topsoil sample locations and it is evident that no results above the adopted criteria were measured. Topsoil sampling locations are shown as Attachment 13 (**Appendix A**).

Table 8-1: Summary of Topsoil Surface Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	203	26	0.0086	0	—	—
PFOS	203	26	0.0086	—	0	0
PFOA	203	2	0.0002	0	—	0

Notes:

1. 165 primary samples and 38 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.2 Stockpiles of Topsoil

There were eight stockpiles (A1 to A8) of residual topsoil material present at the audit site that were yet to be distributed during the validation fieldworks. Sampling of the eight stockpiles was completed and all results were below the adopted criteria except for the one sample from Stockpile A8 (which was 1,606 m³) listed in **Table 8-2**. Stockpile sampling locations are shown as Attachment 14 (**Appendix A**).

**Table 8-2: Soil Results from Stockpile A8 Above the Adopted Criteria (mg/kg)**

Sample ID	Depth (m)	PFOS	Sum of PFHxS and PFOS	Comments
NEMP ecological guideline values (indirect exposure)		0.01	—	
NEMP human health investigation level (HIL A)		—	0.01	
A8_05	0.9 to 1.0	0.016	0.016	This sample (collected 17 August 2021) has been removed and disposed off-site as temporary Stockpile A9.
A8_08	0 (surface)	0.011	0.011	This sample (collected on 2 September 2021) was to validate remaining Stockpile A8 after a portion was removed and disposed off-site.

A portion (approximately 733 m³) of Stockpile A8 with PFAS impacts was subsequently removed and disposed off-site as temporary Stockpile A9, including sample A8_05.

The remaining portion of Stockpile A8 was validated with three new samples (A8_07 to A8_09). Of the three new samples, sample A8_08 reported PFAS concentrations marginally above the adopted criteria (refer to **Table 8-2**). Subsequently, consistent with the approach discussed in Schedule B1 of ASC NEPM, statistical (95% upper confidence limit [UCL]) analysis was conducted on the results from all remaining stockpile A8 samples (i.e. primary and associated duplicate results).

The statistical evaluation (presented in Table 8 of Appendix B of the Validation Report) indicated that an 95% UCL average mean concentration of 0.006 mg/kg of Sum of PFHxS and PFOS, was below the NEMP HIL A. While the PFOS data from remaining stockpile A8 was not statistically calculated by Ramboll, PFOS concentrations were less than or equal to Sum of PFHxS and PFOS, therefore, the 95% UCL concentration of PFOS would also be below the NEPM indirect ecological guideline value. In summary, the concentrations from the remaining on-site portion of Stockpile A8 were below relevant objectives.

8.1.3 Sub-surface Soil

Outside of the individual AECs, validation sampling was conducted across the audit site over proposed residential and public open space areas. These samples were collected to assess the sub-surface soil targeting:

- Soil at the interface between imported bulk VENM and natural soil below the VENM.
- Natural soil below the bulk VENM.

These were termed 'background' samples by Ramboll (2021e) and the 'background' sampling locations (BG_BH125 to BG_BH187 and MW01 to MW11) are shown in Attachment 4a (**Appendix A**). **Table 8-3** below summarises the analytical soil results from the sub-surface background samples.

**Table 8-3: Summary of Sub-surface Soil Validation Results**

	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	138	1	0.015	1 (BG_BH166_2.7)	—	—
PFOS	138	1	0.015	—	1 (BG_BH166_2.7)	0
PFOA	138	0	<0.005	0	—	0

Notes:

1. 112 primary samples and 26 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

It is evident that all samples are below the human health and ecological criteria with the exception of BG_BH166 at 2.7 mbgl.

As indicated in Attachment 6, 16 and 17 (**Appendix A**), BG_BH166 was located in an area proposed for recreational land use. In line with the land zoning and proposed land use, the NEMP human health investigation level for public open space (HIL-C) is more applicable. The Sum of PFOS and PFHxS concentration (0.015 mg/kg) at BG_BH166 was well below NEMP HIL-C criterion of 1 mg/kg.

The same location also exceeded the ecological guideline value for PFOS for indirect exposure. Ramboll concluded that the exceedance is unlikely to pose a direct or indirect risk to ecological receptors because of its depth (which is proposed to be even deeper as a further 0.5 to 1 m of VENM is expected to be imported for landscaping works) and isolated extent. Ramboll also indicated that the likelihood for this impact to leach and impact groundwater is negligible due to the thickness of overlying material surface water would need to infiltrate.

The auditor reviewed a historical aerial photograph of the former Schofields aerodrome (2017) and a site plan from Environ (2013) SAR, and observed that BG_BH166 was located in an open grassed paddock that was not near any identifiable PFAS sources. Therefore, the auditor concurs that the contamination at BH_BH166 appears isolated and is at a depth that is unlikely to have an impact on food chain transfer.

8.1.4 Blimp Hangar

Table 8-4 below summarises the analytical soil results from the validation works conducted at the blimp hangar. Samples (BLH_BH001 to BLH_BH009) were analysed from the fill/topsoil interface and natural soil within this AEC. The blimp hangar sampling locations are shown in Attachment 8 (**Appendix A**).

**Table 8-4: Summary of Blimp Hangar Soil Validation Results**

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	22	0	<0.005	0	—	—
PFOS	22	0	<0.005	—	0	0
PFOA	22	0	<0.005	0	—	0

Notes:

1. 18 primary samples and 4 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.5 Former Drainage Lines

Table 8-5 below summarises the analytical soil results from the validation works conducted at former drainage lines, which have been back-filled with VENM. Samples (DR_BH010 to DR_BH024) were analysed from the fill/topsoil interface (where present) and natural soil with this AEC. The sampling locations targeting the former drainage lines are shown in Attachment 6 (**Appendix A**).

Table 8-5: Summary of Former Drainage Lines Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	32	3	0.0009	0	—	—
PFOS	32	3	0.0007	—	0	0
PFOA	32	1	0.0001	0	—	0

Notes:

1. 26 primary samples and 6 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.6 Go-cart Club

Table 8-5 below summarises the analytical soil results from the validation works conducted at the former go cart club. Samples (GC_BH032 to GC_BH038) were analysed from the fill/topsoil interface (where present) and natural soil within this AEC. The go-cart club sampling locations are shown in Attachment 9 (**Appendix A**).



Ramboll informed the auditor that the southern portion of this AEC was on a steep hill with unsafe access and therefore, the southern portion was untested. The auditor notes that all accessible area of this AEC were tested to the extent practicable.

Table 8-6: Summary of Go-cart Club Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	15	0	< 0.005	0	—	—
PFOS	15	0	< 0.005	—	0	0
PFOA	15	0	< 0.005	0	—	0

Notes:

1. 13 primary samples and 2 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.7 Hangar Building

Table 8-7 below summarises the analytical soil results from the validation works conducted at the hangar building. Samples (HB_BH039 to HB_BH045) were analysed from the fill/topsoil interface and natural soil within this AEC. The hangar building sampling locations are shown in Attachment 9 (**Appendix A**).

Table 8-7: Summary of Hangar Building Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	16	1	0.0002	0	—	—
PFOS	16	1	0.0002	—	0	0
PFOA	16	0	< 0.005	0	—	0

Notes:

1. 14 primary samples and 2 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.



8.1.8 Landfill 1

Table 8-8 below summarises the analytical soil results from the validation works conducted at Landfill 1. Samples (LF1_BH046 to LF1_BH068) were analysed from the fill/topsoil interface (where present) and natural soil within this AEC. The Landfill 1 sampling locations are shown in Attachment 7 (**Appendix A**).

Table 8-8: Summary of Landfill 1 Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	50	5	0.0016	0	—	—
PFOS	50	5	0.0012	—	0	0
PFOA	50	2	0.0002	0	—	0

Notes:

1. 36 primary samples and 14 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.9 Piggery Landfill

Table 8-9 below summarises the analytical soil results from the validation works conducted at the piggery landfill. Samples (PLF_BH094 to PLF_BH109 noting that soil bore PLF_BH100 was converted into groundwater monitoring bore MW12) were analysed from the fill/topsoil interface and natural soil within this AEC. The piggery landfill sampling locations are shown in Attachment 10 (**Appendix A**).

Table 8-9: Summary of Piggery Landfill Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	36	1	0.0018	0	—	—
PFOS	36	1	0.0018	—	0	0
PFOA	36	0	<0.005	0	—	0

Notes:

1. 30 primary samples and 6 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.



8.1.10 Radio Laboratory

Table 8-10 below summarises the analytical soil results from the validation works conducted at the radio laboratory. Samples (RL_BH110 to RL_BH114) were analysed from the fill/topsoil interface and natural soil within this AEC. The radio laboratory sampling locations are shown in Attachment 9 (**Appendix A**).

Table 8-10: Summary of Radio Laboratory Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	11	0	<0.005	0	—	—
PFOS	11	0	<0.005	—	0	0
PFOA	11	0	<0.005	0	—	0

Notes:

1. 11 primary samples and no duplicate sample.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.

8.1.11 Sewage Treatment Plant (STP) Media Stockpile

Table 8-11 below summarises the analytical soil results from the validation works conducted at the STP media stockpile. Samples (SMS_BH025 to SMS_BH031) were analysed from the fill/topsoil interface and natural soil within this AEC. The STP media stockpile sampling locations are shown in Attachment 7 (**Appendix A**).

Table 8-11: Summary of STP Media Stockpile Soil Validation Results

Analyte	No. of samples ¹	No. of detections ¹	Maximum concentration (mg/kg)	No. of samples exceed NEMP human health investigation level (HIL A)	No. of samples exceed NEMP ecological guideline values – indirect exposure	No. of samples exceed NEMP ecological guideline values – direct exposure
Sum of PFHxS and PFOS	16	1	0.0004	0	—	—
PFOS	16	1	0.0001	—	0	0
PFOA	16	0	<0.005	0	—	0

Notes:

1. 14 primary samples and 2 duplicate samples.

mg/kg – milligram/kilogram.

— = no applicable criterion.

All results were reported below the adopted human health and ecological criteria.



8.2 Auditor's Opinion

Overall, the auditor considers that the validation of the audit site was generally adequate given the non-detects or low concentrations of PFAS in soil are consistent with the site history i.e., AECs in the audit area presented a low risk of PFAS contamination compared to the excluded areas i.e., FFTA. The validation evaluated the overall audit site including specific AECs and the remaining surface and sub-surface soil. The results for PFAS are consistent with the expectations for a low density residential and/or public open space development.



9.0 Evaluation of Groundwater Analytical Results

9.1 Groundwater Analytical Results

Groundwater analytical results from MW01 to MW13 monitored in July 2021 are summarised below in **Table 9-1** and Attachment 11 (**Appendix A**).

Table 9-1: 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 Freshwater 99% species protection (Batley et al 2018)	No. of samples exceed NEMP Recreational Water Quality Guideline Value
Sum of PFHxS and PFOS	17	6	0.024	—	—	—	0
PFOS	17	8	0.01	6 ²	0	0	—
PFOA	17	4	0.18	0	0	—	0

Notes:

1. 13 primary samples and 4 duplicate samples.

2. 5 primary samples (MW08, MW09, MW10, MW11 and MW12) and QC421 (blind duplicate of MW08).

µg/L – microgram/litre.

— = no applicable criterion.

PFOS concentrations above the NEMP ecological guideline value (99% species protection) were measured in five bores located in the southern portion of the site. The NEMP ecological value is likely to be conservative. The groundwater concentrations are noted to be below the draft updated 99% species protection level presented by Batley *et al.* (2018) of 0.05 µg/L. Batley *et al.* (2018) presents a draft updated 99% species protection level (0.04 µg/L PFOS) which addresses some key technical issues identified with the initial draft values which are currently listed in the PFAS NEMP; specifically they account for the observed bimodality in the toxicity data and therefore reduce the extrapolation error in the derived values, particularly for the derived 95% and 99% protection levels.

No concentration exceeding the NEMP ecological guideline value for 95% species and human health recreational water guideline value were recorded.

MW11 and MW12, both located near the eastern site boundary of the audit site as shown in Attachment 11 and 12 (**Appendix A**), are considered to indicate 'background' condition of up-gradient groundwater migrating from the east onto the audit site. The auditor notes that they reported the following concentrations:

- MW11 with 0.01 µg/L PFOS, above NEMP 99% species protection ecological guideline value (this is the highest concentrations measured in the audit site).



- MW12 with 0.0017 µg/L PFOS, above NEMP 99% species protection ecological guideline value.

This suggests the PFOS levels observed at the site may be associated with background PFAS concentrations in area.

9.2 Auditor's Opinion

In the auditor's opinion, the groundwater at the site did not indicate elevated concentrations above the ecological and human health criteria. The PFAS levels observed at the site are likely to reflect 'background' concentrations migrating onto the site from the east. These groundwater results are consistent with those obtained for the soil i.e., low PFAS levels.



10.0 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 (2021e) for their investigation area (which includes the audit site). **Table 10-1** provides the auditors review of the CSM.

Table 10-1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	The CSM indicated that the discussion on the potential sources of PFAS contamination are presented in Ramboll (2021a) Overview Letter. The sources of PFAS contamination are not listed in the CSM presented in Table 5-1 and Table 11-1 of the Validation Report.	Adequately identified for the audit site. 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. As indicated in the Validation Report, it was documented separately (Ramboll 2021a). The sources of PFAS contamination were found to be selected features present at the former aerodrome such as Piggery Landfill, Landfill 1, Hangar Building (refer to AECs listed in Section 3.0). Transport mechanism such as overland runoff and leaching (from soil to groundwater) has been identified.
Affected media	• Soil. • Soil Vapour. • Sediment. • Surface water • Groundwater.	Adequately identified.
Exposure pathways	• Direct contact/ingestion. • Inhalation. • Overland run-off. • Leaching.	Adequately identified for PFAS contamination in soil and groundwater.
Receptor identification	• Residents (on-site and off-site). • On-site groundwater user. • On-site and off-site construction and maintenance worker. • On-site ecological receptors (flora and fauna). • Eastern Creek (down-gradient aquatic ecological receptor).	The human and ecological receptors have been generally identified. Future on-site commercial workers were not listed, but this is not material to the audit as the more sensitive on-site residents were listed.



11.0 Assessment of Risk

The site history indicated that the audit site excluded the main areas of concern with regard to PFAS impacts. Validation of all remaining areas of concern confirmed low concentrations such that the risk to human health and the environment is considered to be low and acceptable. As the extent of PFAS soil impact identified at the audit site is very limited, the potential for leachate contamination to impact groundwater is considered to be negligible and also unlikely to pose a risk to aquatic ecosystem. The auditor acknowledges that groundwater is unlikely to be extracted for use at the site due to the high salinity and low yield of the aquifer.

.



12.0 Contamination Migration Potential

No significant levels of contaminants were detected over the audit site and therefore there is little or no potential for migration of contamination from the audit site or vertically to groundwater. 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 were not considered to be an issue as no elevated results were measured in the topsoil.

In the auditor's opinion, there is no evidence of significant migration of contamination and little potential for future migration given the residential housing estate development of the audit site.



13.0 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 SEPP 55 Planning Guidelines 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.

13.1 Notification

Ramboll did not indicate in the Validation Report whether the validation works required any consent from regulatory authorities. The auditor has not been provided further detail on any associated notification to Council in relation to the works undertaken.

13.2 Development Approvals

The Development Consents for the various subdivision approvals included the following consent conditions:

'Prior to the issue of a Subdivision Certificate, an EPA recognised accredited geoscientist is to validate the site as suitable for residential development in accordance with the strict residential use criteria as set out in the National Environment Protection (Assessment of Site Contamination) Measures (NEPM) 1999 as amended 2013'.

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

13.3 Waste Disposal

Waste disposal is excluded from this audit and therefore, no information about waste disposal was documented in the Validation Report.

13.4 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.

13.5 Licenses

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



14.0 Conclusions and Recommendations

Ramboll (2021e) considers that the:

- “risks to human and ecological health from PFAS in soil and groundwater across the areas that were investigated are low and acceptable”.
- “the areas that were subject of this investigation [i.e. which includes the audit site], ... are suitable for its proposed future land uses of:
 - Low density residential
 - Public recreation
 - Private recreation
 - Infrastructure
 - Local centre
 - Environmental conservation
 - Environmental living (proposed as biodiversity offset).”

Based on the information presented in the Validation Report and observations made on-site, the auditor concludes that:

- The nature and extent of the PFAS contamination has been appropriately determined.
- The risk to human health and the environment posed by the soil and groundwater are considered to be acceptable for the proposed land use. Extraction of groundwater for any purpose within the audit site was documented in the Validation Report to be not proposed or not likely due to the high salinity and poor yield from clayey aquifer.

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.



15.0 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 Remaining Site Area 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 (Current) – Audit Area

Attachment 2: Survey Plan of Audit Site

Attachment 3: Site Location and Layout (Current)

Attachment 4: Former Schofields Aerodrome Areas of Environmental Concern

Attachment 5: Former Schofields Aerodrome Cut/Fill Plan

Attachment 6: Background, Drainage Lines and VENM Thickness Investigation Locations

Attachment 7: Former Landfill 1 and STP Media Stockpile Area Investigation Locations

Attachment 8: Former Landfill 2, Sewage Treatment Plant and Blimp Hangar Investigation Locations and Guideline Exceedances

Attachment 9: Former Go Cart Club, Former Hangar Building, Former Radio Laboratory Investigation Locations

Attachment 10: Former Piggery Landfill Investigation Locations

Attachment 11: Former Schofields Aerodrome Groundwater Monitoring Well Locations and Groundwater Guideline Exceedances

Attachment 12: Former Schofields Aerodrome Contoured Groundwater Elevations

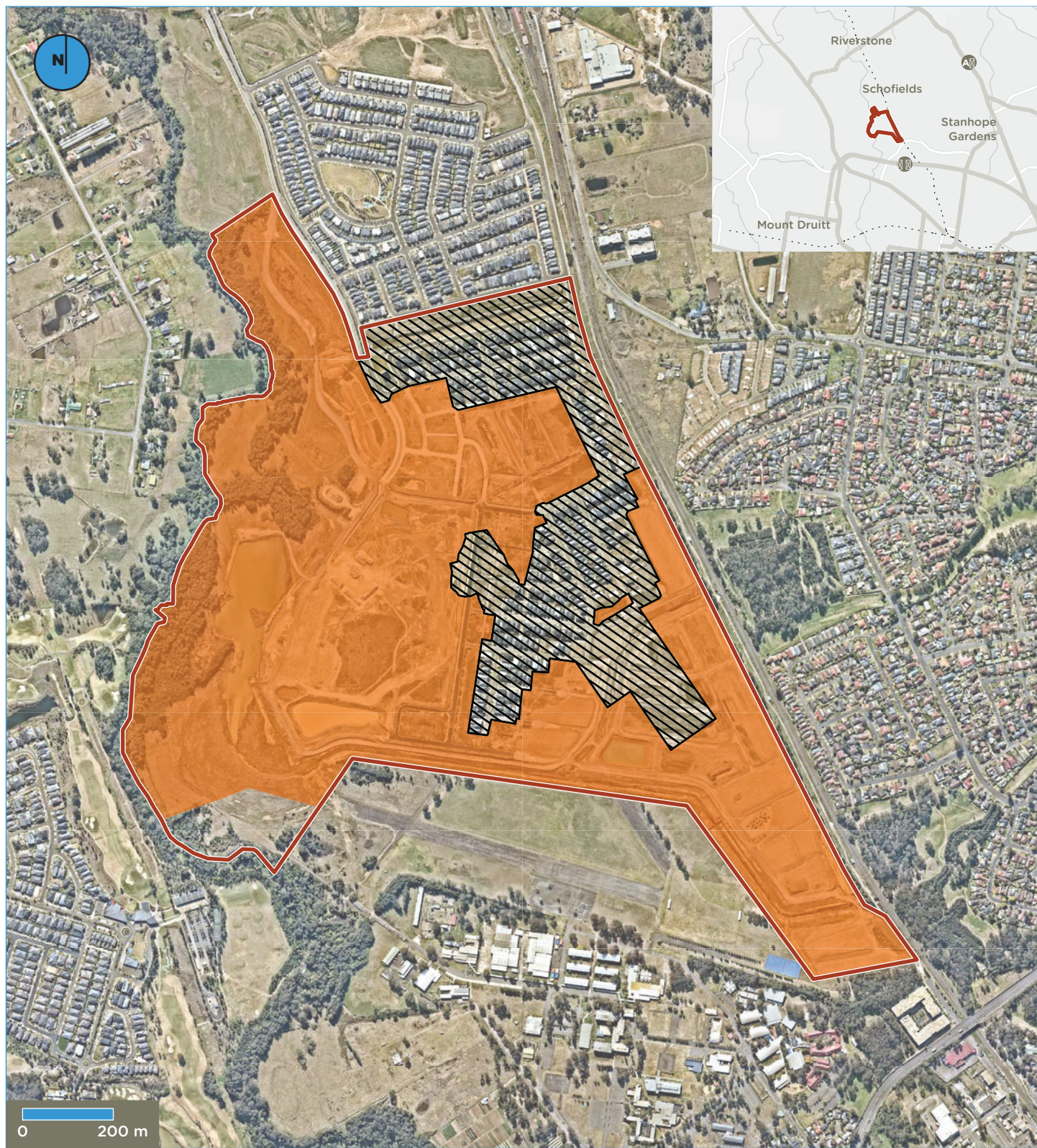
Attachment 13: Former Schofields Aerodrome Topsoil Investigation Locations

Attachment 14: Topsoil Stockpile Investigation Locations and Soil Guideline Exceedances

Attachment 15: Staging Plan – Current Zoning Aerial

Attachment 16: Staging Plan – Proposed Zoning Aerial

Attachment 17: Akuna Vista, Nirimba Fields, Master Plan

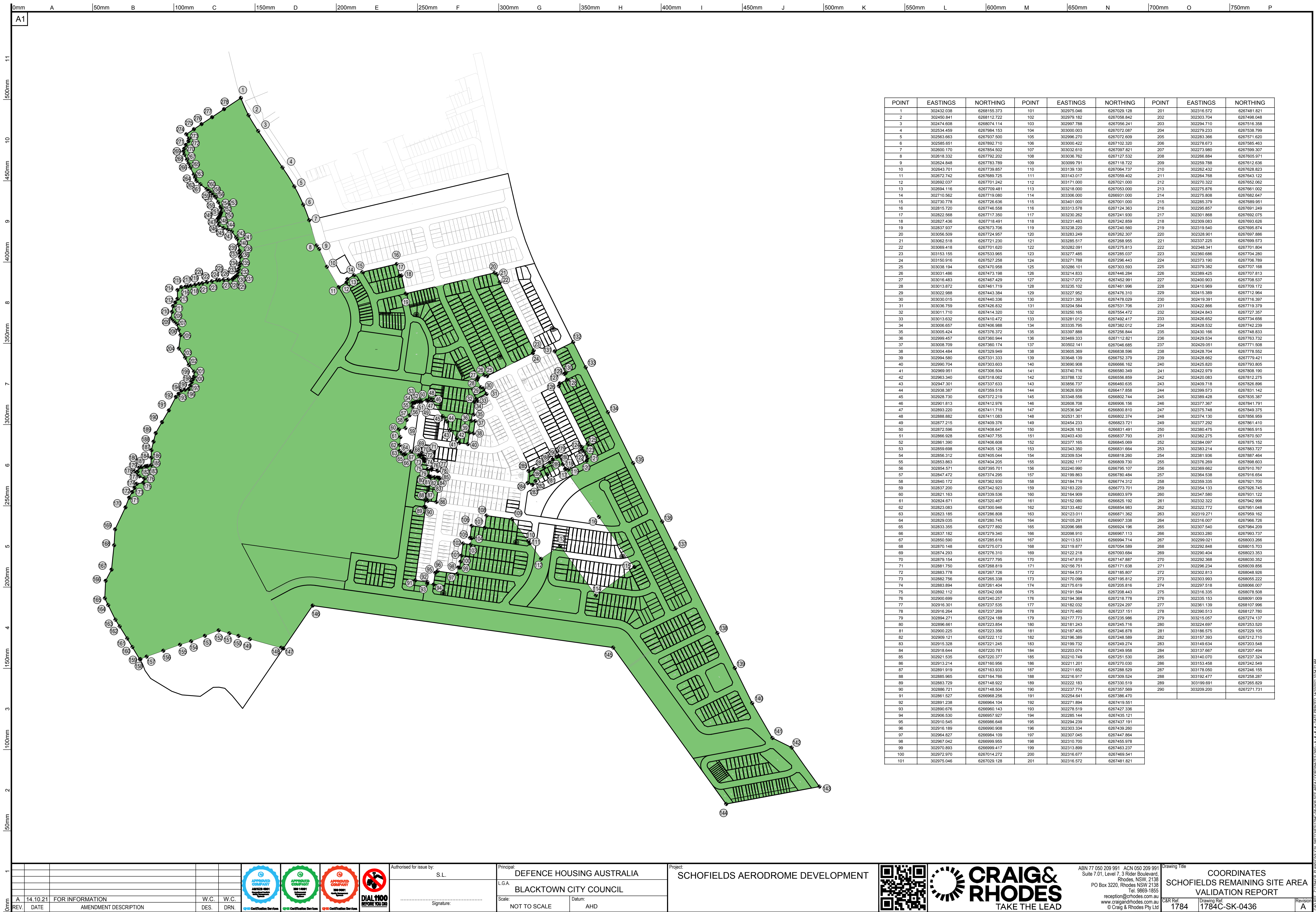


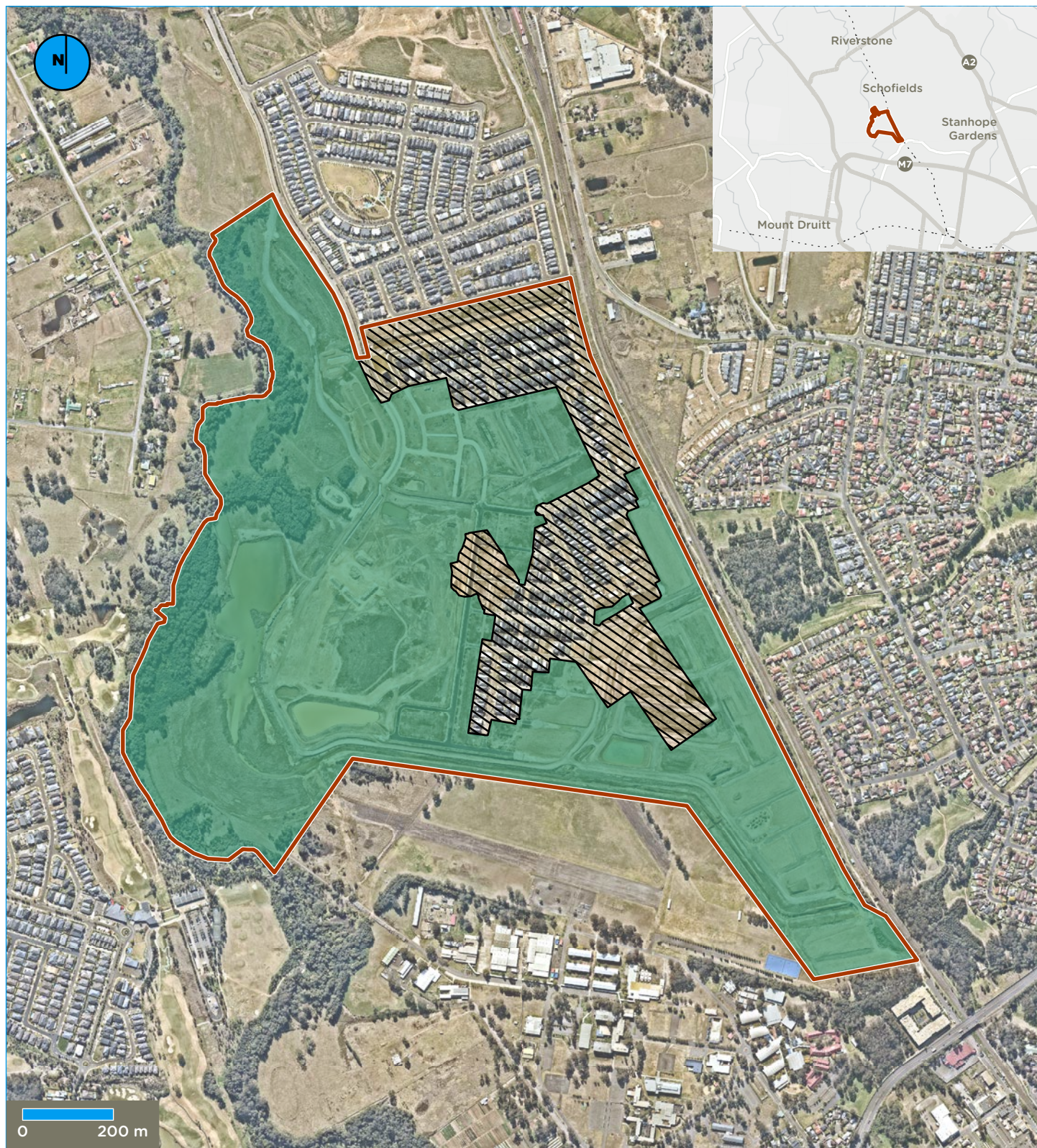
Legend

- Site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Audit area (101.92 ha)

A4
1:12,000

Figure 1a: Site Location and Layout (Current) - Audit Area
PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome





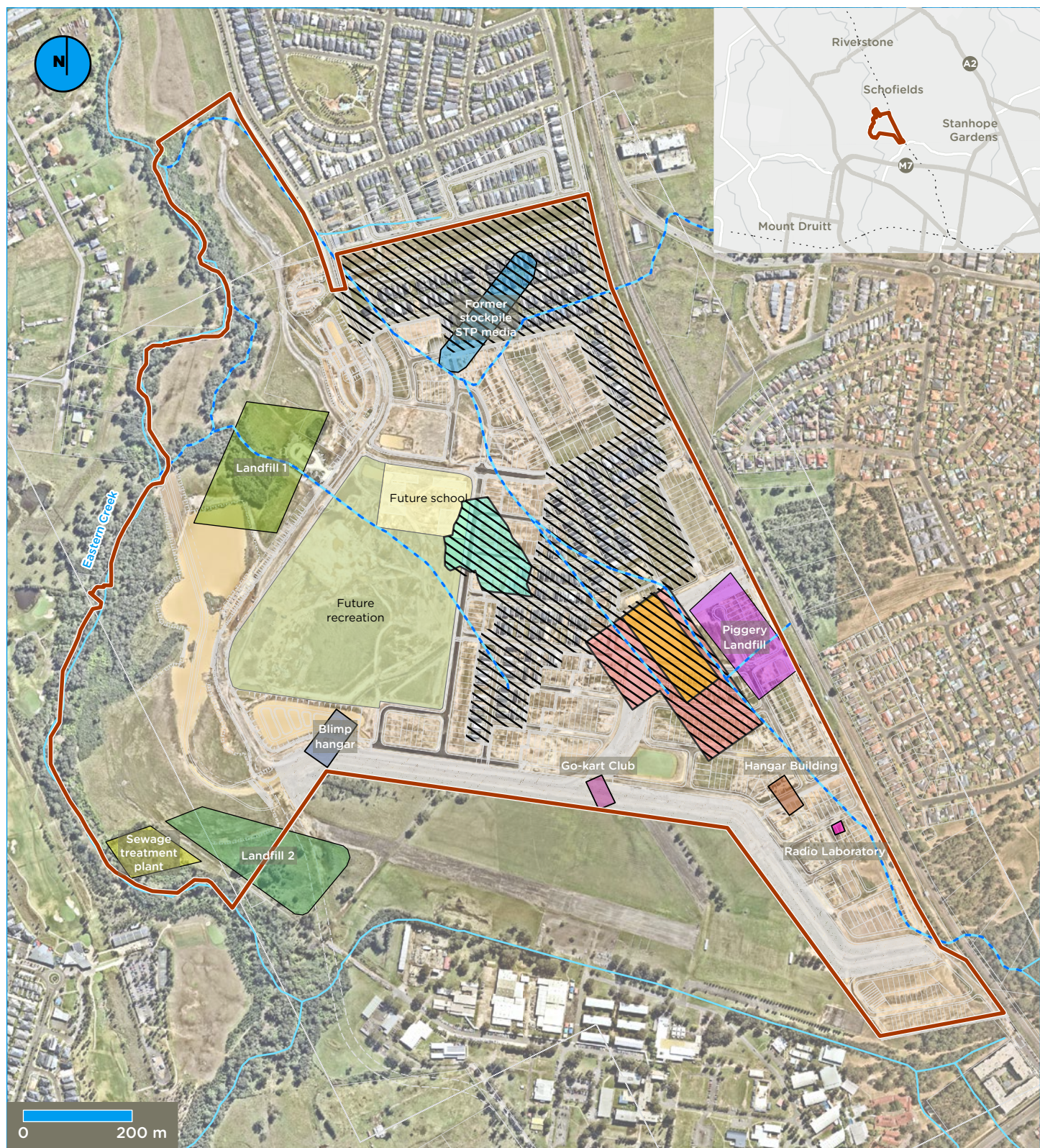
Legend

- Site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Validation area (105.6 ha)

A4
1:12,000

Figure 1: Site Location and Layout (Current)

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



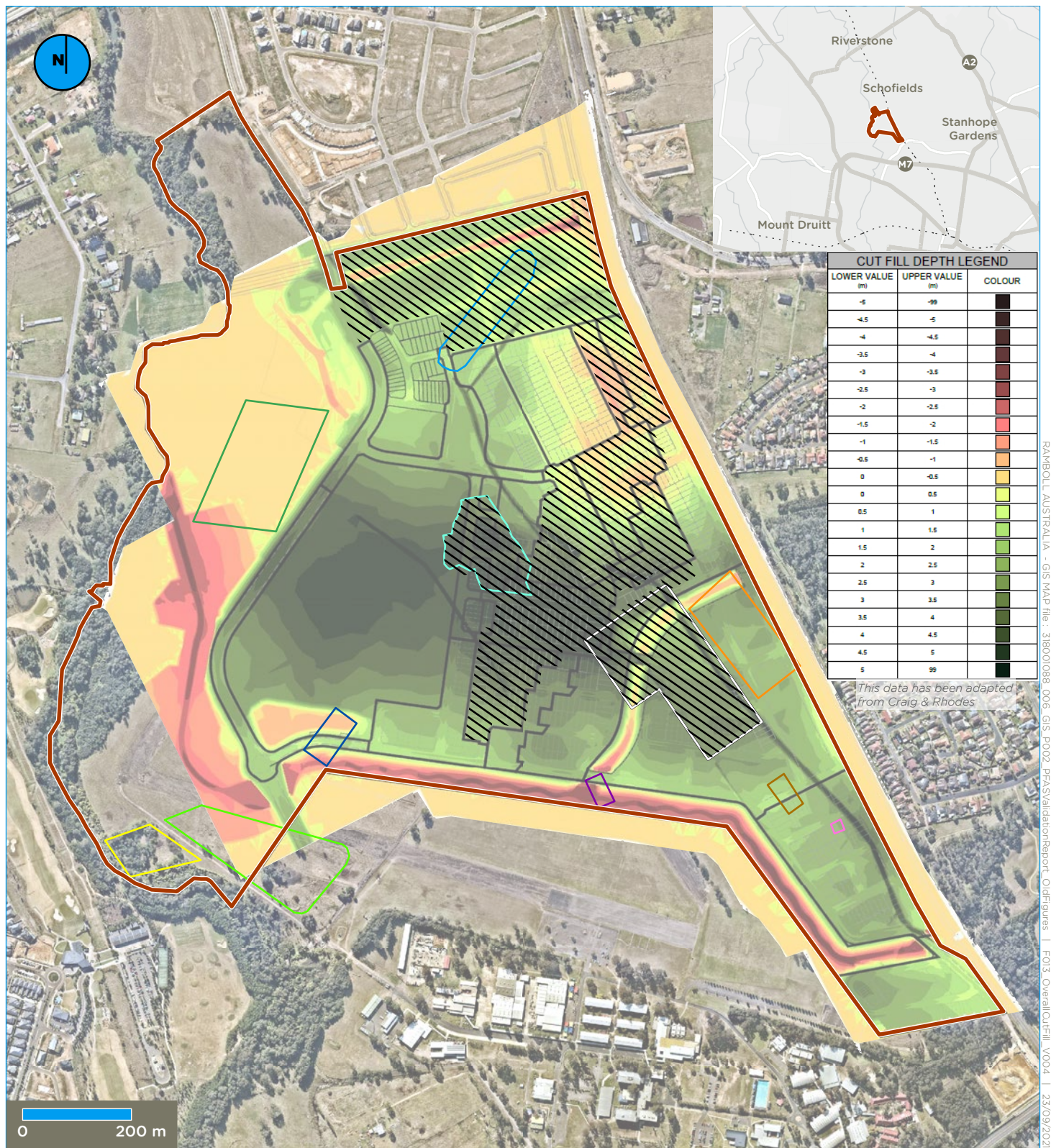
Legend

- | | | | |
|--|--|---|--|
|  | Approximate site boundary (comprising majority of Former Schofields Aerodrome) |  | PFAS material emplacement area at depth |
|  | Excluded area |  | 'No Scrape Area' Area not suitable for top soil re-use (moved to placement area) |
|  | Approximate location of Former Fire Fighting Training Area (FFTA) |  | Waterways |
| | |  | Former drainage channels |

A4
1:10,000

Figure 2 : Former Schofields Aerodrome Areas of Environmental Concern

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome

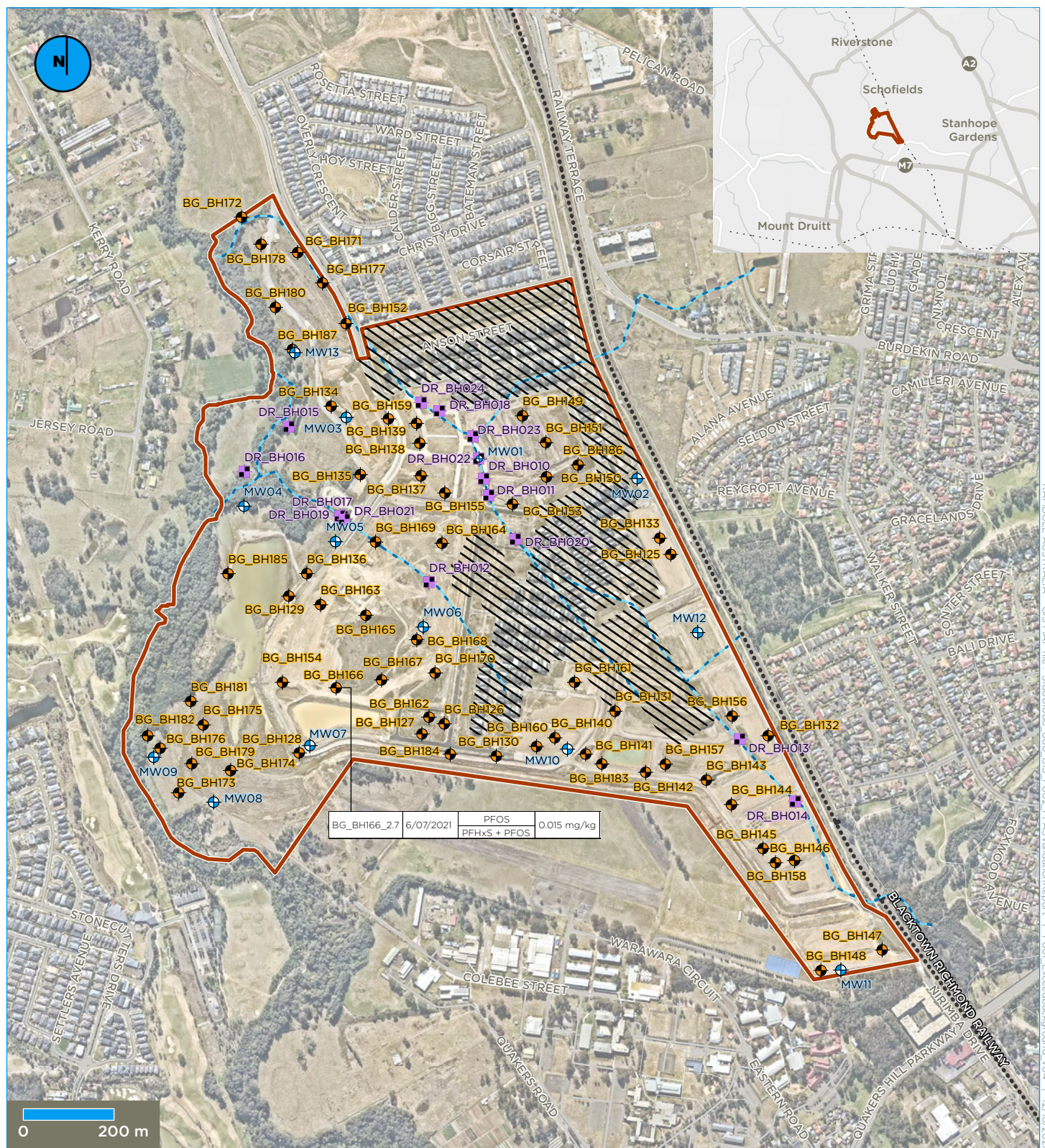


Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- 'No scrape area'
- PFAS material emplacement area at depth
- Landfill 1
- Landfill 2
- Piggery landfill
- Former sewage treatment plant
- Radio laboratory
- Blimp hangar
- Former stockpile STP media
- Go kart
- Hangar building

Figure 3 : Former Schofields Aerodrome Cut/Fill Plan

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Background sample
- ⊕ Monitoring well
- Drainage line borehole
- Former drainage channels

Exceedance Criteria

Sample Location and Depth (m)	Sample Date	CoPC	Adopted Criteria Exceeded		Reported Concentration
		PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg	
			HEPA EGV SOIL INDIRECT 2020	0.01 mg/kg	
		PFHxS + PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg	

Figure 4a: Background, Drainage Lines and VENM Thickness Investigation Locations and Soil Guideline Exceedances

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



Esri, HERE, Garmin, METI/NASA, USGS and aerial photography by Nearmap, flown 07/08/2021

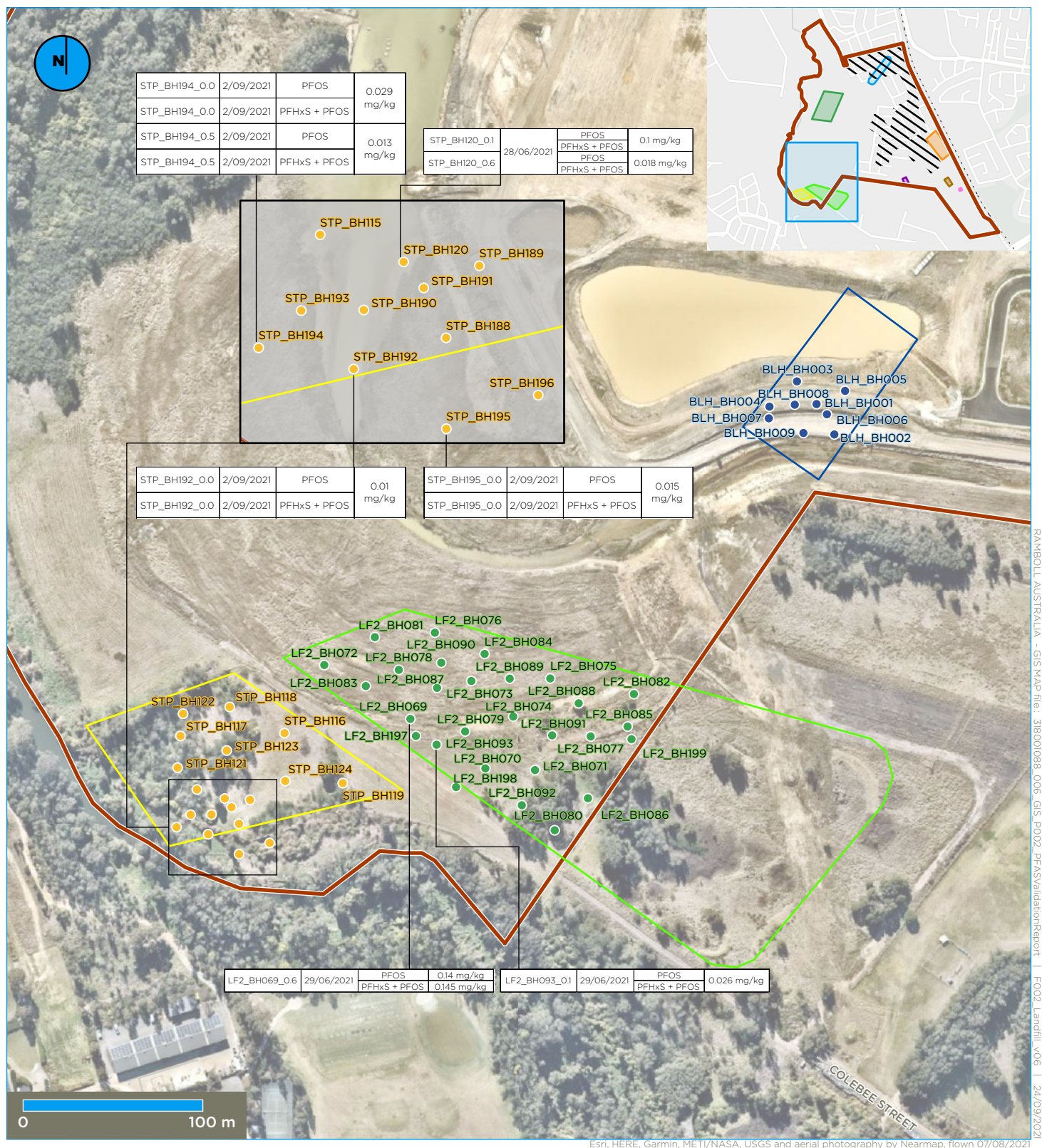
Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Former landfill 1 sample location
- STP media stockpile sample location
- Former landfill 1
- Former STP media stockpile

A4
1:3,000

Figure 4b: Former Landfill 1 and STP Media Stockpile Area Investigation Locations

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Former landfill 2 sample location
- Former blimp hangar sample location
- Former sewage treatment plant sample location
- Former landfill 2
- Former sewage treatment plant
- Former blimp hangar

Exceedance Criteria

Sample Location and Depth (m)	Sample Date	CoPC	Adopted Criteria Exceeded		Reported Concentration
		PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg	
			HEPA EGV SOIL INDIRECT 2020	0.01 mg/kg	
		PFHxS + PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg	

Figure 4c: Former Landfill 2, Sewage Treatment Plant and Blimp Hangar Investigation Locations and Guideline Exceedances

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



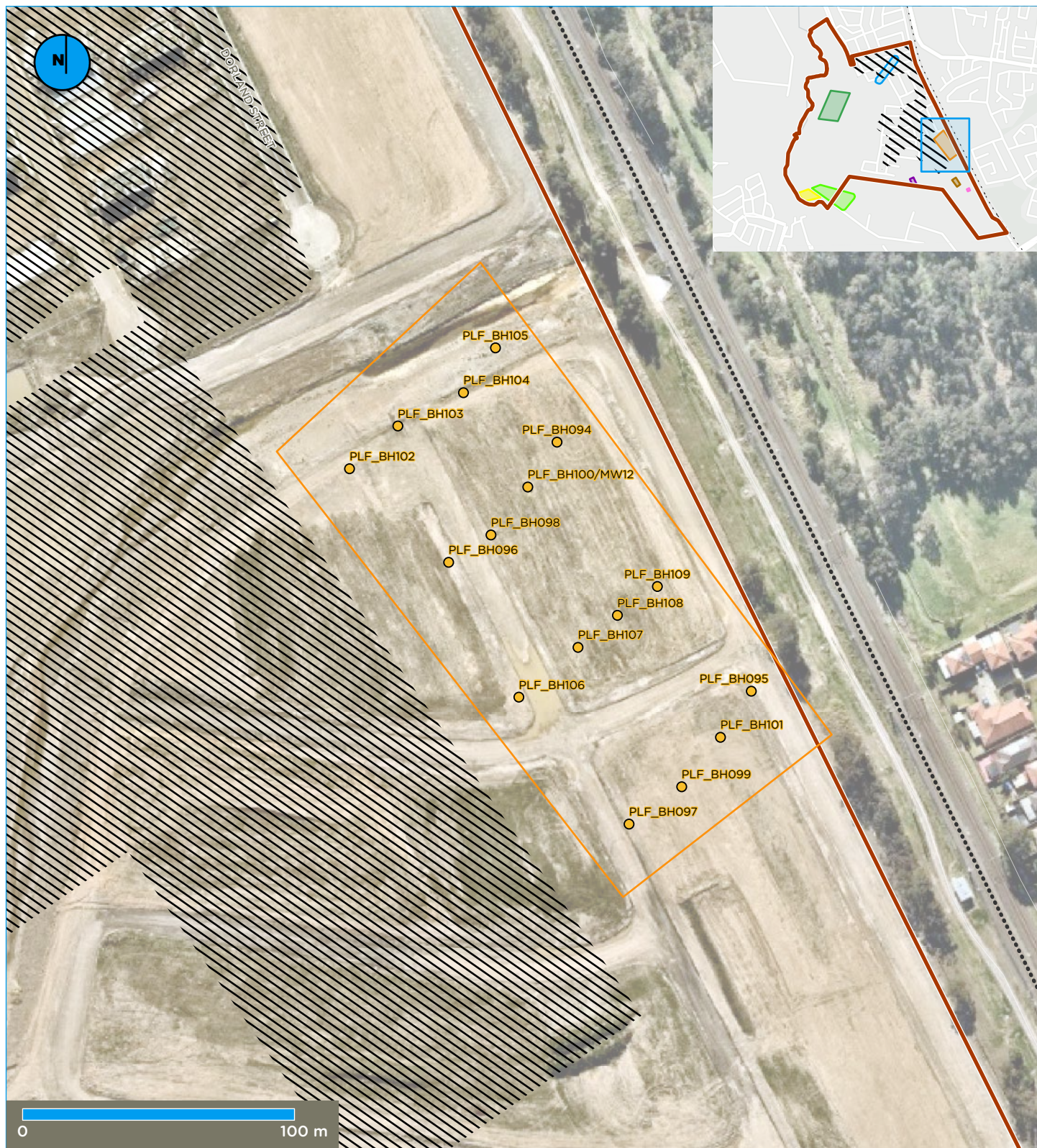
Legend

- | | | | |
|--|--|--|---|
| | Approximate site boundary (comprising majority of Former Schofields Aerodrome) | | Former radio laboratory sample location |
| | Excluded area | | Former piggery landfill |
| | Former go-kart club sample location | | Former radio laboratory |
| | Former hangar building sample location | | Former go kart |
| | | | Former hangar building |

A4
1:3,000

Figure 4d: Former Go Cart Club, Former Hangar Building and Former Radio Lab Investigation Locations

PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



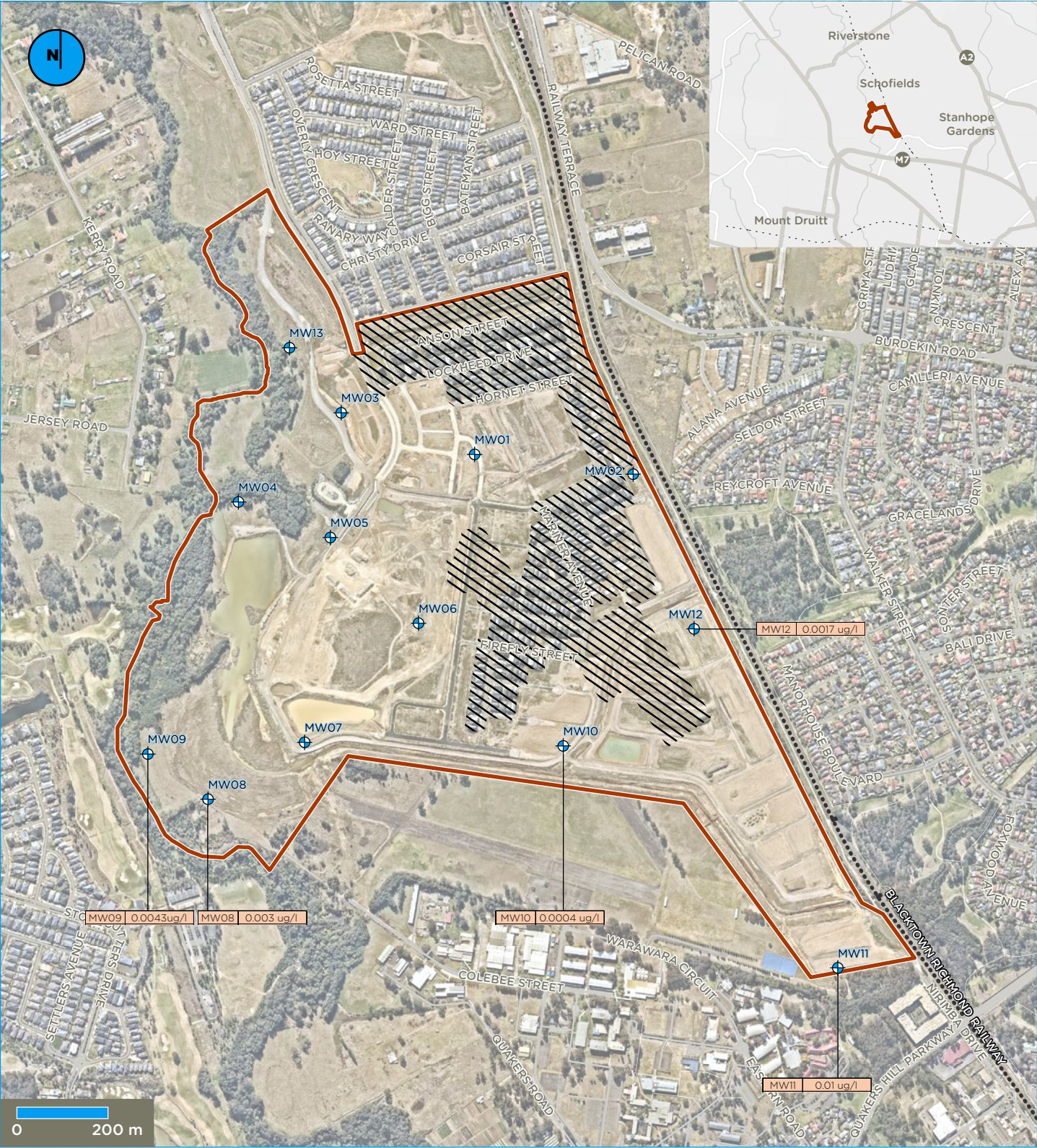
Esri, HERE, Garmin, METI/NASA, USGS and aerial photography by Nearmap, flown 07/08/2021

Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Former piggery landfill sample location
- Former piggery landfill

A4
1:2,000

Figure 4e: Former Piggery Landfill Investigation Locations
PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



Approximate site boundary (comprising majority of Former Schofields Aerodrome)

Excluded area

Monitoring well

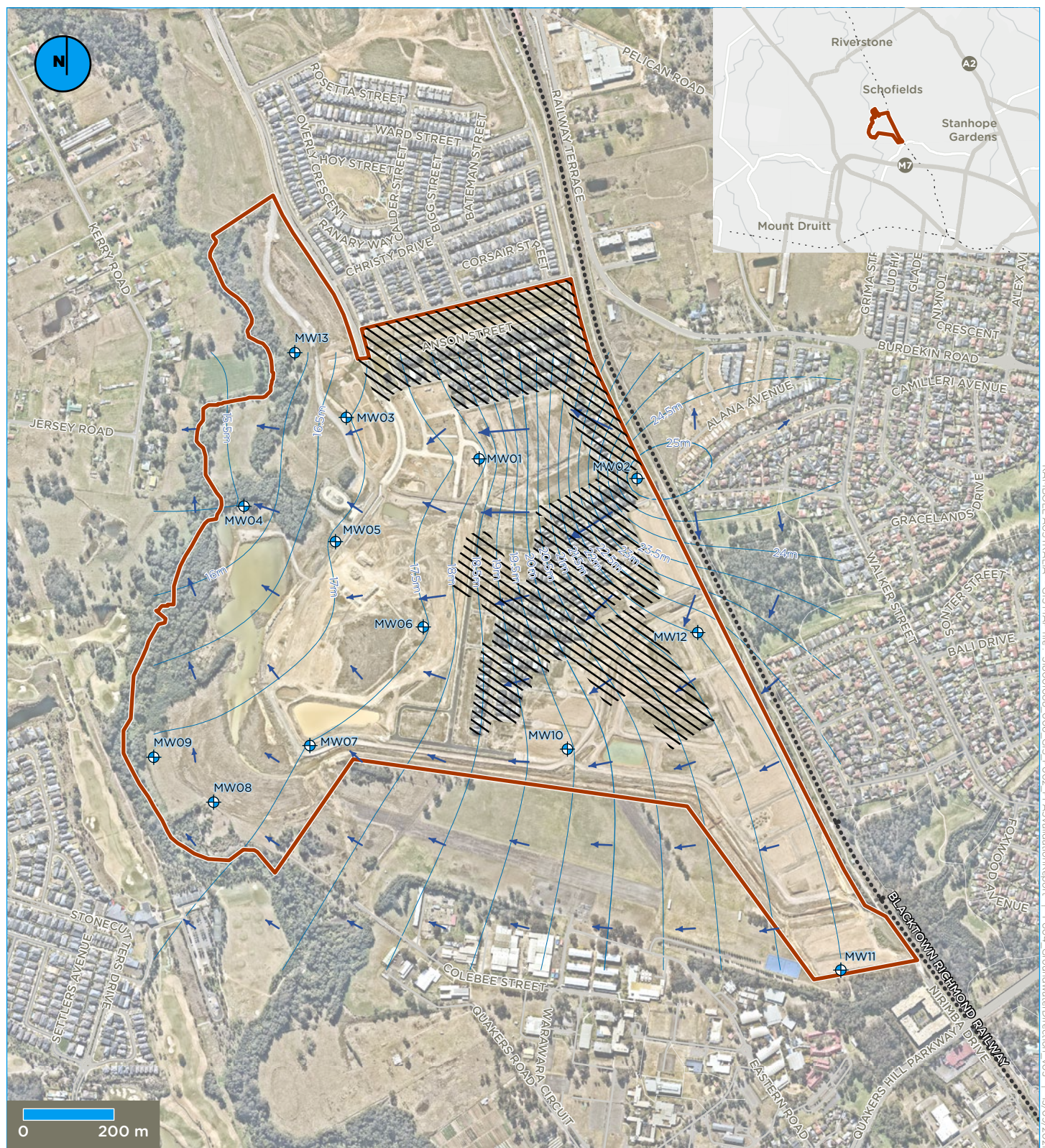
Exceedance Criteria

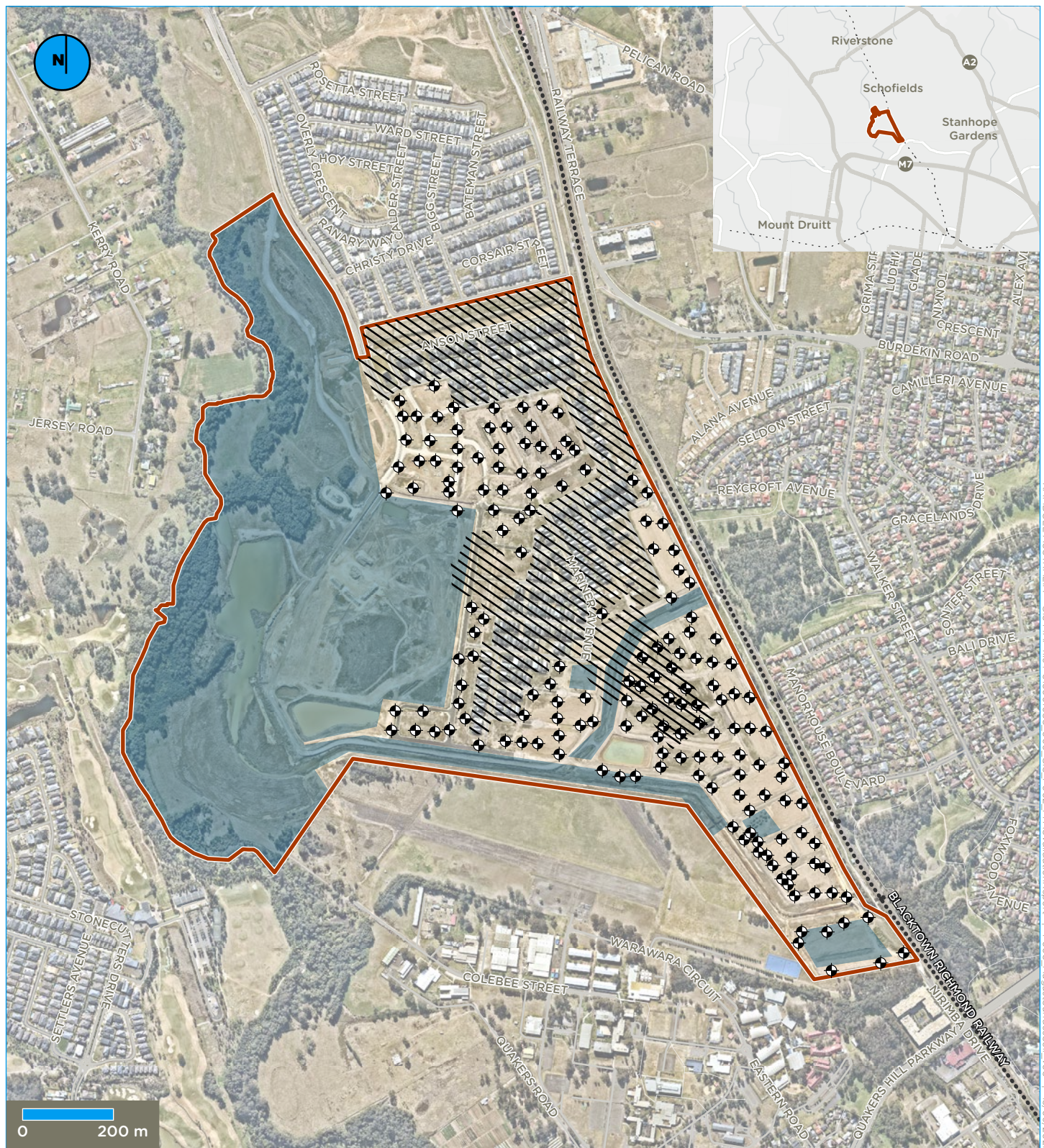
Sample ID	Sample Date	CoPC	Adopted Criteria Exceeded	Reported concentration
	8/07/2021	PFOS	DOEE 2016 FRESHWATER 99%	0.00023 ug/l

A4

1:12,000

Figure 5: Former Schofields Aerodrome Groundwater Monitoring Well Locations and Groundwater Guideline Exceedances
PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome

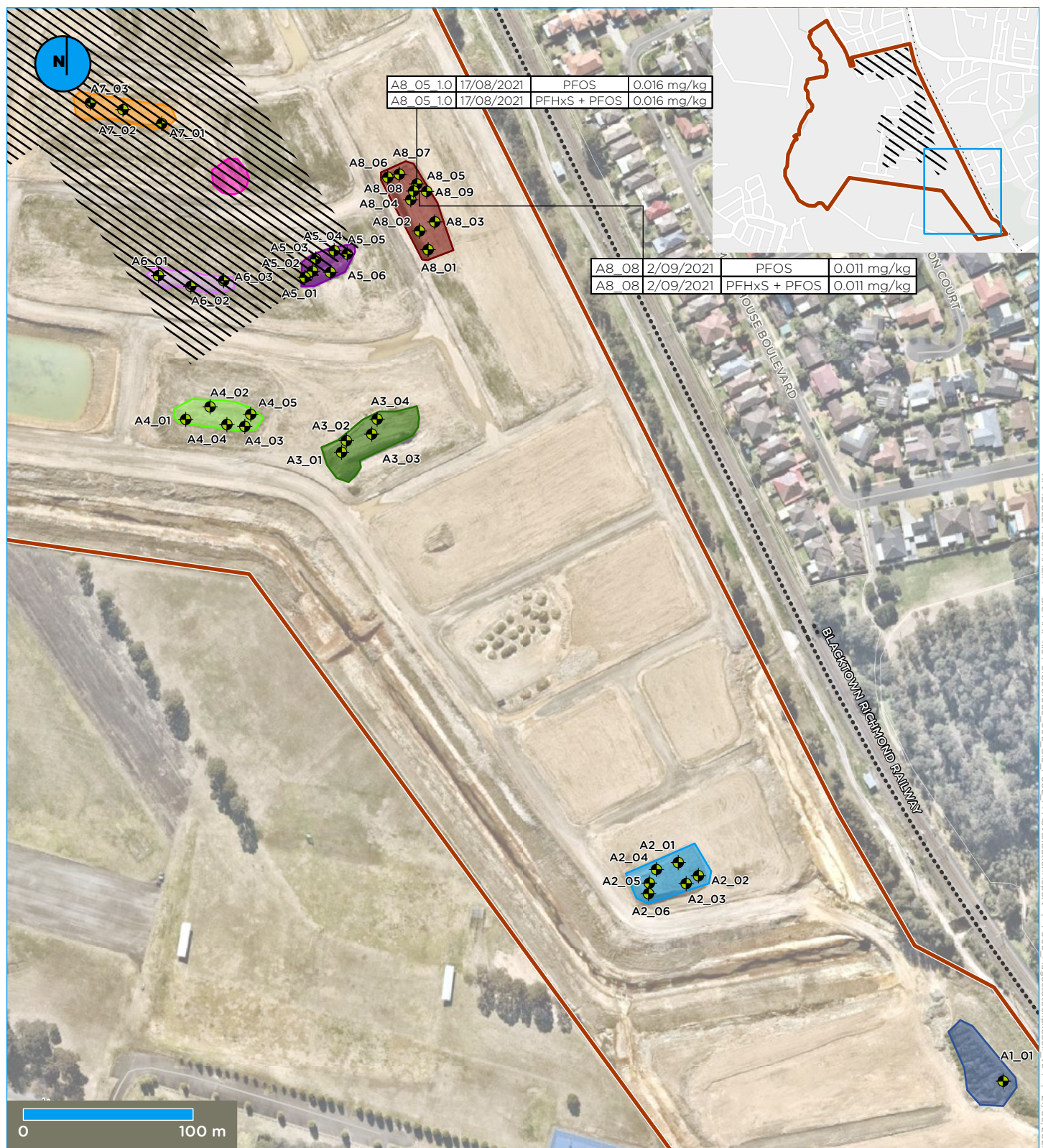




Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- No topsoil applied
- Topsoil sample

Figure 7: Former Schofields Aerodrome Topsoil Investigation Locations
 PFAS Remaining Site Area Validation Report - Former Schofields Aerodrome



Legend

- Approximate site boundary (comprising majority of Former Schofields Aerodrome)
- Excluded area
- Stockpile sample

Stockpiles

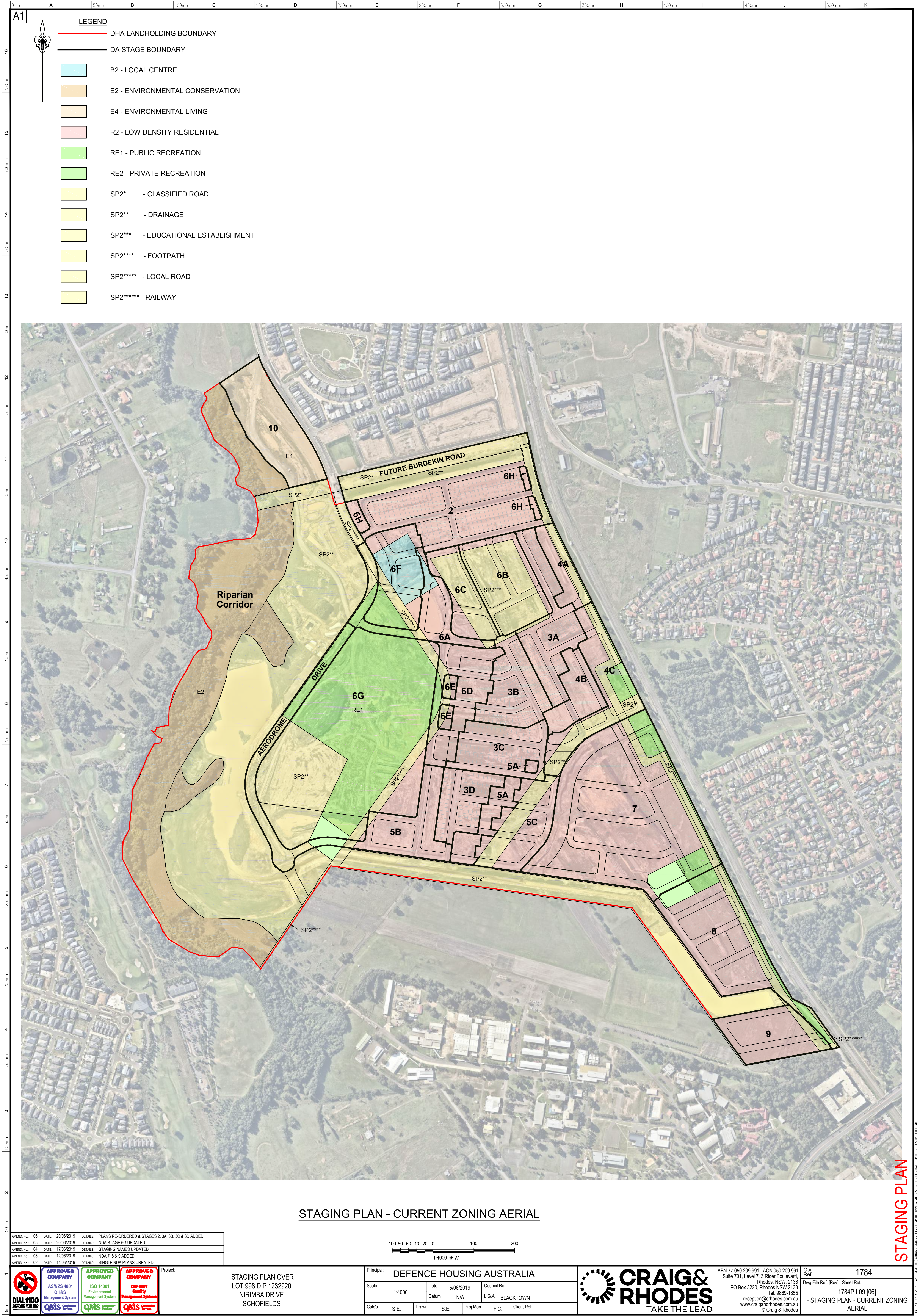
- A1, 101m³
- A2, 2516m³
- A3, 2440m³
- A4, 696m³
- A5, 939m³
- A6, 456m³
- A7, 483m³
- A8, 1606m³
- A9, 733m³

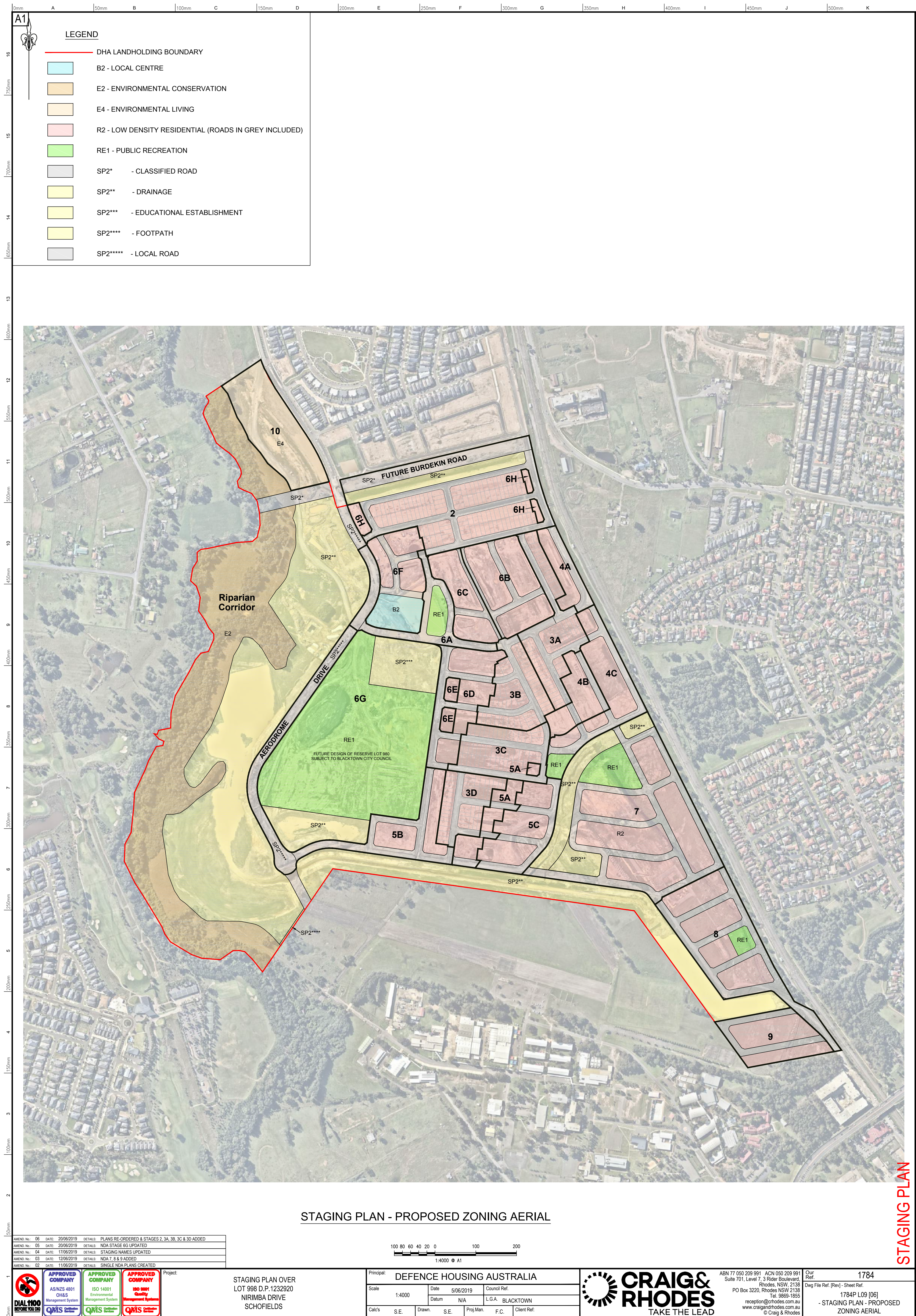
Exceedance Criteria

Sample Location and Depth (m)	Sample Date	CoPC	Adopted Criteria Exceeded	Reported Concentration
		PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg
			HEPA EGV SOIL INDIRECT 2020	0.01 mg/kg
		PFHxS + PFOS	HEPA HIL A SOIL 2020	0.01 mg/kg

Figure 8: Topsoil Stockpile Investigation Locations and Soil Guideline Exceedances

PFAS Remaining Site Area 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

1300 258 628
sales@akunavista.com.au
akunavista.com.au



Defence Housing Australia (DHA) and Urban Land Housing (ULH) do not guarantee, warrant or represent that the information contained in this material is free from errors or omissions. Any interested parties should make their own enquiries, seek expert advice and review the contract terms. All information contained herein is, and shall remain the copyright of DHA and may not be distributed, modified, or reproduced, in whole or in part without the express prior written consent of DHA.





Appendix B: EPA Guidelines



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

(as of: 28 April 2021)

Section 105 of the Contaminated Land Management Act 1997 (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)
- Sampling design guidelines (PDF 2MB)
- 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 (ANZECC, October 2000), are replaced as of 29 August 2018 by the Australian and New Zealand Guidelines 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 & 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).

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 Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)* (ASC NEPM)
- 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, NHMRC 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

18 March 2021

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

Dear ██████████

Re: Audit Process Letter **Former Schofields aerodrome/Nirimba Fields, Quakers Hill NSW**

1. Introduction

I have been engaged by Defence Housing Australia (DHA), as a NSW Environmental Protection Authority (EPA) accredited Contaminated Site Auditor, to conduct a non-statutory site contamination audit of the former Schofields aerodrome. The site is approximately 135 hectares and is currently being redeveloped as a low-density residential estate with suburban road network, a school and recreational areas called Nirimba Fields. The site is located within the Blacktown City Council (Council) area.

A Site Audit Report dated September 2013 and a Site Audit Statement (GN481) were previously issued and concluded that 'the site is suitable for residential use with accessible soil, as well as other similarly or less sensitive landuses, such as schools and recreational open space'.

Due to its historical use as a former aerodrome, it is now known that per- and polyfluoroalkyl substances (PFAS) containing Aqueous Film Forming Foam (AFFF) chemicals were historically used for firefighting purposes in the former fire training area (FFTA). As the previous SAS GN481 did not consider PFAS, the objective of the current audit is to confirm whether the investigations undertaken were appropriate to confirm whether the nature and extent of PFAS contamination has been adequately determined and that the site does not pose a risk to human health or the environment in relation to potential PFAS impacts.

I have been issued with the following documents:

- *Site Contamination Due Diligence Assessment*, Former Schofields Aerodrome, Schofields NSW, prepared by JBS Environmental Pty Ltd dated October 2012.
- *Site Audit Report – Part of Former Schofields Aerodrome, Lot 400 in DP1171596*, audit number GN481, prepared by ENVIRON Australia Pty Ltd dated September 2013.
- *Targeted Phase 2 PFAS Site Investigation, Former Schofields Aerodrome Quakers Hill NSW*, prepared by Ramboll Environ Australia Pty Ltd dated November 2017.
- *PFAS Leachate Analysis – Former Schofields Aerodrome*, prepared by Ramboll Australia Pty Ltd dated 31 May 2018.
- *PFAS Validation Report*, Former Schofields Aerodrome, draft, revision D4, prepared by Ramboll Environ Australia Pty Ltd dated 12 February 2021.



- *PFAS Validation Report*, Former Schofields Aerodrome, draft, revision D5, prepared by Ramboll Environ Australia Pty Ltd dated 5 March 2021.
- *PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW*, draft D2, prepared by Ramboll dated 16 March 2021.
- *Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil*, draft v1, prepared by Ramboll dated 11 March 2021. This is provided as Appendix 2 of the PFAS Assessment Overview Letter listed above.

I am currently undertaking this independent review and through this process will be issuing interim audit advice (IAA). I am familiar with the site and will undertake a site inspection in the coming weeks.

If you have any comments or questions about this letter, 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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

22 March 2021

[REDACTED]
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear [REDACTED]

**Re: Interim Site Audit Advice No. 4: PFAS Assessment
Overview Letter
Former Schofields aerodrome/Nirimba Fields, Quakers Hill 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 former Schofields aerodrome excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was assessed, reported and audited separately, they are not discussed further in this letter.

In relation to the site, I have been provided with the following document prepared by Ramboll for review:

- *PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW*, draft D2, prepared by Ramboll dated 16 March 2021. This is hereafter referred to as the Overview Letter.



- *Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil*, draft v1, prepared by Ramboll dated 11 March 2021. This is provided as Appendix 2 of the Overview Letter.

The purpose of this letter is to provide comment on the Overview Letter.

3. Auditor's Initial Comments

The comments provided in this IAA are high-level comments and responses are required to enable us to continue the audit. It is expected that further detailed comments will be sent following receipt and review of that information and as the audit continues.

This high-level review was conducted with the assistance of the auditor's expert support team member for risk assessment with consideration of the following guidelines:

- 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).
- *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards* (enHealth 2012).

3.1 Key Issues

There is limited PFAS concentration data presented for the majority of the site as the PFAS investigation conducted to date was centred around one part of the site, namely FFTA and PFAS MEA (which are considered as off-site). Given this, there needs to be confidence that the review of the current site history was specifically focussed on PFAS, was robust and went back to the past reports (rather than just the SAR) and that all potential data gaps have been ruled out or identified. The rationale should be provided.

To rely on the information, I would expect that the information would be presented in accordance with *Consultants reporting on contaminated land* guideline (NSW EPA 2020) i.e., Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) in accordance with Schedule B2 of the NEPM (NEPC 2013). Where the site history identifies data gaps, additional sampling should be undertaken, and where that is not possible, a risk assessment/multiple lines of evidence or long term management considered.

Ramboll conclude that groundwater does not pose a risk to human health where groundwater is not extracted for use in the proposed new development. However, no discussion was provided about the ecological risk of groundwater given that public open space (nature reserve) is proposed at the western boundary of the site adjacent to Eastern Creek.

In addition to these key issues, see some additional detailed comments outlined in Section 3.2.



3.2 General

The following items require clarification or amendments:

1. **Site identification:** All land title for the parcel of lands within the audit site need to be presented in the SAR/SAS and therefore, this information is required.
2. **Site history:** Review of site history completed by Ramboll and four former site features with potential PFAS contamination were identified:
 - Two former landfills, known as Landfill 1 and Landfill 2, located adjacent to Eastern Creek.
 - A former sewage treatment plant (STP), located adjacent to Eastern Creek.
 - FFTA.

As indicated in Appendix B of PFAS NEMP, PFAS contamination is also associated with use of fertilisers and pesticides; car-wash facilities; firefighting foam deluge systems, aviation-specific products, articles and activities, such as aviation hydraulic fluid. Have considerations be given to former site features such as nursery, fuel storage areas, vehicle/plane maintenance or repair workshops, vehicle and plane-washing facilities, effluent or sewer drainage lines associated with the STP?

3. **Site history:** Please provide more information about the site history review undertaken by Ramboll. For example: which documents were actually reviewed, methodology of review, etc, during the Overview Report, other than referring back to the ENVIRON SAR.
4. **PFAS data from the site in relation to current guidance:** What depth was the 'mixed soil' (scraped sediment and VENM) placed? If no information is available, please state so.
5. **Additional potential sources of PFAS identified:** It is stated that for former Landfill 2, "*approximately 55% of the excavated material was able to be separated, validated and used as backfill*" (page 8). Where the material was used as backfill (e.g. at Landfill 2 or elsewhere)?
6. **Additional potential sources of PFAS identified:** Please provide more rationale why the PFAS contamination risk for the former landfills and STP was concluded by Ramboll to be low and the risk of ongoing PFAS contamination is low and acceptable, given that:
 - The auditor does not consider the domestic non-putrescible waste (such as carpets, cardboard, textiles and furniture) within Landfill 1 and Landfill 2 have low potential for containing PFAS as domestic solid inert waste is documented to contain PFAS (Simmons 2019¹).
 - The field sampling undertaken at former landfills and SPT prior to 2005 did not analyse for PFAS as part of the validation process.
7. **Groundwater:** Concentration of what measured at BH107 exceeded which NEMP 2.0 criteria?
8. **Groundwater:** The groundwater on-site was stated to be "*up to 6 m below ground level*". Is this the case close to Eastern Creek or is the groundwater shallower? This section will benefit with some discussion on potential risk to ecosystem (Eastern Creek and proposed natural reserves adjacent to the creek).
9. **Sediment:** The discussion presented on page 8 indicated one sediment sample reported above the NEMP 2.0 guidance criteria. Please clarify which NEMP 2.0 criteria is this referring to as

¹ Simmons N, 2019. PFAS concentrations of landfill leachates in Victoria, Australia – implications for discharge of leachate to sewer, *17th International Waste Management and Landfill Symposium*, Sardinia, 30 September to 4 October 2019.



Appendix 2 indicated that elevated concentrations were reported at two samples (SS107 and SS108).

10. **Sediment:** How is the 'Area of Interest' as shown in Figure 6 and 7 defined? It is noted that other than SS101 (located near the northern site boundary far away from SS108), there is no other sediment sampling conducted that the former drainage channel.
11. **Sediment:** What is the volume of the impacted sediment material in question, as it was described as "relatively small volume"?
12. **Sediment:** The discussion presented about the risk posed seems to suggest that the PFAS-impacted sediment is expected to be placed at depth. Hasn't the sediment been scraped, mixed and placed somewhere at depth?
13. **Sediment:** Site geology is mentioned for the first time in this section and it is out of context as there is no site geology information presented in this letter report.
14. **Conceptual Site Model (Soil):**
 - Please clarify why leaching is not a potential exposure pathway for the soil at the site. The leachability analysis conducted in 2018 indicated elevated TCLP concentrations exceeding the NEMP ecological and drinking water guideline value confirming that leaching of PFAS from the soil medium.
15. **Conceptual Site Model (Surface water):**
 - Why are the exposure pathways of direct contact/ingestion and overland runoff for surface water not existing for the site?
 - Why is Eastern Creek not an environmental receptor for the site?
 - Is there any surface water PFAS monitoring data from Eastern Creek to assess potential risk?
16. **Risks to human health and the environment:** Refer to Item 12 above, please confirm whether the sediment sample SS108 with elevated PFAS concentration has been scraped, mixed and placed at depth somewhere on-site.
17. **Suit suitability for proposed land use:** Table 4-1 of the PFAS MEA Validation Report (Ramboll, 2021) indicated that bulk earthworks involving placement of VENM to level and raise site surface level for flood mitigation was conducted at PFAS MEA. The discussion presented has not discussed whether any bulk VENM filling works has been conducted at the site.

If this bulk filling was conducted at the site, detail discussions about the location and thickness of VENM imported, and the overall PFAS contamination risk to future residential and non-residential land use should be presented.



4. Closure

Please note that comments on Appendix 2: Potential Risks Associated with PFAS Impacted Scraped Soil will be provided at a later date.

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]

NSW EPA Accredited Auditor [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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

1 April 2021

[REDACTED]
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear [REDACTED]

**Re: Interim Site Audit Advice No. 5: Potential Risks Associated
with PFAS Impacted Scraped Soil (Draft v1)
Former Schofields aerodrome/Nirimba Fields, Quakers Hill NSW**

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Site Auditor, the auditor has been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the former Schofields aerodrome excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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 the low density residential and other proposed land uses.

As the PFAS MEA, FFTA and 'No Scrape Area' were assessed, reported and audited separately, they are not discussed further in this letter.

In relation to the site, the auditor was provided with the following documents prepared by Ramboll for review:

- *PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW, draft D2*, prepared by Ramboll dated 16 March 2021. This is hereafter referred to as the Overview Letter.



- *Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil*, draft v1, prepared by Ramboll dated 11 March 2021. This memorandum is provided as Appendix 2 of the Overview Letter.

The current Auditor has already provided initial high-level comments of the Overview Letter (draft D2) in my interim audit advice (IAA) no. 4 dated 22 March 2021.

The purpose of this letter is to provide comment on the Potential Risks Associated with PFAS Impacted Scraped Soil (draft v1) memorandum (i.e. Appendix 2 of the Overview Letter).

3. Auditor's High-level Comments

The auditor, with the assistance of her expert support team members, has completed a review of the memorandum 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).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).
- *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards* (enHealth 2012).

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

1. **Introduction:** For context, please detail the distance between SS101 and SS108, and between SS102 and SS108.
2. **Selection of concentrations adopted in risk assessment:** This assessment focusses on the measured concentrations of PFAS in a single drainage line sample, and there is considered to be inadequate site characterisation in the overview letter to establish whether there could be other elevated concentrations of PFAS across the broader site (excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area') for which risk assessment is required. Addressing this data gap is required to determine whether further risk assessment works are required. The below comments relate specifically to the risk assessment completed for the impacts in SS108.
3. **Extent of residual impact in SS108:** The potential extent of the impact in SS108 is considered to be insufficiently characterised to support the assertion in the report that this impact will be localised in extent, or that the highest concentrations in the drainage lines have necessarily been identified. Reference to Figure 1 indicates that no down-gradient samples were collected in proximity to this sample, and that sample SS101 and SS102 (in which only very low concentrations of PFAS were measured) are located over 1 km down-gradient of SS108. While elevated concentrations may be most likely in areas where ponding may occur, there is no site data to support this assertion, and it is also unclear whether there are other similar areas of ponding elsewhere in the drainage channels where similar or higher concentrations may exist. There is not considered to be sufficient information to conclude that concentrations further down-gradient would necessarily be lower than those measured in SS108. Further assessment is required to address this data gap.
4. **Human health risk (comparison with HIL-A):** Several lines of argument (first two bullets in Section 2) centre on the localised/limited nature of the impact and the reduction in concentration which would be expected associated with mixing with VENM. As the volume of impacted material is not considered well-quantified, and the extent of mixing is unknown these lines of evidence are not considered robust. The approach of adjusting the site-specific HIL-A based on the site-specific ratio of PFOS+PFHxS, and the adjusted transfer factors presented in Appendix 1, are considered



valid for the identified impact in SS108. Modelling undertaken by the Auditor indicates the modified HIL-A is appropriate; however the NEPM HIL spreadsheet should be incorporated into the report to allow the derivation of the adjusted HIL-A to be reviewed. As the measured concentration of PFOS+PFHxS in SS108 is below the HIL-A, this indicates that risks to residential users via pathways of soil contact and ingestion of home grown produce (fruit and vegetables, up to 10% of diet) will be low and acceptable. This conclusion is not dependant on the extent of the impact, or on the allowance for mixing with VENM. It is therefore agreed that the risks to site residents via these pathways from the measured concentration in SS108 are low and acceptable.

5. **Human health risk (poultry):** It is unclear there is adequate evidence that poultry (i.e. chickens for eggs) would not be kept on this development; this can represent an extremely sensitive exposure scenario, given the very high potential for PFAS uptake into chicken eggs, particularly where pathways of backyard foraging by chickens may be active. It is noted that potential risks via this pathway can be posed at concentrations well below the HIL-A. Either clarification that of the rationale behind excluding this pathway, or further assessment of this pathways is required.
6. **Risks to terrestrial ecosystems (use of 140 µg/kg):** Despite reference to this value in the NEMP, the use of the 140 µg/kg criterion is not considered directly relevant to the assessment of pathways to terrestrial ecosystems. The 140 µg/kg criterion was developed by CCME considering a pathway of leaching and migration to off-site surface water (and may not be protective for this pathway, as the acceptable concentration in PFOS freshwater inherent in the derivation is different from the screening values for the protection of aquatic ecosystems in the NEMP).
7. **Risks to terrestrial ecosystems (overall conclusions):** the measured concentration of PFOS in SS108 only marginally exceeds the NEMP 2.0 screening level for indirect exposure. As discussed above there is uncertainty regarding the volume of material which may be impacted. However, other lines of evidence could support an assessment that the risks to terrestrial ecosystems associated with this concentration are low. Further information should be presented to support the assertion that the indirect exposure pathway is unlikely to be significant for the development. This could include brief commentary on the presence/absence of suitable habitat for the key sensitive receptors for which the screening level is derived, and/or the likelihood that any habitat present would provide for a significant proportion of the dietary needs of these receptors. It is noted that the screening level is derived for a small insectivorous mammal, and where these are assessed as absent it may be possible to adopt an alternate (less stringent) screening level for other receptor groups which may be present.
8. **Aquatic ecosystems (location of emplaced material):** The depth and location of emplaced material is not robustly described. The assessment notes that *"the material is located primarily below residential blocks and roads and is not expected to be directly accessible"* (page 6). Where this is the case, the risks to aquatic ecosystems would be reduced. However, there is insufficient supporting evidence to provide confidence that the material could not be placed in other, higher-risk settings (e.g. near surface waters; at soil surface [such that surface water run-off is a concern]; or in locations where there is a greater potential for leaching to groundwater). Further information / assessment is required.
9. **Aquatic ecosystems (overall approach):** The assessment of risk to the surface water environment is highly qualitative. Given the uncertainties associated with the potential volumes of impacted material at similar concentrations to SS108 (see comment #3) and the uncertainty of the location where the material was placed (see comment #8) more detailed consideration of this pathway is required. Further consideration is required of the following:
 - **The distance to surface water receptors including Eastern Creek:** noting the uncertainty on where the material was placed, it is unclear how a distance of 500 m to these receptors was determined.



- **The potential risk to groundwater:** giving consideration to leachable concentrations, possible emplacement depths and proximity to creeks to better quantify the significance of this pathway.
- **The potential risk via surface water run-off:** giving consideration to leachable concentrations, potential for surface emplacement, and proximity to creeks to better quantify the significance of this pathway.

4. Closure

Please revise Potential Risk Associated with PFAS Impacted Scraped Soil memorandum to 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]

KR/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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

16 April 2021

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

Dear ██████████

**Re: Interim Site Audit Advice No. 7: PFAS Assessment
Overview Letter (Draft D3)
Former Schofields Aerodrome/Nirimba Fields, Quakers Hill 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 former Schofields aerodrome excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was assessed, reported and audited separately, they are not discussed further in this letter.

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

Document	Corresponding Auditor's Interim Advice
Ramboll (2021a) <i>PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW</i> , draft D2, 16 March 2021.	<i>Interim Site Audit Advice No. 4: PFAS Assessment Overview Letter</i> , dated 22 March 2021 (ref: S18612_LET04_Rev0)



Document	Corresponding Auditor's Interim Advice
Ramboll (2021b) <i>Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil</i> , draft v1, 11 March 2021. This is Appendix 2 of the <i>PFAS Assessment Overview Letter</i> .	<i>Interim Site Audit Advice No. 5: Potential Risks Associated with PFAS Impacted Scraped Soil (Draft v1)</i> , dated 1 April 2021 (ref: S18612_LET05_Rev0)

Subsequently, the PFAS Assessment Overview Letter document listed in the table above was revised and the auditor was provided on 6 April 2021 with the following documents for review:

- Ramboll (2021c) *PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW*, draft revision D3 dated 31 March 2021. This is hereafter referred to as the Overview Letter.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 4, provided in spreadsheet titled 'Auditor Comments Register_Cover Letter_Rev1_.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comment on the Overview Letter (draft D3) and Ramboll's Responses.

3. Auditor's Comments

Based on a review of the Overview Letter and Ramboll's Responses 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) Measures (NEPC 2013) and *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020), the following items require clarification or amendments:

1. **Site History Review:** As discussed in IAA No. 4, the auditor expects to see a robust site history review with supporting evidence, which identifies the potential and actual PFAS sources at the site. The previous review of the site history was not necessarily focused on PFAS sources. In accordance with the Schedule B2 of the NEPM, the site history review should review and present:
 - Site plans, historical maps and aerial photographs showing the location of each individual potential source or activity associated with PFAS on-site.
 - DHA-provided information.
 - Interviews with current and past owners, operators and occupiers of the site specifically regarding PFAS activities.
 - Historical societies and directories search.
 - Technical literature such as flammable and combustible liquid storage and handling licenses, chemical inventory, etc.
 - Complaint history and information from environmental licences and trade waste permits.
 - Sewer and underground service plans.
 - Historical incidents, spills and accidents (including fire).
 - Observation from site inspection (e.g., photographs, notes).

For each potential source or activity associated with PFAS identified on-site, discussion should be presented as it is or is not a PFAS source. Currently, the discussion provided in Site History section (page 6) of the Overview Letter is very broad as it is not clear what "consideration" was given to former PFAS sources on-site (e.g., nursery, fuel storage area, washing facilities, etc.).



If a robust site history is not able to be provided, leaving uncertainties associated with the nature and extent of PFAS contamination on-site, in accordance with NEPM and EPA requirements, detailed investigation or reliance on cap and contain (and verification that VENM is not also a source of PFAS/testing) may be required. At this preliminary stage, based on the information provided, it is unlikely that the auditor would be able to provide a Site Audit Statement confirming site suitability with regard to PFAS or confirm that the nature and extent of PFAS contamination has been adequately determined.

2. **Site history:** Is there any supporting evidence or literature information to support Ramboll's statement that PFAS was not expected to be present in hydraulic oils used for small light aircraft (i.e., Schofield Flying Club) compared to "*high performance hydraulic systems*" (page 6)?
3. **Site history:** The previous environmental assessment and remediation works (with majority of the field works conducted pre-2005) for contaminants of concern did not include testing for PFAS. Given that PFAS is persistent in the environment and potential sources of PFAS were identified on-site, please clarify why PFAS was considered to be "*less likely contaminant of concern*" (page 7). It should be noted that PFAS contamination is not associated with TRH, metals, PAH contamination as they are different compounds.
4. **Discussion:** It is stated that "*majority of the site has undergone significant filling with imported VENM material*" (page 8). As the VENM layer is likely to be required to confirm whether the site is suitable (i.e., cap and contain to compensate for the lack of specific site history/sampling), it is recommended that further information be included as follows:
 - VENM was used in the bulk raising of the site surface. Provide VENM certificate(s) to confirm the absence of PFAS as a source of contamination in the VENM.
 - Survey data is required to confirm the depth of VENM placed to raise the site level and identify any areas on-site with less than 3 m VENM thickness (i.e., area of the site without "significant filling").
 - The backfilling or earthworks that had occurred at the drainage channels at the site to support the notion that PFAS contamination is no longer an issue in surface water at the site.
5. **Former Sewage Treatment Plant (STP):** Please provide further information to indicate that the fate of the filter material from former STP (which was placed where residential houses are currently located at the former Runway No. 3 near the drainage channel). Has it been mixed with VENM and placed at depth?
6. **Sediment:** It is recommended that the estimated volume of 300 m² of the impacted sediment material (calculated by Ramboll) be stated as it provides context to the scale of the contamination.
7. **Conceptual Site Model (Soil):** Given that there is potential for PFAS to be present in the soil (albeit at depth after VENM placement/filling), it is unclear why leaching is not considered to be a potential exposure pathway.
8. **Conceptual Site Model (Surface water):** Acknowledging that there has been no surface water monitoring conducted at Eastern Creek, it is still unclear why is Eastern Creek not a potential environmental receptor for the site? Do the drainage channels on-site flow into another water body?
9. **Site Suitability for Proposed Land Use:** Ramboll has indicated that the site is "*considered suitable with respect to PFAS contamination for low-density residential land use...*" however, no information on the absence of PFAS in VENM (used for bulk filling) was presented to support this. (Refer to Item 4 above).



4. Closure

Please revise 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]

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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

5 May 2021

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

Dear ██████████

**Re: Interim Site Audit Advice No. 10: Potential Risks
Associated with PFAS Impacted Scraped Soil (Draft v2)
Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW**

1. Introduction

As a NSW Environmental Protection Authority (EPA) accredited Contaminated Site Auditor, I have been engaged by Defence Housing Australia (DHA) to conduct a non-statutory Section B site contamination audit of the former Schofields aerodrome excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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 the low density residential and other proposed land uses.

As the PFAS MEA, FFTA and 'No Scrape Area' were assessed, reported and audited separately, they are not discussed further in this letter.

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

Document	Corresponding Auditor's Interim Advice
Ramboll (2021a) <i>PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW</i> , draft D2, 16 March 2021.	<i>Interim Site Audit Advice No. 4: PFAS Assessment Overview Letter</i> , dated 22 March 2021 (ref: S18612_LET04_Rev0)



Document	Corresponding Auditor's Interim Advice
Ramboll (2021b) <i>Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil</i> , draft v1, 11 March 2021. This memorandum is provided as Appendix 2 of the Overview Letter.	<i>Interim Site Audit Advice No. 5: Potential Risks Associated with PFAS Impacted Scraped Soil</i> (draft v1), dated 1 April 2021 (ref: S18612_LET05_Rev0)
Ramboll (2021c) <i>PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW</i> , draft D3, 31 March 2021.	<i>Interim Site Audit Advice No. 7: PFAS Assessment Overview Letter (Draft D3)</i> , dated 16 April 2021 (ref: S18612_LET07_Rev0)

Subsequently the memorandum was revised, and the auditor was provided on 12 April 2021 with the following documents for review:

- *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.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 5, provided in spreadsheet titled 'Auditor Comments Register_Cover Letter_Rev1.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comment on the Potential Risks Associated with PFAS Impacted Scraped Soil (draft v2) memorandum (which is understood to be Appendix 2 of the Overview Letter) and Ramboll's Responses.

3. Auditor's Comments

The auditor, with the assistance of her expert support team member, has completed a review of the revised memorandum 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).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).
- *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards* (enHealth 2012).

- 1. Selection of concentrations adopted in risk assessment:** It is acknowledged that this risk assessment addresses only the measured concentrations SS108. As such, the conclusion of this risk assessment are based on these measured concentrations alone, and the overall risks associated with PFAS on the site (i.e. the broader site excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area') can only be assessed following adequate characterisation of the potential PFAS impacts. Please see IAA7 for Auditor comments on the status of this characterisation. These uncertainties should be addressed as part of the response to IAA7 regarding characterisation of potential PFAS impacts.
- 2. Potential for higher concentrations than those measured in SS108:** As mentioned above, it is acknowledged that this risk assessment specifically relates to the measured concentrations in SS108. Uncertainties are considered to remain regarding the potential for higher PFAS concentrations to be present than those measured in SS108. These uncertainties should be addressed as part of the response to IAA7 regarding characterisation of potential PFAS impacts.
- 3. Pathways of uptake into poultry:** Lot size alone is considered to be insufficient justification for entirely excluding a pathway of the keeping of backyard poultry. The assessment does, however,



make reference to the emplacement of material at depth which is acknowledged to reduce the potential for exposure provided adequate justification is provided. Given the very high uptake potential for PFAS into invertebrates, the key pathway is a pathway of uptake into invertebrates, and subsequent ingestion of these invertebrates by poultry. Excluding this pathway on the basis of depth requires clear justification for the presence of PFAS-free material in residential back yards across the site within the full depth range depth range utilised by invertebrates, and clarification that the thickness of VENM is sufficient to prevent impacts at depth being brought closer to the surface in the future. This should be addressed in responding to Auditor comment #4 in IAA7.

4. **Location of emplaced material:** Ramboll has used a few lines of evidence i.e. small volume and site photos, combined with multiple assumptions that cannot be verified regarding the final placement of the material. This remains a data gap and limits the conclusions that can be made regarding risk to surface waters, leaching and surface run-off (see below).
5. **Risk to surface waters:** Provided the material is a minimum of 500 m away from surface waters, it is agreed the risks to surface waters will be minimal. This is dependent on adequate justification of the placement location (see comment #4 above).
6. **Potential for leaching:** Provided the material is beneath buildings and roads, it is agreed the potential for leaching is reduced. This is dependent on adequate justification of the placement location (see comment #4 above).
7. **Potential for surface run-off:** Provided the material is present at depth, it is agreed the potential for surface run-off generation is low. This is dependent on adequate justification of the VENM thickness at the placement location. See comment #4 above for further commentary on the uncertainty associated with the placement location. Clarity regarding the VENM thickness should be addressed in responding to Auditor comment #4 in IAA7.



4. Closure

Please revise Potential Risk Associated with PFAS Impacted Scraped Soil memorandum to 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]

KR/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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

17 May 2021

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

Dear ██████████

**Re: Interim Site Audit Advice No. 12: PFAS Assessment
Overview Letter (Draft D4)
Former Schofields Aerodrome/Nirimba Fields, Quakers Hill 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 former Schofields aerodrome excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was assessed, reported and audited separately, they are not discussed further in this letter.

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

Document	Corresponding Auditor's Interim Advice
Ramboll (2021a) <i>PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW</i> , draft D2, 16 March 2021.	<i>Interim Site Audit Advice No. 4: PFAS Assessment Overview Letter</i> , dated 22 March 2021 (ref: S18612_LET04_Rev0)



Document	Corresponding Auditor's Interim Advice
Ramboll (2021b) <i>Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil</i> , draft v1, 11 March 2021.	<i>Interim Site Audit Advice No. 5: Potential Risks Associated with PFAS Impacted Scraped Soil (Draft v1)</i> , dated 1 April 2021 (ref: S18612_LET05_Rev0)
Ramboll (2021c) <i>PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill NSW</i> , draft D3, 31 March 2021.	<i>Interim Site Audit Advice No 7: PFAS Assessment Overview Letter (Draft D3)</i> , dated 16 April 2021 (ref: S18612_LET07_Rev0)
Ramboll (2021d) <i>Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW: Potential Risks Associated with PFAS Impacted Scraped Soil</i> , draft v2, 12 April 2021. This is Appendix 2 of the <i>PFAS Assessment Overview Letter</i> .	<i>Interim Site Audit Advice No 10: Potential risks associated with PFAS impacted scraped soil (draft v2)</i> , dated 5 May 2021 (ref:S18612_LET10_Rev0)

Subsequently, the PFAS Assessment Overview Letter document listed in the table above was revised and the auditor was provided with the following documents for review:

- Ramboll (2021d) *PFAS Assessment Overview Letter - Former Schofields Aerodrome/Nirimba Fields, Quakers Hill, NSW*, draft revision D4 dated 6 May 2021. This is hereafter referred to as the Overview Letter.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 7 and 10, provided in spreadsheet titled 'Auditor Comments Register_Cover Letter_Rev4_.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comment on the Overview Letter (draft D4) and Ramboll's Responses.

3. Auditor's Comments

Based on a review of the Overview Letter and Ramboll's Responses 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) Measures (NEPC 2013) and *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020), the following items require clarification or amendments:

1. **Background:** "*The majority of the development area filled with a minimum of 3 m of VENM as shown in Figure 9, Attachment 1*". The area with greater than 3 m fill (green polygons) shown in Figure 9 does not seem like more than half of the entire site.
2. **Site characterisation:** As the SAR is to be based on this PFAS Assessment Overview Letter, please include a section on site characterisation (Similar to Section 4 of PFAS MEA's Validation Report) to discuss the site and surrounding areas.
3. **Discussion/Conclusion:** "*Filling with VENM over the historical site surface within the development area provides further confidence that risk to current and future human health and ecological receptors at the site due to potential PFAS contamination from historical site usage is currently low and acceptable.*" Figure 8 (Attachment 1) indicates that VENM filling did not occur over all areas on-site. At selected areas proposed for residential use, the former site surface was cut instead. Perhaps a statement the absence of PFAS sources in these areas with <3 m VENM can be included.



Table 2: Activities associated with PFAS contamination listed in NEMP 2.0 applicable to the former Schofields Aerodrome:

4. **Agriculture** – The discussion provided is based on pesticides with no elevated pesticides identified during previous investigation. Given that the PFAS was also stated to be associated with fertilisers, please include some discussion about fertilisers.
5. **Automotive industry including retailing, detailing and car washing facilities** – PFAS contamination is not correlated to TPH and heavy metal contamination and thus the absence of hydrocarbon and metal contamination does not imply that PFAS contamination is also absent.
6. **Automotive industry including retailing, detailing and car washing facilities** – Please indicate whether there were any car washing facility (and plane washing facility) present at the site.
7. **Aviation, aerospace and defence** – It is stated that “*only type of planes used at the site since 1946 were small light aircraft associated with the flying club from 1975 to 1993*”. This is inconsistent with the site history presented for 1942 to 1955 where planes were present prior to 1975.
8. **Aviation, aerospace and defence** – Please provide some discussion about the potential for PFAS contamination to be present due to the historical use of PFAS-containing aviation hydraulic fluid in 1950s at the site (as the discussion provided has been focusing on the Flying Club). At the moment, it is not clear where RAAF/RAN aircraft maintenance facilities were located on-site and if they are not located within the No Scrape Area, the potential PFAS risk (or lack of) should be discussed.
9. **Aviation, aerospace and defence** – Where did washing of aeroplanes (for RAAF, RAN or flying club plane) take place?
10. **Electricity, telecommunication and information technologies** – PFAS contamination is not correlated to PCB, TPH and heavy metal contamination. Please confirm that AFFF or fire deluge system was never present in the radio laboratory.
11. **Firefighting and fire protection sales and services** – Excluding FFTA/No Scrape Area, please indicate whether the following activities were present or had occurred at the site (and how you have verified this):
 - Fire-fighting activities (training or otherwise). E.g. Was there any incident of fire reported at the site?
 - Fire deluge system (e.g. inside hangar building, inside blimp hangar).
 - Storage of AFFF (e.g. in drums or extinguishers).
12. **Firefighting and fire protection sales and service** – This section is confusing as it seems to be referring to groundwater impact downgradient of No Scrape Area and PFAS MEA (under potential source on-site related to activity). Should this be referring to the PFAS groundwater impacts identified at BH107 (located between No Scrape Area and PFAS MEA)?
13. **Waste processing and disposal** – A review of Section 8.2.1 of Environ 2013 SAR has indicated that deep burial waste at the former piggery was only found in two burial pits (as shown in GHD's Figure 12 provided in Attachment 4). Please indicate this in Table 2 as current, it implies that the waste was placed over the entire extent of the Former Piggery Landfill.
14. **Former Sewerage Treatment Plan (STP)** – The drawing titled ‘Sewer/Stormwater Location’ provided in Attachment 4 shows that the STP received effluent from former RAAF facility located off-site (which later was redeveloped into Nirimba Education Precinct in the mid 1990s). Therefore, throughout majority of its existence, the STP did service a RAAF facility and what were these former buildings used for.



15. **Former stockpiled STP media** – Was PFAS analysed in the ERM investigation conducted in 2012 on the filter medium from STP that was relocated to near runway No. 3? It is noted that the ERM 2012 report is titled 'Characterisation of Soil Beneath Stockpiled Filter Media'. A review of 'Site Contamination Due Diligence Assessment' by JBS dated 2012 report did not reveal any PFAS data.
16. **Former stockpiled STP media** – What was the volume of the STP filter material relocated on-site?
17. **Former stockpiled STP media** – It is stated that STP "*relocated filter media is unlikely to be a significant source of PFAS impact*" and the risk is low. However, based on the information presented, the STP filter material was noted to be:
 - Placed beneath low density residential houses at depth of 1.0 to 2.5 mbgl.
 - Derived from a STP that treated effluent from a former RAAF facility located off-site to the south-east.
 - Has no PFAS soil and groundwater data available to substantiate its contamination status (unless ERM 2012 investigation has relevant data). The nearest groundwater monitoring bore BH111 is approximately 200 m at PFAS MEA.
 - Sediment sample SS101 is located approximately 400 m away and thus, it may not be considered representative of potential PFAS impact sourced from filter material.

Please provide further justification to support Ramboll's conclusion that the overall risk of PFAS contamination is low based on the uncertainties around the nature and extent of PFAS contamination.
18. **Groundwater:** Discussions provided has centred on BH107 (located between PFAS MEA and FFTA) which reported an elevated concentration. Could a statement be provided about the nature and extent of PFAS in groundwater elsewhere at the site where groundwater testing has not been conducted?
19. **Sediment:** Area of Interest is not shown in Figure 8 and 9 (Attachment 1).
20. **Conclusion:** Please check and revise this section to reflect the expanded site history review (potential historic PFAS sources) conducted.
21. **Attachment 1:** Area of Interest from No Scrape Area North of Swale is shown in Figure 1 and 2. This is confusing as it is not the same 'Area of Interest' relevant to the site (former aerodrome excluding No Scrape Area and PFAS MEA).
22. **Attachment 3:** Based on the excel spreadsheet of land parcels provided by DHA, there appears to be lots constructed within the site that are not listed in Attachment 3. For example: Lot 215 to 218, DP 1241538.

Discussion

23. It is stated that Council approval would be required for excavations > 0.6 mbgl (third dot point) or 3m (last dot point)? What triggers this?
24. Please confirm the average depth expected of a backyard swimming pool? I suspect this is 1.2 to 2mbgl.



5. Closure

Please revise 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]

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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

6 July 2021

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

Dear ██████████

Re: Interim Site Audit Advice No. 15: Sampling and Analysis Quality Plan (draft D1) Remaining Site Area, PFAS Validation, 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 former Schofields aerodrome, excluding the PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site).

The site 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, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was assessed, reported and audited separately, they are not discussed further in this letter.



In relation to the site, I have been provided with the following document prepared by Ramboll for review:

- *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D1, prepared by Ramboll dated 18 June 2021. This is hereafter referred to as the SAQP.
- Further clarification and amended to the sampling program discussed in Ramboll's email correspondence dated 29 June 2021.

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

3. Auditor's Comments

The auditor has completed a review of the Screening Assessment 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 SAQP, the following items require clarification or amendments:

1. **Audit site:** Based on Ramboll's email correspondence dated 28 June 2021, the audit site is now not the same as the former Schofield aerodrome (remainder area). Please clearly indicate in a figure and state in Section 1 and 2 what is the current audit site.
2. **Audit site:** It also appears that eastern bank of Eastern Creek that are vegetated with trees (e.g. between Landfill 1 and STP/Landfill 2) are proposed to be tested so should this area be excluded as well from the audit site. Please confirm.
3. **Audit process:** Given that the audit site is now irregularly-shaped and still greater than 100 hectares covering various land zones, consider dividing the audit site into smaller more manageable subareas for assessment, reporting and auditing.
4. **Site area:** Please make the site area consistent. Section 1 notes a size of 135 hectares while Section 2 states 105 hectares.
5. **Background information:** Please list the current zoning (not proposed) for the audit site.
6. **Background information:** If the audit site is to be split into subareas, Table 2.1, Table 2-2 and Section 2.2 should be amended to detail each subarea (refer to Item 2 above).
7. **Assessment criteria:** Please consider the validation requirements previously adopted for other parts of the former aerodrome (i.e. NEMP 2.0 Material Reuse Requirements and Ramboll Material Reuse Requirements/Ramboll's 2018 recommendations).
8. **Groundwater and soil leachate validation acceptance criteria:** In accordance with NEMP 2.0, it is recommended 99% freshwater species protection guideline values be adopted because of the bioaccumulative nature of PFAS and the proximity of the audit site to Eastern Creek (which is the receptor for groundwater). If the 95% species levels are not adopted as VAC, the auditor expects to see new site-specific screening or risk assessment conducted for the groundwater results (as was the approach adopted for assessing groundwater for the PFAS MEA).
9. **Sampling locations and rationale:** Hand auger holes in shallow (newly developed) drainage lines are proposed (Section 6.1). Please clarify which or what drainage lines this is referring to. Figure 1 and 2 only show 'former drainage channels'. Table 6-1 indicated that they are only 1 m depth. Confirm the intention is to target VENM.



10. **Sampling locations and rationale:** The size of AEC is not correlated to the likelihood of PFAS contamination to be present. The rationale for the sampling density based in AEC > 1ha vs AEC < 1ha is not understood.
11. **Sampling locations and rationale:** Based on information provided on 29 June 2021, the density rates have doubled for “*background residential areas with VENM <3 m.*” This density rate should apply to all sensitive land use (including primary school). Have the density rates for non-residential areas also increased? The density for VENM < 2m is still low, how many locations is that per number of houses?
12. **Soil Sampling Methodology (Table 6-1):** Perhaps the target depths for push-tube boreholes could be extended deeper (around 1 m instead of 0.5 m) into the natural soil horizon. In the case of the No Scrape Area North of Swale, the observation during drilling was helpful when assessing groundwater depth.
13. **Soil Sampling Methodology (Table 6-1):** Is testing of VENM fill going to be conducted as “*current ground surface*” (1 to 0.1 mbgl) is listed under Sample Collection? Please clarify.
14. **Monitoring Well Installation Methodology (Table 6-2):** Specify the length of screen proposed for the monitoring wells.
15. **Table 6-4 and Figure 1 Groundwater Well Locations:**
 - Ramboll has indicated on 29 June 2021 that three groundwater bores are installed to assess PFAS levels coming onto the site. This will be reviewed in due course. (For example, MW12 to assess for up-gradient condition and also test for contamination sourced from Piggery Landfill?). Please provide a figure.
 - Ramboll has indicated that no groundwater bore is proposed in the north-west corner of the site (near where tributary flow into Eastern Creek) and this portion of the site is to be used for biodiversity off-set (i.e. undeveloped). Therefore, why is a Section B audit required for this portion of the site? Should this portion be excluded from the audit site
16. **Table 6-4 and Figure 1 Soil Locations:**
 - The number of proposed boreholes shown in Figure 1 does not appear to match Table 6-4, especially for the AECs. Which will be used? For example: Figure 1 shows 8 boreholes in STP and Table 6-4 indicates 10 sampling locations.
 - Table 6-4 indicated 10 sampling location for STP and only 10 primary samples for STP. This is not consistent with the 2-3 samples per location strategy listed.
 - The number of duplicate samples listed is inconsistent with rate of 1 in 10 specified in Table 4-1 and Section 7.1. For example: 3 duplicate samples for 16 primary soil samples listed in 1st row. Should this be 4 duplicates samples (2 inter-laboratory and 2 intra-laboratory)? Please check and revise Table 6-4.
 - Increased sampling locations in the drainage lines with <3m VENM fill should be considered and Ramboll has indicated on 29 June 2021 that this will be addressed. However, it is not clear how the sampling regime has changed.
17. **Analytical QAQC:** Please also consider PFAS NEMP 2.0 (2020) in the evaluation of data (Section 8.1 and 8.4)
18. **Validation Report:** It is stated that “*the Validation Report is intended to be factual*”. Is this valid as the Validation Report needs to form conclusion on risk (to the environment and human health) and suitability of the site for its proposed use?
19. **Figures:** Please consider preparing figures for subareas and more details/information can be presented.



4. Closure

Please revise the SAQP 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]

AM/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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

16 July 2021

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

Dear ██████████

Re: Interim Site Audit Advice No. 16: Sampling and Analysis Quality Plan (draft D3) Remaining Site Area, PFAS Validation, 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 former Schofields aerodrome, excluding the already developed/sold residential lots, PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site). The audit site is approximately 102 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 site, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was 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>Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome</i> , draft D1, prepared by Ramboll dated 18 June 2021 Further clarification and amended to the sampling program discussed in Ramboll's email correspondence dated 29 June 2021	Interim Site Audit Advice No. 15: Sampling and Analysis Quality Plan (draft D1), dated 6 July 2021 (ref: S18612_LET15_Rev0)

Subsequently, I have been provided with the following document prepared by Ramboll for review:

- Ramboll (2021b) *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D3 dated 14 July 2021. This is hereafter referred to as the SAQP.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 15, provided in spreadsheet titled 'Auditor Comments Register_Remainder of Site.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the SAQP and Ramboll's Responses.

3. Auditor's Comments

The auditor has completed a review of the SAQP (draft D3) 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 SAQP, the following items require clarification or amendments:

1. **Objective:** "Assessment of VENM materials placed at the site will not be undertaken and is not required under the scope of the Section B SAS". Is this still valid as the VENM is now indicated to be potentially contain PFAS contamination?
2. **Background:** Please clarify as the school zoned 'SP2' is not shown as hatched area in Figure 1, 3 and 4 (Appendix 1) and Table 2-1 to be excluded from the audit site, however, Ramboll's Responses indicated that the school is excluded. If there is any revision to the audit site, please also amend the audit site area.
3. **Conceptual Site Model:** Given the new information regarding PFAS-impacted material being placed as topsoil (above VENM) at the site, please consider revising Table 3-1, which indicated potentially existing pathways inconsistent with last sentence of Section 3.
4. **Preliminary results:** Are the preliminary results for "Background" presented in Table 6-1 collected from samples at depth (e.g. near the VENM/natural top soil interface, natural soil below interface, etc.) or at current site surface? It is not clear whether the topsoil (above VENM) has been tested with the testing completed to date and we note that no further testing (i.e. field program detailed in Table 6-6) is now proposed.
5. **Preliminary results:** Sampling conducted needs to provide sufficient information throughout the depth profile of the VENM layer, given that PFAS impacted material were mixed with the VENM. In



future report where the results are report, please discussion the lateral and vertical extent of PFAS contamination identified.

6. **Assessment of Topsoil:** To avoid misunderstanding, please confirm that the sampling proposed in Section 6.1.2 is completely separate to Table 6-6.
7. **Assessment of Topsoil:** Perhaps the excluded (hatched) area shown in Figure 4 Appendix 1 for topsoil sampling be shown differently to the excluded (hatched) area for Figure 1 and 3 of Appendix 1 to avoid confusion. E.g. Different colour hatch lines?
8. **Assessment of Topsoil:** Based on Figure 4, topsoil sampling fieldwork is proposed for part of PFAS MEA and No Scrape Area North of Swale. As discussed, the auditor would need to revise SAS/SAR completed for PFAS MEA and No Scrape Area North of Swale.
9. **Drainage Lines sampling locations and rationale (Section 6.1):** Hand auger holes in shallow (newly developed) drainage lines is described in Ramboll's Responses as *"drainage lines at the periphery of the site in area of limited filling or cutting"*. Based on Figure 3, the drainage lines at the periphery of the site is only in the north-western and south-eastern corners of the site; but it appears that majority of the sampling at the drainage lines are in the middle of the former aerodrome. Also, the auditor was under the impression that around 4-6 m of VENM were placed to infill existing drainage channels or is this only for PFAS MEA and No Scrape Area North of Swale? Please provide more information to clarify the filling conducted at former drainage lines.
10. **Reinstated topsoil sample collection (Table 6-3):** What is the proposed sampling depth?
11. **Stockpiled sample collection (Table 6-3):** Are the stockpile sampling proposed to be conducted at varying depth intervals (greater than 300 mm from stockpile surface) at the same location?
12. **Proposed sampling and analysis program:** Table 6-6 indicated that 11 out of the 12 groundwater monitoring wells were drilled. This is inconsistent with Figure 3 which showed 12 groundwater monitoring wells.
13. **Proposed sampling and analysis program:** There are odd numbers of duplicate samples (e.g. 7 duplicate for 34 primary samples; 19 duplicates for 94 primary samples) shown in Table 6-6. This does not appear to comply with NEMP (or NEPM) QAQC requirements which specified paired duplicates (blind and split duplicate).
14. **Proposed sampling and analysis program:** Please check as total number of locations completed summed up to 198 (not 197).
15. **Proposed sampling and analysis program:** Table 6-6 indicated that not all proposed sampling locations were sampled to date and no further work is now planned. For example:
 - 17.03 ha of "background" area with fill >2 to <3 m fill: 9 out of 17 locations completed.
 - 23.44 ha of "background" are with fill >0 to <2 m fill: 29 out of 47 locations completed.Please discuss how the reduced scope contains sufficient data to meet the objectives of the project.
16. **Analytical QAQC:** Reference to PFAS NEMP 2.0 (2020) is not added to 8.4.



4. Closure

Please revise the SAQP 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]

AM/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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

30 July 2021

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

Dear ██████████

Re: Interim Site Audit Advice No. 17: Sampling and Analysis Quality Plan (draft D4) Remaining Site Area, PFAS Validation, 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 former Schofields aerodrome, excluding the already developed/sold residential lots, PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site). The audit site is approximately 102 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 site, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was 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>Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome</i> , draft D1, prepared by Ramboll dated 18 June 2021 Further clarification and amended to the sampling program discussed in Ramboll's email correspondence dated 29 June 2021	Interim Site Audit Advice No. 15: Sampling and Analysis Quality Plan (draft D1), dated 6 July 2021 (ref: S18612_LET15_Rev0)
Ramboll (2021b) <i>Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome</i> , draft D3 dated 14 July 2021 Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 15, provided in spreadsheet titled 'Auditor Comments Register_Remainder of Site.xlsx'	Interim Site Audit Advice No. 16: Sampling and Analysis Quality Plan (draft D3), dated 16 July 2021 (ref: S18612_LET16_Rev0)

Subsequently, I have been provided with the following document prepared by Ramboll for review:

- Ramboll (2021c) *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D4 dated 21 July 2021. This is hereafter referred to as the SAQP.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 16, provided in spreadsheet titled 'Auditor Comments Register_Remainder of Site.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the SAQP (draft D4) and Ramboll's Responses.

3. Auditor's Comments

The auditor has completed a review of the SAQP (draft D4) 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 SAQP (draft D4), previous Auditor comments are considered to have been adequately addressed.



4. Closure

Please finalise and implement the SAQP.

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]

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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

17 September 2021

[REDACTED]
Defence Housing Australia
Suite 2, Level 2/287 Elizabeth Street
Sydney NSW 2000

Dear [REDACTED]

Re: Interim Site Audit Advice No. 19: PFAS Validation Report (draft D3) Remaining Site Area, 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 former Schofields aerodrome, excluding the already developed/sold residential lots, PFAS Material Emplacement Area [MEA], former fire flight training area [FFTA] and 'No Scrape Area' (the site). The audit site is approximately 102 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 site, PFAS MEA, FFTA and 'No Scrape 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.

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.

As the PFAS MEA, FFTA and 'No Scrape Area' was assessed, reported and audited separately, they are not discussed further in this letter.

I have been provided with the following document prepared by Ramboll for review:

- Ramboll (2021a) *PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area*, draft D3 dated 9 September 2021. This is hereafter referred to as the Validation Report.



The purpose of this letter is to provide comments on the draft Validation Report (Ramboll 2021a).

3. Auditor's Comments

The auditor has completed a review of the Validation Report (draft D3) 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).
- *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D4 dated 20 July 2021 (Ramboll 2021b).

3.1 Key Issues

Based on a review of the Validation Report, the following key issues would need to be resolved prior to the completion of the audit:

- Clear and consistent definition of the 'Remaining Site Area' audit site extent/boundaries, including figures.
- Amendments of the inconsistencies in data presented and provision of relevant supporting documentation to support the reliability of the data (such as groundwater field sheets, equipment calibration certificates).
- The presence and thickness of fill (i.e. bulk VENM placement) at the site is unclear based on the logging information.
- More robust discussion on risk assessment with multiple line of evidence and reach a conclusion on the potential ecological risk identified in the Validation Report for indirect exposure at Sewage Treatment Plant (and Landfill 2 and one background sampling location BG_BH166). Currently, the conclusions made leave uncertainty and therefore, it is not considered feasible for the site suitability to be verified.

Detailed comments which expand on these key issues are provided in Section 3.2 below.

3.2 Detailed Comments

The following items require clarification or amendments:

1. Audit site: The auditor understands that the 'Remaining Site Area' audit site is the former aerodrome area excluding PFAS MEA, No Scrape Area, developed and sold residential lots as shown in Figure 1 of Ramboll's SAQP (2021b). However, in this Validation Report, the audit site is shown in Appendix A figures to include all the developed and sold residential lots/houses. Please amend all figures and text in the Validation Report to:
 - Clearly show the extent audit site (and areas excluded).
 - Confirm that the audit site is approximately 102 hectares.
 - Refer to a consistent street address for the site (e.g. "off Nirimba Drive, Quakers Hill" is listed in Section 1 compared to "off Mariner Avenue, Schofields" in Table 2-1).
2. Appendix C includes land parcels that are not in the audit site (refer to Item 1 above). For example:
 - Lot 2, Lot 4 and Lot 7 of DP270921 (south of the audit site).
 - Lot 502 to Lot 504 of DP1241177 (north of the audit site).



- Lot 2230 to Lot 2253 of DP1252015 (developed and sold lots within the former aerodrome).
- Lot 210 to Lot 217 of DP1241538 (developed and sold lots within former aerodrome).

Please amend Appendix C to show the titles (lot/plan numbers) and street addresses of all the land parcels that are **within** the audit site.

3. Section 1.1: "*These areas are outside of the development area and any PFAS impacts in these areas would pose low or negligible risk to future site users*" (3rd paragraph). We suggest that this sentence be removed as it seems pre-mature and confusing to be discussing risk profile in 'background' section of a site validation report.
4. Section 1.1: Given the change (which resulted in confusion), please include a clear statement to indicate that PFAS-impacted soil **was** or **was not** mixed with fill and reinstated at depth. It is noted that Objective #2 in Section 1.2 indicated that PFAS-impacted soil was "*mixed with VENM and placed at depth*" and many of the areas of concern (e.g. piggery landfill, radio laboratory, blimp hanger, etc.) were tested at the VENM/natural soil interface.
5. Table 2-1:
 - Comparing Table 2-1 to 'Staging Plan – Current Zoning' provided in Appendix G, current land zoning is missing SP2 (educational establishment and local road).
 - Please update referencing as 'Attachment 1', 'Attachment 3' and 'Appendix 2' are listed, but there is only Appendix A to G to this report. Also, 'Further Land use of No Scrape Area, North of Swale' is listed as a heading in this table.
 - In line with Appendix G, future land use should also include environmental conservation and environmental living.
6. Table 3-1:
 - Please provide more information about the drainage swales present or being constructed at the site. It is noted that there is one open swale located where the 'No Scrape Area' is. How many are presented on-site and where are they?
 - In addition to the temporary sediment basins in the western portion of the site (adjacent to Eastern Creek), as evident in Figure 1 and 7 and Appendix G, there appears to be two permanent sedimentation basins present on-site:
 - One located south of 'Future Recreational' and 'Future School' proposed areas.
 - One at the south-western corner of Stage 7 residential area (i.e. at the southern end of open swale drain transecting 'No Scrape Area').
 - We suggest that groundwater elevations (mAHD measured from 2017) be listed too because the ground surface has changed over time (i.e. raised by imported VENM).
 - For completeness, please clarify whether all eleven existing groundwater wells are existing/operational or not.
 - Similar to the approach applied for PFAS MEA and No Scrape Area, North of Swale, please provide the results and a location figure showing the groundwater bore search of the Water NSW database conducted by Ramboll in this report.
 - Based on Appendix 13 of 'PFAS MEA' and Appendix 9 of 'No Scrape Area, North of Swale' Validation Reports, there seems to be registered bores located with 1 km from the site. E.g. GW108485 is located less than 300 m from the site's southern boundary.
 - Please check the information listed for 'Site boundaries and surroundings' as it seems to be text for 'No Scrape Area, North of Swale' site. E.g. Blacktown Richmond railway line is not 150 m to the east and agricultural land is not 1.2 km to the northwest of this audit site.
7. Table 5-1: It is noted that groundwater exposure pathway for direct contact/ingestion is marked as 'N' and 'N/a' for on-site groundwater users in Table 5-1. Please discuss whether groundwater extraction for any purposes (e.g. drinking, irrigation, recreation to fill swimming pools) is permitted within the new



development. We note that this was the case for the No Scrape Area, North of Swale Validation Report. If this is the also the case for this audit site, we recommend this be clearly stated.

8. Table 5-1: Given that the topsoil at the final site surface is documented to contain potential PFAS contamination, please comment on whether there is a potential for PFAS contamination to impact surface water via the 'overland run-off' pathway.
9. Section 5: Please amend referencing as specific AEC is not shown in Figure 1 (Appendix A).
10. Section 6.2: It was understood that the soil assessment criteria listed in Table 6-1 are the ones adopted for this report. However, this is inconsistent with Table 3a to 3n (Appendix B) which included guideline values adopted for PFOS (PFOS + PFHxS) not listed in Table 6-1 for PFOS.
11. Section 6.3: It was understood that the PFAS NEMP 2.0 groundwater assessment criteria listed in Table 6-2 are the ones adopted for this report. However, this is inconsistent with Table 4 (Appendix B) which adopted DOH 2017 recreational and DOEE 2016 criteria. Also, please include Bartley *et. al.* 2018 criteria into Table 4.
12. Section 7.1.1: Please check as Figure 4, Appendix A do not show the areas where topsoil was distributed.
13. Section 7.1.1: Stockpile A9 is shown in Figure 14 (Appendix A). Please clarify as:
 - Stockpile A9 is not listed in Table 7-1.
 - Based on Table 3m (Appendix B), stockpile A9 was sampled with three samples (A9_01 to A9_03) but this is not shown in Figure 14, Appendix A.
 - Stockpile A9 is shown in Figure 14 (Appendix) to be 733 m³. However, it was only tested with three samples, which is not consistent with the sampling frequency of 1/150m³.
14. Table 7-2 stated that non-destructive digging down to 1.2 mbgl followed by push-tube was conducted at the boreholes. However, a review of bore logs in Appendix E did not indicate that non-destructive digging was used at all.
15. Section 7.3: Bore logs for MW01 to MW12 (Appendix E) do not show that at least 1 m of annular seal placed above the top of the gravel pack.
16. Section 7.3: Please include the following supporting information in the appendices:
 - Licenced surveyor report for the monitoring wells.
 - Groundwater bore development and sampling field sheets.
17. Section 7.4: Please provide more information about this MW13 (existing groundwater monitoring bore). Was this bore surveyed in 2021? This bore (MW13 or BH06) is not discussed or shown in the historical reports (Environ's SAR dated September 2013, JBS's Site Contamination Due Diligence Assessment dated October 2012, Ramboll's Targeted Phase 2 PFAS Site Investigation dated November 2017) provided to the auditor. Please include the bore log for MW13 (existing bore) in Appendix E.
18. Section 8.1.1: Based on the review of bore logs in Appendix E, it is not clear whether fill soil (i.e. imported or disturbed material) were present at the site at all. 'Fill' was not used in the lithology description. It is also unclear what the information provided in the graphic log represents as a legend is not provided.
19. Table 8-1: A spot check conducted by the auditor highlighted that the average and maximum VENM thickness values (m, not mbgl) for Blimp Hangar and Go Cart areas listed are inconsistent with information from bore logs (Appendix E). Please check for all areas and update.
20. Table 8-2: Please check as Darcy flux is not the same as effective porosity. Please provide effective porosity (to verify the calculated groundwater velocity listed in the table).



21. Section 8.3.1: This was stated that 77 soil intra-laboratory and 60 inter-laboratory duplicate samples were analysed, which does not match Table 6 (Appendix B) with 76 intra-laboratory and 61 inter-laboratory duplicates.

22. Table 8-4:

- Please amend typographical error BH_BH166.
- Based on Table 3a (Appendix B), the 'Sum of PFOS and PFHxS' concentration at various sample locations were above the NEMP ecological guideline value for indirect exposure and they are not shown in Table 8-4. (Also refer to Item 10 above.)

23. Section 8.3.2: We suggest amending the first sentence to "*5 of the 13 groundwater sampling locations*" to be consistent in discussing number of wells/sampling locations.

24. Section 8.3.2: Please clarify why the LOR for PFOS (i.e. higher than adopted criterion) for four bores (MW02 to MW05) were different to the other bores.

25. Table 9-2 Field Quality Control Samples:

- Please check the number of soil intra-laboratory and soil inter-laboratory duplicates listed (refer to Item 21 above).
- Please clarify why there are more intra-laboratory soil duplicates analysed compared to the inter-laboratory soil duplicates.
- The frequency of rinsate blanks is one per day of sampling (as listed in Table 4-1 and Section 7.1 of Ramboll's SAQP (2021b)). It is not based on one per 10 or 20 primary samples.
- Please check the number of field blank and rinsate blank samples listed as they are inconsistent with Table 5 (Appendix B).
- Field reagent blanks are not discussed.
- One field blank QC104 was indicated to show a PFAS detection. This does not match Table 5 (Appendix B) where there are PFBA detections in rinsate and field blank samples. Please assess.

26. Table 9-2 Limits of Reporting: Please clarify why LORs for MW02 to MW05 are above adopted criteria.

27. Table 9-3 Completeness:

- There are nine stockpiles in total, not eight.
- "...therefore meets the objective of the investigation". Should this be referring to the DQO or DQI?

28. Table 9-3 Precision and Accuracy: Please check as the text does not appear to be reflecting this site. For examples:

- "All results for laboratory duplicates were acceptable and no detections were made in the blank samples" is inconsistent with Table 9-2.
- "A rinsate blank was collected during the soil sampling programme and a field reagent blank and field blank was held during the soil sampling programme." There are more than one of these blank samples collected.

29. Section 9: In line with Section 7.7 of Ramboll's SAQP (2021b), please provide the calibration certificates of the field equipment used and discuss them.

30. Section 10.1:

- Please review the statement about the number of results above laboratory LOR as the auditor notes that majority of the detects were reported for inter-laboratory duplicates which have lower LORs compared to primary laboratory. If Ramboll wishes to list all PFAS compounds with results above LOR, 'sum of PFHxS + PFOS' and N-Ethyl-Perfluorooctanesulfonamidoacetic Acid (NETFOSSA) concentrations should also be included.



- PFBA was listed to be below the adopted human and ecological criteria, however, there is no criterion listed for PFBA in Section 6.
- BG_BH166 (2.7 mbgl), located in the area for proposed recreational land use) measured 0.015 mg/kg PFOS above the 0.01 mg/kg ecological indirect exposure NEMP guideline value in natural soil (below VENM horizon). The auditor acknowledges that this is an isolated case, please provide more discussions on the significance of this in terms of risk for bioaccumulation and potential for leaching into groundwater (i.e. line of evidence to indicate no ecological risk).

31. Section 10.2:

- It is noted that majority of the results for Landfill 1 were from the surface or shallow <0.5 mbgl. Please revise the discussion to reflect the horizon/depth tested for clarity.
- Based on the lithology provided in bore logs, natural soil was logged from the surface at many sampling locations (e.g. LF1_BH050, LF1_BH057, LF1_BH65, LF1_BH066, etc). This seems odd for Landfill 1 which should be remediated and backfilled pre-2013.

32. Section 10.3: It is noted that all results for STP media stockpile samples were from depth greater than 1.4 m (i.e. targeting the VENM/natural soil interface below the current site surface). Please revise the discussion as currently, it is not clear whether the discussion presented is for the surface/shallow depth (i.e. current site surface) or for the VENM/natural soil interface (i.e. original site surface).

33. Section 10.4:

- Please include sample STP_BH192_0.0 reported 0.01 mg/kg PFOS (same as ecological indirect exposure NEMP criterion).
- Based on the lithology provided in bore logs, it appears that elevated PFOS concentrations were measured in natural soil present at the surface (STP_BH120_0.1 and STP_BH195_0.0). Please check as given that the STP was remediated and validated pre-2013, it seems unlikely that natural soil was present at the surface. (Note: STP sampling locations are not shown in Appendix A figures [refer to Item 49 below], so the auditor is not able to verify the exact location of these samples.)

34. Section 10.5:

- Based on the lithology provided in bore logs, natural soil was logged from the ground surface at many sampling locations (e.g. LF2_BH069, LF2_BH73, LF2_BH078, LF2_BH089, LF2_BH090). This seems odd for Landfill 2 which has been remediated and backfilled pre-2013.
- Elevated PFOS concentration measured at LF2_BH069 at 0.6 mbgl in natural soil. Please discuss the implication of this as it suggests that leaching/migration of PFAS has occurred through the natural soil profile.
- As per discussion for adjacent STP, Landfill 2 is located in close proximity to Eastern Creek, and elevated PFOS (above NEMP ecological criteria for indirect exposure) has been identified, further information or assessment is deemed warranted (refer to Item 44 below).

35. Section 10.6: It is noted that all the testing at Blimp Hangar was from depth greater than 0.6 m (i.e. targeting the VENM/natural soil interface below the current site surface). Please indicate this in the discussion for clarity.

36. Section 10.7:

- As indicated in Figure 10d (Appendix A), the southern portion of the Go-Cart area of concern appears untested. Please comment.
- Please clarify why GC_BH032 was only advanced to 0.1 mbgl and terminated in 'fill' soil.

37. Section 10.8, 10.9, 10.10 and 10.11: It is noted that all the testing at Hangar Building, Radio Laboratory, Piggery Landfill and majority of testing at former drainage lines were targeting the



- VENM/natural soil interface below the current site surface. Please indicate this in the discussions for clarify.
38. Section 10.12: Similar to Item 30 above, please review the statement about the number of results above laboratory LOR as the auditor notes that majority of the detects were reported for inter-laboratory duplicates which have lower LORs compared to primary laboratory.
39. Section 10.13 and Appendix E: “*Stockpile A8 facing south after removal of PFAS Exceedance area (733 m³)*” is stated for Photograph 13. Please confirm whether 733 m³ is the volume of material removed from stockpile A8 (i.e. disposed off-site); or the volume of stockpile A8 before removal; or the volume of stockpile A8 remaining after a portion was removed. (Note: Figure 14, Appendix A, indicated that stockpile A8 is 1,606 m³ and A9 is 733 m³.)
40. Section 10.13: Elevated sum of PFHxS and PFOS concentrations was reported at sample ‘A8_05_1.0’ and it was stated that the portion of the stockpile A8 containing this sample was removed and disposed off-site. Subsequently ‘validation’ samples A8_07, A8_08 and A8_09 were collected. However, sample A8_05 (located in the northern part of A8) is not shown in Figure 14 (Appendix A) to be near A8_07, A8_08 and A8_09 (located in the southern end of stockpile A8). Please clarify.
41. Section 10.13: Please include the source data for UCL output (Table 8, Appendix B) and please discuss why concentrations from duplicate samples were not used in the statistical analysis.
42. Section 10.14: Is there any information about the salinity of the surface water or the elevation at Eastern Creek? Please provide more information supporting Ramboll’s interpretation that Eastern Creek is a losing stream. MW08 is located adjacent to unlined Landfill 2 which may exhibit higher recharge from rainfall (i.e. lower salinity).
43. Section 10.14: Based on Figure 12 (Appendix A), MW02 (25.54 mAHD) at the eastern boundary could be considered the “*most upgradient well sampled*” at the site, compared to MW11 (21.99 mAHD). Please consider re-phrasing.
44. Section 10 and Section 12: For STP and Landfill 2 (and background areas BG_BH166) which reported soil concentrations above the ecological criteria for indirect exposure, perhaps a semi-quantitative screening assessment (similar to Ramboll’s Screening Assessment of Potential Risks from PFAS impacted Soil Layer dated 13/4/2021 for PFAS MEA) can be included in the Validation Report to further assess (and potentially close off) the ecological risk. Currently, Section 12.2 indicated that there is potential ecological risk, and it is not clear then how the audit site is deemed suitable for its proposed use.
45. Table 11-1 Soil: Is sample A8_05_1.0 (with elevated sum of PFHxS and PFOS) still on-site or has it been removed?
46. Table 11-1 Surface water: Based on the findings of the topsoil/background BH and groundwater assessment, it would be beneficial to provide some discussion about there is any potential for PFAS contamination to impact surface water via the ‘overland run-off’ pathway (refer to Item 8 above).
47. Table 11-1 Groundwater: Please comment whether groundwater extraction for any purposes (e.g. drinking, irrigation, recreation to fill swimming pools) is permitted or not within the new development.
48. Section 12.3: Based on the text in Section 12.2, it is not clear how the site can be concluded to be suitable for its proposed use, if the potential risk to ecosystem is unknown.
49. Please include discussion on why ongoing site management is not required.
50. Appendix A Figures:
- Figure 3, 4 and 5 from Ramboll’s 2017 Targeted PFAS investigation at the FFTA/Scrape area are not discussed or referenced in the body text. Are they relevant for this report?
 - Figure 2 and 3 are in the wrong order.
 - Sampling locations targeting Sewage Treatment Plan (e.g. STP_BH115, STP_BH196) and drainage lines (e.g. DR_BH010 to DR_BH024) are missing.



- Figure 10e shows PLF_BH100, however, it is not clear if it exists as there is no result for this sampling location in Table 3h (Appendix B) and no bore log in Appendix E.
- Area of Interest (located over former drainage line immediately north of No Scrape Area) is not discussed in the Validation Report. It is recommended that it be removed from Figure 6, 7, 8 and 9 to avoid confusion (with Area of Environmental Concern AEC).

51. Appendix B Tables:

- Table 4 and 5 are in the wrong order.
- Table 3f – LF1_BH046_0.0 is shown to be from 9-0 m.
- NEMP criteria do not apply to QAQC samples (rinsate, field reagent and field blank). Please remove from Table 5.

52. Appendix D Photographic Log: Is Photograph 2 showing large imported VENM stockpiles (i.e. excluded from site investigation and audit)?

53. Appendix E Bore logs:

- Please indicate what is 'NOC' shown in the bore logs.
- BLH_BH007 shows samples deeper than the 'termination' depth.
- Please amend the log for BG_BH135 as information was presented for the wrong depth.
- Please amend the log for BLH_BH001 as samples ID are missing.
- Please amend as the log for LF2_BH071 and LF2_BH080 are incomplete.

54. Survey plan: Please include a survey plan showing the coordinates for the audit site (i.e. 'Remaining Site Area' excluding PFAS MEA, No Scrape Area, developed and sold residential lots) to the Validation Report.

4. Closure

Please revise the PFAS Validation Report (draft D3) 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]

MA/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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

10 October 2021

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

Dear ██████████

Re: Interim Site Audit Advice No. 21: PFAS Validation Report (draft D4) Remaining Site Area, 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 portions of 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.

The audit site or 'the site' is the former Schofields aerodrome excluding the following area:

- Already developed/sold residential lots.
- PFAS Material Emplacement Area (MEA).
- Former fire flight training area (FFTA).
- No Scrape Area.
- Former sewage treatment plant (STP).

It is listed as approximately 103.8 hectare.

2. Background

The former Schofields aerodrome (including the audit site, PFAS MEA, FFTA and 'No Scrape 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.



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.

As the PFAS MEA, FFTA and 'No Scrape Area' was 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>PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area</i> , draft D3, prepared by Ramboll dated 9 September 2021	Interim Site Audit Advice No. 19: PFAS Validation Report (draft D3), dated 17 September 2021 (ref: S18612_LET19_Rev0)

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

- Ramboll (2021b) *PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area*, draft D4 dated 28 September 2021. This is hereafter referred to as 'the Validation Report'.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 19, provided in spreadsheet titled 'Auditor Comments Register_DHA Schofields Remainder of Site Area PFAS Validation Report.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the Validation Report (draft D4) and Ramboll's Responses.

3. Auditor's Comments

The auditor has completed a review of the Validation Report (draft D4) against:

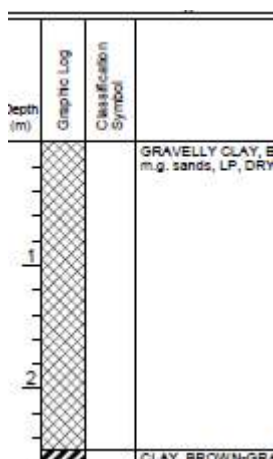
- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines* (NSW EPA 2020).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013).
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).
- *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D4 dated 20 July 2021 (Ramboll 2021b).

Based on a review of the Validation Report (draft D4), the following items require clarification or amendments:

1. Audit site: The auditor notes that the former Sewage Treatment Plant (STP) is now excluded from the audit site and requests that Landfill 2 be excluded as well. Similar to STP, Landfill 2 reported soil concentrations exceeding the ecological indirect exposure criteria (at four locations ranging from 0.1 to 1.4 mbgl) and the information presented to indicate that risk is acceptable is limited. Therefore, in line with the approach for STP, please exclude Landfill 2 from the audit site and amend the validation report and Figure 1A including audit area size text in the legend accordingly.
2. Survey plan: Please include a survey plan showing the coordinates for the audit site (i.e. 'Remaining Site Area' excluding PFAS MEA, No Scrape Area, developed and sold residential lots, STP, Landfill 2) to the Validation Report.
3. Appendix C: The land parcel information provided in Appendix C still include land parcels that are outside of the audit site. Please amend Appendix C to show the titles (lot/plan numbers) and street addresses of all the land parcels that are within the audit site.



4. Table 3-1 Surface water: Please include the information about temporary and two permanent sediment basins present at the site.
5. Table 5-1 and Table 11-1 CSM: It is noted that the CSMs presented in Table 5-1 and Table 11-1 have been changed to cover areas of environmental concern only (as shown in Figure 2). Given that this validation report covers a large area additional to the areas of environmental concern, we request that CSMs be prepared for the Ramboll's validation area (which includes the audit site).
6. Table 5-1 and Table 11-1 Groundwater: Please confirm whether groundwater extraction for any purposes (e.g. drinking, irrigation, recreation to fill swimming pools) is permitted within the new development. The information presented seems to indicate that re-use is allowed with approval obtained. If this is a permitted use, then the groundwater concentrations measured needs to be assessed against all these permitted uses to indicate whether there is a risk or not.
7. Section 7.1.1: For clarity and consistency with Figure 8, please explain what was stockpile A9 (which has been disposed off-site) and how it relates to Stockpile A8.
8. Section 7.3 Well installation: Ramboll's Response indicated that Table 7-3 was updated to read "500 mm annual seal". However, Table 7-3 was not amended.
9. Section 8.1.1 and Appendix E: Ramboll's Responses indicated for majority of locations, the material encountered was hard to identify as fill or not and this is noted by the auditor. However, there is inconsistency about the information presented in the bore logs in Appendix E. There are many logs with the 'Fill' shown in graphic log, but the text in material description does not indicate any fill present. For example (and not limited to): BG_BH125 to BG_BH134, BG_BH135 to BH151, BLH_BH001 to BLT_BH009. Should we rely on the information presented in the graphic log column to work out what interval is logged as 'fill'? If yes, please provide a legend in Appendix E.



10. Section 10.1: BG_BH166 (2.7 mbgl), located in the area for proposed recreational land use measured 0.015 mg/kg PFOS above the 0.01 mg/kg ecological indirect exposure NEMP guideline value in natural soil (below VENM horizon). The auditor acknowledges that this is an isolated case and it is located deeper than 2 mbgl so it is not likely to impact terrestrial ecology. Please provide some discussion on the significance of this in terms of risk for bioaccumulation and potential for leaching into groundwater (i.e. line of evidence to indicate no ecological risk).
11. Section 12.2 and 12.3: Please amend to include the exclusion of Landfill 2 from the audit site.
12. Section 12.3: Please include a sentence to indicate why ongoing site management is not required for the validation area (and audit site) in the validation report.
13. Appendix A Figure 7: It is noted that there isn't a figure showing the location of the surface soil grab samples listed in the 'Surface Soil Grab Sample Register' provided in Appendix E.
14. Appendix E Bore logs: Please amend as these comments from IAA19 have not been addressed.
 - BLH_BH007 shows samples deeper than the 'termination' depth.



- BG_BH135 has information was presented for the wrong depth.
- BLH_BH001 is missing samples ID.
- LF2_BH071 and LF2_BH080 are incomplete.

4. Closure

Please revise the PFAS Validation Report (draft D4) 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]

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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

22 October 2021

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

Dear ██████████

Re: Interim Site Audit Advice No. 22: PFAS Validation Report (draft D5) Remaining Site Area, 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 portions of 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.

The audit site or 'the site' is the former Schofields aerodrome excluding the following area:

- Already developed/sold residential lots.
- PFAS Material Emplacement Area (MEA).
- Former fire flight training area (FFTA).
- No Scrape Area.
- Former sewage treatment plant (STP).
- Landfill 2

It is listed as approximately 101.9 hectare.

2. Background

The former Schofields aerodrome (including the audit site, PFAS MEA, FFTA and 'No Scrape 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.



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.

As the PFAS MEA, FFTA and 'No Scrape Area' was 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>PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area</i> , draft D3, prepared by Ramboll dated 9 September 2021	Interim Site Audit Advice No. 19: PFAS Validation Report (draft D3), dated 17 September 2021 (ref: S18612_LET19_Rev0)
Ramboll (2021b) <i>PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area</i> , draft D4, prepared by Ramboll dated 28 September 2021	Interim Site Audit Advice No. 21: PFAS Validation Report (draft D3), dated 10 October 2021 (ref: S18612_LET21_Rev0)

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

- Ramboll (2021c) *PFAS Validation Report, Former Schofields Aerodrome Remaining Site Area*, draft D4 dated 13 October 2021. This is hereafter referred to as 'the Validation Report'.
- Ramboll's responses to auditor's comments from Interim Site Audit Advice No. 21, provided in spreadsheet titled 'Auditor Comments Register_DHA Schofields Remainder of Site Area PFAS Validation Report)13Oct21.xlsx'. This is hereafter referred to as 'Ramboll's Responses'.

The purpose of this letter is to provide comments on the Validation Report (draft D5) and Ramboll's Responses.

3. Auditor's Comments

The auditor has completed a review of the Validation Report (draft D5) 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).
- *Sampling and Analysis Quality Plan, Remaining Site Area PFAS Validation, Former Schofields Aerodrome*, draft D4 dated 20 July 2021 (Ramboll 2021b).

Based on a review of the Validation Report (draft D5), the following items require clarification or amendments:

1. Figure 1a Site Location and Layout (current) – Audit Area: Based on Ramboll's Responses, this figure (which shows Landfill 2 within the audit site) is to be excluded from the Validation Report, but it is still present. Please clarify.
2. Please provide the revised Figure 4a showing the DR_BH## samples.
3. Appendix E Bore logs: Please check whether BLH_BH007 is 3.5m deep or not.



4. Closure

Please address the minor comments above and finalise the PFAS 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.

Reliance – This document has been prepared solely for the use of Defence Housing Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.

Copyright and Intellectual Property – This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.

Senversa Pty Ltd

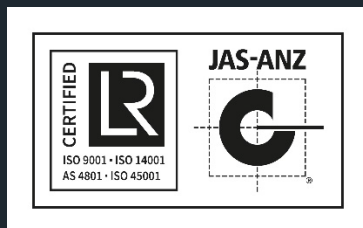
ABN 89 132 231 380

www.senversa.com.au

enquiries@senversa.com.au

LinkedIn: Senversa

Facebook: Senversa



Certified



Corporation

To the extent permissible by law, Senversa shall not be liable for any errors, omissions, defects or misrepresentations, or for any loss or damage suffered by any persons (including for reasons of negligence or otherwise).

©2021 Senversa Pty Ltd