65385 - 152029
L01 - Advice on PFAS in Groundwater - Rouse Hill HS (Rev 0)

30 June 2023

School Infrastructure NSW
Frank Princi
Project Director
Via email: frank.princi3@det.nsw.edu.au

Advice regarding PFAS in Groundwater, Rouse Hill High School, 24 Withers Road, Rouse Hill, NSW

Dear Frank,

1. Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by School Infrastructure NSW (SINSW, the client) to provide advice on potential concerns regarding reported levels of per- and poly-fluoroalkyl substances (PFAS) in groundwater identified within a portion of Rouse Hill High School (referred to as 'RHHS') that is proposed to undergo redevelopment/upgrades (referred to as the 'developable portion' of the RHHS site) located at 24 Withers Road, Rouse Hill, NSW.

It is understood that a Detailed Site Investigation (DSI) was completed in 2022 by Douglas Partners (DP) within the developable portion of the RHHS site (DP 2022[1]). The DSI was completed in conjunction with geotechnical investigations (also by DP), presumably to inform planning decisions. The investigation area was approximately 0.4 hectares (ha).

During the investigations, groundwater samples were collected from four groundwater monitoring wells and low PFAS concentrations were identified in groundwater. Specifically, reported concentrations of Perfluorooctanesulfonic acid (PFOS), a constituent within the PFAS group, marginally exceeded the groundwater criteria adopted by DP at all four groundwater monitoring well locations (i.e., 99% species protection for freshwater ecosystems, HEPA 2020[2]).

DP provided advice in the DSI for the developable portion of the RHHS site which states that whilst the PFAS was identified in groundwater that exceed the adopted 99% species protection criteria for freshwater ecosystems, that groundwater will not be abstracted for potable uses and as such, there are no complete source-receptor pathways and therefore the site is suitable for the proposed land use. The DSI however recommends further investigations to assess potential sources and extent of the PFAS impacts in groundwater across the RHHS site.

SINSW has sought further independent advice regarding the reported PFAS levels and suitable response actions.

2. Review and Advice

JBS&G has reviewed the information provided by DP, as presented in **Attachment 2**.

1

2 *PFAS National Environmental Management Plan Version 2.0 – January 2020*, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020 PFAS NEMP)

Based on information provided by DP (2022), groundwater was assessed to flow to the west, towards Caddies Creek, located approximately 100m south-west of the site. DP reported that no free groundwater was encountered during auger drilling and use of water as a drilling fluid prevented observation of water during coring of bedrock. It is assumed therefore groundwater was present as seepage in bedrock.

DP reported the site was historically undeveloped rural residential or agricultural land with no major structures until the school was developed between 2007 and 2009. Consideration by JBS&G to the historical aerials presented by DP indicates the site formed part of a golf course between the 1970s and development of the school. PFAS were not identified as a contaminant of potential concern (COPC) in the preliminary conceptual site model (CSM) developed by DP (2022), As such it is unclear why PFAS were included in the analytical suite for soil and groundwater.

Review of the DSI indicates the highest PFOS concentrations were at monitoring wells BH108 and BH111, with the highest concentration reported at BH111 at 0.005 µg/L. This groundwater monitoring well location is in a hydraulically upgradient area within the developable portion of the RHHS site, and as such, represents groundwater quality migrating onto the site, i.e., it's clearly an offsite/regional issue, rather than a site specific issue. Similar concentrations of PFOS were reported at all groundwater monitoring well locations (irrespective of their location within the RHHS site), with concentrations ranging from 0.001 µg/L to 0.005 µg/L.

DP also reported very low (<1 µg/kg) concentrations of PFAS in soil samples from five boreholes, two of which coincide with monitoring well locations. The soil concentrations were well below adopted HEPA (2020) health or ecological criteria, and at such low concentrations are unlikely to be a source for PFAS in deeper groundwater.

With respect to ecological risks, the reported concentrations PFAS in groundwater are very low (only 10 times the 99% value, but 25 times less than the 95% value (considering the highest concentration of 0.005 µg/L)) and as a result it is straight forward to conclude that the groundwater poses no material risk to offsite ecological receptors in an urban, developed environment.

Additionally, the reported concentrations are more than an order of magnitude less than the drinking water guideline, so there is no risk to human health. DP notes that groundwater is not intended to be extracted or used as part of the proposal, nor is it extracted for uses across any of the RHHS site. Further, as DP report there are no registered groundwater bores within 500 m of the site, it can be inferred there is also no use of groundwater proximal to the site.

Consideration to the NSW Government's PFAS investigation program, no investigation sites are noted that would pose a potential PFAS source as a risk to the site. Upgradient use (to the east) was largely rural, low-level agricultural until new residential developments in the late 2000s.

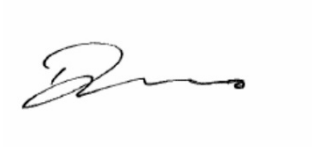
Further assessment of PFAS in groundwater is not warranted.

3. Conclusion and Recommendations

Subject to the limitations provided in **Attachment 1**, it is considered the reported PFAS levels in groundwater are a regional/offsite issue, and do not pose a risk to human health or offsite ecological receptors. Further assessment with regards to site contamination investigations is not warranted.

Should you require clarification, please contact the undersigned on 02 8245 0300 or by email ddenaro@jbsg.com.au.

Yours sincerely:



Daniel Denaro
Associate
JBS&G Australia Pty Ltd

Reviewed/approved by:

Matthew Bennett
Senior Principal, CEnvP-SC
JBS&G Australia Pty Ltd

Attachments

1) Limitations
2) Supplied Information

Attachment 1 – Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. JBS&G accepts no liability for incomplete or inaccurate information provided to JBS&G by the client or other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in the type of assessment works being reviewed, and should not be used for any other purpose beyond which it was intended.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced in part or without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties except at their sole risk after making their own enquiries.

Conclusions arising from the review and assessment of data are based on the scope of work considered appropriate based on the regulatory requirements and relevant codes of practice. Within the limitations of the scope of services, the work reported herein has been performed in a professional manner in accordance with generally accepted industry standards and using a degree of skill and care ordinarily exercised by members of its profession.

No sampling or laboratory analyses were undertaken as part of the investigations undertaken, as described herein, which was limited to inspection of visible and accessible ground surfaces only in the designated area.

Changes to the surface conditions may occur subsequent to the investigations described herein, through natural processes such as rain, surface water runoff and wind, through the intentional or accidental disturbance of ground surfaces such as vehicle and pedestrian movement, excavation or failure of sediment and erosion controls, and/or through addition of materials/contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the status of the site, and it is limited to the scope defined herein. Should additional information become available regarding conditions at the site, JBS&G reserves the right to review the report in the context of the additional information. This may require JBS&G undertaking further inspection, and possible sampling, analysis and reporting to verify additional information. Such additional works will only be completed following mutual written agreement between JBS&G and the client.

Attachment 2 – Supplied Information

Douglas Partners
Geotechnics - Environment - Groundwater

Table I3: Summary of Groundwater Analytical Results - Site Assessment Criteria (All results in μg/L unless otherwise stated)

Sample ID	Heavy Metals								PAH and Phenols							TRH							BTEX				PCB	PFAS			VOC [2]										
	As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	Napthalene	Anthracene	Phenanthrene	Fluoranthene	Benzo(a)pyrene	Total +ve PAH	Total Phenolics	C6-C10	C10-C14	C15-C28	C29-C36	TRH>C10-C16	TRH>C16-C34	TRH>C34-C40	Benzene	Toulene	Ethyl-benzene	Total Xylenes	Total PCB	PFOS	PFOA	PFOS/PFHxS	Chloroform	1,2-Dichloroethane	1,1,1-Trichloroethane	Carbon Tetrachloride	1,2-Dichloropropane	1,1,2-Trichloroethane	1,3-Dichloropropane	1,1,2,2-Tetrachloroethane	1,3-Dichlorobenzene	1,4-Dichlorobenzene
PQL	1	0.1	1	1	1	0.05	1	1	0.2	0.1	0.1	0.1	0.1	0.1	0.05	10	50	100	100	50	100	100	1	1	1	3	2	0.001	0.001	0.001	1	1	1	1	1	1	1	1	1	1
BH103	2	<0.1	<1	4	<1	<0.05	19	100	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<10	<50	<100	<100	<50	<100	<100	<1	<1	<1	<3	<2	0.001	<0.001	0.001	4	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH104	2	<0.1	<1	2	<1	<0.05	9	19	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<10	<50	<100	<100	<50	<100	<100	<1	<1	<1	<3	<2	0.001	<0.001	0.001	3	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH108	<1	<0.1	<1	4	1	<0.05	8	31	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<10	<50	<100	<100	<50	<100	<100	<1	<1	<1	<3	<2	0.004	0.008	0.005	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH111	<1	0.1	<1	<1	<1	<0.05	9	11	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	28	<50	<100	<100	<50	<100	<100	<1	<1	<1	<3	<2	0.005	0.009	0.008	42	<1	<1	<1	<1	<1	<1	<1	<1	<1
BD01	<1	0.1	<1	<1	<1	<0.05	9	31	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Groundwater Investigation Levels (GIL) [3]																																								
Fresh water [4]	13.0	0.2	3.3	1.4	3.4	0.60	11	8	16	0.4*	2.0*	1.4*	0.2*	-	-	-	-	-	-	-	-	-	950	180*	80*	625*	-	0.00023	19	-	770*	1900*	270*	240*	900*	6500	1100*	400*	260	60

Notes:

1	Assumed as Cr(III) oxidation state
2	Only those compounds for which GILs have been determined are included in the list
3	NEPC (2013) and ANZG (2018) Australian and New Zealand Guidelines for Fresh & Marine Water Quality
4	Fresh water trigger values for slightly to moderately disturbed ecosystems - 95% species protection (99% for PFAS)
*	Insufficient data for reliable trigger value. Interim working value or low reliability value used for screening purposes
**	No positive PAHs detected by the laboratory
-	Not defined/ not analysed/ not applicable
	Exceeds GIL
	Exceeds PQL
NL	Not limiting
PQL	Practical Quantification Limit of Laboratory

Douglas Partners
Geotechnics - Environment - Groundwater

Table I3: Summary of Groundwater Analytical Results - Site Assessment Criteria (All results in µg/L unless otherwise stated)

Sample ID								OCP																		OPP				
	1,2-Dichlorobenzene	1,2,3-Trichlorobenzene	Isopropylbenzene	n-propyl benzene	Sec-butyl benzene	n-butyl benzene	All other VOC	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	g-BHC (Lindane)	HCB	Heptachlor	Heptachlor epoxide	Mirex	Methoxychlor	Chlorpyrifos	Diazinon	Dimethoate	Fenitrothion	Ethion
PQL	1	1	1	1	1	1		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
BH103	<1	<1	<1	<1	<1	<1	<PQL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH104	<1	<1	<1	<1	<1	<1	<PQL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH108	<1	<1	<1	<1	<1	<1	<PQL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH111	<1	<1	<1	<1	<1	<1	<PQL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BD01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fresh water [4]	160	10	30	-	-	-	-	-	0.001	-	0.08		-	-	0.01	0.01	0.2		-	0.02	-	-	0.09	-	0.04	0.005	0.01	0.01	0.15	0.2	-

Notes:

1	Assumed as Cr(III) oxidation state
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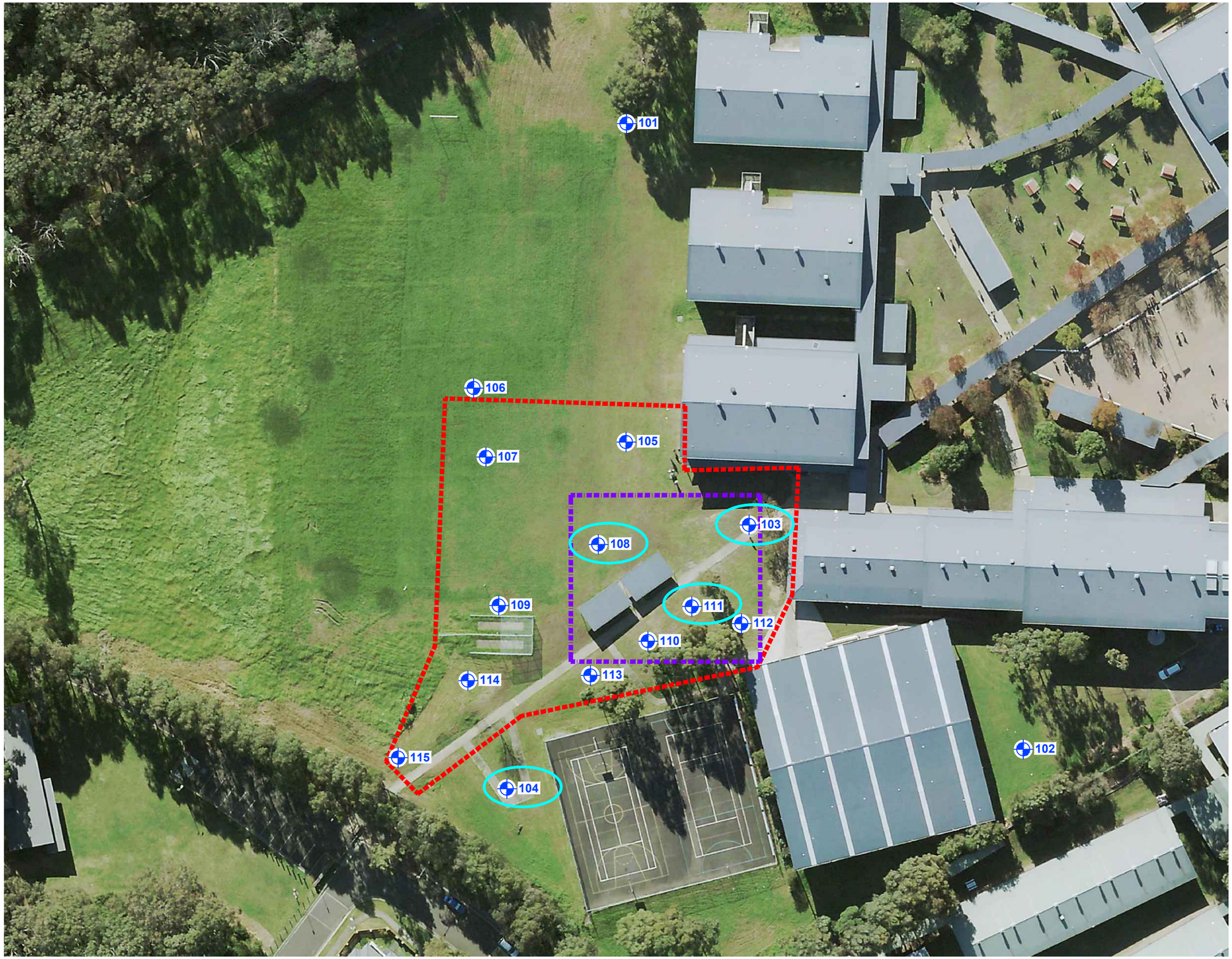
NL	Not limiting
PQL	Practical Quantification Limit of Laboratory



Location Plan

N

0 10 20 30 m

SCALE 1:750 (A3)

LEGEND:-

- Borehole Location and Number
- Approximate Footprint of Proposed New Building
- Approximate site area

NOTE:-

1. Test locations are approximate only and are shown with reference to existing site features.
2. Image obtained from Metromap. Date of imagery 06-06-2022.

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Geotechnics | Environment | Groundwater

CLIENT: NSW Department of Education		
OFFICE: North West Sydney	DRAWN BY: JST	
SCALE: As shown	DATE: 2 November 2022	

TITLE: **Site and Test Location Plan**
Rouse Hill High School
240 Withers Road, Rouse Hill

PROJECT No:	215851.00
DRAWING No:	1
REVISION:	0

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