RAW EARTH
ENVIRONMENTAL

Preliminary Site Investigation

Stanton Dahl Architects on behalf of Catholic Schools Broken Bay

Mackillop Catholic College

91 Sparks Road, Woongarrah

NSW, 2259

July 2024

Raw Earth Environmental Pty Ltd
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Report Distribution

Report Title	Preliminary Site Investigation
Site Address	91 Sparks Road, Woongarrah, NSW 2259
Lot/DP	Lot 9 DP 3368
Project Reference	S00266
Prepared For	Stanton Dahl Architects on behalf of Catholic Schools Broken Bay
Document Number	2.0
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Document Revisions

Revision	Date	Created by	Short Description of Changes
V01	15/03/24	Jacques Chiomey	General review.
V02	11/07/24	Tiago Guedes	Amendments recommended by Stanton Dahl Project Manager and Town Planner.

Executive Summary

Raw Earth were engaged by Stanton Dahl Architects on behalf of Catholic Schools Broken Bay to conduct a PSI at the property located at 91 Sparks Road, Woongarrah, NSW 2259 ('the site'). The site is described as Lot 71 DP1258149 and comprises an approximate total area of 75,800 m². The investigation area is located on the north-west portion of the site and comprises an approximate total area of 13,570 m².

Information provided to Raw Earth indicate that the site-based works will involve a redevelopment of the site to the north-west portion including the demolition of existent structures and construction of one (1) three-storey and two (2) two-storey school buildings.

During the site walkover, it was noted that the primary school campus comprises of a number of building housing classrooms, administrative offices, and communal areas, such as the library and outside play areas, alongside separate classroom blocks. Outdoor spaces include playgrounds and sports facilities with asphalt and concrete surfaces noted across the investigation area. The structures present within the investigation area feature a variety of construction materials. The roofing and building exterior typically consist of corrugated sheeting with pier or concrete slab foundation construction. There are also numerous walls, foundations, retaining walls and other constructions made with centre block materials seen throughout the investigation area.

The desktop investigation indicates the site has remained as commercial property (private school) in nature since 2003, when it began to be developed.

The presence of existent building/structures within the investigation area may be an indicative of the use of potential uncontrolled fill and therefore, a potential source of contamination. Considering that the site development includes soil excavation, it is recommended an investigation to find out whether the fill/soil is contaminated or not. No waste/rubble was present on-site.

The site walkover and desktop investigation indicated 1 potential Areas of Environmental Concern (AECs) at the site, as follows:

- AEC1 – Potential uncontrolled fill material situated across site beneath the buildings.

Based on the preliminary CSM, the potential exposure of CoPC at the site is considered **low-moderate** given the presence of one (1) AECs identified across the site, as shown in Figure 3, **Appendix A.**

It is the opinion of Raw Earth and in accordance with relevant Australian standards and guidelines that the site can be made suitable for its proposed development subject to the following recommendations:

- Based on the site inspection, desktop review and the proposed development involving in situ soil disturbance excavations, intrusive soil sampling in the form of a detailed site investigation is recommended to assess the contamination status of in situ soils identified in Areas of Environmental Concern: AEC1, of which are known to be disturbed during future site-based works. This will confirm the source, pathway, and receptor linkages to the CSM, assessing the risk of exposed soils to future site users and construction workers to ensure suitability for the proposed development;
- Any proposed soil is to be excavated as part of the development and requires offsite disposal, then waste needs to be classified in accordance with NSW Environmental Protection Authority, Waste Classification Guidelines Part 1-4: Classifying Waste, 2014 or be analysed for beneficial reuse under the NSW EPA Resource Recovery Order under Part 9, Clause 93 of the

Protection of the Environment Operations (Waste) Regulation (2014) to be classified as Excavated Natural Material (ENM); and,

- In the event of any unexpected finds, including the discovery of asbestos containing materials, underground storage tanks, odorous and/or stained soil uncovered during works, all site works must cease, and Raw Earth must be notified immediately for further investigation.

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1 Introduction

1.1 Background

Raw Earth Environmental Pty Ltd (Raw Earth) have been engaged by Stanton Dahl Architects on behalf of Catholic Schools Broken Bay (referred to herein as 'the client') to conduct a Preliminary Site Investigation (PSI) at the property located at 91 Sparks Road, Woongarrah, NSW 2259 ('the site'). The site is described as Lot 71 DP1258149 and comprises an approximate total area of 75,800 m². The investigation area is located on the north-west portion of the site and comprises an approximate total area of 13,360 m².

Raw Earth understands that the proposed school development at the site includes the demolition of existent structures located on the north-west portion of site and construction of one (1) three-storey and two (2) two-storey school buildings.

The Site Location Plan is shown in Figure 1, in the **Appendix A**. The site is located approximately 30km north-east of Gosford Central Business District (CBD), within the Local Government Area of Central Coast Council (CCC).

This report has been prepared to support a Development Application (DA) to CCC and for the purpose of enabling the developer to meet its obligations under the Contaminated Land Management Act 1997 (CLM Act) for the assessment and management of contaminated land.

1.2 Objectives

The objectives of this PSI were as follows:

- Assess the potential for contamination at the site, from former and current land use activities;
- Assess site suitability for the proposed land use; and,
- Provide recommendations in relation to further investigations and/or a Detailed Site Investigation (DSI).

2 Scope of Works

To complete the PSI, Raw Earth undertook the following scope of works:

- A desktop review of the following sources:
  - Published geology maps;
  - Real NSW Bore reports;
  - Local council GIS layers including lot description, land zoning and council flood mapping;
  - NSW ePlanning Spatial Viewing GIS layers including hydrology and Acid Sulfate Soil Risk Mapping;
  - Australian Per and Polyfluoroalkyl Substances (PFAS) Chemical Map;
  - NSW Environmental Protection Agency (EPA) Contaminated Land Register (CLR) search;
  - Protection of the Environment Operations (POEO) Act Public Register search; and,
  - Local council records and planning search.
- A historical review, which included the following:
  - Current and historical aerial photographs; and,
  - Current and historical Certificate of Titles.
- Site inspection, detailing current site use and any potential indicators of contamination;
- Development of a preliminary Conceptual Site Model (CSM) identifying potential sources of contamination, pathways and receptors and any potential linkages; and,
- Preparation of this PSI report, documenting our findings of the desktop study and recommendations for further investigations (if required).

3 Regulatory Framework

This PSI was undertaken in accordance with the following regulatory framework and guidelines:

- National Environment Protection (Assessment of Site Contamination) Measure as varied 2011, Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater, 2013;
- National Environment Protection (Assessment of Site Contamination) Measure as varied 2011, Schedule B2 – Guideline on Site Characterisation, 2013;
- NSW Department of Environment and Conservation, Guidelines for the Assessment and Management of Groundwater Contamination, 2007;
- NSW Department of Planning and Environment, State Environmental Planning Policy (Resilience and Hazards) Chapter 4, 2022;
- NSW Environmental Protection Authority, Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017;
- NSW Environmental Protection Authority, Guidelines on the Duty to Report Contamination under Contaminated Land Management Act, 1997;
- NSW Environmental Protection Authority, Sampling Design Guidelines, 2022;
- NSW Environmental Protection Authority, Waste Classification Guidelines Part 1-4, 2014;
- NSW Environmental Protection Authority, *Consultants reporting on contaminated Land: Contaminated land guidelines,* 2020;
- Western Australia Department of Health, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2021;
- Work Health and Safety Act, 2011; and,
- Work Health and Safety Regulation, 2017.

4 Site Condition and Environmental Setting

4.1 Site Identification

A site location plan is shown in Figure 1, with a site layout plan shown in Figure 2, **Appendix A**. A summary of the site details is shown below in **Table 1.**

Table 1: Site Details	
Site Address	91 Sparks Road, Woongarrah, NSW 2259
Lot Description	Lot 71 DP1258149
Site Location Map	Figure 1, **Appendix A**
Site Photographs	**Appendix B**
Area of Site (m²)	74,530
Site Investigation Area (m²)	13,570
Local Government Council	Central Coast Council
Current Land Zoning	R1: General Residential
Surrounding Land Zoning	R1: General Residential SP2: Infrastructure
Previous Land Zoning	R1: General Residential

4.2 Site Inspection

Raw Earth undertook a site inspection at the site on the 4th March 2024. Site photographs are shown in **Appendix B**. Key observations noted during the inspection are summarised in **Table 2** below.

Table 2: Site Layout and Current Use	
Site Layout and Use	**Details**
Current use	The site is a commercial property that is currently being used as a private school.
Surface cover type and condition	The site investigation area is predominantly covered by buildings. There is patches of grass and trees between the buildings. The south-west portion of site is occupied by sports field and courts. No visual signs of vegetation distress or die off were noted.
Building construction	The primary school campus comprises of a number of building housing classrooms, administrative offices, and communal areas like the library and outside play areas, alongside separate classroom blocks. Outdoor spaces include playgrounds and sports facilities with asphalt and concrete, surfaces seen throughout the investigation area. The structures present within the investigation area feature a variety of construction materials. The roofing and building exterior typically consist of corrugated sheeting with pier or concrete slab foundation construction. There are also numerous walls, foundations, retaining walls and other constructions made with centre block materials seen throughout the investigation area.
Water runoff flow direction and drain/ pit location	The site investigation area slopes downhill from northwest to southeast, water runoff will follow this direction travelling across the site.
Depth, size and flow of any water features which may include creeks, rivers, lakes, ponds and lagoons	There is a lake/pond occupying the south-east portion of site, with an approximate area of 1065 m².
Waste/ rubble	No waste/rubble was present on-site.
Areas of restricted access	No areas of restricted access.

4.3 Surrounding Land use

A summary of surrounding features and/or land uses noted during a review of desktop information and the site inspected is provided in **Table 3** below.

Table 3: Surrounding Land Use	
North	Residential properties zoned as R1, and vacant bushland zoned as C2 located adjacent and beyond.
East	Residential properties zoned as R1, and a patch of public recreation structure zoned as RE1.
South	Infrastructure zoned as SP2 (Sparks Road), and residential properties zoned as R2 beyond.
West	Development project zoned as R2 and public recreation structure (RE1) and mixed used zone beyond (MU1).
Abbreviations (NSW Department of Planning and Environment): R1: General Residential R2: Low Density Residential RE1: Public Recreation C2: Environmental Conservation and Environmental Management SP2: Infrastructure MU1: Mixed Use	

4.4 Geology

The Geological Map of Gosford-Lake Macquarie (Geological Series Sheet 9131, 1st Edition, Scale 1:100,000, D.J. Jones, D.C. Uren and R.R. Hughes, 2015) published by the NSW Geological Survey, indicates the site is underlain by Narrabeen Group and Clifton subgroup/Tuggerah Formation (Mesozoic/Triassic era) consisting of grey to green-grey laminate, red-brown claystone and siltstone, interbedded with fine to medium grained green-grey sandstone.

4.5 Hydrogeology

A search of the WaterNSW Portal was conducted on 7th March 2024, which identified 10 registered groundwater bores within 500m of the site. Details and information about groundwater bores within the region of the site are presented in **Table 4.** Refer to Figure 4, **Appendix A** for groundwater bore details within proximity to site.

Table 4: Groundwater Bore Information					
Bore ID	**Bore Location**	**Total Depth (m)**	**Lithology**	**Screen Depth (m)**	**Standing Water Level (m)**
GW200674	180m north-west	4.5	N/A	N/A	N/A
GW200673	183m north-west	4.5	N/A	N/A	2.6
GW200675	188m north-west	3.0	N/A	N/A	N/A
GW200678	202m north-west	3.0	N/A	N/A	N/A

GW200672	193m north-west	4.5	N/A	N/A	N/A
GW200677	205m north-west	3.0	N/A	N/A	N/A
GW200676	196m north-west	4.5	N/A	N/A	N/A
GW200679	203m north-west	4.8	N/A	N/A	1.1
GW068414	260m north-west	24.0	N/A	N/A	6.0
GW200671	210m north-west	5.5	N/A	N/A	N/A

4.6 Hydrology

A search of NSW River Styles Map was undertaken on 8th March 2023, the closest off-site surface water receptor is a tributary to Wallarah Creek, and it is located approximately 200 m north. Wallarah Creek is located approximately 700m north-east off-site and flows towards the Budgewoi Lake.

4.7 Site Vegetation

Site vegetation, including shrubs and trees were found mainly two areas, south-east and centre portion of the site.

The site investigation area is covered mainly by buildings, with grass and trees in between them.

4.8 Topography

A review of Google Earth undertaken on the 8th March 2024, indicates that site investigation area slopes downhill from northwest to southeast. The surface elevation ranges from 40m to 31m above sea level. The water runoff will follow this direction travelling across the site.

4.9 Acid Sulfate Soils

A search of the Central Coast Council - Local Environmental Plan (LEP) 2022 was undertaken on the 8th of March 2024, to identify if Acid Sulfate Soils (ASS) are a risk at the site.

The investigation area is not categorised as a risk area for ASS, assumably because the site is located at an average height of 31m AHD.

4.10 Per & Polyfluoroalkyl Substances

The Australian potential per- and poly-fluoroalkyl substances (PFAS) Chemicals Map was viewed on the 8th March 2024. No sites were identified as impacted by PFAS contamination within the immediate vicinity of the site.

5 Site History

A site history assessment was conducted for the site which comprised a review of current and historical aerial photographs and council records.

5.1 Historical Aerial Photographs

Aerial photographs dating back to 1961 were reviewed as part of this PSI. Descriptions of the aerial photographs are presented in **Table** below. Historical aerial photographs are presented in **Appendix A**.

Table 5: Summary of Historical Aerial Review		
Date	**Observations on Site**	**Observations offsite**
1974	The site appears to be a farm, covered majority by dense vegetation. There is a clear are with a farmhouse in the south portion of site.	The surrounding is undeveloped as the site. Dense vegetation can be seen along north and west directions. Farm properties in the surroundings.
1983	East portion of the site has been deforested	Areas to the north off site have been deforested.
1995	The site is relatively unchanged. Trees growing in the eastern portion of site.	Farming development can be seen along east and south directions.
2000	The site is relatively unchanged.	The surroundings are under development, building density has increased mainly in the southeast direction, across Sparks Road.
2003	The site is under development. Some structures are being built. Most of the vegetation has been supressed. Buildings can be seen mainly along the north-east portion of site.	The building density has increased in all directions, mainly to the east and south off site.
2005	The site has been developed to what seems to be the school that is currently in place.	Development in progress. Building density has increased in all directions.

5.2 Section 10.7 (2) Local Council Planning Certificate

Section 10.7 (2) of the *Environmental Planning and Assessment 1979.* The site is zoned as R1 General Residential use, under the Local Environmental Plan (Central Coast Council - 2022). This zoning has the following objectives:

- To provide for the housing needs of the community.
- To provide for a variety of housing types and densities.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To promote best practice in the design of multi dwelling housing and other similar types of development.
- To ensure that non-residential uses do not adversely affect residential amenity or place unreasonable demands on services.

R2 Low Residential use zone permits the following land use:

- Permitted without consent: Home occupations; Recreation areas.

- Permitted with consent: Attached dwellings; Bed and breakfast accommodation; Boarding houses; Boat launching ramps; Boat sheds; Car parks; Caravan parks; Centre-based child care facilities; Community facilities; Dual occupancies; Dwelling houses; Educational establishments; Emergency services facilities; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition villages; Flood mitigation works; Group homes; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Hostels; Hotel or motel accommodation; Information and education facilities; Jetties; Multi dwelling housing; Neighbourhood shops; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Residential flat buildings; Respite day care centres; Roads; Secondary dwellings; Semi-detached dwellings; Seniors housing; Serviced apartments; Sewage reticulation systems; Shop top housing; Signage; Tank-based aquaculture; Water recycling facilities; Water reticulation systems, and Water storage facilities.

- Prohibited: Any development not specified in the previous items.

5.3 NSW EPA Contaminated Land Register

The NSW EPA publishes a list of contaminated land notified under Section 58 of the *Contaminated Land Management Act 1997* (CLM Act). These have been assessed by the EPA as being contaminated, but not always require regulation under the CLM Act. It does not include notifications under Section 60 of the CLM Act.

A search of the NSW EPA Contaminated Land Register found no results relating to the site or the surrounding area.

5.4 Protection of the Environmental Operations Act Public Register

A search of the Protection of the Environmental Operations Act (POEO) Public Register on the 8th March 2024 indicated the site was not listed on the POEO Register, or within 500m of any site registered on the POEO.

5.5 SafeWork NSW Hazardous Goods

At the time of reporting, no authorisation was issued to request a site search for licensed to keep dangerous goods at the site through SafeWork NSW.

6 Preliminary Conceptual Site Model

In accordance with NEPM (2013) *Schedule B2 – Guideline on Site Characterisation* and to aid in the assessment of data collection for the site, a Conceptual Site Model (CSM) assesses plausible pollutant linkages between potential contamination sources, migration pathways and receptors. The CSM provides a framework for the review of the reliability and useability of the data collected and to identify data gaps in the existing site characterisation.

6.1 Potential Contamination Sources

Potential sources of contamination at the site and the associated Contaminants of Potential Concern (CoPC) are shown in **Table** .

Table 6: Potential Sources of Contamination

Source	AEC	CoPC
Potential uncontrolled fill throughout investigation area	AEC1	Metals, Total Recoverable Hydrocarbons (TRH)/ Benzene, Toluene, Ethylbenzene, Xylene and Naphthalene (BTEXN), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides and Asbestos

6.2 Potential Migration Pathways

Currently the site presents limited contaminant migration pathways and potential mechanisms associated with contamination. Once intended earthworks are undertaken, the potential contaminant migration pathways and mechanisms considered included:

- Soil ingestion;
- Dermal contact;
- Inhalation of vapours;
- Direct uptake;
- Vertical migration;
- Migration via underground service trenches and fill preferential pathways;
- Horizontal migration; and,
- Groundwater migration.

6.3 Potential Receptors

Key receptors and associated pathway mechanisms identified are presented below:

Onsite

- Maintenance workers conducting earthworks. Exposure pathways associated with these receptors include dermal contact, ingestion of soil and inhalation of dust or vapours associated with potential contamination;
- Future site workers and personnel utilising the site for residential purposes. Exposure pathways associated with these receptors include dermal contact, ingestion of soil and inhalation of dust or vapours associated with potential contamination;

- Ecological receptors (fauna). Direct and indirect exposure pathways include dermal contact, inhalation, ingestion (e.g. contaminated food items, ingestion of contaminated dust through preening);
- Ecological receptors (flora). Uptake of contaminated soil or groundwater contamination into the root system, foliage, or fruit; and,
- Surface body water and groundwater ecosystem onsite.

Offsite

- Commercial properties;
- Residential properties;
- Maintenance workers; and,
- Mardi Creek.

6.4 Exposure Assessment

Based on the preliminary CSM, the potential exposure of CoPC at the site is considered **low-moderate** given the presence of one (1) AECs identified across the site, as shown in Figure 3, **Appendix A.**

6.4.1 AEC1 – Building pad consisting of potential uncontrolled fill material

Uncontrolled fill in soils has the potential to contain contaminants within the matrix of the material that when applied to land as fill, can cause localised contamination, affecting ecological macrobacteria within the immediate strata beneath, nearby waterways due to contamination leachate runoff and any other flora and fauna coming into contact with the potentially contaminated soil. Contaminated uncontrolled fill also has the capacity to impact human health through contact of fill material via dermal contact, incidental ingestion, and incidental inhalation of volatising contaminants.

7 Discussion

Raw Earth were engaged by Stanton Dahl Architects on behalf of Catholic Schools Broken Bay to conduct a PSI at the property located at 91 Sparks Road, Woongarrah, NSW 2259. The site is described as Lot 71 DP1258149 and comprises an approximate total area of 75,800 m². The investigation area is located on the north-west portion of the site and comprises an approximate total area of 13,570 m².

Raw Earth understands that the proposed school development at the site includes the demolition of existent structures located on the north-west portion of site and construction of one (1) three-storey and two (2) two-storey school buildings.

During the site walkover it was noted that the investigation area is predominantly covered by buildings, connected by concrete pathways. Grass and plants were noted to be present in the spaces between buildings. Most of the buildings within the investigation area will be demolished as part of the development of the site.

The desktop investigation indicates the site has remained as commercial property in nature since 2003, after which it began to be developed. The presence of existent structures previous concrete structure may be the indicative of the use of potential uncontrolled fill and therefore, a potential source of contamination. No waste/rubble was present on-site.

The site walkover and desktop investigation indicated 1 potential Areas of Environmental Concern (AECs) at the site, as follows:

- AEC1 – Potential uncontrolled fill material situated across site beneath the concrete building slab.

Based on the preliminary CSM, the potential exposure of CoPC at the site during proposed works is considered **low-moderate** given the presence of 1 AECs identified across the site.

The site is currently in use as a commercial property (private school). Further site-based assessments are recommended to be undertaken prior to development, with specific recommendations presented below.

8 Conclusion & Recommendations

It is the opinion of Raw Earth and in accordance with relevant Australian standards and guidelines that the site can be made suitable for its proposed development subject to the following recommendations:

- Based on the site inspection, desktop review and the proposed development involving in situ soil disturbance excavations, intrusive soil sampling in the form of a detailed site investigation is recommended to assess the contamination status of in situ soils identified in Areas of Environmental Concern: AEC1, of which are known to be disturbed during future site-based works. This will confirm the source, pathway, and receptor linkages to the CSM, assessing the risk of exposed soils to future site users and construction workers to ensure suitability for the proposed development;
- Any proposed soil is to be excavated as part of the development and requires offsite disposal, then waste needs to be classified in accordance with NSW Environmental Protection Authority, Waste Classification Guidelines Part 1-4: Classifying Waste, 2014 or be analysed for beneficial reuse under the NSW EPA Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation (2014) to be classified as Excavated Natural Material (ENM); and,
- In the event of any unexpected finds, including the discovery of asbestos containing materials, underground storage tanks, odorous and/or stained soil uncovered during works, all site works must cease, and Raw Earth must be notified immediately for further investigation.

9 Limitations

Raw Earth Environmental Pty Ltd (Raw Earth) understands to the best of our knowledge, the information within this report is accurate at the date of issue. However, due to the irregularity and dynamic nature of subsurface conditions, soil and groundwater characteristics are capable of change over a short period of time. No warranties, expressed or implied, are made. The contents of this report must be read in full.

If the unexpected finds of materials suspected to be hazardous or toxic occur, all site works must cease, and Raw Earth must be immediately contacted for further instruction.

Raw Earth performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. There is no investigation thorough enough to dismiss a particular material, which presently or in the future is considered hazardous at the site. Regulatory criteria are subject to change, where concentrations of a particular contaminant currently considered low, could be subject to review and fall under different regulatory standards and criteria and may require remediation in the future.

The results of this assessment are based on a desktop review of available information and regulatory criteria identified at the time of the site inspection. Raw Earth will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report. The scope and period of Raw Earths' services are subject to restrictions and limitations. Raw Earth did not perform a complete assessment of all possible conditions that may exist at the site.

Raw Earth takes no responsibility or liability for errors in any data obtained from scientific laboratories, regulatory agencies, statements from sources outside of Raw Earth, or developments resulting from situations outside the scope of this project.

All conclusions and recommendations regarding the site are the opinion of Raw Earth. Opinions are judgements, which are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions.

We trust the information contained within this document meets your requirements. Should you have any queries, please do not hesitate to contact the Raw Earth.

10 References

- Google Earth, https://www.google.com/earth.
- National Environment Protection (Assessment of Site Contamination) (NEPC) Measure as varied 2011, Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater, 2013.
- National Environment Protection (Assessment of Site Contamination) (NEPC) Measure as varied 2011, Schedule B2 – Guideline on Site Characterisation, 2013.
- NSW Department of Environment and Conservation, Guidelines for the Assessment and Management of Groundwater Contamination, 2007.
- NSW Department of Planning and Environment, State Environmental Planning Policy (Resilience and Hazards) Chapter 4, 2022.
- NSW Environmental Protection Authority, Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.
- NSW Environmental Protection Authority, Guidelines on the Duty to Report Contamination under Contaminated Land Management Act, 1997.
- NSW Environmental Protection Authority, Sampling Design Guidelines, 2022.
- NSW Environmental Protection Authority, Waste Classification Guidelines Part 1: Classifying Waste, 2014.
- NSW Office of Environment & Heritage, Guidelines for Consultants Reporting on Contaminated Sites, 2011.
- Six Maps, https://www.maps.six.nsw.gov.au.
- WaterNSW, waternsw.com.au.
- Western Australia Department of Health, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2009.
- Work Health and Safety Act, 2011.
- Work Health and Safety Regulation, 2017.

11 Abbreviations

Abbreviation	Full Description
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AFFF	Aqueous Firefighting Foam
ASS	Acid Sulfate Soils
BTEXN	Benzene, Toluene, Ethylbenzene, Xylene and Naphthalene
CCC	Central Coast Council
C&D	Construction & Demolition
CoPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DA	Development Application
DSI	Detailed Site Investigation
ENM	Excavated Natural Material
EPA	Environment Protection Agency
NSW CLR	New South Wales Contaminated Land Register
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PFAS	Per and Poly-Fluoroalkyl Substances
PID	Photoionsation Detector
PSI	Preliminary Site Investigation
TPH	Total Petroleum Hydrocarbons

Appendix A: Figures

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Figure 1:
Site Location Plan

Project:
Preliminary Site Investigation.
91 Sparks Road, Woongarrah, NSW 2259.

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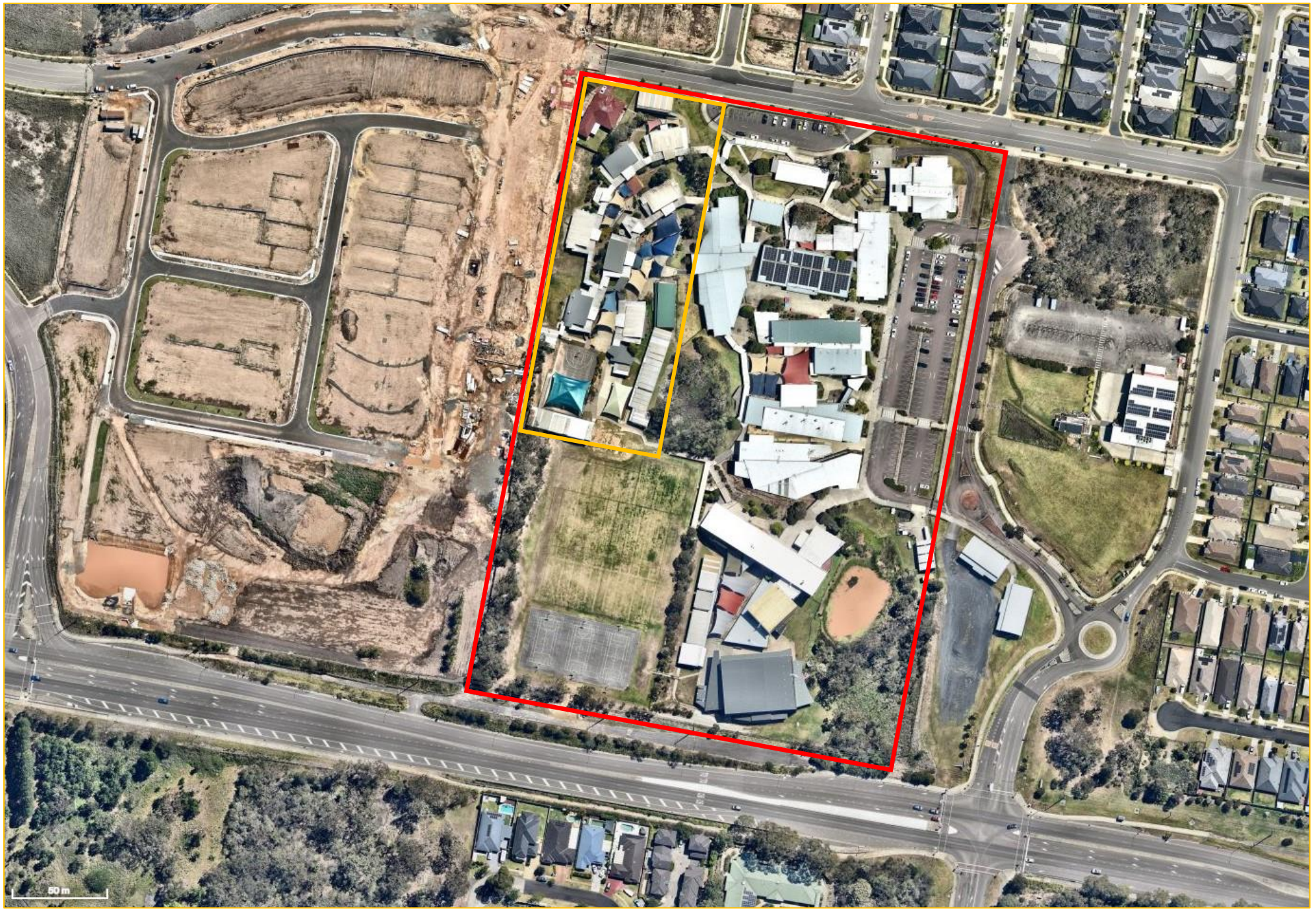

Site Boundary

Site Investigation Area

Figure 2:
Site Layout Plan

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Preliminary Site Investigation.
91 Sparks Road, Woongarrah, NSW 2259.

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Site Investigation Area

AEC1 - Potential uncontrolled fill

Figure 3:
Areas of Environmental Concern Plan

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Hydrogeology - Groundwater Bore Map

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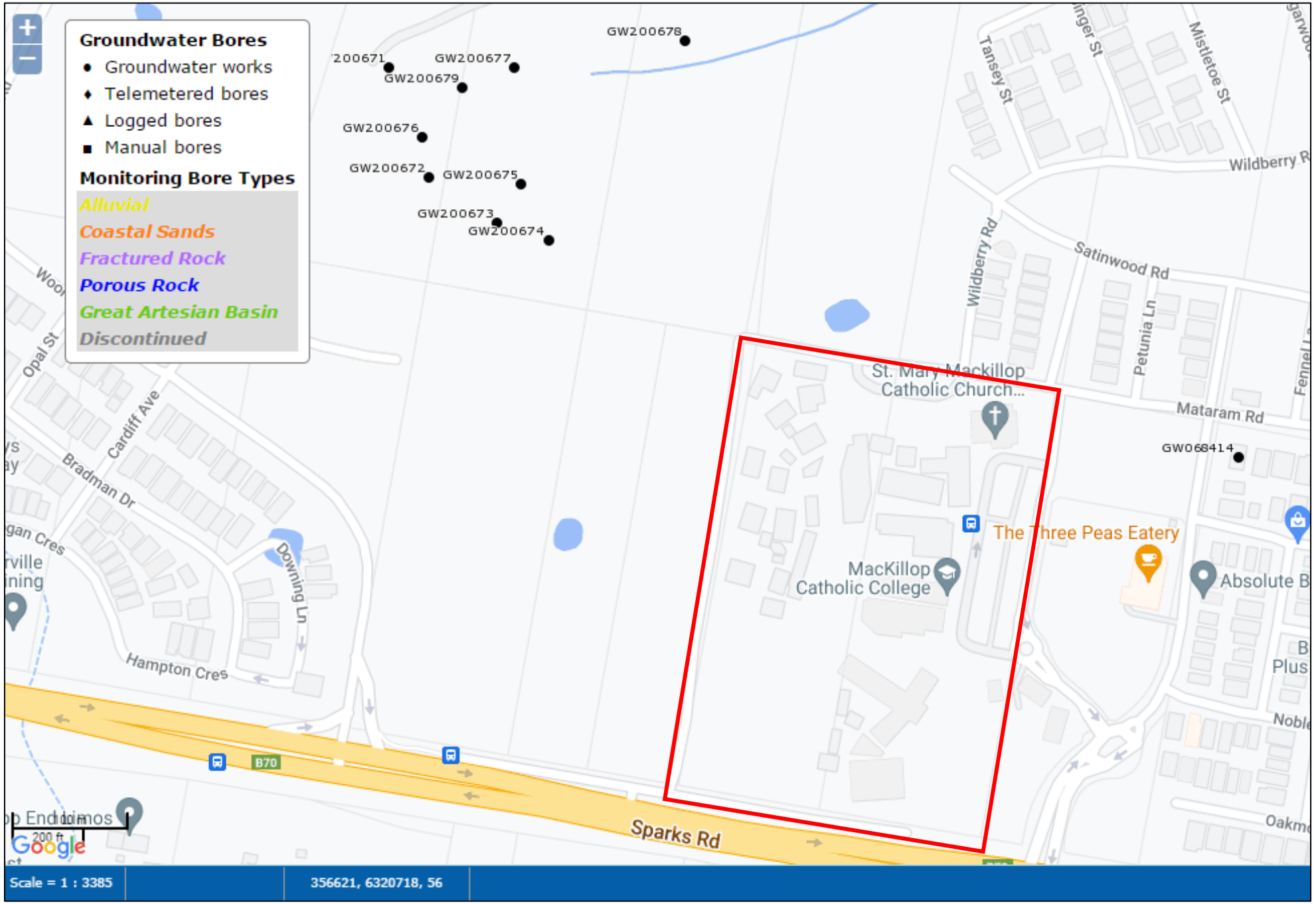

Figure 4:
Groundwater Bore Map

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Historical Aerial Photographs

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1974	
1983	

1995	
2000	

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2003	
2005	

Appendix B: Site Photographs

Photo 1: Overview of the northeastern portion of the investigation area, looking southwest.

Photo 2: Overview of the central western portion of the investigation area, looking south.

Photo 3:Overview of the Central portion of the investigation area, amongst the current primary school buildings present and in use. Looking south.

Photo 4: Overview of the central portion of the investigation area, amongst the current primary school buildings still in use. Looking north.

Photo 5: Overview of the play area adjacent to the basketball court and large open grassed area in the southwestern portion of the school grounds. This is the southeastern portion of the investigation area, looking northeast.

Photo 6: Overview of the western portion of the investigation area, looking east.

Photo 7: Overview of the basketball court within the southwestern portion of the investigation area. Looking south.

Photo 8: Overview of the western portion of the investigation area adjacent to the primary school buildings present. Looking north.

Photo 9: Overview of the southeastern portion of the investigation area showing the old weathered wooden boardwalk present and the rear portion of the primary school buildings present here.

Photo 10: Overview of the northeastern portion of the investigation area adjacent to the school's external fence line. Looking south.

Photo 11: Overview of the eastern portion of the site and the primary school buildings present. The damaged boardwalk structure is present in the distance. Looking southwest.

Photo 12: Overview of the pathed area within the northeastern portion of the site. Looking southwest.