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ACID SULFATE SOILS MANAGEMENT PLAN

August 2021
J169135

SCHOOL INFRASTRUCTURE NSW (SINSW) - DEPARTMENT OF EDUCATION

Proposed Sydney Olympic Park High School

C123934 : SW

Proposal

The proposed development is for the construction of a school whereby the project is known as Sydney Olympic Park new high school. The school is to be developed in two stages. The SSD application will seek consent for both Stage One and Stage Two. While Stage Two is submitted as part of this proposal, construction is subject to approval of additional funding.

Stage One will provide for a Stream 5 high school, catering for up to 850 students. Stage Two will bring the school up to a stream 9 school capability catering up to 1,530 students.

The design features a six storey building. To the north of the site, a hall building (for sports and performance) is proposed.

The play space required to meet the need of students for Stage One can be generally accommodated onsite, within the 9,511sqm available. Additional play space may be required to accommodate the increased student numbers anticipated during Stage 2. The proposed adjoining play space comprises an area of around 8,800sqm, and will be subject to a Joint Use Arrangement and available for public use outside school hours. The future Wentworth Point Peninsula Park will result in an open space area of approximately 4 ha.

The remainder of the peninsula (TfNSW land) is under review and will be subject to a separate approval process. Redevelopment of this land will include the new access road proposed off Burroway Road along the eastern boundary of the subject site and is proposed to include car parking, drop-off zones and delivery zones.

Site Description

The proposed development is located within the peninsula of Wentworth Point at 7-11 Burroway Road, Wentworth Park across parts of three lots; Lot 202 DP1216628, Lot 203 DP1216628 and Lot 204 DP1216628. The site forms part of the Wentworth Point Planned Precinct, which was rezoned in 2014 for the purposes of high density residential, public recreation, school and business purposes.

The site is approximately 9,511sqm in area, with a frontage of approximately 91m to Burroway Road. It currently contains vacant land, which is cleared of all past development, and almost entirely cleared of native vegetation.

The surrounding area is generally characterised by high rise residential and mixed-use developments. The site is directly adjacent to the Wentworth Point Peninsula Park and immediately east of Wentworth Point Public School.

Site Aerial Map

Source: Mecone

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Acid Sulfate Soils Management Plan

School Infrastructure NSW (SINSW) - Department of Education

Proposed Sydney Olympic Park High School

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1 Introduction

1.1 Background

Greencap Pty Ltd (Greencap) were engaged by School Infrastructure NSW (SINSW) - Department of Education (the 'Client') to prepare an Acid Sulfate Soils Management Plan (ASSMP) to safely manage Acid Sulfate Soils (ASS) during the remediation and construction of Proposed Sydney Olympic Park High School (the 'site'). Refer to **Figure 1** for site location.

1.2 Proposed Development Works

Greencap understood that following activities may disturb ASS on site:

- **Trenches** – most of the trenches are anticipated to be built in the validated capping material, however deeper trenches excavations (if required) may cause disturbance in ASS would require ASS management.
- **Pilling** – pilling is noted as a potentially disturbing activity of ASS on site, however Greencap understand should driven and concrete screw type piles (e.g. atlas and omega piles) are used, the disturbance and spoil generation will be minimal.
- **Other activities** – any activity that may involve disturbance of ASS (e.g., UST removal).

1.3 Roles and Responsibilities

Roles and responsibilities of stakeholders are presented in **Table 1** below.

Table 1. Roles and responsibilities

NAME / ORGANISATION	ROLE	RESPOSNSIBILITY
SINSW – DoE[1]	Client	Manage civil earthworks contractor, review and provide advice on implementation this ASSMP.
Greencap	Environmental Consultant	Prepare this ASSMP and issue further revisions (if required).
Contractor to be assigned[2]	Contractor	Identify actual acid soils (ASS) and potential acid soils (PASS) prior to excavation and/or during excavation works. Monitor implementation of control measures in accordance with the ASSMP during the soil excavation works.

Note:

1. SINSW – DoE: School Infrastructure NSW - Department of Education
2. Contractor was unknown at the time of reporting.

2 Project Objectives (Scope of Works)

The ASSMP includes the following:

- An overview of the proposed civil (excavation) works which may disturb ASS;
- Summary of previous ASS investigation works (DSI, Greencap) to identify the depth of ASS;
- Procedures for additional investigations to further assess presence/absence of ASS / PASS and associated risks. Focus on early detection of actual and potential ASS impacts through the monitoring of excavation materials;
- Develop management strategies to be implemented where ASS / PASS are identified including procedures for how excavated soil and sediment materials should be managed, including identification

of ASS, specific materials handling, storage and treatment procedures to enable onsite management and/or waste classification and landfill disposal. The management recommendations are based on:

- *Acid Sulfate Soils Manual (*Acid Sulfate Soil Management Advisory Committee (ASSMAC), *1998);*
- *Waste Classification Guidelines – Part 4 Acid Sulfate Soils;*
- *Work Health and Safety (WHS) Act 2011 NSW*;
- *Work Health and Safety Regulation 2017 NSW* (WHS Regulation);
- *Queesland Acid Sulfate Soil Technicla Manual – Soil Management Guidelines v4.0, Queensland Government 2014;*
- *Protection of the Environment Operations (Waste) Regulation 2014.*

- Outline of how excavated materials, if unsuitable for reuse as backfilling material, can be classified as wastes to enable offsite disposal in accordance with the Waste Classification Guidelines – Part 1 Classifying Waste (NSW EPA 2014) and Part 4 Acid Sulfate Soils (NSW EPA 2-14); and
- Provide a description of the acid soils mitigation strategies to be implemented in order to minimise potential impacts including monitoring of materials during civil works for prevention/management of soil and water acidification;
- Provide a methodology to facilitate the appropriate management of ASS including containment, neutralisation (i.e. lime treatment), classification for disposal or validation for retaining onsite.

3 Site Description

3.1 Site Description and Surrounding Land Use

General site information is provided in **Table 2** below. Site locality and site layout maps are depicted in Figure 1 in **Appendix A** of this report.

Table 2. Site Information		
Site Address:	Proposed Sydney Olympic Park High School - 7-11 Burroway Rd, Wentworth Point NSW 2127	
Current Zoning:	B1 Neighbourhood Centre, R4 High Density Residential and RE1 Public Recreation	
Local Government Area	Parramatta City Council	
Approximate Site Area	0.95 ha	
Current Site Use:	Vacant Land	
Potential Site Users:	• Future students and staff, parents of the students; and • Current and future site workers and other temporary visitors.	
Surrounding Site Use:	**North** **East** **South** **West**	Parramatta River Parramatta River Riverside Medicine Park Wharf Wentworth Point Public School, Marina Square Shopping Mall
Surface Water Bodies:	**North**	Parramatta River (~180 m distance)
	East	Parramatta River (~110 m distance)

3.2 Site Topography

The sites general elevation is 2m Australian Height Datum. An exception is the relatively large mound locates at the western section of the site. The mound is estimated to be 30m wide, 2m high at the southern end and increase to 5m at the north end. The eastern side of the site (also eastern to the mound) is generally covered by concrete slab.

3.3 Site Geology

The site is underlain by anthropogenic deposits – Natural surface elevation raised by placement of fill over former estuarine swamps and subaqueous estuarine margins (supratidal to subtidal zone); estuarine banks and islands formed from dredge spoil. The anthropogenic deposit overlies quaternary silty to peaty quartz and, silt and clay.

3.4 Site Hydrology

Storm water and other surface water is expected to be directed towards gutters and the drainage, governed by the local topography of impervious surfaces (i.e. roads, footpaths, drains). The drainage of the site is collected in the gutters and appeared to be transferred to the Sydney Water drains located on Burroway Road, which then discharged to the Paramatta River near the corner of Hill Road.

3.5 Site Soils

The site is located within a Class 2 area on the Office of Environment & Heritage (OEH) Acid Sulfate Soil Risk Maps (2011). Acid Sulfate soil in a Class 2 area are likely to be found below the natural ground surface. An Acid Sulfate Soil Assessment undertaken by Greencap in May 2021 (refer to Section 5), indicating ASS presents at 2.0-4.6 mBGL on site. The ASS on site was generally noted within natural or dredged natural material layer (1.5 – 6 mBGL) – clay and sand mixture with inclusion of seashells, organic & sulfate odour.

The undisturbed natural material, dark grey to black clay with high plasticity, starts form 3.5 mBGL at western section of the site and starts form 6 mBGL at eastern section of the site.

3.6 Groundwater

The Detailed Site Investigation undertaken by Greencap (June 2021) indicates the Sanding Water Levels (SWL) of groundwater was 1.9 mBGL at northern of the site, 1.3 mBGL at eastern and 1.0 mBGL at southern of the site. Groundwater and surface runoff is expected to flow eastern towards the Parramatta River.

3.7 Ecology

The nearest ecology receipt of the site is considered to be Parramatta River North and East to the site

4 ASS Identification

4.1 Acid Sulfate Soils (ASS)

Acid sulfate soils (ASS) are coastal and near-coastal soils, sediments or other materials containing iron sulfides. They are environmentally benign when left undisturbed in an aqueous, anoxic environment, but when exposed to oxygen the iron sulfides break down, releasing sulfuric acid and soluble iron. Both substances have considerable ability to degrade the natural and built environment, and the acid may additionally mobilise other pollutants (e.g. aluminium, lead, zinc) if present in the soil. Approximately 1.6 tonnes of sulphuric acid is produced per tonne of oxidized sulphide material. Once converted, ASS can drain into nearby waterways impacting natural aquatic and terrestrial ecosystems and cause substantial damage to nearby manmade structures.

ASS in Australia is commonly found in Holocene sediments below 5m AHD and estuarine environments (i.e. floodplains, rivers, creeks) and exist in an oxidised state stabilised beneath the water table or within the phreatic zone of moisture. The presence of moisture restricts oxidization reactions via exposure to air ensuring that sulphides remain in a reduced state until such time as sediments are exposed through

excavation or lowering of the water table via dewatering practices. Dependent on environmental conditions, ASS may be present in the following forms;

4.2 Actual Acid Sulfate Soils (AASS)

Actual Acid Sulfate Soils (AASS) are highly acidic sediment layers converted to sulphuric acid resulting from the oxidization of iron sulphide materials via exposure to air.

4.3 Potential Acid Sulfate Soils (PASS)

Potential Acid Sulfate Soils (PASS) are soils that contain unoxidized iron pyrite which have not been converted to AASS as a result of air exposure.

5 Previous ASS Investigations

5.1 ASS Sampling

Field sampling and analysis was undertaken in general accordance with the *NSW Acid Sulfate Soil Assessment Guideline 1998*. Nine boreholes targeted proposed building footprint were drilled, logged by Greencap at the locations shown on **Figure 2**. Borehole Logs are included in **Appendix A.** Fill Material was recorded at all locations. Dredged natural material in the form of wet loose sand was encountered below fill layer and it was followed by grey to black high plasticity natural clay. 13 samples were collected from 7 boreholes where hydrogen sulfide odour was detected. The soil had hydrogen sulfide odour was noted as dark brown to dark grey sandy clay and clayey silt with inclusion of shells. 13 samples sealed in zipped plastic bags without void were stored in an esky with ice and were sent to Eurofins (A NATA Accredited Laboratory) within same day for ASS pH screening to assess the presence of PASS and AASS. Refer to **Appendix B** for pH screening results.

5.2 ASS pH Screening

Assessment of the pH screening results is performed by comparison of analytical results with the criteria presented in the NSW Acid Sulfate Soil Manual (ASSMAC 1998). The results of laboratory testing have been assessed in accordance with action criteria for coarse textured soil provided in ASSMAC 1998.

Six samples (from three boreholes GG1, GG2 and GG5) had a pH reduction >2 after peroxide oxidation, and were submitted for Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) test. Refer to **Appendix B** for SPOCAS test results.

5.3 Adopted Criteria and Laboratory SPOCAS Results

Criterial for coarse texture ASS is selected based on the action criteria triggering the need for a management plan presented in *Table 4.4 of Acid Sulphate Soils Assessment Guidelines (NSW Acid Sulphate Soils Management Advisory Committee 1998)*.

SPOCAS test results showed GG2-04-ASS(3.5-3.6), GG5-05-ASS(2.0-2.1) and GG5-06-ASS(3.5-3.6) exceeded Acid Trial criterion, and all samples except for GG5-05-ASS(2.0-2.1) exceeded Sulphur Trial criterion. Refer to Figure 2 for the borehole Locations. The SPOCAS test results are present in **Table 3**.

Table 3: Acid Sulphate SPOCAS Test Results

Suite	Criteria	Unit	GG5-05-ASS (2.0-2.1)	GG5-06-ASS (3.5-3.6)	GG5-07-ASS (4.5-4.6)	GG1-07-ASS (2.0-2.1)	GG1-08-ASS (2.6-2.7)	GG2-04-ASS (3.5-3.6)
Acid Trail – TPA[1]	18	mol H+/t	35	390	< 2	< 2	< 2	290
Sulphur – POS[2]	0.03	% S	< 0.02	1.2	1.2	0.06	1.1	0.79
Liming rate	-	kg $CaCO_3$/t	3	38	< 1	< 1	12	27

Note:

1. Acid trail – Titratable Actual Acidity.

2. Sulphur – Peroxide Oxidisable Sulphur.
3. Shade – Result exceeds the criteria.

Following analysis, results indicated that 5 samples (GG1 2.0-2.1 mBGL , GG1 2.6-2.7mBGL, GG2 3.5-3.6mBGL, GG5 3.5- 3.6mBGL, and GG5 4.5-4.6) were found to marginally exceed action criteria for the sulphur trail when considering <1000 t of disturbed material.

5.4 Summary of Previous ASS investigation findings

The previous ASS investigation indicated that ASS comprised of dark grey sandy clay and clayey sand (with shells) presents at generally > 1 (below Standing Water Levels) - < 6 mBGL on site. As the distribution of ASS is not consistent, all natural soils including both dredged natural sandy soils underneath the fill layer and high plasticity clay should be considered as ASS and treated with lime. Excavated ASS should be stockpiled separately and managed under an Acid Sulfate Soils Management Plan. Based on the lab results, it was recommended that soils be neutralised with lime at a recommended rate up to 38 kg lime per tonne of soil (a field safety factor of **1.5** should be applied to the liming requirement rate).

Other findings from the abovementioned investigation include:

- Groundwater was encountered between 0.9 - 1.9 mBGL;
- Fill materials comprised of variable sandy clays, gravelly sand and clayey sand materials extending between 0.8-1.0 mBGL at southern section of the site and 0.5 – 1.5 mBGL at the northern section of the site;
- Fill or dredged material comprised of loose sand and clayey sand was encountered between 0.5 – 3.0 mBGL at northern section, at 1.0 – 2.6 at southern section and at 3.0 - 6.0mBGL at eastern section of the site;
- Grey to black, soft to stiff high plasticity clay was encountered at ~3.0 mBGL at northern section of the site, at ~2.6 mBGL at southern section of the site and at ~6.0 mBGL at eastern, of the site;

6 Requirement for Further ASS Investigations During Construction

6.1 Further ASS Investigation

The previous ASS investigation results indicated presence of ASS based on the materials and locations sampled. To identify potential and actual ASS materials during excavation, regular sampling of excavated materials is to be undertaken in accordance with Step 5 of Part 1 of the Waste Classification Guidelines indicating a minimum sampling density of one sample per 25m^3 of excavated materials.

6.2 Laboratory Analysis and Lime Requirements

pH screening is to be conducted for the samples at a NATA accredited laboratory with same day turnaround time. Presence of alkaline buffering capacity such as carbonate sources (e.g. shell grit) can mask potential oxidized pH reductions during pH screening testing and the laboratory analysis is required to confirm the presence or absence of ASS materials. Laboratory SPOCAS analysis also provides the lime requirement (calcium carbonate addition rate) or neutralisation of net soil acidity. A field safety factor of **1.5** should be applied to the liming requirement rate reported by the laboratory. pH values before (pH_F) and after sample oxidation using a peroxide reagent (pH_{FOX}) indicate likely presence of ASS when the following are observed:

- Moderate to high reaction rate during sample oxidation treatment using peroxide;
- A substantial reduction in pH after sample oxidation treatment (>1 pH unit), and an oxidised sample pH (pH_{FOX}) value of less than 3.5 can be indicative of potential ASS (PASS);
- Low unoxidized sample pH_F values (<4.5) can be indicative of actual acid soil (AASS); and
- pH screening results are used to assess soils investigated according to the following ranges for peroxide treated (oxidised) samples (pH_{FOX}):
  - pH_{FOX} < 3: high PASS potential;

- pH_{FOX} 3 - 4: high to moderate PASS potential;
- pH_{FOX} 4 -5 moderate to low PASS potential;
- pH_{FOX} > 5 low PASS potential

6.3 Timing

The identification of acid sulfate materials, lime requirements for neutralisation treatment and waste classification should be carried out within the shortest period of time achievable, to enable rapid treatment and disposal of the material. This will require an environmental consultant to be present during excavation and storage of material so samples can be sampled and submitted to the laboratory for a 24-hour turnaround time for laboratory reports.

6.4 ASS Impact Assessment

Acidification of excavated material can result in acidified drainage water and mobilisation of contaminants in the solid materials, particularly heavy metals. To prevent this, there are a number of management procedures integral to this management plan. The basis of this plan is to focus on early detection of an ASS impact through the monitoring of excavation / construction works and lime treatment to neutralise acidic or potentially acidic soils and drainage water. The following sections of this plan provide spoil management options in case acidity risks are identified in these materials.

By taking the proposed development into consideration, the risks associated with acid sulfate materials are likely to be limited to the piling, excavations, handing and storage stages prior to neutralisation by liming. However, during earthworks, specific ASS risk assessments should be conducted to ensure that individual work elements that could potentially disturb ASS have procedures and contingencies in place to minimise potential environmental impacts.

7 Management Options

There is a range of strategies available for the management, handling and treatment of acid sulfate soils disturbed during site excavation works. These techniques are included here to outline the approaches which could be adopted should ASS be identified during construction works. Broadly, the strategies available include:

7.1 Avoidance /Non-Disturbance

Avoidance, non-disturbance or partial non disturbance in order to prevent exposure is considered as the environmentally preferred strategy where only minimal excavation above the water table is required. Areas where ASS are present are either avoided altogether (total avoidance) and or if possible, plans are altered to encompass oxidization prevention measures which was include strategies such as:

- In situ capping;
- Alteration of drainage de-watering plans or;
- Offsite transportation and rapid reburial to an anoxic location below the water table on site (suitable for PASS only).

7.2 On- site Treatment

On site/ off site treatment and validation of ASS is often considered a viable option for sites that may facilitate apricate space and storage conditions. Following treatment, materials may be reused onsite or classified for disposal to an appropriate landfill facility. Alternatively, materials may be transferred offsite for treatment if on site storage is deemed unsuitable.

- Acid neutralisation - This approach relies on the in-situ neutralisation of acid that may be produced on oxidation or acidity that is already present. Specific techniques that can be employed to achieve this include the addition of non-corrosive alkaline agents such as agricultural lime or calcium carbonate

(CaCO3) or soil profile mixing (in specific cases where a soil layer in the profile has a high neutralising capacity).

- Leachate treatment – The leachate treatment method involves the oxidation and leaching of PASS in stockpiles and collection and treatment of acidic runoff. As this process allows the production of acidic leachate that is potentially strongly acidic, it requires careful control and monitoring. A low permeability base is required to prevent percolation into groundwater and the process could require contingencies to accommodate rainfall/flood events. This method is applicable to sands but may not be an appropriate treatment procedure for silts and clays due the low permeability of these soils which results in lengthy drying times.

7.3 Disposal of Potential Acidic Sulfate Soils (PASS)

Potential ASS may be reburied in anoxic conditions (i.e below the water table) at an EPA licenced waste management facility provided:

- Burial of materials is conducted prior to material oxidization (i.e within 24 hrs of excavation) and;
- Materials meet the definition of "Virgin Excavated Natural Material" (VENM) under the Protection of the environment Operations Act (POEO) 1997 even though it may contain sulfidic ores or soils[1]

8 Acid Sulfate Soils Management Strategy

Where disturbance of ASS or PASS is unavoidable, treatment of excavated material will be required for neutralisation of actual or potential acidity. The site activities to be conducted should include an ASS management strategy that, where at all possible, "partial avoidance", "oxidation prevention' and "acid neutralisation" are its main principles. The strategy should include:

- Minimising removal of acid sulfate soils. Generally, only the upper layers of sediments should require removal from cut and fill areas on the alluvium, in excavations and from pilling spoil.
- Materials excavation, storage (sealed bins or stockpiles on a bunded impervious pad), immediate sampling for pH screening, laboratory analysis for lime requirement and waste classification including treatment (liming) of soil and sediment.

A contingency plan for acid sulfate soils management is control of the discharge of water from the excavated material and from excavation. The immediate action associated with water quality protection is to prevent discharge, identify acidity sources and ensure neutralising of the acidity is carried out immediately.

Where excavation into potential ASS in unavoidable, the most applicable and cost-effective management methodology for the activities is Acid Neutralisation – excavation and addition of a liming agent.

Lime requirements for excavated material disposed of to landfill are to be determined for each stockpile of material produced. Lime requirements based on tonnage of excavated material and SPOCAS test results for ASS obtained from laboratory analysis. Once validated neutralised material may then be deemed suitable for:

- Re-used on site as fill, subject to validation/suitability requirements; or
- Disposed to a landfill licensed to accept ASS as "General Solid Waste" or "Restricted Solid Waste".

Treated material disposed of to a licensed landfill as a classified waste, is to be accompanied by, details of the neutralisation treatment carried out and results of pH analyses should be provided to the landfill as part of the materials waste classification reports, before disposal is approved by the landfill operator.

Greencap was noted by the client that no bulk excavation nor dewatering is planned for the development, ASS disturbance activity on site will be associated with pilling works and potential deep trench excavations

[1] Waste Classification Guidelines NSW Part 4: Acid Sulphate Soils.

(if required). Reuse the treated ASS onsite below the validated capper layer is considered the most applicable and cost-effective management option (refer to RAP Greencap 2021).

9 ASS Treatment Process

9.1 Soil/Water Neutralization

Soil

Lime requirements for excavated material disposed of to landfill are to be determined for each stockpile of material produced. Lime requirements based on tonnage of excavated material may be determined by laboratory test results**.** This treatment should include the mixing of lime into the soil immediately following identification of lime requirements. Mixing procedures should achieve an even blending of the lime throughout the soil, to the extent practicable. The quantity of lime used should be in accordance with the lime requirement (kg lime/ tonne soil) shown on the laboratory testing Certificate of Analysis.

Water

Greencap understands that no dewatering activity is planned in the development. However, an Underground Storage Tank (UST) was identified at the eastern side of the site and was recommended to be decommissioned (refer to RAP Greencap 2021). It is likely that groundwater will fill into the excavation pit during and after UST removal due to the shallow SWL (approximate 1.5 mBGL) around UST. The water flown into the excavation pit will be field tested for pH by using a calibrated water quality meter and be neutralised if pH is measured < 6.0. Following testing and potential neutralisation, the excavation pit will be back filled with validated clean soils as soon as practical.

Due to the low solubility of agricultural lime in water slacked lime (or quicklime) may be used as a preferred neuralisation agent for water. Given its corrosive nature, it is recommended that quicklime be added to sufficient in measured increments as per the water/lime ratios recommended by a NATA accredited laboratory.

9.1.1 Validation and Disposal

Following neutralization, waste must be chemically assessed in accordance with Step 5 of Part 1 of the Waste Classification Guidelines (for off-site disposal) or relevant contamination validation suite (on-site application).

Validation sampling should be undertaken at a frequency of at least one sample per 25m^3 of treated batch of material. Acceptance criteria for treated ASS is determined on a case by case basis derived by the results of pH testing and the outcome of laboratory results. Successful treatment of ASS will only be considered when then following requirements are met:

- (Potential Acidity + Existing Acidity - Acid Neutralisation Capacity) ≤ 0
- Field pH: > or equal to 5.5 and <8.5 (to be considered for onsite re-use).

If the above requirements are failed to be met, additional lime treatment and further verification testing shall be conducted.

10 ASS Environmental Controls

10.1 Materials Handling and Storage for Soils

The objective of excavated materials management and monitoring will be early detection of any acidity and implementation of the following procedures for on-site mitigation.

Following excavation, identified PASS materials, will be subject to the following management controls:

- Stockpiles (or bins) identified or suspected of being ASS should be separated from spoil not suspected of being ASS, and labelled;

- No soil is to be stockpiled on the site without appropriate environmental controls. Excavated suspected material should be placed within plastic lined skip bins or be placed as small stockpiles within a lined and bunded area;
- Shape and cover bins and stockpiles with HDPE plastic sheet to reduce rain infiltration. Suspected ASS excavated material should be kept moist and covered with plastic sheet or rain-proof tarpaulin to prevent drainage of rain water through the material. Keep stockpiles moist to minimise oxidation;

Additional assessment should be carried out if materials are suspected to require treatment from areas that were not previously identified as requiring management.

10.2 Monitoring and Management Programs

10.2.1 Surface Water Monitoring and Management

Surface water runoff from rainfall should not be exposed to actual or potential ASS. Should surface water come into contact with ASS stockpiles or an excavation into ASS, the surface water should be collected and, prior to reuse or disposal, tested for pH either in the field with a calibrated pH meter or by a NATA accredited laboratory. If the pH is less than pH 6.0, the water should be treated with lime before use or disposal.

Surface runoff is to be directed around exposed ASS stockpiles via the use of sediment controls such as filter socks, hay bales, leachate drains or equivalent measures to minimise the volume of water that may come into contact with ASS. Water from surface runoff from stockpiles are to be retained by bunding around the stockpiles (or bins) and lining or sealing of the ground surface are to be implemented to prevent runoff or infiltration of water affected by the material. Lining options include HDPE membrane or compacted clay. In the case of bins or small stockpiles, several layers of plastic sheeting or tarpaulin may be sufficient. The lined area should form a bund and grade to a collection point for recovery and treatment of drainage water;

- Surface water runoff from surrounding areas should be directed away from excavated materials and;
- Collect and test for pH from any water that infiltrates the neutralised material within the skip bins or stockpiles;

Additional assessment should be carried out if materials are suspected to require treatment from areas that were not previously identified as requiring management.

Lime treatment of the perimeter of the excavations and stockpiled soils, if soil pH falls below 4.0, will provide an available buffering reserve to intercept acidic seepage and neutralise acidic water.

If an ASS impacted excavation is filled with water, a sample should be taken to establish the pH and total suspended solids prior to disposal of the water. Water in excavations should not be released to water ways and the provisions of the Protection of the Environment Operations Act 1997 must be considered.

10.2.2 Groundwater Monitoring

The pH of the groundwater in excavations should be monitored via the existing wells onsite. If acidified, groundwater should be collected within an impermeable storage area for treatment.

10.2.3 Soils Monitoring and Management

Any ASS stockpiled on site should be the subject of an ongoing assessment of the status of any oxidation occurring within the soils. Refer to Section 6 for sampling and analysis procedures.

10.2.4 Reporting

Reports should be prepared to demonstrate conformance with performance objectives. Records of ASS management activities should be maintained and be available for review by relevant authorities on request.

11 References

- *Acid Sulfate Soils Manual (*Acid Sulfate Soil Management Advisory Committee (ASSMAC), *1998);*
- *Queesland Acid Sulfate Soil Technicla Manual – Soil Management Guidelines v4.0, Queensland Government 2014;*
- *Waste Classification Guidelines – Part 4 Acid Sulfate Soils;*
- *Work Health and Safety (WHS) Act 2011 NSW*;
- *Work Health and Safety Regulation 2017 NSW (WHS Regulation);*
- *Protection of the Environment Operations (Waste) Regulation 2014;*
- *State Planning Policy 2/02: Guideline Planning and Managing Development involving Acid Sulfate Soils (August 2002);*
- *Detailed Site Investigation -SOPHS-Draft, June Greencap;*
- *SOPHS – Remediation Action Plan – V1, July Greencap.*

J169135 - SOPHS - Acid Sulfate Soils Management Plan - V3

School Infrastructure NSW (SINSW) - Department of Education

Proposed Sydney Olympic Park High School

Figures

Metres
0 15 30 45 60

New Site Boundary

Site Location

GREENCAP
Going Further in Managing Risk

G, N - Building, 22 Giffnock Ave
Macquarie Park, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Department of Education (School Infrastructure NSW)				
Client Number:	C123934	Project Number:	J169135		
Project Description:	Acid Sulfate Soils Management Plan - SOPHS				
Address:	Proposed Sydney Olympic Park High School, 7-11 Burroway Road, Wentworth Point, NSW 2127				
Prepared:	SW	Reviewed:	MB	Version Date:	16/08/20201
Figure 1	Site Location and Regional Context				

NOTE: Acid sulfate soils are expected at the entire site (not only at the investigation locations where exceedance were recorded), generally in depths ranging bet ween 1.0 mBGL to 6.0 mBGL.

ASS: GG2(3.5-3.6)
SWL: 1.9 mBGL
Natural*: from 0.5 mBGL
Max, Investigation Depth: 3.9 mBGL

GG2

ASS: GG1(2.6-2.7)
SWL: Dry
Natural*: from 1.2 mBGL
Max. Investigation Depth: 2.7 mBGL

GG1

SWL: Dry
Natural*: from 1.5 mBGL
Max. Investigation Depth: 2.7 mBGL

GG3

GG4

SWL: Dry
Natural*: from 1.0 mBGL
Max. Investigaiton Depth: 1.7mBGL

SWL: 0.89 mBGL
Natural*: from 0.8 mBGL
Max. Investigation Depth: 1.2 mBGL

GG5

ASS: GG5(2.0-2.1)
GG5(3.5-3.6)
GG5(4.5-4.6)
SWL: 1.27 mBGL
Natural*: from 3.0 mBGL
Max, Investigation Depth: 8.0 mBGL

GG6

GG9

GG8

SWL: 1.26 mBGL
Natural*: from 1.0 mBGL
Max, Investigation Depth: 2.3 mBGL

GG7

SWL: 0.94 mBGL
Natural*: from 1.0 mBGL
Max. Investigation Depth: 3.0 mBGL

SWL: 1.18 mBGL
Natural*: from 0.9 mBGL
Max. Investigation Depth: 1.7 mBGL

Legend:

Metres: 0, 5, 10, 15, 20

- New Site Boundary
- Proposed Building Footprint (received 16/08/2021)
- Gas Monitoring Wells (ASS was sampled during drilling)

ASS: Acid Sulfate Soils

SWL: Standing Water Level

Natural*: Natural and Dredged Natural Material

Shade: Samples exceeded the adopted ASS criteria

GREENCAP
Going Further in Managing Risk

G, N - Building, 22 Giffnock Ave
Macquarie Park, NSW 2113

Ph: 02-9889-1800

Fx: 02-9889-1811

Client Name:	Department of Education (School Infrastructure NSW)				
Client Number:	C123934	Project Number:	J169135		
Project Description:	Acid Sulfate Soils Management Plan - SOPHS				
Address:	Proposed Sydney Olympic Park High School, 7-11 Burroway Road, Wentworth Point, NSW 2127				
Prepared:	SW	Reviewed:	MB	Version Date:	16/08/20201
Figure 2	Previous Acid Sulfate Soils Investigation locations				

J169135 - SOPHS - Acid Sulfate Soils Management Plan - V3

School Infrastructure NSW (SINSW) - Department of Education

Proposed Sydney Olympic Park High School

Appendix A: Borehole Logs

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG1
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

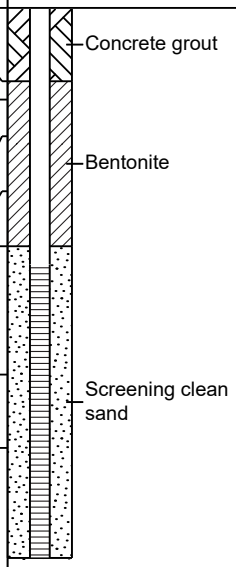
DATE: 30/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 2.7
DRILL METHOD: Concrete Coring, Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate odor was noted from 1.8mBGL to 2.7mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
0						Concrete slab
0.2	72.8			Wet	Loose	Fill - brown to yellow, coarse sand.
	72.8	GG1-01(0.25-0.35)		Moist	Stiff	Fill - brown to grey, sandy clay, red clay with white mottled (40%).
0.4	71.2	GG1-02(0.4-0.5)		Moist	Loose	Fill - dark grey, coarse sand and gravels (angular to subangular, 10mm-50mm, 40%)
0.6	22.8	GG1-03(0.5-0.6)		Dry	Loose	Fill - red, coarse sand, organic matter / hydrocarbon odour.
0.8	72.5	GG1-04(0.8-0.9) FD4 FT2		Moist	Stiff	Fill - dark grey with yellow and red mottled, organic matter/ hydrocarbon odor, trace organic fibers.
1						Fill - light grey, silty soil, angular gravels (10mm-20mm, 15%), one 35mm rock.
1.2	68	GG1-05(1.1-1.2)			Soft	Fill?/Natural? - grey clay, high plasticity, color changes to yellow form 1.6mBGL.
1.4						
1.6	84.9	GG1-06(1.6-1.7)				
1.8				Wet	Loose	Fill?/Natural? - brown sand with black sulfate odor sand, shell (10%).
2	134.6	GG1-07(2.0-2.1) GG1-07-ASS				
2.2						
2.4						
2.6	69.8	GG1-08(2.6-2.7) GG1-08-ASS		Moist	Soft	Natural - dark to black clay, high plasticity, sulfate odor.
2.8						End of depth, natural soil reached.
3						
3.2						
3.4						
3.6						
3.8						

Well Diagram



ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG2
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 30/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 3.9
DRILL METHOD: Concrete Coring, Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate/organic matter odor was noted from 2.0mBGL to 3.9mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0						Concrete slab	Concrete grout
0.2	8.4			Moist	Loose	Fill - yellow, sand.	
0.4	7.1	GG2-01(0.3-0.4)		Dry	Loose	Fill - grey, mixture of sand and gravels (rounded to sub-angular, 5-25mm, 40%)	Bentonite
0.6				Moist	Stiff	Fill?/Natural? - brown to grey clay with red mottled, high plasticity.	
1	4.8	GG2-02(1.0-1.1)					
2				Wet	Loose	Fill?/Natural? - dark grey, coarse sand, with black sulfate/organic matter odor sand, shell (5-10%).	Screening clean sand
2.6	6.4	GG2-03(2.5-2.6)					
3				Wet	Soft	Natural - dark grey clay, medium to high plasticity, sulfate odor.	
3.4	8.1	GG2-03(3.5-3.6) GG2-03-ASS					
3.8						End of depth, natural soil reached.	

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG3
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 30/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 2.7
DRILL METHOD: Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate odor was noted from 2.0mBGL to 2.7mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0				Dry	Loose	Fill - light brown to pink, silty sand with rocks (sub-angular to angular, 5-100mm, 30%) and gravels.	Concrete grout
	52.2	GG3-01(0.1-0.2)					
0.2							
0.4						Fill - silty sand, gravels (2-10mm, 10%), rocks (sub-angular to angular, 20-150mm), with inclusion of glass fragments.	Bentonite
0.6							
0.8							Screening clean sand
	58.2	GG3-02(0.9-1.0)					
1							
1.2							
1.4							
1.6				Moist	Stiff	Fill?/Natural? - yellow to brown, clay, with brown clayey sand (20%)	
	50.2	GG3-03(1.7-1.8)					
1.8							
2				Wet	Loose	Fill?/Natural? - brown, medium sand, with black sulfate odor sand, shell (20%).	
2.2							
2.4							
	48.7	GG3-04(2.5-2.6) GG3-04-ASS					
2.6							
2.8						End of depth, target depth reached.	
3							
3.2							
3.4							
3.6							
3.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG4
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 29/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 1.7
DRILL METHOD: Concrete Coring, Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate odor was noted from 0.4mBGL to 1.7mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0.2						Concrete slab	Concrete grout
					Loose	Fill - brown, coarse sand, angular gravels (15-60mm, 50%), one 180mm rock.	
0.4	10	GG4-01(0.3-0.4)					
		GG4-02(0.5-0.6)			Stiff	Fill - brown sandy clay, red clay (stiff, 10%), rocks (angular to sub-angular, 15-30mm, 25%), sulfate odor sand. Clay increases from 0.6 to 1.0 mBGL.	Bentonite
0.6	2.5	GG4-02-ASS FD2 & FT1					
0.8							
1					Medium Stiff	Fill?/Natural? - dark grey, sandy clay, rocks (angular to sub-angular, 10-20mm, 5%), sulfate odor sand. Black color sand increases from 1.5 to 1.7 mBGL.	Screening clean sand
1.2	2.8	GG4-03(1.1-1.2) GG4-03-ASS					
1.4		GG4-04(1.4-1.5)					
1.6	2.5	GG4-04-ASS			Stiff		
1.8						End of depth, target depth reached.	
2							
2.2							
2.4							
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG5
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 30/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 8.0
DRILL METHOD: Concrete Coring, Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate/organic matter odor was noted from 1.5mBGL to 7mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
						Concrete slab	Concrete grout
0.2	10.9	GG5-01(0.15-0.2)		Moist	Loose	Fill - yellow, medium sand.	
				Moist to Wet	Loose	Fill - dark grey to black, sand and gravels (sub-angular to angular, 10mm-60mm).	
0.4	10.2	GG5-02(0.3-0.4)					Bentonite
				Dry to Moist	Stiff	Fill - red clay with grey mottled, sandy gravels (grey, 5-25mm, rounded to sub-angular, 10%), organic matter odor.	
0.6	9.5	GG5-03(0.5-0.6)					
0.8				Wet	Loose	Fill - yellow, medium sand.	
1							
	10.8	GG5-04(1.0-1.1)					
1.2							
1.4							
1.6				Saturated	Soft	Fill - brown to grey, sandy clay, low plasticity, sulfate/organic matter odor.	
1.8							
2		GG5-05(2.0-2.1)					
	11.2	GG5-05-ASS					
2.2							Screening clean sand
2.4							
2.6							
2.8							
3				Moist to Wet	Soft	Fill?/Natural? - dark grey clay, shell (10%), medium plasticity, sulfate/organic matter odor.	
3.2							
3.4		GG5-06(3.5-3.6)					
	13.6	GG5-06-ASS					
3.6							
3.8							
4				Wet	Soft	Fill?/Natural? - brownish grey, sandy clay, shell (5%),	

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ENVIRONMENTAL BOREHOLE

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
4.2						medium plasticity, sulfate/organic matter odor.	
4.4							
	7.0	GG5-07(4.5-4.60 GG5-07-ASS					
4.6							
4.8							
5							Screening clean sand
5.2				Moist to Wet	Soft	Fill?/Natural? - brown to yellow sandy clay, gravels (5-10mm, 5%), medium plasticity, sulfate odor.	
5.4							
	11.3	GG5-08(5.5-5.6) FD3					
5.6							
5.8							
6				Moist	Stiff	Natural - red and yellow clay, rock (5%), high plasticity, organic matter odor.	
6.2							
6.4							
	10.8						
6.6							
6.8							
7				Moist	Stiff	Natural - grey clay with red and yellow mottled, high plasticity.	
7.2							
7.4							
7.6							
7.8							
8						End of depth, natural soil reached.	
8.2							
8.4							
8.6							
8.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG6
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 29/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Matthew Barberson
APPROVED BY:

TOTAL HOLE DEPTH: 2.3
DRILL METHOD: Concrete Coring, Hand Auger & Push Tubing
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators. Sulfate odor was noted from 0.9mBGL to 2.3mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0						Concrete slab	Concrete grout
0.2	2.8	GG6-01(0.2-0.3)			Loose	Fill - grey, medium sand with gravel (5-20mm), sub-angular rock (20%).	
0.4					Very Stiff	Fill - red, grey and orange mottled clay.	Bentonite
0.6							
0.8	0.9	GG6-02(0.7-0.8)					
1	24.6	GG6-03(1.0-1.1) GG6-03-ASS		Wet	Loose	Fill?/Natural? - yellow to brown, snad with inclusions of shells (10%), silty clay (5%).	Screening clean sand
1.2							
1.4							
1.6				Wet	Loose	Fill?/Natural? - dark grey sand, shells (5%), with inclusion of dark grey sand, sulfate odor.	
1.8							
2	12.6	GG6-04(2.0-2.1) GG6-04-ASS					
2.2							
2.4						End of depth, target depth reached.	
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG7
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 29/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 1.6
DRILL METHOD: Hand Auger & Drill Rig
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual or olfactory indicators was noted.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0	70.4	GG7-01(0.05-0.15)		Dry		Fill - light brown, silty sand, cobbles (30%), rocks (10%).	Concrete grout
0.2				Dry		Fill - dark grey, coarse sand, rocks (10-40mm, 10%).	
0.4	20.4	GG7-02(0.3-0.4)				Fill - dark grey, coarse sand, with yellow/black sandy clay and red clay (white mottled), trace tile and china fragments.	Bentonite
0.6							
0.8	21.4	GG7-03(0.7-0.8)					
1				Moist to Wet	Soft	Fill?/Natural? - yellow clayey sand (90%), grey clay (10%), with inclusion of shell.	Screening clean sand
1.2	25.8	GG7-04(1.1-1.2)					
1.4				Wet	Soft	Fill?/Natural? - grey sandy clay, with inclusion of shell (25%).	
1.6	24.1	GG7-05(1.5-1.6)				End of depth, target depth reached.	
1.8							
2							
2.2							
2.4							
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG8
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 29/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 3.0
DRILL METHOD: Hand Auger & Drill Rig
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual indicators was noted. Strong hydrocarbon odor was noted at 0.5mBGL.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0				Dry		Fill - light brown, clay and rock.	Concrete grout
0.2	34.1	GG8-01(0.2-0.3)		Dry		Fill - grey, coarse sand, rocks (15%).	
0.4	438	GG8-02(0.4-0.5)		Moist	Loose	Fill - dark grey, coarse sand, rocks (5-10mm, 10%), strong hydrocarbon odor at 0.5mBGL.	Bentonite
0.6				Moist		Fill?/Natural? - dark grey clayey sand and yellow sand, with inclusion of shells, trace wood fragements, hydrocarbon odor.	
0.8							
1	80.1	GG8-03(0.9-1.0)					
1.2				Wet		Fill?/Natural? - dark grey, coarse, with inclusion of shells, organic matter odor.	
1.4							
1.6							Screening clean sand
1.8							
2	19.8	GG8-04(1.9-2)					
2.2							
2.4							
2.6				Wet	Soft	Natural - black clay, high plasticity.	
2.8							
3		GG8-05(2.9-3.0)				End of depth, natural material reached.	
3.2							
3.4							
3.6							
3.8							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: GG9
PROJECT NAME: DSI - SOPHS
JOB NO.: J169135-01
CLIENT NAME: SINSW

DATE: 29/04/21
LOCATION: 9 Burroway Road, Wentworth Point
LOGGED BY: Shihui Wang
APPROVED BY: Matthew Barberson

TOTAL HOLE DEPTH: 1.2
DRILL METHOD: Hand Auger & Drill Rig
DRILLING CONTRACTOR: Epoca

COMMENTS No ACM was observed, no visual or olfactory indicators was noted.

Depth (mBGL)	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)	Well Diagram
0				Dry		Fill - grey, coarse sand, rocks and cobbles 930%).	Concrete grout
	31.8	GG9-01(0.1-0.2)					
0.2				Moist		Fill - grey to dark grey, coarse sand, rocks (25%), yellow clay (20%, increase to 60% at 0.5mBGL).	
0.4	21.3	GG9-02(0.4-0.5)		Moist			Bentonite
				Moist		Fill - yellow, coarse sand, rocks (15%), grey clayey sand (10%).	
0.6							
0.8	22.7	GG9-03(0.7-0.8)					
				Wet		Fill?/Natural? - grey clayey sand, with inclusion of shells (30%).	Screening clean sand
1	42.2	GG8904(1.0-1.1)					
1.2						End of depth, borehole clapsed due to groundwater encountered.	
1.4							
1.6							
1.8							
2							
2.2							
2.4							
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

J169135 - SOPHS - Acid Sulfate Soils Management Plan - V3

School Infrastructure NSW (SINSW) - Department of Education

Proposed Sydney Olympic Park High School

Appendix B: Lab Certificates

Greencap NSW P/L
Ground Floor, North Building, 22 Giffnock Avenue
Macquarie Park
NSW 2113

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention: **Shihui Wang**

Report **792824-S**
Project name SYDNEY OLYMPIC PARK HS
Project ID J169135-01
Received Date May 02, 2021

Client Sample ID			**GG9-04-ASS(1.0-1.1)**	**GG6-04-ASS(2.0-2.1)**	**GG6-03-ASS(1.0-1.1)**	**GG4-02-ASS(0.5-0.6)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-My04030**	**S21-My04031**	**S21-My04032**	**S21-My04033**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.0	8.5	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	6.6	7.0	7.9
Reaction Ratings*[S05]	-	comment	4.0	3.0	4.0	4.0

Client Sample ID			**GG4-03-ASS(1.1-1.2)**	**GG4-04-ASS(1.4-1.5)**	**GG5-05-ASS(2.0-2.1)**	**GG5-07-ASS(4.5-4.6)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-My04034**	**S21-My04035**	**S21-My04184**	**S21-My04185**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**	**Apr 30, 2021**	**Apr 30, 2021**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	8.2	8.2	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	7.8	3.5	3.2
Reaction Ratings*[S05]	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			**GG5-06-ASS(3.5-3.6)**	**GG3-04-ASS(2.5-2.6)**	**GG1-07-ASS(2.0-2.1)**	**GG1-08-ASS(2.6-2.7)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-My04186**	**S21-My04187**	**S21-My04188**	**S21-My04189**
Date Sampled			**Apr 30, 2021**	**Apr 30, 2021**	**Apr 30, 2021**	**Apr 30, 2021**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.2	8.1	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	6.6	6.1	2.9
Reaction Ratings*[S05]	-	comment	4.0	3.0	4.0	4.0

Client Sample ID			GG2-04-ASS(3.5-3.6)
Sample Matrix			**Soil**
Eurofins Sample No.			**S21-My04190**
Date Sampled			**Apr 30, 2021**
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6
Reaction Ratings*[S05]	-	comment	4.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Sydney	May 06, 2021	7 Days

- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

Melbourne
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Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Greencap NSW P/L
Address: Ground Floor, North Building, 22 Giffnock Avenue
Macquarie Park
NSW 2113

Project Name: SYDNEY OLYMPIC PARK HS
Project ID: J169135-01

Order No.: PO286462
Report #: 792824
Phone: 02 9889 1800
Fax: 02 9889 1811

Received: May 2, 2021 9:36 PM
Due: May 7, 2021
Priority: 2 Day
Contact Name: Shihui Wang

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory - NATA Site # 25079						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	GG9-04-ASS(1.0-1.1)	Apr 29, 2021		Soil	S21-My04030	X
2	GG6-04-ASS(2.0-2.1)	Apr 29, 2021		Soil	S21-My04031	X
3	GG6-03-ASS(1.0-1.1)	Apr 29, 2021		Soil	S21-My04032	X
4	GG4-02-ASS(0.5-0.6)	Apr 29, 2021		Soil	S21-My04033	X
5	GG4-03-ASS(1.1-1.2)	Apr 29, 2021		Soil	S21-My04034	X
6	GG4-04-	Apr 29, 2021		Soil	S21-My04035	X

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NATA # 1261 Site # 25079

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory - NATA Site # 25079						
External Laboratory						
	ASS(1.4-1.5)					
7	GG5-05-ASS(2.0-2.1)	Apr 30, 2021		Soil	S21-My04184	X
8	GG5-07-ASS(4.5-4.6)	Apr 30, 2021		Soil	S21-My04185	X
9	GG5-06-ASS(3.5-3.6)	Apr 30, 2021		Soil	S21-My04186	X
10	GG3-04-ASS(2.5-2.6)	Apr 30, 2021		Soil	S21-My04187	X
11	GG1-07-ASS(2.0-2.1)	Apr 30, 2021		Soil	S21-My04188	X
12	GG1-08-ASS(2.6-2.7)	Apr 30, 2021		Soil	S21-My04189	X

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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Received: May 2, 2021 9:36 PM
Due: May 7, 2021
Priority: 2 Day
Contact Name: Shihui Wang

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory - NATA Site # 25079						
External Laboratory						
13	GG2-04-ASS(3.5-3.6)	Apr 30, 2021		Soil	S21-My04190	X
Test Counts						13

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

John Nguyen Analytical Services Manager

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Greencap NSW P/L
Ground Floor, North Building, 22 Giffnock Avenue
Macquarie Park
NSW 2113

Attention: **Shihui Wang**

Report **794152-S-V2**
Project name ADDITIONAL - SYDNEY OLYMPIC PARK HS
Project ID J169135-01
Received Date May 10, 2021

Client Sample ID			**GG5-05-ASS (2.0-2.1)**	**GG5-06-ASS (3.5-3.6)**	**GG5-07-ASS (4.5-4.6)**	**GG1-07-ASS (2.0-2.1)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-My19417**	**S21-My19418**	**S21-My19419**	**S21-My19420**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**
Test/Reference	LOR	Unit				
SPOCAS Suite						
pH-KCL	0.1	pH Units	4.7	8.4	9.0	9.0
pH-OX	0.1	pH Units	5.7	3.4	8.0	8.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	34	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	35	390	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	390	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.050	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	0.06	0.62	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.62	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.02	0.07	0.10	< 0.02
Sulfur - Peroxide	0.02	% S	0.03	1.3	1.3	0.07
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	1.2	1.2	0.06
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	750	730	39
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A	N/A	N/A
Calcium - KCl Extractable	0.02	% Ca	< 0.02	0.30	0.22	0.17
Calcium - Peroxide	0.02	% Ca	< 0.02	0.60	3.7	0.74
Acid Reacted Calcium	0.02	% Ca	< 0.02	0.30	3.5	0.57
acidity - Acid Reacted Calcium	10	mol H+/t	< 10	150	1700	280
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	< 0.02	0.24	2.8	0.46
Magnesium - KCl Extractable	0.02	% Mg	0.11	0.14	0.06	0.02
Magnesium - Peroxide	0.02	% Mg	0.12	0.33	0.16	0.03
Acid Reacted Magnesium	0.02	% Mg	< 0.02	0.19	0.10	< 0.02
acidity - Acid Reacted Magnesium	10	mol H+/t	< 10	160	85	< 10
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	< 0.02	0.25	0.14	< 0.02
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	N/A	N/A	4.6	1.6
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	n/a	n/a	910	310
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	N/A	N/A	1.5	0.50
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	0.06	0.82	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	40	510	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	3.0	38	< 1	< 1

Client Sample ID			GG5-05-ASS (2.0-2.1)	GG5-06-ASS (3.5-3.6)	GG5-07-ASS (4.5-4.6)	GG1-07-ASS (2.0-2.1)
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-My19417**	**S21-My19418**	**S21-My19419**	**S21-My19420**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**	**Apr 29, 2021**
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	94	32	64	79
>2mm Fraction	0.005	g	8.4	5.7	26	8.2
Analysed Material	0.1	%	92	85	71	91
Extraneous Material	0.1	%	8.2	15	29	9.4
% Moisture	1	%	12	40	26	20

Client Sample ID			GG1-08-ASS (2.6-2.7)	GG2-04-ASS(3.5-3.6)
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-My19421**	**S21-My19422**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**
Test/Reference	LOR	Unit		
SPOCAS Suite				
pH-KCL	0.1	pH Units	8.8	7.9
pH-OX	0.1	pH Units	7.2	3.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	290
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	290
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.46
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.46
Sulfur - KCl Extractable	0.02	% S	0.07	0.06
Sulfur - Peroxide	0.02	% S	1.2	0.85
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	1.1	0.79
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	710	490
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A
Calcium - KCl Extractable	0.02	% Ca	0.25	0.14
Calcium - Peroxide	0.02	% Ca	1.7	0.24
Acid Reacted Calcium	0.02	% Ca	1.4	0.10
acidity - Acid Reacted Calcium	10	mol H+/t	710	50
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	1.1	0.08
Magnesium - KCl Extractable	0.02	% Mg	0.06	0.14
Magnesium - Peroxide	0.02	% Mg	0.12	0.30
Acid Reacted Magnesium	0.02	% Mg	0.06	0.17
acidity - Acid Reacted Magnesium	10	mol H+/t	47	140
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.08	0.22
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	0.62	N/A
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	120	n/a
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	0.20	N/A
ANC Fineness Factor		factor	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	0.25	0.57
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	150	350
SPOCAS - Liming rate	1	kg CaCO3/t	12	27

Client Sample ID			GG1-08-ASS (2.6-2.7)	GG2-04-ASS(3.5-3.6)
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S21-My19421**	**S21-My19422**
Date Sampled			**Apr 29, 2021**	**Apr 29, 2021**
Test/Reference	LOR	Unit		
Extraneous Material				
<2mm Fraction	0.005	g	78	20
>2mm Fraction	0.005	g	4.8	< 0.005
Analysed Material	0.1	%	94	100
Extraneous Material	0.1	%	5.8	< 0.1
% Moisture	1	%	31	36

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite			
SPOCAS Suite	Brisbane	May 13, 2021	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	May 13, 2021	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	May 11, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Site # 1254 & 14271

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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
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Mayfield East NSW 2304
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NATA # 1261 Site # 25079

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IANZ # 1290

Company Name: Greencap NSW P/L
Address: Ground Floor, North Building, 22 Giffnock Avenue
Macquarie Park
NSW 2113

Project Name: ADDITIONAL - SYDNEY OLYMPIC PARK HS
Project ID: J169135-01

Order No.:
Report #: 794152
Phone: 02 9889 1800
Fax: 02 9889 1811

Received: May 10, 2021 1:20 PM
Due: May 17, 2021
Priority: 5 Day
Contact Name: Shihui Wang

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						SPOCAS Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	GG5-05-ASS (2.0-2.1)	Apr 29, 2021		Soil	S21-My19417	X	X
2	GG5-06-ASS (3.5-3.6)	Apr 29, 2021		Soil	S21-My19418	X	X
3	GG5-07-ASS (4.5-4.6)	Apr 29, 2021		Soil	S21-My19419	X	X
4	GG1-07-ASS (2.0-2.1)	Apr 29, 2021		Soil	S21-My19420	X	X
5	GG1-08-ASS (2.6-2.7)	Apr 29, 2021		Soil	S21-My19421	X	X
6	GG2-04-	Apr 29, 2021		Soil	S21-My19422	X	X

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Sample Detail	SPOCAS Suite	Moisture Set
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Sydney Laboratory - NATA Site # 18217		
Brisbane Laboratory - NATA Site # 20794	X	X
Perth Laboratory - NATA Site # 23736		
Mayfield Laboratory - NATA Site # 25079		
External Laboratory		
ASS(3.5-3.6)		
Test Counts	6	6

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
SPOCAS Suite									
pH-KCL			%	102			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
SPOCAS Suite				Result 1	Result 2	RPD			
pH-KCL	S21-My22121	NCP	pH Units	8.3	8.3	<1	30%	Pass	
pH-OX	S21-My22121	NCP	pH Units	7.4	7.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	S21-My22121	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Peroxide Acidity	S21-My22121	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	S21-My22121	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	S21-My22121	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	S21-My22121	NCP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	S21-My22121	NCP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Sulfur - KCl Extractable	S21-My22121	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
Sulfur - Peroxide	S21-My22121	NCP	% S	0.11	0.11	2.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	S21-My22121	NCP	% S	0.11	0.11	2.0	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	S21-My22121	NCP	mol H+/t	67	66	2.0	30%	Pass	
HCl Extractable Sulfur	S21-My22121	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur	S21-My22121	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - acidity units	S21-My22121	NCP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	S21-My22121	NCP	% S	N/A	N/A	N/A	30%	Pass	
Calcium - KCl Extractable	S21-My22121	NCP	% Ca	0.38	0.38	1.0	30%	Pass	
Calcium - Peroxide	S21-My22121	NCP	% Ca	1.6	1.6	2.0	30%	Pass	
Acid Reacted Calcium	S21-My22121	NCP	% Ca	1.2	1.2	3.0	30%	Pass	
acidity - Acid Reacted Calcium	S21-My22121	NCP	mol H+/t	620	600	3.0	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	S21-My22121	NCP	% S	0.99	0.96	3.0	30%	Pass	
Magnesium - KCl Extractable	S21-My22121	NCP	% Mg	< 0.02	< 0.02	<1	30%	Pass	
Magnesium - Peroxide	S21-My22121	NCP	% Mg	0.04	0.04	3.0	30%	Pass	
Acid Reacted Magnesium	S21-My22121	NCP	% Mg	0.03	0.02	4.0	30%	Pass	
acidity - Acid Reacted Magnesium	S21-My22121	NCP	mol H+/t	20	20	4.0	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	S21-My22121	NCP	% S	0.03	0.03	4.0	30%	Pass	
Acid Neutralising Capacity (ANCE)	S21-My22121	NCP	% CaCO3	3.3	3.2	1.0	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	S21-My22121	NCP	mol H+/t	650	640	1.0	30%	Pass	
ANC Fineness Factor	S21-My22121	NCP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	S21-My22121	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	S21-My22121	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	S21-My22121	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-My19420	CP	%	20	20	<1	30%	Pass	

Comments

This report was revised V2 to amend sample ID GG2-04-ASS(3.5-3.6) for samples My19422.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

John Nguyen	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.