

Appendix D – Soil Amendment Management Plan (SAMP)



Environmental Services

Specialising in:

Acid Sulphate Soils
Contaminated Site Assessment
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Remediation Advice and Design
Groundwater Management
Facility Maintenance

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OPERATING STRATEGY

Soil Amendment Management Plan

**Lot 20 Adelaide Street
Hazelmere**

PREPARED FOR:

Wasterock Pty Ltd





Environmental Services

DOCUMENT DETAILS

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1 INTRODUCTION

This Soil Amendment Management Plan (SAMP) has been prepared to support the application submitted by Wasterock Pty Ltd to become licensed for the acceptance and treatment of Acid Sulfate Soils (ASS) and Hydrocarbon Impacted soils (HI) at Lot 20 Adelaide Street, Hazelmere (herein referred to as 'the Site').

The proposed development involves the remediation of current land use at the Site from a closed landfill facility to 'industrial / commercial' use (lot subdivision). .

The SAMP is intended to address the following final use scenarios:

- The use of neutralised/amendment material in on-site landscaping activities.
- The use of neutralised/amendment material in soil blends; and/or
- The disposal of treated material, with no identified re-use options.

The Site occupies an area of approximately 16.95 Ha. Surface and sub-soil consists of Bassendean sands, with limonite-cemented sand (coffee rock) occurring throughout most of the property near the water table.

2 OBJECTIVES

This SAMP has been prepared in order to minimise impacts to the local environment and to ensure no unacceptable environmental impacts occur as a result of the management of ASS/HI materials. The objectives of the plan are to:

- Ensure that no adverse changes occur to ground or surface water quality outside the Site boundary as a result of the management of ASS/HI materials.
- Ensure that soils are treated and disposed in an environmentally conscious manner.
- Ensure that all ASS/HI material accepted is monitored and documents.
- Ensure that all ASS/HI materials are safely managed, treated and re-used/disposed in accordance with relevant guidelines.
- Ensure that groundwater quality at the site is monitored for any changes that may occur.

3 SITE CHARACTERISTICS

The Site is located at Lot 20 Adelaide Street, Hazelmere within the City of Swan, approximately 14 km east north east of the Perth CBD, 6 km east of the Swan River and 1 km west of the Darling Scarp (Figure 1). The Site was formerly vested with Hazelland Pty Ltd since 2006 under the Land Title City of Swan Location Lot 20 Volume 2054 / Folio 299. The Certificate of Title is attached in Appendix A. The Site is currently vested with Wasterock Pty Ltd.

The Site covers an area of approximately 16.95 Ha, bounded by Adelaide Street to the south, and Roe Highway to the east (Figure 2). Semi-rural properties containing discarded farming, market gardens and horse trotting tracks/stables flank the Site to the north, with a small operational industrial site (ice works) functioning adjacent to the western boundary, adjacent to the proposed abstraction bores.

Current topography varies across the Site from approximately RL 33 mAHD at the top of the inert fill mounds in the north east sector, to approximately RL 27 mAHD at the south, adjacent to Adelaide Street.

3.1 Proposed Development

It has been proposed that the Site is to be transformed and remediated from a closed landfill facility into industrial / commercial lots. This will be achieved through a process of strategic excavation down to clay/sandy substrates, processing of extracted soils and placement within a engineered cell.

3.2 Local Geology

The site is underlain by Bassendean sands, which can generally be characterised by pale grey to white; sub-rounded to rounded quartz sands. A layer of friable, limonite-cemented sand, often referred to as 'coffee rock' commonly occurs throughout most of the area near the water table (Davidson 1995).

The Bassendean Sand unconformably overlies the Cretaceous and Tertiary Strata, interfingers with Guildford clays and conformably overlies the Gnangara Sands (Davidson 1995). The stratigraphic configuration of the Bassendean Sand with the Guildford Clay and Gnangara Sand suggests the formation was deposited under changing conditions, most likely alternating between fluvial, estuarine and shallow-marine environments (Davidson 1995).

3.3 Acid Sulfate Soils

The DEC ASS Risk Map obtained from the WA Atlas (Landgate, 2012) indicates that the majority of the Site is located within a moderate to low risk area of ASS generally occurring below 3 mbgl. (Figure 2).



Figure 1 Site Location

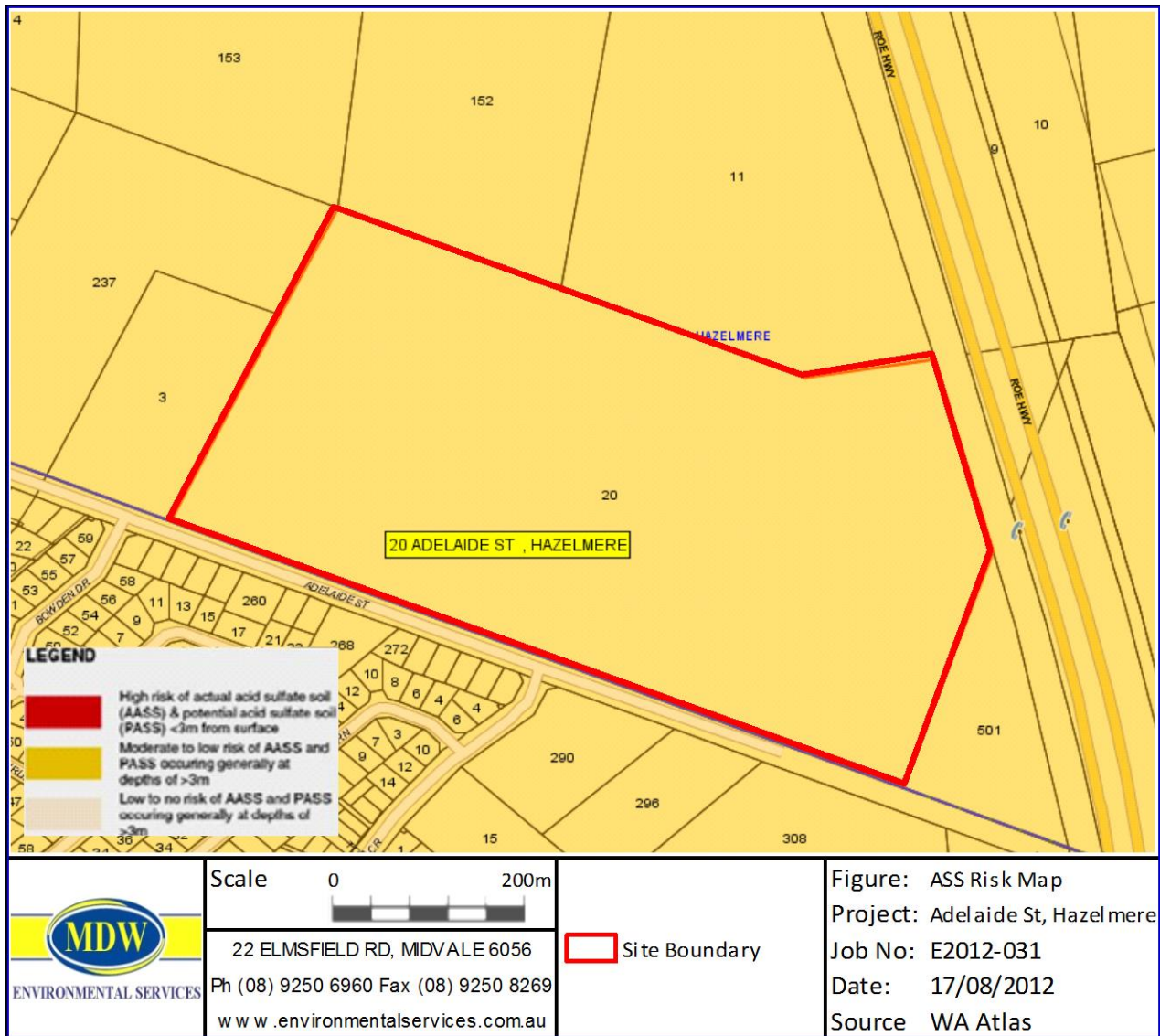


Figure 2 ASS Risk Map

4 SITE MANAGEMENT PLAN

4.1 RECIEVED - ACID SULFATE SOILS

The following pertains to operational considerations for the acceptance, management, re-use and disposal of ASS material.

Samples of untreated material that are identified as PASS or AASS must undertake laboratory analysis to determine the amount of neutralising agent required to neutralise the soil. The analytical methods of choice are the Suspension Peroxide Oxidation Combined Acidity and or Sulfate (SPOCAS) and Chromium Reducible Sulfur (SCR). The number of samples required will be as required according to the *Landfill Waste Classifications and Definitions 1996 (As Amended)*.

4.1.1 Re-use

ASS material will be treated and re-used as capping material as part of the remediation of the project (Peat material will not be accepted for amendment at this Site) . If the soil is not able to be re-used or there is an overabundance of soil in the stockpile, it will be disposed of as landfill, where the organic content is less than 20%. The disposal of ASS soils to a Class 1 landfill facility is only justifiable in the event that:

1. There are no other uses for the material on-site.
2. That the Department of Environment Regulation is informed of the necessity for disposal as landfill and has given the appropriate authorisation.

4.1.2 Methodology

All materials will be tested according to *Landfill Waste Classifications and Waste Definitions 1996 (As Amended)* (DEC 2009). The results will then be validated and checked by MDWES and written approval for acceptance will be submitted to Wasterock Pty Ltd prior to material delivery. MDWES will also advise regarding the treatment, processing and remediation requirements of soils.

The liming rate provided by MDWES will be determined as per the DEC (2011) *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes*. Contaminated Sites Branch, Department of Environment and Conservation (now Department of Environment Regulation) and includes a safety factor of 1.5. The treatment procedure will then be provided to the Site Manager; the client advised; and, material delivery will commence.

4.1.2.1 Neutralisation

Every 20m³ truck load of ASS material will be tipped onto a limestone treatment pad. Materials are to be treated immediately or as soon as is practicable. The minimum standard shall be, **"All material is treated on the day of delivery"**.

The Site Manager will oversee the application of the appropriate quantity of limestone, which will be spread over the top of each truck load. The material will be blended mechanically with a front end loader bucket and rake. Once homogeneity has been reached, the treated load will be placed on a stockpile designated for that job pending validation testing. The stockpile as a whole will receive further mixing from this handling process and as the material rolls down the stockpile face.

Samples will be taken for validation during delivery and promptly dispatched for analysis. Whilst samples are being validated, the locations will be marked for identification, pending the results. Results will then be tabulated and the material disposed of or re-treated.

4.1.2.2 Treatment Pad

A treatment pad will be used for untreated ASS material to be stockpiled. The material will stay on the treatment pad until analysis confirms that material has been neutralised and meets assessment criteria from Section 5.1. The size and location of the treatment pad will vary according to the operational requirements of the Site, however changes must be communicated in writing. Specifications for the treatment pad include:

- The base of the treatment pad will consist of compacted crushed limestone with a minimum thickness of 300mm.
- The pad will be graded with a fall of 1:100 or greater, to facilitate drainage. It will be bunded on all sides with crushed limestone to retain any run-off. The bund will have a minimum height of 300mm, measured from the top of the treatment pad surface. The end of the pad, the highest point, will be protected by a drive-over bund to allow access by trucks. The drive-over bund will be 150mm high, with drainage being directed away from this point by the fall in the pad.

4.1.3 Validation Sampling

Treated materials will be sampled in accordance with the recommendations contained in the Landfill Waste Classifications and Definitions 1996 (As amended). The samples are to be taken in accordance with proper sampling techniques by the Site Manager, to ensure the sample is a good representation of the material treated.

The sample location is to be clearly marked and labelled with the date, job and sample number recorded on the marker. These details and the location should then be recorded in the Site sampling diary.

Samples are to be taken promptly to MDWES for analysis and approximately 25% of the samples will be forwarded to a NATA accredited laboratory for verification analysis under the SPOCAS or CRS method. Analysis results will be produced in a table format by MDWES and compared against the assessment criteria. A written review will then be sent to Wasterock Pty Ltd.

If validation is in compliance with the assessment criteria, the sample markers will be removed and the material will be re-used to its highest and best use. If the samples do not meet assessment criteria, that section will be excavated and re-treated with additional limestone, then re-sampled. The sample validation processes apply.

4.2 RECEIVED - HYDROCARBON IMPACTED SOILS

The following relates to operational considerations for the acceptance, management, re-use and disposal of Hydrocarbon Impacted (HI) soil materials.

Samples of untreated material that are identified must undertake laboratory analysis to determine the amount of bioremediation required to amend the soil. The number of samples required will be as required according to the *Landfill Waste Classifications and Definitions 1996 (As Amended)*.

4.2.1 Re-use

Hydrocarbon impacted (HI) soils will be treated and re-used in soil amendment products within the capping layer of the remediated Site. If the soil is not able to be re-used, or there is an overabundance of soil in the stockpile, it will be disposed of as landfill.

4.2.2 Methodology

All materials will be tested according to *Landfill Waste Classifications and Waste Definitions 1996 (As Amended)* (DEC 2009). The results will then be checked by MDWES and written approval for acceptance will be submitted to Wasterock Pty Ltd, prior to material delivery. MDWES will also advise regarding the treatment, processing and remediation requirements of the soils.

4.2.2.1 Bioremediation

Every 20m³ truck load of HI material will be tipped onto a limestone treatment pad. Soils will be placed into windrows and will be rotated periodically to assist in the volatilisation of the HI soils.

Samples will be taken for validation once the soils appear to be remediated using hydrocarbon detection/instrumentation. The soils will then be further validated through laboratory analysis. Whilst samples are being validated, the locations will be marked for identification, pending the results. Results will then be tabulated and the material will be suitable for use as capping soils or will re-treated and assessed further.

4.2.2.2 Treatment Pad

A treatment pad will be used for untreated HI soil material being stockpiled. The material stays on the treatment pad until analyses confirm that material has been volatilised and meets assessment criteria. The size and location of the treatment pad will vary according the operational requirements of the Site, with any changes to be communicated in writing. Specifications for the treatment pad include:

- The base of the treatment pad will consist of a 1.5mm HDPE liner and compacted crushed limestone with a minimum thickness of 300mm.
- The pad will be graded with fall of 1:100 or greater to facilitate drainage and will be bunded on all sides with crushed limestone to retain any run-off. The bund will have a minimum height of 300mm, measured from the top of the treatment pad surface. The end of the pad, the highest point, will be protected by a drive-over bund to allow access by trucks. The drive-over bund will be 150mm high, with drainage being directed away from this point by the fall in the pad.

4.2.3 Validation Sampling

Treated soil material will be sampled in accordance with the recommendations contained in the *Landfill Waste Classifications and Definitions* 1996 (As amended). The samples will be taken in accordance with proper sampling techniques by the Site Manager, to ensure the sample is a good representation of the material treated.

The sample locations will be clearly marked and labelled with the date, job and sample number recorded on the marker. These details and the location will then be recorded in the Site sampling diary.

Samples will be taken promptly to MDWES for analysis and then forwarded to a NATA accredited laboratory for verification analysis. Analyses will be recorded in a table format by MDWES and compared against the assessment criteria. A written review will then be sent to Wasterock Pty Ltd.

If validation is in compliance with the assessment criteria, the sample markers will be removed and the material will be used/re-used to its highest and best use.

If the samples do not meet assessment criteria, then further volatilisation may be required. To remove the HI within the soils, soils would be placed back into windrows and rotated. This would require further validity processing and laboratory samples to be taken, to ensure that the soils were suitable for their intended use (capping soils).

5 ASSESSMENT CRITERIA

5.1 Acid Sulfate Soil

5.1.1 Stage 1 Validation

Soil treatment will be considered successful if:

- The individual verification samples have field test results of pH_F and $\text{pH}_{OX} > 5.5$.
- The laboratory $\text{pH} > 5.5$.
- The laboratory net acidity $< 18 \text{ mol H}^+/\text{tonne}$.

Treatment materials will be removed from the pad when a pH of 5.5 or greater has been achieved. The material may be stored anywhere on the site pending Stage 2 testing.

5.1.2 Stage 2 Validation

Treated material that meets the Stage 1 criteria will be further tested in 4 to 8 weeks. These results will be assessed against the assessment criteria of $\text{pH}_F > 6.5$ and $\text{pH}_{OX} > 6$. If above these Stage 2 levels, the material will be considered “successfully treated” and considered fully neutralised. The soils can then be used for any purpose within the limitations of Section 4.1.

Materials that fail Stage 2 will be subjected to additional testing until the criterion is met. Re-treated material will be re-tested immediately and will not require the 4 to 8 week stabilisation period.

5.2 Hydrocarbon Impacted Soils

Soil treatment is considered successful if:

- The individual verification samples have laboratory test results of TPH below HIL-F.

6 MONITORING AND RECORDING

The existing groundwater monitoring bores at the site will be monitored in accordance with the existing licences. Wasterock Pty Ltd will also record the following information for each disposal operation:

- The total quantity of material accepted.
- The source from which the material originated.
- The end use of the treated material.
- The approximate location of disposal and the dates over which the disposal operation ran.
- Validation results for material amended for re-use on-site.

7 REFERENCES

DEC (2009) *Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009)*. Department of Environment and Conservation.

DEC (2011) *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes*. Contaminated Sites Branch, Department of Environment and Conservation

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