Mulgoa Excavations Pty Ltd C/-
Precise Planning

Remedial Action Plan: 25 Martin Road, Badgerys Creek, NSW.

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

P1404242JR04V01
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All enquiries regarding this project are to be directed to the Project Manager.

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1 Introduction

1.1 Overview

This remedial action plan (RAP) is prepared by Martens and Associates (MA) Pty Ltd for Mulgoa Excavations Pty Ltd C/-Precise Planning for the purpose of addressing bonded asbestos contamination at 25 Martin Road, Badgerys Creek, NSW ('the site').

This RAP outlines the remedial actions and management practices required in relation to the presence of bonded asbestos contamination identified on site as part of a preliminary site contamination assessment prepared by MA (2014) which should be read in conjunction with this document. Further discussion regarding previous onsite contamination investigations is found in Section 3.

This RAP has been prepared in general accordance with ASC NEPM (1999, amended 2013) and NSW OEH (2011).

1.2 Objectives and Scope of the RAP

RAP objectives are:

- Set remediation goals and criteria.
- Review the available remedial options.
- Select the preferred remedial option.
- Provide details of preferred remedial option.
- Outline procedures and activities for implementation of the preferred remediation option.
- Outline requirements for contractors to prepare environmental and occupational health and safety plans for the remediation.
- Outline contingency plans.
- Outline regulatory compliance requirements.
- Provide a framework for site environmental management during remediation.

The format of this RAP is as follows:

- Summary of previous study and contamination status (Section 3).
- Extent of remediation required to allow proposed use (Section 4).
- Remediation goals and criteria (Section 5).
- Remediation and validation activities (Section 6).
- A guide for site control during remediation and site specific health and safety for remediation and validation (Section 7).
- Regulatory compliance requirements (Section 8).
- Remediation contacts (Section 9).
- Contingency plan (Section 10).

1.3 Proposed Development

We understand that the proposed development includes the following:

- Construction of weighbridge office and two additional prefabricated portable buildings.
- Development of pond for site stormwater management purposes.
- Hardstand or other pavement areas across majority of site for placing and managing stockpiles.
- Precast concrete dividing walls surrounding perimeter of site.

1.4 Abbreviations

ABC – Ambient background concentration

ACL – Added contaminant level

ACM – Asbestos containing material

AEC – Area of environmental concern

AF – Asbestos fines

AHD – Australian height datum

ASC NEPM – Assessment of site contamination (National Environmental Protection Measure)

BTEX – Benzene, toluene, ethyl benzene, xylene

BGL – Below ground level

COC - Chain of custody

COPC – Chemical of primary concern

CSM – Conceptual site model

DEC – NSW Department of Environment and Conservation

DP – Deposited Plan

DQI – Data quality indicators

DQO – Data quality objectives

EIL – Ecological investigation levels

EPA – NSW Environmental Protection Authority

ESA – Environmental site assessment

ESL – Ecological screening levels

EQL – Estimated quantitation limit

FA – Fibrous asbestos

GSW – General solid waste

HIL – Health investigation levels

HM – Heavy metals

HSL – Health Screening levels

LCC- Liverpool city council

LGA – Local government area

LPG – Liquid petroleum gas

MA – Martens and Associates Pty Ltd

mbgl – Meters below ground level

NATA – National Association of Testing Authorities

OCP – Organochloride pesticides

OEH – NSW Office of Environment and Heritage

OPP – Organophosphate pesticides

PAH – Polycyclic aromatic hydrocarbons

PCB – Polychlorinated biphenyl

QA/QC - Quality assurance / quality control.

RAP – Remediation Action Plan

RPD – Relative percentage difference – difference between two values divided by the average

SAC – Site acceptance criteria

SAQP – Sampling analytical quality plan

SCA – Site contamination assessment

SOP – Standard operating procedure

TCLP – Toxicity characteristic leaching procedure

TRH – Total recoverable hydrocarbons

UCL – Upper confidence limit

UST – Underground storage tank

VHC- Volatile halogenated compounds

VOC – Volatile organic compounds

WHSP – Worker health and safety plan

2 Site Background Information

2.1 Location and Setting

Table 1: Site background information.

Investigation address	25 Martin Road, Badgerys Creek, NSW
Lot and DP (Title Information)	Lot 1, DP 611519
Site area	2.0 ha
Local Government Area (LGA)	Liverpool City Council
Zoning	RU1 – Primary Production
Site description	Site is undeveloped rural property, currently used as a storage yard for an excavation company. Stockpiles of sandstone, gravel, concrete, sand and clayey sand located across the site. Two vegetated bunds are located in the western third of the lot. The site is bordered by Martin Road to the east, Lawson Road to the west, and rural residential to the south. Agricultural/industrial developments are located to the north. The site has low slopes of <5% grading to the south west. Site elevation is between approximately 55 – 61 mAHD.
Current land use	Vacant rural residential property, with limited industrial use
Proposed land use	Industrial
Surrounding land uses	Mixture of rural residential and agricultural
Geology and soil landscapes	The Penrith 1:100,000 Geological Series Sheet 9030 (1991) indicates that the site is underlain by Bringelly Shale which comprises shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone and rare coal/tuff. The Penrith 1:100,000 Soil Landscape Series Sheet (1989) indicates site soils comprise the Blacktown soil landscape which consists of shallow to moderately deep (<1 m) hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines.
Environmental receptors	The investigation site generally drains toward a dam approximately 350m south west which eventually drains to Badgerys Creek (approximately 460 m to the west of the site).
Human receptors	Future workers of the site. Existing surrounding rural residential developments. Market gardens in surrounding properties. Future onsite construction workers / builders.

Site plan is provided in Attachment A (Figure 1).

2.2 Hydrogeology

2.2.1 Regional Aquifers

Previous studies (Department of Transport and Regional Development, 1997) have identified two major aquifers within the Badgerys Creek area being:

- An unconfined aquifer located within quaternary alluvium.
- A confined, deeper aquifer located in Bringelly Shale.

Minor perched groundwater zones have been identified throughout the Badgerys Creek areas located in weathered shales, however, these zones are not continuous and are not considered to form aquifers.

2.2.2 Regional Groundwater Bore Information

Review of NSW Natural Resources Atlas indicated twenty-five groundwater bores within 1 km of the site; however, only three of those borehole locations feature available information (Table 2).

Table 2: Available hydrogeological information.

Groundwater Bore Identification	Direction and Distance	Depth To Groundwater (mBGL)	Intended Use	Water Bearing Zone Substrate
GW072774	North (640m)	ND [1]	Groundwater Explore	ND [1]
GW112172	North (580m)	ND [1]	Monitoring Bore	ND [1]
GW105016	South (420m)	53.00	Domestic Stock	Shale

Notes

[1] ND – No data available.

From a review of the above information, groundwater wells in the nearby area are utilised for domestic stock, monitoring bore or for groundwater exploration.

Bore data indicates nearby regional aquifer groundwater levels are typically at 53.0 mBGL.

2.2.3 Onsite Groundwater Monitoring Wells

2 groundwater monitoring wells were installed on 8 July 2014 as part of the site investigation works. GW1 (4.3 mbgl) and GW2 (4.1 mbgl) were both installed with a 1.5m slotted screen located in the underlying

siltstone and shale geology. Well construction details are available in attached borehole logs.

2.2.4 Groundwater Monitoring

Groundwater levels were continually monitored using diver data loggers in both wells over two separate monitoring periods of approximately 1 and 2 months. Permeability testing (Section 4.5) involving recovery tests were completed between each monitoring period. A statistical summary of collected groundwater data is provided in Table10 and Table 11.

Table 3: Summary of groundwater level July 2014

GW Bore ID	Ground Level (mAHD)	Minimum Groundwater Level (mAHD)	Median Groundwater Level (mAHD)	Maximum Groundwater Level (mAHD)	Min. Depth (mbgl) to Groundwater
GW1	60.35	56.50	56.37	56.29	3.84
GW2	58.10	55.91	55.79	54.48	2.19

Table 4: Summary of groundwater level August – September 2014

GW Bore ID	Ground Level (mAHD)	Minimum Groundwater Level (mAHD)	Median Groundwater Level (mAHD)	Maximum Groundwater Level (mAHD)	Min. Depth (mbgl) to Groundwater
GW1	60.35	56.45	56.19	55.75	3.90
GW2	58.10	55.35	54.99	54.73	2.75

Based on the groundwater monitoring data and regional groundwater data, intercepted ground water at the site is considered to be a discontinuous perched water bearing zone and not hydraulically connected to regional groundwater bearing zones or aquifers. Further study would be required to define the extent of the perched water zone beneath the site.

3 Summary of Previous Investigation

3.1 Martens and Associates (2014) Preliminary Site Contamination Assessment

Site contamination has previously been addressed in the following document:

- Martens and Associates (2014) *Preliminary Site Contamination Assessment: 25 Martin Road, Badgerys Creek, NSW* ref: P1404242JR01V01.

A summary is provided in Table 5.

Table 5: Summary of previous site investigations.

Investigation Details	Investigation Task and Finding
Scope of works	o Walkover inspection to review current land use, potential contaminating activities and neighbouring landuses. o Review available Liverpool City Council (LCC) site development consents. o Review 4 historic aerial photographs to assess past site and surrounding land use patterns. o Review NSW EPA notices under the Contaminated Land Management Act (1997). o Preliminary intrusive soil investigation and laboratory analysis. o Preparation of a preliminary SCA report in general accordance with the relevant sections of NSW OEH (2011) and DEC (2006).
Key findings of site walkover	o Site currently used as a sorting and storage yard with temporary stockpiles of gravel, concrete, topsoil and other material located in the eastern half of site. o Two grassed bunds in central western section of lot and along western boundary. o Extensive filling appears to be spread across majority of the eastern and central portions of the property, consisting of ripped sandstone (sand) or gravelly sand with silt. o Previous dam along southern boundary filled with material from unknown source. o Crushed sandstone placed across eastern 2/3 of site to provide working platform for storage of stockpiles and vehicular movement. o PACM fibrous cement sheeting fragments observed in south east corner of lot (from illegal dumping noted by site owner and documented with Council). o Surface water/ponding (with sulphur odour) observed along northern boundary where neighbouring dam discharges. o Concrete 'Hebel' walls around the north east, east and south east perimeter sections of the site. o Stockpile of 'Hebel' blocks in eastern portion of the site. o Some vegetation consisting of approximately 10-15 year old gum trees. o No watercourses visible onsite.

Investigation Details	Investigation Task and Finding
Key finding of subsurface investigation and soil testing	o Subsurface testing include 5 testpits using an excavator and 5 boreholes using a 4WD truck mounted drilling rig. Maximum investigation depth was to 4.5 mbgl. o Fill material was encountered which was found to be generally heterogeneous and consisted of sandy clay, gravelly sand or silty sands overlaying ripped shale. Minor anthropogenic inclusions were noted including brick, tile and concrete. Anthropogenic Inclusions were limited to TP101 and TP102. o Soil samples were analysed for the suite of chemicals of primary concern which included 8 heavy metals, BTEX, TRH, PAH, PCB, OCP/OPP and asbestos fibres in soil. o Laboratory results were compared to commercial / industrial land use specific site acceptance criteria (SAC) developed based on ASC NEPM (1999, amended 2013). o A sample of observed PACM fibre sheeting in the south east corner of the site was collected for asbestos analysis. o All tested analytes from soil samples reported concentrations below the adopted SAC. o The collected material sample returned a positive detection of asbestos.
Conclusion and recommendations	o The site contamination assessment concluded that a remediation action plan (RAP) was required to manage the identified asbestos contamination and render the site fit for the proposed commercial development.

4 Extent of Remediation Required

Based on the completed onsite investigations, asbestos contamination in the form of bonded cement fibre fragments has been identified at the surface in the south east corner of the site. Remediation will be required to render the site fit for the proposed commercial industrial use. Identified contamination is limited to visible surface fragments with no asbestos fines or fibres detected in site soils, and natural soils were noted underlying the impacted area.

A review of available remediation technologies suitable to address remediation requirements is outlined in Section 5 and a remediation plan is detailed in Section 6.

5 Remediation Programme

5.1 General

The following sections present a plan for remediation and management of identified asbestos contamination.

5.2 Remediation Goals

The remediation goal is to render the site suitable for proposed commercial / industrial use and mitigate the potential risk to sensitive receptors from asbestos contamination.

5.3 Assessment of Remedial Options

A review of soil remedial technologies has been undertaken to establish which technology or combination of technologies is most suitable to meet the site remediation objectives. NSW DEC (2006) provides a preferred hierarchy of options for site clean-up and/or management, outlined as follows:

- On-site treatment of the contamination so that is it destroyed and the associated risk is reduced to an acceptable level.
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which the soil is returned to the site.
- Removal of contaminated material to an approved facility, followed, where necessary, by replacement with appropriate material.
- Cap and contain material onsite with an appropriately designed barrier.

Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy would be required.

Review of available soil remediation strategies and technologies is considered on the basis of:

- Effectiveness at achieving remediation objectives.
- Suitability in light of the proposed development.
- Anticipated costs.
- Ongoing environmental and public health adequacy.

Based on the above, the following strategies may be applicable to the remediation of contaminated material:

- Excavation, waste classification, and offsite disposal of contaminated soil to landfill.
- Residual risk may be managed on-site through capping. This shall remove direct exposure pathways between the known and likely contaminated soil and future users of the site.

A review of treatment options is presented in Table 6.

Table 6: Review of soil remediation options.

Remediation Options	Advantages	Disadvantage	Comments
Capping and containment	o Likely to be a low cost option.	o Will not remove contamination. o Ecological and public health risks remain onsite. o Remaining future liability. o A long term EMP required to manage remaining contamination. o Note on title indicating presence of onsite contamination	Capping is considered an unsuitable remediation technique to deal with identified asbestos impacted soils as it places future land use restrictions on the site with the requirement of an EMP and note on title.
Offsite disposal	o Provides the shortest timeframe for remediation. o Removes human health risks and long term management requirements. o Meets redevelopment objectives.	o High cost for material transport and disposal charges. o Additional cost associated with classifying wastes prior to offsite disposal.	This proven and reliable technique for managing onsite contamination is suitable as it removes identified contamination and associated risk to the environment as well as long term site management responsibilities. Based on site testing to date, there is a relatively small amount of material proposed for offsite disposal as part of remediation requirements.

5.3.1 Preferred Soil Remediation Option

In consideration of soil remediation technologies presented in Table 6 and the proposed development, offsite disposal is considered the most suitable technology. Details of the approach to execute this remediation option are provided in Section 6.

6 Remediation Planning

6.1 Remediation Plan

6.1.1 Overview

The following sections outline works required to remediate identified contaminated soils such that the site is fit for proposed commercial / industrial use as a dry materials sorting and recycling facility.

The remediation process shall be completed in 5 stages as outlined in the following sections.

Unless otherwise identified, activities discussed below will be the responsibility of the contractor or its representative.

6.2 Stage 1 – Regulatory Approvals / Notification

The following regulatory approval and notifications will be required:

- Notification to Liverpool City Council is required in accordance with SEPP 55 - Remediation of Land (1998) where other development consents do not cover the works. At the conclusion of remediation works, Council shall also be notified outlining completion of remediation.

6.3 Stage 2 – Appointment of Environmental Consultant / Remediation Contractor

An environmental consultant / occupational hygienist is to be engaged to oversee and document all stages of the remediation works, perform a detailed site wide asbestos survey, perform validation testing (where required) and prepare a validation report. As no asbestos fines (AF/FA) have been detected onsite, air monitoring for asbestos fines during remedial works is not considered necessary. Dust mitigations (Section 7.2.4) shall be incorporated through the remediation process. Should any AF/FA material be discovered during remedial works, the unexpected finds protocol (Section 10) shall be followed and onsite management, including active air monitoring shall be designed and executed by the appointed environmental site consultant.

For remediation works to be successfully completed, the appointment of a suitability qualified environmental / earthworks contractor is required. As no FA/AF has been detected onsite, the selected contractor will require a NSW WorkCover Class B licenced to complete the remediation works as outlined in the NSW Work Health and Safety

Regulation (2012). An asbestos management plan is to be prepared by the nominated contractor prior to the commencement of onsite works.

6.4 Stage 3 – Asbestos Survey

Prior to the commencement of remedial excavation, a site survey shall be completed by the appointed environmental consultant. The survey will include visual inspection of areas previously observed to contain bonded cement fibre fragments, marking of areas requiring remediation and preparation of a plan identifying areas requiring remediation. Results of the asbestos survey will constitute an addendum to the RAP, with the information used for remediation and validation requirements and the extent of remediation required.

6.5 Stage 4 – Remediation Work

The remedial works will involve the excavation and offsite disposal of soils and material identified as asbestos impacted during the Stage 3 – asbestos survey. Remedial excavation considerations for asbestos impacted portions of the site will be detailed in an addendum to the RAP following completion of the asbestos survey (i.e. the expected material volume and condition).

All remedial excavation works shall be undertaken under fulltime supervision from the appointed environmental consultant.

Impacted material shall be excavated (min 100 mm into underlying soil) and temporally stockpiled and covered in a secure onsite location where waste classification sampling shall be completed by the environmental consultant.

Following excavation, the impacted area is to be visually assessed to confirm natural soil is exposed and bonded asbestos fragments have been removed.

Waste classification is to be completed for any material designated for offsite disposal in accordance with NSW EPA (2014) Waste Classification Guidelines. Waste classification sampling frequency shall meet ASC NEPM (1999, amended 2013) criteria being 1:25 m^3 (minimum of 3 samples) and analysed for TPH/BTEX, PAH and heavy metals.

6.6 Stage 5 – Site Validation

Prior to the site being declared suitable for industrial land use, a validation report documenting the completed remediation works and results of onsite validation testing must be prepared by a the appointed site environmental consultant. The following sections outline the site validation requirement.

6.6.1 Data Quality Objectives

A data quality objective (DQO) process is required to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of the site. Table 5 outlines DQO which have been prepared in general accordance with NSW DEC (2006) and US EPA (2006) guidelines.

Table 7: Data quality objectives for the assessment of soil investigations.

Step 1 **Stating the Problem**	Previous site investigations have identified the presence of bonded asbestos contamination which requires appropriate remediation before the site can be deemed suitable for the intended commercial / industrial land use.
Step 2 **Identifying the Decision(s)**	To assess the suitability of the site for future residential use, decisions are to be made based on the following questions: o Has the completed remediation works removed the identified risk to future site users? o Is the current soil quality suitable for the intended commercial / industrial land use? o Are there any aesthetic impacts remaining in the remediated areas? o Is any future management of site soils required?
Step 3 **Identification of Inputs to the Decision**	The inputs to the assessment of site soil quality will include: o Existing site environmental data. o Observations during remediation activities. o Soil sampling results from site areas undergoing remediation works. o Assessment of analytical results against site suitable human health and ecological risk criteria.
Step 4 **Study Boundary Definitions**	Study boundaries are as follows: o Lateral – Lateral boundary of the assessment is defined by the site boundary as indicated in Figure 1 (Attachment A). o Vertical – Vertical boundary will be governed by the maximum depth reached during remediation works o Temporal – The dates of site inspection and validation sampling.

Step 5 **Development of Decision Rules**	The decision rules for this for this investigation area is as follows: o Follow remedial excavation of bonded asbestos impacted soils, should the underlying material be confirmed as natural soil (i.e. no fill material) then visual validation shall suffice to confirm the removal of bonded asbestos fragments and any impacted soil. o Following remedial exaction of bonded asbestos impacted soils, should the underlying material be determined to be fill material then a validation sampling program will be required and the following addition decision rules will apply: a) If the concentration of asbestos in the soil data collected from a remediation area does not exceed the validation criteria, then the area or soil 'packet' can be confirmed as validated. b) If the concentration of asbestos in the soil data collected from a remediation area exceeds the validation criteria then additional remediation or management strategy will be required for that remediation area. o Any material nominated for offsite disposal shall be classified in accordance with NSW EPA (2014) Waste classification guidelines.
Step 6 **Specification of Limits on Decision Errors**	Guidance found in ASC NEPM (1999 amended 2013) Schedule B2 regarding 95% upper confidence limit (UCL) states that the 95% UCL of the arithmetic mean provides a 95% confidence level that the true population mean will be less than or equal to this value. Therefore a decision can be made based on a probability that 95% of the data collected will satisfy the site acceptance criteria. A limit on decision error will be 5% that a conclusive statement may be incorrect.
Step 7 **Optimisation of Sampling Design**	The validation testing program will aim to ensure that all the necessary data is collected to confirm the site suitability for the intended commercial / industrial use.

6.6.2 Confirmation of Natural Material and Visual Validation.

Based on previous site testing, it is anticipated that the material beneath the bonded asbestos impacted area consists of natural site soils. Following the remedial excavation works, additional test pitting within remediation areas will be required to confirm the presence of natural material. Following confirmation of natural material a validation of remedial works shall be completed through a visual assessment supported by a photographic survey undertaken by the appoint environmental consultant. The results of the visual validation and photographic survey will be documented in the site validation report.

Should post remedial excavation test pitting find fill material, a validation sampling program will be required which is outlined in the following sections.

6.6.3 Validation Criteria

To ensure that site remediation works have rendered the site fit for the proposed commercial / industrial use, asbestos health screening levels from ASC NEPM (1999, amended 2013) shall be adopted as site validation criteria. A summary of adopted criteria is presented in Table 8.

Table 8: Adopted asbestos screening criteria.

Form of Asbestos	Adopted Screening Level (w/w)
Bonded ACM	0.05%
FA and AF	0.001%
All forms of asbestos	No visible asbestos for surface soils (top 100mm)

6.6.4 Validation Sampling Program

The required validation sampling program shall meet the requirements of NSW EPA (1995) *Sampling Design Guidelines.*

It is anticipated (based on previous site inspections) that asbestos impacted areas will total less than 500m^2 resulting in a maximum of 5 sampling points required to meet validation requirements.

ASC NEPM (1999, amended 2013) asbestos sampling methodology, is to be adhered to for validation testing.

6.6.5 Quality Control/Quality Assurance

The following field QA/QC measures will be completed and reported for all material sampled:

- Collection of intra-laboratory duplicate samples at a rate of 1 per 10 primary samples (minimum 1 per day of sampling) to assess sampling analytical process and laboratory replication of results.
- Daily trip spikes and trip blanks to assess cross-contamination and losses.

All samples will be analysed by a NATA accredited testing laboratory. The analytical laboratory will be required to perform internal quality control procedures specific to analytical methods and guidance documents. These include, but not limited to the following:

- Laboratory blanks - Analysed with each set of samples to assess analytical accuracy.
- Duplicate - Complete duplicate analysis of a sample from the process batch to assess reproducibility of results.
- Matrix Spike – Used to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
- Surrogate Spike – Assessment of matrix effects and sample preparation losses.

6.6.6 *Data Assessment*

Laboratory data will be reviewed by the appointed environmental consultant and assessed by applying data validation guidelines. The data will be compared to the adopted validation or waste classification criteria. Statistical interpretation of validation data may be required to establish that the remediation goals have been met. Based on comparison, areas that have under gone satisfactory remediation will be identified and will be designated as "No Further Action Required." Where the validation criteria have not been met, require further remediation works and validation sampling will be required.

6.6.7 *Validation Reporting*

A site validation report will be prepared by the appointed environmental consultant at the completion of remediation works. This report shall document the remediation and validation sequence, detail all validation works (visual survey or sampling) and results of assessment. The document shall also include details regarding any remaining site contamination, and identify residual risks posed by remaining contaminants.

7 Site Management Plans for Remediation

7.1 Overview

A site specific Environmental Management Plan (EMP) and Workers Health and Safety Plan (WHSP) are to be prepared by the Contractor prior to the commencement of onsite works. The following sections are intended as guide to the information that should be included in these plans.

7.2 Environmental Management Plan

A site specific EMP shall be prepared to ensure the works do not negatively impact on potential receptors (humans and environment) and comply with applicable environmental legislation.

Based on the site condition and proposed remediation method, primary environmental hazards requiring management during remedial works may include:

- Soil and stockpile management.
- Noise controls.
- Odour control.
- Dust control.

Additional onsite management issues that may be included in the EMP include:

- Site access and security.
- Signage and contact information.
- Traffic control.
- Hours of operation.

Suggested requirements for these management points are discussed in the following section.

7.2.1 Soil and Stockpile Management

The following points should be addressed regarding soil and stockpile management:

- Detailed records of stockpile material, location and volume are to be prepared and kept onsite. Stockpile records are to be maintained and updated with any changes (i.e. offsite disposal).
- No placement of soil or other material on Council properties (footpaths / nature strips) unless prior approval is sought.
- All stockpiles are to be covered by appropriate weighted plastic liners to reduce the potential for air pollution.
- All stockpiles containing soil or material identified as contaminated shall be stored in clearly marked areas with appropriate signage.

7.2.2 Noise Control

To mitigate noise impacts which may arise as a result of remedial works, the Contractor will undertake works in accordance with state and local noise regulations. The contractor's machinery, including machinery hired by the contractor, should be in good working order so that abnormal machine noise is avoided.

All works are to be undertaken with the Liverpool City Council designated working hours (Section 7.2.8).

7.2.3 Odour Control

Based on the identified site contaminants (asbestos), odour is not considered to be major environmental concern. Should odours be encountered contingency measures including the covering of stockpiles and the use of odour suppressant spays should be implemented.

7.2.4 Dust Control

Dust control procedures are to include:

- Erection of dust screens around the site perimeter.
- Cover of all soil loads entering or exiting the site.
- Use of water sprays across the site.
- Covering of all soil stockpiles if left greater than 24 hours.

7.2.5 Site Access and Security

Prior to works commencing, barricades shall be erected to control access to the designated work area, along the proposed remediation area boundary. Signage should be erected, identifying the area as asbestos contaminated and no unauthorised access is permitted. Site security and access controls must remain in place during all onsite construction works.

7.2.6 Signage and Contact Information

Security fencing and appropriate signage around all open excavations must be installed and maintained by the contractor.

A sign displaying the contact details of the contractor (including the onsite foreman or manager) shall be displayed for the duration of onsite works.

7.2.7 Traffic Control

Prior to exiting the site, vehicles shall be required to pass through a stabilised exit point to remove potentially contaminated soil that may have accumulated while onsite. Prior to leaving the site, during the decontamination phase, earthworks machinery are required to decontaminate upon plastic sheeting laid beneath vehicles, with all accumulated potentially contaminated soil removed. Plastic sheeting and contaminated soils collected should be disposed of with classified waste for subsequent offsite disposal.

7.2.8 Hours of Operation

Onsite works are only permitted during the following hours as outlined in the Liverpool City Council building site specifications:

- Monday – Friday: 7am – 6pm
- Saturday: 8am – 1:00 pm

- Sunday and public holidays: No work permitted.

7.3 Works Health and Safety Plan

Worker health and safety of all onsite workers or visitors is the responsibility of the contractor. The purpose of an WHSP plan is to provide relevant health and safety information for all personnel undertaken work or visiting the site.

All onsite personnel and visitors must read the WHSP plan and acknowledge the requirements prior to entering the site.

The WHSP plan should include (but not necessarily be limited to):

- Legislation requirements.
- Hazardous materials identification (including fuel and chemical management).
- Induction requirements.
- Worker facilities.
- Designation, delineation and control of access to various work zones.
- Community notification.
- Contingency management.
- Roles and responsibilities.
- Training and competency.
- Hazard identification and risk assessment.
- Control measures including personal protective equipment (PPE).
- Incident and emergency response.
- Safe work method statement.
- Audits.

7.3.1 WHSP Legislation and Standards

All onsite works should comply with current legislation, regulation and standards. As a minimum all work is to comply:

- Workplace Health and Safety Act (2011).

- Workplace Health and Safety Regulation (2011).
- Work Safe Australia – How to Safely Remove Asbestos: Code of Practice (2011).

Additional codes of practices and standards that should be followed include:

- AS 1940 (2004) – The Storage and Handling of Flammable and Combustible Liquids
- AS 2436 (2010) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;
- Managing the Work Environment and Facilities Code of Practice (December 2011);
- Managing Noise and Preventing Hearing Loss at Work Code of Practice (December 2011);
- Hazardous Manual Tasks Code of Practice (December 2011)
- Work Health and Safety Consultation, Co-operation and Co-ordination Code of Practice (December 2011).

7.3.2 Hazard Assessment

An health and safety hazards assessment is to be completed by the contractor and incorporated into the WHSP plan. Key hazards may include:

- Asbestos containing material and asbestos fibres in air.
- Onsite chemical hazards (storage of fuels, contaminated soils).
- Heat exposure for workers.
- Buried services.
- Noise.
- Dust.
- Operation of heavy equipment.
- Operation of electrical equipment.

7.3.3 Worker Facilities

Facilities for workers at the site must be supplied in accordance with the Work Health and Safety Regulation (2011) including the relevant Codes of Practice.

Lunch rooms and toilet/washing facilities shall be separate from the designated work areas.

7.3.4 Site Inductions

Prior to starting works, site workers involved in the project shall attend a site-specific safety induction.

Documented evidence of the safety induction/s must be readily available on site and will be recorded on forms. The contractor should supply site workers including visitors to the site with appropriate PPE as outlined in Section 7.3.5.

7.3.5 Personal Protective Equipment

To reduce short and long term health risks associated with the potential exposure to the chemicals of concern, the minimum level of PPE required for people, depending on the site activity, are listed below.

Table 9: Personal protective equipment.

Type	Description	Required Activity
Head protection	Hard hat	All site activities
Eye protection	Safety glasses	All site activities
Hand protection	Disposable nitrile gloves	Soil sampling activities
	Cut resistant gloves	Manual handling activities
Respiratory protection	Minimum P2 rated particulate respirator	During asbestos remediation works
Body protection	Disposable overalls	During asbestos remediation works
	High visibly clothing	All site activities
	Sunhat, sun screen	All site activities

Type	Description	Required Activity
Foot protection	Steel toed boots	All site activities
Hearing protection	Ear plugs or ear muffs	Site activities likely to generate potentially harmful noise levels.

Site personnel should be aware that personal protection equipment required to be worn may limit manual dexterity, hearing, visibility and may increase the difficulty of performing tasks. PPE places an additional strain on the user when performing work that requires physical activity.

Eating, drinking, chewing gum or tobacco, smoking or any practice that involves hand to mouth transfer increases the probability of ingestion of foreign matter into the body. Hands must be thoroughly washed before eating, drinking or smoking. Clothing which becomes dirty from onsite work should be washed separately from other clothing.

8 Identification of Regulatory Compliance Requirements

8.1 State Environmental Planning Policies

In accordance with SEPP 55 - Remediation of Land (1998), it is considered proposed remediation works would likely classify as Category 2, and therefore would not require specific development consent.

8.2 Waste Disposal Requirements

All soil is to be waste classified in accordance with EPA (2014) Waste Classification Guidelines prior to offsite disposal. Should soils be transported to a landfill, it is a requirement that the receiving landfill be licenced to accept the category of waste leaving the site.

Waste classification documentation and waste dockets from the receiving landfill are to be keep for site validation purposes.

8.3 Asbestos Licences

All asbestos removal shall be undertaken in accordance with relevant work health and safety regulation including but not limited to:

- WorkCover Asbestos – Guidelines for Licensed Asbestos Removal Contractors (2008).
- Work Safe Australia – How to Safely Remove Asbestos: Code of Practice (2011).

9 Remediation Contacts

Names and phone numbers of appropriate personnel for contact during the remediation will be provided prior to commencement of remediation work.

10 Contingency Plan for Remediation and Redevelopment

10.1 Overview

It is considered possible that unexpected situations may occur during remediation and site redevelopment works including the possibility to uncover unidentified contamination. A site contingency plan for managing unexpected situations should be prepared by the Contractor. Unexpected situations that may arise include:

- Uncovering types of contamination that are not presently identified.
- Detection of friable material.
- Generation of unacceptable dust.
- Generation of unacceptable noise.
- Excessive rainfall.
- Collection of water in excavations.

The following sections shall outline procedures to be adopted should any of the above listed events occur.

A flow chart outlining unexpected finds protocol is found in Attachment B

10.1.1 Unknown Materials

If during remedial/construction work, material is encountered which appears to be potentially contaminated, and appears to be different from the soils encountered during previous site investigation, or point sources of contamination, i.e. buried drums, which were not expected to be present are encountered, the following procedures are to be applied:

1. Suspicious material/soil which has been excavated should be stockpiled on bunded, strong, impermeable plastic sheeting, protected from erosion, with seepage retained.
2. Excavation works at that part of the site where the suspicious material (soil, fill or other) was encountered should cease until observed by an experience environmental consultant.

3. Based on visual inspection, the environmental consultant will provide interim advice on construction health and safety, soil storage and soil disposal to allow construction to proceed if practicable.

4. Based on sampling and analysis of the material, the environmental consultant will provide final advice, based on comparison of laboratory test results to suitable criteria relating to human health, potential environmental impacts and waste disposal.

In the context of the above, some examples of "suspicious" material would include oily or odorous material, drums or metal or plastic chemical containers.

10.1.2 Friable Material

During the asbestos survey and / or remedial works, should any material be identified as potentially friable or weathered to the point of generating fibres, all remedial works is to cease and an appropriate management plan is to be prepared by the appointed environmental consultant. The plan is to outline any addition testing and validation requirements, site WHS requirements and air monitoring requirements.

10.1.3 Control of Dust

Contingency measures are to be prepared and implemented if dust levels exceed acceptable levels (based on onsite observation, measurements by dedicated dust monitoring equipment or community complaints). Possible measures shall include:

- Increased use of water sprays.
- Sheeting utilised to cover exposed areas.
- Changing work protocols i.e. avoid work on windy days.

10.1.4 Control of Noise

Should excessive noise be generated during remediation works, contingency measures shall be implemented which include:

- Identification and isolation of the source.
- Modification of the action of the source.
- Erection of temporary noise barriers.

10.1.5 Excessive Rainfall

Contingency measures to be undertaken in the event of excessive rainfall include:

- Ensure that sediment and surface water controls are operating correctly.
- Diversion of surface water away from excavations, soil stockpiles and active work areas.
- Appropriate cover over stockpiles.

11 References

ASC NEPC (1999, amended) *National Environmental Protection (Assessment of Site Contamination) Measure (ASC NEPM,1999 amended 2013*).

Geological Survey of NSW Department of Minerals and Energy (1991), Penrith 1:100,000 Geological Series Sheet 9030.

Martens and Associates (2014) *Preliminary Site Contamination Assessment: 25 Martin Road, Badgerys Creek, NSW report reference P1404242JR01V02*

NSW DEC (2006) 2nd Ed. Contaminated Sites: Guidelines for the NSW Site Auditor Scheme.

NSW EPA (2014) Waste Classification Guidelines Part 1: Classifying Waste.

NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines.

NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.

State Environmental Planning Policy No. 55 (1998) – Remediation of Contaminated Land.

12 Attachment A – Remediation Plan

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KEY

APPROXIMATE SITE INVESTIGATION AREA

APPROXIMATE LOCATION OF SURFACE ASBESTOS IMPACTED AREA

AREA REQUIRING REMEDAITION MAY CHANGE FOLLOWING DETAILED ONSITE ASBESTOS SURVEY

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BM	**REMEDIATION AREAS** **25 Martin Road, Badgerys Creek, NSW**	Drawing No./ID: **Figure 1**
Approved:	JF		
Date:	29.03.2016		
Scale @A3:	NA	Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au	Project: P1404242 | File: JD03V01 | Revision: A

13 Attachment B – Unexpected Finds Protocol

Unexpected Finds Protocol