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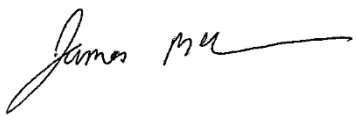
REMEDIATION ACTION PLAN (Revision 3)

30 Swan St Morpeth NSW

7 September 2015

Prepared by



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EXECUTIVE SUMMARY

This report presents the preparation of a Remediation Action Plan (RAP) undertaken by JM Environments (JME) for a portion of 30 Swan Street, Morpeth NSW (the site) as shown in Figure 1.

The work was commissioned by Mr Brad Lantry.

The previous land use of the site was a railway corridor and terminus and the site is currently used as rural residential land use. It is proposed to rezone the site for residential land use. JME has conducted a Preliminary Contamination Assessment which concluded that the site was potentially contaminated from its previous land use. A Detailed Contamination Assessment by JME concluded the site was considered unsuitable for rezoning in its current state from a contamination point of view. A more detailed summary of these reports are presented in Section 3 of the RAP. Based on that conclusion Maitland City Council (MCC) requires a Remediation Action Plan from a contaminated land consultant to describe how the site can be made suitable with appropriate remediation.

The objectives of this RAP are to provide a remediation strategy for the site.

In order to achieve the above objectives, the following scope of work was undertaken:

- A review of previous contamination assessments;
- Preparation of this RAP report.

JME recommends the removal of contaminated soil to an approved waste facility and replacing the soil with validated "clean" soil as the most appropriate remedial technique to render the site suitable for residential land use.

ACM concentration in remediation area 2 is likely to be low. Hence, tilling the soil and hand picking ACM from the surface is considered a cost effective remediation strategy for this area.

Upon completion of the remedial works, a validation report will be produced summarising the results of the remediation and final validation of the site. The report will be written to comply with industry standards and relevant guidelines and will provide a statement as to the suitability of the site for the proposed future land use.

The validation report will be prepared in accordance with the NSW OEH (2011) *Guidelines on Consultants Reporting on Contaminated Site*

RECORD OF DISTRIBUTION

No. of copies	Report File Name	Report Status	Date	Distributed to:	Initials
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ATTACHMENTS

1 INTRODUCTION

1.1 General

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1.2 Objectives

The objectives of this RAP are to provide a remediation strategy for the site.

1.3 Scope of Work

In order to achieve the above objectives, the following scope of work was undertaken:

- A review of previous contamination assessments;
- Preparation of this RAP report.

2 SITE DESCRIPTION

2.1 Site Location and Identification

General site information is provided below in Table 1.

TABLE 1 – Summary of Site Details

SITE ADDRESS:	30 Swan, Morpeth NSW shown in Figure 1.
SITE AREA:	Approximately 7,900m^2
CURRENT ZONING	RU1 Primary Production
SITE IDENTIFICATION:	Lot 3 DP237264 within the Local Government area of Maitland, Parish of Alnwick, County of Northumberland.
PREVIOUS LANDUSE:	Historical evidence indicates that the site has been used as a • Railway line and terminus; • Rural residential.

CURRENT LANDUSE:	Rural residential
PROPOSED LANDUSE:	Residential
ADJOINING SITE USES:	Residential land use south and west of the site; Rural land use north and east of the site
SITE COORDINATES	Easting 383950, Northing 6356784

2.2 Site Topography and Drainage

A review of the online topographic map (www.maps.six.nsw.gov.au) indicates the site is relatively flat and less than 10m above sea level. Stormwater from site would drain into the paddock immediately north of the site. It is expected that the local stormwater would discharge into the Hunter River approximately 160m north of site.

2.3 Local Geology, Hydrogeology and Groundwater Use

A review of Newcastle 1:250,000 Geological Series Sheet S1 56-2, First Edition, 1966 indicates that the site is underlain by Quaternary soils made up of gravel, sand, silt, clay "waterloo rock" (aka indurated sand or "coffee rock"), marine and freshwater deposits.

The NSW Department of Water and Energy operates a website listed as www.waterinfo.nsw.gov.au with search tools that provide summary reports on registered bores in NSW. JME carried out a search of registered bores on this website on the 21 March 2014. The results of this search indicated that that there were no registered bores within a 1 kilometre radius of the Site. .

It is anticipated that groundwater will be located between 2mbgs and 6mbgs of site and flow north towards the Hunter River.

A review of the online acid sulfate risk map (www.nratlas.nsw.gov.au) indicated that the site is located on the border of Class 4 and Class 5 acid sulfate areas. Class 4 areas require an acid sulfate soil assessment be conducted for works beyond 2 metres below natural ground surface or works by which the watertable is likely to be lowered beyond 2 metres below natural ground surface. Class 5 areas require an acid sulfate soil assessment for works within 500 metres of adjacent Class 1, 2, 3, or 4 land which are likely to lower the watertable below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land.

2.4 PREVIOUS CONTAMINATION ASSESSMENTS

As mentioned earlier JME has conducted a PCA, *JME4015 Preliminary Contamination Assessment 30 Swan Street Morpeth 16 April 2014* (JME2014) and a DCA, *JME4079 Swan Street Morpeth Detailed Contamination Assessment* (JME2014a).

2.4.1 JME2014

A review of the JME2014 was undertaken. The objectives of JME2014 were to:

- identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past;

- assess Areas of Environmental Concern (AEC's) and Chemicals of Concern (COC's) for the site; and
- provide recommendations on further assessment or remediation, if considered necessary.

In order to meet the objectives the following scope of works was undertaken:

- desktop study;
- a site walkover;
- review and collation of the above information and identification of potential Areas of Environmental Concern (AECs) and potential Chemicals of Concern (COCs);
- preparation of the PCA report.

The desk stop study indicated the site had been potentially contaminated from its past use as railway station and rail terminus. It was recommended that a detailed contamination site assessment which includes soil sampling and analysis is undertaken to further assess the potential contamination of the site. The areas of environmental concern (AEC) and the potential chemicals of concern (PCoC) from the PCA are summarised in Table 2.

Table 2 Areas of Concern and Chemicals of Concern

AEC	POTENTIAL CONTAMINATING ACTIVITY	POTENTIAL COCS	LIKELIHOOD OF CONTAMINATION *	COMMENT
1. Entire site	Former use as a train terminal. Uncontrolled filling across site.	Metals,TPH, PAH, BTEX,OCPs, OPPs, PCBs Metals, and Asbestos	Medium	Contamination, if any, from train use would be from the surface down. Fill of unknown origin and quality used to level the line.
2. Former engine shed	Maintenance of steam engine	TPH, PAH, BTEX, Metals, and Asbestos (brakes)	Medium-low	Contamination, if it existed would be located in the upper soils.
Passenger station	Weathering and demolition of hazardous building materials	Zinc, lead and asbestos.	low	Asbestos contamination risk is considered low as buildings were likely to be constructed prior to asbestos being used in building products.

NOTES:
** = It is important to note that this is not an assessment of the financial risk associated with the AEC in the event contamination is detected, but a qualitative assessment of the probability of contamination being detected at the potential AEC.*
Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc; TPH - Total Petroleum Hydrocarbons; PAH - Polycyclic Aromatic Hydrocarbons; OCP - Organochlorine Pesticides; OPP – Organophosphorus Pesticides

It was assumed that rezoning the site for residential land use would result in single/double storey residential developments. Hence the disturbance of the soil 2m below the surface was considered unlikely into the future. Therefore further assessment of acid sulfate soils was not considered necessary.

2.4.2 JME2014a

JME2014a described the assessment of soil samples collected using an excavator on 2 October 2014 from eighteen test pits located in a grid pattern across the site. Four further test pits were excavated around test pit TP4 on 17 November 2014 to delineate arsenic contamination identified in test pit TP4. Four hand auger samples were collected along Swan Street to assess the ambient background concentrations of metals in the urban area around the site. Thirteen hand auger samples were collected on 11 July 2015 to further assess the arsenic contamination on site. The sampling methodology included:

- The use of new disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately;
- Collection of 10% replicate samples for Quality Assurance / Quality Control (QA/QC) purposes;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample jars, bottles and. replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of COC documentation ensuring that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory.

The results of test pitting indicated that the northern half of the site contains a variety of fill. Test pits TP1-TP3 were located in the northern eastern corner of site. The fill in these test pits contained significant amounts of red and grey ash and charcoal with some coal with depths ranging from 1-1.6mbgs.

Test pits TP4-8, located along the northern boundary of site, contained significant amounts of sandstone cobbles and boulders at depths ranging from 0.5-1.4mbgs. Test pits TP 9-11 and TP14, located on the central eastern portion of site, contained fill comprised primarily of dark grey gravelly sand and sand with trace amounts of brick rubble and metal pieces. Fragments of asbestos containing materials (ACM) were also located in test pits TP9 and TP10. Test pits TP12 and TP13, located centrally on the western portion of site, were typified by containing slabs of sandstone (TP12, See Photo3) and concrete (TP13).

Test pits TP15-18 were excavated along the southern boundary of site. These test pits indicate that the southern portion of site has not been filled however some anthropogenic objects e.g. small fragments of broken china indicates the topsoil has been disturbed.

In general the fill/topsoil on site is underlain by a stiff to very stiff dark grey/black alluvial clay.

Laboratory analysis of selected samples indicated that concentrations of BTEX, OCP, OPP, PCB were not detected above the laboratory reporting limit in the samples analysed. Concentrations of TRH, PAH, cadmium, chromium, nickel and mercury were not detected above the adopted ILs in the samples analysed.

BaP was detected above the adopted IL (0.7mg/kg) in the samples collected from TP5 0.1-0.2 (1.2mg/kg), TP11 0.2-0.3 (0.8mg/kg), TP13 0.1-0.2 (1.4mg/kg), TP15 0.1-0.2 (1.8mg/kg), TP10 0.1-0.2 (0.9mg/kg), TP9 0.1-0.2 (1.2mg/kg) and TP18 1.0-0.2 (2.3mg/kg). The UCL was

calculated for BaP following the removal of TP15 0.1-0.2 and TP18 1.0-0.2 from the data set as their concentration were greater than 250% of the IL. The UCL for BaP was 0.6mg/kg.

BaP-TEQ was detected above the adopted IL (3mg/kg) in the sample collected from TP18 1.0-0.2 (3.3mg/kg). The UCL was calculated for BaP-TEQ to be 1.2mg/kg.

Arsenic was detected above the adopted IL (100mg/kg) in the sample collected from TP4 0.1-0.2 (340 mg/kg), TP6 0.0-0.1 (120mg/kg), TP7 0.0-0.1 (200mg/kg), TP8 0.1-0.2 (120mg/kg), HLHA9 (330mg/kg), HLHA10 (140mg/kg), HLHA11 (180mg/kg), HLHA13 (220mg/kg) and HLHA14 (110mg/kg). The arsenic detected exceeded both the adopted HIL and EIL at these locations. The UCL was calculated for arsenic following the removal of TP4 0.1-0.2 and HLHA9 from the data set as their concentrations were greater than 250% of the IL. The UCL for arsenic in surface samples was 110mg/kg.

Copper was detected above the adopted IL (60mg/kg) in the sample collected from TP4 0.1-0.2 (120mg/kg), TP6 0.0-0.1 (61mg/kg), TP7 0.0-0.1 (75mg/kg) and TP13 0.1-0.2 (66mg/kg). The UCL for copper was calculated to be 44mg/kg.

Lead was detected above the adopted IL (300mg/kg) in the sample collected from TP13 0.1-0.2 (400mg/kg) and TP18 1.0-0.2 (550mg/kg). The UCL for lead was calculated to be 44mg/kg.

Zinc was detected above the adopted IL (195mg/kg) at locations TP2 0.0-0.1 (350mg/kg), TP15 0.4-0.5 (200mg/kg), TP9 0.1-0.2 (310mg/kg), TP13 0.1-0.2 (330mg/kg) and TP18 1.0-0.2 (520mg/kg). The UCL was calculated for zinc following the removal of TP18 0.1-0.2 from the data set as its concentration was greater than 250% of the IL. The UCL for zinc was 150mg/kg.

Potential ACM fragments were collected from three test pits, TP1, TP9 and TP10. Laboratory analysis confirmed the presence of asbestos in each of the fragments. A sample of surface soil was collected from TP2 and analysed for presence of asbestos. No asbestos was detected.

Test pitting of site indicates that the site is aesthetically impacted by the presence of large quantities of various types of shallow fill.

The UCL95 for the surface arsenic concentrations was 110mg/kg and arsenic detection Delineation of the arsenic contamination was attempted in fieldwork undertaken on 17 November 2014 (test pitting) and 11 July 2015 (hand auger). Two samples were collected from each test pit. Concentrations of arsenic in samples collected from the upper soil profile (0.1-0.3mbgs) in the test pits ranged from 22mg/kg-1,000mg/kg. Soil samples collected from depth (0.8-1.3mbgs) in the test pits had concentrations between 27mg/kg-94mg/kg. Based on the results is considered the arsenic contamination identified in TP4 is delineated to the west by TP5, to the south by TP11, to the east by HLHA18. The delineation test pits are shown in Figure 4. Hand auger samples collected from the western portion of site indicate that the former railway track footprint is also contaminated with arsenic above HIL.

The UCL for zinc, 150mg/kg, was below the adopted IL of 195mg/kg. One sample collected from TP18 marginally exceeded the 250% IL (490mg/kg) at 520mg/kg. Given that the samples collected off site from along Swan Street had an average concentration of 570mg/kg, the exceedance of zinc at TP18 was not considered significant.

The sampling locations are shown on Figure 2.

3 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) has been prepared for the site with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment 2013)

Schedule B2. The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. In this case the fieldwork and laboratory analysis undertaken by JME has reduced the chemicals of concern to arsenic and asbestos. The CSM is presented in Table 3 below.

Table 3: Conceptual Site Model for 30 Swan St Morpeth.

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathways	Potential Receptors
Maintenance/Demolition of former railway	Termite prevention treatment of wooden rail way sleepers. Dumping of coal ash	Movement of contaminated surface soils via runoff. Leaching of contamination via storm water infiltration/ percolation	Soil, groundwater, surface water	Arsenic	Dermal contact, inhalation (dust), ingestion	Current: Site owners, site visitors, surface water bodies, groundwater and neighbouring properties. Future: Residents, construction workers, site visitors, surface water bodies, groundwater, neighbouring properties.
Demolition of former rail buildings	Poor demolition practices of hazardous building materials.	Movement of contaminated surface soils via runoff. Leaching of contamination via storm water infiltration/ percolation	Air, soil, surface water	Asbestos	Dermal contact, inhalation (dust), ingestion	
Potential storage of coal or spent coal	Contaminated soils did not appear visibly contaminated.	Movement of contaminated surface soils via runoff. Leaching of contamination via storm water infiltration/ percolation	Soil, groundwater, surface water	BaP	Dermal contact, inhalation (dust), ingestion	

4 REMEDIAL ACTION PLAN

4.1 Remedial Objective

The remediation objective, where contamination poses unacceptable risks to human health or the environment, is to determine the most technically appropriate methodology that addresses the financial, timing and logistical constraints of the client to ensure that the site is suitable for the proposed uses and protection of the environment.

4.2 Discussion of the Extent of the Remediation Required

Based on the results of the previous contamination assessments it appears that the arsenic impact lies within 0.5m of the surface in the area of site bounded by TP5 to the west, TP11 to the south, TPE4 to the east and the site boundary to the north (remediation area 1). The former railway footprint on the lower bench of the western portion of site is also impacted by arsenic contamination (remediation area 2). It is estimated that there is approximately 126m^3 of impacted soil.

Asbestos containing materials (ACM) were found at TP1, TP9 and TP10 and as such some remediation of this area (remediation area 3) for ACM contamination is required. Based on the observations from JME2014a it assumed that less 10m^2 of ACM is present in the soil on site.

BaP contamination at locations TP18 and TP 5 exceeded the IL by more 250% it is assumed that approximately 56m^3 (6m radius) has been impacted at remediation areas 4 and 5.

The areas requiring remediation are shown in Figure 3.

4.3 Discussion of Possible Remedial Options

DEC, 2006 provides a preferred hierarchy of options for site clean-up and/or management, which was originally developed in NEPC 1999. The hierarchy is outlined as follows:

1. **On site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level**. This is not considered technically feasible for the contaminants of concern.
2. **Off site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site.** This option is not considered technically feasible for the chemicals of concern.
3. **Removal of contaminated soil to an approved treatment site or waste facility followed, where necessary, by replacement with clean fill.** This option is considered technically feasible and not cost prohibitive due to the relatively small volume of soil requiring disposal.
4. **Consolidation and isolation of the soil on site by containment with a properly designed barrier.** This option is considered technically feasible on the site. The potential exposure between surface human and environmental populations to the fill material would be removed. However legacy issues including ongoing monitoring may not be appealing to future purchasers.

JME has not considered a 'do nothing' strategy because of the proposal to develop the site.

4.4 Recommended Remedial Option

JME recommends the removal of contaminated soil to an approved waste facility and replacing the soil with validated "clean" soil as the most appropriate remedial technique to render the site suitable for residential land use for remediation areas 1, 2, 4 and 5.

ACM concentration in remediation area 3 is likely to be low. Hence, tilling the soil and hand picking ACM from the surface is consider a more cost effective remediation strategy for this area.

Removal of near surface slabs and boulders.

These options have been chosen:

- to allow removal of arsenic contamination that exceeded the adopted HILs;
- due to the relatively small volume of contaminated soil to be removed from remediation areas 1, 2, 4 and 5; and
- due to the lack of contamination legacies with this method; and
- the cost of hand picking of ACM is significantly lower than removing and dumping soil;

Specifically the remedial strategy will comprise the following:

- Remediation area 1, 2, 4 and 5:
    - The presence of an appropriately qualified and RAP inducted project manager to oversee the remediation strategy and to ensure that all records are kept for future validation of the site.
    - The excavation and temporary stockpiling of the surface soils from remediation areas 1, 2, 4 and 5;
    - Validation/Waste classification of temporary stockpiles:
    - Re - emplacement or removal from site of the temporary stockpiles.
    - Validation of excavated area.
    - Importation and placement of "clean" soil.
- Remediation area 3
    - Tilling the upper 300mm of the surface of remediation area 2;
    - Hand picking of ACM from tilled soil;
    - Validation of ACM removal.
- Site aesthetics in general. Most aesthetic issues will be dealt with coincidentally with the above strategy. Other slabs and or boulders near the surface in other areas of site will be removed and disposed of offsite as general solid waste (pre-classified)

It is envisaged that the remediation will be conducted over two-three stages depending on the availability of plant and equipment. This will be done to allow the assessment of stockpiles.

4.4.1 Excavations of Site Soils

Remediation area 1, 2, 4 and 5 will be excavated to a target depth of 0.2m. Soils that are excavated will be checked visually for the potential presence of asbestos containing materials or

other waste. Excavated soils will be stockpiled on plastic sheeting, in order to minimise the risk of cross-contamination to other site soils.

The excavations will be supervised by an appropriately trained and experienced environmental scientist, who will guide the excavations and undertake the visual screening. The excavations will be extended until visual evidence indicates that the extent of contaminated soil has been removed.

Validation sampling of the excavations will be undertaken to confirm that contaminated soil has been effectively removed. The site validation programme will be carried out in accordance with the NSW EPA (1994) *Guidelines for Assessing Service Station Sites*. Further details on the validation programme are included in Section 8.5.

During the excavation and stockpiling there is a natural tendency for contaminated soils and non-contaminated soils to be inadvertently blended thereby averaging the concentration of contaminants. Caution will be taken not to over excavate the soils to reduce the mixing of soils. The stockpiles of excavated material will be sampled after being created in order to provide an assessment of contamination within the stockpiles. Those stockpiles not suitable for on-site re-use following the initial sampling event will be disposed of off-site at a suitably licensed landfill. Stockpiles that are validated as suitable will be reinstated.

If an 8.5mx8.5m area does not pass the remediation acceptance criteria (see below), a further 200mm will be excavated until the area passes the validation criteria.

Materials will be tracked from excavation to stockpile creation so that the location of soils origin is known.

4.4.2 Remediation of Surface Asbestos Contamination

ACM observed on the surface of remediation area 3 will be handpicked. Following the handpicking, the surface of remediation area 2 will be ripped using the tynes of an excavator bucket (or similar) to a depth of approximately 15-30cm. The ripped area will be divided into 10mx10m squares. Each square will raked in two direction at right angles to each other. Further observed ACM will handpicked throughout this process.

4.4.3 Validation of Remediation Area 1, 2, 4 and 5

The remediation acceptance criteria (RAC) for the soil validation of arsenic and BaP were established based on the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999 – amended 2013) Guideline on Investigation Levels for Soil and Groundwater. Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children's day care centres, preschools and primary schools, HIL A / HSL A & HSL B and the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999 – amended 2013) Guideline on Investigation Levels for Soil and Groundwater – Urban residential / public open space. Where a CoC has an investigation level listed in more than one table the more conservative value was adopted as the RAC.

Although the NEPM guidelines indicate that site specific risk based remediation criteria should be developed as remediation criteria in preference to use of investigation levels (ILs) (as they may be more conservative than required) the guidelines referenced above are considered appropriately conservative to be used for site remediation criteria based on the proposed land use and proximity of neighbouring sensitive receptors. The RAC is summarised in Table 4.

TABLE 4: Site Remediation Acceptance Criteria (RAC)

Analyte Name	Units	RAC
Arsenic	mg/kg	100
BaP	mg/kg	0.7
Bonded Asbestos at surface	-	None visible
Bonded ACM	% w/w	0.01
Asbestos Fines	% w/w	0.001

4.4.4 Validation of Excavations in Remediation Area 1, 2, 4 and 5

In order to validate the excavations, the following works will be undertaken:

- The excavations will be visually assessed to confirm that potentially contaminated soil has been removed to the extent practical.
- Validation soil samples will be taken at a ratio of 1 sample per 64m^2. Where applicable, soils samples will be collected from the batter of the excavation at a rate of 1 sample per 10 lineal metres.
- Samples will be collected by using hand tools.
- A clean pair of disposable gloves will be worn when collecting each sample.
- Samples will be kept chilled while in the field and in transit to the laboratory.
- An excavation in remediation area 1 and 2 will be considered remediated if all validation analytical data for arsenic is less than 250mg/mg and the UCL95% of arsenic is less than 100mg/kg.
- An excavation in remediation area 4 and 5 will be considered remediated if all validation analytical data for BaP is less than 1.75mg/mg, the UCL95% of arsenic is less than 0.7mg/kg and the UCL95% of lead is less than.

4.4.5 Validation of Stockpiles in Remediation Area 1, 2, 4 and 5

In order to validate stockpiles of excavated material, the following works will be undertaken:

- Stockpile samples will be taken at a rate as per Table 5.

Table 5: Sampling of Stockpiled Material*

Quantity (m^3)	Number of Samples
<75	3
75 - <100	4
100 - <125	5
125 - <150	6
150 - <175	7
175 - <200	8

*From Section 7.5.2 NEPM Schedule B2

- Samples will be taken using hand tools such as a trowel or hand auger. Excavator may also be used to collect stockpile samples;
- Samples will be collected at different depths within the stockpile in order to provide adequate representation of the stockpile contamination status.

- Where hand tools are used, these will be decontaminated between samples by rinsing with phosphate-free detergent and potable water.
- Where an excavator is used to collect stockpile samples, the samples will be taken from the centre of the excavator bucket in order to minimise the potential for cross-contamination.
- A clean pair of disposable gloves will be worn when collecting each sample.
- Samples will be kept chilled while in the field and in transit to the laboratory.

4.4.6 Validation of Remediation Area 3.

Following the handpicking of ACM from remediation area 3 a test pit will be excavated at the centre of each 10mx10m square. Each test will extend to the base of fill. A 10 litre soil sample will be collected at 0.5 below ground surface (mbgs) and each metre thereafter. Each 10 litre sample will be weighed and separated using a 7mm sieve. The +7mm fraction will be inspected for ACM fragments. If ACM is observed then the ACM will be collected and weighed and a representative portion of <7mm fraction will sent to a laboratory and analysed for the presence/absence of asbestos fines. A sample will be collected from each test pit analysed for BaP.

Collected ACM will be double bagged and disposed of at a landfill licenced to accept asbestos waste. Refer to Section 5.7 for the appropriate guidance of working with soils potentially contaminated with asbestos.

4.5 Validation Laboratory Analysis

4.5.1 Excavations and Stockpiled Soils

The validation samples collected from the excavations will be analysed for arsenic, BaP and lead as required. If suspected asbestos containing materials are observed during the excavation the concentration of asbestos in soils will also be assessed.

4.5.2 Data Quality Assurance/Quality Control

The data quality assurance and quality control samples are listed in Table 6.

Table 6 - Data Quality Indicators (DQI)

Type of Quality Control Sample	Control Limit
Duplicate and Triplicate Samples	RPDs within 50% for analyte concentrations greater than 5 x Limit of reporting
Rinsate Samples (deionised water)	Analytes not detected at concentrations greater than the blank deionised water.
Spikes	Laboratory spike acceptance limits are a “live” range and updated regularly. The laboratory acceptance limits at the time of analysis will used.
Blanks	Analytes not detected

The QA/QC review will include checking of the DQIs against completeness, comparability, representativeness, precision and accuracy of the data.

4.6 Importation of Soils

Following the validation of the excavations and emplacement of validated stockpiles remaining voids will be backfilled with either virgin excavated natural material (VENM) or excavated natural material (ENM). Imported material must be classified at the point of origin and delivered to site directly from the point of origin. A copy of the validation letter must be reviewed and approved by an appropriately qualified and RAP inducted project manager prior to delivery of the material.

4.7 Validation Data Assessment and Reporting

The laboratory data will be reviewed by JME to assess data usability by applying the generally utilised data validation guidelines. Statistical interpretation of validation data may be used to assess whether the remediation goals have been met. Based on the assessment, areas that have been satisfactorily remediated will be identified and will be designated by JME as 'No Further Action Required.' Where data assessment has indicated that the remediation criteria have not been met, JME will discuss with Mr Lantry the areas requiring further remediation. Further remediation may include the excavation of additional material, sampling of excavated material and validation sampling of the excavation.

Upon completion of the remedial works, a validation report will be produced summarising the results of the remediation and final validation of the site. The report will be written to comply with industry standards and relevant guidelines and will provide a statement as to the suitability of the site for the proposed future land use.

The report will be prepared in accordance with the NSW OEH (2011) *Guidelines on Consultants Reporting on Contaminated Sites.*

5 SITE MANAGEMENT PLAN DURING REMEDIATION

The remediation works have the potential to cause environmental or human health issues during excavation and stockpiling of contaminated soils. This section of the RAP discusses measures to lower these risks.

The Plan will address:

- Site Access;
- Hours of operation;
- Stormwater and soil management;
- Noise control;
- Dust Control and Monitoring;
- Odour control;
- Occupational health and safety;
- Remediation Schedule
- Other issues required to be addressed.

Each of the issues to be addressed in the site management plan is briefly discussed below.

5.1 Site Access

The site is fenced and adequate fences or barriers will be placed around the excavations and stockpiles to prevent access of unauthorised personnel to areas where contaminated material is exposed, and also to prevent the public from the hazards of excavations. Adequate warning signs will also be placed around the area.

5.2 Hours of Operations

Remediation hours of operations will be limited to the hours of general site works as stipulated in the DA consent.

5.3 Stormwater and Soil Management

Adequate stormwater runoff, run-on and sediment control measures will be put in place for the remedial works.

- The stockpiles should be managed in a way to prevent harm to the environment and general public from potentially contaminated soils within the stockpiles.

The following recommendations provide guidance on managing stockpiled material:

- Access to the stockpiles of potentially contaminated material should be limited by keeping stockpiles within site fences;
- Stockpiles should be placed on level ground. If this is not possible stockpiles should not be placed on slopes greater than 5°;
- Material should be placed on strong impermeable plastic sheeting to prevent the contamination of the underlying soils. Material should not be stockpiled more than 2m high;
- Once the soils have been stockpiled, the stockpiles should be covered by weighted polythene sheets or tarpaulins to prevent erosion of stockpiled materials. Heavy objects not containing sharp edges should be placed on the sheets to prevent them from being blown by wind;
- Adequate straw bales and/or silt fences should be placed around the perimeter of the stockpile area to filter runoff from the stockpiles and prevent overland storm water flow from affecting the base of the stockpile;
- A diversion trench should be excavated, or tightly packed sand bags placed, up-gradient of the stockpile to prevent storm water running into the stockpile.

5.4 Noise

To mitigate noise impacts which may arise as a result of remedial works, the civil contractor will undertake the works in accordance with state and local noise regulations applicable to the site.

5.5 Dust Control

Dust control is required to prevent airborne dust being inhaled by human receptors. Airborne dust may be generated by wind action from loose earth left on the ground. This could cause migration of contaminated dust, as well as cause a nuisance for the surrounding area and must be controlled.

Therefore, the following dust control measures are proposed:

- Dust levels will be monitored visually during site work; and
- Soil will be kept adequately moist to reduce the generation of dust.

Air monitoring for air borne fibres will be undertaken during remediation and validation of asbestos impacted areas.

5.6 Odour

The remediation works are not expected to generate any significant odours.

5.7 Occupational Health and Safety

A Health, Safety, Security and Environmental (HSSE) Plan should be prepared by the remediation contractor, in accordance with relevant NSW legislation.

The HSSE Plan should include, but not be limited to, the following.

- Hazard Identification and Control;
- Dust and odour monitoring during excavation and stockpiling works;
- Chemical Hazard Control;
- Handling Procedures;
- Personal Protective Equipment;
- Work Zones;
- Decontamination procedures;
- Contingency Plans; and
- Incident Reporting.

The HSSE Plan should be periodically reviewed and updated prior to various project tasks being conducted.

The contractor, supporting sub-contractors and third party observers to the site will be required to work strictly to this plan. During site activities, only approved personnel should be allowed access to the remediation work area.

The HSSE Plan will identify hazards, assess the risks posed by the hazards and recommend measures to control the hazards.

5.7.1 Summary of Contamination and Exposure Pathways

Exposure of site users to contaminants could occur through:

- Dermal contact with contaminated soil;
- Ingestion of contaminated soil;
- Inhalation of hydrocarbon vapours; and
- Inhalation of contaminated dust.

5.7.2 Health and Safety Control Measures for Contamination Hazards

The following section presents some control measures that should be adopted to manage health and safety hazards posed by contamination during the remediation. These control measures include:

- Site Access;
- Personal Protective Equipment;
- Safe Work Practices.

It is important to note that this section only covers contamination issues associated with contaminated soil. It is also important to note that these procedures will need to be evaluated for effectiveness and where necessary revised and/or improved during site work.

Personal Protective Equipment (PPE)

To minimise short and long term health risks associated with the potential exposure to contaminants, the minimum level of PPE required for persons undertaking the excavations include:

- Hard hats;
- High visibility clothing;
- Long sleeve shirts and trousers;
- Steel capped workers boots;
- Safety glasses;
- Chemical resistant rubber gloves for persons coming in contact with the soil; and
- Dust resistant disposable overalls and P1 (minimum) dust masks when handling potentially asbestos contaminated soil.

Safe Working Practices

Chemical resistant gloves should be changed after handling each sample and disposed of appropriately.

The contractor should ensure that adequate signage is present across the remediation area to warn unauthorised persons from entering the area.

Eating, drinking, chewing gum or tobacco, smoking or practices that involve hand to mouth transfer increases the probability of ingestion of contaminated soil or dust into the body. With respect to remediation activities, hands must be thoroughly washed after coming into contact with soil or groundwater on the site before eating, drinking or smoking.

Smoking will be prohibited in the remediation areas.

5.8 Remediation Schedule

The remediation will take approximately four weeks to complete. The schedule is summarised in Table 7. The schedule represents the remediation going ahead to plan without the need to invoke contingency plans and without inclement weather etc.

Table 7: Remediation Schedule

Week	Actions
Week 1	Site establishment, excavation of 0.2m soils from remediation areas 1, 2, 4 and 5. Stockpiling of top 0.2m exposed soils. Validation soil sampling of excavations and stockpiles from remediation area 1. Hand picking of asbestos containing material from remediation area 3. Test pitting and asbestos validation of remediation area 3 Collection and laboratory analysis of validation samples.
Week 2	Data analysis and recommendations.
Week 3	Re-instatement of validated stockpiles from week 1. Disposal of non-validated stockpiles from week 1. Importation and emplacement of imported soils.
Week 4	Preparation of Validation Report

6 LEGISLATIVE AND REGULATORY FRAMEWORK

This section provides a summary of current legislation and regulations applicable to the RAP.

6.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 ('EP&A Act') regulates development in NSW and incorporates the principles of Ecologically Sustainable Development through the EP&A Regulation 2000.

6.1.1 Changes to the Act

Part 3A of the EP&A Act was repealed and replaced by the Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011. The complementary planning policy has also been revised to the State Environmental Planning Policy (State and Regional Development) 2011.

In accordance with Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, Remediation of Contaminated Land is considered State Significant Development if it is classified as Category 1 Remediation Work on 'significantly contaminated land' and remediation is required under the Contaminated Land Management Act.

6.1.2 State Environmental Protection Policy (SEPP) 55 – Remediation of Land

State Environmental Planning Policy – Remediation of Land (SEPP 55) under the EP&A Act provides a framework for contaminated land remediation. Remediation work which requires development consent is known as category 1 work. Category 1 refers to work:

- designated development, or
- carried out or to be carried out on land declared to be a critical habitat, or

- likely to have a significant effect on a critical habitat or a threatened species, population or ecological community, or
- development for which another State environmental planning policy or a regional environmental plan requires development consent, or
- carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:

  (i) coastal protection,

  (ii) conservation or heritage conservation,

  (iii) habitat area, habitat protection area, habitat or wildlife corridor,

  (iv) environment protection,

  (v) escarpment, escarpment protection or escarpment preservation,

  (vi) floodway,

  (vii) littoral rainforest,

  (viii) nature reserve,

  (ix) scenic area or scenic protection,

  (x) wetland, or

  (xi) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).

All other remediation work is classified as Category 2 work and may be carried out without development consent. The local council must be notified at least 30 days prior to the commencement of Category 2 remedial works.

The remediation is considered to be Category 1.

6.2 Protection of the Environment Operations Act 1997

Under Section 48 of the Protection of the Environment Operations Act 1997 ('POEO Act'), an Environment Protection Licence is required if the activity undertaken is listed in Schedule 1. The POEO Act also defines 'waste' for regulatory purposes.

6.2.1 Contaminated Soil Treatment

Contaminated soil treatment is declared to be a scheduled activity requiring a licence if:

- in any case, it has the capacity to treat more than 1,000 cubic metres per year of contaminated soil received from off-site, or
- where it treats contaminated soil originating exclusively on-site, it has a capacity:

(i) to incinerate more than 1,000 cubic metres per year of contaminated soil, or

(ii) to treat (otherwise than by incineration) and store more than 30,000 cubic metres of contaminated soil, or

(iii) to disturb more than an aggregate area of 3 hectares of contaminated soil.

As no contaminated soil is proposed to be received from off-site; less than 30,000 m^3 of contaminated soil is proposed to be stored at the Site; and less than 3 hectares of contaminated soil will be disturbed, the remedial works are not considered to be a scheduled activity under the Act and do not require a licence.

Impacted soil requiring off-site disposal (should this be required) will be classified, transported and disposed of to a licensed landfill.

A Class A asbestos removal licence will be required if friable asbestos is encountered on site.

A Class B asbestos removal license will be required if bonded asbestos is encountered on site.

Material entering/leaving the site will be tracked, documented and included in the site validation report.

6.3 Contaminated Land Management Act 1997

The Contaminated Land Management Act 1997 ('CLM Act') establishes a process for the investigation and remediation of land that is contaminated where the contamination is considered significant enough to warrant regulation.

Under Section 60 of the CLM Act, a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify the NSW EPA when they become aware of the contamination. Notification is required when soil concentration triggers are exceeded and a person either has been, or foreseeably will be exposed to the contaminant or any by-product of the contaminant.

JME considers that there is no duty to report the site to the NSW EPA.

6.4 Waste Classification Guidelines

It is understood that the legislation, regulations and guidelines are due to be updated in July 2015. Following considerations should be reviewed prior to any remediation take place:

- Is the waste a trackable waste (particularly asbestos and arsenic contaminated waste)?
- Is the waste being disposed of at a landfill whose location satisfies the proximity rule?(in this case the two likely disposal landfills are Mt Vincent Landfill in East Maitland or the Sita Landfill at Newline Road Raymond Terrace).

7 CONTACTS

The following provisional contact numbers for project personnel are given for the duration of the project. The contact names will be displayed on a sign on a sign during the remediation process.

In the event that project personnel change, relevant parties will be notified.

PROJECT PERSONNEL CONTACT NUMBERS

PERSONNEL CONTACT NUMBER

Environmental Consultant

James McMahon, JM Environments Pty Ltd

Mobile: 0427 893 668

Client Contact

Brad Lantry

Phone: 0416 069 517

8 CONTINGENCY PLAN

A contingency plan is outlined in Table 8, listing potential events that may arise during the field work and actions that will be undertaken if unexpected conditions occur.

Table 8 - Contingency Plan

Unexpected Condition	Action
Contaminated soil extends further than expected.	The client would be called to discuss options. Options could include excavating soils further.
Identification of unexpected contaminated materials during excavations.	Stop work in that area. Additional validation samples and analytes may be required to be collected and analysed for (depending on the nature of the material).
ACM uncovered during earthworks	Stop work in that area. Keep soil moist. Contact JME for further guidance.

9 LIMITATIONS

The findings within this report are the result of discrete/specific sampling practices used in accordance with normal practices and standards. To the best of our knowledge they represent a reasonable interpretation of the general conditions of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

It is the nature of contaminated site investigations that the degree of variability in site conditions cannot be known completely and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site. Professional judgement must be exercised in the collection and interpretation of the data.

In preparing this report, current guidelines for assessment and management of contaminated land were followed. This work has been conducted in good faith in accordance with JME understanding of the client's brief and general accepted practice for environmental consulting.

This report was prepared for Mr Brad Lantry with the objective of remediating the presence of contamination on the site that could potentially impact on the use of the property for residential use following subdivision. No warranty, expressed or implied, is made as to the information and professional advice included in this report. The report is not intended for other parties or other uses with the exception of Maitland Council for the purpose of assessing the DA. Anyone using this document does so at their own risk and should satisfy themselves concerning its applicability and, where necessary, should seek expert advice in relation to the particular situation.

Figures

Notes:

1) https://six.nsw.gov.au/

2) Subject Site

CLIENT: **Mr H Lantry**

PROJECT TITLE: **Rezoning Project**
30 Swan Street, Morpeth NSW

PROJECT:	JME15051	DESIGNED:	JMc		
DWG #:	1	DRAWN:	JMc		
REVISION:	1	STATUS:	NFC		
SCALE:	NTS				
DATE:	1/06/2015				

FIGURE TITLE: **Site Location Plan**

FIGURE NUMBER: **1**

JM ENVIRONMENTS

Notes:

1) Google Earth

2) Subject Site

Client
Mr H Lantry

PROJECT TITLE: **Rezoning Project**
30 Swan Street, Morpeth NSW

PROJECT:	JME15051	DESIGNED:	JMc		
DWG #:	1	DRAWN:	JMc		
REVISION:	1	STATUS:	NFC		
SCALE:	NTS				
DATE:	22/07/2015				

FIGURE TITLE:
Sampling Locations

FIGURE NUMBER: **2**

JM ENVIRONMENTS

Notes:

1) Subject Site
2) Remediation Area 1 and 2
3) Remediation Area 3
4) Remediation Area 4 and 5

Client: **Mr H Lantry**

PROJECT TITLE: **Rezoning Project**
30 Swan Street, Morpeth NSW

PROJECT:	JME15051	DESIGNED:	JMc		
DWG #:	1	DRAWN:	JMc		
REVISION:	1	STATUS:	NFC		
SCALE:	NTS				
DATE:	22/7/2015				

FIGURE TITLE: **Remediation Areas**

FIGURE NUMBER: **3**

JM ENVIRONMENTS