Remediation Strategy for North Eveleigh Rail Yard

Prepared for

Redfern Waterloo Authority

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EXECUTIVE SUMMARY

Introduction

The Remediation Strategy for the Redevelopment of North Eveleigh Rail Yard has been prepared to outline the remediation goals, the proposed remedial strategy and the environmental management procedures will be implemented to demonstrate that the site can be remediated in a safe and environmentally sound manner. This is a strategy document that is not intended to include all of the details that would be required in a formal Remediation Action Plan (RAP).

The remedial objective is to make the site suitable for the proposed land uses, taking into consideration the mixed land use nature of the proposed development (i.e. residential apartments, cultural / artistic uses, commercial uses, landscaping and plazas). These features of the development have a major influence on the remedial strategy. For example, the public accessible open space areas, the heritage buildings and the Arts/ Cultural buildings will not require bulk excavation to accommodate basement carparks. However, some of the areas earmarked for open space landscaping may require excavation for remediation purposes.

The design of the remediation strategy is intended to provide flexibility such that the strategy will remain applicable even if details of the proposed development are modified in the future to meet the specific requirements of the stakeholders.

With future landuses currently proposed in the North Eveleigh Concept Plan (RWA, December 2007), SMEC considers it prudent to adopt Remediation Acceptance Criteria (RAC) and Site Assessment Criteria (SAC) relevant to the proposed end land uses as follows:

- Arts Precinct (Central Quarter) encompasses the Blacksmiths Workshop and the existing Carriage Workshops Buildings, proposed for cultural and artistic uses.
- Western Quarter comprises the area west of the existing Arts Precinct and is proposed for a combination of land uses including residential apartments.
- Eastern Half comprises the area east of the existing arts precinct and is proposed for mixed commercial and residential apartments.

The key features of the development:

- Certain buildings will be retained for heritage purposes.
- The centrally located landscape areas will be created above basement carparking.
- Basements are to be formed to approximately 5 and 6m depth below ground level (bgl) respectively in residential and commercial buildings to facilitate car parking.

Arts Precinct – Investigations and Remediation to Date

The majority of the Arts Precinct has already been redeveloped and the Carriage Works Building has recently been resurfaced, capping the soil. Many of the remediation strategies which have been (or will be) applied to this central quarter are considered relevant to different parts of the whole site, as remedial strategies are developed further for the Western Quarter and Eastern Half. The Arts Precinct is being managed from a contamination perspective by a capping strategy and Environmental Management Plan (EMP) and is the subject of a separate site audit and Interim Audit Advice issued for the Blacksmiths Workshop remains to be completed.

The CH2M HILL RAP (May 2000) outlined the broad policy and procedures for a remedial action plan to remediate Area B (Carriage Workshop Building and surrounds) for the proposed commercial end land use.

The EMP (SMEC 2003) identified contaminants and health risks in soils encountered during construction or operation of the arts precinct and outlined site management procedures for the construction and operation phases of the Arts Precinct.

The Interim Audit Advice 2, indicated that an addendum to the EMP (SMEC 2003) would be prepared to address the issues relating to asbestos, the lack of groundwater data beneath the site, drainage, impacted soils and capping solutions.

The remedial activities undertaken to date in the Arts Precinct, are relevant to the remedial design of the Western Quarter and Eastern Half of the larger site, particularly in terms of groundwater remediation approach and the current lack of groundwater data beneath the site.

Data Gaps and Insufficient Information

Data gaps should be considered in light of inaccessible locations, deeper areas of fill, previous in-ground obstructions, the relevance of 10 year old data and soil impacts identified above the respective NEPM (1999) guidelines.

The Auditor (WSP, November 2007) recommended preparation of detailed SAQP detailing data gaps, updated RAP, Remediation Validation Report and EMP.

Currently, insufficient information exists to quantify groundwater issues, develop the groundwater remediation strategy and confirm that the groundwater beneath the site is suitable for the proposed mixed use development.

It is considered that many proven remediation technologies exist to be able to effectively address any groundwater contamination issues that may be identified by the proposed additional investigation works, thereby, making the groundwater beneath the site suitable for the proposed mixed use development.

Basement Areas

Fill material in all proposed basement areas will be excavated, stockpiled and sampled to confirm the waste classification in accordance with NSW EPA (2004) waste disposal guidelines. In soil samples assessed to date, there is limited TCLP data available to determine the waste classification of the soil materials.

Excavation of basement levels will require removal and stockpiling of contaminated fill material, along with approximately 1m of natural materials underlying impacted fill materials. The basement excavations will then proceed in the underlying uncontaminated shale bedrock. Most of the waste rock will be suitable as virgin excavated natural material (VENM) for export from the site for use as fill on other sites.

Due to very localised exceedances in soils at depth, clay soils excavated from between the fill and bedrock layers will also require classification for off site disposal purposes. Clay material affected by lead, BaP, TPH and PAH will not be classified as VENM and will either be:

- disposed of appropriately at a licensed landfill; or
- encapsulated in a specially designed cell such as one below the basement, resulting from deliberate over excavation beneath buildings.

Remedial measures are required to manage the penetration of contaminated groundwater from other residual parts of the site that are not completely removed during basement construction. Remediation methods may include cutoff walls, impermeable membrane liners and engineered drainage designs.

Recreational Open Space and Landscaped Areas

Further soil/fill sampling will be conducted in areas proposed for recreational open space land use. Sampling will be performed when access is made available after demolition of existing site buildings and pavements. The soil sampling results will be assessed against both the NEPM HIL E (open space) and EIL (phytotoxicity). The fill material exceeding the remediation criteria will then either be exported off site to appropriately licensed landfill, or disposed on site in a specially designed encapsulation cell.

Other Sealed Areas

At least the upper 0.5m will need to be removed during development of the site, to facilitate removal of existing surfacing and construction of new roads, thus generating further volumes of soil for remediation, reuse, or disposal. Further soil/fill sampling will be conducted in other sealed areas outside the basement footprints.

Heritage Buildings

Heritage buildings to be retained will require cleanup and validation to make the buildings suitable for the proposed heritage adaptive re-use. Capping of soils beneath the Carriage Workshop is already complete. Remediation of the Blacksmiths Workshop has commenced, with the earthen floor still to be capped. The floor must be capped prior to commencement of the Community Markets for which a development application has been approved. Areas beneath heritage buildings will be sampled as practicable to determine the nature and extent of contamination, but will not be excavated. The sampling results will be used to develop an appropriate EMP.

Hazardous Building Materials

Where buildings are retained and refurbished, potentially hazardous building material may be kept in place following appropriate remediation. Removal of hazardous materials shall be carried out in accordance with OH&S plans. Post-removal validation audits shall be carried out in such buildings to verify that no potentially hazardous materials are left in the area. As part of the remedial strategy, all the internal surfaces, walls and ceilings of the Blacksmiths Workshop should be cleaned again at completion of capping activities to remove potentially contaminated lead dust.

Other Buildings

Appropriate OH&S plans shall be prepared and all potentially hazardous material shall be disposed of at appropriate locations. Demolition of buildings should be undertaken by a suitably qualified occupational hygienist, licensed for the removal of hazardous material.

USTs and Hydrocarbon Contamination

If USTs are found or encountered during remediation, the tanks will be removed and any impacted soils will be excavated and treated on site and/or exported off site for disposal depending upon concentrations. On site treatment of petroleum hydrocarbon contaminated soil may be performed by land farming. PSH was detected in groundwater beneath the Western Precinct in an area proposed for open space landscaping. Therefore, although the immediate vicinity is not earmarked for basement bulk excavations, remediation of groundwater will be reasonably accomplished by excavation of the hydrocarbon impacted fill and soils down to bedrock.

Remediation options to address the PSH impacted groundwater include:

1. proven in-situ groundwater remediation technologies; or
2. excavation and ex-situ bioremediation of hydrocarbon impacted soils from the PSH source area.

SMEC considers that Remediation Option 2 is the fastest and more efficient way to remediate PSH impacted groundwater. The aerial extent of the impacted soils to be excavated is not known at this stage, however

In terms of groundwater remediation, SMEC proposes that a groundwater monitoring programme be developed for the heritage sectors.

General Comments on Remediation Options

The selection of the most suitable remediation options depends on a wide range of factors such as site use, the type, degree and extent of contamination, proximity to groundwater, leachability to groundwater, building designs and landscaping, details of construction methods and acceptance of on-going liabilities. Soil remediation options are likely to involve a combination of Disposal of soils off-site, encapsulation on-site and/or cut and fill operation.

A series of management plans will be developed for the Eastern Half and Western Quarter and implemented as part of the development works including:

- OH&S plans for site workers;
- EMPs for the remedial works dealing with waste management, stormwater and sediment management, traffic management, noise, dust and air emissions;
- A community information and consultation plan;
- Post remediation safety, health and environmental management plans for site areas containing residual contamination (such as areas beneath heritage buildings) and to specify operation and monitoring requirements for basement groundwater seepage collection systems that may need to be installed.

The North Eveleigh Rail yard site can be remediated for the proposed land uses in a safe and environmentally sound manner, taking into consideration the nature of the development and the interests of the stakeholders and surrounding community. The proposed Remediation Strategy effectively addresses the nature and extent of contamination (with data gaps currently being addressed in the SAQP) and the key features of the proposed development. Accordingly, the Remediation Strategy, the RAP and the subsequent remedial works will be subject to review by the EPA Accredited Site Auditor for the project. On completion of remediation, appropriate Site Audit Statements will be issued for the relevant land uses.

1 INTRODUCTION

1.1 Overview

SMEC Australia (SMEC) was engaged by Redfern Waterloo Authority (RWA) to prepare a Remediation Strategy for the Redevelopment of North Eveleigh Rail Yard located at Wilson Road, Darlington, NSW 2008 (see Figure 1, Appendix A). The Remediation Strategy will accompany the North Eveleigh Concept Plan, prepared by RWA and submitted to the Department of Planning (December 2007).

The Remediation Strategy has been prepared to outline the remediation goals, the proposed remedial strategy and the environmental management procedures which will be implemented as part of the remediation works and to demonstrate that the site can be remediated in a safe and environmentally sound manner, taking into consideration the nature of the development and the interests of the stakeholders and surrounding community.

This is a strategy document that is not intended to include all of the details that would be required in a formal Remediation Action Plan (RAP). A formal RAP which will include all of the necessary details concerning the proposed remedial works will be prepared prior to commencement of development. Nor does this document include details of additional soil and groundwater investigation works to be formalised in a Sampling Analysis and Quality Plan (SAQP). Environmental Management Plan (EMP) and Occupational Health and Safety (OH&S) plans will also be required prior to commencement of development.

1.2 Objectives

The remedial objective is to make the site suitable for the proposed land uses, taking into consideration the mixed land use nature of the proposed development (i.e. residential apartments, cultural / artistic uses, commercial uses, landscaping and plazas). SMEC understands that the proposed development comprises mixed commercial and high density residential land use in various proposed buildings including adapted heritage reuse, with approximately 15% the site proposed as landscaped public recreational open space and plazas. Smaller landscaped areas will also be located in other areas such as building frontages and central to residential apartment blocks.

These features of the development have a major influence on the remedial strategy, especially in terms of the approximate outlines of the basement car parking areas beneath some residential and commercial buildings. For example, the public accessible open space areas, the heritage buildings and the Arts/ Cultural buildings shown on the proposed block plan (Figure 3) will not require bulk excavation to accommodate basement carparks. However, some of the areas earmarked for open space landscaping may require excavation for remediation purposes.

In accordance with DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, the default Site Remediation Criteria (SRC) for soil will be the National Environmental Protection Measure (NEPM) Health Based Investigation Levels (HIL):

- HIL D (residential with minimal access to soil including high-rise apartments and flats) for all residential built areas, including beneath heritage buildings adaptive to residential reuse (where applicable);
- HIL E (parks, recreational open space, playing fields) for the remaining defined public recreational open space areas;
- HIL F (commercial) for commercial office and retail areas, including beneath heritage buildings adaptive to retail, office and arts/cultural space; and
- EIL (phytotoxicity) - the Ecological Investigation levels (EIL) for all landscaped and open space areas.

In addition, the NSW EPA (1994) *Guidelines for Assessing Service Station Sites* will be applied for remediation of areas affected by petroleum hydrocarbon contamination. Groundwater will be assessed against the ANZECC 2000 Water Quality Guidelines for the Protection of Aquatic Ecosystems. Where these criteria are not applicable, a human health risk based approach will be used to determine remediation criteria based on site specific conditions.

The design of the remediation strategy is intended to provide flexibility such that the strategy will remain applicable even if details of the proposed development are modified in the future to meet the specific requirements of the stakeholders.

1.3 Background

With future landuses currently proposed in the North Eveleigh Concept Plan (RWA, December 2007), SMEC considers it prudent to adopt Remediation Acceptance Criteria (RAC) and Site Assessment Criteria (SAC) relevant to the proposed end land uses. The three main subdivisions of the site and the proposed end land uses (see Figure 2, Appendix A), are as follows:

- Arts Precinct (Central Quarter) encompasses the Blacksmiths Workshop and the existing Carriage Workshops Buildings together with the intervening hardstand areas, proposed for cultural and artistic uses.
- Western Quarter comprises the area west of the existing Arts Precinct and is proposed for a combination of land uses including residential apartments.
- Eastern Half comprises the area east of the existing arts precinct and is proposed for mixed commercial and residential apartments.

The key features of the proposed buildings shown on Figure 2, Appendix A and can be summarised as follows:

- Buildings H1, N1, N2 and the existing Telecommunications Building in the east will be retained for heritage purposes.
- The centrally located landscape areas within Buildings C and D will be created above basement carparking.
- Basements are to be formed to approximately 5 and 6m depth below ground level (bgl) respectively in residential (B1, C, D and P1) and commercial (J1, K1, K2, L1, M1 and M2) buildings to facilitate car parking.
- The proposed site levels will remain largely unchanged from the current site conditions.

The site has been further divided into proposed block boundaries with each block containing one or more landuses. The current proposed land use block layout is presented in Figure 3, Appendix A.

1.3.1 The Arts Precinct

The existing heritage buildings are proposed to remain and no other building elements are proposed in the centre of the site. However, additional floor space is proposed in the Carriage Workshop and Blacksmiths' buildings.

1.3.2 The Western Precinct

In terms of heritage significances, detailed in the North Eveleigh Concept Plan (RWA, 2007), proposed work to the Western Site, consists of the following:

- Retention of the Clothing Store to be adaptively reused as a residential building.
- Demolition of a group of early sheds and the Timber Shed Extension.
- Demolition of later sheds.
- Construction of eight residential blocks.

1.3.3 The Eastern Precinct

In terms of heritage significances, proposed work to the Eastern Site consists of the following:

- The significant Chief Mechanical Engineer's Office and the existing Telecommunications Building to the west of the site are to be adaptively reused.
- The Scientific Services Laboratory will be adaptively reused.
- The Paint Shop will be retained and undergo extensive adaptation. This will include a residential component constructed through the middle of the existing building.

- Demolition of a number of buildings of low significance to the centre of the site and the demolition of the Paint Shop addition (also known as the Suburban Car Workshop).
- The construction of five residential buildings between Wilson Street and the Paint Shop to form Carriageworks Way.
- Construction of a residential building to the west of the Paint Shop.
- Construction of six Commercial/Office buildings bordering the rail corridor.
- Construction of a residential tower adjacent to Redfern Station.

1.4 Limitations of Report

This report does not provide a complete assessment of the environmental status of the site, and is limited to the objectives defined in Section 1.2. The extent of sampling of soil and subsequent analysis undertaken during previous investigations has been necessarily limited and may not identify contamination which occurs in other areas and/or unexpected locations or from unexpected sources. Sub-surface conditions may vary significantly from those reported previously. The Remediation Strategy report shall only be used for the purposes stated in Section 1 and shall not be relied upon by any party other than the client for this project.

2 SITE DESCRIPTION

2.1 Site Description

The North Eveleigh Rail Yard (the site) is located between Wilson Street to the north, Redfern Station to the east, the Main West Railway to the south and Iverys Lane to the west (see Figure 1 Site Location Map). The site is bounded to the north east and west by residential properties. The southern boundary is formed by the Sydney Rail Line, beyond which lies the Eveleigh Rail Workshops.

The whole site comprises approximately 11 hectares and is known as Lot 4 DP862514. The current Site Map is shown in Figure 4, which indicate the various existing buildings on the site.

Approximately 85% of the site is sealed by asphalt or concrete with a large number of buildings also being present. The area to the south eastern corner of the site is unsealed and covered by rail tracks and blue metal rail ballast.

Drainage from the sealed areas of the site is to controlled stormwater drains and pipes which enter the local stormwater system. This system drains to a Sydney Water culvert located in Alexander Street, and is located in the Munni Creek Catchment. Water falling on the unsealed areas is likely to infiltrate into the local groundwater system.

2.2 Site Development and History

The site has been owned and operated by the railways since 1887, and was primarily used for the construction and maintenance of carriages. These operations continued until the early 1990' s after which it became a storage facility and individual areas and sections of buildings were leased to a variety of organisations. For example, new cars were stored in the former clothing and furniture warehouses located in the western precinct.

The site and associated buildings have more recently been used for various commercial and industrial purposes. Significant developments since the closure of the Railway Yards include:

- Establishment of café and training centres for hospitality and construction courses in the refurbished former Canteen and Carpenters building, in late 2006.
- Development of Carriage Works (Contemporary Performing Arts Centre) in the Carriage Workshop, in January 2007.
- Viewing platform and pedestrian entrance structure off Wilson Street opposite the Carriage Works, in January 2007.
- Remediation in the Blacksmiths Workshop has commenced including coating the lead paint walls with transparent paint and cleaning the dust from the eaves. The floor still has to be capped (to contain soil and dust contaminated with lead) prior to commencement of the Community Markets for which a development application has been approved.
- Design of the proposed pedestrian and cycle bridge to connect North Eveleigh to Redfern Railway Station, the Redfern Town Centre and the Australian Technology Park.
- Plans to relocate electrical infrastructure from within the North Eveleigh site and install a new substation and work depot in the south western corner of the site.

2.2.1 Arts Precinct – Investigations and Remediation to Date

The majority of the Arts Precinct has already been redeveloped and the Carriage Works Building has recently been resurfaced, capping the soil. Many of the remediation strategies which have been (or will be) applied to this central quarter are considered relevant to different parts of the whole site, as remedial strategies are developed further for the Western Quarter and Eastern Half.

The Arts Precinct occupies the central quarter of the site and comprises 3.18 hectares of land which is being managed from a contamination perspective by a capping strategy and Environmental Management Plan (EMP). The Arts Precinct is the subject of a separate site audit and Interim Audit

Advice issued for the Blacksmiths Workshop remains to be completed. The reports listed in Table 1 pertain mostly to previous investigations and remediation strategies of the Arts Precinct.

TABLE 1. PREVIOUS INVESTIGATIONS OF THE ARTS PRECINCT

Doc. *No.	Consultant	Report Title	Date
5	Rust PPK	Validation Report for Dust Removal from Wilson Street Carriage Works	1-Feb-97
15	CH2M HILL	Remedial Action Plan – North Eveleigh (Areas A & B)	1-May-00
22	SMEC	Environmental Site Management Plan	1-Sep-03
23	Hibbs & Associates	Hazardous Materials Survey, Carriage Works at Eveleigh	1-Sep-04
24	SMEC	Blacksmith's Workshop, Soil Investigation	30-Nov-04
25	HLA – Bill Ryall (previous Auditor)	Site Audit Report and SAS - Arts Precinct	14-Dec-04
26	SMEC	Soil Sampling and Waste Classification - Blacksmiths Entrance	1-Feb-06
27	SMEC	Geotechnical Investigation - Blacksmiths	1-Mar-06
28	SMEC	Blacksmith Capping Specification	1-Apr-06
29	SMEC	Blacksmith Hazmat Abatement	1-Apr-06
32	SMEC	Soil Contamination Assessment - Blacksmiths	1-Feb-07
	WSP – Rod Harwood (new Auditor)	Interim Audit Advice 1 – Blacksmiths Workshop (Building 7)	16-Aug-07
	WSP – Rod Harwood (new Auditor)	Interim Audit Advice 2 – Addendum to SMEC ESMP, Blacksmiths Workshop Building 7	14-Jan-08

* To aid the reader document numbers remain, as given in the WSP document titled Interim Audit Advice 1, Remainder of the Site – North Eveleigh Rail Yard, dated 31 August 2007.

The CH2M HILL RAP (May 2000) outlined the broad policy and procedures for a remedial action plan to remediate Area B (Carriage Workshop Building and surrounds) for the proposed commercial end land use, including:

- Containment on-site of B(a)P, total PAH and chromium contaminated soil;
- Removal of damaged and deteriorating hazardous material, or material that may be damaged as part of future development, which is of no heritage significance;
- Encapsulation or restoration of damaged or deteriorating hazardous material of heritage significance;
- Removal of hazardous material in good condition and of no heritage value; and
- Off-site disposal of all PCB containing materials.

The Environmental Management Plan [EMP (SMEC 2003)] identified contaminants and health risks associated with lead, PAH and TPH in soils encountered during construction or operation of the arts precinct and outlined site management procedures for the construction and operation phases of the Arts Precinct.

It was the previous Auditors opinion (HLA, December 2004) that implementation of the EMP provided adequate measures to properly allow for the protection of human health during the use of the site, and concluded that it was suitable for a commercial/industrial use provided that intrusive earthworks and removal of pavements and floors within the heritage buildings were undertaken in accordance with the EMP.

Furthermore, as part of the new separate audit for the Blacksmiths Workshop, the Interim Audit Advice 2, issued by WSP in a letter dated 14 January 2008, indicated that an addendum to the EMP (SMEC 2003) would be prepared to address the following issues:

- Presence of asbestos as a contaminant of concern not previously covered in the EMP;
- Requirement of additional data relating to the lack of groundwater beneath the site;
- Outline of the drainage proposals;
- Outline of the removal and validation of impacted soils (SS6 and SS7) in the vicinity of the machine plinths;
- Justification of the adoption of capping as the most appropriate remedial solution for the site; and
- Outline of the capping proposals and justification of the design in accordance with ANZECC (1999) *Guidelines for the Assessment of On-site Containment of Contaminated Soil*.

The remedial activities undertaken to date in the Arts Precinct, and some of the issues outlined above, may be considered relevant during remedial design of the Western Quarter and Eastern Half of the larger site, particularly in terms of these groundwater remediation approach and the current lack of groundwater data beneath the site.

2.2.2 Previous Investigations

Previous investigations listed in Table 1 pertain to the arts precinct, whilst reports listed in Table 2 pertain to either the site as a whole, or specific target areas. The documents were reviewed in detail by WSP and summarised in a letter report titled, Interim Audit Advice, dated 31 August 2007. In order to aid the reader, the documents numbers presented in Tables 1 and 2 remain the same as given in the Interim Audit Advice. To avoid duplication, the documents considered to have the most relevance to the development of site wide remediation strategies, have been referenced herein, and summarised as required.

Figure 4 entitled *"Site Map"* is sourced from CH2M HILL and shows the building layout and numbers which were current in 1998. With exception of some building identifiers and the redeveloped interior layout of Carriage Works Building 8, the site map remains approximately the same today. Soil contaminant exceedances of the appropriate guidelines for the proposed end uses are shown on Figure 5 and summarised in Section 4.4.2.

TABLE 2. PREVIOUS INVESTIGATIONS NOT EXCLUSIVE TO THE ARTS PRECINCT

Doc. No.	Consultant	Report Title	Date
1	ADI	State Rail Authority Relocation Project, Stage 1 Environmental Contamination Assessment, Wilson Street, Eveleigh	5-Nov-93
2	ADI	Stage 2 Investigation Report for Rail Estate at Wilson Street Eveleigh	14-Dec-93
3	Rust PPK	Specification for Removal of Dust from Building at Wilson Street, Eveleigh	1-Jun-95
4	HLA-Envirosciences	Site Contamination Assessment and Monitoring at Eveleigh Rail Yards	1-Jun-96
6	HLA-Envirosciences	Hazardous Material Audit of SRA Eveleigh Railway Workshop	1-Dec-97
7	Hibbs & Associates	Hazardous Material Survey Report, Eveleigh Railway Workshops, Wilson Street, Darlington	1-May-98
8	CH2M HILL	Eveleigh Workshops - Phase I Report	1-Jun-98
9	CH2M HILL	Eveleigh Workshops - Stage II Field Investigations and Data Assessment	1-Jul-98
10	Jeffrey and Katauskas	Geotechnical Investigation of Redevelopment Potential at Eveleigh Workshops	9-Jul-98

Doc. No.	Consultant	Report Title	Date
11	CMP-GBG	Subsurface Investigation Using GPR	1-May-98
12	ERM (Rod Harwood)	Site Audit Statement & Summary Site Audit Report	15-Sep-98
13	HLA	Hazardous Material Audit of State Rail Authority, Eveleigh Railway Workshops, Wilson Street, Darlington	17-Dec-99
14	HLA	Hazardous Material Audit of SRA Eveleigh Railway Workshop 1, 2, 8, 12, 20	1-Apr-00
16	CH2M HILL	North Eveleigh Workshops - Baseline Groundwater Investigation	1-May-00
17	ERM - Frank Mohen	Site Audit Statement	21-Dec-00
18	SMEC	Rail Estate, Remedial Action Plan, North Eveleigh Railyard	1-Jan-01
19	SMEC	South Sydney Council Letter	23-Aug-01
20	SMEC	Groundwater Study II at North Eveleigh Railyard	1-May-02
21	SMEC	March 2003 Groundwater Monitoring Assessment	1-Jun-03
25A	CH2MHILL	South Western Portion of the North Eveleigh Railyard, Wilson Street, Eveleigh	1-Dec-05
30	SMEC	EMP Draft - Canteen Site	1-Apr-06
31	SMEC	EMP RWA Training Centre	1-May-06
33	CH2MHILL	Soil Classification – North Eveleigh Railyard, Wilson Street, Eveleigh	1-Feb-07
	WSP – Rod Harwood (new Auditor)	Interim Audit Advice 1 – Remainder of the Site – North Eveleigh Rail Yard, NSW.	31-Aug-07
	WSP	Statement of Site Suitability	28-Nov-2007
	WSP	Preliminary Comments on the Masterplan	7-Dec-07
	RWA	North Eveleigh Concept Plan – Part 3A Major Project Application, Preliminary Environmental Assessment	Dec-07

2.3 Site Geology, Topography and Hydrogeology

The 1:100,000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale, black to dark grey shale and laminate, which ranges in thickness from between 48 to 54m across the Sydney area. The local geological conditions encountered during site investigations included surface soils and a shallow fill layer, overlying red/brown silty clay/clay above weathered shale. The depth to bedrock beneath the site generally increases from the north west to the south east and is immediately overlain by increasing thicknesses of fills and residual clays.

The majority of the site is level, with a gradual slope from the north west to the south east, with the exception of a four metre high embankment along the northern site boundary with Wilson Street and a filled ramp access to Wilson Street at the western end of the site. Shale bedrock can be seen at various locations along the northern site boundary.

Approximately 85% of the site is covered by hard surfaces with materials such as building slabs, asphalt and concrete slabs. Water falling on the unsealed areas is likely to infiltrate into the local groundwater system. According to the Botany Basin Groundwater Management Map, produced by the DLWC, the site is located over Ashfield Shale and is approximately 250-650m away from the Botany Sand Aquifer. The groundwater flow appears to be in a south easterly direction.

3 SITE CONTAMINATION SUMMARY

3.1 Areas of Potential Contamination

Areas of Potential Contamination (APC) and nature of contaminants associated with site history were identified by CH2MHILL (July 1998), presented in Table 3. These APCs have been targeted during previous contamination investigations. However, data gaps should be considered in light of:

- inaccessible locations;
- deeper areas of fill;
- previous in-ground obstructions;
- the relevance of 10 year old data; and
- soil impacts identified above the respective NEPM (1999) guidelines.

TABLE 3. AREAS OF POTENTIAL CONTAMINATION

Location	Activity	Potential Contaminants
The Paint Shop (Building 8)	Train painting operations	Paint and paint solvents
The Old Loco paint (Grid Cell C 29 and 30)	Unknown (Paint Store)	Paint and paint solvents
Paint Store (near Building 23)	Paint Store	Paint and paint solvents
Building 6 – Former paint Shop	Painting operations and discharges to sewer?	Paint and paint solvents
ARF (Building 17)	Asbestos removal	Asbestos
Underground Storage Tank (Building 1)	Petrol or diesel storage and dispensing	Petrol or diesel
Blacksmiths Shop (Building 7)	Hot metal working on an earthen floor	Metals
Underground Storage Tanks (Building 5)	Petrol and fibreglass resin storage	Petrol, fibreglass resins
Fibre Glass work area (Building 5)	Fibreglass window frames were constructed	Fibreglass resins
Electroplating Facility (Building 8)	Plating Cr, Cu, and Hard Casing	Cr, Cu, Pb, CN and acids
Oil Store (Compound D)	Storage of oils, solvents	Solvents and hydrocarbons
Battery Store (Grid Cells C28-29, Building ES on Map Reference 13)	Battery storage	Sulfuric acid, metals
Bogie Cleaning	South side eastern corner of Building 8	Bogie cleaning agents (steam, water, soap, solvents). Other chemicals may include TPHs and PAHs because these would wash off the bogies.
Gardens and track areas	Weed and pest control	Metals, OCPs/OPPs and weedicides
Substations	Electrical services	PCBs

Source: CH2MHILL (July 1998).

In terms of future remedial works, the exact extent of any additional works will be governed by the zoning / phasing of the proposed development. For example, in areas planned for open space and landscaping, the respective NEPM (1999) guidelines (i.e. HIL E and EIL) should be applied and historical / additional data considered accordingly.

It is possible that other reasons for potential contamination have occurred since 1998 due to potential site activities, such as the importation of fill materials during site developments and/or potential leaks and spills as a result of warehouse storage practices. WSP are currently developing a Guidance SAQP to aid the appointed Environmental Consultant in covering these issues, to close all data gaps prior to developing the more detailed SAQP and Remedial Action Plan (RAP).

3.2 Data Gaps and Insufficient Information

In the Statement of Site Suitability (WSP, November 2007), the Auditor considered that the site could be made suitable for the proposed mixed land use provided the following were undertaken:

1. Preparation of a detailed SAQP which targets the data gaps present in the existing ground investigation information.
2. Following completion of the additional investigation works, preparation of an updated RAP;
3. Following completion of the remedial works, preparation of a Remediation Validation Report; and,
4. If any immobile contamination remains in-situ following the remedial works, preparation of an Environmental Management Plan (EMP).

SMEC considers that items 1-4 also form an integral component in the development of this Remediation Strategy, especially the SAQP and EMP, which based on remediation experiences already learned in the Arts Precinct, should be considered in the early stages of redevelopment, in terms of whole site remediation strategies.

Currently, insufficient information exists to quantify groundwater issues, develop the groundwater remediation strategy and confirm that the groundwater beneath the site is suitable for the proposed mixed use development. Consequently, the SAQP will need to outline the scope of additional investigation to demonstrate that the groundwater will not pose an unacceptable risk to human health and / or the environment.

Notwithstanding the above, given the site geology (i.e. shallow fill overlying shale) it is considered that many proven remediation technologies exist to be able to effectively address any groundwater contamination issues that may be identified by the proposed additional investigation works, thereby, making the groundwater beneath the site suitable for the proposed mixed use development.

3.3 Soil Contamination

Based on the available information, the principal chemicals of concern that were encountered at concentrations in excess of the NEPM (1999) HIL D (residential with limited soil access) and HIL F (commercial/ industrial) within the fill materials include lead, BaP, TPH and PAH. Localised exceedances of chromium, copper, cadmium, zinc and mercury were also detected.

The majority of the available results indicate that the natural clay soils are suitable for the proposed end uses, as defined by HIL D and HIL F. the exceptions are lead, BaP and PAH in very localised samples.

Detected concentrations of asbestos were also encountered within the site soils, however, there is insufficient data to make a comment regarding their overall distribution.

The Bates Smart Proposed Block Boundaries shown in Figure 3, are superimposed with soil sampling results exceeding relevant guidelines on Figure 5. Given the inaccuracy of the original drawings in previous investigations, it has only been possible to broadly identify which proposed block the borehole exceedances are likely to be in.

In the Interim Audit Advice 1 – Remainder of the site (August 2007), WSP recommended that a reassessment of the exceedance data (as presented in Figure 5) be undertaken if private residences

with gardens (i.e. HIL A), parks and / or open space are to form part of the proposed development (i.e. HIL E and EILs will need to be considered). The Preliminary Comments on the Masterplan (WSP, December 2007), has since confirmed that:

- residential buildings will all be developed as apartment blocks, and no residential areas will contain private gardens (therefore NEPM HIL A is not considered relevant remediation criteria, for any part of the site);
- gardens, parks and landscaping developed in the Western Half will either be on existing ground surfaces in tree pits and planters, or over proposed basement areas; and
- gardens, parks and landscaping developed in the Eastern Quarter will include trees growing in the existing ground surface and planters (therefore NEPM HIL E and EIL soil exceedances and groundwater contamination will require careful consideration in tree growing areas of the East).

3.4 Groundwater Contamination Summary

Based on the available information, the principal chemicals of concern that were encountered at concentrations in excess of the ANZECC (2000) 95% level of protection for freshwater include copper, nickel, zinc, TPH (separate phase) and PAH. Localised exceedances of chromium, lead, cadmium, arsenic and mercury were also detected.

Separate phase hydrocarbons were noted in ADI BH2 formed near the Oil Store at the western end of the site in 1993. This varied in thickness between a sheen and 920mm when monitoring was undertaken in 1993 and 1996. The impacts above guideline levels in groundwater are show on Figure 6, Appendix A.

4 REMEDIATION STRATEGY

4.1 Approach

The remediation strategy for the site has been designed to ensure that the site is remediated in a safe and environmentally sound manner, taking into consideration the extent of contamination, nature of the development and the interests of the stakeholders and surrounding community. The design of the remediation strategy is intended to ensure the health and safety of the occupants and protection of the environment, provide flexibility such that the strategy will remain applicable even if details of the development are modified in the future to meet the specific requirements of the stakeholders.

Important features of the development that influence the strategy are:

- Planned mix of commercial and medium to high density residential land use, combined with defined areas of landscaped public recreational open space and plazas. Smaller landscaped areas will also be located in other areas such as the building frontages and overlying basements central to residential apartment blocks.
- Some of the residential and commercial buildings will incorporate multilevel basement car parks which will occupy approximately 14% of the total site.
- Certain heritage buildings will be retained.

The regulatory objectives and guidelines that will be applied for the remedial works are outlined in Section 1.3. Where predefined regulatory criteria are not applicable, a human health risk based approach will be used to determine remediation criteria based on site specific conditions. For example, in the case of the existing 'Science Lab', planned for new residential development, it may not be necessary to apply the more stringent HIL D remediation criteria to soils beneath the building, depending on the floor design for the heritage building and capping strategy for soils beneath.

4.2 Soil Remediation

4.2.1 Basement Areas

The proposed development building reference numbers, taken from the North Eveleigh Concept Plan (RWA, December 2007) are shown in Figure 2, Appendix A. Basements are to be formed to approximately 5m and 6m depth below ground level (bgl) in residential (B1, C, D and P1) and commercial (J1, K1, K2, L1, L2, M1, M2) buildings to facilitate car parking. Approximately 28% of the total area of the Western Quarter will be developed into basement carparking. Approximately 14% (or 17% if the area between the commercial blocks is removed to facilitate basement car parking) of the East will be developed into basement carparking. No basements will be formed within the Arts Precinct.

Fill material in all proposed basement areas will be excavated, stockpiled and sampled to confirm the waste classification in accordance with NSW EPA (2004) *Environmental Guidelines Assessment, Classification & Management of Liquid & Non Liquid Wastes*. In soil samples assessed to date, there is limited TCLP data available to determine the waste classification of the soil materials. TCLP data from stockpiles of excavated fill material is required to determine if the soil beneath the site would be classifiable as Inert or Solid Waste for purposes of off site disposal to an appropriately licensed landfill. During previous investigations (Documents 25A and 33) materials tested from Compound D, located in the south western corner of the site, were classified as inert waste for off site disposal. No other testing for waste classification has been undertaken during recent investigations.

In the East, the depth to top of shale is highly variable, between 1-4m bgl and the basements will extend to 5-6m bgl. In the West, the depth to top of shale ranges between 2.5 and 2,0m, and the basements will extend to 5m bgl. Excavation of basement levels will require removal and stockpiling of contaminated fill material, along with an assumed thickness of approximately 1m of natural materials underlying impacted fill materials. The basement excavations will then proceed in the underlying uncontaminated shale bedrock. Most of the waste rock will be suitable as virgin excavated natural material (VENM) for export from the site for use as fill on other sites. The majority of the available results indicate the natural clay soils are suitable for the proposed end

uses, with the exception of very localised samples. Therefore, clay soils excavated from between the fill and bedrock layers will also require classification for off site disposal purposes. Clay material affected by lead, BaP, TPH and PAH will not be classified as VENM and will either be:

- disposed of appropriately at a licensed landfill; or
- encapsulated in a specially designed cell such as one below the basement, resulting from deliberate over excavation beneath buildings.

4.2.2 Recreational Open Space and Landscaped Areas

Further soil/fill sampling will be conducted in the main areas proposed for recreational open space land use, as well as any other smaller areas that are proposed to be landscaped. Sampling will be performed when access is made available after demolition of existing site buildings and pavements.

It is expected that during development of the site, in areas outside the proposed building footprints, it is anticipated that at least the upper 0.5m will need to be disturbed to facilitate removal of existing surfacing for the construction of public open space areas. Depending on results of testing, this depth is likely to be exceeded locally, thus potentially generating further volumes of soil for remediation, reuse, or disposal.

The soil sampling results will be assessed against both the NEPM HIL E (open space) and EIL (phytotoxicity). The sampling results will be assessed to determine the acceptability of the fill material, superficial natural soils and groundwater, taking into consideration deep planting of trees proposed in the East. Unacceptable material will be excavated, stockpiled and sampled to confirm the waste classification. The fill material exceeding the remediation criteria will then either be exported off site to appropriately licensed landfill, or disposed on site in a specially designed encapsulation cell, in the same manner as the fill in the basement areas.

4.2.3 Other Sealed Areas

Similarly, at least the upper 0.5m will need to be removed during development of the site, to facilitate removal of existing surfacing and construction of new roads, thus generating further volumes of soil for remediation, reuse, or disposal. Further soil/fill sampling will be conducted in other sealed areas outside the basement footprints. Sampling will be performed when access is made available after demolition of existing site buildings and pavements. The sampling results will be assessed to determine the acceptability of the fill material for sealed areas with medium to high density residential and commercial land uses. Unacceptable material (if any) will be excavated, stockpiled and sampled to confirm the waste classification. The fill material will then be exported off site to licensed landfill, or encapsulated on site.

4.2.4 Heritage Buildings

Heritage buildings that will not be demolished during future development works, will require cleanup and validation to make the buildings suitable for the proposed heritage adaptive re-use. Contaminants of concern located inside buildings include hazardous materials [asbestos containing materials, synthetic mineral fibres, lead based paint systems and lead contaminated settled dust] and PCBs in capacitors of fluorescent lights. The relatively small open areas surrounding the Carriage Workshop and Paint Shop buildings are paved, with virtually no exposed soil. Capping of soils beneath the Carriage Workshop is already complete. Remediation of the Blacksmiths Workshop has commenced, with the earthen floor still to be capped. The floor must be capped prior to commencement of the Community Markets for which a development application has been approved.

Areas beneath heritage buildings and other areas deemed impractical to access due to existing infrastructure will be sampled as practicable to determine the nature and extent of contamination, but will not be excavated. The sampling results will be used to develop an appropriate Environmental Management Plan (EMP), having consideration for human health to enable the management of any residual contaminated material remaining beneath these areas.

4.2.5 Hazardous Building Materials

Buildings earmarked for adaptive heritage re-use in the Eastern Precinct include the existing Science Lab, Chief Engineers Office, Paint Shop and existing Telecommunications Building, and in the Western Precinct include the Clothing Store. Where buildings are retained and refurbished, potentially hazardous building material may be kept in place following appropriate sealing, e.g. painting. Removal of such materials shall be carried out in accordance with adequate and approved OH&S plans. Post-removal validation audits shall be carried out in such buildings to verify that no potentially hazardous materials are left in the area.

Remediation and capping of the floor of the Blacksmiths Workshop is a critical component of the strategy, however timing did not coincide with dust removal from the ceilings and coating of the "lead paint' walls with transparent paint. As part of the remedial strategy, all the internal surfaces, walls and ceilings of the Blacksmiths Workshop should be cleaned again at completion of capping activities to remove potentially contaminated lead dust.

4.2.6 Other Buildings

Where existing buildings are to be demolished (as listed in Section 1.3), appropriate OH&S plans shall be prepared and all potentially hazardous material shall be disposed of at appropriate locations. Demolition of buildings should be undertaken by a suitably qualified occupational hygienist, licensed for the removal of hazardous material. Remedial strategies for the management of hazardous building materials, include:

- Removal of damaged and deteriorating hazardous material (e.g. asbestos), or material which is of no heritage significance;
- Restoration of damaged or deteriorating hazardous material of heritage significance;
- Off-site disposal of all PCB containing materials; and
- Post-removal soil validation sampling of the former building areas to verify that no potentially hazardous materials are left in the area.

Excavations of footings for brand new buildings without basements are likely to encounter soils exceeding the relevant land use criteria, thus generating further volumes of soil for remediation, reuse or disposal.

4.2.7 Underground Fuel Storage Tanks (USTs)

Further surveys may if necessary, be conducted using geophysical techniques to verify the presence of any unidentified USTs in suspect areas. If USTs are found or encountered during remediation, the tanks will be removed and any impacted soils will be excavated and treated on site and/or exported off site for disposal depending upon concentrations. On site treatment of petroleum hydrocarbon contaminated soil may be performed by land farming. Land farming operations will be managed to ensure that surrounding community is not adversely affected by air emissions or odours. Possible measures could include covering of contaminated spoil, application of chemicals for odour control or by performing land farming works inside an existing site building prior to its demolition.

4.3 Remediation of Groundwater

4.3.1 Separated Hydrocarbons

Phase separate hydrocarbon (PSH) impact was detected in groundwater beneath the western precinct (vicinity of BH2) in an area proposed for open space landscaping. Therefore, although the immediate vicinity is not earmarked for basement bulk excavations, remediation of PSH detected in groundwater will be reasonably accomplished by excavation of the hydrocarbon impacted fill and soils down to bedrock (expected to be 4.5m bgl). Hydrocarbon impacted seepage waters containing PSH, are likely to be encountered in the weathered shale zone, expected between 4.0m and 6.0m bgl.

Remediation options to address the PSH impacted groundwater include:

3. proven in-situ groundwater remediation technologies; or
4. excavation and ex-situ bioremediation of hydrocarbon impacted soils from the PSH source area.

With more hydrogeological information and up to date groundwater data, Remediation Option 1 could be developed further following investigation and delineation of the vertical and lateral extent of the PSH plume. Depending on how long product recovery may take and/or biodegradation of the PSH, recovery/ remediation wells may need to remain in place, even after completion of the proposed landscaped development.

SMEC considers that Remediation Option 2 is the fastest and more efficient way to remediate PSH impacted groundwater. The aerial extent of the impacted soils to be excavated is not known at this stage, however can be determined either by:

1. further delineation borehole investigations in the vicinity of the PSH impacted area; or
2. Excavation chase out works using field screening techniques, whereby clean overlying layers are stockpiled and/or re-used elsewhere on site, and hydrocarbon impacted soils are stockpiled and/or transported to a dedicated landfarm area for bioremediation.

The impacted area in question requiring further delineation/investigation and/or remedial excavation is the strip of land between Blocks 3 and 4 (see Figure 3), and the proposed landscape area adjacent to the south eastern corner of Block 3. The mass excavation of the overlying fill material, clay and shale bedrock within the basement of Blocks 3 and 4, would remove any remaining contaminated groundwater within this weathered shale zone.

The disadvantage of Remediation Option 2 is that the proposed development plan and remediation strategy is already generating tonnes of material, to be excavated, hauled and disposed of, but a staged approach formatted in the RAP would enable most of the material from this area to be re-used on site. After a period of on site landfarming, the remediated material can be validated and re-used. However re-use would exclude any fill material that may be contaminated with other contaminants such as heavy metals which are not usually remediated through landfarm practices.

The staged approach developed in the RAP should consider prevention of potentially contaminated groundwater seeping into bulk basement excavations in the adjacent buildings (labelled B1 and C1 in Figure 2). Excavation of hydrocarbon impacted soils in the vicinity of PSH impact should be conducted prior to the commencement of adjacent basement excavations, so contaminated seepage water drains towards the source of impact, rather than spreading laterally and vertically away from the source of impact. Following validation sampling of the walls and base of the hydrocarbon 'chase out' excavations, validated VENM material sourced from elsewhere on site can be used to re-instate the area back up to grade for future landscaping.

4.3.2 Heritage Sectors

In terms of groundwater remediation, SMEC proposes the following remedial strategy for the heritage sectors:

- Install additional groundwater monitoring wells down gradient of the heritage buildings;
- Carry out further sampling to determine the leachability characteristics of the contaminated soil under the buildings;
- Monitor the groundwater at six monthly intervals;
- Assess the groundwater and leachability with consideration for human health and demonstrate that the site does not pose any unacceptable risk to human health or the environment.
- If the soil is leachable, installation of groundwater barrier walls should be considered. If the soil is not leachable, the barriers may not be required.
- With respect to the various commercial uses, concrete slabs, sub-floor capped soils and floor ventilation system designs incorporated into the adaptive heritage buildings need to be considered in light of the human health risk, having particular regard for dust generation and potentially leachable soils.

The proposed remedial work should contribute to improving the quality of the groundwater, however the fact that contaminated soil will remain on site under the heritage buildings means on-going groundwater monitoring will probably be required until it can be demonstrated to the DEC that the site does not pose any unacceptable risk to the environment or human health. Remedial measures should be developed further in the RAP to manage groundwater contamination (i.e. heavy metals) sourced from residual parts of the site such as beneath heritage buildings and capping layers.

4.3.3 Basement Areas

Remedial measures are required to manage the penetration of contaminated groundwater from other residual parts of the site that are not completely removed during basement construction. The proposed strategy is as follows:

- In the multi storey basement designs, incorporate impermeable structural cut off walls, extending below the weathered shale upper bedrock unit into sound shale bedrock. The purpose of the cutoff wall is to prevent groundwater seepage into the basement from the overburden and underlying weathered bedrock. The impermeable cutoff wall will act as an effective barrier to the migration of potentially contaminated groundwater particularly in the permeable overburden and highly weathered bedrock zone between 4 and 6m bgl. Remediation design will ensure no escape of chemical odours to the basement or atmosphere.
- There is limited data available on the level of potential contaminants within the shale bedrock, therefore a potential exists for some low concentrations of hydrocarbons to be present in the shale bedrock at depth below the proposed basement levels. For example, the basement floors of Building Blocks 3 and 4 may need to be equipped with a membrane impermeable to water and vapour and the floors may need to be equipped with specially engineered drains connected to one or more collection sumps.
- Drainage designs should be developed further in the RAP, but not before additional sampling of groundwater and shale bedrock has been undertaken, particularly during delineation of groundwater hydrocarbons, in the vicinity of proposed Building Blocks 3 and 4.

4.4 General Comments on Remediation Options

The selection of the most suitable remediation options depends on a wide range of factors such as:

- site use;
- the type, degree and extent of contamination;
- proximity to groundwater;
- leachability to groundwater;
- building designs and landscaping;
- details of construction methods ; and
- acceptance of on-going liabilities.

Figure 6 shows the monitoring well coverage to date, however further groundwater investigations are recommended prior to finalising the RAP. Previous recommendations and remediation options were made in the SMEC (January 2001) Remedial Action Plan (discussed below), which largely remain applicable, particularly in terms of on-site containment of contaminants and groundwater management.

It is proposed that potentially contaminated material remain beneath certain heritage buildings. Human exposure to the contamination is prevented through the existing surface covers. Contaminated materials outside the heritage building footprints will be excavated and either disposed off site or encapsulated on site. On-site containment of materials exceeding Site Assessment Criteria, requires effective and adequate measures to counter potential leaching of contamination from on-site containment areas into groundwater. On-site containment is acceptable where human exposure is prevented and the containment is sufficiently bound to the host matrix or is unlikely to come into contact with groundwater or infiltrating surface water.

During future Phase 2 investigations (to be detailed in the SAQP), correlation between groundwater and soil contamination in the same area may provide an indication of current leaching behaviour. A significant correlation between groundwater and soil contamination can not be made with the present data. For example, SMEC (2001) indicated that the fill beneath the Paint Shop and surrounds was likely to remain above the groundwater for most of the time, and given most surfaces are currently sealed, vertical infiltration and subsequent potential contaminant leaching from surface soils would be minimised.

In terms of leachability and future testing (to be detailed in SAQP), low contaminant concentrations in groundwater and acid leaching tests carried out on the material to be contained, may provide further indication on the leachability of contamination. High leachability (i.e. above NSW criteria for Inert Waste) would indicate the need to isolate the material from groundwater. This can be achieved by placing material into engineered containment cells (requires excavation) or by retrofitting groundwater barriers around the contamination, aiming at eliminating or reducing potential flows through the material.

In the absence of sufficient water and acid leaching test data, it is proposed that a barrier be installed along the outside of heritage buildings. SMEC (2001) recommended the installation of barriers associated with the Carriage Workshop and Paint Shop buildings. The barrier design, surface cover and drainage will ensure that adequate isolation of contamination from groundwater, surface water infiltration and drainage water is achieved.

In addition to the above, SMEC recommended in the earlier RAP that further soil sampling would be required to more accurately define the extent of contamination and leaching characteristics and to characterise any soils leaving the site. It was suggested that this testing be carried out either well in advance (such as during proposed Phase 2 investigations) or during construction works.

Validation sampling will also be required following completion of remediation works and prior to obtaining a Site Audit Statement for the completed remediation works. Sampling densities should comply with NSW EPA (1995) *Sampling Design Guidelines*.

SMEC understands that the Auditor and his team (WSP) are currently drafting a Guidance SAQP document to aid the appointed Environmental Consultant in covering these afore mentioned data gap issues. The guidance document will summarise the existing number of sampling locations for each of the proposed development blocks and will identify where further investigations are required to meet the minimum number of locations outlined in the NSW EPA guidelines.

4.4.1 Soil Exceedances in Relation to Proposed land Uses

Based on available data, Figure 5 shows soil exceedances of Remediation Acceptance Criteria (RAC) against the proposed future landuse blocks, notwithstanding the following:

- given the inaccuracy of the original drawings, it has only been possible to broadly identify which proposed land use block the borehole exceedances are likely to be in;
- where exceedances of HIL F (commercial) and D (High-rise residential) are shown, it may mean that the more stringent HIL E (open space) and EIL (phytotoxicity) are also exceeded for contaminants (shown) and other contaminants of concern (not shown);
- where proposed land uses are indicated as public accessible open space, exceedances of the relevant HIL E and EIL criteria should also be considered. However, this would require deeper extraction of tabulated laboratory data from previous investigations and more review time.

SMEC considers it prudent to consider all data against the relevant landuse criteria for each proposed block. The upcoming Phase 2 investigations should include a review of previous data in terms of phytotoxicity and open space exceedances, and future soil sampling should include assessment against the open space and phytotoxicity criteria.

Note that soil contaminant concentrations shown on Figure 5 point to coloured areas represented by the proposed block, rather than a single soil investigation borehole location and data gaps or areas where refusal on obstructions occurred covers approximately 40-50% of the site. Given the available data, scenarios have been considered in terms of remediation strategies or outcomes, however these RAP scenarios would need to be re-considered as additional data is obtained. In general:

- Proposed commercial development exceeds RAC (HIL F commercial) in Blocks 10, 11 and 12, however basement excavations will remediate this area.
- Proposed residential development exceeds the 'not as stringent' commercial RAC in Blocks 1, 2, 3, 5, 7, 8 and 13. Block 13 and 5 will be remediated with basement excavations, however other remediation strategies should be developed in detail for the non-basement Blocks.
- Proposed road developments exceed commercial RAC in roadways adjacent to Blocks 1, 8, 9 and 10, however removal of at least the upper 0.5m of material to facilitate removal of existing materials and construction of new roads would also remove the majority of impacted material encountered mostly at depths of 0.2m bgl.
- Proposed open space developments exceeding the 'not as stringent' commercial RAC in the vicinity of Blocks 7, 9, 15, 16, 13 and 14 should also be remediated by removal of at least the upper 0.5m of material to facilitate open space developments. However further assessment of all open space areas shown in green on Figure 5, and comparison with the 'more stringent' open space HILs and phytotoxicity EILs is required.
- Proposed retail development exceeds the relevant commercial RAC in Block 7, therefore remediation strategies should be developed further for scenarios of this kind.
- Proposed residential and open space development exceeds residential RAC in Block 3. Although no basement is proposed beneath the open space area adjacent to Block 3, a remediation strategy is outlined in Section 4.3.1.
- Proposed retail and residential development exceeds residential RAC in Block 7. No basement excavation is planned beneath this heritage 'Paint Shop' building. Remediation strategy to be developed in detail in the RAP and include EMPs and OH&S plans, similar to the completed Carriageworks remediation, restoration and soil capping strategies.
- Proposed residential development exceeds relevant residential RAC in Block 1. This scenario will include a remediation strategy to deal with potentially contaminated fill material excavated to facilitate construction of foundations and footings.

4.4.2 Estimated Volumes and Remediation Costs

Preliminary Comments on the Masterplan (Background Information, Appendix B) presents the estimated volumes of soil to be manipulated, excavated, hauled, remediated and transported around or off the site during development of the Western and Eastern Precincts.

The document presented in Appendix B should be read in conjunction with this remediation strategy as it gives the developer an idea of costs and volumes of material to be remediated. SMEC endorses the process by which these quantitative estimates were developed. In summary, three preliminary considerations have been presented in Appendix B and discussed herein, as follows:

- Disposal of soils off-site;
- Encapsulation on-site; and/or
- Cut & fill operation.

Each of these strategies will prove costly or may not be accepted by DECC. SMEC is of the opinion that off site disposal of soils will be a critical but costly component of the remediation strategy. However with careful design and DEC approval, re-use and encapsulation may be incorporated into the design of the RAP as much as possible whereby reducing the overall costs associated with off site disposal.

Should cut and fill operations be considered as a viable remediation option, approvals from the EPA would need to be granted. This cut and fill approach should be considered further in the detailed RAP as a contingency option, subject to DEC approval.

5 SITE MANAGEMENT PLANS

Site safety, health and environmental management is an important component of the remediation strategy. As was deemed during redevelopment of the Carriage Works building, the provisions detailed in the EMP were critical in the overall remediation of the Arts Precinct. The objective is to ensure that all other remedial works remaining to be performed in the Blacksmiths Workshop, the Eastern Half and Western Quarter are done so in a safe and environmentally sound manner. Also that relevant NSW and council regulations are complied with and that the interests of the stakeholders and the community are considered and protected. To achieve this objective, EMPs already developed for the Blacksmiths Workshop will need to be implemented, along with the specifications in the Interim Audit Advice documents. A series of management plans will be developed for the Eastern Half and Western Quarter and implemented as part of the development works. These will include:

- Occupational health and safety (OH&S) plans for site workers;
- Environmental management plans for the remedial works dealing with waste management, stormwater and sediment management, traffic management, noise, dust and air emissions;
- A community information and consultation plan;
- Post remediation safety, health and environmental management plans for site areas containing residual contamination (such as areas beneath heritage buildings) and to specify operation and monitoring requirements for basement groundwater seepage collection systems that may need to be installed.

Further details of site management plans will be set out in the RAP. It is expected that the appointed remediation contractor will develop and implement the OH&S and environmental management plans for the remedial works as a component of the Work Methos Statements for the remediation programme.

6 CONCLUSIONS

The North Eveleigh Rail yard site can be remediated for the proposed land uses in a safe and environmentally sound manner, taking into consideration the nature of the development and the interests of the stakeholders and surrounding community. The proposed strategy effectively addresses he nature and extent of contamination (with data gaps currently being addressed in the SAQP) and the key features of the proposed development. The Strategy is reasonably straightforward, practical and achievable.

The remediation strategy is flexible such that the strategy will remain applicable if details of the development are modified in the future to meet the specific requirements of the stakeholders.

The remedial works will be performed in accordance with the regulatory requirements of the Department of environment and Conservation (DEC) and Department of Natural Resources (DNR). Accordingly, the Remediation Strategy, the RAP and the subsequent remedial works will be subject to review by the EPA Accredited Site Auditor for the project. On completion of remediation, appropriate Site Audit Statements will be issued for the relevant land uses.

7 REFERENCES

ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Waters*, Australian and New Zealand Environment and Conservation Council

ANZECC (1999) *Guidelines for the Assessment of On-site Containment of Contaminated Soil*

DEC (2006) *Guidelines for the NSW Site Auditor Scheme*

NSW EPA (1994) *Guidelines for Assessing Service Station Sites*

NSW EPA (1995) *Sampling Design Guidelines*

NSW EPA (2004) *Environmental Guidelines; Assessment, Classification & Management of Liquid & Non-liquid Wastes*

RWA (December 2007) North Eveleigh Concept Plan – Part 3A Major Project Application, Preliminary Environmental Assessment

SMEC (January 2001) Rail Estate, Remedial Action Plan, North Eveleigh Railyard

WSP (28 November 2007) Statement of Site Suitability

WSP (7 December 2007) Preliminary Comments on the Masterplan

WSP (16 August 2007) Interim Audit Advice 1 – Blacksmiths Workshop (Building 7)

WSP (14 January 2008) Interim Audit Advice 2 – Addendum to SMEC ESMP, Blacksmiths Workshop Building 7

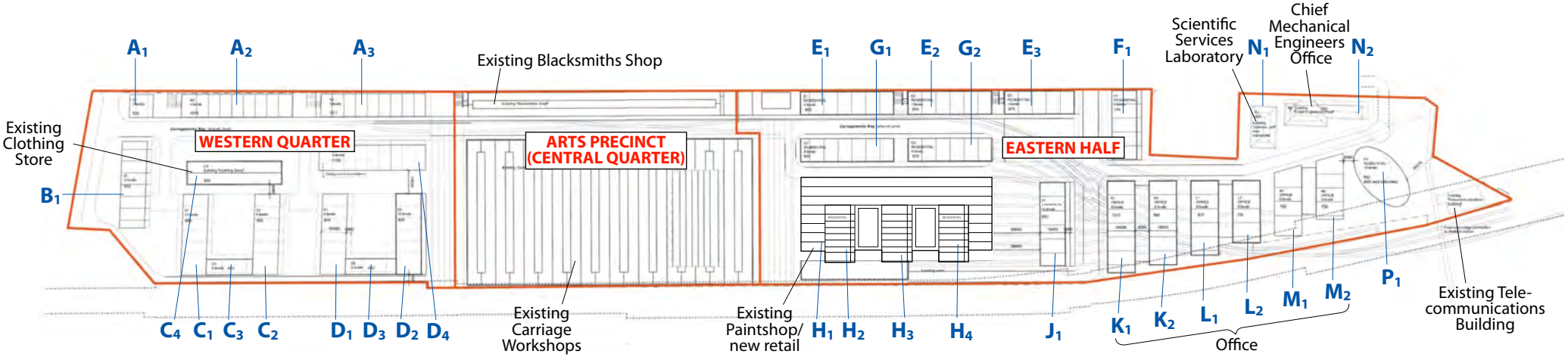
WSP (31 August 2007) Interim Audit Advice 1 – Remainder of the Site – North Eveleigh Rail Yard, NSW

8 APPENDICES

APPENDIX A : FIGURES

JOB TITLE RWA Eveleigh Remediation Strategy			
FIGURE TITLE Site Location Map			
FIGURE No. 1	REFERENCE Google Maps 2007		
DATE 25/03/08	SCALE (m) (approx.) 0 100 200m	PROJECT No. 3001510	

SMEC



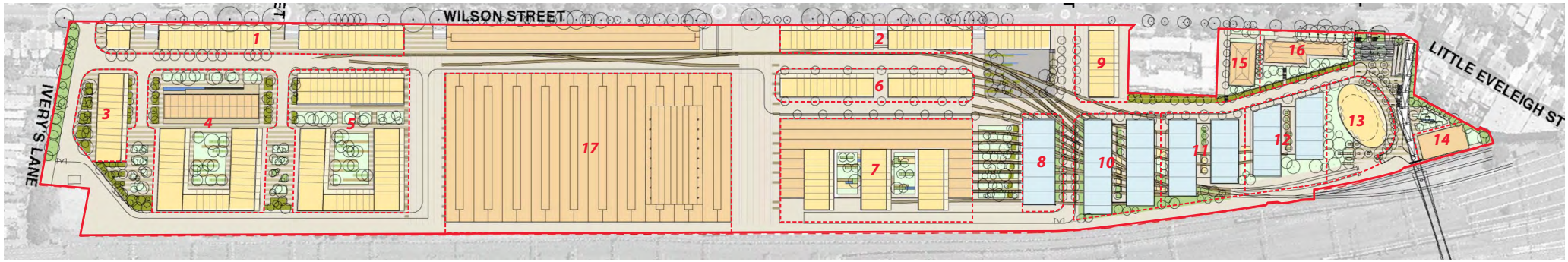
Legend

A_1 Building identifier

Note: All building identifiers are for residential, unless otherwise shown.

JOB TITLE	RWA Eveleigh Remediation Strategy		
FIGURE TITLE	Main Subdivisions and Proposed Land Uses		
FIGURE No. 2	REFERENCE	BatesSmart North Eveleigh Masterplans 1, 2, 3 (2007)	
DATE 25/03/08	SCALE (m) (approx.) Not to Scale	PROJECT No. 3001510	

SMEC

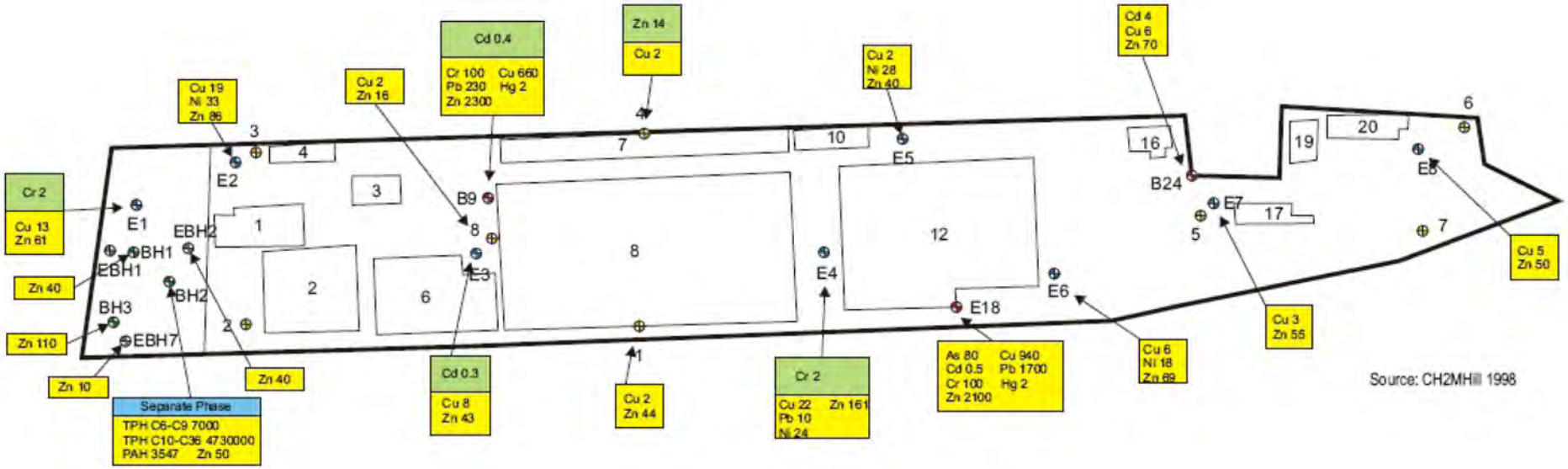


Legend

- Site Boundary
- Block Pattern Sub-boundary
- 1 Block numbers referenced in report
- Residential
- Office/ Retail
- Heritage - Adaptive Reuse
- Roads / Public Access
- Landscape and Open Space

JOB TITLE	RWA Eveleigh Remediation Strategy		
FIGURE TITLE	Development Plan		
FIGURE No. 3	REFERENCE	North Eveleigh Plan showing Proposed Block Patterns	
DATE 25/03/08	SCALE (m) (approx.) Not to Scale	PROJECT No. 3001510	

SMEC



- ADI 1993
- HLA 1996
- CH2MHill July 1998
- CH2MHill May 2000
- SMEC June 2003

Zn 43 — Exceeds ANZECC 90%

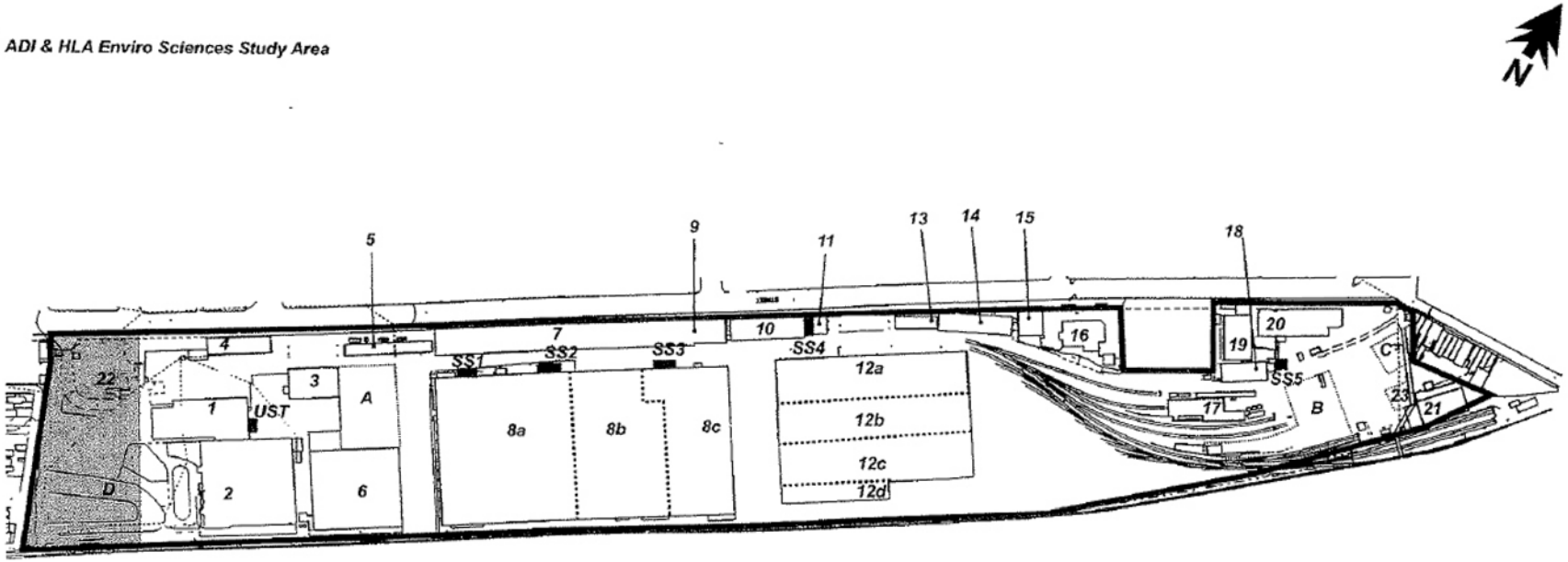
Cr 2 — Exceeds ANZECC 95%

Note: All concentrations are in ug/L

JOB TITLE: RWA Eveleigh Remediation Strategy		
FIGURE TITLE: Contaminant Exceedances in Groundwater		
FIGURE No.: 6	REFERENCE: WSP (February 2008)	
DATE: 25/03/08	SCALE (m) (approx.): Not to Scale	PROJECT No.: 3001510

SMEC

ADI & HLA Enviro Sciences Study Area



Site Identification

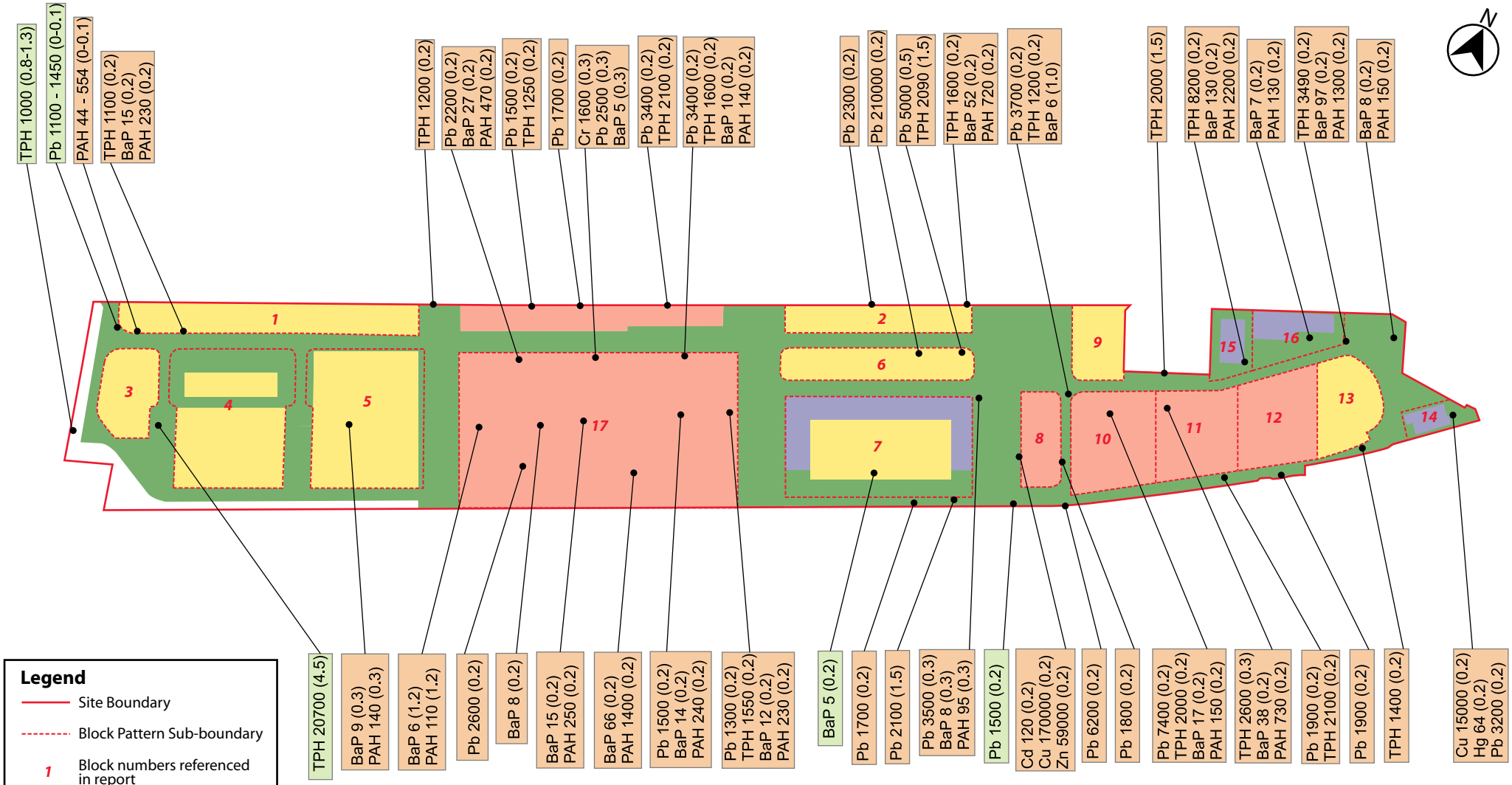
1. Clothing Store
2. Furniture Store (RSA Facilities)
3. Leased Area (Safe repository - TNT Chubb)
4. Vacant Shed
5. Vacant Shed (Boiler Room)
6. Cable Shed (Former)
7. Blacksmith Workshop (Former)
8. Carriage Workshops Building
   a. Belvoir Street Theatre
   b. Heritage Store
   c. Rollingstock Compound
9. Occupational Health Centre
10. Carpenters Workshop (RSA)
11. Carriage Workshops Compressor Building
12. Suburban Car Workshops - Redfern
    a. Suburban Car Workshop
       - Open Ended - 5 roads
    b. Suburban Car Workshop
       - Heritage Carriages, Secured - 5 roads
    c. Paint Shop - Secured - 2 roads
    d. Open Pit Inspection Area - 2 roads
13. Vacant
14. Police and Drug Investigations (Lower)
    Fire Protection Unit (Upper)
15. Fire Station
16. Heritage Store (Former Trackfast Building)
17. Asbestos Removal Centre (Former)
18. Welding Workshop Inspection Centre
19. Scientific Services Laboratory and Office
20. Passenger Fleet Maintenance (CME Building)
21. Railway Telecommunications (RAIL COM)
22. Demountable Compound
23. Garage

A,B,C,D Compounds

SS1 - Electrical Substation 1
SS2 - Electrical Substation 2
SS3 - Electrical Substation 3
SS4 - Electrical Substation 4
SS5 - Electrical Substation 5
UST - Underground Storage Tank

JOB TITLE	RWA Eveleigh Remediation Strategy		
FIGURE TITLE	Site Map		
FIGURE No. 4	REFERENCE CH2MHILL		
DATE 12/02/08	SCALE (m) (approx.) Not to Scale	PROJECT No. 3001510	

SMEC



Note: This figure has been prepared for information purposes only and represents one possible interpretation of the available data. The concentrations of contaminants are zoned in an indicative manner only and no guarantee is offered by SMEC that variations due to the heterogeneous nature of soil do not occur between the data points.

JOB TITLE	RWA Eveleigh Remediation Strategy		
FIGURE TITLE	Contaminant Exceedances in Soil in relation to Proposed Land Uses		
FIGURE No. 5	REFERENCE WSP (February 2008)		
DATE 25/03/08	SCALE (m) (approx.) Not to Scale	PROJECT No. 3001510	

SMEC

APPENDIX B : BACKGROUND INFORMATION

Statement of Site Suitability

Based on the information available to date, WSP Environmental Pty Limited consider that the soils at the North Eveleigh Rail Yard site can be made suitable for the proposed mixed land use (i.e. residential apartments, cultural / artistic uses, commercial uses, landscaping and plazas) provided that the following are undertaken:

- Appointment of an Environmental Consultant to prepare a Sampling Analysis and Quality Plan (SAQP) which targets the data gaps present in the existing ground investigation information. Namely, deeper areas of fill; previous in-ground obstructions; and, soil impacts identified above the respective NEPM (1999) guidelines. The exact extent of these additional works will be governed by the zoning / phasing of the proposed development;
- Following completion of the additional investigation works, the Environmental Consultant will be required to prepare an updated Remedial Action Plan;
- Following completion of the remedial works, the Environmental Consultant will be required to prepare a Remediation Validation Report; and,
- If any immobile contamination remains in-situ following the remedial works, the Environmental Consultant will also be required to prepare an Environmental Management Plan.

Currently, insufficient information exists to confirm that the groundwater beneath the site is suitable for the proposed mixed use development. Consequently, the Environmental Consultant will need to outline the scope of additional investigation to demonstrate that the groundwater will not pose an unacceptable risk to human health and / or the environment.

Notwithstanding the above, given the site geology (i.e. shallow fill overlying shale) it is considered that many proven remediation technologies exist to be able to effectively address any groundwater contamination issues that may be identified by the proposed additional investigation works, thereby, making the groundwater beneath the site suitable for the proposed mixed use development.

In addition to the foregoing, a DECC accredited Environmental Auditor will review the foregoing elements of additional investigation in a staged manner throughout the works to ensure that the remediated site is suitable for the proposed mixed land use and does not pose an unacceptable risk to the environment.

WSP Environmental Pty Limited

Our ref: 01-07-099L01.08.31Interim Advice 1
31 August 2007

Mr Jack Borozan
Redfern Waterloo Authority
Level 11, Tower 2
1 Lawson Square
Redfern
NSW 2016

Dear Jack

Interim Audit Advice 1
Remainder of the Site - North Eveleigh Rail Yard, NSW.

Introduction

Redfern Waterloo Authority (RWA) has appointed Mr Rod Harwood as environmental Site Auditor to provide third party review of environmental contamination assessment at the former North Eveleigh Rail Yard. It is understood that The Site will be used for a combination of land uses including residential apartments (western quarter), cultural and artistic uses (central quarter) and mixed commercial and residential apartments (eastern half). It is understood that parks, plaza's and public open space may also be incorporated into the scheme, however, the overall layout of the proposed scheme has yet to be finalised.

The whole site comprises approximately 11 hectares and is known as Lot 4 DP862514. For the purposes of providing audit advice, the site has been divided into two separate areas, namely, the former Blacksmiths Workshop (approximately 0.265 hectares) and the Remainder of the Site (approximately 10.735 hectares).

The portion of the site addressed in this Interim Audit Advice is the Remainder of the Site ("The Site") only. Interim Audit Advice for the Blacksmiths Workshop (Building 7) has been provided under separate cover.

RWA submitted copies of previous environmental assessments conducted at the site to the Auditor for his review and comment prior to commencement of the redevelopment of the property. This letter presents the findings of that review and provides interim advice (as discussed below) regarding the content of those reports.

Nature of Interim Advice

RWA has engaged Rod Harwood, a New South Wales Environment Protection Authority (EPA) (now Department of the Environment and Climate Change - DECC) contaminated land accredited site auditor (accreditation number 03-04), employed by WSP Environmental Pty Limited (WSP) to act as Auditor for this project. The final outcome of this engagement is to be a site audit statement (SAS) and associated site audit report (SAR), indicating the suitability of the land and the proposed development to meet the NSW DEC land use criteria for the intended use of the land.

This interim audit advice does not constitute a SAS or a SAR, but rather is provided to assist RWA In the assessment and management of contamination issues at the site.

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WSP Group plc
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The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audit opinion based on the current review of available site information.

Scope of Audits

Whereas interim audit advice is provided to assist in the assessment and management of contamination issues at the site, the interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Auditor Scheme* describes the site assessment and audit process as:

(i) *Consultant is commissioned to assess contamination*. The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and,

(ii) *Site auditor reviews the consultant's work*. The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Current Interim Audit Advice

In preparing this Interim Advice for The Site – North Eveleigh Rail Yard, NSW (part of Lot 4 DP862514), and the Auditor has conducted a review of the following documents:

Doc. No.	Consultant	Report Title	Date
1	ADI	State Rail Authority Relocation Project, Stage 1 Environmental Contamination Assessment, Wilson Street, Eveleigh	5-Nov-93
2	ADI	Stage 2 Investigation Report for Rail Estate at Wilson Street Eveleigh	14-Dec-93
3*	Rust PPK	Specification for Removal of Dust from Building at Wilson Street, Eveleigh	1-Jun-95
4	HLA-Envirosciences	Site Contamination Assessment and Monitoring at Eveleigh Rail Yards	1-Jun-96
5	Rust PPK	Validation Report for Dust Removal from Wilson Street Carriage Works	1-Feb-97
6*	HLA-Envirosciences	Hazardous Material Audit of SRA Eveleigh Railway Workshop	1-Dec-97
7	Hibbs & Associates	Hazardous Material Survey Report, Eveleigh Railway Workshops, Wilson Street, Darlington	1-May-98
8	CH2M HILL	Eveleigh Workshops - Phase I Report	1-Jun-98
9	CH2M HILL	Eveleigh Workshops - Stage II Field Investigations and Data Assessment	1-Jul-98
10	Jeffrey and Katauskas	Geotechnical Investigation of Redevelopment Potential at Eveleigh Workshops	9-Jul-98
11*	CMP-GBG	Subsurface Investigation Using GPR	1-May-98
12	ERM (Rod Harwood)	Site Audit Statement & Summary Site Audit Report	15-Sep-98
13	HLA	Hazardous Material Audit of State Rail Authority, Eveleigh Railway Workshops, Wilson Street, Darlington	17-Dec-99
14	HLA	Hazardous Material Audit of SRA Eveleigh Railway Workshop 1, 2, 8, 12, 20	1-Apr-00
15	CH2M HILL	Remedial Action Plan - North Eveleigh (Areas A & B)	1-May-00
16	CH2M HILL	North Eveleigh Workshops - Baseline Groundwater Investigation	1-May-00
17	ERM - Frank Mohen	Site Audit Statement	21-Dec-00
18*	SMEC	Rail Estate, Remedial Action Plan, North Eveleigh Railyard	1-Jan-01
19*	SMEC	South Sydney Council Letter	23-Aug-01

Doc. No.	Consultant	Report Title	Date
20*	SMEC	Groundwater Study II at North Eveleigh Railyard	1-May-02
21	SMEC	March 2003 Groundwater Monitoring Assessment	1-Jun-03
22	SMEC	Environmental Site Management Plan	1-Sep-03
23	Hibbs & Associates	Hazardous Materials Survey, Carriage Works at Eveleigh	1-Sep-04
24	SMEC	Blacksmith's Workshop, Soil Investigation	30-Nov-04
25	HLA – Bill Ryall	Site Audit Report and SAS - Arts Precinct	14-Dec-04
25A	CH2MHILL	South Western Portion of the North Eveleigh Railyard, Wilson Street, Eveleigh	1-Dec-05
26	SMEC	Soil Sampling and Waste Classification - Blacksmiths Entrance	1-Feb-06
27	SMEC	Geotechnical Investigation - Blacksmiths	1-Mar-06
28	SMEC	Blacksmith Capping Specification	1-Apr-06
29	SMEC	Blacksmith Hazmat Abatement	1-Apr-06
30	SMEC	EMP Draft - Canteen Site	1-Apr-06
31	SMEC	EMP RWA Training Centre	1-May-06
32	SMEC	Soil Contamination Assessment - Blacksmiths	1-Feb-07
33	CH2MHILL	Soil Classification – North Eveleigh Railyard, Wilson Street, Eveleigh	1-Feb-07

*** - indicates that reports were written but have not yet been provided to WSP for review.**

The review of these documents has been in general accordance with the requirements in the NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* and NSW EPA (1997) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.*

The objective of this audit is to provide advice on the suitability of the previous investigations with regard to the assessment of impacts from previous site uses and the proposed redevelopment of the site. It is understood that The Site will be used for a combination of land uses including residential apartments (western quarter), cultural and artistic uses (central quarter) and mixed commercial and residential apartments (eastern half). It is understood that parks, plaza's and public open space may also be incorporated into the scheme, however, the overall layout of the proposed scheme has yet to be finalised. Recommendations for future investigations are also made.

Land Contamination Status of the Site

In order aid the discussion of the previous reports, the Auditor has attached CH2MHILL Figure 2 entitled *"Current Site Map"* from Document 9. The figure identifies all buildings by number, which are presented in brackets after the document number in the discussion below. Where contamination impacts are discussed below, this is in relation to exceedances of the appropriate guidelines for the proposed enduse.

The following provides an overview of the land contamination status of the site based on the reports submitted for review, a site inspection and discussion with RWA personnel:

<u>Previous Investigations</u>

- Document 1 (Area 22 and Compound D) comprised a preliminary investigation to evaluate the potential for contamination with respect to proposed State Rail Workshops. This included a review of available historical data and limited shallow soil sampling. Six shallow (0.1m) samples were analysed for heavy metals, volatile organic compounds (VOC), organochlorine pesticides (OCP), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), toxicity leaching characteristic procedure (TCLP) and asbestos. Shallow soil contamination (heavy metals and PAH) was identified, which was considered to be attributable to historical filling and bulk fuel storage respectively. A Stage 2 Soil and Groundwater Investigation was recommended.

- Document 2 (Area 22 and Compound D) comprised a Stage 2 investigation as recommended in Document 1. This included soil sampling from seven boreholes (three of which were converted into monitoring wells) and nine additional shallow soil samples. Thirty three samples were analysed for heavy metals, total petroleum hydrocarbons (TPH), benzene / toluene / ethyl benzene / xylene (BTEX) and PAH. Soil contamination included heavy metals, PAH and TPH. Groundwater contamination included PAH and TPH. A delineation investigation for soil and groundwater; remediation of metals, PAH and TPH in soils; and, establishment of a groundwater monitoring programme were recommended.

- Document 3 (Building 8) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 4 (Area 22 and Compound D) comprised a contamination assessment to evaluate the extent of TPH and PAH; evaluate sources and pathways of groundwater contamination; assess the influence of rainfall on contaminant flow; and, identify cost effective options for the management or remediation of TPH and PAH contamination. This included the construction of nine boreholes (three of which were converted into monitoring wells) and groundwater sampling and analysis from the new and existing wells. Thirteen soil and five groundwater samples were analysed for heavy metals, TPH, BTEX and PAH. Soil and groundwater contamination included heavy metals / TPH and TPH (including separate phase) and zinc respectively. It was recommended that any residual soil contamination or groundwater identified during construction should be disposed of in accordance with EPA guidelines.

- Document 5 (Building 8) is linked to Document 3 and comprised a validation report for dust removal from the former Carriage Workshop to facilitate future use as a theatre. Heavy metal impacts were recorded in dust / dirt samples and all metal concentrations in air were below WorkCover standards. Implementation of an occupational health & safety (OHS) Plan, dust suppression and management of public exposure during construction activities were recommended. In addition regular cleaning of the floors during the future use was also recommended.

- Document 6 (location unknown) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 7 (The Site) comprised a survey to establish typical locations and applications of hazardous materials. Asbestos, synthetic mineral fibre, lead and PCB were considered. All hazardous materials were encountered in some shape or form within the buildings at The Site. Recommendations included removal of asbestos materials in a damaged or deteriorating condition; labeling of asbestos in a stable condition; and, stabilisation of deteriorating lead based paints by over-painting. No remedial action was considered necessary with respect to the PCB lighting capacitors identified. No estimated volumes of hazardous materials was provided.

- Document 8 (The Site) comprised a Draft Phase 1 Environmental Site Assessment and includes a review of available historical data, aerial photographs, interviews with former employees, review of title information and environmental characteristics. Potentially contaminating historical activities included painting operations, fuel storage, electroplating, cleaning solvents, weed and pest control. A targeted Phase 2 soil and groundwater investigation was recommended.

- Document 9 (The Site) comprised a Phase 2 Field Investigation and Data Assessment to locate and quantify contaminants in soil and groundwater identified in the Phase 1 (Document 8) and provide an estimated cost of remediation. This report also provides a review of Documents 2 and 4. A grid based sampling strategy with additional judgmental locations was undertaken comprising 105 boreholes (three of which were converted into monitoring wells). One hundred and eighty three samples were analysed for metals, TPH, PAH, BTEX, OCP, organophosphate pesticides (OPP), asbestos, VOC, semi volatile organic compounds (SVOC) and PCB. The majority of the surface soil is contaminated with heavy metals, TPH and PAH. Lead and PAH hotspots have also been identified in both the fill and natural soils. Groundwater was impacted by heavy metals. In 1998 the cost of remediation was estimated at between $4.44 and $9.51million. Recommendations included:

    - restricting access, removal or capping of soil with concentrations in excess of industrial criteria;
    - investigate vapours in former solvent store behind RailCom Offices;
    - delineate extent of hotspots;
    - undertake additional TCLP analysis;
    - conduct trials for stabilisation of leachable metals in soils;
    - investigate alternative remedial options; and,
    - undertake additional groundwater investigations.

- Document 10 (The Site) comprised an investigation to assess the geotechnical properties of the existing ground conditions, which involved the drilling of twenty boreholes, three test pits and associated geotechnical testing. In the north of The Site, shale bedrock was encountered at or very near the surface. In the south of The Site, shale bedrock was encountered at depths of up to 5m and was overlain by between 1 to 3m of fill and residual natural clays. The fill generally comprised a thin layer of granular material underlain by poorly compacted clay fill. Groundwater was encountered in most holes at between 2 and 3m below ground levels (bgl). The report recommended stripping of surface fill and replacement of poorly compacted materials with an engineered fill.

- Document 11 (location unknown) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 12 (The Site) comprised a SAR and SAS, which discusses Documents 4, 8, 9 and 10. The SAS concluded that the site was not currently suitable for any beneficial use due to the risk of harm from contamination. This SAS is very brief and has been superceded by further work.

- Document 13 (The Site) comprised a survey to review and confirm the location and extent of all hazardous materials identified in Document 7 and to quantify the extent of those materials within the buildings, prior to any demolition, refurbishment or building works commencing. Asbestos, synthetic mineral fibre, lead and PCB were considered. All hazardous materials were encountered in some shape or form within the buildings at The Site. Recommendations included removal of asbestos materials in a damaged or deteriorating condition or prior to demolition; determination of any other hazardous materials that may be encountered during demolition; over-painting and labelling of asbestos in a stable condition; removal of PCB lighting capacitors prior to demolition; and, controlled chemical removal of deteriorating lead based paints with concentration >1%. Approximate volumes of hazardous materials are provided in this document.

- Document 14 (Buildings 1, 2, 8, 12 and 20) quantifies the likely extents of hazardous materials encountered in Document 7.

- Document 15 (Buildings 8 and 12) outlines the broad policy and procedures for a remedial action plan (RAP) to remediate Area A (Building 12 and surrounds) and Area B (Building 8 and surrounds) for a proposed commercial or industrial end use. Contaminants in soil comprised copper, lead, benzo-a-pyrene (BaP) and chromium, BaP and total PAH in Areas A and B, which are to be remediated by a combination of off site disposal and containment respectively. In addition, the hazardous building materials are to be remediated by a combination of removal / disposal or treatment / containment.

- Document 16 (The Site) comprised a baseline groundwater assessment against which future groundwater assessments can be compared. The document was also intended aid in the determination of commercial risk posed by onsite groundwater contamination. Eight monitoring wells were installed and groundwater samples were tested for heavy metals, PAH, TPH, BTEX, OCP, PCB, ammonia, anions, cations and alkalinity. Heavy metals and PAH impacts to groundwater were noted.

- Document 17 (The Site) comprised a SAR and SAS, which discusses Documents 2, 4, 8, 9, 10, 15, 16 and 18. The SAS concluded that the site was not currently suitable for any beneficial use due to the risk of harm from contamination. The SAS also commented that *"Currently the site is contaminated to an extent where remediation will be required before it can be used for the proposed land uses. The Remedial Action Plan prepared by SMEC is an appropriate basis for the remediation of the site subject to the comments and recommendations given in my report titled "North Eveleigh Railway Yard, Wilson Street, Redfern – Summary Site Audit Report" dated 21 December 2000."*. More detail is required from Document 18 to determine the exact requirements of the RAP, however, this report has yet to be provided to WSP.

- Document 18 (location unknown) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 19 (location unknown) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 20 (location unknown) was absent from the original group of reports provided to WSP. A copy has been requested from RWA and we look forward to receiving it in due course.

- Document 21 (The Site) comprised an assessment of the groundwater quality with respect to the baseline results outlined in Document 16 and establish any changes between up and down gradient boundaries. Groundwater conditions which pose a significant risk of harm to human health or the environment were to be identified. Eight new monitoring wells were installed and nineteen soil samples were obtained. All new and five existing wells were sampled and tested for heavy metals, TPH, BTEX and PAH. It was concluded that groundwater quality had improved and site conditions were unlikely to cause an unacceptable risk to human health or the environment. However, it was recommended that groundwater should not be abstracted for use; any development should minimise surface water infiltration and lateral migration; and, impacted soils should be removed or capped. A more detailed assessment of the well placement and screened sections of the wells, however, there are no Appendices presented with this report for review.

- Document 22 (Building 8) comprised an Environmental Management Plan for the arts precinct only. The contaminants and health risks identified were associated with lead, PAH and TPH in soils encountered during construction or operation of the arts precinct. Site management procedures for the construction and operational phases of the arts precinct are also given.

- Document 23 (Buildings 7 and 8) comprised a survey to establish typical locations and applications of hazardous materials. Asbestos, synthetic mineral fibre, lead in paints, lead and cadmium in dusts and PCB were considered. With the exception of PCB in lighting capacitors, all hazardous materials were encountered in some shape or form. Recommendations included removal of hazardous materials prior to the commencement of any demolition / renovation works that may cause their disturbance. Potential PCB in transformer oils could not be sampled due to the inherent electrical hazard. Accumulated and settled dust should be removed and disposed of in an appropriate manner.

- Document 24 (Building 7) comprised a soil investigation to establish the environmental condition of the fill and natural soils beneath the Blacksmiths Workshop. Four boreholes (with one converted into a groundwater monitoring well) were constructed and a total of eleven soil and one water sample were obtained. Samples were analysed for metals, TPH, BTEX, PAH, OCP, phenols and cyanide. TPH and lead impacts were noted in six and one sample of shallow fill respectively. It was recommended that a containment system and EMP be developed. A disposal option was also presented that involved the removal of the upper 0.50m of fill material, however, it is since apparent that the capping option was deemed more appropriate given the likely heritage constraints.

- Document 25 (Buildings 7 and 8) comprised a SAR and SAS, which discusses Documents 20, 21, 22 and 24. Although significant contamination by heavy metals, PAH and TPH was identified in fill materials, it was the audit opinion that implementation of the EMP (Document 22) provided adequate measures to properly allow for the protection of human health during the use of the site. The SAS concluded that the Arts Precinct was suitable for commercial/industrial use subject to the following conditions:

  1) *"This Site Audit Statement provides a summary of the Summary Site Audit Report and must be read in conjunction with the Summary Site Audit Report.*
  2) *Intrusive earthworks* [in the context of future works / maintenance] *and removal of pavements or floors within buildings on the Arts Precinct are to be undertaken in accordance with the provisions of the "Environmental Site Management Plan, North Eveleigh, Art Precinct" prepared by SMEC dated August 2004 ".*

- Document 25A (D compound) comprised a site characterisation and waste classification exercise to facilitate the construction of a new electrical substation. This report also includes a brief review of Documents 1, 2, 4, 9 and 12. Eight sampling locations were formed using test pits and twenty five samples were analysed for heavy metals, TPH, BTEX, PAH, OCP, PCB and asbestos. The testing indicates that the site soil encountered were suitable for a commercial / industrial use and that the electricity substation could be constructed in the desired location. The materials were classified as inert waste for off site disposal purposes. It was recommended that a contingency plan be established to deal with any unexpected materials encountered during the works.

- Document 26 (Buildings 7 and 9) comprised an investigation to establish the extent of contamination in the kiln and flue residues in Building 7 and in soil at Building 9 to determine disposal and management options. Sampling included drilling of five boreholes, two stockpile samples and of residues within the steel flue and kiln. Samples were analysed for metals, TPH, BTEX, PAH, cyanide for kiln and flue residues and metals, TPH, BTEX, PAH and PCB for the stockpiles. TPH and lead impacts were recorded in the kiln and flue residues; TPH, PAH and lead impacts in soils and lead in slag stockpiles in Building 9. A site specific OHS plan was recommended for ay works conducted in Buildings 7 and 9. Soil on the northern side of Building 9 requires capping and soil on the southern side requires capping or removal.

- Document 27 (Building 7) comprised an investigation to determine subsurface conditions and establish foundation design parameters, which included the formation of six boreholes and associated geotechnical testing. No shallow groundwater was observed and subsurface conditions comprised concrete overlying fill, silty clays and weathered shale.

- Document 28 (Building 7) outlines the technical requirements for the soil capping works.

- Document 29 (Building 7) outlines the technical requirements for the hazardous material abatement works.

- Document 30 (Buildings 10 and 11) comprised a draft Environmental Management Plan for the canteen site only. The contaminants and health risks identified were associated with asbestos, lead, PAH and TPH in soils in the landscaping to the north of the buildings. Site management procedures for the construction and operational phases of the canteen site are also given.

- Document 31 (Buildings 10 and 11) comprised an Environmental Management Plan for a proposed RWA training centre. The contaminants and health risks identified were associated with asbestos, lead, PAH and TPH in soils in the landscaping to the north of the buildings. Site management procedures for the construction and operational phases of the canteen site are also given.

- Document 32 (Building 7) comprised an assessment of the suitability of the building for use as a market following decontamination works. Decontamination works included use of high pressure water to remove dust from surfaces and heritage items within the building. Shallow soil samples were collected from fifteen locations using a shovel. Eighteen samples were analysed for metals, PAH, TPH, BTEX and asbestos. TPH and lead impacts were recorded and asbestos fibres were detected in all samples. In the short term it was recommended that the migration of dusty soils or particles be minimised by temporary covering. In the medium term, it was recommended that contaminated materials were removed or capped in accordance with Document 22.

- Document 33 (Compound D) comprised a soil sampling and classification programme of fill materials to facilitate the construction of a new electrical substation. This report also includes a brief review of Document 25A. Nine sampling locations were formed using test pits and nineteen samples were analysed for heavy metals, TPH, BTEX, PAH, OCP, PCB and asbestos. TCLP testing was undertaken on five samples. Using both the past and present data, the testing indicates that the site was suitable for a commercial / industrial use and that the electricity substation could be constructed in the desired location. The materials were classified as inert waste for off site disposal purposes. Isolated fragments of asbestos cement were identified and it was recommended that a contingency plan be established to deal with any unexpected materials encountered during the works.

In summary, the extent of the available ground investigation data at The Site can be summarised as follows:

Document Number	No. of Sampling Points	Nos. of Soil Testing		Nos. of Water Testing	Nos. of Duplicate Sample	Nos. of Triplicate Samples	Nos. of TCLP Tests	Nos. of Asbestos Tests
		Total	of which are shallow samples*					
1	6	6	6	0	0	0	3	1
2	16	33	14	3	5	0	0	0
4	9	13	0	5	0	0	0	0
9	105	183	112	3	17	0	5	3
10	23	0	0	0	0	0	0	0
16	8	0	0	8	2	0	0	0
21	27	21	No lab data	17	10	5	0	0
24	4	11	9	2	2	1	0	0

Document Number	No. of Sampling Points	Nos. of Soil Testing		Nos. of Water Testing	Nos. of Duplicate Sample	Nos. of Triplicate Samples	Nos. of TCLP Tests	Nos. of Asbestos Tests
		Total	of which are shallow samples*					
25A	8	25	17	0	2	1	4	8
27	6	0	0	0	0	0	0	0
32	15	18	15	0	2	1	0	15
33	9	19	15	0	2	0	5	6
TOTAL	**236**	**329**	**189**	**38**	**42**	**8**	**17**	**33**

*** - shallow samples are those taken from less than 0.5m depth.**

Site Setting

Based on the available information the majority of The Site is level with a gradual slope from the north west to the south east. The only exceptions being a four metre high embankment along the northern site boundary with Wilson Street and a filled ramped access to Wilson Street at the western end of The Site. Shale bedrock can be seen at various locations along the northern site boundary.

Approximately 85% of The Site is sealed by asphalt or concrete with a large number of buildings also being present. The area to the south eastern corner of The Site is unsealed and covered by rail tracks and blue metal rail ballast.

Drainage from the sealed areas of The Site is to controlled stormwater drains and pipes which enter the local stormwater system. This system most likely drains to Alexandra Canal to the south east. Water falling on the unsealed areas is likely to infiltrate into the local groundwater system.

The regional geology of the area comprises the Ashfield Shale, which ranges in thickness from between 48 to 54m across the Sydney area. The depth to bedrock beneath The Site generally increases from the north west to the south east and is immediately overlain by an increasingly thick wedge of fills and residual clays.

The Site is bounded to the north east and west by residential properties. The southern boundary is formed by the Sydney Rail Line, beyond which lies the Eveleigh Rail Workshops.

Historical Site Use

The attached Figure 3 and Table 2.1 from Document 9 present the Areas of Potential Contamination and nature of contaminants associated with the previous site use.

Ground Conditions

The ground conditions described within the reports can be summarised on the following table :

Stratum Type	Minimum Depth to Base of Stratum (m bgl)	Maximum Depth to Base of Stratum (m bgl)
Concrete / Asphalt	0.05	0.8
Topsoil (Fill)	0.1	1.6
Granular Ashy Fill	0.2	2
Cohesive Ashy Fill	0.2	0.5
Granular Non Ashy Fill	0.19	4.9
Cohesive Non Ashy Fill	0.2	3.9
Reworked Natural Clay	0.2	5.2
Natural Silty Clay	0.2	6.5
Natural Clay	0.4	8
Shale (base not proven)	0.3+	9+
Groundwater (levels during drilling)	0.9 to 7.8	

In order to aid the reader, the attached WSP Figures 1 and 2 show the approximate depth to base of fill and top of shale respectively across The Site based on the information provided in the available reports.

Soil Results

Based on the available information, the principal chemicals of concern that were encountered at concentrations in excess of the NEPM (1999) HIL D (residential with limited soil access) and HIL F (commercial / industrial) within the fill materials include lead, BaP, TPH and PAH. Localised exceedances of chromium, copper, cadmium, zinc and mercury were also detected.

The majority of the available results indicate that the natural clay soils are suitable for the proposed end uses, as defined by HIL D and HIL F. The exceptions are lead, BaP and PAH in very localised samples.

The following table summarises the numbers of available soil samples in fill, clays and shale and the associated impacts above the guideline levels:

Document Number	Total No. of Samples	No. of Fill Samples	No. of Clay Samples	No. of Shale Sample	No. of Fill > HIL (D/F)	No. of Clay > HIL (D/F)	No. of Shale > HIL (D/F)
1	6	6	0	0	(1/1)	No data	No data
2	33	21	12	0	(2/1)	(2/1)	No data
4	13	5	8	0	(0/0)	(0/0)	No data
9	183	149	18	15	(32/32)	(0/0)	(3/3)
10	0	**No soil samples analysed**					
16	0	**No soil samples analysed**					
21	21	**No laboratory data available for review (appendices missing)**					
24	11	9	0	2	(6/6)	No data	(0/0)
25A	25	25	0	0	(0/0)	No data	No data
27	0	**No soil samples analysed**					
32	18	15	3	0	(12/11)	(0/0)	No data
33	19	15	4	0	(0/0)	(0/0)	No data
TOTAL	**329**	**245**	**45**	**17**	**(53/51)**	**(2/1)**	**(3/3)**

Detected concentrations of asbestos were also encountered within The Site soils, however, there is insufficient data to make a comment regarding their overall distribution.

To aid the reader, the exceedances in soil are shown on the attached WSP Figure 3. For completeness, WSP Figure 3A (Blacksmiths Workshop) has also been attached.

Groundwater Results

Based on the available information, the principal chemicals of concern that were encountered at concentrations in excess of the ANZECC (2000) 95% level of protection (LoP) for freshwater include copper, nickel, zinc, TPH (separate phase) and PAH. Localised exceedances of chromium, lead, cadmium, arsenic and mercury were also detected.

Separate phase hydrocarbons were noted in ADI BH2 formed near the Oil Store at the western end of the site in 1993. This varied in thickness between a sheen and 920mm when monitoring was undertaken in 1993 and 1996.

To aid the reader, the exceedances in groundwater are shown on the attached WSP Figure 4.

Conditions Associated with this Interim Advice

The following table summarises the nature and extent of investigations undertaken at The Site to date:

Investigation Type	Document Numbers
Mixed (Blacksmiths Workshop / Building 7)	24, 26, 27, 28, 29 and 32
Geotechnical	10
Hazard Materials Surveys	7, 13, 14 and 23
Phase 1 and 2	1, 2, 4, 8, 9, 16 and 20
Waste Classification	25A and 33
RAP	15 and 18
EMP	22, 30 and 31
SAS and SAR	12, 17 and 25

The Auditor is currently awaiting copies of Documents 3, 6, 11, 18, 19 and 20 and is therefore unable to provide comment at this time.

Advice concerning Documents 24, 26, 27, 28, 29 and 32 has been provided for the Blacksmiths Workshop (Building 7) in Interim Audit Advice 1 letter dated 16 August 2007 and will not be commented upon herein.

Document 10 comprises a geotechnical report and is beyond the scope of this Interim Audit Advice. Documents 7, 13, 14 and 23 comprise hazardous materials reports and are beyond the scope of this Interim Audit Advice. However, given that they were prepared between 1998 and 2004 it is likely that they will need to be reviewed and updated by an appropriately qualified consultant to facilitate RWA ongoing requirements (e.g. refurbishment or demolition).

Bearing the above in mind, the Auditor's current assessment is based on the remaining reports submitted for review, a site inspection and discussion with RWA personnel:

- The reports are broadly compliant with the NSW EPA (1997) and NSW DEC (2006) guidelines. Whilst there are some exceptions, these are considered unlikely to compromise the validity of the data set as a whole.
- The QA / QC of the data within the reports are of a generally acceptable standard. Again, there are some exceptions but these are considered unlikely to compromise the validity of the data set as a whole. The most notable absence is inter-laboratory samples (triplicates) from the earlier reports.
- Given the significant amount of laboratory data presented in the reports provided, it has not been possible to thoroughly review the data in its entirety. Notwithstanding the above, the Auditor has undertaken random checks and extracted the key information to determine that the works were generally conducted in accordance with the NSW EPA (1997) and NSW DEC (2006) guidelines.
- The contaminants of concern (CoC) have been targeted in a reasonable manner when the data set is considered in its entirety. The notable exceptions are total nickel in soil (excluded from Document 9), leachable metals (to assess risks to groundwater), TCLP (to determine the waste classification of the soil materials) and asbestos (to manage human health and waste disposal issues) sampling, which should be added to the list of CoC for future phases of investigation.

- Given the size of the site (i.e. 11 hectares), approximately 121 sampling locations are advised within NSW EPA (1995). The 236 sampling locations undertaken to date were formed on a regular grid with targeted sampling around areas of concern (e.g. former Oil Store) or investigation specific objectives (e.g. proposed new electricity substation). This approach is considered to be compliant with the current guidance when The Site is considered in its entirety. However, care should be taken to ensure compliance with NSW EPA (1995) if The Site is zoned for the purposes of remediation and / or phased development.
- Approximately 55% of the soil samples are taken from the upper 0.5m soil horizon of The Site. Whilst fill is generally only present to shallow depths, the significant number of hole refusals on obstructions (see WSP Figure 1) and areas of deeper fill should be targeted, sampled and analysed in future investigations. This is especially important where they coincide with known soil impacts above the guidelines for the proposed end use (as shown on WSP Figure 3).
- The soil exceedances shown on WSP Figure 3 should also be targeted to facilitate delineation and characterisation of the impacted soil horizons at The Site as a whole. A reassessment of the data presented in this figure will be required if private residences with gardens, parks and / or open space are to form part of the proposed development (i.e. HIL A, HIL E and EILs will need to be considered).
- A total of twenty six groundwater monitoring installations were formed but there are notable gaps in coverage and placement downgradient of potential contaminant sources (e.g. Oil Store / USTs) is not ideal. In addition, the lack of survey level data for all holes and inconsistency of monitoring to date makes robust interpretation of the groundwater regime very difficult. A more detailed assessment of where the response zones of the well lie in relation to the stratum at the site is also required to complete the assessment. These data gaps should be addressed in any future investigation to establish whether groundwater is likely to present a significant risk of harm to human health and / or the environment.
- BH2 (Compound D) contains separate phase, which is likely to pose a significant risk of harm to the environment. It is understood that RailCorp are currently undertaking delineation works in this area but is it important that the Auditor is advised exactly what scope of works and remediation is proposed to address the soil source and groundwater impact caused by the separate phase in this part of The Site.
- Confirmation should be sought to ensure that the High Priority items (i.e. areas exceeding HIL F and former solvent store) recommended in Document 9 were addressed.
- Whilst the content of the existing RAP (Documents 15) is of interest it was written some 7 years ago for selected areas of The Site only. In order to facilitate the proposed redevelopment of The Site, a revised RAP will need to be prepared.
- The requirements outlined in the existing EMPs for The Site (Documents 22, 30 and 31) should be maintained until such time as The Site can be declared as being suitable for the land uses in question without restrictions. If The Site condition is altered during redevelopment then the EMPs should be reviewed and amended where deemed appropriate.

Conclusion

In order to progress the project to the next stage, the Auditor considers the following points should be addressed:

- All points outlined in the aforementioned Section of this letter entitled “Conditions Associated with this Interim Advice”;
- Where relevant to the scope of this Audit, the previous SAS / SARs (Documents 12, 17 and 25) appear to be in general agreement with the statements / conditions made above.

- The Auditor considers that RWA should appoint an environmental consultant to prepare a holistic Sampling Analysis and Quality Plan (SAQP) for The Site to identify data gaps and recommend further investigation. The implementation of the SAQP will then provide RWA with a robust data set to facilitate their proposed redevelopment objectives.
- If required, the Auditor would be happy to attend a briefing meeting for the RWA nominated consultant to convey the points described herein.

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I trust that the Interim Advice outlined herein meets your immediate requirements and look forward to receiving the SAQP for review in due course. However, in the meantime, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely

Rod Harwood
Accredited Site Auditor (NSW EPA #03-04)

Our ref: 01-07-099L02.01.14Interim Advice 2

14 January 2008

Jack Borozan
Redfern Waterloo Authority
Level 11, Tower 2
1 Lawson Square
Redfern
NSW 2016

Dear Jack

Interim Audit Advice 2 – Addendum to SMEC ESMP
Blacksmiths Workshop (Building 7) - North Eveleigh Rail Yard, NSW.

Introduction

Redfern Waterloo Authority (RWA) has appointed Mr Rod Harwood as environmental Site Auditor to provide third party review of environmental contamination assessment at the former North Eveleigh Rail Yard. It is understood that the site is to be redeveloped as a combination of landuses including residential (western quarter), cultural and artistic uses (central quarter) and mixed commercial and residential (eastern half). It is understood that parks, plaza's and public open space will also be incorporated into the scheme, however, the detailed layout has yet to be finalised.

The whole site comprises approximately 11 hectares and is known as Lot 4 DP862514. For the purposes of providing audit advice, the site has been divided into two separate areas, namely, the former Blacksmiths Workshop (approximately 0.265 hectares) and the Remainder of the Site (approximately 10.735 hectares).

The portion of the site addressed in this Interim Audit Advice is the former Blacksmiths Workshop only. In keeping with the terminology adopted in third party reports, the former Blacksmiths Workshop will also be referred to as Building 7.

Nature of Interim Advice

RWA has engaged Rod Harwood, a New South Wales Environment Protection Authority (EPA) (now Department of Environment and Climate Change) contaminated land accredited site auditor (accreditation number 03-04), employed by WSP Environmental Pty Limited (WSP) to act as Auditor for this project. The final outcome of this engagement is to be a site audit statement (SAS) and associated site audit report (SAR), indicating the suitability of the land and the proposed development to meet the NSW DECC land use criteria for the intended use of the land.

This interim audit advice does not constitute a SAS or a SAR, but rather is provided to assist RWA in the assessment and management of contamination issues at the site.

The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audit opinion based on the current review of available site information.

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Scope of Audits

Whereas interim audit advice is provided to assist in the assessment and management of contamination issues at the site, the interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Auditor Scheme* describes the site assessment and audit process as:

(i) *Consultant is commissioned to assess contamination.* The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and,

(ii) *Site auditor reviews the consultant's work.* The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Current Interim Audit Advice

In preparing this Interim Advice for the former Blacksmiths Workshop (Building 7) – North Eveleigh Rail Yard, NSW (part of Lot 4 DP862514), the Auditor has conducted a review of the following document:

1. David Lane Associates (DLA) (18 December 2007) *Remedial Recommendations – Blacksmith Workshop: Addendum – Environmental Site Management Plan – North Eveleigh Art Precinct, SMEC 2004.*

The review of these documents has been in general accordance with the requirements in the NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition).*

The overall objective of this audit is to provide advice on the suitability of the previous investigations with regard to the assessment of impacts from previous site uses and the proposed redevelopment of the site. It is understood that the Building 7 is to be refurbished for use as a hard surfaced market stall area.

Background

The Auditor has previously provided Interim Audit Advice for this site in a letter dated 16 August 2007 (Ref : 01-07-099L01.08.16), which should be read in conjunction with this Interim Audit Advice.

In August 2004, SMEC prepared an Environmental Site Management Plan (ESMP) for the North Eveleigh Arts Precinct to manage residual risks associated with lead, polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH) impacted soils.

In December 2004, Dr William Ryall prepared an SAS and SAR for the Arts Precinct and concluded that it was suitable for a commercial / industrial use provided that intrusive earthworks and removal of pavements or floors are undertaken in accordance with the ESMP referred to above. It should be noted that the Blacksmiths Workshop forms part of the larger Arts Precinct site.

At a site meeting on 7 November 2007, it was agreed with the current Auditor and the RWA that DLA would prepare an addendum to the SMEC ESMP (2004) to address the following issues:

- The presence of asbestos as a contaminant of concern not previously covered in the SMEC ESMP;
- Present additional data relating to the lack of groundwater beneath the site;
- Outline the drainage proposals;
- Outline the removal and validation of impacted soils (SS6 and SS7) in the vicinity of the machine plinths;
- Justify the adoption of capping as the most appropriate remedial solution for the site; and,
- Outline the capping proposals and justification of the design in accordance with ANZECC (1999) *Guidelines for the Assessment of On-site Containment of Contaminated Soil.*

The Auditor considered that the emplacement of the capping layer and implementation of an ESMP which addressed the points outlined above was likely to render the site suitable for the proposed commercial / industrial use.

Conditions Associated with this Interim Advice

The Auditor's current assessment is based on the report submitted for review, a site inspection and discussion with RWA personnel:

- The Auditor considers that the addendum ESMP letter should comprise a bound report document;
- Section 1.0 should be amended to state that the addendum ESMP report was produced to provide additional detail on issues outlined in the foregoing section ("Background") of this Interim Audit Advice letter;
- Section 1.0 should be amended to state that the addendum ESMP will need to be used in conjunction with the SMEC ESMP (2004);
- To aid the reader please show the location of SMEC Well 4 on Figure 1;
- Section 2.2 - reference to the "heavy impermeable clays" should be clarified by reference to weathered shale as detailed on the logs in Attachment 3;
- Section 2.2 - the Auditor considers that it would be more accurate to refer to the natural clays as being negligibly permeable rather than impermeable;
- When Attachment 1 is referred to in the text of the document it should made clear that the results for sample ER-3 on lab report E033962 do not relate to the subsurface soils at the site;
- Section 2.3 should be restructured to include discussion of the adoption of capping as the most appropriate remedial solution for the site (i.e. specific comment regarding heritage and geotechnical constraints as discussed with RWA) and justification of the design in accordance with ANZECC (1999) *Guidelines for the Assessment of On-site Containment of Contaminated Soil*;
- Section 3.0 – a new section should be included to present the soil impacts outlined in the previous investigations;
- Section 3.0 - comments should be added to this section which outlines the removal and validation of impacted soils (SS6 and SS7) in the vicinity of the machine plinths;
- Section 3.0 – the contaminants of concern outlined by SMEC included lead, PAH and TPH. Please provide a comment to the Auditor which justifies why the further work undertaken by DLA did not include TPH analysis;
- Section 3.1 – for consistency the Auditor considers that this additional contaminant of concern (i.e. asbestos) should be discussed in a similar manner to Section 2 of the SMEC ESMP (2004); and,

- Please provide a copy of the Work Method Statement (referred to in Section 3.0) to the Auditor for review prior to its implementation.

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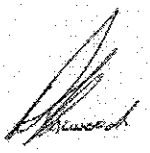
I trust that the Interim Advice outlined herein meets your immediate requirements and look forward to receiving the amended addendum EMP report and Work Method Statement for review in due course. However, in the meantime, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely



Rod Harwood
Accredited Site Auditor (NSW EPA #03-04)

Our ref: 01-07-099L01.08.16Interim Advice 1

16 August 2007

Redfern Waterloo Authority
Level 11, Tower 2
1 Lawson Square
Redfern
NSW 2016

Dear Jack

Interim Audit Advice 1
Blacksmiths Workshop (Building 7) - North Eveleigh Rail Yard, NSW.

Introduction

Redfern Waterloo Authority (RWA) has appointed Mr Rod Harwood as environmental Site Auditor to provide third party review of environmental contamination assessment at the former North Eveleigh Rail Yard. It is understood that the site is to be redeveloped as a combination of landuses including residential (western quarter), cultural and artistic uses (central quarter) and mixed commercial and residential (eastern half). It is understood that parks, plaza's and public open space will also be incorporated into the scheme, however, the detailed layout has yet to be finalised.

The whole site comprises approximately 11 hectares and is known as Lot 4 DP862514. For the purposes of providing audit advice, the site has been divided into two separate areas, namely, the former Blacksmiths Workshop (approximately 0.265 hectares) and the Remainder of the Site (approximately 10.735 hectares).

The portion of the site addressed in this Interim Audit Advice is the former Blacksmiths Workshop only. In keeping with the terminology adopted in third party reports, the former Blacksmiths Workshop will also be referred to as Building 7. Interim Audit Advice for the Remainder of the Site will be provided under separate cover in due course.

RWA submitted copies of previous environmental assessments conducted at the site to the Auditor for his review and comment prior to commencement of the redevelopment of the property. This letter presents the findings of that review and provides interim advice (as discussed below) regarding the content of those reports.

Nature of Interim Advice

RWA has engaged Rod Harwood, a New South Wales Environment Protection Authority (EPA) (now Dept of Environment and Conservation) contaminated land accredited site auditor (accreditation number 03-04), employed by WSP Environmental Pty Limited (WSP) to act as Auditor for this project. The final outcome of this engagement is to be a site audit statement (SAS) and associated site audit report (SAR), indicating the suitability of the land and the proposed development to meet the NSW DEC land use criteria for the intended use of the land.

This interim audit advice does not constitute a SAS or a SAR, but rather is provided to assist RWA in the assessment and management of contamination issues at the site.

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The information provided herein should not be considered pre-emptive of the final site audit conclusions, but rather represents the site audit opinion based on the current review of available site information.

Scope of Audits

Whereas interim audit advice is provided to assist in the assessment and management of contamination issues at the site, the interim audit advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Auditor Scheme* describes the site assessment and audit process as:

(i) *Consultant is commissioned to assess contamination.* The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and,

(ii) *Site auditor reviews the consultant's work.* The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed landuse.

Current Interim Audit Advice

In preparing this Interim Advice for the former Blacksmiths Workshop (Building 7) – North Eveleigh Rail Yard, NSW (part of Lot 4 DP862514), the Auditor has conducted a review of the following documents:

1. CH2MHill (July 1998) *Eveleigh Workshops – Stage II Field Investigations and Data Assessment.*
2. SMEC (June 2003) Groundwater Monitoring Assessment.
3. SMEC (August 2004) *Environmental Site Management Plan.*
4. Hibbs & Associates (September 2004) *Hazardous Materials Survey – Carriage Works at Eveleigh.*
5. SMEC (November 2004) *Blacksmiths Workshop Investigation.*
6. HLA (December 2004) *Summary Site Audit Report and Site Audit Statement – Arts Precinct.*
7. SMEC (February 2006) *Soil Sampling and Waste Classification Report – Eveleigh Blacksmiths Shop and Entrance.*
8. STS (March 2006) *Geotechnical Investigation – Blacksmiths Workshop, North Eveleigh.*
9. SMEC (April 2006) *Blacksmiths Shop Soil Capping Technical Specification.*
10. SMEC (April 2006) *Blacksmiths Shop Hazmat Abatement – Phase 2.*
11. SMEC (February 2007) *Blacksmiths Workshop Soil Contamination Assessment Report.*

The review of these documents has been in general accordance with the requirements in the NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* and NSW EPA (2000) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.*

The objective of this audit is to provide advice on the suitability of the previous investigations with regard to the assessment of impacts from previous site uses and the proposed redevelopment of the site. It is understood that the Building 7 is to be refurbished for use as a hard surfaced market stall area.

Recommendations for future investigations are also made.

Conditions Associated with this Interim Advice

The Auditor's current assessment is based on the reports submitted for review, a site inspection and discussion with RWA personnel:

- Figure 1, appended to this letter indicate that concentrations of total petroleum hydrocarbons (TPH), lead and asbestos within the shallow soils beneath Building 7 exceed NEPM (1999) health-based intervention levels for the proposed end use.
- It is considered that the proposed capping strategy will break the exposure pathway between these impacted soils and the proposed end users of the site and is considered by the Auditor to represent an appropriate remedial solution in this regard.
- It is requested that the appointed consultant (David Lane) discusses and agrees the proposed capping solution with the Auditor prior to implementation but it should be noted that capping will need to comply with the requirements outlined in ANZECC (1999) *Guidelines for the On-site Containment of Contaminated Soil.*
- Notwithstanding the above, the groundwater beneath Building 7 is impacted by heavy metals (see Figure 2 and Table 1 appended to this letter).
- Based on the available data, only one groundwater monitoring well (MW4) exists within the footprint of Building 7.
- One well is considered insufficient to determine the lateral extent of groundwater contamination on the subject site. Consequently, the Auditor requires a further three monitoring wells to be installed on or in the immediate vicinity of Building 7. The consultant is requested to provide a Sampling Analysis and Quality Plan (SAQP) to detail the proposed location, formation and sampling regime of the new wells. However, the Auditor anticipates that both up and down gradient water quality will need to be addressed.
- Whilst the capping strategy is deemed an appropriate remedial solution by the Auditor for the proposed enduse, RWA need to understand that adoption of this approach is unlikely to aid in the remediation of impacted groundwater as the impacted soil source will remain in situ beneath the proposed capping layer. However, the Auditor accepts that the cap is likely to limit future surface recharge beneath Building 7.
- It is the Auditors' opinion that an interception trench may be required on some part of the site to control migration of metal impacted groundwater to other parts of the site and potentially to third party properties.
- If Building 7 is to be assessed in its own right (i.e. subject to its own SAR and SAS) then the interception trench may need to be located within that subdivision. However, if Building 7 is to form part of a larger site then there will be more flexibility on the location and design of such a trench.
- The design and location of the trench may be dependent upon the recommended additional groundwater monitoring and the subdivision proposals for the North Eveleigh Rail Yard site as a whole.
- The Auditor understands that David Lane will be preparing a Remedial Action Plan (RAP) for Building 7 in accordance with NSW EPA (1997) Guidelines for Consultants Reporting on Contaminated Sites.

- A key component of the RAP is the inclusion of an Environmental Management Plan (EMP). The Auditor considers that the enforcement of an EMP will be mandatory for Building 7 for the duration of its future enduse as a market.
- The EMP should address the on-going integrity and maintenance of the proposed capping system in both the short and long term. The EMP will also need to consider the operation, protection and maintenance of the interception trench.

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I trust that the Interim Advice outlined herein meets your immediate requirements and look forward to receiving the SAQP, RAP and EMP for review in due course. However, in the meantime, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely

Rod Harwood
Accredited Site Auditor (NSW EPA #03-04)

Preliminary Comments on the Masterplan

Introduction

WSP Environmental Pty Limited (WSP) has been provided with a copy of the North Eveleigh Masterplan, prepared by Bates Smart, to comment on the implications of the current layout with respect to our existing knowledge of the contaminant distribution.

Once the proposed Lot subdivisions have been determined, WSP will provide detailed comment on the additional investigation works required and the potential remedial strategy that could be adopted to facilitate the redevelopment of the North Eveleigh Rail Yard site.

For the purposes of this revised preliminary appraisal, the site has been divided into the following three areas, which are discussed in greater detail in the following sections of this document:

- Super Lot 1, which forms the area to the west of the existing Arts Precinct;
- Arts Precinct, which comprises the central portion of the site and encompasses the Blacksmiths Workshop and the Existing Carriage Workshops Buildings together with the intervening road and hardstanding; and,
- Super Lot 2, which forms the area to the east of the existing Arts Precinct.

The Arts Precinct comprises 3.18 hectares of land which is being managed from a contamination perspective by a capping strategy and environmental management plan (EMP). The Arts Precinct is the subject of a separate site audit statement (SAS) and site audit report (SAR) and will not be considered any further within this document.

This document supersedes that produced by WSP on the 3 December 2007.

Basic Configurations

Based on the available information provided to date, WSP has determined the following basic configurations of proposed land use for the site:

Item	Super Lot 1 (west)	Super Lot 2 (east)
Area (m2)	29,481	47,333
Area of buildings to be retained for heritage purposes (m2)	935 (Clothing Store) 935 (TOTAL)	6870 (Paintshop) 454 (Science Lab) 700 (Chief Engineers Office) 400 (Telecommunications Building) 8424 (TOTAL)
Residual ground area potentially disturbed by redevelopment (Lot Area minus Area of Heritage Buildings)	28,546	38,909
Area of ground bearing building footprints (managed residential)	8,395	6,560
Area of ground bearing building footprints (commercial)	0	5,155
Area of all proposed building footprints	8,395	11,715
Area of basement car parking (m2)	8,290	6880 (+1035*)
Area of proposed building footprints without basement car parking	3,438	4,835
Area of proposed garden / parks / green landscaping (on existing ground surface) (over proposed basement areas)	 tree pits / planters 1,400	 1950 (plus trees / planters) 0
Area of hardstanding, public open space and roadways	18,751	25,244

*** - assumes that the area between the commercial blocks will be removed to facilitate basement car parking.**

Ground and Contamination Constraints

Based on the information contained within our Interim Advice letter dated 31 August 2007 and what we can establish about the basic configuration of the proposed development layout provided we can draw the following conclusions regarding the potential ground and contamination constraints:

- During redevelopment of the site in areas outside proposed building footprints it is anticipated that at least the upper 0.50m will need to be disturbed to facilitate removal of existing surfacing and construction of new roads and areas of public open space. Locally, this depth is likely to be exceeded thus potentially generating further volumes of soil for remediation, reuse or disposal.
- The likely depth to the top of the shale in Basements B1, C1 to C3 and D1 to D3 is approximately 4.5m, between 2.5 and 5.0m and between 2.5 and 5m respectively.
- The likely depth to the top of the shale in Basements J1, K1 and K2, L1 and L2, M1 and M2 and P1 is highly variable but is generally between 1 to 4m.
- Excavations of footings for buildings without basements are likely to encounter soils exceeding the relevant land use criteria.
- The current estimate of the vertical extent of soils exceeding the relevant land use criteria for Super Lot 1 is approximately 44% (0.1 to 0.5m), 41% (0.5 to 1.0m), 6% (1.0 to 2.0m) and 9% (3.5m).
- The current estimate of the vertical extent of soils exceeding the relevant land use criteria for Super Lot 2 is approximately 58% (0.1 to 0.5m), 16% (0.5 to 1.0m), 21% (1.0 to 2.0m) and 5% (3.5m). These figure assume that some of the impacted soils beneath the paint shop will not be removed due to the presence of the heritage building.
- The current estimate of the aerial extent of soils exceeding the relevant land use criteria for Super Lots 1 and 2 is between approximately 15 to 28% and 33 to 37% respectively.
- From a practical perspective in facilitating the removal and validation of soils exceeding the relevant land use criteria it is considered likely that the underlying 0.1m of non impacted material will be removed during the process.
- Based on the available data set it is considered likely that approximately 4.5% of natural materials underlying impacted fill materials may be impacted to an assumed thickness of 1m.
- Groundwater levels ranged between 0.9 and 7.8m below current ground levels and provision should be made for the control of potentially contaminated groundwater within any proposed excavations.

Bearing the above in mind, the following summary of likely soil volumes to be manipulated and / or remediated could include:

Item	Unit	Super Lot 1 (west)		Super Lot 2 (east)	
		Best Case	Likely Case	Best Case	Likely Case
Estimated volume of fill disturbed soils from non building areas (0.5m thickness)		9736		13597	
Estimated volume of fill materials from basement excavations		1820 (B1) 7380 (C and D)		1100 (J1) 1025 (225*) (K1 & K2) 1995 (395*) (L1 & L2) 1185 (340*) (M1 & M2) 1690 (P1)	
Estimated volume of residual soils generated from basement excavations		2275 (B1) 18450 (C and D)		1540 (340*) (K1 & K2)	
Estimated volume of shale generated from basement excavations		450 (B1) 11075 (C and D)		4180 (J1) 9735 (2,135*) (K1 & K2) 7575 (1495*)(L1 & L2) 7170 (1,280*) (M1 & M2) 2,335 (P1)	

Item	Unit	Super Lot 1 (west)		Super Lot 2 (east)	
		Best Case	Likely Case	Best Case	Likely Case
areal extents of typical fill thickness (0.1 to 0.5m)	%	44	44	58	58
areal extents of typical fill thickness (0.1 to 0.5m)	m2	**8913**	**8913**	**18577**	**17977**
estimated volume of typical fill thickness (0.1 to 0.5m)	m3	**4456**	**4456**	**9288**	**8988**
areal extents of typical fill thickness (0.5 to 1.0m)	%	41	41	16	16
areal extents of typical fill thickness (0.5 to 1.0m)	m2	**8305**	**8305**	**5125**	**4959**
estimated volume of typical fill thickness (0.5 to 1.0m)	m3	**8305**	**8305**	**5125**	**4959**
areal extents of typical fill thickness (1.0 to 2.0m)	%	6	6	21	21
areal extents of typical fill thickness (1.0 to 2.0m)	m2	**1215**	**1215**	**6726**	**6509**
estimated volume of typical fill thickness (1.0 to 2.0m)	m3	**2431**	**2431**	**13452**	**13017**
areal extents of typical fill thickness (3.5m)	%	9	9	5	5
areal extents of typical fill thickness (3.5m)	m2	**1823**	**1823**	**1601**	**1550**
estimated volume of typical fill thickness (3.5m)	m3	**6381**	**6381**	**5605**	**5424**
estimated volume of fill material across residual site area (excludes basements)	m3	**21573**	**21573**	**33470**	**32389**
total estimated volume of fill across residual site area (includes basements)	m3	**30773**	**30773**	**40465**	**40344**
areal extents of soils exceeding relevant land use criteria	%	15	28	33	37
estimated volume of fill requiring remediation / disposal	m3	**4616**	**8616**	**13354**	**14927**
estimated volume of fill unimpacted fill to be reused / disposed of	m3	**15789**	**13374**	**13797**	**13578**
estimated thickness of underlying natural soil removed during validation	m	0.1	0.1	0.1	0.1
estimated volume of underlying natural soil removed during validation	m3	**428**	**799**	**1284**	**1440**
estimated % of natural soils impacted by overlying fill materials to 1m depth	%	4.5	4.5	4.5	4.5
estimated volume of natural soils impacted by overlying fill materials to 1m depth	m3	**193**	**360**	**578**	**648**
estimated volume of residual soils to be reused / sold to facilitate development	m3	**20104**	**19566**	**1540**	**1880**
estimated volume of shale to be reused / sold to facilitate development	m3	**11525**	**11525**	**29133**	**33818**

*** - assumes that the area between the commercial blocks will be removed to facilitate basement car parking.**

Preliminary Considerations

Based on the proposed design it is considered that the remedial strategy is likely to comprise either disposal of soils off-site; encapsulation on-site and / or a cut & fill operation. However, off-site disposal is often prohibitively expensive; encapsulation requires a sufficiently large open area (i.e. beneath landscaping) and long term management under an EMP; and, cut & fill operations are not often accepted by DECC due to the 'spreading' of fill materials that exceed land use criteria.

If the disposal route was adopted then between approximately 4,616 to 8,616m3 and 13,354 to 14,927m3 of unsuitable fill materials and between approximately 621 to 1,159m3 and 1,862 to 2,088m3 of impacted natural materials would need to be disposed of to a licensed landfill from Super Lots 1 and 2 respectively.

Based on our current dealings with landfill operators, the approximate disposal cost (excluding excavation, haulage and GST) is $110/m3. Therefore, if the disposal route was chosen for unsuitable materials then the landfill cost could be between $576K to 1.08M and $1.67M to $1.87 for Super Lots 1 and 2 respectively.

If the encapsulation route was adopted for fill and natural soils that exceed site criteria then a cell would need to be constructed to contain between approximately 20,453 to 26,790m3 with a minimum 0.50m thickness of clay capping, which could be sourced from the residual weathered shale.

To put this into perspective, if an area the size of a football field was allocated (i.e. 5000m2) then the void would need to be excavated to between 4 to 5.5m depth. This could be prohibitively expensive due to the requirement to remove shale bedrock.

If a cut and fill exercise was accepted by DECC, then the fill and natural materials that exceed site criteria would need to be spread at a thickness of approximately 1.0m in non building areas. It is likely that a 0.5m cap would also need to be accommodated thereby raising overall site levels by approximately 1.5m.

In addition, between approximately 13,374 to 15,789m3 and 13,578 to 13,797m3 of fill materials that meet the land use criteria from Super Lots 1 and 2 respectively would need to be reused (i.e. encapsulated) on site or in over-excavated basement areas. This would require a similar sized cell to that described above for the fill materials that exceed the site criteria or an extension to proposed basement depths of between 1.6 to 1.8m.

Furthermore, between approximately 21,106 to 21,984m3 and 40,658m3 and 45,343m3 of residual soil and shale could be sold for reuse off-site as VENM from the site as a whole.

The estimated volumes presented above are for information purposes only, are based on the stated assumptions and a preliminary assessment of the North Eveleigh Masterplan only. The budget estimates provided are based solely on our recent dealings with local landfill operators and are likely to vary based on market forces / chemical composition of the wastes in question. The information contained in this document will need to be considered in greater detail once the Lot subdivisions have been determined and the additional investigation recommended within the Interim Advice letter dated 31 August 2007 has been carried out by the nominated environmental consultant.

WSP Environmental Pty Limited