ENVIRONMENTAL INVESTIGATION SERVICES

16 July 2015
Ref: E24001Klet3

Warringah Council
C/- Mt Pritchard & District Community Club Ltd
101 Meadows Road
Mt Pritchard NSW 2170

Attention: Mr Grant Harding – Cerno Management

PROPOSED RESIDENTIAL/COMMERCIAL DEVELOPMENT (DA2014/0875) – HARBORD DIGGERS
80 EVANS STREET, FRESHWATER, NSW, 2096

EIS have prepared the following reports for the proposed development of the Harbord Diggers:

- *Report to Mount Pritchard & District Community Club on Revised Preliminary Stage 1 Environmental Site Assessment for the "Concept Plan" at Harbord Diggers Club, 4, 4A & 25 Lumsdaine Drive, Freshwater, NSW. (Report Ref: E24001K-rptREV1.1, dated September 2011 (original report May 2010);*
- *Report to Mount Pritchard & District Community Club on Additional Environmental Site Assessment for Proposed Residential/Commercial Development "Concept Plan" at Lumsdaine Drive, Freshwater, NSW. (Report Ref: E24001Krpt2, dated October 2012);*
- *Report to Mount Pritchard & District Community Club on Additional Environmental Site Assessment and Remediation Action Plan for Proposed Residential/Commercial Development at 80 Evans Street, Freshwater, NSW. (Report Ref: E24001Krpt3, dated 2 April 2015); and*
- *Report to Mount Pritchard & District Community Club on Contamination Management Plan for Proposed Residential/Commercial Development at 80 Evans Street, Freshwater, NSW (Report Ref: E24001Krpt4-CMP, dated 2 April 2015).*

EIS have reviewed the Warringah Council Notice of Determination (DA2014/0875). We are of the opinion that DA condition 25 (d) is not applicable for the proposed construction works. EIS have completed a Remediation Action Plan (RAP) and Construction Management Plan (CMP) for the remediation and management of the identified contamination at the site. All requirements for remediation, validation and a contingency for unexpected finds are detailed within the above reports.

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EIS has used a degree of care, skill and diligence normally exercised by consulting engineers/scientists in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees, the client alone shall have a licence to use this letter.

If you have any questions concerning the contents of this letter please do not hesitate to contact us.

Kind Regards

Mitch Delaney
Environmental Scientist

Vittal Boggaram
Associate Environmental Scientist

ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

MOUNT PRITCHARD & DISTRICT COMMUNITY CLUB LIMITED

ON

CONTAMINATION MANAGEMENT PLAN

FOR

PROPOSED RESIDENTIAL/COMMERCIAL DEVELOPMENT

AT

80 EVANS STREET, FRESHWATER, NSW

2 APRIL 2015

REF: E24001KRPT4-CMP

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Document Distribution Record			
Report Reference	**Report Status/Revision**	**Distribution**	**Report Date**
E24001Krpt4-CMP	Final	Client	2 April 2015

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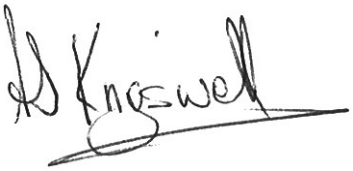

Adrian Kingswell
Principal Environmental Scientist

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1 INTRODUCTION

Cerno Management Pty Ltd on behalf of Mount Pritchard & District Community Club Limited ('the client') commissioned Environmental Investigation Services (EIS)[1] to prepare a Contamination Management Plan (CMP) for the proposed residential/commercial development at the Harbord Diggers Club, 80 Evans, Street, Freshwater, NSW. EIS note that the residential property in the north section of the site has now been acquired and is listed under the same address.

The site location is shown on Figure 1 and the assessment was confined to the site proposed development area as shown on Figure 2. The proposed development area is referred to as 'the site' in this report.

The CMP was prepared generally in accordance with an EIS proposal (Ref:EP8705K) of 12 February 2015 and written acceptance from Cerno Management Pty Ltd on behalf of Mount Pritchard & District Community Club Limited of 27 February 2015.

1.1 Proposed Development Details

Based on the plans and information supplied to EIS we understand that the proposed re-development of the existing club will include the demolition of the car park located in the west section of the site and the residential building located in the north section of the site. Following demolition a four story residential building over two levels of basement level car park will be constructed in this section of the site. To achieve the lowest basement (Level 2) level at RL9.0m, excavation to depths between about 9m and 16m below existing grade will be required. EIS also understand that external and internal refurbishment will also be undertaken as part of the proposed development. The existing electrical substation on the Evans Street frontage will be retained throughout. Copies of the proposed development plans supplied to EIS are attached in the appendices.

1.2 Objectives

The objectives of the CMP are to:

- Outline measures that will reduce the risks associated with the asbestos contaminated soil during the construction works at the site; and
- Outline measures that will reduce/control the risks once the construction works have been completed.

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

1.3 Scope of Work

The scope of work included:

- A review of the previous investigation reports prepared for the proposed development including the Additional Environmental Site Assessment (ESA) and Remediation Action Plan (RAP); and
- Preparation of a report (CMP);

Table 1-1: Guidelines

Guidelines/Regulations
Contaminated Land Management Amendment Act, NSW Government Legislation, 2008 (CLM Amendment Act 2008)
State Environmental Planning Policy No. 55 – Remediation of Land, NSW Government, 1998 (SEPP55)
Guidelines for Consultants Reporting on Contaminated Sites 2011
Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, 1997 (Reporting Guidelines 1997)
National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1), National Environment Protection Council (NEPC), 2013 (NEPM 2013)
Guidelines on the Duty to Report Contamination, NSW EPA, Draft 2011 (Duty to Report Contamination 2011)
Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, WA Department of health, Perth, Australia, May 2009 (Western Australian Asbestos Guidelines 2009).

2 SITE INFORMATION

2.1 Background

The following reports/documents have been prepared by EIS for the site/ proposed development:

- EIS, (2010/2011[2]), *Report to Mount Pritchard & District Community Club on Revised Preliminary Stage 1 Environmental Site Assessment for the "Concept Plan" at Harbord Diggers Club, 4, 4A & 25 Lumsdaine Drive, Freshwater, NSW. (Report Ref: E24001K-rptREV1.1, dated September 2011 (original report May 2010);*
- EIS, (2012[3]), *Report to Mount Pritchard & District Community Club on Additional Environmental Site Assessment for Proposed Residential/Commercial Development "Concept Plan" at Lumsdaine Drive, Freshwater, NSW. (Report Ref: E24001Krpt2, dated October 2012); and*
- EIS, (2014[4]), *Letter to Mount Pritchard & District Community Club on Review of Environmental Site Assessment Reports for Proposed Residential/Commercial Development at 80 Evans Street, Freshwater, NSW. (Letter Ref: E24001Klet, dated 30 July 2014).*

EIS have also prepared an Additional Environmental Site Assessment (ESA) and Remediation Action Plan (RAP) report, details of this report (which summarises previous investigation results above) are summarised in **Section 2.2.1** below.

The Additional ESA and RAP report should be read in conjunction with this CMP.

2.1.1 Additional Environmental Site Assessment Report & Remediation Action Plan (EIS, 2015[5])

Introduction, Objectives and Scope of Work

Cerno Management Pty Ltd on behalf of Mount Pritchard & District Community Club Limited ('the client') commissioned Environmental Investigation Services (EIS) to undertake a Additional Environmental Site Assessment (ESA), prepare a Remediation Action Plan (RAP) and a Contamination Management Plan (CMP) for the proposed residential/commercial development at the Harbord Diggers Club, 80 Evans, Street, Freshwater, NSW. EIS note that the residential property in the north section of the site has now been acquired and is listed under the same address.

[2] Referred to as EIS 2010/2011 Report

[3] Referred to as EIS 2012 Report

[4] Referred to as EIS 2014 Letter

[5] EIS, (2014), *Letter to Mount Pritchard & District Community Club on Review of Environmental Site Assessment Reports for Proposed Residential/Commercial Development at 80 Evans Street, Freshwater, NSW.* (Letter Ref: E24001Klet, dated 30 July 2014) (referred to as EIS 2014 letter)

The report has been prepared to address selected Development Application (DA) conditions issued in Warringah Council Notice of Determination for the proposed (DA Ref: DA2014/0875, dated 1 December 2014.

The assessment objectives of the assessment and reports were to:

- Assess the potential for soil contamination beneath the car park in the west section of the site and within the residential property in the north section of the site;
- Assess the potential for groundwater contamination at the site;
- Assess the potential risk the contamination may pose to the site receptors;
- Provide a waste classification for the off-site disposal of soil;
- Comment on the suitability of the site for the proposed development/landuse;
- Prepare a Remediation Management Plan (RAP); and
- Prepare a Contamination Management Plan (CMP).

Investigation procedure

Samples were obtained from ten sampling locations for the EIS 2010/2011 Investigation. Samples were obtained from an additional nine sampling locations for the EIS 2012 Investigation. Samples were obtained from an additional three locations for the additional ESA. This density is approximately 88% of the minimum sampling density recommended by the EPA. The additional soil sampling locations are shown in Figure 2.

Groundwater monitoring wells were installed in two selected geotechnical boreholes (BH201 and BH204) as shown on Figure 2.

Sampling was not undertaken beneath the existing buildings at the site as access was not possible during the field investigation. However, some limited soil sampling was undertaken beneath the slab of the existing car park.

Soil Analysis Results

An elevated concentrations of benzo(a)pyrene TEQ in the sample BH105 (0.5-0.95m) above the HIL-B criteria.

The result is below 250% of the SAC and inside the acceptance criteria. The 95% UCL was calculated using the total benzo(a)pyrene TEQ data from the fill soil samples. The 95% UCL (Chebyshev) for benzo(a)pyrene TEQ was 2.3mg/kg which is below the HIL-B of 4mg/kg. The Standard Deviation (SD) was inside the acceptance criteria.

Asbestos was not detected in any of the fill soil samples analysed for the additional ESA. Asbestos fibres were detected in a FCF sampled from the surface in the south-east corner section of the residential property located in the north section of the site (sample Ref: FC). Asbestos was encountered in fill soil samples BH4 (0-0.15m) and BH9 (0.4-1.0m) sampled during the EIS Stage 1 preliminary ESA undertaken in 2010. The laboratory

report stated that the asbestos encountered in these samples was embedded in either a bituminious membrane or fibre cement sheeting.

Waste Classification

The fill soils are classified as General Solid Waste (non-putrescible) (GSW) containing asbestos. The natural soils and bedrock are classified as Virgin excavated natural material (VENM), however, additional validation sampling will be required after removal of the asbestos contaminated fill material.

Groundwater Analysis Results

Elevated concentrations of individual metals were encountered above the GIL-ANZECC criteria as outlined below:

Analyte	Sample	GIL	Concentration
Copper	MW201 MW204	1.3μg/L	2μg/L (MW201) 5μg/L (MW204)
Zinc	MW204	15μg/L	19μg/L (MW204)

Additional ESA Conclusion

A review of the site information indicates that the site is located in an area which has been historically filled to achieve existing levels. Alternatively demolition of the former buildings at the site could have resulted in remnant FCF in the fill.

Due to the potential source of FCF, discrete nature of FCF in fill and extent of contamination, no distinct hotspots can be identified at the site. All fill material in the proposed development area is considered to be asbestos contaminated and should be treated accordingly. A plan showing the asbestos remediation area is shown in Figure 4.

Only a one soil sampling location (BH203) was drilled beneath the existing car parking basement in the west section of the site due to access limitations. No sampling was undertaken beneath the residential building in the north section of the site and beneath the existing club building in the east section of the site. The contingency plan outlined in the RAP will address any unexpected finds during excavation.

EIS were of the opinion that the elevated concentrations of heavy metals (copper and zinc) detected in the groundwater samples are typical with an urban/regional groundwater conditions and usually associated leaking water infrastructure. No elevated heavy metal soil concentrations above the soil HIL SAC were detected during the soil sampling program.

EIS note that the groundwater pH was outside of the ANZECC 2000 range. Again this is attributed to regional issues.

Based on the results of the assessment, EIS are of the opinion that the groundwater contamination posed a low risk to the receptors identified in the Conceptual Site Model and groundwater remediation is not required.

Based on the scope of works undertaken, EIS were of the opinion that the asbestos contamination identified at the site pose a risk to the receptors.

EIS consider that the site can be made suitable for the proposed development provided that the following recommendations are implemented to manage the risks:

1. Prepare a Remediation Action Plan (RAP) to outline remedial measures for the site;

2. Prepare a Contamination Management Plan (CMP) to manage contamination during remediation works;

3. Prepare a Validation Assessment (VA) report on completion of remediation;

4. Undertake a Hazardous Materials Assessment (Hazmat) for the residential building in the north section of the site prior to the commencement of demolition work.

Adopted Remediation Action

The earthworks plan includes removal of the fill over the majority of the site surface. Therefore the most viable option for remediation is excavation of all the fill material at the site and disposal to an appropriate facility.

Validation Plan

Validation is necessary to demonstrate that remedial measures described in this RAP have been successful and that the site is suitable for the intended land use.

Conclusion

EIS are of the opinion that the site can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented.

EIS note that the Additional ESA and RAP report (EIS Ref: E24001Krpt3, dated 2 April 2015) should be read in conjunction with this CMP.

3 SITE INFORMATION AND PHYSICAL SETTING

3.1 Site Identification

Table 3-1: Site Identification

Current Site Owner:	Mount Pritchard & District Community Club Limited.
Site Address:	80 Evans Street, Freshwater, NSW
Lot & Deposited Plan:	Lot 12 in DP1197725
Current Land Use:	Commercial and residential
Proposed Land Use:	Residential/commercial (mixed-use)
Local Government Authority (LGA):	Warringah Council
Site Area (m^2):	Approximately 15,568m^2
RL (AHD in m) (approx.):	22
Geographical Location (MGA) (approx.):	N:6260110 E:3341560
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Contamination Data Plan:	Figure 3
Remediation Area Plan:	Figure 4

3.2 Site Location and Regional Setting

The site is located in a predominantly residential area of Freshwater. The site is located to the east of Carrington Parade, to the north of Evans Street and to the west and south of Lumsdaine Drive. The site is located approximately 30m to the south of South Curl Curl beach headland and 100m to the north of Freshwater beach.

4 MANAGEMENT PLAN

The details outlined in the following management plan have been designed to reduce the risks associated with working around contaminated asbestos fill material at the site. The anticipated asbestos related site work includes disturbance of asbestos impacted fill material at the site. For the purposes of regulatory terminology, this work is referred to as asbestos removal work. As this work is the most 'sensitive' in terms of requirements to control risks, the majority of this management plan relates to asbestos works controls.

4.1 Asbestos Removal Contractor

A Class B (bonded) asbestos removal contractor should be engaged to make the appropriate notifications and preparations for the construction works at the site.

The asbestos removal contractor must prepare an asbestos removal control plan for the removal work to be specifically undertaken at the site

The asbestos removal contractor must notify the regulator (WorkCover NSW) in writing at least 5 days before the licensed asbestos removal work commences.

The Class B asbestos removal contractor must provide appropriate training for the site workers, so that the work is carried out in accordance with the asbestos management plan for the site.

In the event that friable asbestos is encountered during the excavation/remediation works a Class A asbestos removal contractor will need to be present for the removal of the friable asbestos material.

4.2 Training

All work at the site associated with the disturbance of asbestos impacted soil is defined as Asbestos Removal Work. The WHS Regulations require asbestos removal work to be overseen and carried out only by a licensed asbestos removalist. Work associated with the asbestos impacted fill material at the site requires a Class B Asbestos Removal Licence.

All other workers involved with asbestos work/soil disturbance/excavation must be supervised by the Class B licensed asbestos removalist. These workers must have also undergone asbestos awareness training, be provided with all asbestos related site reports, prepare a safe work method statement and attend a site tool box talk/induction.

The Class B asbestos removal contractor must provide appropriate training for the site workers that ensures the work is carried out in accordance with the asbestos removal control plan for the site.

All site work must be undertaken after full consultation, involvement and information sharing between all parties.

All site workers should have access to previous EIS reports (see **Section 2**).

4.3 Personal Protective Equipment

The following personal protective equipment (PPE) must be used as a minimum during asbestos removal work at the site:

- Disposable coveralls rated for asbestos use (type 5, cat 3 prEN ISO 13982-1 or equivalent);
- Half face disposable particulate respirator (P2); and
- Disposable Gloves.

All PPE discarded after use must be treated as asbestos waste.

All respiratory protective equipment shall conform to the requirements of Australian Standards AS 1715 and AS 1716. All respirators are to be issued for personal and single use only.

Other PPE should be worn where applicable such as sun and standard construction site PPE (hats, boots, gloves, glasses etc).

The application and removal of PPE must be conducted within the Personal Decontamination/Change Area.

PPE must be worn by all personnel occupying the Asbestos Work Area. This includes any drivers/operators who will walk through the area to 'contaminated' machines. PPE will be required to be worn whilst operating machinery in this instance.

Contamination specific PPE (tyveks, masks etc.) must not be worn in other areas of the site.

4.4 Air Monitoring

Air monitoring will be required along the site boundaries during the fill excavation works. Monitoring should commence prior to the start of works and continue intermittently for the duration of the works.

EIS recommend that air monitoring is undertaken on a daily basis for the following reasons:

- The site is within a residential area and highly visible to the public; and
- There is a duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard of 0.01 fibres/ml is not exceeded.

Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory.

The monitoring results must conform to the requirements of the NOHSC Guidance note on the *Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC:3003 (2005)].

The monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded.

The following levels will be used as action criteria during the air monitoring:

- <0.01 Fibres/ml: Work procedures deemed to be successful;
- 0.01 to 0.02 Fibres/ml: Inspection of the site and review of procedures; and
- >0.02 Fibres/ml: Stop work, inspection of the site, review of procedures, clean-up, rectification works where required and notify the relevant regulator.

4.5 Site Establishment

4.5.1 Asbestos Impacted Area

The 'Asbestos Impacted Area' as shown on Figure 2 is defined as the area in which asbestos impacted fill material is considered to be present on the site. In this case, the Asbestos Impacted Area will be taken to be the development area/area of proposed disturbance. For this project, the Asbestos Impacted area will be the entire site where disturbance will be undertaken. This area must be isolated and clearly demarcated by the following methodology:

- Where possible at least a 10m exclusion zone should be made between the Asbestos Impacted Area and surrounding areas such as a lunch area or adjacent roads/work areas;
- Warning Tape on temporary fencing can be used as a barrier between the Asbestos Impacted Area and other areas;
- All areas surrounding the Asbestos Impacted Area (as well as potential entry points) should be signposted or labelled in accordance with AS1319-1994 *Safety Signs for the Occupational Environment;*

- Following the entry / exit of vehicles and machinery from the area barrier tape must be re-applied to enclose the area;
- Barrier tape and warning signage is to remain in position until the completion of the fill excavation works and following the issue of an Asbestos clearance certificate by the Asbestos Consultant.

The asbestos work area must be made secure when the site is not attended.

Vehicles and machinery exiting the Asbestos Impacted Area must be decontaminated before leaving the 'contaminated' area as detailed in Section 4.7.2.

A decontamination area must be connected to the area as described in Sections 4.5.2 and 4.5.3.

4.5.2 Personal Decontamination and Change Area

A decontamination area is to be connected to the Asbestos Impacted Area exclusion zone (at the 10m barrier). This area must be isolated and clearly demarcated by barrier tape. This area must be used as an entry and exit point at all times between the Asbestos Impacted Area and other areas except during an emergency. It is the only area where personnel can enter the Asbestos Impacted Area (the works site). It is the only area where personnel can decontaminate and exit the Asbestos Impacted Area.

All contaminated PPE must be left in a designated storage bin within the Decontamination Area.

This area must have an adequate supply of decontamination equipment, associated facilities and equipment including:

- A waste bin or drum with lid. The bin must be lined with an asbestos waste bag. The bin must be labelled 'asbestos waste'. The bin should be emptied by the Licensed Asbestos Removal Contractor;
- Water spray applicators;
- Washing facilities including water, soap and paper towels; and
- Spare PPE for the next working shift.

Toilet, lunch and office facilities (where required) should be located in a separate area of the site, outside areas of disturbance. Personnel should have access to these facilities including toilets and an area to securely store personal items. If personnel require use of these facilities during a shift they must decontaminate before leaving the Asbestos Impacted Area.

4.5.3 Vehicles and Machinery

The decontamination area is to be located on the edge of the Asbestos Impacted Area exclusion zone on the vehicle access/egress line. The vehicle and machinery decontamination area must be separated (at least 10m if possible) from the Personal Decontamination Area. Vehicle drivers/operators should only exit their vehicle/machinery outside the Asbestos Impacted Area.

Vehicles should adhere to the same path to minimise disturbance of the surface. Some dust suppression may be required in areas where soil is exposed at the surface. Alternatively a temporary gravel driveway/road could be installed to reduce surface disturbance. Barriers or signage should be used to inform site personnel the area is a vehicle and machinery thoroughfare as for standard construction sites.

4.6 Working within the Asbestos Impacted Area

Personnel intending to commence work within the area must wear the listed PPE. PPE must not be removed inside the area except in the event of an emergency.

Dust suppression techniques must be used whilst earthworks are being undertaken.

4.7 Exiting the Asbestos Impacted Area

4.7.1 Personal Decontamination Procedure

On the completion of a work shift within the fill excavation area personnel must go to a designated Decontamination Area and undertake the following:

- use a water spray applicator to coat the overalls, boots and other exposed areas with a fine mist;
- roll overalls down in order to prevent transfer of fibre from the overall exterior to persons clothes;
- remove gloves; and
- Wash hands and remove respirator.

All discarded PPE must be treated as asbestos waste and placed into a lined bin.

The above decontamination procedure should be described face to face during site specific training.

A rigorous degree of hygiene must be observed to ensure that asbestos fibres are not transported from the filling area, through the Decontamination Area to other areas of the site when personnel leave the area, or when equipment or asbestos waste bags are removed from the Asbestos Impacted Area.

4.7.2 Equipment and Machinery Decontamination

Vehicles and machinery should be sprayed down with water prior to exiting the Asbestos Impacted Area. The wetting down area should be located on the edge of the Asbestos Impacted Area exclusion zone. The Asbestos Impacted Area can be subsequently opened temporarily to allow vehicles and machinery to exit. Additional care may be required for tyres / tracks in contact with the ground. For earthworks machines this includes buckets etc used for excavation.

Trucks transporting contaminated soil should have their loads sprayed with water and covered.

4.8 Traffic Control

Vehicle and machinery thoroughfare should be undertaken along the same line as the existing roads/driveway to prevent disturbance of additional areas. Access to and from the Asbestos Impacted Area should only be undertaken via areas where road base has been laid or on areas where filling will occur in the future. This means the most effective method of filling (including placement of the cap) would be from the existing driveways in the south and north sections of the site.

Vehicle speed should be limited to approximately 5km/hr within the filling area.

Dust suppression techniques should be undertaken in areas where soil is exposed and dust generation is expected.

Vehicle and machinery access on grassed areas outside the development footprint should be kept to a minimum.

4.9 Dust Suppression Techniques

A fine water spray applied by a hose should be applied to:

- All exposed soil surfaces;
- Truck loads;
- Vehicle and machinery wheels/tracks; and
- Areas where traffic causes excessive dust liberation.

Excessive watering that could result in water runoff should be avoided.

4.10 Review of Site Management Procedures (Site Inspections)

In the event that any site conditions significantly change all site work should cease and the site should be inspected by an experienced asbestos consultant.

Periodical inspections and reviews should be undertaken by the consultant in order to ensure WHS and environmental precautions are being undertaken at the site. The review should include an inspection of site facilities, use of PPE, procedures used and general site activities. This is also a requirement of the RAP and remediation validation plan.

4.11 Asbestos Accidents, Incidents and Emergencies

Any accidents, incidents or emergencies at the site associated with asbestos must be documented by the site supervisor.

In the first instance appropriate medical assistance should be sought.

Any accidents, incidents or emergencies should be dealt with generally in accordance with the appointed contractor's procedures.

4.12 Non-Compliances

Non-compliance records are kept in order to maintain WHS and environmental standards during site construction works.

The following non-compliances may trigger corrective action (these are examples only, they are not an exhaustive list):

- Persons not adhering to the specifications outlined in this report;
- Persons not adhering to instructions from the experienced asbestos consultant; and
- Contractors or sub-contractors not adhering to the above specifications and instructions.

Corrective actions may include written warnings and/or a stop work order. In some instances persons or contractors may be asked to leave the site.

4.13 Friable Asbestos Contingency

Bonded asbestos material has been identified within fibre cement fragment and a bituminous fragment within fill material at the site. Friable asbestos material has not been encountered at the site to date. However, in the event friable asbestos is encountered during construction works, the following procedure should be implemented:

- Stop all excavation work in the vicinity of the asbestos find;
- Isolate the area by the installation of temporary barricades/barrier tape and asbestos warning signage. This area should not be entered again until further assessment has been undertaken;
- If the soil is dry, dust should be controlled by applying small amounts of water by the use of a hose/sprinkler. Alternatively cover the area with plastic;
- The excavator bucket or tools that uncovered the asbestos materials should be decontaminated by washing down;

- Contact the appointed Asbestos Consultant (Asbestos Assessor) to inspect the site, assess the extent and type of asbestos materials and discuss other management procedures to be implemented;
- Site work may continue in other areas of the site; and
- If the area is found to contain significant amounts of asbestos additional control measures will be required to be implemented prior to works proceeding in the area.

5 TEMPORARY DEWATERING DURING EXCAVATION/CONSTRUCTION

The proposed development includes deep excavations for basements car parking. Dewatering is likely to be required. An assessment of the groundwater laboratory results indicate that the groundwater is suitable for disposal into the sewer or to the stormwater provided the following recommendations are implemented:

- A suitably qualified dewatering contactor should be appointed;
- A treatment unit/settlement tank should be setup on-site for the treatment of groundwater prior to off-site disposal;
- The pH is outside the acceptance criteria and will require treatment (dosing) prior to disposal;
- The groundwater is impacted by copper and zinc. A flocculent or similar product should be used to settle/remove these metals from the groundwater prior to off-site disposal;
- Additional testing should be undertaken in order to demonstrate that the treatment has been successful prior to disposal. The additional testing should be undertaken on a fortnightly basis during the dewatering as stipulated by Warringah Council; and
- Approval should be obtained by Warringah Council for storm water disposal or Sydney Water for disposal of groundwater into the sewer. All consent conditions should be adhered and addressed.

6 CONTINGENCY PLAN FOR UNEXPECTED FINDS

There is a possibility that additional hazards exist at the site. The extent of the contamination has been interpreted from point source data and a documented process of reviewing historical site activities. However, ground conditions may vary between sampling locations and additional hazards may arise as result.

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. At this site, these types of hazards may include: friable asbestos, Underground Storage Tanks (USTs), odorous or stained hydrocarbon impacted soils, demolition waste or ash and slag contaminated soils.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and works;
- In the event potential friable asbestos material is encountered, the EC should be contacted;
- The client should engage a qualified environmental consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination in order to allow for cap and containment of the material;
- In the event remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an additional remediation action plan (RAP) should be prepared;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

6.1 Significant Contamination Incidents

Any chemical/product to be bought onsite should be accompanied by a MSDS and a detailed SWMS which is to be reviewed by the principal contractor. Appropriate incident precautions are to be in place.

Should a significant contamination incident occur due to the spill or release of chemicals/products that are considered dangerous goods including materials that are radioactive, flammable, explosive, corrosive, oxidizing, asphyxiating, biohazardous, toxic, pathogenic, or allergenic the NSW Fire and rescue service should be contacted immediately on 000.

The Environmental Consultant should be contacted to advise on the appropriate course of action for remediation/clean up following the initial response by the emergency services.

The requirement to notify the NSW EPA of a pollution incident under the *Protection of the Environment Operations Act 1997* (POEO Act) should be assessed by the Environmental Consultant and emergency services.

7 ADDITIONAL SITE MANAGEMENT CONTROLS

The information presented in this section of the CMP outlines additional site controls to reduce the risk of exposure to potential receptors during excavation/ construction works.

7.1 Interim Site Management

The following interim measures should be adopted immediately at the commencement of the development:

- Maintain fences to prevent access to the remediation area/site;
- Construct new fences following demolition of the existing buildings where necessary;
- Entrances to the site should be locked to prevent unauthorised access, tipping or dumping on the site; and
- Appropriate warning signage should be erected as required.

7.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The contacts will also facilitate registration of complaint acceptance points. The primary point for complaint acceptance will be the Project Manager (PM). The contact details of key project personnel are summarised below.

Table 7-1: Project Contacts

Task	Company	Contact Details
Project Manager (PM)	Cerno Management Pty Ltd	(02) 9279 0897
Remediation Contractor (RC)	TBA	TBA
Environmental Consultant (EC) & Asbestos Consultant (AC)	Environmental Investigation Services	(02) 9888 5000
Certifier	TBA	TBA
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

7.3 Security

Prior to the commencement of site works, fencing should be installed as required to secure the remediation areas. Warning signs should be erected, which outline the PPE required for remediation work. All excavations should be clearly marked with coloured tape to reduce the risk to site personnel from injury by falling into open excavations.

7.4 Site Soil and Water Management Plan

The earthworks contractor should prepare a detailed soil and water management plan prior to the commencement of site works. Silt fences should be used to control the surface water runoff at all appropriate locations of the site. Reference should be made to the consent conditions for more details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

7.5 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in Australian Standard AS-2460 (2002[6]) should be adopted. Other measures specified in the consent conditions should also be complied with.

Noise producing machinery and equipment should only be operated between the hours approved by Council (refer to DA consent documents).

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the Project manager/Site Foreman/Remediation Contractor, specifying the expected duration of the noisy works.

7.6 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;

[6] Australian Standard, (2002), *AS2460: Acoustics - Measurement of the Reverberation Time in Rooms.*

- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Concrete surfaces brushed or washed to remove dust;
- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the site; and
- The expanse of cleared land should be kept to a minimum to achieve a clean and economical working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than 3 days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the Waste Classification Guidelines 2014.

7.7 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act 1997[7];
- Demolition materials and other combustible waste should not be burnt on site;

[7] NSW Government, (1997), *Protection of Environment Operations Act.* (referred to as POEO Act 1997)

- The spraying of a solution of Biosolve™ or other appropriate product if required to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. HDPE).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

Disturbance of any hydrocarbon contaminated (based on current data this is considered unlikely) soils may result in odorous conditions. The following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- Biosolve or a similar product should be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM 2013:
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

7.8 Health and Safety Plan

A site specific work, health and safety (WHS) plan should be prepared by the contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in NSW WorkCover WHS regulations. The WHS plan also should make reference to this RAP prepared for specific WHS requirements when working with ACM in soil.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves and dust masks should be worn when working on remediation activities.

Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

7.9 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the contractor should develop a waste management or recycling plan to minimise the amount of waste produced by the site. This should, as a minimum, include measures to recycle and re-use excavated material wherever possible.

7.10 Incident Management Contingency

The environmental consultant engaged to undertake the VA should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly if any incident occurs on site, the EC should be advised to assess potential impacts on site contamination conditions and the remediation/validation timetable.

7.11 Hours of Operation

Hours of operation should be between those approved by Council under the development approval process. Reference should also be made to any specific conditions imposed by other consent authority/regulatory bodies.

7.12 Groundwater Seepage and Dewatering

In the event groundwater is intercepted during excavation works, dewatering will be required. Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system. Contaminated groundwater will require treatment prior to disposal.

8 ADDITIONAL DOCUMENTATION

During the works described above, EIS will undertake regular inspections of the site. A record of these inspections will be kept in the form of compliance letters. Similarly, results of air monitoring undertaken during the above works will be provided. These records will be included in Validation Assessment report to be prepared following the completion of the remediation works.

All contractor permits, clearance certificates, air monitoring results, disposal dockets and additional documentation will be attached/summarised in the Validation report, which will be provided to council and or the certifying authority.

9 REGULATORY REQUIREMENT

The regulatory requirements applicable for the site are outlined in the following table:

Table 9-1: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2008[8]	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. After successful implementation of the RAP and validation assessment, the site contamination is unlikely to meet the Notification Triggers.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.
Water Management Act 2000[9]	The remediation of contaminated groundwater may require treatment. Relevant approval should be obtained from NSW EPA and NSW Office of Water (NOW) prior to the commencement of pumping and treatment.
Dewatering Approval	In the event groundwater is intercepted during excavation works, dewatering will be required. Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system.
WHS Code of Practice 2011[10]	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.

[8] NSW Government Legislation, (2008), *Guidelines on the Duty to Report Contamination.* (referred to as Duty to Report Contamination 2008)

[9] NSW Government Water Management Act 2000

[10] WHS Regulation, (2011), *Code of Practice – How to Manage and Control Asbestos in the Workplace.*

10 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and

- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is Based on a Unique Set of Project Specific Factors:
This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- the proposed land use is altered;
- the defined subject site is increased or sub-divided;
- the proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- the proposed development levels are altered, eg addition of basement levels; or
- ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is Based on Professional Interpretations of Factual Data
Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

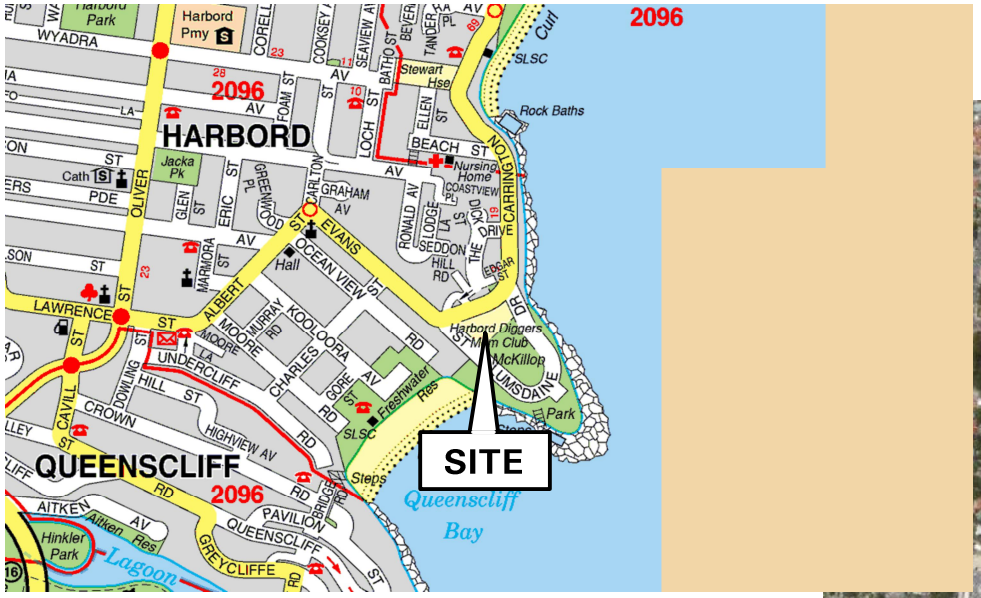
Misinterpretation of Site Assessments by Design Professionals
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

REPORT FIGURES

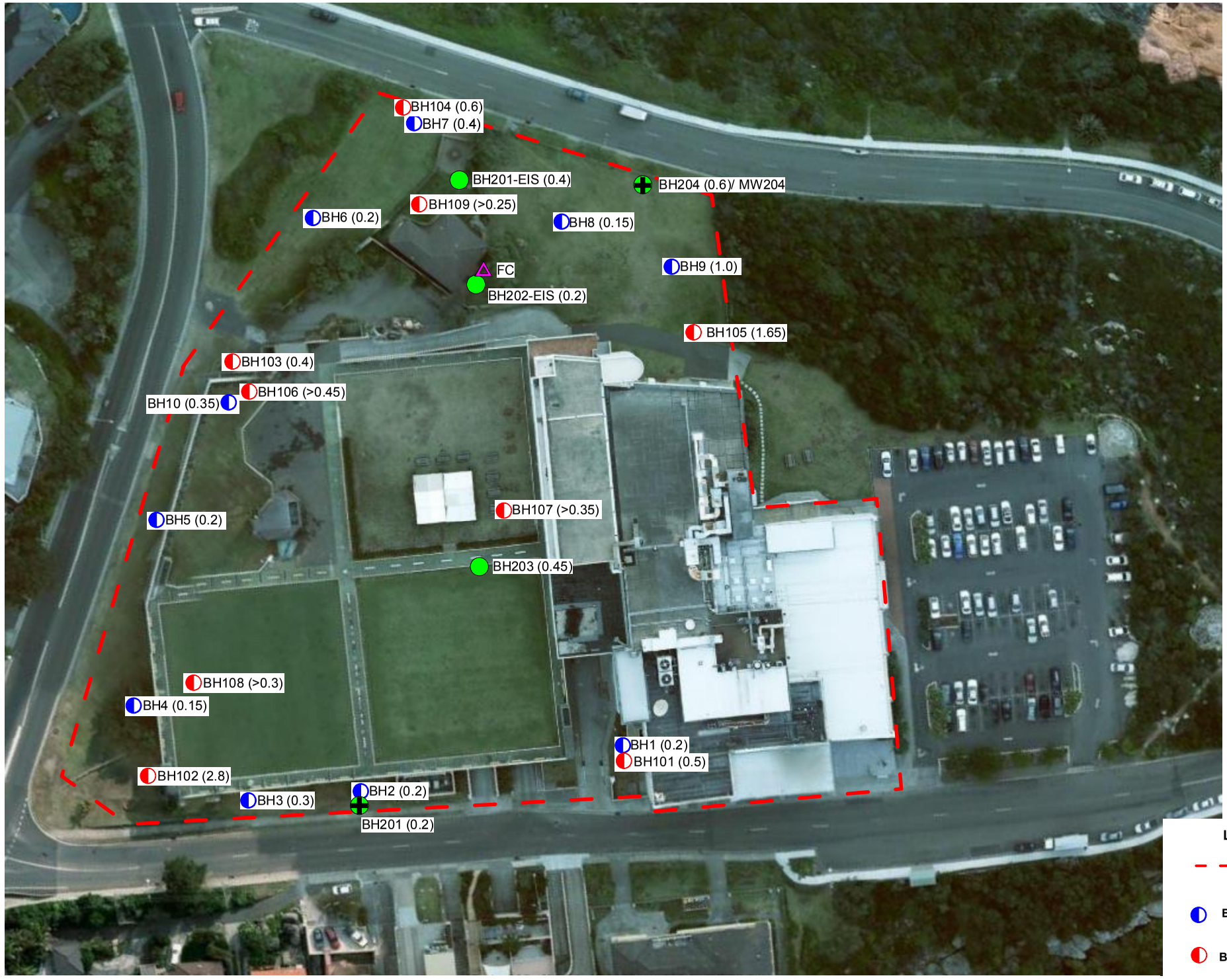


NOTES:
Figure has been recreated from UBD on disc (version 7.1) and http://maps.six.nsw.gov.au/.

Figure is not to scale. UBD Map ref: 198 E2

Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E24001Krpt	Title: SITE LOCATION PLAN
	Figure: 1	Address: 4, 4A & 25 LUMSDAINE DRIVE, FRESHWATER, NSW



LEGEND:

- Approximate site boundary
- BH1 (0.2) — Borehole location, number and depth of fill (m), EIS 2010 Investigation.
- BH101 (0.2) — Borehole location, number and depth of fill (m), EIS 2012 Investigation.
- BH201 (0.2) — Borehole location, number and depth of fill (m), EIS 2015 Investigation.
- Groundwater monitoirng well location
- Surface fibre cement fragment sample

NOTES:
Figure has been recreated from Google Earth Pro.

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

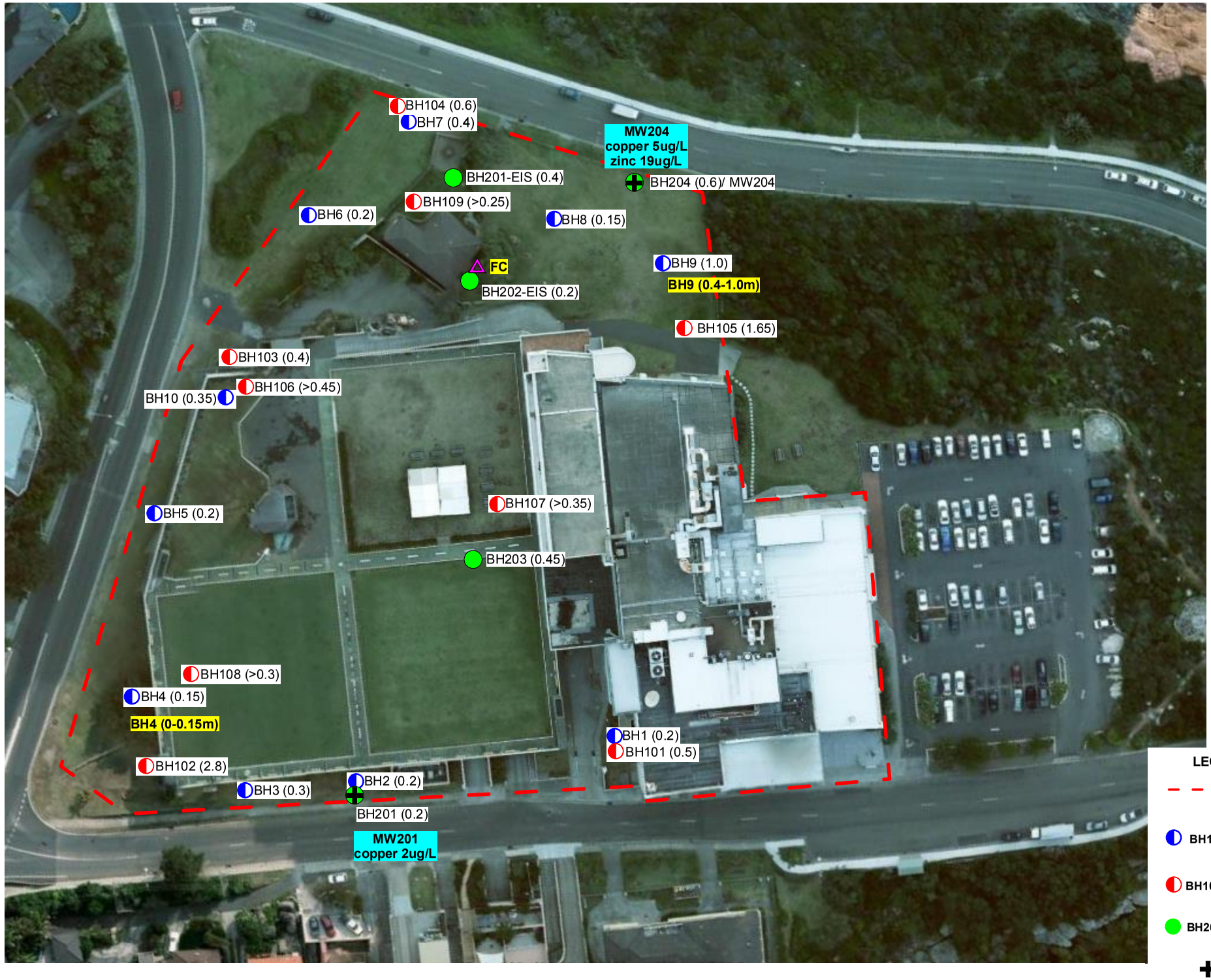
Reference should be made to the report text for a full understanding of this plan.

Approximate Scale (m): @ A3

0 10 20 30 40 50

ENVIRONMENTAL INVESTIGATION SERVICES

Project Number:	Title:
E24001Krpt4	SAMPLE LOCATION PLAN
Figure: 2	Address: 80 EVANS STREET FRESHWATER, NSW



LEGEND:

	Approximate site boundary
BH1 (0.2)	Borehole location, number and depth of fill (m), EIS 2010 Investigation.
BH101 (0.2)	Borehole location, number and depth of fill (m), EIS 2012 Investigation.
BH201 (0.2)	Borehole location, number and depth of fill (m), EIS 2015 Investigation.
	Groundwater monitoirng well location
	Surface fibre cement fragment sample
BH1 (0.3)	Asbestos detected
MW201 Zinc 20ug/L	Groundwater contamination data (ug/L)

NOTES:
Figure has been recreated from Google Earth Pro.

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

Approximate Scale (m): @ A3

0 10 20 30 40 50

ENVIRONMENTAL INVESTIGATION SERVICES

Project Number: E24001Krpt4	Title: CONTAMINATION DATA PLAN
Figure: 3	Address: 80 EVANS STREET FRESHWATER, NSW

LEGEND:

Approximate site boundary

Asbestos remediation area

NOTES:
Figure has been recreated from Google Earth Pro.

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

Approximate Scale (m): @ A3

0 10 20 30 40 50

ENVIRONMENTAL INVESTIGATION SERVICES

Project Number:	Title:
E24001Krpt4	REMEDIATION AREA PLAN
Figure: 4	Address: 80 EVANS STREET FRESHWATER, NSW

Appendix A: Report Explanatory Notes

Abbreviations

ABC	Ambient Background Concentrations
ACL	Added Contaminant Limits
AC	Asbestos Cement
ACM	Asbestos-Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AHD	Australian Height Datum
As	Arsenic
ASL	Asbestos Health Screening Levels
ASS	Acid Sulfate Soil
AST	Above Ground Storage Tank
BA	Building Application
Bgl	Below Ground Level
BH	Borehole
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLM	Contaminated Land Management
CMP	Construction Management Plan
COC	Chain of Custody Documentation
Cr	Chromium
CSM	Conceptual Site Model
CT	Contamination Threshold
Cu	Copper
DA	Development Application
DBYD	Dial Before You Dig
DQI	Data Quality Indicators
DQOs	Data Quality Objective
DSI	Detailed Site Investigation
EAC	Ecological Assessment Criteria
EC	Electrical Conductivity
EILs	Ecological Investigation Levels
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FR	Field Rinsate
GAI	General Approvals of Immobilisation
GSW	General Solid Waste
HILs	Health Based Investigation Level
HM	Heavy Metals
HMTV	Hardness Modified Trigger Values
HSLs	Health Screening Level
HW	Hazardous Waste
ISO	International Organisation of Standardisation
JK	Jeffery and Katauskas
LCS	Lab Control Spike
LNAPL	Light Non-Aqueous Phase Liquid
MGA	Map Grid of Australia
MW	Monitoring Well
NATA	National Association of Testing Authorities

Abbreviations

NEPM	National Environmental Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PCC	Potential Contaminants of Concern
PID	Photo-ionisation Detector
PQL	Practical Quantitation Limit
PSI	Preliminary Site Investigation
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
RL	Reduced Level
RPD	Relative Percentage Difference
RSW	Restricted Solid Waste
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SAS	Site Audit Statement
SAR	Site Audit Report
SCC	Specific Contamination Concentration
SD	Standard Deviation
SIX	Six Maps
SPT	Hardness Modified Trigger Values
sVOC	Semi-Volatile Organic Compounds
SWL	Standard Water Level
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TS	Trip Spike
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compounds
VOCC	Volatile Organic Chlorinated Compound
WA	Western Australia
WHS	Workplace, Health and Safety
Zn	Zinc