Land & Groundwater Consulting Pty Ltd
ABN 65 162 117 928

President Private Hospital

Remediation Action Plan

369-381 President Avenue
Kirrawee, NSW

28 October 2020

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Executive Summary

Background

Land & Groundwater Consulting Pty Ltd (LG) has been engaged by President Private Hospital Pty. Limited, to prepare a remediation action plan (RAP) for the remedial works required at 369-381 President Avenue, Kirrawee, NSW.

LG understands that a development application (DA) has been submitted to NSW Department of Planning, Industry, and Environment (DPIE) comprising the demolition and alteration of existing structures and addition of new structures with 2 basement levels.

It is understood that a remedial strategy is to ensure that the site will be suitable for the proposed Commercial D land use, consistent with an SP1 Special Activities (Health Services Facility) zoning, and consequently this RAP is required to address the potential for risks to future site users under this land use scenario.

Conclusions

Based on the information available from the previous investigations, this RAP has been prepared to guide remediation works to be carried out at the site and address the following aspects:

- Remediation of the following areas of environmental concern (AECs):
  - AEC 1 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH3/0.1-0.3; and
  - AEC 2 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH13/0.1-0.3.
- Assessment of suitability of any remedial excavations to remain in-situ to a standard suitable for Commercial D land use; and
- In-situ waste classification, removal and offsite disposal of soils to be excavated during bulk earthworks and construction works.

1. Introduction

1.1 Background

Land & Groundwater Consulting Pty Ltd (LG) has been engaged by President Private Hospital Pty. Limited, to prepare a remediation action plan (RAP) for the remedial works required at 369-381 President Avenue, Kirrawee, NSW (hereafter referred as 'the site'). The site is legally identified as Lot 1 in Deposited Plan (DP) 841502, Lots 23 and 24A in DP 26995, and Lots 53 and 54 in DP 29493. The location of the site is shown in **Figure 1**.

This RAP details the procedures to be implemented for the remediation and/or removal of impacted soils detected during previous environmental site investigations and validation of the resultant excavations and imported fill material, if any.

It is understood that a remedial strategy is to ensure that the site will be suitable for the proposed Commercial D land use, consistent with an SP1 Special Activities (Health Services Facility) zoning, and consequently this RAP is required to address the potential for risks to future site users under this land use scenario.

The proposed scope of work presented in this RAP has been developed in general accordance with relevant guidelines made or approved by the NSW Environment Protection Authority (EPA) and NSW Office of Environment and Heritage (OEH) *"Guidelines for Consultants Reporting on Contaminated Sites"* (2011).

1.1.1 Proposed Development

LG understands that a development application (DA) has been submitted to NSW Department of Planning, Industry, and Environment (DPIE) comprising the demolition and alteration of existing structures and addition of new structures with 2 basement levels.

The proposed development plans are provided in **Appendix A**.

1.2 Objectives

The objectives of the RAP are to:

- Summarise the site characteristics;
- Define the extent of remediation required;
- Assess appropriate remediation options and select a preferred option;
- Document the remediation methodology, including the associated safety and environmental management controls;
- Establish the validation criteria relevant to the likely future land use and detail the validation program (including reporting); and
- Identify the regulatory requirements relevant to the proposed remedial works.

1.3 Scope of Works

The RAP has been prepared for the following remediation scope of works:

- Remediation of the following areas of environmental concern (AECs):
  - AEC 1 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH3/0.1-0.3; and
  - AEC 2 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH13/0.1-0.3.
- Assessment of suitability of any remedial excavations to remain in-situ to a standard suitable for Commercial D land use; and
- In-situ waste classification, removal and offsite disposal of soils to be excavated during bulk earthworks and construction works.

2. Site Description and Setting

2.1 Site Identification

The site layout is presented in **Figure 2** and the site identification details are summarised in **Table 1**.

Table 1 – Site Identification Details

Site Details	Description
Address	369-381 President Avenue, Kirrawee, NSW
Lot/DP	Lot 1 in DP 841502, Lots 53 and 54 in DP 29493, Lots 23 and 24A in DP 26995
Local Government Area	Sutherland Shire Council
Parish and County	Parish of Sutherland, County of Cumberland
Site Area	Approximately 9,519 m^2
Registered Owner	President Private Hospital Pty. Limited
Zoning	SP1 Special Activities (Health Services Facility)
Current Land Use	Private hospital

2.2 Site Setting

The setting of the site including surrounding land use, topographical, geological and hydrogeological information for the locality is summarised in **Table 2**.

Table 2 – Site Setting Information

Category	Observation
Surrounding Land Use	The site is bound by Bidurgal Avenue to the north, Hotham Road to the east, a surface water easement and President Avenue to the south and residential properties to the west.
Topography	The ground surface at the site slopes from north to south. The ground surface varies in elevations from approximately 67.5 m (Australian Height Datum) AHD in the vicinity of the southern boundary of the site to approximately 75.5 m AHD in the vicinity of the northern boundary of the site, respectively.

Geology and Hydrogeology	Geological information obtained from the Sydney 1:100,000 Geological Series Sheet 9130 Edition 1, dated 1983, by the Geological Survey of New South Wales, Department of Mineral Resources, indicates the site is located within an area underlain by Hawkesbury Sandstone, denoted as Rh. The Hawkesbury Sandstone is described as "Medium to coarse-grained quartz sandstone, very minor shale and laminate lenses". Hydrogeological conditions at the site are likely to be defined by shallow and deeper aquifer systems. The shallow system is likely to be a transient perched aquifer that develops after heavy rainfall and lies on the soil-bedrock contact. The shallow aquifer is thought to exist at a depth of 3 to 4 m bgs and is possibly the consequence of the infiltration of rainfall through the subsurface. It is likely that the shallow aquifer is discontinuous and will be favourable in higher permeability areas, such as the area of fill and easements (such as the stormwater easement). The groundwater in this system is unlikely to pose an off-site migration risk due to its transient nature and the most likely contaminant source being from intermittent spills/leaks from near-surface infrastructure. The deeper system is likely to be a semi-confined aquifer located within the rock fractures and defects within the Hawkesbury Sandstone bedrock. The deeper aquifer is inferred to be located at a depth of 5 to 10 m bgs and would correspond to the regional system present at the site and local area. This system would also correspond to the system that would present the highest off-site migration risk, if any, due to its permanent nature.
Fill Materials	Sandy clay and silty sand fill materials were encountered across the site, either from the surface or from underlying the surficial pavements and described as light to dark grey/brown, well graded, loose and moist. These were encountered at depths ranging from 0.0 m to 0.3 m (LG, 2020).
Natural Soils	Sandy clays consistent with soils derived from weathered rock types of the Hawkesbury Sandstone Formation were encountered underlying fill materials. The sandy clays were described as light to dark orange, non-plastic to moderate plasticity, stiff and moist. These were encountered at depths ranging from 0.3 m to 1.0 m (LG, 2020).
Acid Sulfate Soils	A review of the acid sulfate soils (ASS) risk maps (1997) for Port Hacking conducted by LG (2020) indicated that the site is located in an area designated as "No Known Occurrence". Therefore, acid sulfate soils are not known or expected to occur in these areas. The ASS risk map defines that land management activities are not likely to be affected by acid sulfate soil materials.
Registered Groundwater Bores	A review of groundwater bore records available on the NSW Office of Water (NOW) online database was undertaken by LG (LG, 2020). The search was limited to registered bores located within a radius of approximately 500 m of the site. The search identified the presence of 1 registered bore (GW018433) within a radius of approximately 500 m of the site.
Nearest Surface Water Feature	The nearest surface water body is Denys Creek located approximately 293 m south of the site.
Surface Covering	The site surface can be summarised as follows: ▪ Approx. 40% was covered with asphalt. ▪ Approx. 30% of the site was covered with grass. ▪ Approx. 30% was covered with concrete and pavement.

2.3 Site History Summary

Prior to the current layout the site appeared to have comprised mainly crown land between 1860's and 1910's and agricultural garden markets between 1910's and 1950's. Residential structures are likely to have occupied the site since sometime between 1910's and 1960's. The main hospital structures are likely to have been constructed between 1970's and 1980's. Therefore, it is estimated that the site has been in its current hospital configurations for nearly 50 years. No significant changes were observed on the site during this period

2.4 Site Condition

LG made the following observations during fieldworks conducted by LG on 9 June 2020:

- The site could be accessed through three (3) street fronts, including President Avenue to the south west, Hotham Road to the north east and to the south east.
- The surface topography was sloping down from north to south;
- The site was occupied in the southern and western portions by private hospital structures and the north eastern and eastern portions by residential dwellings.
- Three separate car parking areas were observed in the south western, south eastern and northern portion of the site.
- No signs of oil spill or stains were noted on floor surfaces;
- There were no active pipelines;
- There were no above ground tanks (ASTs) or visible evidence of underground storage tanks (USTs) or systems which should cause air emissions such as laboratories, incinerators, surface impoundment and land treatment areas; and
- Asbestos containing materials were not observed on the surfaces across the site during the inspection.

3. Extent of Contamination

3.1 Contamination Identified

As part of the investigation works conducted by LG on 9 June 2020 (LG, 2020) soil samples were collected from 21 borehole locations across the site. The boreholes comprised fill materials (0.0 m to 0.3 m bgs) and natural sandy clay (0.3 to 1.0 m bgs). Subsurface conditions encountered consisted of the following:

- The fill materials comprised sandy clay and silty sand and minor brick and demolition fragments, at the locations investigated. This fill was underlain by natural sandy clay and then sandstone.

Based on the findings of the LG investigation (LG, 2020) the following contamination impacts were identified:

- Concentrations of petroleum hydrocarbons (TRH and BTEX) were either below the below the Estimated Quantitation Limit (EQL), HIL D and EIL D criteria in the soil samples analysed.
- Concentrations of heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) were below the HIL D and EIL D criteria in all soil samples analysed.
- Concentrations of OCPs, OPPs and PCBs were either below the below laboratory EQL, HIL D and EIL D criteria in all soil samples analysed.
- Asbestos containing materials were detected above the HIL D in the following samples:
  - Chrysotile cement sheet fragments (approx. 5x3x2mm) in soil sample BH3/0.1-0.3, collected within the fill material at Borehole 3; and
  - Chrysotile cement sheet fragments (approx. 12x10x4mm) in soil sample BH13/0.1-0.3, collected within the fill material at Borehole 13.

Soil sample locations are shown in **Figure 3**, and analytical results are summarised in **Table A** attached.

3.2 Remediation Required

The following is a summary of remediation requirements to render the site fit for Commercial D land use:

- Excavation and removal of asbestos impacted soils in the following areas of environmental concern (AEC) (refer **Figure 4**):
  - AEC 1 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH3/0.1-0.3; and
  - AEC 2 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH13/0.1-0.3.

A review of available and relevant remediation options suitable to address remediation requirements are outlined in **Section 4**.

3.3 Exposure Pathway Evaluation

Exposure pathways that were considered relevant for this RAP are listed in **Table 3**.

Table 3 – Exposure Pathways

Contamination Source	Transport Mechanism	Exposure Media	Potential Receptors	Likelihood of Exposure
Impacted soils	Ambient air during excavation and removal of accessible soil areas.	Inhalation of asbestos fibres (if present) during excavation and removal of accessible soil areas	Outdoor workers	Unlikely if management to prevent exposure is undertaken.

4. Remediation Options

4.1 Remediation Objectives

The remediation objectives are outlined as follows:

- Excavation of the asbestos fines/fibrous asbestos (AF/FA) impacted soils at AECs 1 and 2, followed by off-site disposal to an appropriately licensed waste facility;
- Validate the subsequent excavations, in accordance with the relevant NSW EPA guidelines;
- Reinstatement of excavations with appropriately validated imported material (if required); and
- Document the validation process.

4.2 Evaluation of Available Remedial Options

The Contaminated Sites Guidelines for the NSW Auditor Scheme (EPA 2017) lists the following order of preference for soil remediation and management:

- On-site treatment so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
- Off-site treatment so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
- Excavation and off-site removal of the impacted material to an approved site or facility, followed where necessary by replacement with clean fill; and
- Consolidation and isolation of the impacted material on-site by containment within a properly designed barrier.

In addition, where there are large quantities of soil with low levels of contamination, alternative strategies are required to be considered or developed (EPA 2017).

The WA Department of Health (May 2009) *"Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia"* outline the following options for remediation and management of asbestos contaminated Sites:

- Management in-situ;
- Treatment on-site; and
- Removal off-site.

The suitability of each option for achieving remediation goals at the site is presented in **Table 4**.

Table 4 – Remediation Options for the Identified Contaminants

Remediation Methodology	Discussion	Conclusion
Option 1. Removal of asbestos contaminated material and off-site disposal.	Asbestos contaminated material can also be excavated and disposed of offsite. This is a preferable method where asbestos contamination at a site is well-defined and covers a relatively small area or where the contamination includes significant exposed asbestos free fibres generating material. Advantages are summarised as follows: • Provides the shortest timeframe for remediation. • Removes risks to human health and long-term management requirements. • Higher cost for material transport and disposal charges. • Additional cost associated with classifying wastes prior to off-site disposal.	Preferred option.
Option 2. Management of asbestos contaminated soils in-situ by containment, isolation or capping so as to prevent disturbance of or human contact with the contaminated material.	According to the WA Department of Health (May 2009) *"Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia"*, this method is suitable for sites where: • It is difficult to determine the distribution of asbestos contamination; or • The site will largely be covered by hardstand.	Not considered a suitable option by client.

Remediation Methodology	Discussion	Conclusion
Option 3. Treatment of asbestos contaminated material on site.	Treatment of asbestos contamination on site involves hand-picking, tilling or screening of surface material to remove asbestos fragments. This method is particularly suited to sites where fibrous asbestos is not present and where asbestos fragments are present within the top one metre of soils. This option is not suitable if asbestos fibres and construction debris is present.	Not a suitable option. This technique is not considered suitable for asbestos fibres such that remediation is likely to increase the public risk.

5. Remediation Plan

5.1 Notifications

Prior to Category 2 remediation activities beginning at the site, the local council must be notified of the intent to remediate the site under the Department of Urban Affairs and Planning/EPA SEPP 55 guidelines (DUAP/EPA 1998), as per Section 10. Additionally, after the remediation is completed at the site, the council must be notified of the completion of the works.

Since the remediation works will involve the excavation and removal of asbestos contamination, the works should be carried out by a Remediation Contractor licensed to conduct non-friable and friable asbestos removal works. The Contractor should be required to notify the SafeWork NSW of the intention to conduct asbestos removal prior to removal.

5.2 Site Establishment

An appropriately experienced and licensed asbestos Remediation Contractor is required to undertake the works, under the guidance of an appropriately qualified and experienced Environmental Consultant.

All safety and environmental controls are to be implemented as the first stage of remediation works. These controls will include but not be limited to:

- Establish site boundary using barricades, barrier tape and PPE, and asbestos warning signage;
- Establish exclusion zone of at least 10 m (if possible) around the work areas to ensure no unauthorised personnel may enter the site;
- Ensure correct 200 µm thick asbestos waste bags are present onsite for disposal of asbestos waste and/or asbestos contaminated PPE;
- Set up decontamination area adjacent to the asbestos handling area for Remediation Contractor personnel to use at the end of each shift and at the end of each day;
- Locate and isolate all required utilities in the proximity of the works;
- Work area security fencing, with dust mesh on the fences;

- Site signage and contact numbers;
- Sediment fencing (attached to security fencing); and
- Stormwater runoff and sediment controls (hay bales).

5.3 Option 1 - Asbestos Removal and Off-site Disposal

5.3.1 Asbestos Management Plan

Asbestos removal works (if any) should be undertaken in accordance with the site specific asbestos management plan, prepared separately to this RAP.

The transportation and disposal of asbestos contaminated wastes shall be conducted in accordance with the requirements of Section 29 of the *Protection of the Environmental Operations (Waste) Regulation 1996*. All tip dockets should be kept and issued to Infinity once received and recorded.

The asbestos materials removed must be classified in accordance with the Department of Environment and *NSW EPA (2014) Waste Classification Guidelines, Part 1: Classifying Waste*.

All asbestos cement fragments waste is to be transported to and disposed off at a landfill licensed to receive asbestos waste.

Asbestos contaminated soils should be transported and disposed off as Special Waste at a landfill licensed to receive asbestos contaminated soils.

Transportation of asbestos cement fragments waste and asbestos contaminated soils must be by an EPA licensed person/company and the load must be secured and covered.

5.3.2 Respirable Asbestos Monitoring

The National Occupational Health and Safety Commission Code of "*Practice for the Safe Removal of Asbestos 2nd Edition"* [NOHSC:2002(2005)] stipulates that "air monitoring should be performed whenever ACM are being removed, to ensure the control measures are effective". The WA Department of Health (May 2009) *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* suggest that "if best practice is used to control generation of dusts, atmospheric sampling or asbestos fibres adds little value to the evaluation or

management of asbestos risks. However, asbestos air sampling can help provide confidence in those control measures".

Due to the potential for fibrous asbestos to become airborne during capping activities, monitoring of respirable asbestos is recommended during works to confirm the adequacy of control measures. Air monitoring for respirable asbestos should be conducted in accordance with the "*Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition"* [NOHSC: 3003 (2005)] and samples should be collected during days when disturbance of ACM is most likely to occur.

The WA Department of Health (May 2009) *"Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia"* recommend a 0.01 fibres per millilitre asbestos air quality limit to protect human health. This is also the para-occupational limit endorsed in Management of Asbestos in the Non-Occupational Environment (enHealth, 2005) and is the limit of detection using the membrane filter method. Should results from air monitoring exceed this limit, additional control measures should be introduced to control dust generation during works.

5.3.3 Asbestos Cement Fragments Remedial Works

Asbestos cement fragments should be removed from across the site surfaces, by a Licensed Contractor, as follows:

- Manual raking to a depth 0f 0.1 m to identify shallowly buried bonded ACM;
- Dampen asbestos fragments with water or PVA solution;
- Pick up fragments and place into an asbestos waste bag. Smaller fragments should also be swept up and placed into the asbestos waste bags. The bags are to be double bagged, goose necked and sealed with duct tape when half full;
- An Environmental Consultant should then perform a visual inspection of the work area; and
- If the Licensed Asbestos Assessor (Class A) is satisfied with the work area and the removal works performed a visual clearance certificate is to be issued to the Remediation Contractor.

5.3.4 AF/FA Impacted Soils Remedial Works

Excavation and removal of AF/FA impacted areas (AECs 1 and 2) estimated at approximately 9 m^3 (refer to **Figure 3**), with approximate depths ranging 0.0 to 0.5 m bgs.

5.3.5 Validation

Validation of the remedial works will be an integral part of the works, to demonstrate that the works were undertaken in accordance with the requirements outlined in this RAP. Details of the validation program are provided in **Section 6**.

5.3.6 Backfilling of Excavation

If backfilling is required upon confirmation of excavation validation, the excavation will be reinstated using material from the site and/or imported virgin excavated natural material (VENM) (or any other suitable material granted an applicable EPA Exemption under the Protection of the Environment Operations (Waste) Regulation 2015). Should VENM require to be imported to the site, this will be completed as per the criteria in **Section 6.5.3**.

5.4 Site Dis-establishment

On completion of the remediation works all plant/equipment and safety/environmental controls required during the remediation works shall be removed from the site. Details are provided in the Site Management Plan in **Section 7**.

6. Validation Plan

Based on the proposed remediation methods, validation activities will be required for:

- Obtaining waste disposal documents for the asbestos contaminated soils and/or bonded asbestos fragments;
- The excavation formed by the excavation and removal of the asbestos impacted materials and obtaining associated waste disposal documents;
- Any residual soils underneath temporary stockpiles (if utilised during remedial works);
- Review of material characterisation documentation that accompanied any imported material onto site; and
- Sampling, analysis and material characterisation reporting for any material imported onto the site (if required), including appropriate validated imported material to be used as growing media within the proposed garden area.

6.1 Data Quality Objectives

Data quality objectives (DQOs) were developed for the validation assessment. The seven-step Data Quality Objective (DQO) approach has been undertaken in accordance with Appendix IV of the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*. The DQO's are presented in detail in the following sections.

6.1.1 State the Problem

It is understood that the site has been used as a private hospital for nearly 50 years, and is required to be fit for the intended Commercial D land use. Previous inspections have identified the presence of asbestos impacted soils within 2 separate areas of the site.

Excavated asbestos impacted soils will be disposed off-site to a landfill licensed to accept the waste, and any material used to backfill the excavations (if required) will be validated prior to placement.

Asbestos cement fragments, if identified, will be hand-picked and disposed off-site to a landfill licensed to accept the waste.

6.1.2 Identify the Decision

The following decisions are required to be made during the validation works:

- What was the nature and extent of the asbestos impacted soils both laterally and vertically across the site?
- Where the impacted areas (i.e. AECs 1 and 2) remediated and validated to a level suitable for the intended Commercial D land use?
- Was it likely that that asbestos fragments/fibres were present within the fill material, and in areas adjacent to AECs 1 and 2?
- Was impacted material classified and disposed of off-site to a facility licensed to accept the classified waste?
- Was imported material used to backfill excavations classified according to NSW EPA requirements?

6.1.3 Identify the Inputs of the Decision

The inputs to the decisions are:

- Assess sampling density and propose a sampling plan;
- Physical observations, including visual, asbestos air monitoring (for air borne fibres impact) results during site activities;
- Documentation to verify appropriate removal and disposal of waste;
- Assess whether the field observations indicated the presence of aesthetic issues, including but not limited to odours, discolouration and presence of foreign materials;
- Soil analytical data from samples collected from the base and walls of the excavation formed by the removal of the impacted soils; and
- Assess whether the reported analytical concentrations are greater than the adopted validation and waste classification criteria.

6.1.4 Define the Boundary of Impact

The boundaries of the areas inferred to have asbestos impacted soils are shown in **Figure 4**. The vertical extent of the impacted soils ranges from 0.0 to 0.5 m bgs. It is possible that contaminated soils will be required to be 'chased out' from the walls and base of the excavations depending on the visual screening and/or validation sampling.

6.1.5 Develop a Decision Rule

Soil analytical data will be assessed against EPA published / endorsed criteria for constituents:

- *National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 2013 (2013).*
- *Guidelines for the NSW Site Auditor Scheme 3rd Edition, October 2017 (NSW EPA 2017);*
- *Waste Classification Guidelines. Part 1: Classifying Waste, NSW DECCW, December 2009 (DECCW 2009); and*
- *WA Department of Health (May 2009) "guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia.*

It is noted that EPA (2017) requires that aesthetics (including the presence of asbestos) from soils on residential sites also be adequately assessed. No odorous soils or staining are currently known to exist at the site.

6.1.6 Specify Limits of Decision Errors

The objective of the project is to remediate targeted areas of the site to a standard, which is suitable for the intended on-going commercial/industrial land use. In order to document the remediation works, validation sampling and analyses will be conducted and the quality of the validation data must be sufficient to draw conclusions regarding the suitability of the site. Hence, the quality assurance/quality control (QA/QC) program employed as part of remediation works will involve the pre-determined data quality objectives (DQOs). The data quality objectives and the associated data quality indicators (DQIs) are shown in **Table 5** and discussed further below.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD[1]) of duplicate samples.

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1 $RPD(\%) = \frac{(D1-D2)}{\frac{(D1+D2)}{2}} \times 100$

Where D1 is the analyte concentration of the original sample

D2 is the analyte concentration of the duplicate sample

- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.

- **Representativeness** - expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.

- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.

- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 5 – Data Quality Indicators for Soil Validation Program

Data Quality Indicator	Frequency	Data Quality Criteria
Precision		
Blind duplicates (intra laboratory) analysis	1 / 20 samples	70-130%[1]
Blind duplicates (inter laboratory)	1 / 20 samples	
Accuracy		
Laboratory control samples	1 per lab batch	<LOR
Surrogate spikes	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes	All samples	All samples
Samples extracted and analysed within holding times - asbestos	All samples	No holding time
Rinsate	1 per sample batch	<LOR
Trip spike	1 per sample batch	70-130%
Trip Blank	1 per sample batch	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All Samples
Standard analytical methods used for all analyses	All Samples	All Samples
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All Samples
Limits of reporting appropriate and consistent	All Samples	All Samples
Completeness		
Soil description and COCs completed and appropriate	All Samples	All samples
Appropriate documentation	All Samples	All samples
Satisfactory frequency and result for QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All samples	LOR<= site assessment criteria

Notes: [1] RPD's to be less than 70% for inorganic and 130% for organic analyses. If the RPD between duplicates is greater than the pre-determined data quality criteria, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

6.1.7 Optimise the Design for Obtaining Data

The purpose of this step is to identify a resource-effective field investigation sampling design that generates data that are expected to satisfy the site manager's decision performance criteria, as specified in the preceding steps of the DQO Process. The output of this step is the sampling design that will guide development of the field sampling and analysis plan. This step provides a general description of the activities necessary to generate and select data collection designs that satisfy decision performance criteria. For the validation, samples will be collected on a grid basis within the excavation, along both the walls and base. Imported materials will also be validated where required.

6.2 Soil Sampling Methodology

Soil samples will be collected by an appropriately trained and experienced Environmental Consultant using an excavator. Samples of the material shall be collected from the centre of the excavator bucket ensuring that no part of the sample has contacted the sides of the excavator bucket.

Sufficient sample material will be collected to allow both field and laboratory analyses. Additional samples will be collected from any soil horizons which exhibit staining, odours, or other physical evidence of potential contamination.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination will be noted on the field documentation. Collected soil samples will be immediately transferred to laboratory supplied sample jars, which will be sealed with Teflon lined screw closures. The sample containers will be transferred to a chilled esky for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form will be completed and forwarded with the samples to the testing laboratory.

Any asbestos cement fragments collected must be double bagged in sealable plastic bags and labelled as 'Asbestos Waste' and lawfully disposed at a facility licensed to accept asbestos waste.

6.3 Sampling Rationale

The sampling and analytical regime presented in **Table 5** is based on the following guidelines:

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), National Environment Protection Council (NEPC 2013);
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, 1997 (OEH 2011);
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (EPA 1995);
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 3rd Edition, NSW EPA, 2017 (EPA 2017); and
- Contaminated Sites: Guidelines on Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, June 2009 (DECC 2009).

6.4 Laboratory Analysis

All laboratories engaged for the project will need to be NATA accredited for the required analyses.

In addition, each laboratory is required to meet internal QA/QC requirements consistent with NEPM (NEPC 2013). Laboratory analysis of samples will be conducted with reference to COPCs listed in **Table 6**.

The proposed soil validation sampling and analytical program for impacted soils is outlined in **Table 6**.

Table 6 – Validation Sampling and Analytical Program

Sample Type	No. of Sampling Locations	Analyses (exc. QA/QC)
Excavation validation (asbestos impact in soil)	1 validation sample per 5 m linear of excavation wall and 1 m depth. 1 validation sample per 25 m^2 area of excavation floor.	Asbestos
Asbestos cement fragments fragment inspection on ground surface	1 m grid based sampling. At least 2 passes of picking made with 90° direction change between each pass.	Visual for Asbestos Cement Fragments
Asbestos cement fragments inspection in fill material	Exploratory trenches (handdug to depths of approx. 0.3 to 0.4 m bgs)	Visual for Asbestos Cement Fragments
Waste classification	1 sample per 50 m^3 with a minimum of 2 samples per each material type.	Heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) TPH/BTEX PAH Phenols Asbestos TCLP (metals/PAHs) – if required
Imported material (if required), either VENM or other waste regulatory framework exempt materials (e.g. ENM)	Minimum samples required as per guidelines and for calculation of 95%UCL avg concentrations	pH Heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) PAH TPH/BTEX Asbestos OCP/PCB
Unexpected Finds	1 in 25 m^2 (excavation floor), 1 in 5 m (excavation wall), 1 in 25 m^3 (materials)	As appropriate, based on the location and characteristics of the find

6.5 Soil Validation Criteria

6.5.1 Excavation Surfaces

Given that the site will continue to be used for commercial purposes, and in accordance with the decision process for assessment of urban redevelopment sites (EPA 2017), the soil results will be compared against the validation criteria stipulated in **Table 7**. The validation criteria are based upon the guidelines provided in the NEPC (2013) for Commercial/Industrial sites and include the following:

- NEPM (2013) Health-based Investigation Levels for Commercial/Industrial (HIL-D);
- NEPM (2013) Health-based Screening Levels (HSLs) for soil vapour intrusion in sandy soils for Commercial/Industrial (HSL-D); and
- NEPM (2013) Ecological Screening/Investigation Levels for Commercial/Industrial (ESL/EIL).

Table 7 – Asbestos in Soil Health Based Validation Criteria

Form of Asbestos	Adopted Validation Criterion[1]
Bonded ACM	0.05 %
Fibrous asbestos or asbestos fines[2]	0.001 %
All forms of asbestos	No visible ACM for surface soil (0-0.1 m gs) and no asbestos fibres in soil[3]

Notes:

1. NEPC 2013 Commercial/Industrial (HSL D).
2. The screening level of 0.001 % w/w asbestos in soil for fibrous asbestos and asbestos fines (i.e. non-bonded/friable asbestos) only applies where the fibrous asbestos and asbestos fines are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.
3. As demonstrated by laboratory analysis in accordance with NATA analysis method consistent with AS4964 (2004) with a detection limit of 0.01 % w/w obtained from a 500 mL sample.

6.5.2 Waste Classification

Soils/wastes to be disposed of off-site will be compared against the criteria provided in NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste* for heavy metals, TRHs, BTEX, PAHs and TCLP in benzo(a)pyrene. A summary of the criteria is provided in **Table 8**. Where appropriate, statistical analysis will be used to interpret the data set.

Table 8 – Waste Classification Criteria

Contaminant	General [1]	Restricted [1]	General [2]	Restricted [2]	General [3]	Restricted [3]
	CT1	CT2	SCC1	SCC2	TCLP1	TCLP2
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(µg/L)	(µg/L)
Heavy metals						
Arsenic	100	400	500	2000	5.0	20
Cadmium	20	80	100	400	1.0	4
Lead	100	400	1500	6000	5	20
Mercury	4	16	50	200	0.2	0.8
Nickel	40	160	1050	4200	2	8
BTEX						
Benzene	10	40	18	72	0.5	2
Toluene	288	1152	518	2073	14.4	57.6
Ethylbenzene	600	2400	1080	4320	30	120
Xylenes (total)	1000	4000	1800	7200	50	200
Petroleum Hydrocarbons						
C_6-C_9	N/A	N/A	650	2600	N/A	N/A
C_{10}-C_{36}	N/A	N/A	10000	40000	N/A	N/A
PAHs						
Benzo(a)pyrene	0.8	3.2	10	23	0.04	0.16
PAHs (total)	N/A	N/A	200	800	N/A	N/A
Pesticides (total)	N/A	N/A	250	1000	N/A	N/A
PCBs (total)	N/A	N/A	<50	<50	N/A	N/A

Notes:

1. Contaminant threshold values for classifying waste by chemical assessment without the leaching (TCLP) test (Table 1) – NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*.

2. Specific contaminant concentration (SCC) values for classifying waste by chemical assessment (Table 2) – NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*.

3. Leachable concentration (TCLP) values for classifying waste by chemical assessment (Table 2) – NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*.

6.5.3 Imported Fill Material

Should importation of material be required to reinstate the excavations it will need to be completed in accordance with current NSW Policy. This includes appropriate validated imported material used to construct the proposed kitchen garden area (raised garden beds). Under the current NSW Policy, only material that does not represent an environmental or health risk at the receiving site may be legally imported to site. In accordance with this requirement, only VENM as defined in the Protection of the Environment Operations Act (1997) Schedule 1; excavated natural materials (ENM), as defined in EPA (2014); or any other suitable material granted an applicable EPA Exemption under the Protection of the Environment Operations (Waste) Regulation 2008 may be imported to reinstate excavations.

7. Remediation Works - Requirements

7.1 Regulatory Requirements

Unless more explicit or more stringent requirements are written directly into this document, the following Acts, Codes, Regulations and Standards are the minimum requirements in relation to asbestos that the is Contractor required to comply with for this project:

- Australian Standard 1715 - 1994 Selection Use and Maintenance of Respiratory Protective Devices.
- Australian Standard 1716 - 2003 Respiratory Protective Devices.
- National Occupational Health and Safety Commission (NOHSC) Code of Practice for the Safe Removal of Asbestos, April 2005.
- National Occupational Health and Safety Commission (NOHSC) Code of Practice for the management and Control of Asbestos in Workplaces, April 2005.
- National Occupational Health and Safety Commission (NOHSC) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition [NOHSC:3003 (2005)].
- Occupational Health and Safety Act, 2000 (NSW).
- Occupational Health and Safety Regulation 2001 (NSW).
- Protection of the Environment Operations Act, 1997 (NSW).
- Protection of the Environment Operations (Waste) Regulation, 2005 (NSW) – Clause 42 Special requirements relating to asbestos waste.
- SafeWork Code of Practice – Managing Asbestos in or on soil, 2014 (NSW).
- SafeWork Code of Practice – How to Manage and Control Asbestos in the Work Place, 2019 (NSW).
- SafeWork Code of Practice – How to Safely Remove Asbestos, 2019 (NSW).
- Work Health and Safety Act, 2011 (NSW).
- Work Health and Safety Regulation, 2011 (NSW).

7.2 General Requirements

Prior to ACM handling works commencing, a safe work method statement (SWMS) and all other safety documentation should be prepared and reviewed for these works.

All works should be assessed for hazards with the input of the licensed Contractor's project manager and site supervisor. The site should be reviewed for new hazards daily or as required.

Daily pre-start briefings shall be held prior to any work commencing. These briefings are to be conducted to discuss the day's work activities, any safety issues or requirements and any corrective actions. Toolbox meetings should also be held as required to discuss any safety issues that may have arisen or any new work activities not discussed in the pre-start briefing.

The licensed Contractor's personnel handling ACM must have the appropriate training and experience. Only relevant licensed Contractor's personnel should physically (by hand or mechanically) handle bonded ACM (deemed "non-friable") or AF/FA contaminated material (deemed "friable"), if any.

The ACM handling work area at the site should be deemed not accessible to non-employees or personnel not inducted for working within ACM areas until a final clearance has been given by the relevant Consultant.

This access restriction should be lifted once the relevant Consultant has issued a clearance certificate. Upon receipt of the clearance certificate, the work area may be accessed without the need for asbestos personal protective equipment (PPE).

PPE is a last resort to health and safety, but when required to be used it should be identified in the SWMS. It is the site supervisor's responsibility to ensure all required PPE is available and is being used.

Decontamination facilities are to be provided and maintained by the relevant licensed Contractor's for all personnel working at the site.

7.3 Requirements for Excavation/Capping Activities Involving Suspected ACM Fragments

7.3.1 Regulatory Requirements

1. Ensure that during any site activity that is likely to involve disturbance or contact with asbestos-cement fragments or pieces on the surface and below the surface, that no health risk is created.

2. Conduct a risk assessment in association with the mandatory SWMS, and take any action necessary to achieve the above requirement.

7.3.2 Additional Requirements

1. Ensure that no visible dust leaves the site during excavation / capping works. Also minimise any visible dust emission. One way of reducing dust emission is to keep the surface damp if practicable.

2. Provide the employee or contractor and any adjacent workers with P1 or P2 disposable respirators, and instruct them how to use them.

7.4 Requirements When Inspecting Surfaces Containing ACM Fragments

7.4.1 Regulatory Requirements

1. During any visual inspection of surfaces containing suspected asbestos-cement pieces, and whilst picking up / capping any of the asbestos-cement, ensure that no health risk is created.

2. Conduct a risk assessment in association with the mandatory Safe Work Method Statement (SWMS), and take any action necessary to achieve the above requirement.

7.4.2 Additional Requirements

The remediation protocol for a hot spot area is that the surface of the affected area should be excavated until the asbestos is removed and/or capped. If the area is contaminated fill material then all fill material should be excavated as per methodology described in **Section 7.5**.

7.5 Requirements for Works Involving Handling, Excavation and Transportation of ACM Onsite

Implement these requirements when ACM is identified in soil or fill materials which cannot be cleaned up through manual handpicking.

7.5.1 Regulatory Requirements

1. Ensure that during any remediation activity relating to asbestos-cement fragments or pieces on the surface, that no health risk is created. These activities may include inspection, 'emu-bobbing', raking, screening, excavation, moving stockpiles, contained/capped onsite and so on.

2. Conduct a risk assessment, and take any action necessary to achieve the above requirement. Create Safe Work Method Statements (SWMS) for the work being conducted.

7.5.2 Additional Requirements

1. Cordon off any area found to contain ACM with tape, plus appropriate signage.

2. Ensure that no visible dust leaves the site during any remediation. Also minimise any visible dust emission from all activities. This may entail covering stockpiles containing ACM with hessian or similar, if they are to remain for any significant period of time.

3. Provide all workers including machine operators with P1 or P2 disposable respirators, and instruct them how to use them.

4. If necessary, conduct airborne asbestos monitoring conducted or supervised by an occupational hygienist during activities likely to cause measurable airborne asbestos fibre concentrations.

5. If necessary, conduct airborne asbestos monitoring on representative sections of the work area boundary.

Airborne asbestos fibre measurements to be conducted by a National Association of Testing Authorities (NATA) laboratory, and NATA endorsed reports will be issued by NATA approved analysts.

8. Remediation Works - Site Management Plan

This section contains procedures and requirements that are to be implemented as a minimum requirement during the remediation works. The responsible party will undertake preparation and implementation of an appropriate site-specific management plan during remediation activities.

8.1 Contractor Contact Details

The remediation works shall be managed by a contractor to be announced.

Contact: Contact name, Position, TBA

Phone: TBA

Mobile: TBA Email: TBA

8.2 Hours of Operation

The proposed hours of operation for physical remediation activities, including associated truck movements, will be between 7 am and 5.30 pm Monday to Friday, 7 am to 1 pm Saturdays, with no activities proposed on Sundays or public holidays. The proposed hours will be adjusted if required by Sutherland Shire Council.

8.3 Hours of Operation

All works shall be conducted in strict accordance with the soil and water management measures outlined in this section.

To prevent the migration of impacted soil/sediment off site, silt fences shall be constructed at the down-gradient work area boundaries, as per the specifications contained in *Managing Urban Stormwater – Soil and Construction Volume 1, 4th Edition*, NSW Government, March 2004. Any material which is collected behind the sediment controls shall be treated as potentially contaminated and will be suitably managed.

In a storm event, the sediment controls located on-site will need to be monitored and replaced or altered if necessary. Collected material will need to be suitably managed in accordance with the remediation works.

8.4 Site Access

During remediation works, perimeter fencing will be maintained to restrict access to the works area. Only authorised persons will be able to enter the works area.

Vehicle access to the works area shall be via President Avenue or Hotham Road. The road ways must be kept clean of excess soil.

The principal remediation contractor shall arrange appropriate traffic management plans to be in place prior to transporting contaminated material off-site.

8.5 Stockpiles

Stockpiled material is unlikely to occur at the site, however should stockpiles be constructed then the following procedures will be implemented:

- No stockpiles or other materials shall be placed on footpaths or roadways and will be away from all stormwater infrastructure (including drainage lines, stormwater pits, gutters, etc.) where possible. Where this is not possible, sediment controls will be placed over stormwater grates to prevent ingress of sediment to stormwater drainage lines;
- Stockpiles shall be formed with sediment control structures placed immediately down slope to protect other lands and waters from sediment pollution;
- All formed stockpiles likely to generate substantial dusts or potential volatile hydrocarbons shall be covered and, if left for more than 24 hours, be stored in a secure area; and
- All formed stockpiles will be placed on a level area as a low elongated mound.

8.6 Noise

The remediation works shall comply with the NSW EPA's Environmental Noise Control Manual for the control of noise from construction sites.

All machinery and equipment used on site will be in good working order and fitted with appropriate silencers when required.

8.7 Vibration

The use of plant and machinery shall not cause vibrations to be felt or capable to be measured at the neighbouring premises.

8.8 Air Quality

8.8.1 Dust Suppression

Should earthworks be undertaken at the site, dust suppression would be required during disturbance of the material below the capping material to prevent nuisance dust and minimise the potential for liberating free asbestos fibres that would result from damaging asbestos cement fragments. This level of management should also be sufficient to control occupational exposure to asbestos.

At times when wet weather is not sufficient to suppress nuisance dust during excavation works, water trucks/water cannons are to be used to apply water to surrounding soil should be wetted to a level where no visible dust is evident when the soil is disturbed. Regular air monitoring should be provided as part of a strategy to monitor and demonstrate the effectiveness of the dust control techniques.

The Remediation Contractor undertaking the excavation work is expected to perform the works in compliance with Occupational Health and Safety Regulations and National Occupational Health and Safety Commission (NOHSC) revised Codes of Practice.

8.8.2 Airborne Asbestos Dust Monitoring Procedures

During any earthworks which may result in the disturbance of potential asbestos cement fragments, monitoring for airborne asbestos fibres should be undertaken to confirm that the airborne asbestos fibre concentrations are below the WorkSafe time weighted average (TWA) criteria of 0.1 fibres per mL of air.

Regular air monitoring should be provided on days when weather conditions suggest dust may be generated (such as windy days) to monitor any airborne asbestos fibres. Air sampling should be conducted during the earthworks at a minimum of 3 locations, one air monitoring unit upwind and 2 downwind.

Air monitoring should be conducted using a filter assembly and a constant flow pump operating over 4 hours at an air flow of 2.0 L/min. The filters are then read within 24 hours,

in accordance with 'Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003 (2005)]. Results are measured against the time weighted average (TWA) criteria of 0.1 fibres per mL of air.

In the event any airborne asbestos fibre concentration analytical results exceed 1 fibre per 100 fields the contractor will be informed within 24 hours by air monitoring personnel and additional dust suppression techniques will be developed by the contractor and employed during site works.

8.8.3 Material Transporting

The transporting contractor shall ensure that there is no material tracked out onto the street and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

All appropriate road rules shall be observed and state roads will be selected as far as practicable over local roads when deciding on the transport route to the off-site material disposal location.

Where material is to be imported, controls are to be implemented to maintain separation between contaminated and non-contaminated materials.

8.9 Hazardous Materials

All hazardous and/or intractable wastes (if any) shall be removed and disposed of in accordance with the relevant regulatory requirements. In particular, any hazardous wastes will be transported by a licensed transporter.

8.10 Disposal of Contaminated Soil

All soil will be classified, managed and disposed of in accordance with the NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*, as outlined in **Section 6.5.2**.

8.11 Imported Fill

If any materials are required to be imported on site to re-establish existing ground levels, then only material meeting the requirements outlined in **Section 6.5.3** will be accepted onto the site.

8.12 Unexpected Finds Protocol

Given that ACMs have been identified within fill materials at the site there is the potential for varied ground conditions across the site, which may result in unexpected ACM contamination being encountered during bulk earthworks at the site.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of unexpected potentially contaminated finds be identified, works would need to stop until further advice by a suitably qualified Environmental Consultant and adequate procedures are implemented.

All unexpected finds identified on site should be documented in an unexpected finds register by the Contractor and/or Environmental Consultant.

The sampling strategy for the characterisation and validation of each 'unexpected find' shall be designed by the Environmental Consultant dependent upon the nature and extent of the unexpected find, in accordance with guidelines made or endorsed by NSW EPA.

The general management strategy to manage unexpected contamination finds will be dependent on the results of the characterisation assessment. Materials will generally be retained on the site if they are assessed by the Environmental Consultant to be suitable for the intended land use consistent with NSW EPA made or endorsed guidelines including NEPC (2013) guidance. Or alternatively, unexpected finds may be managed via offsite disposal. All soil requiring offsite disposal will be classified, managed and disposed in accordance with the Waste Classification Guidelines (NSW EPA 2014)4 or EPA waste exemptions if applicable. Appropriate documentation shall be maintained to provide evidence for all soil disposal and provided to the environmental consultant for inclusion in validation letters.

8.13 Site Signage and Contact Numbers

A sign shall be displayed throughout the duration of the works with the contact details of the remediation contractor and project manager. Council shall also be notified of these details at least 30 days prior to commencing works.

8.14 Complaint Reporting and Resolution

Complaints from adjoining site occupants or workers on site will be directed initially to the principal contractor on site. Following that, discussion with the client and the complainant will investigate the issue and remedy it as required or applicable.

9. Conclusions

Based on the information available from the previous investigations, this RAP has been prepared to guide remediation works to be carried out at the site and address the following aspects:

- Remediation of the following areas of environmental concern (AECs):
  - AEC 1 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH3/0.1-0.3; and
  - AEC 2 – Excavation and removal of asbestos impacted soils located at and around Asbestos Hotspots BH13/0.1-0.3.
- Assessment of suitability of any remedial excavations to remain in-situ to a standard suitable for Commercial D land use; and
- In-situ waste classification, removal and offsite disposal of soils to be excavated.

10. References

ASTM Standard Practice D2488-90 *Description and Identification of Soils (Visual-Manual Procedure)*. American Society for Testing and Materials.

LG, 2020. *Detailed Environmental Site Investigation Report, 369-381 President Avenue, Kirrawee, NSW*. Prepared for President Private Hospital Pty. Limited.

NEPC, 2013. *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) – Schedule B*. National Environment Protection Council.

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NSW EPA, 2017. *Guidelines for the NSW Site Auditor Scheme (3rd edition).* NSW Department of Environment and Conservation.

USEPA, 2000. *Guidance for the Data Quality Objectives Process*, EPAC QA/G-4 DEC/600/r-96/055, United States Environmental Protection Agency Office of Environmental Information, Washington DC.

11. Limitation Statement

This RAP has been prepared for the sole purpose of providing guidance for the remediation of potentially contaminated soils at the site in accordance with generally accepted consulting practice. No other warranty or guarantee, expressed or implied is made as to the advice indicated in this report.

This report should not be used for any other purpose without our prior written consent. Accordingly, neither LG nor any member or employee of LG accepts responsibility or liability in any way whatsoever for the use of this report for any purpose other than that for which it has been prepared.

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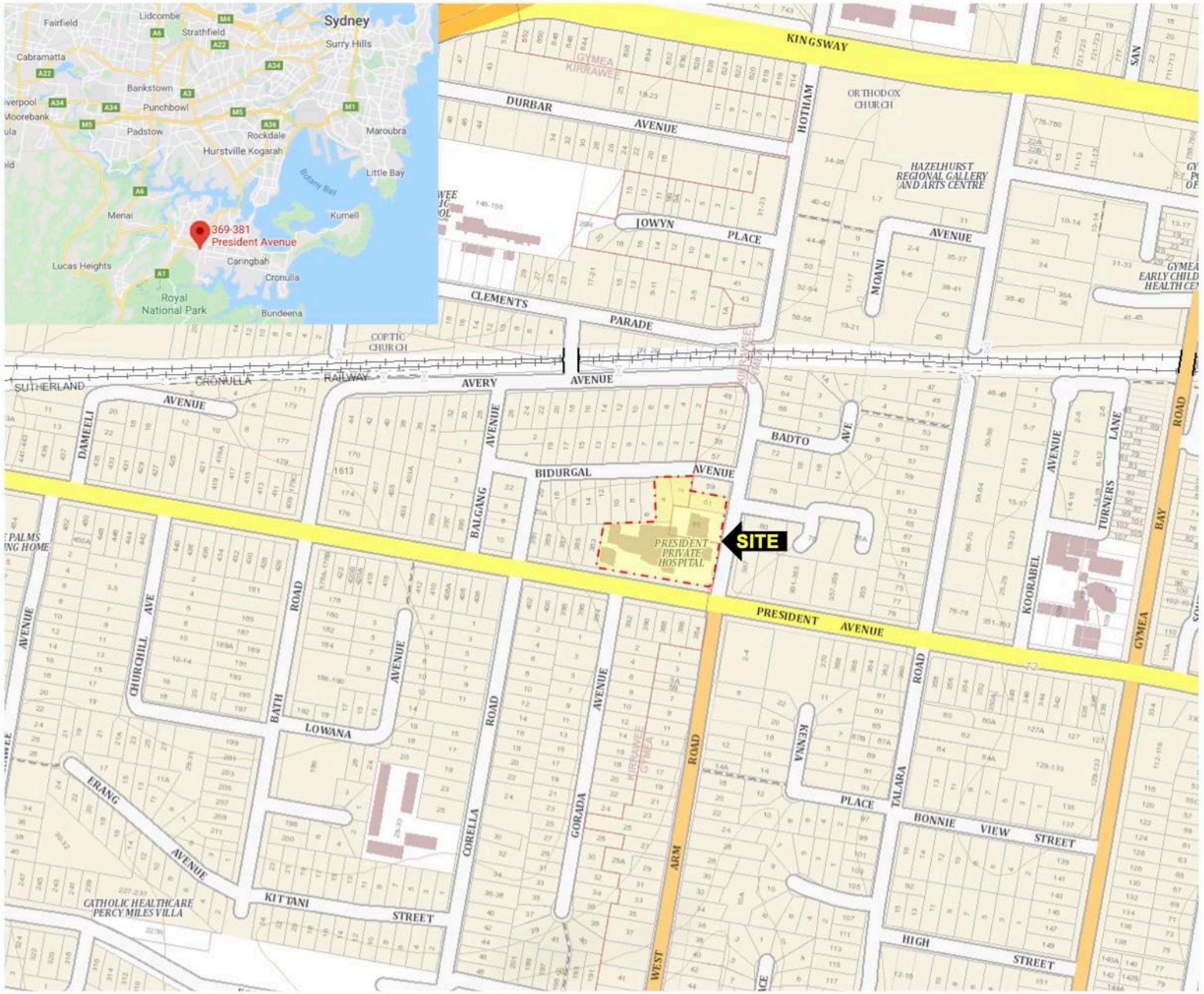
If further information becomes available, or additional assumptions need to be made, LG reserves its right to amend any statements or opinions made in this report.

Figures



SCALE: DRAWN TO SCALE AS SHOWN

Not To Scale

NORTH

LEGEND:

Site Boundary

Images courtesy of Google Maps & SIX Maps

LG CONSULT

REV:	A
DATE:	07/06/2020
DRAWN:	GP
APPROVED:	GP
STATUS:	Final
DWG NO:	

CLIENT: **President Private Hospital**

PROJECT: **369-381 President Avenue, Kirrawee, NSW**

PROJECT NUMBER: LG1930.01

TITLE:

Site Location Plan

FIGURE: **1** A4

SCALE: DRAWN TO SCALE AS SHOWN

Not To Scale

NORTH

LEGEND:

Site Boundary

Photograph courtesy of
SSC Maps & NSW Land and Property Information

LG CONSULT

REV:	A
DATE:	07/06/2020
DRAWN:	GP
APPROVED:	GP
STATUS:	Final
DWG NO:	

CLIENT: **President Private Hospital**

PROJECT: **369-381 President Avenue, Kirrawee, NSW**

PROJECT NUMBER: LG1930.01

TITLE:

Site Layout

FIGURE: **2** A4

SCALE: DRAWN TO SCALE AS SHOWN

Not To Scale

NORTH

LEGEND:

- Site Boundary
- BH1 Borehole Location 9 June 2020
- PAC1 Asbestos Containing Material (ACM) Location

Photograph courtesy of SSC Maps & NSW Land and Property Information

LG CONSULT

REV:	A
DATE:	28/10/2020
DRAWN:	GP
APPROVED:	GP
STATUS:	Final
DWG NO:	

CLIENT: **President Private Hospital**

PROJECT: **369-381 President Avenue, Kirrawee, NSW**

PROJECT NUMBER: LG1930.01

TITLE: **Sampling Locations 9 June 2020**

FIGURE: **3** A4

SCALE: DRAWN TO SCALE AS SHOWN

Not To Scale

NORTH

LEGEND:

Site Boundary

BH1 Borehole Location 9 June 2020

Area of Environmental Concern (AEC)

Photograph courtesy of SSC Maps & NSW Land and Property Information

LG CONSULT

REV:	A
DATE:	28/10/2020
DRAWN:	GP
APPROVED:	GP
STATUS:	Final
DWG NO:	

CLIENT: **President Private Hospital**

PROJECT: **369-381 President Avenue, Kirrawee, NSW**

PROJECT NUMBER: LG1930.01

TITLE: **Areas of Environmental Concern**

FIGURE: **4** A4

Tables

Table A - Soil Analytical Results

Laboratory ID							SE207286.001	SE207286.002	SE207286.003	SE207286.004	SE207286.022	SE207286.005	SE207286.006	SE207286.007	SE207286.008	SE207286.009	SE207286.010	SE207286.011	SE207286.012	SE207286.013	SE207286.014	SE207286.015	SE207286.016	SE207286.017
Sample ID							BH1/0.1-0.3	BH2/0.1-0.3	BH3/0.1-0.3	BH4/0.1-0.3	QC1	BH5/0.1-0.3	BH6/0.1-0.3	BH7/0.1-0.3	BH8/0.1-0.3	BH9/0.1-0.3	BH10/0.1-0.3	BH11/0.1-0.3	BH12/0.1-0.3	BH13/0.1-0.3	BH14/0.1-0.3	BH15/0.1-0.3	BH16/0.1-0.3	BH17/0.1-0.3
Depth (m)							0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	Duplicate of BH4/0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3
Soil Type							Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay		Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Silty Sand
Date Sampled							9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20	9/6/20
Compounds	Unit	EQL	General Solid Waste: Contaminant Threshold Without Leaching (TCLP) CT1 (mg/kg)	General Solid Waste: Leachable Concentration TCLP1 (mg/L)	General Solid Waste: Specific Contaminant Concentration SCC1 (mg/kg)	NEPM 2013: Commercial and Industrial HIL D [1]	NEPM 2013: Commercial and Industrial EIL [2]																	
TRHs																								
TRH C6-C9	mg/kg	20	N/A	N/A	650	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRH C6-C10	mg/kg	25	-	-	-	-	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	-	-	-	260 [3]	215	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH C10-C14	mg/kg	20	-	-	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	-	-	-	-	-	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	-	-	-	-	-	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	-	-	-	-	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	-	-	-	-	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH >C10-C16 less Naphthalene (F2)	mg/kg	25	-	-	-	-	170	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	-	-	-	-	1700	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	-	-	-	-	3300	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120
TRH >C10-C36	mg/kg	110	N/A	N/A	10,000	-	-	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110	<110
TRH >C10-C40	mg/kg	210	-	-	-	-	-	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210	<210
BTEX																								
Benzene	mg/kg	0.1	10	0.5	18	3 [3]	75	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	600	30	1,080	-	165	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	288	-	-	-	135	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (m & p)	mg/kg	0.2	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylene (o)	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene Total	mg/kg	0.3	1,000	50	1800	230 [3]	180	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
PAHs																								
Naphthalene	mg/kg	0.1	-	-	-	-	370	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	0.8	0.04	10	-	0.7	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a&h)anthracene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=0	TEQ	0.2	-	-	-	40	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=LOR	TEQ (mg/kg)	0.3	-	-	-	40	-	NA	NA	NA	<0.3	<0.3	<0.3	NA	NA	NA	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=LOR/2	TEQ (mg/kg)	0.2	-	-	-	40	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
PAHs (Sum of total)	mg/kg	1	N/A	N/A	200	4,000	-	NA	NA	NA	<0.8	<0.8	<0.8	NA	NA	NA	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
OCPs																								
Hexachlorobenzene (HCB)	mg/kg	0.1	-	-	-	80	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	-	-	-	50	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	-	-	-	45	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.1	-	-	-	45	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	-	-	-	2000	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Beta Endosulfan	mg/kg	0.1	-	-	-	2000	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	-	-	-	2000	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Gamma Chlordane	mg/kg	0.1	-	-	-	530	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	-	-	-	530	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
p,p'-DDT	mg/kg	0.2	-	-	-			NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
p,p'-DDE	mg/kg	0.1	-	-	-	3600	640	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
p,p'-DDD	mg/kg	0.1	-	-	-			NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.2	-	-	-			NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
o,p'-DDE	mg/kg	0.1	-	-	-	3600	640	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
o,p'-DDD	mg/kg	0.1	-	-	-			NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Endrin	mg/kg	0.1	-	-	-	100	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	-	-	-	2500	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	-	-	-	-	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	-	-	-	100	-	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	<0.1	<0.1	NA	<0.1	<0.1	<0.1
OPPs																								
Dichlorvos	mg/kg	0.5	-	-	-	-	-	NA	NA	NA	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	<0.5	<0.5	NA	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	-	-	-	-	-	NA	NA	NA	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	<0.5	<0.5	NA	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	-	-	-	-	-	NA	NA	NA	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	<0.5	<0.5	NA	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	-	-	-	2000	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	-	-	-	-	-	NA	NA	NA	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	<0.5	<0.5	NA	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
PCBs																								
Arochlor 1016	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	-	-	-	-	-	NA	NA	NA	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	N/A	N/A	<50	7	-	NA	NA	NA	<1	<1	<1	NA	NA	NA	NA	NA	<1	<1	NA	<1	<1	<1
Metals																								
Arsenic	mg/kg	3	100	5	500	3000	160	1	2	6	3	2	5	4	2	2	3	3	2	2	10	4	4	3	4
Cadmium	mg/kg	0.3	20	1	100	900	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	0.3	-	-	-	3600	530	5.2	6.9	11	12	11	10	12	12	31	8.8	6.9	12	10	7.8	26	14	13	21
Copper	mg/kg	0.5	-	-	-	240000	400	3.8	38	10	7.4	0.7	12	12	3.3	3.7	6.7	9.9	<0.5	<0.5	35	7.8	2	5.7	3.4
Lead	mg/kg	1	100	5	1,500	1500	1800	25	20	40	17	4	36	20	75	8	18	55	13	6	22	25	11	48	22
Mercury	mg/kg	0.01	4	0.2	50	730	-	<0.05	<0.05	0.07	0.07	<0.05	0.06	0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	mg/kg	0.5	40	2	1,050	6000	600	1.7	66	4.8	3.6	0.7	5.7	15	5.4	6.6	3.2	1.7	0.6	0.8	1.5	3.4	1	2.5	1.5
Zinc	mg/kg	0.5	-	-	-	400000	1400	19	45	80	31	17	86	44	42	20	43	140	12	18	140	97	13	37	55
Asbestos																								
Asbestos Detected - Fibre Identification in soil	No unit	0.01	No Detected	-	-	No Detected	-	No	No	Yes	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No
Estimated Fibres - Fibre Identification in soil	%w/w	0.01	-	-	-	0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	>0.01	<0.01	<0.01	<0.01	<0.01

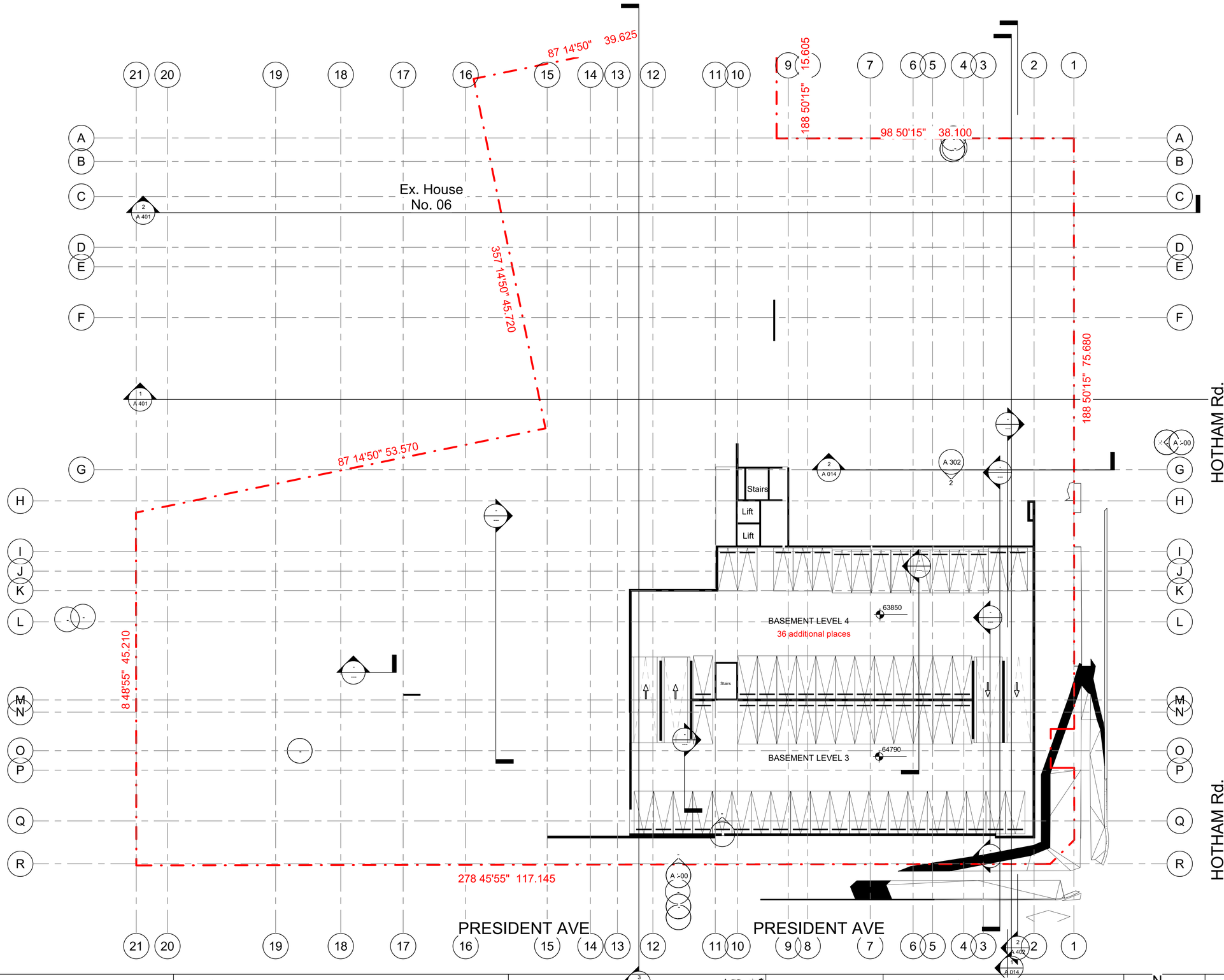
NOTES:
All concentrations are in mg/kg
(1) - Table 1A(1), HIL Column 3 - Health Based Investigation Levels for Commercial/Industrial for Soil Access - NEHF D (NEPC, 2013)
(2) - Table 1A(3), HSL D Column 3 (Sand 0 m to <1 m) - Soil HSLs for Vapour Intrusion for Commercial/Industrial - NEHF D (NEPC, 2013)
(3) - Tables 1B(1), 1B(2), 1B(3), 1B(4), 1B(5) and 1B(6), EILs and ESLs - Commercial/Industrial (NEPC, 2013)
EQL - laboratory Estimated Quantitation Limit
"-" indicates that the criteria is not applicable for these analytes
< Value = Concentration less than laboratory EQL
40

Table A - Soil Analytical Results

Laboratory ID							SE207286.018	SE207286.019	SE207286.020	SE207286.021
Sample ID							BH18/0.1-0.3	BH19/0.1-0.3	BH20/0.1-0.3	BH21/0.1-0.3
Depth (m)							0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3
Soil Type							Fill: Silty Sand	Fill: Sandy Clay	Fill: Sandy Clay	Fill: Sandy Clay
Date Sampled							9/6/20	9/6/20	9/6/20	9/6/20
			General Solid Waste			NEPM 2013				
Compounds	Unit	EQL	Contaminant Threshold Without Leaching (TCLP) CT1 (mg/kg)	Leachable Concentration TCLP1 (mg/L)	Specific Contaminant Concentration SCC1 (mg/kg)	Commercial and Industrial HIL D [1]	Commercial and Industrial EIL [2]				
TRHs										
TRH C6-C9	mg/kg	20	N/A	N/A	650	-	-	<20	<20	<20	<20
TRH C6-C10	mg/kg	25	-	-	-	-	-	<25	<25	<25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	-	-	-	260 [3]	215	<25	<25	<25	<25
TRH C10-C14	mg/kg	20	-	-	-	-	-	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	-	-	-	-	-	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	-	-	-	-	-	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	-	-	-	-	-	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	-	-	-	-	-	<25	<25	<25	<25
TRH >C10-C16 less Naphthalene (F2)	mg/kg	25	-	-	-	-	170	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	-	-	-	-	1700	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	-	-	-	-	3300	<120	<120	<120	<120
TRH >C10-C36	mg/kg	110	N/A	N/A	10,000	-	-	<110	<110	<110	<110
TRH >C10-C40	mg/kg	210	-	-	-	-	-	<210	<210	<210	<210
BTEX										
Benzene	mg/kg	0.1	10	0.5	18	3 [2]	75	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	600	30	1,080	-	165	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	288	-	-	-	135	<0.1	<0.1	<0.1	<0.1
Xylene (m & p)	mg/kg	0.2	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2
Xylene (o)	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Xylene Total	mg/kg	0.3	1,000	50	1800	230 [2]	180	<0.3	<0.3	<0.3	<0.3
PAHs										
Naphthalene	mg/kg	0.1	-	-	-	-	370	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	0.8	0.04	10	-	0.7	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Dibenzo(a&h)anthracene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=0	TEQ	0.2	-	-	-	40	-	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=LOR	TEQ (mg/kg)	0.3	-	-	-	40	-	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs (as BaP TEQ)-assume results <LOR=LOR/2	TEQ (mg/kg)	0.2	-	-	-	40	-	<0.2	<0.2	<0.2	<0.2
PAHs (Sum of total)	mg/kg	1	N/A	N/A	200	4,000	-	<0.8	<0.8	<0.8	<0.8
OCPs										
Hexachlorobenzene (HCB)	mg/kg	0.1	-	-	-	80	-	NA	<0.1	NA	NA
Lindane	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Heptachlor	mg/kg	0.1	-	-	-	50	-	NA	<0.1	NA	NA
Aldrin	mg/kg	0.1	-	-	-	45	-	NA	<0.1	NA	NA
Dieldrin	mg/kg	0.1	-	-	-	45	-	NA	<0.1	NA	NA
Alpha BHC	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Beta BHC	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Delta BHC	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Heptachlor epoxide	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Alpha Endosulfan	mg/kg	0.2	-	-	-	2000	-	NA	<0.2	NA	NA
Beta Endosulfan	mg/kg	0.1	-	-	-	2000	-	NA	<0.1	NA	NA
Endosulfan sulphate	mg/kg	0.1	-	-	-	2000	-	NA	<0.1	NA	NA
Gamma Chlordane	mg/kg	0.1	-	-	-	530	-	NA	<0.1	NA	NA
Alpha Chlordane	mg/kg	0.1	-	-	-	530	-	NA	<0.1	NA	NA
trans-Nonachlor	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
p,p'-DDT	mg/kg	0.2	-	-	-			NA	<0.2	NA	NA
o,p'-DDE	mg/kg	0.1	-	-	-	3600	640	NA	<0.1	NA	NA
p,p'-DDD	mg/kg	0.1	-	-	-			NA	<0.1	NA	NA
o,p'-DDT	mg/kg	0.2	-	-	-			NA	<0.2	NA	NA
o,p'-DDE	mg/kg	0.1	-	-	-	3600	640	NA	<0.1	NA	NA
o,p'-DDD	mg/kg	0.1	-	-	-			NA	<0.1	NA	NA
Endrin	mg/kg	0.1	-	-	-	100	-	NA	<0.1	NA	NA
Endrin Aldehyde	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Methoxychlor	mg/kg	0.1	-	-	-	2500	-	NA	<0.1	NA	NA
Endrin Ketone	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Isodrin	mg/kg	0.1	-	-	-	-	-	NA	<0.1	NA	NA
Mirex	mg/kg	0.1	-	-	-	100	-	NA	<0.1	NA	NA
OPPs										
Dichlorvos	mg/kg	0.5	-	-	-	-	-	NA	<0.5	NA	NA
Dimethoate	mg/kg	0.5	-	-	-	-	-	NA	<0.5	NA	NA
Diazinon (Dimpylate)	mg/kg	0.5	-	-	-	-	-	NA	<0.5	NA	NA
Fenitrothion	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Malathion	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	-	-	-	2000	-	NA	<0.2	NA	NA
Parathion-ethyl (Parathion)	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Bromophos Ethyl	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Methidathion	mg/kg	0.5	-	-	-	-	-	NA	<0.5	NA	NA
Ethion	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Azinphos-methyl (Guthion)	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
PCBs										
Arochlor 1016	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1221	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1232	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1242	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1248	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1254	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1260	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1262	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Arochlor 1268	mg/kg	0.2	-	-	-	-	-	NA	<0.2	NA	NA
Total PCBs (Arochlors)	mg/kg	1	N/A	N/A	<50	7	-	NA	<1	NA	NA
Metals										
Arsenic	mg/kg	3	100	5	500	3000	160	2	1	3	1
Cadmium	mg/kg	0.3	20	1	100	900	-	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	0.3	-	-	-	3600	530	19	9.4	10	4.5
Copper	mg/kg	0.5	-	-	-	240000	400	3.2	1.3	5.2	5.4
Lead	mg/kg	1	100	5	1,500	1500	1800	12	4	22	33
Mercury	mg/kg	0.01	4	0.2	50	730	-	<0.05	<0.05	0.05	<0.05
Nickel	mg/kg	0.5	40	2	1,050	6000	600	0.9	0.6	1.3	1.8
Zinc	mg/kg	0.5	-	-	-	400000	1400	47	23	200	24
Asbestos										
Asbestos Detected - Fibre Identification in soil	No unit	0.01	No Detected	-	-	No Detected	-	No	No	No	No
Estimated Fibres - Fibre Identification in soil	%w/w	0.01	-	-	-	0.01	-	<0.01	<0.01	<0.01	<0.01

NOTES:
All concentrations are in mg/kg
(1) - Table 1A(1), HIL Column 3 - Health Based Investigation Levels for Commercial/Industrial for Soil Access - NEHF D (NEPC, 2013)
(2) - Table 1A(3), HSL D Column 3 (Sand 0 m to <1 m) - Soil HSLs for Vapour Intrusion for Commercial/Industrial - NEHF D (NEPC, 2013)
(3) - Tables 1B(1), 1B(2), 1B(3), 1B(4), 1B(5) and 1B(6), EILs and ESLs - Commercial/Industrial (NEPC, 2013)
EQL - laboratory Estimated Quantitation Limit
"-" indicates that the criteria is not applicable for these analytes
< Value = Concentration less than laboratory EQL
40

Appendix A – Development Plans



Preliminary

Consultant Team:

Traffic Engineer:	ML Traffic Engineers	- Ph. 02 8004 2434
BCA Consultant:	Blackett Maguire and Goldsmith	- Ph. 02 9211 7777
Electrical Consultant:	Erbas and Associates	- Ph. 02 9437 1022
Hydraulic Consultant:	Erbas and Associates	- Ph. 02 9437 1022
Mechanical Services Engineer:	Erbas and Associates	- Ph. 02 9437 1022
Landscape Architect:	Habit 8	- Ph. 04 2520 6047
Surveyor:	Dunlop Thorpe & Co.	- Ph. 02 9283 6677

Amendment Issue:

No.	Description	Date
53	Updated Dwg	20/04/2020

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Macquarie HEALTH CORPORATION

Additions & Alterations to President Private Hospital

Macquarie Health Corporation

369-381 President Ave, 61-65 Hotham Rd, 2-4 Bidurgal Ave
Kirrawee NSW

N
NORTH POINT

Basement Plan LVL 3 & 4

Project number	MacHealth-06	A 102	
Date	20/08/2019		
Drawn by	Author	Scale @ A1	Plot stamp: 21/04/2020 6:27:13 PM
Checked by	Checker	1 : 250	Version: 53

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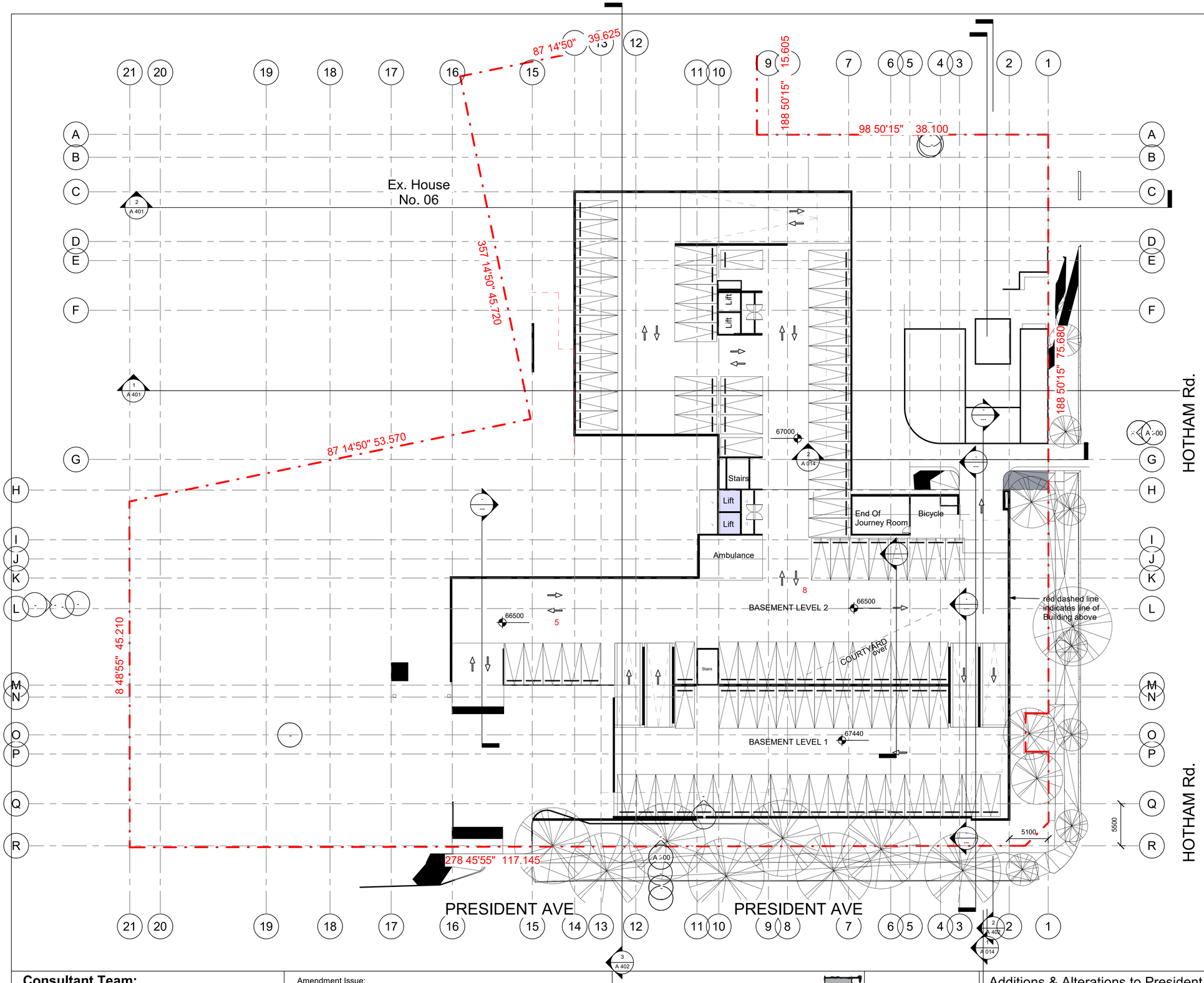

Preliminary

Consultant Team:

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BCA Consultant:	Blackett Maguire and Goldsmith	- Ph. 02 9211 7777
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Mechanical Services Engineer:	Erbas and Associates	- Ph. 02 9437 1022
Landscape Architect:	Habit 8	- Ph. 04 2520 6047
Surveyor:	Dunlop Thorpe & Co.	- Ph. 02 9283 6677

Amendment Issue:

No.	Description	Date
51	Updated Dwg	17/12/2019
53	Updated Dwg	20/04/2020

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Macquarie HEALTH CORPORATION

Additions & Alterations to President Private Hospital

Macquarie Health Corporation

369-381 President Ave, 61-65 Hotham Rd, 2-4 Bidurgal Ave
Kirrawee NSW

N
NORTH POINT

Basement Plan LVL 1 & 2

Project number	MacHealth-06	A 103	
Date	20/08/2019		
Drawn by	Author	Scale @ A1	Plot stamp: 21/04/2020 6:27:22 PM
Checked by	Checker	1 : 250	Version: 53

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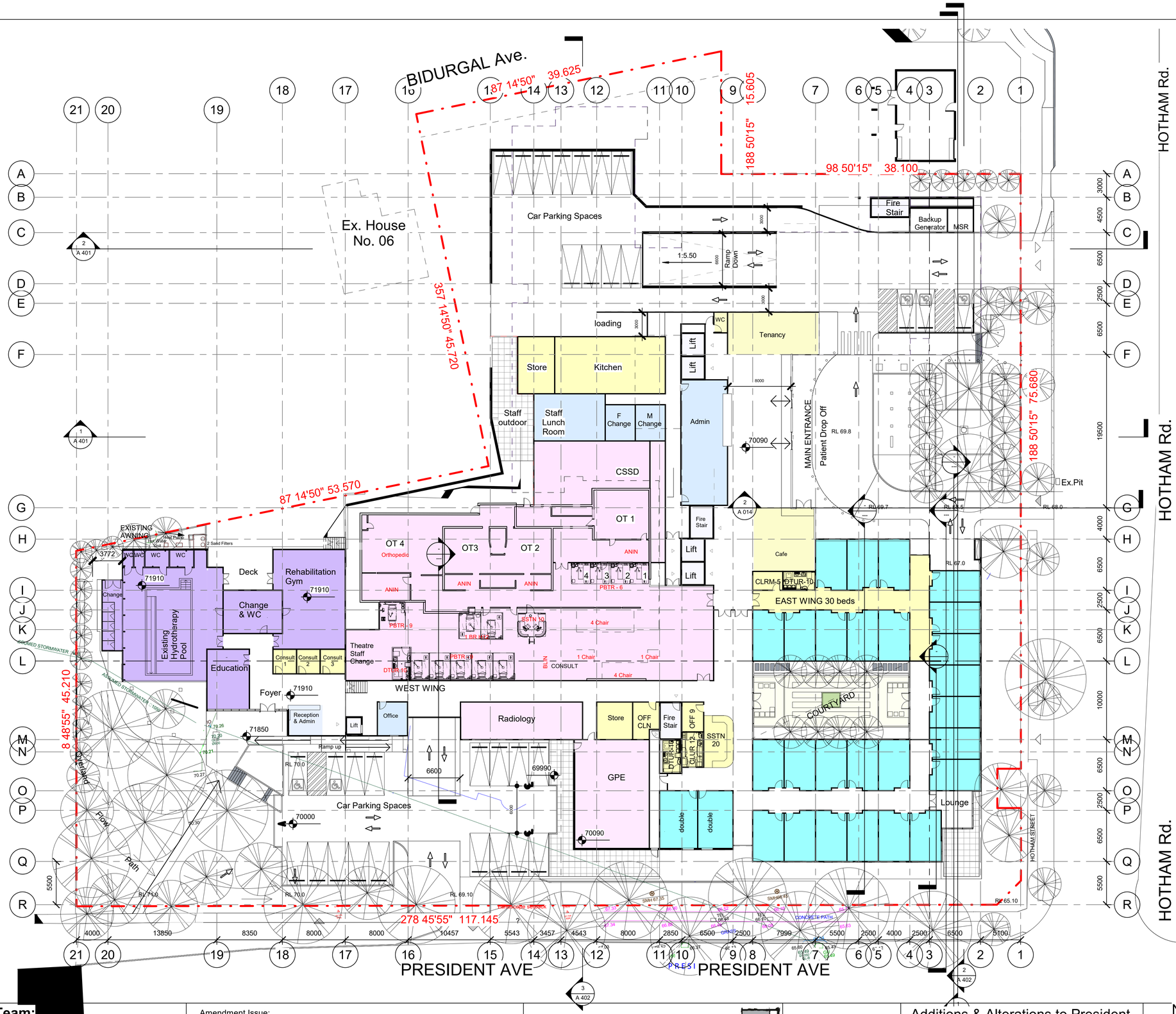

Consultant Team:

Traffic Engineer:	ML Traffic Engineers	- Ph. 02 8004 2434
BCA Consultant:	Blackett Maguire and Goldsmith	- Ph. 02 9211 7777
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Mechanical Services Engineer:	Erbas and Associates	- Ph. 02 9437 1022
Landscape Architect:	Habit 8	- Ph. 04 2520 6047
Surveyor:	Dunlop Thorpe & Co.	- Ph. 02 9283 6677

Amendment Issue:

No.	Description	Date
44	Final for Sears Request	24/04/2019
45	Add Cafe Area	29/04/2019
47	Additional alterations	20/08/2019
51	Updated Dwg	17/12/2019
53	Updated Dwg	20/04/2020

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Macquarie HEALTH CORPORATION

Additions & Alterations to President Private Hospital

Macquarie Health Corporation

369-381 President Ave, 61-65 Hotham Rd, 2-4 Bidurgal Ave
Kirrawee NSW

NORTH POINT

Ground Floor General Arrangement Plan

Project number	MacHealth-06	A 104	
Date	20/08/2019		
Drawn by	NA	Scale @ A1	Plot stamp: 21/04/2020 6:27:47 PM
Checked by	SP	1 : 250	Version: 53

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