ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

NSW HEALTH INFRASTRUCTURE

ON

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

FOR

GOULBURN HOSPITAL & HEALTH SERVICE REDEVELOPMENT PLANNING PROJECT

AT

GOULBURN BASE HOSPITAL
130 GOLDSMITH STREET, GOULBURN NSW

3 MARCH 2017 **REF: E30116Krpt**

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EXECUTIVE SUMMARY

NSW Health Infrastructure ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake a Preliminary Environmental Site Assessment (ESA) for the Goulburn Hospital and Health Services redevelopment at 130 Goldsmith Street, Goulburn NSW. The site location is shown on Figure 1 and the assessment was confined to the proposed development area as shown on Figure 2. The proposed development area is referred to as 'the site' in this report.

A geotechnical investigation was undertaken in conjunction with this assessment by JK Geotechnics[2]. The results of the investigation are presented in a separate report (Ref. 30116Vrpt[3]). This report should be read in conjunction with the JK report.

A hazardous building materials survey was undertaken on only the buildings within the site as specified by TSA Management on behalf of the client. The results of the survey are presented in a separate report (Ref: E30116Krpt_HAZ[4]). This report should be read in conjunction with the EIS report.

The assessment objectives were to:

- Provide an appraisal of the past site use(s) based on a review of historical records;
- Assess the current site conditions and use via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil contamination conditions via implementation of a preliminary sampling and analysis program;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether further intrusive investigation and/or remediation is required; and
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint).

Review of the site history information indicated the following:

- Construction of hospital and potential filling of the site occurred (Pre 1961): Land title records and aerial photographs indicate the site was in possession of trustees for the hospital and some hospital buildings were constructed. Potential filling of the land may have taken place during the earthworks to enable construction of hospital buildings;
- Agricultural (orchard): Historical aerial photographs indicated a potential fruit tree orchard was on the subject site to the east of Lady Grouse Home up until 1975; and
- Hospital Grounds (1975 to present): The subject site and surrounding land have been used as hospital grounds..

The CSM identified the following areas of environmental concern at the site:

- Fill material - The site may have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.
- Historical agriculture use: - The site may have been used for agricultural purposes (orchard). This could have resulted in contamination across the site via the application of pesticides and building/demolition of various structures. Old asbestos cement irrigation pipes may also be present.
- Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site; and

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

[2] Geotechnical consulting division of J&K

[3] Referred to as JK 2017 Report

[4] Referred to as EIS 2017 HAZ Report

- Hazardous Building Material: – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site.

Samples for this investigation were obtained from a total of nine (9) sampling points. All soil results were below the health based criteria adopted for the screening. One fill soil result for copper encountered a result above the ecological based assessment criteria adopted for the assessment.

The preliminary investigation did not identify significant widespread contamination that would trigger further detailed investigation at this stage. On this basis, EIS are of the opinion that the site can be made suitable for the proposed development provided that any unexpected conditions or unexpected finds are inspected by a suitably qualified environmental consultant during the works. Any issues should be addressed in accordance with the consultant's recommendations.

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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ABBREVIATIONS

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Asbestos Health Screening Levels	**ASL**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Assessment Criteria	**EAC**
Ecological Investigation Levels	**EILs**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Fibre Cement Fragments	**FCF**
General Solid Waste	**GSW**
Health Investigation Level	**HILs**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Suspected Asbestos Containing Material	**sACM**

ABBREVIATIONS

Sampling, Analysis and Quality Plan	**SAQP**
Standard Penetration Test	**SPT**
Semi-Volatile Organic Compounds	**sVOC**
Standard Sampling Procedure	**SSP**
Standing Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Trip Blank	**TB**
Total Recoverable Hydrocarbons	**TRH**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**

1 INTRODUCTION

NSW Health Infrastructure ('the client') commissioned Environmental Investigation Services (EIS)[5] to undertake a Preliminary Environmental Site Assessment (ESA) for the Goulburn Hospital and Health Services redevelopment at 130 Goldsmith Street, Goulburn NSW. The site location is shown on Figure 1 and the assessment was confined to the proposed development area as shown on Figure 2. The proposed development area is referred to as 'the site' in this report.

A geotechnical investigation was undertaken in conjunction with this assessment by JK Geotechnics[6]. The results of the investigation are presented in a separate report (Ref. 30116Vrpt[7]). This report should be read in conjunction with the JK report.

A hazardous building materials survey was undertaken on only the buildings within the site as specified by TSA Management on behalf of the client. The results of the survey are presented in a separate report (Ref: E30116Krpt_HAZ[8]). This report should be read in conjunction with the ESA report.

1.1 Proposed Development Details

The proposed development is currently in the feasibility stage with information obtained during the Preliminary ESA to provide data for the schematic design. The proposed development includes the Stage 1 Development (demolition, refurbishment and construction of buildings) and on-grade car park in the eastern corner of the hospital site.

1.2 Aim and Objectives

The primary aims of the assessment were to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil contamination conditions. The assessment objectives were to:

- Provide an appraisal of the past site use(s) based on a review of historical records;
- Assess the current site conditions and use via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil contamination conditions via implementation of a preliminary sampling and analysis program;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether further intrusive investigation and/or remediation is required; and

[5] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)
[6] Geotechnical consulting division of J&K
[7] Referred to as JK 2017 Report
[8] Referred to as EIS 2017 HAZ Report

- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint).

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP44003K) of 20 December 2016 and written acceptance from the client of 13 January 2017. The scope of work included the following:

- Review of site information, including background and site history information from a Lotsearch Pty Ltd *Environmental Risk and Planning Report* and other sources;
- A walkover site inspection;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted site assessment criteria (SAC);
- Assessment of data quality; and
- Preparation of a report presenting the results of the assessment, including a CSM and Tier 1 risk assessment.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Act (1997)[9]
State Environmental Planning Policy No.55 – Remediation of Land (1998)[10]
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)[11]
Guidelines for Consultants Reporting on Contaminated Sites (2011)[12]
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006)[13]
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)[14]

[9] NSW Government Legislation, (1997). *Contaminated Land Management Act 1997.* (referred to as CLM Act 1997)

[10] NSW Government, (1998). *State Environmental Planning Policy No. 55 – Remediation of Land.* (referred to as SEPP55)

[11] Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

[12] NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites.* (referred to as Reporting Guidelines 2011)

[13] NSW DEC, (2006). *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

[14] National Environment Protection Council, (2013). *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 1999* (as amended 2013). (referred to as NEPM 2013)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Current Site Owner:	Southern NSW Local Health Network & Southern NSW Local Health District
Site Address:	130 Goldsmith Street, Goulburn
Lot & Deposited Plan:	Lots 5 to 9 Section 46 in DP758468 Part of Lot 10 in DP758468 Part of Lot 1 in DP133606
Current Land Use:	Hospital Grounds
Proposed Land Use:	Unchanged
Local Government Authority (LGA):	Goulburn Mulwaree Council
Current Zoning:	SP2 – Infrastructure: Hospital
Area of Proposed Development (m^2):	~2,750 Development area as per tender documents ~6,500 Stage 1 Development Area including on-grade carparks
Geographical Location (decimal degrees) (approx.):	Latitude: -34.747820 Longitude: 149.713912

2.2 Site Location and Regional Setting

The site is located in an urban area of Goulburn. The site is situated within the hospital grounds and bounded by Goldsmith Street to the northeast and Faithful Street to the southeast. The site is located approximately 1.2km to the northwest of the Mulwaree River.

2.3 Topography

The regional topography is characterised by an east facing hillside. The site itself has a gentle slope towards the east at approximately 2° on the southern side. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.4 Site Inspection

The site is currently used as car parking, nurse's accommodation, community mental health and landscaped areas within the hospital grounds. A walkover inspection of the site was undertaken by

EIS on 31 January 2017. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of limited buildings undertaken as part of the hazardous building materials report, please refer to EIS report ref: E30116Krpt_HAZ Goulburn. A summary of the findings are outlined in the following subsections:

2.4.1 Buildings, Structures and Roads

The site was occupied by a two storey brick building identified as Springfield House / George Gerathy Wing / Lady Grose Home located in the southwest corner of the site and used for community mental health and nurse's accommodation. An asphaltic concrete carpark and driveway extended through the site from Faithful Street in the east to Goldsmith Street in the north. The wider hospital area was occupied by various buildings typically of brick or concrete construction. The age of the school buildings across the hospital varied, as did the general condition.

Concrete footpaths and asphaltic concrete (AC) paved areas were observed in the vicinity of the buildings across the hospital area with the exception of landscaped areas.

2.4.2 Visible or Olfactory Indicators of Contamination

An above ground tank was observed on the site adjacent to the southeast corner of the Lady Grose building. The tank was identified as containing liquid oxygen.

Visible or olfactory (i.e. odours) indicators of contamination were not identified. Significant staining from oil or leaking fuel was not observed at the ground surface in the car park areas.

2.4.3 Presence of Drums/Chemicals, Waste and Fill Material

No evidence of drums, chemicals or contaminating waste sources were observed on the development area during the site inspection.

Fill was evident at the ground surface in areas of exposed soil. Other obvious areas of filling were not evident across the wider hospital site. However, fill could be present in some adjacent areas, particularly beneath buildings and pavements.

2.4.4 Drainage and Services

Considering the topography stormwater/surface water runoff is expected to flow towards the east. No obvious major services were observed.

2.4.5 Sensitive Environments

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds.

2.4.6 Landscaped Areas and Visible Signs of Plant Stress

The site itself included landscaped areas adjacent to the buildings and street entrances. Similar landscaped areas and garden beds were observed around the hospital grounds. The landscaped areas were well vegetated and/or grass covered. The vegetation appeared to be in good condition.

2.5 Surrounding Land Use

The site is situated within the hospital grounds. The hospital is bound by: Goulburn High School to the northwest; residential properties to the north and east; and Prell Oval, bowling greens and the aquatic centre to the south and southwest.

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

Regional geological information presented in the Lotsearch report (attached in the appendices) indicated that the site is underlain by Palaeozoic aged Gundary beds, which typically consists of siltstone, sandstone, dacite, andesite, conglomerate, tuff, felsite, porphyry and claystone.

3.2 Acid Sulfate Soil Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation.

3.3 Hydrogeology

Hydrogeological information presented in the Lotsearch report (attached in the appendices) indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes fractured or fissured, extensive aquifers of low to moderate productivity. There were a total of 104 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 447m from the site. This was utilised for domestic purposes;
- The majority of the bores were registered for domestic or monitoring purposes; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 2.0-11.0m, underlain by shale or granite bedrock. Standing water levels (SWLs) in the bores ranged from 3.5mBGL to 16.0mBGL.

The information reviewed for this assessment indicated that the subsurface conditions at the site are expected to consist of alluvial soils overlying relatively deep bedrock. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable under these conditions.

3.4 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is the Mulwaree River located approximately 1.2km to the north-east of the site. This is up-gradient from site and is not considered to be a potential receptor.

4 SITE HISTORY INFORMATION

4.1 Review of Historical Aerial Photographs

Historical aerial photographs were included in the Lotsearch report (attached in the appendices). EIS has reviewed the photographs and summarised relevant information in the following table:

Table 4-1: Summary of Historical Aerial Photographs

Year	Details
1961	Lady Grouse Home, Springfield House and the adjacent driveway and carpark to the north of Springfield House were visible on the site. The area to the east of the buildings appeared to comprise medium sized trees evenly spaced (potentially fruit trees). Numerous building were visible across the central and northern area of the hospital site, with most of the southern area vacant and grass covered. The surrounding land use to the north and east of the site appeared to be low density residential properties, with Prell Oval visible to the southwest.
1967	The photograph was of poor quality. The George Gerathy Wing was visible. The surrounding land use appeared similar to the 1961 photograph. The high school site to the northwest of the hospital was visible.
1975	The carpark to the east of Springfield House and Lady Grouse Home was visible and accessed from Goldsmith Street to the north. With the exception of a large new structure visible in the southwest corner of the high school site (west of the subject site), the surrounding land use appeared similar to the 1967 photograph.
1978	New buildings and structures were visible in the northeast corner of the hospital site and along the western boundary. The surrounding land use appeared similar to the 1975 photograph.
1987	The photograph was of poor quality. The site and surrounding land use appeared similar to the 1978 photograph.
1991	Additional buildings on the hospital site were visible to the southwest and the building in the northeast appeared to have been extended. The surrounding land use appeared similar to the 1987 photograph.
1997	The area within the hospital grounds, to the south of the site, appeared to have been cleared and exposed soils were visible.

Year	Details
	The surrounding land use appeared similar to the 1991 photograph.
2002	The Chisholm Ross Centre and associated roads and car parking was visible to the immediate south of the site. The surrounding land use appeared similar to the 1997 photograph.
2006	The site and immediate surrounds appeared similar to the 2002 photograph.
2014	The site and immediate surrounds appeared similar to the 2006 photograph.

4.2 Review of Historical Land Title Records

Historical land title records were reviewed for the hospital site for the assessment. The record search was undertaken by Advance Legal Searchers Pty Ltd. Copies of the title records are attached in the appendices.

The historical land titles indicated that prior to 1911 the hospital site had been Crown land. Between 1911 and 1962 the site was held by individual as trustees of Goulburn hospital and from 1962 to date the site has been owned by Goulburn Base Hospital, Southern NSW Local Health Network, Greater Southern Area Health Service, and/or Southern NSW Local Health District.

4.3 SafeWork NSW Records

SafeWork NSW records were reviewed for the assessment. Copies of relevant documents are attached in the appendices. A summary of the relevant information is provided in the following table:

Table 4-2: Summary of SafeWork NSW Records

Record Number	License Details
35/018505	**Depot 1 – Above ground Storage Tank** UN1073 Oxygen, Refrigerated Liquid, 7,000L vessel **Depot 2 - Flammable Liquids Cabinet** UN1170 Histo Ethanol, 40L UN1230 Methanol, 40L UN1307 Histo Xylenes, 40L

4.4 NSW EPA Records

The Lotsearch report (attached in the appendices) included information from the NSW EPA databases for the following:

- Records maintained in relation to contaminated land under Section 58 of the CLM Act 1997;

- Records of notified sites under Section 60 of the CLM Act 1997 (Duty to Report Contamination); and
- Licensed activities under the Protection of the Environment Operations Act (1997[15]).

The search included the site area and surrounding areas in the report buffer of 1,000m. The search indicated the following:

- There were no records for the site or any properties in the report buffer under Section 58 of the CLM Act 1997;
- The site has not been notified under Section 60 of the CLM Act 1997. There were five (5) notified properties in the report buffer. All five properties were service stations located at least 490m from and down gradient of the site ;
- A former licensed activity was identified at the site under the POEO Act 1997 (Hazardous. Industrial or Group A waste generation and or storage of). This activity is not considered to pose a contamination risk to the site as the site is hospital and this licence related to the generation and or storage of clinical waste, cytotoxic waste, sharps waste and pharmaceuticals; and
- Current and historical licenses were identified for several properties within the report buffer (application of herbicides to waterways), however these activities are considered unlikely to pose a contamination risk to the site.

4.5 Additional Lotsearch Information

In addition to the above, EIS have reviewed additional information contained within the Lotsearch report and note the following:

- The Goulburn Base Hospital is classified as a local conservation area;
- There were no state heritage items at the site or in the immediate surrounds; and
- There were no significant ecological constraints at the site or in the immediate surrounds.

4.6 Summary of Site History Information

A summary of the historical land uses and activities is presented in the table below. The information presented in the table is based on a weight of evidence assessment of the site history documentation and observations made by EIS.

Table 4-3: Summary of Historical Land Uses

Year(s)	Potential Land Use / Activities	Supporting Evidence
Pre 1961	Construction of hospital and potential filling of the site occurred	Land title records and aerial photographs indicate the site was in possession of trustees for the hospital and some hospital buildings were constructed. Potential filling of the land may have taken place during the earthworks to enable construction of hospital buildings.

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

Year(s)	Potential Land Use / Activities	Supporting Evidence
Up until 1975	Agricultural (orchard)	Historical aerial photographs indicated a potential fruit tree orchard was on the subject site to the east of Lady Grouse Home.
From 1975 onwards	Hospital grounds	The subject site and immediate surrounding area operated as part of the Goulburn Base Hospital

4.7 Integrity of Site History Information

The majority of the site history information has been obtained from government organisations as outlined and the relevant sections of this report. The veracity of the information from these sources is considered to be relatively high. A certain degree of information loss can be expected given the lack of specific land use details over time. EIS has relied upon the Lotsearch report and has not independently verified any information contained within. However, it is noted that the Lotsearch report is generated based on databases maintained by various government agencies and is expected to be reliable.

5 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

5.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 5-1: Potential Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material - The site may have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Historical agricultural use – The site appears to have been used for agricultural (orchard) purposes. This could have resulted in contamination across the site via application of pesticides and building/demolition of various structures. Asbestos pipes may also be present for irrigation purposes.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos
Use of pesticides – Pesticides may have been used beneath the hospital buildings and/or around the site.	Heavy metals, OCPs and OPPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site.	Asbestos, lead and PCBs

5.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 5-2: CSM

Potential mechanism for contamination	The mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is also potential for sub-surface releases to have occurred where deep fill is present, although this is considered to be the least likely mechanism for contamination.
Affected media	Soil/soil vapour have been identified as potentially affected media. The potential for groundwater impacts is considered to be very low. However, groundwater would need to be considered in the event significant contamination was identified in soil.
Receptor identification	Human receptors include site users (hospital staff and visitors), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users within the surrounding hospital and adjacent high school, residential areas and public open space. Ecological receptors include terrestrial organisms and plants within unpaved areas (including proposed landscaped areas). Freshwater ecology within the Mulwaree River located approximately 1.2km to the east of the site is not considered a potential receptor
Potential Exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, use of unpaved areas (i.e. the gardens and playground) and buildings/basement areas (if relevant i.e. vapour inhalation or incidental contact with groundwater seepage). Potential exposure pathways for ecological receptors include primary contact and ingestion. Ecological receptors in the Mulwaree River are not likely to come into contact with contaminants migrating off-site in the groundwater due to the distance from the site.
Presence of preferential pathways for contaminant movement	The stormwater system may act as preferential pathways for contamination migration. This would be most relevant to contaminants that are mobile within soil or groundwater.

6 SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site. The DQO process is detailed in the Site Auditor Guidelines 2006 and the USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). These seven steps are applicable to this assessment as summarised in the table below:

Table 6-1: DQOs – Seven Steps

Step	Input
State the Problem	The CSM has identified AEC at the site which may pose a risk to the site receptors. An intrusive investigation is required to assess the risk and comment on the suitability of the site for the proposed development.
Identify the Decisions/ Goal of the Study	The data collection is project specific and has been designed based on the following information: • Review of site information including a limited site history; • AEC, CoPC, receptors, pathways and medium identified in the CSM; • Development of SAC for each media; and • The use of decision statements outlined below: The decisions of the study are: 1. Are any of the results above the SAC? 2. Has the extent of contamination been identified? 3. Do any of the contaminants pose a risk to the site receptors? 4. Is further investigation required? 5. Is the site suitable for the proposed development? 1) Statistical analysis will be used to assess the laboratory data against the SAC. The following criteria will be adopted: ➢ The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC; ➢ The standard deviation (SD) of the results must be less than 50% of the SAC; and ➢ No single value exceeds 250% of the relevant SAC. 2) Statistical calculations will not be undertaken if all results are below the SAC; and 3) Statistical calculations will not be undertaken on Health Screening Levels (HSLs) – elevated point source contamination associated with petroleum hydrocarbons can pose a vapour risk to receptors.

Step	Input
Identify Information Inputs	The following information will be collected: • Soil samples based on subsurface conditions; • The SAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report; • The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013; • Field screening information (i.e. PID data, presence of hydrocarbons etc.) will be taken into consideration in selecting the analytical schedule; and • Any additional information that may arise during the field work will also be used as data inputs.
Define the Study Boundary	The sampling will be confined to the proposed development area of the site as shown in Figure 2.
Develop the analytical approach (or decision rule)	The following acceptable limits will be adopted for the data quality assessment: • The following acceptance criteria will be used to assess the RPD results: ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results < 5 times PQL, RPDs < 100% are acceptable; and ➢ An explanation is provided if RPD results are outside the acceptance criteria. • Acceptable concentrations in a Trip Blank (TB) sample. Non-compliance to be documented in the report; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ <u>RPDs</u>: - Results that are < 5 times the PQL, any RPD is acceptable; and - Results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ <u>LCS recovery and matrix spikes</u>: - 70-130% recovery acceptable for metals and inorganics; - 60-140% recovery acceptable for organics; and - 10-140% recovery acceptable for VOCs; ➢ <u>Surrogate spike recovery</u>: - 60-140% recovery acceptable for general organics; and - 10-140% recovery acceptable for VOCs; ➢ <u>Blanks</u>: All less than PQL.
Specify the performance or acceptance criteria	NEPM 2013 defines decision errors as '*incorrect decisions caused by using data which is not representative of site conditions'*. This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as '*total study error*'. The study error can be managed through the correct choice of sample design and measurement. Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false.

Step	Input
	The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. In this case, for example, the PCC identified in the CSM is considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.
Optimise the design for obtaining data	The most resource-effective design will be used in an optimum manner to achieve the assessment objectives.

6.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 6-2: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The NSW EPA Contaminated Sites Sampling Design Guidelines (1995[16]) recommend a sampling density for an environmental assessment based on the size of the investigation area. The guideline provides a minimum number of sampling points required for the investigation on a systematic sampling pattern. The guidelines recommend sampling from a minimum of 16 evenly spaced sampling points for this site with an area of approximately 6,500m^2. Samples for this investigation were obtained from 9 sampling points as shown on the attached Figure 2. This density is approximately 56% of the minimum sampling density recommended by the EPA.
Sampling Plan	The sampling locations were placed on a judgemental sampling plan. A judgemental sampling plan was considered suitable to address potential contaminants associated with the fill material based on site conditions and the preliminary nature of the assessment.
Exclusion Areas (Data Gaps)	Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. These areas have been excluded from the investigation.
Sampling Equipment	Soil samples were obtained on 31 January and 1 February 2017 in accordance with the standard sampling procedure (SSP) attached in the appendices. Sampling locations were set out using a tape measure. In-situ sampling locations were cleared for underground services by an external contractor prior to sampling as outlined in the SSP.

[16] NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

Aspect	Input
	The sample locations were drilled using the following equipment as shown on the borehole logs attached in the appendices: • Hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler; and • A four-wheel-drive (4wd) mounted hydraulically push tube rig. Soil samples were obtained from disposable polyethylene push tube samplers.
Sampling Collection and Field QA/QC	Soil samples were collected from the fill and natural profiles based on field observations. The sampling depths are shown on the logs attached in the appendices. Additional samples were obtained when relatively deep fill (>0.5m) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis. Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date in accordance with the SSP.
Field PID Screening for VOCs	A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for hydrocarbon analysis. The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source. The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents. PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases.
Decontami-nation and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water.

Aspect	Input
	Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

6.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 6-3: Analytical Schedule

CoPC	Fill Samples	Natural Soil Samples
Heavy Metals	9	9
TRH/BTEXN	9	9
PAHs	9	9
OCPs/OPPs	9	9
PCBs	9	9
Asbestos	9	NA

6.3.1 Laboratory Analysis

The samples were analysed by the NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory report attached in the appendices for further details.

Table 6-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicate and trip blank samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	161238

7 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for the assessment is outlined in the table below. The SAC has been derived from the NEPM 2013 and other guidelines as applicable. The guideline values for individual contaminants are presented in the attached report tables.

Table 7-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs) (NEPM 2013)	The HIL-A criteria for 'residential with accessible soil' have been adopted for this assessment to account for the nurse's residence within Lady Grouse Home.
Health Screening Levels (HSLs) (NEPM 2013)	The HSL-A criteria for 'residential with accessible soil' have been adopted for this assessment.
Ecological Assessment Criteria (EAC) (NEPM 2013)	A preliminary screening of ecological risk has been undertaken based on the limited information available at this stage. The EAC criteria for 'urban residential and public open space (URPOS)' exposure setting have been adopted. Soil parameters: pH; cation exchange capacity (CEC); and clay content have not been analysed for the assessment. On this basis, the EIL and ESL calculations have taken the 'worst case' scenario in order to generate the criteria based on the added contaminant limit (ACL) values presented in Schedule B1 of NEPM (2013).
Direct Contact Limits for TRH (NEPM 2013/CRC Technical Report No. 10)	The criteria for 'Intrusive maintenance workers' have been adopted for this assessment.
Asbestos in Soil	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion for the Preliminary Site Investigation (PSI).
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[17]) has been adopted to classify the material for off-site disposal.

[17] NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

8 INVESTIGATION RESULTS

8.1 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

Table 8-1: Summary of Subsurface Conditions

Profile	Description (m in bgl)
Pavement	Asphaltic Concrete (AC) pavement was encountered in BH1, BH2 and BH5 and ranged in thickness from 0.02m to 0.045m.
Fill	Fill material was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.2m to 1.7m. The fill typically comprised: silty sandy gravel; silty sand; sandy gravel; silty clay; silty gravelly sand; and sandy silty clay. The fill contained inclusions of: igneous gravel; slag; ironstone gravels; ash; and root fibres. No olfactory odours or staining were noted in the fill during the fieldwork.
Natural Soil	Gravelly clay, silty clay, and sandy silty clay was encountered beneath the fill in all boreholes. BH5 to BH9 were terminated in the natural soil to a maximum depth of approximately 2.6m. No olfactory odours or staining were noted in the natural soil during the fieldwork.
Bedrock	Sandstone bedrock was encountered beneath the natural soils in BH1, BH2, and BH3 at depths ranging from 2.0m to 2.2m. Mudstone was encountered beneath the natural soils in BH4 at 1.7m.
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling and a short time after.

8.2 Field Screening

PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. All results were 0 ppm equivalent isobutylene which indicates a lack of PID detectable VOCs.

8.3 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 8-2: Summary of Soil Laboratory Results

Analyte	Results Compared to SAC
Heavy Metals	**HILs:** All heavy metal results were below the HIL-A criteria. **EILs:** With the exception of one result for copper (BH5 0.2-0.4), all heavy metal results were below the EIL-URPOS criteria. **WC:** All heavy metal results were less than the CT1 and SCC1 criteria
TRH	**HSLs:** All TRH results were below the HSL-A criteria. **ESLs:** All TRH results were below the ESL-URPOS criteria. **WC:** All TRH results were less than the relevant SCC1 criteria. **Direct Contact:** All TRH results were less than the relevant direct contact criteria.
BTEX	**HSLs:** All BTEX results were below the HSL-A criteria. **ESLs:** All BTEX results were below the ESL-URPOS criteria. **WC:** All BTEX results were less than the relevant CT1 and SCC1 criteria. **Direct Contact:** All BTEX results were less than the relevant direct contact criteria.
PAHs	**HILs:** All total PAH and benzo(a)pyrene TEQ results were below the HIL-A criteria. **HSLs:** All naphthalene results were below the HSL-A criteria. **ESLs:** All benzo(a)pyrene results were below the ESL-URPOS criteria,

Analyte	Results Compared to SAC
	EILs: All naphthalene results were below the EIL-URPOS criteria. **WC:** All total PAH and benzo(a)pyrene results were less than the relevant CT1 and SCC1 criteria.
OCPs & OPPs	**HILs:** All OCP and OPP results were below the HIL-A criteria. **EILs:** All DDT results were below the EIL-URPOS criteria. **WC:** All OCP and OPP results were less than the relevant CT1 and SCC1 criteria.
PCBs	**HILs:** All PCB results were below the HIL-A criterion. **WC:** All PCB results were less than the SCC1 criterion.
Asbestos	Asbestos was not detected in the samples analysed for the investigation.

9 DATA QUALITY ASSESSMENT

As part of the data quality assessment the following data quality indicators (DQIs) were assessed: precision, accuracy, representativeness, completeness and comparability as outlined in the table below. Reference should be made to the appendices for an explanation of the individual DQI.

Table 9-1: Assessment of DQIs

Completeness

Field Considerations:

- The investigation was designed as a preliminary screening and sampling was confined to the development area (see Figure 2), (referred to as the Site);
- Samples were obtained from various depths based on the subsurface conditions encountered at the sampling locations. All samples were recorded on the borehole logs. All sampling points are shown on the attached Figure 2;
- The investigation was undertaken by trained staff in accordance with the SSP; and
- Documentation maintained during the field work is attached in the appendices where applicable.

Laboratory Considerations:

- Selected samples were analysed for a range of CoPC;
- All samples were analysed by a NATA registered laboratory in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate analytical methods and PQLs were used by the laboratory; and
- Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation.

Comparability

Field Considerations:

- The investigation was undertaken by trained staff in accordance with the SSP;
- The climate conditions encountered during the field work were noted on the site description record maintained in the job file; and
- Consistency was maintained during sampling in accordance with the SSP.

Laboratory Considerations:

- All samples were analysed in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate PQLs were used by the laboratory for all analysis (other than those outlined above);
- All primary, and QA/QC samples were analysed by the same laboratory; and
- The same units were used by the laboratory for all of the analysis.

Representativeness

Field Considerations:

- The investigation was designed to obtain appropriate media encountered during the field work as outlined in the SAQP. Groundwater, dust and/or vapour sampling was outside the scope of this assessment, however we note that soil vapour has been considered via the HSLs; and
- All media based on the subsurface conditions encountered during the field work was sampled. All media identified in the SAQP was sampled.

Laboratory Considerations:

- All samples were analysed in accordance with the SAQP.

Precision

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- Analysis of field QA/QC samples including the intra-laboratory duplicate and trip blank (TB) as outlined below;
- The field QA/QC frequency adopted for the investigation is outlined below;
- Calculation of the Relative Percentage Difference (RPD) from the primary and duplicate results (the RPD calculation equation is outlined in the attached appendices);
- Assessment of RPD results against the acceptance criteria outlined in **Section 6.1.**

Intra-laboratory RPD Results:
Soil Samples at a frequency of 6% of the primary samples:

- DUPKT1 is a soil duplicate of primary sample BH5 (0.2-0.4)

The intra-laboratory results are presented in the attached report tables. The results indicated that field precision was acceptable.

The RPD value for copper was outside the acceptance criteria. This value was just outside the acceptable limit and has been attributed to sample heterogeneity. As both the primary and duplicate results were below the SAC, this exceedance is not considered to have had an adverse impact on the dataset as a whole.

Trip Blank (TB):
One soil TB was analysed for BTEX at a frequency of one blank per batch of volatiles. The results are presented in the attached report tables.

The results were all less than the PQLs.

Accuracy

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- The analytical quality assessment adopted by the laboratory was in accordance with the NATA and NEPM 2013 requirements as outlined in the analytical report; and
- A review of the report indicates the following comments noted by the laboratory:

Envirolab Report 161238 – The laboratory RPD acceptance criteria was exceeded in one sample for lead. A triplicate result was issued to account for this.

10 WASTE CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL

The waste classification of soil for off-site disposal is summarised in the following table:

Table 10-1: Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Fill material at the site (i.e. in the development area)	General Solid Waste (non-putrescible) (GSW)	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.
Natural gravelly clay, silty clay, and sandy silty clay and sandstone/mudstone bedrock	Virgin excavated natural material (VENM)	VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

Contaminated fill material should not be re-used on site. The fill material must be disposed of to a NSW EPA licensed facility. It is the responsibility of the receiving facility to ensure that the material meets their EPA license conditions. EIS accepts no liability whatsoever for illegal or inappropriate disposal of excavated material.

Material classed as VENM must not be mixed with any fill material (including building rubble) as this will invalidate the VENM classification. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted.

11 TIER 1 RISK ASSESSMENT AND REVIEW OF CSM

11.1 Summary of Site Contamination

The assessment has identified the following issues associated with the AEC identified at the site. The site contamination data is shown on the attached Figure 3.

11.1.1 Copper above the EIL

The fill sample obtained from BH5 (0.2-0.4) encountered a copper concentration above the adopted EIL criterion for the site. The source of the copper in the sample is considered likely to be associated with the importation of contaminated fill material, rather than on-site activities. No potential point sources were identified in the area.

EIS note that this elevation is located beneath the asphaltic concrete pavement in the car park area adjacent to Lade Grouse Home, Springfield House and the George Gerathy Wing (see Figure 3). The fill extended to an approximate depth of 0.8m bgl.

11.2 Assessment of Risk to Site Receptors

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

The assessment has identified the following contamination issues at the site:

Table 11-1: Tier 1 Risk Assessment and Review of CSM

Contaminant of Primary Concern (CoPC)	Receptor and Exposure Pathway	Discussion and Risk Rating
Copper	Environmental Receptors: Direct exposure to plants and animals	The elevated concentration located beneath the asphaltic concrete pavement in the car park area (BH5) is not considered to pose an unacceptable risk to ecological receptors. It is also understood that the Stage 1 Development includes construction of a building in this area.

11.3 Data Gaps

The assessment has identified the following data gaps:

- The minimum sampling density for a Stage 2 Environmental Site Assessment has not been met. The investigation was designed as a preliminary screening;
- Areas beneath the existing buildings have not been included in the assessment; and
- Groundwater at the site has not been assessed.

12 CONCLUSION

EIS consider that the report objectives outlined in **Section 1.2** have been addressed.

Based on the scope of work undertaken, EIS are of the opinion that CoPC as identified in the CSM pose a low risk to the site receptors.

The decisions listed in **Section 5.1** are addressed in the table below:

Table 12-1: Decision Results

	Decision Statement	Decision Result
1.	Are any of the laboratory results above the SAC?	Yes, copper above the EILs.
2.	Has the extent of the site contamination been identified?	Yes, the copper encountered above the EILs was restricted to the fill soil in BH5.
3.	Do any of the contaminants pose a risk to site receptors?	No
4.	Is further investigation required?	Not for the proposed development. However, if further significant development of the area takes place in the future an additional assessment should be undertaken.
5.	Is the site suitable for the proposed use?	EIS consider that the site can be made suitable for the proposed development provided that any unexpected conditions or unexpected finds are inspected by a suitably qualified environmental consultants during the works.

12.1 Conclusions and Recommendations

Based on the scope of work undertaken for the assessment, EIS are of the opinion that the historical land uses and potential sources of contamination identified would not preclude the proposed development within the hospital grounds.

The preliminary investigation did not identify significant widespread contamination that would trigger further detailed investigation at this stage. On this basis, EIS are of the opinion that the site can be made suitable for the proposed development provided that any unexpected conditions or unexpected finds are inspected by a suitably qualified environmental consultant during the works. Any issues should be addressed in accordance with the consultant's recommendations.

12.2 Regulatory Requirement

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

Table 12-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2015[18]	EIS consider that there is no requirement to notify the NSW EPA.
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.
Dewatering Consent	In the event groundwater is intercepted during excavation works, dewatering may be required. Council, NSW Office of Water (NOW) and other relevant approvals (from discharge authorities like Sydney Water etc.) should be obtained prior to the commencement of dewatering.

[18] NSW Environment Protection Agency, (2015), *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.* (referred to as Duty to Report Contamination 2015)

13 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

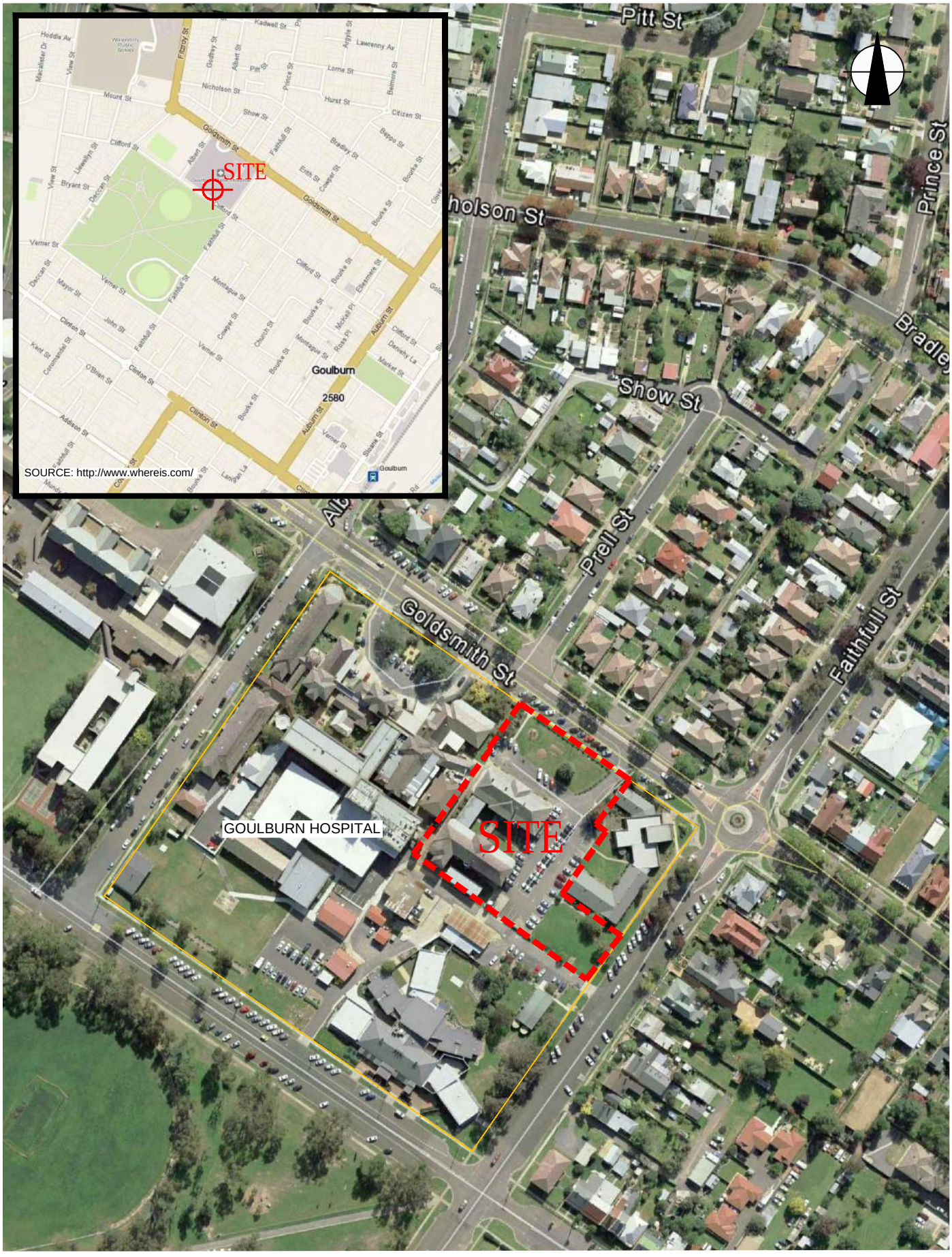
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other 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



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

This plan should be read in conjunction with the EIS report.

Title: **SITE LOCATION PLAN**

Location: GOULBURN HOSPITAL
130 GOLDSMITH STREET, GOULBURN, NSW

Report No: E30116K

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

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LEGEND

APPROXIMATE SITE BOUNDARY

BH (Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

0 5 10 15 20 25

SCALE 1:500 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **SAMPLE LOCATION PLAN**

Location: GOULBURN HOSPITAL
130 GOLDSMITH STREET, GOULBURN, NSW

Report No: E30116K

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

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