

4 Potential Contamination Issues

4.1 Potential Areas of Environmental Concern

Based on the history review and field observations from the site, areas of environmental concern have been identified and are presented in **Table 4.1**.

Table 4.1 Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern (AEC)	Contaminants of Potential Concern (COPC)
Fill material across the site	Asbestos
Stockpiled material on site	Asbestos

Any fill materials that may be present were identified as an area of potential environmental concern.

Stockpiled fill material that was observed at the site surface was identified as an area of environmental concern with the presence of building waste, including asbestos containing material (ACM), visible during the site inspection.

4.2 Potentially Contaminated Media

Potentially contaminated media present at the site include:

- fill materials.

Inspection of the site identified the presence of fill material in a stockpile and the potential presence of fill material across the site. The source of the fill is unknown, however may have originated from industrial and building activities. Based on this, the fill material (if any) underlying the site has been identified as a potentially contaminated medium.

Natural soils have not been identified as a potentially contaminated medium at the site due to the absence of any significant historical sources of contamination at the site other than the potentially contaminated fill material. In the event that the site assessment encounters significantly impacted fill material, the potential for natural soils as a potentially contaminated medium will be re-evaluated.

Groundwater has not been identified as a potentially contaminated medium at the site due to the absence of any significant historical sources of contamination at the site other than the potentially contaminated fill material. In the event that the site assessment encounters significantly impacted fill material, the potential for groundwater as a potentially contaminated medium will be re-evaluated.

Surface water has not been identified as a potentially contaminated medium as the site is surfaced with relatively permeable soils which will result in limited ponding and/or surface water flow. The majority of water falling on the site is likely to infiltrate the ground surface.

4.3 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants of concern identified as part of the site history review and site inspection are generally in solid form (eg. Asbestos, impacted fill material). The site is generally covered in vegetation. As a result, the potential for migration of potentially contaminated surface soils is low to moderate, with the controlling factors being the wind direction and the level of consolidation of the surface soils. The potential for migration via surface water is limited by the relatively permeable nature of the surface soils which results in limited lateral water movement in all but high volume rainfall events. The permeability of the surface soils may result in a potential migration pathway via groundwater movement, in the event that impacted soils are encountered at the site.

5 Sampling and Analysis Plan

5.1 Data Quality Objectives

Data quality objectives (DQOs) were developed for the investigation, as discussed in the following sections.

5.1.1 State the Problem

The site is proposed to be developed into low density housing. An Environmental Site Assessment was requested by the owner to assess the suitability of the site (from a contamination perspective) for the proposed landuse, and establish whether any remedial activities are required to be undertaken prior to the site's development.

5.1.2 Identify the Decision

Based on the decision making process for assessing urban redevelopment sites detailed in DEC (2006), the following decisions must be made:

- Are there any unacceptable risks to future onsite receptors from any current soil concentrations that exceed the lower of the appropriate-health based investigation levels?
- Are there any aesthetic issues arising from the site?
- Are there any issues relating to the local area background soil concentrations that exceed appropriate soil criteria?
- Are there any impacts of chemical mixtures relating to the future use of the site?
- Is there any evidence of, or potential for, migration of contaminants from the site?
- Is a site management strategy required for the proposed redevelopment of the site?

5.1.3 Identify Inputs to the Decision

Inputs identified to provide sufficient data to make the decisions nominated above include:

- historical site information searches and site inspections to identify site conditions and create a specific sampling plan; and
- the delineation and interpretation of fill and natural material through the drilling of boreholes for the collection and subsequent analysis of soil samples.

Specifically, sufficient data need to be collected from each of the identified potentially impacted media (fill material) in the identified areas of environmental concern for the associated potential contaminants of concern (**Table 4.1**)

5.1.4 Define the Study Boundaries

The site is described as Lot 2 DP 135804. The boundaries to the site are shown in **Figure 2**. The vertical extent of the investigation extended to a maximum of 0.3m below ground surface (bgs). The study targeted the potential contamination issues detailed in **Section 4.1**.

The temporal boundaries of this investigation have been limited to the period of field investigation during March 2010.

Due to the nature of potential contaminants identified, seasonality was not assessed as part of this investigation.

5.1.5 Develop a Decision Rule

Soil analytical data were assessed against DECCW endorsed criteria including:

- *National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council, 1999 (NEPC 1999).

The decision rules adopted to answer the decisions identified in **Section 5.1.2** are summarised in **Table 5.1**.

Table 5.1 Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Are there any unacceptable risks to future onsite receptors from any current soil concentrations that exceed the lower of the appropriate health based investigation levels?	Soil analytical data were reviewed for asbestos contamination in soils. If there was no evidence of asbestos contamination in soils above the limit of reporting, the decision is No; Otherwise, the decision is Yes.
2. Are there any aesthetic issues arising from the site?	If there are any unacceptable odours or soil discolouration, the decision is Yes. Otherwise, the decision is No.
3. Are there any issues relating to the local area background soil concentrations that exceed appropriate soil criteria?	Not applicable to investigations limited to asbestos contamination.
4. Are there any impacts of chemical mixtures relating to the future use of the site?	Not applicable to investigations limited to asbestos contamination.
5. Is there any evidence of, or potential for, migration of contaminants from the site?	If there is no evidence of respirable fibres in soil, the decision is No. Otherwise the decision is Yes.
6. Is a site management strategy required for the proposed redevelopment of the site?	Was the answer to any of the above decisions Yes? If yes, a site management strategy is required. If no, a site management strategy is not required.

5.1.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW DECC, NEPC (1999), ANZECC/ARMCANZ (2000), DEC (2007), appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard JBS Environmental procedures for field sampling and handling.

5.1.7 Optimise the Design for Obtaining Data

Various strategies for developing a statistically based sampling plan are identified in EPA (1995)², including judgemental, random, systematic and stratified sampling patterns.

Sampling locations were completed from within each of the proposed subdivisions of the site. Based on the site inspection and known history of the site, systematic sampling was considered the most appropriate design for the current investigation as the following strategies are unsuitable for a variety of reasons.

Judgmental sampling is not appropriate based on the general areas of environmental concern identified in the site history and site inspection. The random sampling pattern is not appropriate for similar reasons. Stratified sampling is used at large sites with complex

² *Sampling Design Guidelines*. NSW EPA. September 1995. (EPA 1995)

contamination issues, and is not appropriate for this site where the potential for complex contamination issues to be present is low.

Soil samples were collected from 16 locations across the site (as shown in **Table 5.2** and **Figure 3**) in accordance with EPA (1995). Given the nature of this investigation to assess the environmental condition of the site, this sampling strategy is considered appropriate.

Although the number of sample locations is below the level recommended in EPA 1995 for a site of this area, given the low potential of contamination and the preliminary nature of the investigation, the number of sample locations was deemed sufficient.

5.2 Soil Sampling Methodology

Soil samples across the site were collected via handauger to identify any impacted material from previous or current site uses. Samples were collected from the surface (0-0.1m) and 0.3m, and from any other layers that were thought to potentially show signs of contamination, to identify any impacted material from previous or current site uses.

Sufficient sample material was collected to allow both field and laboratory analyses.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination were noted on field sheets. Collected soil samples were immediately transferred to laboratory supplied zip lock plastic bags. The sample bags were transferred to a storage container for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form was completed and forwarded with the samples to the testing laboratory.

Based on the results of the historical and background review and as there were no visual or olfactory indications of potential chemical contamination, samples were only collected for analysis for asbestos contamination.

Not all soil samples collected were analysed. Samples were analysed in accordance with the analytical schedule (**Section 5.3**). All samples remain at the primary laboratory for a period of two months if future analysis is required following the receipt of sample results, and provided analysis of analytes is within holding times.

The handauger was decontaminated between each sampling location using the following procedure:

- scrubbing with a wire brush to remove grass contamination;
- pressure spray with Decon 90 detergent and tap water mix;
- pressure spray with tap water; and
- air drying.

5.3 Stockpile Assessment Methodology

The volume of stockpiled material was estimated at approximately 200m³. A material characterisation investigation was completed to delineate the amount of asbestos contamination within the stockpile and limit the amount of material that was to be

disposed of off site. A materials classification (JBS2010)³ had been previously completed for the asbestos contaminated material and is included in **Appendix K**.

The stockpile was divided into 13 sub-stockpiles (SP1 - SP13) of approximately equal volume. Each sub-stockpile was inspected by spreading the material out into 100mm depth layers. The material was then inspected for the presence of asbestos contamination in the form of ACM fragments. If physical evidence of asbestos contamination was observed, the individual stockpile was set aside for off site disposal. Three sub stockpiles (SP1, SP3 and SP13) were observed to contain ACM fragments and were disposed off site by a qualified asbestos removal contractor. The total material disposed off site was approximately 30m³. Waste documentation is included in **Appendix L**.

Soil samples were collected from the remaining ten sub-stockpiles (SP2, SP4-SP12), where there was no physical evidence of asbestos contamination, to be analysed for asbestos fibres within the soil. Collected soil samples were immediately transferred to laboratory supplied zip lock plastic bags. The sample bags were transferred to a storage container for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form was completed and forwarded with the samples to the testing laboratory.

5.4 Laboratory Analyses

JBS Environmental contracted Envirolab Services Pty Ltd (Envirolab) as the primary laboratory for the required analyses. Envirolab is NATA registered for the required analyses.

In addition, Envirolab was required to meet JBS Environmental's internal QA/QC requirements. Laboratory analysis of samples was conducted with reference to COPCs listed in **Table 5.3**.

Table 5.3 Analytical Schedule

Media/AEC	No. of Sampling Locations	No. of Analyses (incl QA/QC Samples)
Fill material	16 (HA1-HA16)	Asbestos - 20 samples
Stockpiled material	10 (SP2, SP4-SP12)	Asbestos - 10 samples

5.5 Assessment QA/QC

To assess the usability of the data prior to making decisions, the data was assessed against pre-determined Data Quality Indicators (DQIs) for completeness, comparability, representativeness, precision and accuracy. The acceptable limit on decision error is 100% compliance with DQIs.

The pre-determined Data Quality Indicators (DQIs) established for the project are discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters), and are shown in **Table 5.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions.
- **Accuracy** - not applicable to investigations limited to asbestos contamination analysis.

³ L01 370 Old Northern Road, Castle Hill, Stockpiled Material Classification Rev A - JBS Environmental Pty Ltd, March 2010, 41112-14825

- **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.

Table 5.2 Summary of Quality Assurance / Quality Control Program

Data Quality Objective	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory)	1 / 20 samples	< 50% RPD ¹
Blind duplicates (inter laboratory) ²	1 / 20 samples	< 50% RPD ¹
Accuracy		
Surrogate spikes ³	All organic samples	70-130%
Matrix spikes ³	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes		-
Laboratory blanks ³	1 per lab batch	< LOR
Samples extracted and analysed within holding times.		pH (7 days), organics (14 days), inorganics (6 months)
Trip spike ³	1 per sampling event	70-130% recovery
Trip blank ³	1 per sampling event	< 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		
Sample 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

- (1) RPD's are not applicable to investigations limited to asbestos contamination, however the frequency of intra laboratory duplicates remains constant.
- (2) Inter laboratory duplicates were not deemed necessary for this investigation.
- (3) Not applicable to investigations limited to asbestos contamination

6 Assessment Criteria

6.1 Regulatory Guidelines

The investigation was undertaken with consideration to aspects of the following guidelines, as relevant:

- *Contaminated Sites: Guidelines for Assessing Service Station Sites*, NSW EPA, 1994 (EPA 1994)
- *Contaminated Sites: Sampling Design Guidelines*, NSW EPA, 1995 (EPA 1995)
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*, NSW EPA, 1997 (EPA 1997)
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition*, NSW EPA, 2006 (DEC 2006)
- *Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*, NSW DECC, 2009 (DECC 2009);
- *National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council, 1999 (NEPC 1999)
- *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council, 1992 (ANZECC/NHMRC 1992)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMCANZ 2000)
- *Australian Drinking Water Guidelines*, National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, 2004 (NHMRC/NRMMC 2004)
- *Composite Sampling*, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, (NEHF 1996)
- *Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards*, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, June 2002 (EnHealth 2002)
- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*, NSW DEC, March 2007 (DEC 2007)

6.2 Soil Criteria

Based on the proposed residential use and in accordance with the decision process for assessment of urban redevelopment sites (DEC, 2006), concentrations of contaminants in the soil were to be compared against health-based soil investigation levels for standard residential use with gardens and accessible soil (HIL-A).

Table 6.1 Soil Criteria (all units in mg/kg)

	Limit of Reporting	Laboratory Method	Health-Based Investigation Level (residential) (HIL-A) ¹
Asbestos	0.1	PLM / Dispersion Staining	No fibres observed using NATA accredited analysis

¹ Column 1 (NEHF - A), Health-based Investigation Levels (DEC 2006)

7 Quality Assurance / Quality Control

7.1 Soil QA/QC Results

The QA/QC results for soil are summarised in **Table 7.1** and discussed in **Section 7.2** below. Detailed QA/QC results are included the laboratory reports in **Appendix I**.

Table 7.1 - Soil QA/QC Results Summary

Data Quality Objective	Results	DQI met?
Precision		
Soil Blind duplicates (intra laboratory)	1 duplicate sample collected for 20 primary samples	Yes
Soil Blind triplicates (inter laboratory)	-	N/A
Accuracy		
Surrogate spikes	-	N/A
Matrix spikes	-	N/A
Representativeness		
Sampling appropriate for media and analytes	All sampling conducted in accordance with JBS procedures	Yes
Laboratory blanks	-	N/A
Samples extracted and analysed within holding times	All samples were analysed within specified holding times	Yes
Trip Spike	-	N/A
Trip blank	-	N/A
Comparability		
Standard operating procedures used for sample collection & handling	The sampling event was conducted by a single field staff member and used same standard operating procedures throughout works	Yes
Standard analytical methods used	Standard analytical methods used as listed in Table 6.1	Yes
Consistent field conditions, sampling staff and laboratory analysis	Sampling was conducted by a single JBS field staff member using standard operating procedures in the same conditions throughout the works. Labs remained consistent throughout the investigation.	Yes
Limits of reporting appropriate and consistent	Limits of reporting were consistent and appropriate.	Yes
Completeness		
Sample description & COCs completed	All bore logs and COCs were completed appropriately.	Yes
Appropriate documentation	All appropriate field documentation is included in the Appendices .	Yes
Satisfactory frequency/result for QC samples	The QC results are considered adequate for the purposes of the investigation.	Yes
Data from critical samples is considered valid	Data from critical samples is considered valid.	Yes

7.2 Soil QA/QC Discussion and Conclusion

Field duplicates were collected at the required frequency for the number of primary samples analysed.

The field sampling and handling procedures QA/QC results indicate that the soil data are of an acceptable quality and suitable for use in site characterisation.

On the basis of the results of the field and laboratory QA/QC program, the soil data are of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site.

8 Discussion of Soil Results

8.1 Field Observations

Geology encountered at the site during the field works is summarised below. Hand auger logs are included in **Appendix I**.

The site surface was covered with long grass. The underlying material consisted of natural silty clays with occasional inclusions of sandstone and shale gravels

A stockpile of material (approximately 200m³) was observed in the centre of the site. The material consisted of brown-orange silty sandy clay, with sandstone and shale gravels to cobbles, plastic (PVC) pipe, concrete pieces, terracotta pipe fragments, metal, brick fragments and suspected ACM fragments.

Apart from the observed ACM, there were no visual or olfactory indications of contamination identified during the field investigation.

8.2 Soil Analytical Results

The soil sampling locations are shown on **Figure 3** and summarised laboratory results are presented in **Tables B**. Detailed laboratory reports and chain of custody documentation is provided in **Appendix J**.

The summary laboratory results are discussed in the following sections.

8.2.1 Asbestos – Broader Site Area

Nineteen soil samples (one sample from the original stockpiled material and eighteen from the broader site area) and two fragments of suspected ACM from the stockpiled material were screened for the presence of asbestos. No asbestos was detected at the reporting limit of 0.1mg/kg and no respirable fibres were detected in any of the soil samples analysed. Chrysotile asbestos was detected in one fragment sample (SP01-F2) collected from the stockpiled material located on the site. The remaining fragment (SP01-F1) was reported as not containing asbestos.

8.2.2 Asbestos – Stockpiled Material Characterisation

A visual assessment of the thirteen sub-stockpiles was completed. Three sub-stockpiles (SP1, SP3 and SP13) were observed to contain ACM fragments and were disposed off site. No ACM fragments were observed in the remaining sub-stockpiles (SP2, SP4-SP12).

Ten soil samples (SP2, SP4-SP12) were collected from the remaining ten sub-stockpiles during the material characterisation investigation and screened for the presence of asbestos. No asbestos was detected at the reporting limit of 0.1mg/kg and no respirable fibres were detected in any of the soil samples analysed.

Soil samples were not collected from stockpiles SP1, SP3 and SP13.

9 Site Characterisation

Based on the decision making process for assessing urban redevelopment sites detailed in DEC (2006) and discussed in **Section 5.1.2**, the decisions requiring to be made are discussed below.

9.1 Potential Risks to Future Onsite Receptors

There are no potential risks to future onsite receptors.

9.2 Aesthetics

There were no aesthetic issues identified during the investigation that may pose an issue at the site.

9.3 Background Soil Concentrations

Not applicable to investigations limited to asbestos contamination.

9.4 Chemical Mixtures

Not applicable to investigations limited to asbestos contamination.

9.5 Odours

There were no unacceptable odours identified in the soil during the current investigation.

9.6 Potential Migration of Contaminants

Not applicable to investigations limited to asbestos contamination.

9.7 Site Management Strategy

A site management strategy is not required for the site.

10 Conclusions

10.1 Conclusions

Based on the results of the investigation undertaken at the site, and subject to the limitations stated in **Section 11**, the following conclusions are made:

- The site history assessment and inspection of the site identified the presence of potentially contaminated fill material as a source of potential concern at the site. Fill materials were not encountered below ground surface during the site investigations, which was consistent with the findings from PSM 2006. Natural silty clay soils were found directly beneath the grassed ground surface. No asbestos containing material fragments were observed across the broader site area during the site inspection. Soil samples were collected across the broader site area and were screened for asbestos. No asbestos was detected at the reporting limit of 0.1mg/kg and no respirable fibres were detected in any of the soil samples analysed;
- Stockpiled material (approximately 200m³) was observed in the central western portion of the site. The site inspection and soil sampling identified the presence of bonded asbestos containing material fragments within the stockpiled material;
- No other signs of contamination were observed across the remainder of the site during the investigation;
- Additional investigations were completed on the stockpiled material located in the central western portion of the site, in an attempt to characterise the material and determine the extent of contamination. The stockpile was divided into thirteen sub-stockpiles and each was inspected for the presence of asbestos containing material fragments. Asbestos containing material fragments were identified within three sub-stockpiles (SP1, SP3 and SP13) with a total volume of approximately 30m³. this material was disposed off site. Soil samples were collected from the remaining ten sub-stockpiles (SP2, SP4-SP12) and were screened for asbestos. No asbestos was detected at the reporting limit of 0.1mg/kg and no respirable fibres were detected in any of the soil samples analysed.
- The remaining stockpiled material is deemed to be suitable for reuse on site for the proposed land use;
- The site is suitable for the proposed land use.

11 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited sampling and laboratory analyses were undertaken as part of the investigations, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Figures

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Figure 1 Site Location

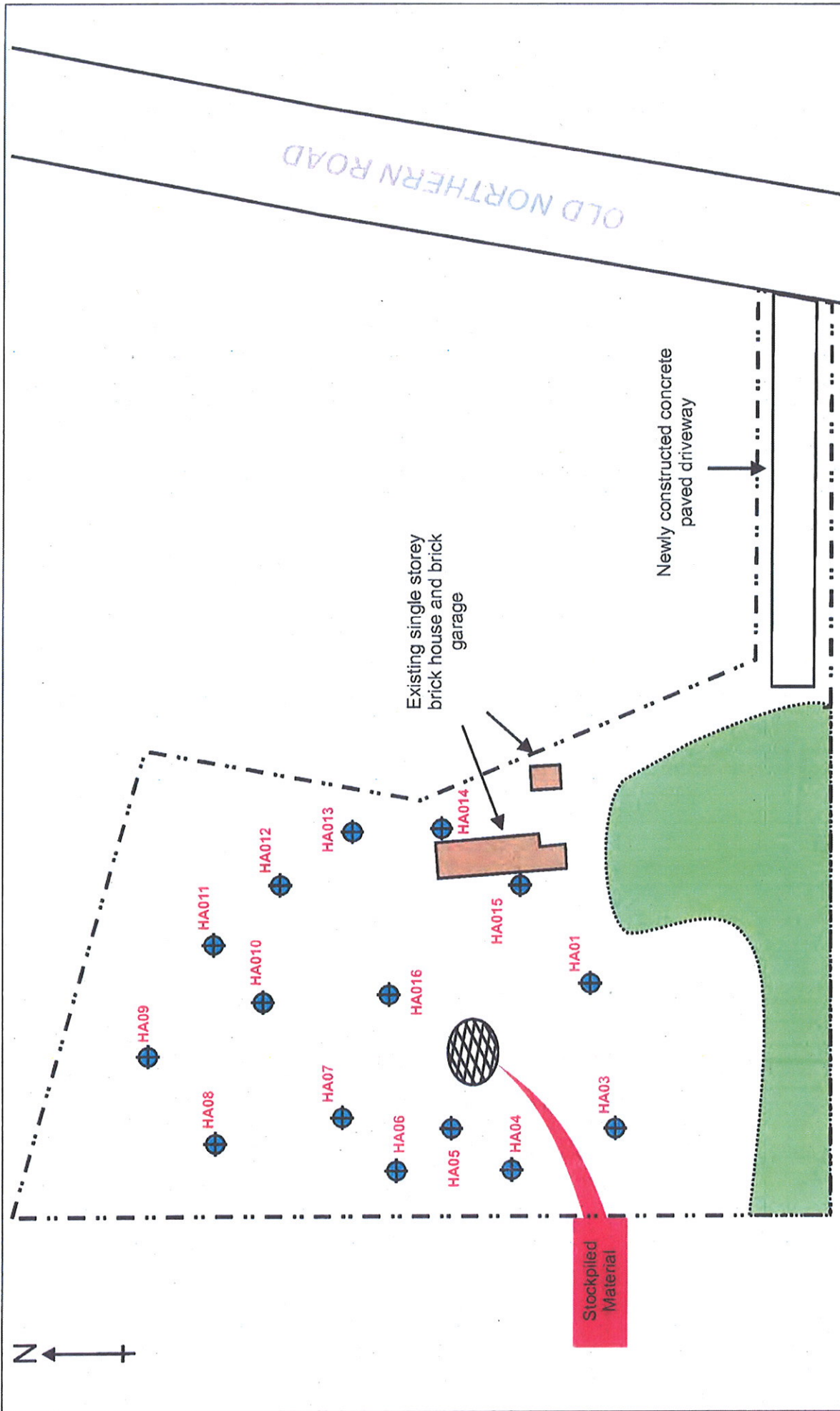
Client: KMSJ Pty Ltd & Lanox Pty Ltd

Site Address: 370 Old Northern Road, Castle Hill NSW

File Name: 41112_01.cdr (Rev 0)

Job Number: 41112

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Legend

- Site Boundary
- Dense vegetation
- Concrete paved driveway
- Existing structures
- Stockpiled material
- HA02 + Sample location

Approximate Scale

0m 25m 50m

Figure 2 Site Layout and Sampling locations

JBS ENVIRONMENTAL

Client: KMSJ Pty Ltd & Lanox Pty Ltd

Site Address: 370 Old Northern Road, Castle Hill NSW

File Name: 41112_02.cdr (Rev 0)

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Job Number: 41112

Appendix A
Summary Tables

FILE REF: G:\JBS Environmental\Projects\KMSJ Pty Ltd and Lanox Pty Ltd\41112-Castle Hill\Tables\41112 Soil Summary Tables.xls\Table A - Sample Description

Soil Sample ID/Depth (m)	Sampling Date	Soil Description (See bore logs for more detailed notes)	Asbestos
HA01-0-0.1	2-Mar-10	Gravelly Silty CLAY	X
HA02-0-0.1	2-Mar-10	Silty CLAY	X
HA03-0-0.1	2-Mar-10	Silty CLAY	X
HA03-0.2-0.3	2-Mar-10	Silty CLAY	X
HA04-0-0.1	2-Mar-10	Silty CLAY	X
HA05-0-0.1	2-Mar-10	Silty CLAY	X
HA05-0.2-0.3	2-Mar-10	Silty CLAY	X
HA06-0-0.1	2-Mar-10	Silty CLAY	X
HA07-0-0.1	2-Mar-10	Silty CLAY	X
HA08-0-0.1	2-Mar-10	Silty CLAY	X
HA09-0-0.1	2-Mar-10	Silty CLAY	X
HA10-0-0.1	2-Mar-10	Silty CLAY	X
HA11-0-0.1	2-Mar-10	Silty CLAY	X
HA12-0-0.1	2-Mar-10	Silty CLAY	X
HA13-0-0.1	2-Mar-10	Silty CLAY	X
HA14-0-0.1	2-Mar-10	Silty CLAY	X
HA15-0-0.1	2-Mar-10	Silty CLAY	X
HA16-0-0.1	2-Mar-10	Silty CLAY	X
SP01	2-Mar-10	Stockpiled silty CLAY	X
SP01-F1	2-Mar-10	Fragment	X
SP01-F2	2-Mar-10	Fragment	X
SP2	23-Mar-10	Sub-stockpile	X
SP4	23-Mar-10	Sub-stockpile	X
SP5	23-Mar-10	Sub-stockpile	X
SP6	23-Mar-10	Sub-stockpile	X
SP7	23-Mar-10	Sub-stockpile	X
SP8	23-Mar-10	Sub-stockpile	X
SP9	23-Mar-10	Sub-stockpile	X
SP10	23-Mar-10	Sub-stockpile	X
SP11	23-Mar-10	Sub-stockpile	X
SP12	23-Mar-10	Sub-stockpile	X
Primary Total			30
QA/QC Sample ID	Sampling Date	Comments	Asbestos
QCO1	2-Mar-10	Silty CLAY (HA12-0-0.1)	X
QA/QC Total			1

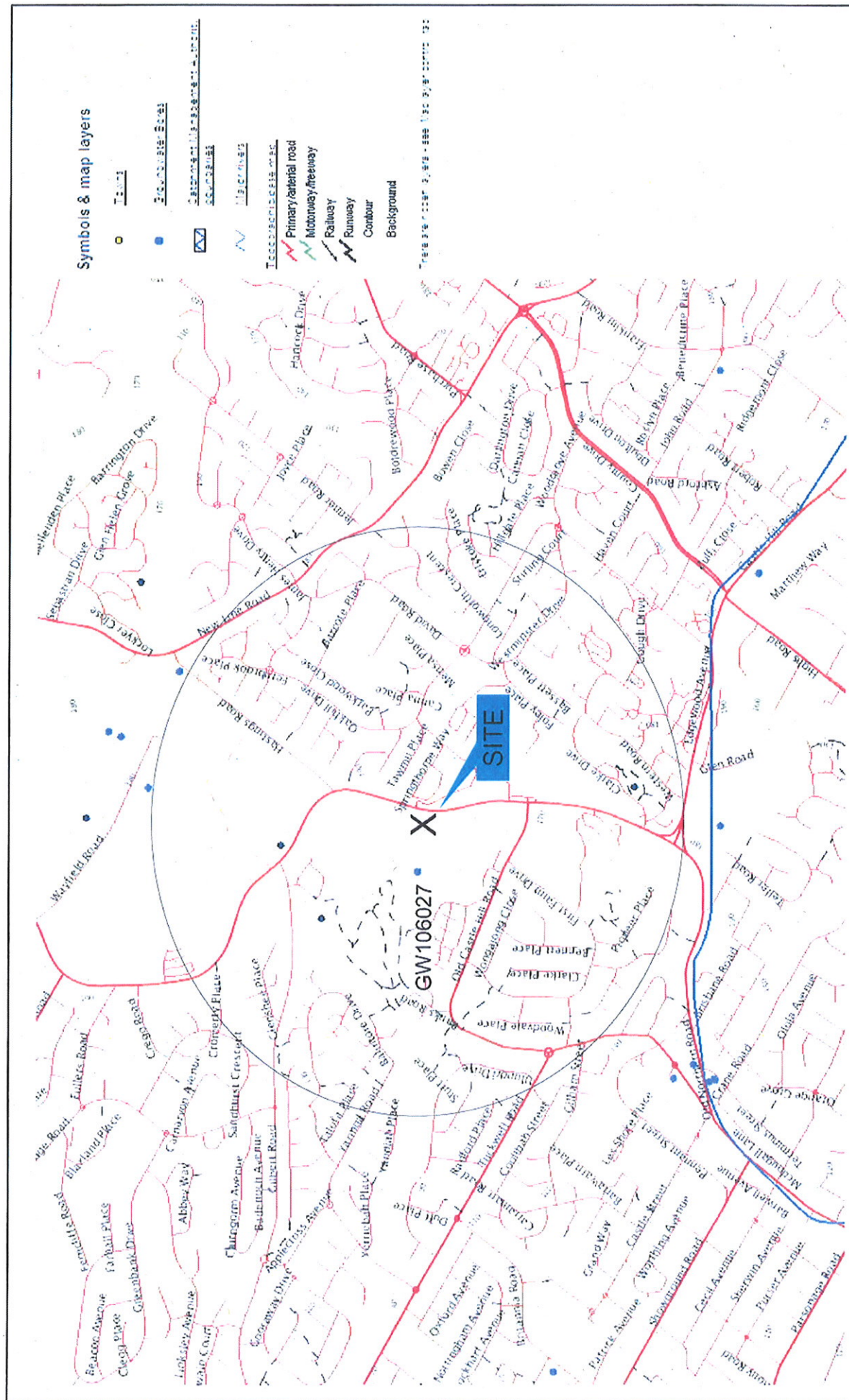
Notes

- (1) Phototoxicity Based Investigation Levels (Column 5, DEC 2006)
(2) Residential with gardens and accessible soil (Column 1, DEC 2006)
(3) Commercial /Industrial (Column 4, DEC 2006)
(4) Threshold concentrations for sensitive land use - soils (Table 1, NSW EPA 1994)
(5) Commercial or Industrial (Column 4, DEC 2006)
(6) Threshold concentrations for sensitive land use - soils (Table 3, EPA 1994)

FILE REF: G:\JBS Environmental Projects\KMSJ Pty Ltd and Lanox Pty Ltd\41112 - Castle Hill Tables\41112 Soil Summary Tables.xls\Table B - Summary Results Soil

Sample number	Asbestos
LOR	-
Landuse criteria (mg/kg)	
FBIU (1) TC (4)	-
Residential (NEHF - A) (2) TC (3)	NIL
Residential (NEHF - D) (2)	NIL
Parks/Open Space (HIL - E) (3)	NIL
Commercial/ Industrial (HIL - F) (5)	NIL
HA01-0-0.1	No asbestos or respirable fibres detected
HA02-0-0.1	No asbestos or respirable fibres detected
HA03-0-0.1	No asbestos or respirable fibres detected
HA03-0.2-0.3	No asbestos or respirable fibres detected
HA04-0-0.1	No asbestos or respirable fibres detected
HA05-0-0.1	No asbestos or respirable fibres detected
HA05-0.2-0.3	No asbestos or respirable fibres detected
HA06-0-0.1	No asbestos or respirable fibres detected
HA07-0-0.1	No asbestos or respirable fibres detected
HA08-0-0.1	No asbestos or respirable fibres detected
HA09-0-0.1	No asbestos or respirable fibres detected
HA10-0-0.1	No asbestos or respirable fibres detected
HA11-0-0.1	No asbestos or respirable fibres detected
HA12-0-0.1	No asbestos or respirable fibres detected
HA13-0-0.1	No asbestos or respirable fibres detected
HA14-0-0.1	No asbestos or respirable fibres detected
HA15-0-0.1	No asbestos or respirable fibres detected
HA16-0-0.1	No asbestos or respirable fibres detected
SP01	No asbestos or respirable fibres detected
SP01-F1	Chrysotile asbestos fibres detected
SP01-F2	No asbestos or respirable fibres detected
SP2	No asbestos or respirable fibres detected
SP4	No asbestos or respirable fibres detected
SP5	No asbestos or respirable fibres detected
SP6	No asbestos or respirable fibres detected
SP7	No asbestos or respirable fibres detected
SP8	No asbestos or respirable fibres detected
SP9	No asbestos or respirable fibres detected
SP10	No asbestos or respirable fibres detected
SP11	No asbestos or respirable fibres detected
SP12	No asbestos or respirable fibres detected
QA/QC	
QC01 (duplicate of HA12-0-0.1)	No asbestos or respirable fibres detected

Appendix B
Groundwater Bore Search



Approximate Scale

0 500 1000m

Scale



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Groundwater Bore Map

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
Document Generated on Wednesday, March 17, 2010

[Print Report](#)

[Works Details](#) [Site Details](#) [Form A](#) [Licensed](#) [Construction](#) [Water Bearing Zones](#) [Drillers Log](#)

Work Requested -- GW106027

Works Details [\(top\)](#)

GROUNDWATER NUMBER	GW106027
LIC-NUM	10BL162948
AUTHORISED-PURPOSES	DOMESTIC
INTENDED-PURPOSES	DOMESTIC
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2004-01-01
FINAL-DEPTH (metres)	253.00
DRILLED-DEPTH (metres)	253.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	REID
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	60.00
SALINITY	
YIELD	0.75

Site Details [\(top\)](#)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9130-4S
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6267095.00
EASTING	316140.00
LATITUDE	33 43' 13"
LONGITUDE	151 0' 56"
GS-MAP	

AMG-ZONE 56
 COORD-SOURCE GIS - Geographic Information System
 REMARK

Form-A [\(top\)](#)

COUNTY CUMBERLAND
 PARISH CASTLE HILL
 PORTION-LOT-DP 2//135804

Licensed [\(top\)](#)

COUNTY CUMBERLAND
 PARISH CASTLE HILL
 PORTION-LOT-DP A 400639

Construction [\(top\)](#)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
 ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE- NO	PIPE- NO	COMPONENT- CODE	COMPONENT- TYPE	DEPTH- FROM (metres)	DEPTH- TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	37.00	200			Down Hole Hammer
1		Hole	Hole	37.00	253.00	165			Down Hole Hammer
1	1	Casing	PVC Class 9	0.00	37.00	160			Screwed and Glued; Driven into Hole; Open End
1	1	Opening	Slots - Diagonal	30.00	31.00	160			PVC Class 9; Sawn; SL: 1mm; A: 2mm; Screwed and Glued

Water Bearing Zones [\(top\)](#)

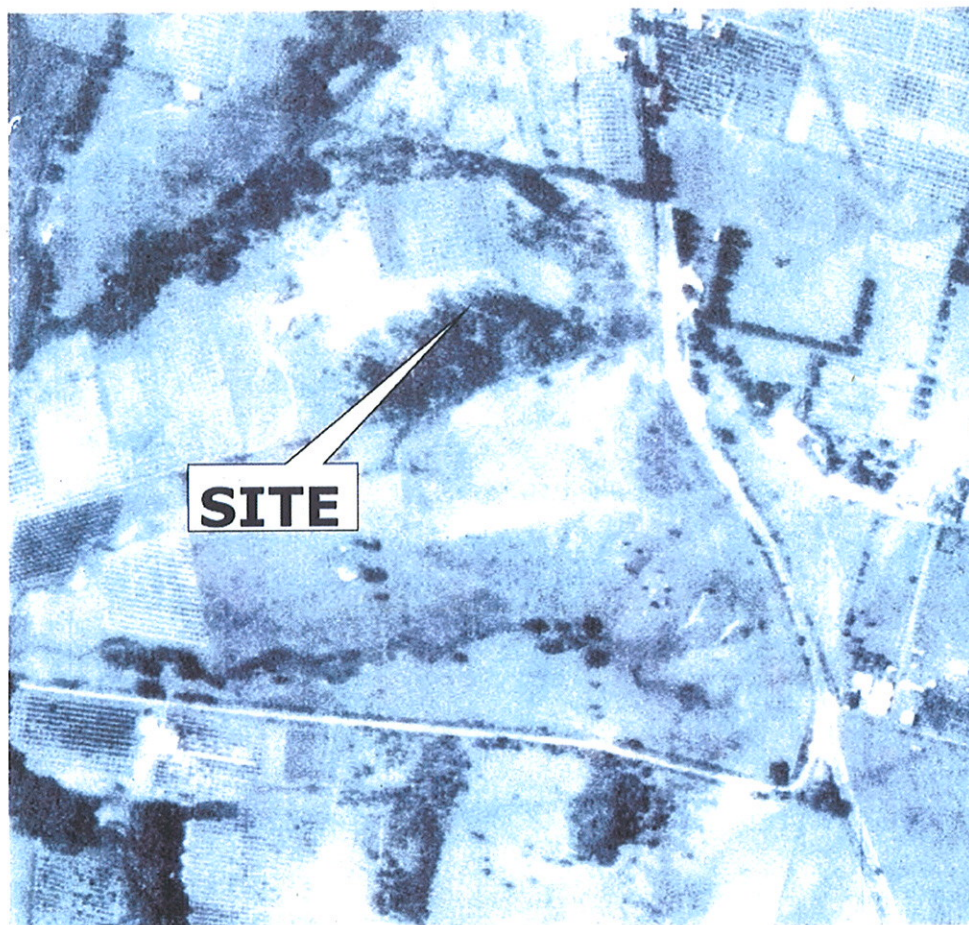
FROM- DEPTH (metres)	TO- DEPTH (metres)	THICKNESS (metres)	ROCK- CAT- DESC	S-W- L	D- D- L	YIELD	TEST- HOLE- DEPTH (metres)	DURATION	SALINITY
60.00	61.00	1.00		60.00		0.18			
84.00	85.00	1.00				0.18			
150.00	151.00	1.00				0.09			
166.00	168.00	2.00				0.20			
223.00	224.00	1.00				0.10			

Drillers Log [\(top\)](#)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL COMMENT
0.00	3.00	3.00	clay	
3.00	25.00	22.00	shale	
25.00	54.00	29.00	sandstone, white	
54.00	112.00	58.00	sandstone, grey	
112.00	121.00	9.00	shale	
121.00	247.00	126.00	sandstone	
247.00	253.00	6.00	shale	

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Appendix C
Aerial Photographs



SITE

Not to scale

Source: LPI NSW

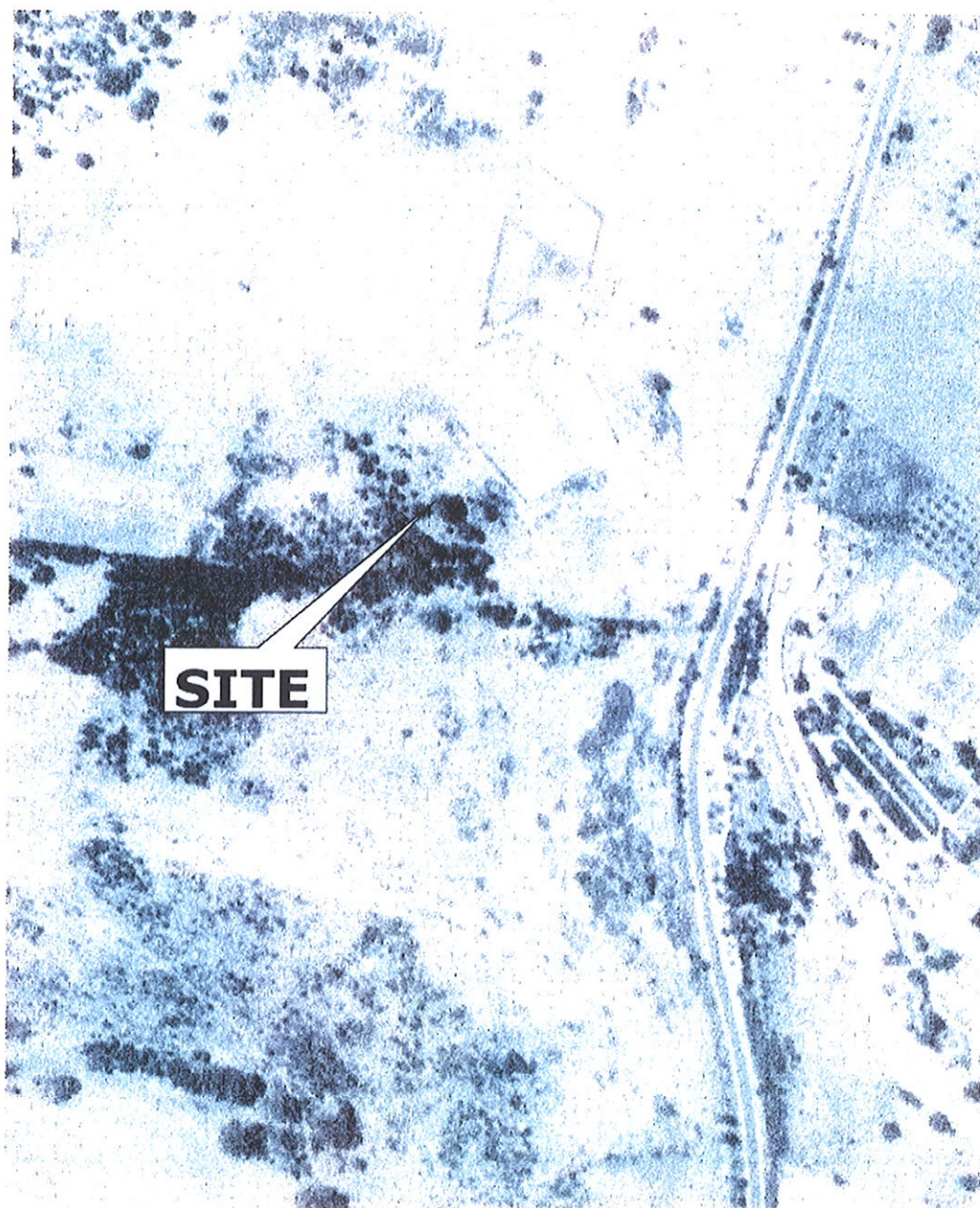
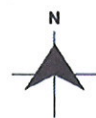


**1930 Historical
Aerial Photograph**

Client: KMSJ Pty Ltd & Lanox Pty Ltd Job Number: 41112

Site Address: 370 Old Northern Rd, Castle Hill, NSW

File Name: 41112_1930.cdr (Rev 0)



SITE

Not to scale

Source: LPI NSW

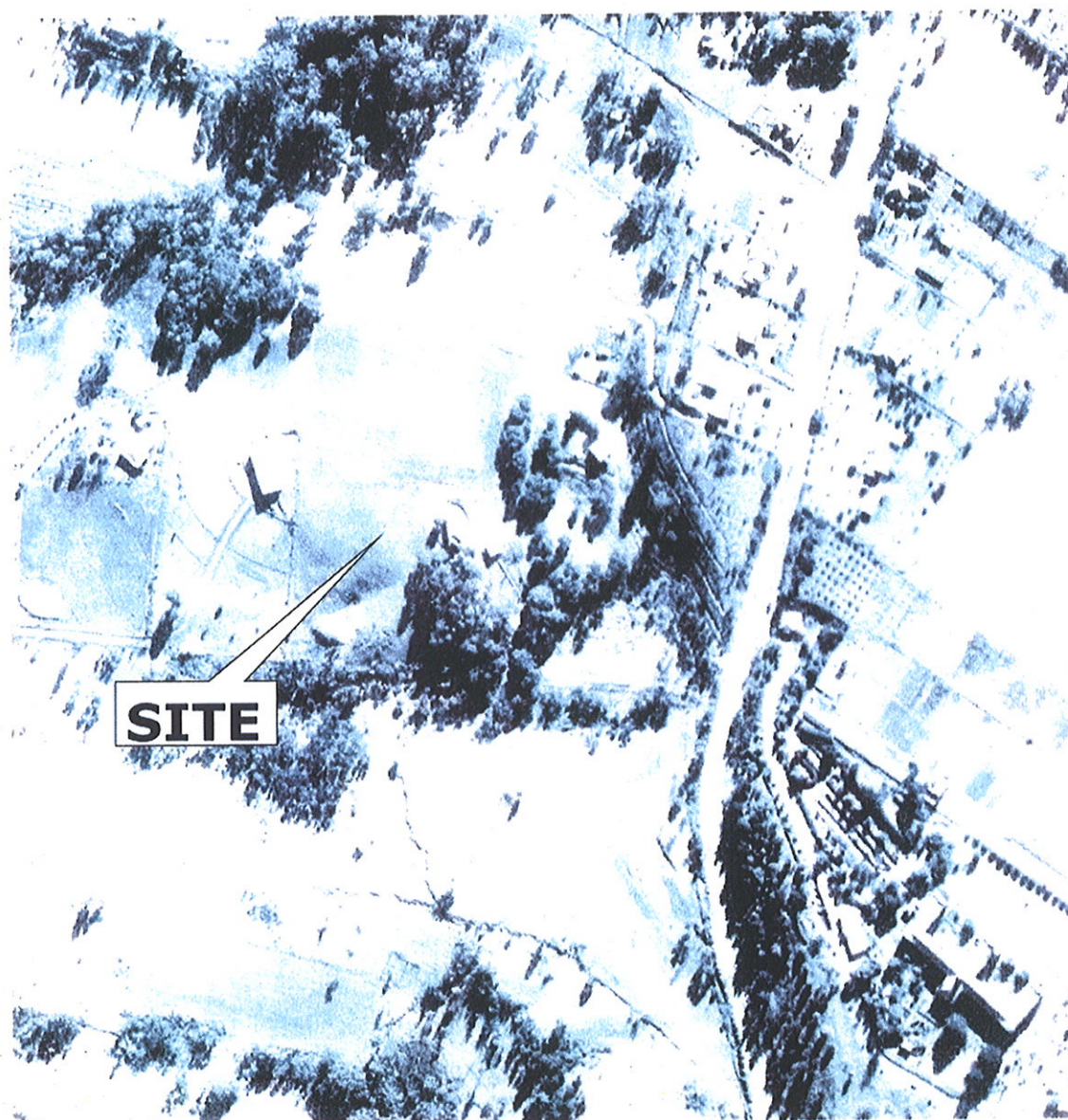


**1947 Historical
Aerial Photograph**

Client: KMSJ Pty Ltd & Lanox Pty Ltd Job Number: 41112

Site Address: 370 Old Northern Rd, Castle Hill, NSW

File Name: 41112_1947.cdr (Rev 0)



SITE

Not to scale

Source: LPI NSW



**1961 Historical
Aerial Photograph**

Client: KMSJ Pty Ltd & Lanox Pty Ltd Job Number: 41112

Site Address: 370 Old Northern Rd, Castle Hill, NSW

File Name: 41112_1961.cdr (Rev 0)



Not to scale

Source: LPI NSW

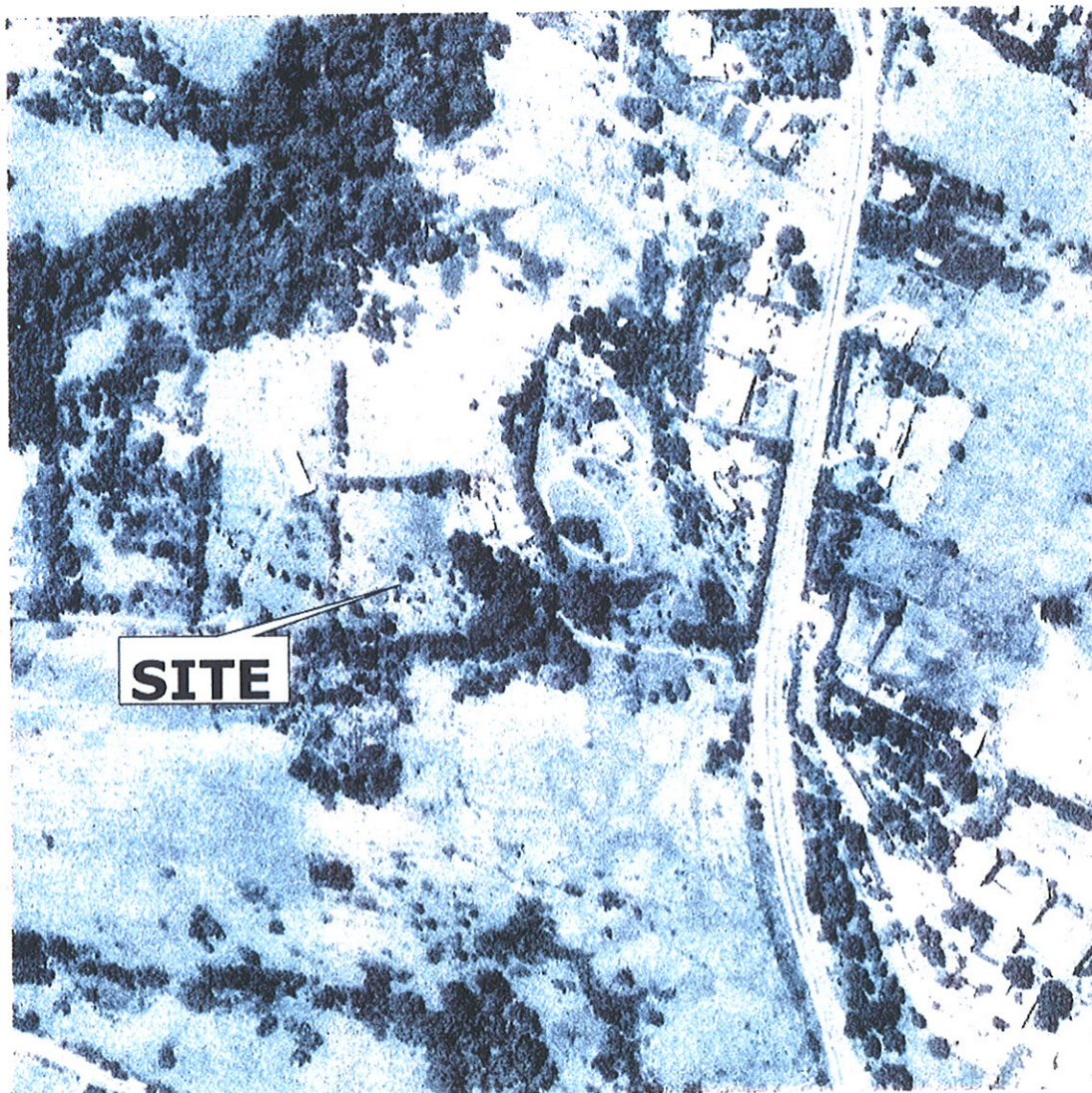


1970 Historical Aerial Photograph

Client: KMSJ Pty Ltd & Lanox Pty Ltd Job Number: 41112

Site Address: 370 Old Northern Rd, Castle Hill, NSW

File Name: 41112_1970.cdr (Rev 0)



SITE

Not to scale

Source: LPI NSW



**1978 Historical
Aerial Photograph**

Client: KMSJ Pty Ltd & Lanox Pty Ltd Job Number: 41112

Site Address: 370 Old Northern Rd, Castle Hill, NSW

File Name: 41112_1978.cdr (Rev 0)