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DETAILED SITE INVESTIGATION, 65 – 67 MANDARIN & 38-42 SEVILLE STREETS, VILLAWOOD, NEW SOUTH WALES

FOR

MERHIS PTY LTD

PROJECT NO. 19852/4618C **SEPTEMBER 2014**
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EXECUTIVE SUMMARY

A detailed site investigation (DSI) was performed for the property at 65-67 Mandarin and 38-42 Seville Streets, Villawood, New South Wales for Merhis Pty Ltd. The objectives of the investigation were to determine the nature and extent of any soil contamination at the site that may be significant for an ongoing commercial/industrial use. The investigation was performed in accordance with Environment Protection Authority (EPA) and national guidelines for the assessment and management of site contamination.

The site is approximately 1.1 hectares and has been used for commercial/industrial purposes since at least the since the 1970s. Activities that are either known or expected to have occurred at the site include various medium scale commercial companies involved in metal fabrication, rigging, construction and diary production.

Soil was sampled from a total of 24 locations across the site for this investigation including two target surface samples in the vicinity of buildings containing potential asbestos materials. The results of the sampling program show that the concentrations of chemical contaminants measured in the soils across the site are generally low and below criteria that are protective of human-health for a commercial/industrial land use setting. However, asbestos fibres have been identified in the soil at one sample location and which could present a potential risk to human-health where exposure pathways exist.

Three quarters of the site is covered with continuous concrete pavements which are considered to be an adequate barrier to prevent site occupants from being inadvertently exposed to the asbestos impacted soil. In view of this, active remediation of the asbestos impacted soil is not necessarily required to make the site suitable for an on-going commercial/industrial land use. However, a Site Management Plan (SMP) should be prepared, which will outline procedures to ensure that human-health and the environment is appropriately protected during sub-surface works, should any be required at the site in the future. If redevelopment occurs, it would be prudent to sample within the warehouse building, that could not be accessed during this investigation and to remediate the asbestos contaminated soil.

Based on the results of this DSI, the site is considered to be suitable for on-going commercial/industrial use provided that the extent of hardstand surfaces is maintained and that a SMP is prepared and implemented.

1. INTRODUCTION

SMEC Testing Services Pty Limited (STS) was engaged by Merhis Pty Ltd to undertake a detailed site investigation (DSI) for the property at 65-67 Mandarin and 38-42 Seville Streets, Villawood, NSW (the 'site'). The objectives of the investigation were to determine the nature and extent of any soil impacts at the site that may be significant for an ongoing commercial/industrial use. The investigation was performed in accordance with Environment Protection Authority (EPA) and national guidelines for the assessment and management of site contamination.

The scope of the DSI included:

- Examination of aerial photographs to identify historical land uses at the site and its surrounds;
- Review of historical land title information relating to the site;
- Review of local Council, EPA and WorkCover NSW records;
- Site inspection;
- Appraisal of local geology and hydrogeology;
- Soil sampling from 22 locations across the site and laboratory analysis of the soil samples retrieved for a broad screen of potential chemical contaminants;
- Assessment of analytical data and quality assurance (QA);
- Appraisal of the contaminant concentrations in the soil based on the results of the investigation, including an appraisal of potential harm to human-health and the environment, potential exposure pathways and off-site impacts;
- Recommendations for the site in accordance with EPA guidelines; and
- Preparation of a confidential report to Merhis Pty Ltd on the results of the investigation.

2. REDEVELOPMENT AND PROPOSED LAND USE

We understand that an ongoing commercial/industrial land is proposed for the site in at least the short to medium term and rezoning is proposed. It is likely that the current configuration of the property will be retained, although some refurbishment works may be proposed in the future.

3. SITE IDENTIFICATION

The site at 65 – 67 Mandarin and 38 – 42 Seville Streets, Villawood has an area of approximately 1.1 hectares and is defined as Lots 2 and 3 in Deposited Plan (DP) 818038, Parish of St John, County of Cumberland. The location of the site is shown on Drawing No. 14/1786/1.

The site is within the Fairfield Council local government area, and is currently zoned 'IN2 – Light Industrial' and 'IN1 – General Industrial'.

4. SITE FEATURES

The site was inspected on 19 August 2014 to confirm the condition of the land and to identify potential contamination sources. A plan showing the current site configuration is shown on Drawing No.14/1786/2. The key site features as determined by the site inspection are:

38 – 42 Seville Street

- A two story brick building used for officers is located at the site. The eastern portion of the site is covered with concrete and used for car parking.
- The boundaries of the site are lined with mature trees and the exposed ground covered in grass.

65 – 67 Mandarin Street

- The centre of the site is covered with a large warehouse building that is used for welding and painting of steel products. No sampling could be completed within the building due to access issues. The building is covered with hardstand surfaces.
- Three small buildings are located to the west of the main warehouse building and are used as site offices.
- The southern portion of the site has three long warehouse buildings constructed on each of the three boundaries. Two of the buildings are used for storage of various products including various oils and chemicals especially the building on the southern boundary. The building located on the eastern boundary is being used as an office. All three buildings are constructed with asbestos roofing and some walls appeared to be constructed of fibre cement sheeting which may contain asbestos fibres.
- The two areas, south and north of the warehouse, are used for the storage and distribution of a variety of metal products. Overhead cranes are located in the south of the site that directly enters the warehouse. A large crane is located in the centre of north section of the site and used to move steel products around the site prior to distribution.
- The area to the south of the main warehouse is covered in concrete and asphalt with no bare ground. Half of the area to the north of the warehouse is covered with concrete. The exposed ground which is in the north portion of the site is covered with gravel.

5. GEOLOGY AND HYDROGEOLOGY

The Geological Survey of NSW 1:100,000 Penrith Geological Map (Sheet 9030) shows that the site is underlain by Middle Triassic Age 'Bringelly Shale' of the Wianamatta Group. This group comprises shale, carbonaceous claystone, laminite and fine to medium grained lithic. Further, our review of the Acid Sulfate Soil (ASS) maps provided on the NSW EPA Natural Resource Atlas (NR Atlas) shows that the site is located on land that is not expected to be affected by ASS. This is supported by the geology and geomorphology of the site.

The natural soils encountered during the investigation comprised of medium to high plasticity silty clays. The silty clays are consistent with residual soils weathered from the regional geological formation. No bedrock was encountered during this investigation.

A layer of fill between 0.2 m and 1.4 m in thickness was also identified at the majority of the sampling locations. The fill material was observed to comprise sandy gravels, silty clay, sandy gravel, gravelly clay and silty sandy gravel. Further, fragments of anthropogenic wastes including asbestos, bricks, ash, wood and general refuse were encountered in the fill at several sample locations.

A search of the Department Natural Resources (DNR) groundwater database was also performed to identify wells in the vicinity of the site. The search results identified 31 registered groundwater monitoring wells located within 1 km of the site, all of which are registered for monitoring purposes. The aquifer depths, where available, measured between 3.1m and 3.4 m below ground level.

Based on the observations made during our on-site soil sampling activities, the results of the groundwater database search and our review of the site geology and regional groundwater conditions, a summary of the site hydrogeology is summarised in Table 5.1.

TABLE 5.1 – SITE HYDROGEOLOGY

Aquifer Type and Lithology:	Clay and Shale[1,2]
Perched groundwater:	Potentially present at the soil/bedrock interface[1]
Depth to Aquifer at Site:	Approximately 3-5 m[1,2]
Local Groundwater Flow Direction:	South to South-west[2]
Regional Groundwater Flow Direction:	South to South-west[2]
Receiving Environments:	Local: Unnamed creek located approximately 130metres to the south of the site which flows into Prospect Creek 1.1km to the west-south-west of the site.[2] Regional: Georges River, located approximately 3.8 km to the south of the site[2].

[1] Actual conditions based on observations made during on-site soil sampling
[2] Inferred conditions based on site/regional geology and geomorphology.

6. SITE HISTORY REVIEW

The history of the land subject to the investigation was obtained from the following sources:

- Aerial photographs of the site and surrounds held by the Department of Lands;
- Historical land titles;
- A Section 149 (2) Certificate provided by Fairfield City Council;
- WorkCover NSW records; and
- EPA records.

6.1 Aerial Photographs

Aerial photographs from 1930, 1951, 1961, 1970, 1986, 1994, 2002 and 2005 were examined to identify previous land uses at the site and its surrounds. A copy of each aerial photograph showing the location of the site is provided in Appendix A, and a description of the observations made is provided in Table 6.1.

TABLE 6.1 – AERIAL PHOTOGRAPH OBSERVATIONS

Year	Site Features	Surrounding Land Use
1930	The site comprises to be vacant and contains no infrastructure. The site is covered by both grasses and mature trees.	The surrounding land is predominately vacant with a mix of both bush land and agriculture. A creek is located to the south of the site. Roads in the area have also been developed. A scattering of rural residential homes is present particularly to the north and west of the site.
1951	The site has been cleared of the majority of trees and redeveloped with two rural residential dwellings. One is located on the northern boundary and one on the south-eastern boundary. Both properties contain multiple sheds at the back of their houses.	The majority of the land to the west, south and east has been redeveloped for residential purposes. Land to the north has been cleared off all vegetation and appears to be in the early stages of redevelopment. A drainage channel has been developed to the south of the site where the creek was previously located.

TABLE 6.1 (CONT) – AERIAL PHOTOGRAPH OBSERVATIONS

Year	Site Features	Surrounding Land Use
1961	A commercial/industrial building has been constructed on the northeast boundary of the site adjacent to the existing residential dwelling. The remainder of the site appears unchanged.	Commercial/industrial buildings have been constructed to the northeast, northwest and west of the site. An increase in residential dwellings has occurred to the south and southeast of the site.
1970	The northern portion of the site appears to remain unchanged however the southern portion of the site has been redeveloped. The residential dwelling and sheds have been demolished and three long warehouse are now located along the south, east and western boundaries. A large commercial/industrial building has also been constructed in approximately the centre of the site.	An increase in commercial/industrial buildings surrounding the site has occurred. The remainder of the surrounding areas is essentially unchanged.
1986	The site features are essentially unchanged however; the commercial/industrial building located in the centre of the site has been extended.	The land uses surrounding the site remain largely unchanged.
1994	The previously existing buildings in the northern portion of the site have been demolished and no infrastructure has replaced those buildings. The southern portion of the site is essentially unchanged.	The land surrounding the site remains largely unchanged. However an increase in the number of commercial/industrial buildings has occurred.
2002	The site northern portion of the site has been redeveloped with a commercial/industrial building. The remainder of the site is essentially unchanged.	The land surrounding the site remains largely unchanged.
2005	The site features are essentially unchanged.	The land surrounding the site also remains largely unchanged.

A review of satellite imagery from 2007 to 2013 available on Google Earth program was also performed, and shows the site features to be the same as those which are evident in the 2005 aerial photograph. The land surrounding the site is also largely unchanged, although a new large commercial/industrial has been constructed on the land to the north of the site.

6.2 Section 149 (2) Certificate

A Section 149 (2) Certificate was obtained from Fairfield Council to determine if any restrictions have been placed on the land due to contamination related risks. A copy of the certificate is provided in Appendix B. The Section 149 (2) Certificate shows that there are

no notices under the provisions of the *Contaminated Land Management Act 1997* issued in relation to the site. Further, the site has not been the subject of a Site Audit.

6.3 Historical Title Search

Copies of the historical land title transfers were obtained from the Land Titles Office, and are provided in Appendix C. A summary of the property ownership details is summarised in Table 6.2, along with key leaseholders. The land use associated with each occupant, where available (based on an internet search), is also provided.

TABLE 6.2 – HISTORICAL LAND TITLE SUMMARY

Year	Registered Owner/Occupant
Lot 2 DP 818038 – Northern Section	
2002 - Present	NKM Holdings Pty Limited
1993 - 2002	World Services and Constructions Pty Limited
1989 - 1993	World Services and Constructions Pty Limited and Anodisers (Holdings) Pty Limited
1953 - 1989	The Dairy Farmers Co-Operative Milk Company Limited
1947 - 1953	Charles Russell James Taylor and Dorothy Kathleen Taylor (Brick maker)
1915 – 1947	Richard Heath Rickard and Emma Augusta Rickard (Freeholder)
Lot 2 DP 818038 – Southern Section	
2002 - present	NKM Holdings Pty Limited
1963 - 2002	World Services and Constructions Pty Limited
1960 - 1963	Alluvial Mining Equipment Limited
1958/1960 - 1960	Fler Company and Staff (NSW) Pty Limited
1951 – 1958/1960	Alfred James Davey (Railway Ganger) and Frank Solomon Hansman (Medical Practitioner)
1927 - 1951	Richard Heath Rickard and Emma Augusta Rickard (Freeholder)
Lot 3 DP 818038	
2010 - Present	NKM Holdings Pty Limited
2005 - 2010	ISCAR Australia Pty Limited
1995 - 2005	IMC International Metalworking Companies BV

1993 - 1995	Anodisers (Holdings) Pty Limited
1989 - 1993	World Services and Constructions Pty Limited and Anodisers (Holdings) Pty Limited
1953 – 1989	The Dairy Farmers Co-Operative Milk Company Limited
1947 - 1953	Charles Russell James Taylor and Dorothy Kathleen Taylor (Brick maker)
1915 - 1947	Richard Heath Rickard and Emma Augusta Rickard (Freeholder)

6.4 WorkCover NSW Records

WorkCover was also requested to search their Dangerous Goods License database to identify if the property is currently, or had previously been licensed for the storage of dangerous goods. The response provided by WorkCover is presented in Appendix D.

Information provided by WorkCover indicated that records concerning to the site could be located.

6.5 NSW EPA Records

The EPA contaminated land public register was inspected on 9 September 2014 to determine if any notices have been issued for the site by EPA under the *Contaminated Land Management Act 1997* (CLM Act) or if the site is registered under the *Protection of the Environment Operations Act 1997* (POEO Act). Our review shows that the site is not listed under the provisions of the CLM Act. Further, our review shows that the site is not listed on EPA's database of properties for which a notification has been received (under the provisions of the *Contaminated Land Management Act 1997*) due to site contamination.

6.6 Site History Summary

Based on the historical information reviewed, the site has been used for commercial/industrial purposes since the 1970s. Activities that are either known or expected to have occurred at the site include various medium scale commercial companies involved in metal fabrication, rigging, construction and diary production.

7. PREVIOUS ENVIRONMENTAL ASSESSMENTS

There are no known previous environmental assessments relating to the site.

8. POTENTIAL CONTAMINATION SOURCES

Based on our site history review and site inspection, an appraisal of the potential contamination risk at the site has been performed, the results of which are summarized in Table 8.1 below.

TABLE 8.1 – CONTAMINATION RISK ANALYSIS

Source	Location	Contamination Pathway Analysis	Potential for Soil Impacts
History of industrial land use	Whole site	The site has been used for commercial/industrial purposes since the 1970s, and key activities that are expected to have occurred on the site include metal fabrication. In view of this, there is the potential for the near surface soils to have been impacted as a result of leaks or spills of chemical products.	Moderate potential for soil impacts to have occurred that are significant for a continued commercial/industrial land use setting.
Filling of the site for levelling purposes	Majority of site, with greatest depths in the north of the property	As the source of the fill cannot be confirmed it has the potential to be contaminated.	Moderate potential for soil impacts to have occurred that are significant for a continued commercial/industrial land use setting.
Presence of fibre cement sheeting which potentially contains asbestos	Within the fabric of the three long warehouse buildings at the southern end of the site	There is the potential for the near surface soil around buildings to be impacted with asbestos fibres as a result of the breakdown of asbestos cement sheeting materials.	Moderate potential for soil impacts to have occurred which are significant for a continued commercial/industrial land use setting.

9. DATA QUALITY OBJECTIVES

The *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM) (and updated April 2013) and Australian Standard (AS) 4482.1-2005 recommend that data quality objectives (DQOs) be implemented during the investigation of potentially contaminated sites. The DQO process described in AS 4482.1-2005 outlines seven distinct steps which are designed to ensure an investigation is performed in a structured and efficient manner. The seven steps and the associated processes that were implemented to ensure data and decision making quality are outlined below:

Step 1 – State the Problem

An ongoing industrial/commercial land use is proposed for the site. Prior to this assessment there was insufficient data to determine if the site is suitable for this proposed use.

Step 2 – Identify the Decision

To determine if the concentrations of contaminants in the soil at the site present an unacceptable risk to human-health or the environment for continued commercial/industrial land use.

Step 3 – Identify Inputs to the Decision

To enable a decision regarding the extent of contamination at the site to be made, the following inputs were required:

- Soil sampling from 22 locations positioned at evenly spaced locations across the site;
- Analysis of the soil samples for a broad screen or potential contaminants;
- Implementation of a quality assurance/quality control (QA/QC) program.

Step 4 – Define the Study Boundaries

The assessment was undertaken within the boundaries of the site located at 65-67 Mandarin and 38-42 Seville Streets, Villawood, NSW. The boundaries of the site are defined in Section 3 and are shown on Drawing No. 14/1786/2.

Step 5 – Develop a Decision Rule

To determine if any soil impacts at the site are significant for a continued commercial/industrial land use setting, data was compared to relevant EPA endorsed criteria. The criteria for this assessment are further discussed in Section 12.

Step 6 - Specify Limits on Decision Errors

To ensure the precision, accuracy, completeness and comparability of data a field QA program was implemented and acceptable error limits were defined. These are further discussed in Section 11.

Step 7 – Optimize the Design for Obtaining Data

To ensure there are sufficient, reliable data to enable the project objectives to be met the following was implemented:

- Obtaining samples from an appropriate number of locations to assess a 1.1 hectare site in accordance with EPA guidelines;
- Collection, storage and transport of soil samples in an appropriate manner to ensure sample integrity (refer to Section 10);
- The collection of an appropriate number of samples from each location and the analysis of samples for an appropriate analytical suite to screen the site for potential soil contamination, based on the potential contamination sources identified from our site inspection and site history review;

10. FIELD INVESTIGATION

The field activities for the DSI were undertaken by STS on 19 August 2014. The assessment was performed according to:

- EPA guidelines comprising:
  - *Contaminated Sites: Guidelines for Assessing Service Station Sites, 1994*;
  - *Contaminated Sites: Sampling Design Guidelines, 1995*;
  - *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, 1997*;
  - *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), 2006*;

- Guidelines issued under Schedule B of the *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM), Environment Protection and Heritage Council (EPHC)/National Environment Protection Council (NEPC), December 1999 (and updated NEPM of April 2013);
- *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* published by the Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council, January 1992 (ANZECC Guidelines);
- Australian Standard 4482.1-2005*: Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Part 1: Non-volatile and Semi-volatile Compounds, 2 November 2005, Standards Australia*.

10.1 Soil Sampling

The sampling program involved the collection of soil samples from 22 locations, which were positioned across the general site. This is a sufficient number of sampling locations to characterize the nature and extent of soil contamination on the 1.1 hectare site in accordance with EPA guidelines and the NEPM. In addition, two surface samples were collected from the exposed surface surrounding the buildings containing fibre cement sheeting materials in order to determine if the soil contains asbestos. The sample locations and site features are shown on Drawing No. 14/1786/2.

Sample locations were referenced to existing ground features and positioned subject to site access issues, on-site services and subsurface conditions, which were encountered during fieldwork activities. The samples were collected by qualified and experienced environmental engineers and technicians. A description of all the samples collected and their corresponding sample locations is provided on soil profile log sheets in Appendix E.

10.1.1 Soil Sample Handling & Equipment Decontamination

A drill rig equipped with solid rotary augers and a manual hand auger was used to obtain the soil samples, and the samples were retrieved directly from the augers by hand using disposable latex gloves. Following collection the samples were transferred into new clean jars prepared by Australian Laboratory Services (ALS). No sample mixing was carried out

to ensure that the loss of any volatile compounds that could be present within the soil matrix is minimized. All sampling equipment was decontaminated prior to use and between sampling locations by washing with a mixture of water and DECON 90 and rinsing with potable water.

All jars were filled to the rim to minimize head space. The sample jars were then placed into ice-filled chests and transferred to ALS for analysis. Chain of Custody (COC) documentation was used to record and track the samples, and is provided in Appendix G. COC documentation detailing the required analyses accompanied the samples to the laboratory. The environmental engineer signed the appropriate section of the COC form before providing the samples to the laboratory.

10.1.2 Analytical Program for Soil Samples

The selection of analytes was based on the site history review, our observations made during our site inspection and EPA site assessment guidelines. The analytes for the soil samples included heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (MAH), volatile chlorinated hydrocarbons (VCH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), organophosphorus pesticides (OPPs), phenolic compounds, cyanide and asbestos.

The analytical program for the soil samples is outlined in the COC documentation, which is provided in Appendix G. ALS Sydney was selected as the primary laboratory, and ALS Brisbane was selected as the secondary laboratory for implementation of the field quality assurance program. ALS is NATA accredited for the analyses performed.

10.1.3 Soil Vapour Survey

During the soil sampling program the concentrations of ionisable volatile organic compounds (VOCs) released from the soil matrix were measured using a photoionisation detector (PID). This provides a qualitative screen of the degree to which the soil samples may be impacted with VOCs. The screening methodology involved the placement of a small portion of each sample (up to approximately 50g) into a sealed plastic ‘snaplock’ bag, which is kept at room temperature and out of direct sunlight for 10-20 minutes, before the

PID reading as taken in the headspace above the sample. The PID was calibrated using a 100ppm isobutylene span gas prior to use.

The PID readings obtained during the soil vapour survey are presented on the soil profile logs in Appendix E. The concentration of ionisable vapours measured in the headspace above the soil ranged from 0.1 ppm to 3.2 ppm (v/v isobutylene equivalent), which is low and suggest that the soil is not significantly impacted with VOCs.

11. QUALITY ASSURANCE PROGRAM

Quality assurance (QA) of data was a key component of this investigation in order to appraise the representativeness and integrity of samples and accuracy and reliability of the analytical results. This is in accordance with the NEPM and AS 4482.1-2005.

The QA procedures, actions and checks implemented during the investigation included:

- The utilisation of appropriate sampling methods in accordance with the EPA requirements, the NEPM and other key guidelines;
- Appropriate sample handling and transportation, and analysis of samples within recommended holding times;
- The collection and analysis of quality control (QC) samples;
- Implementation of internal laboratory QC analyses; and
- The use of National Association of Testing Authorities (NATA) registered laboratories (primary and secondary) and methods.

11.1 Quality Control Sampling

Inaccuracies in sampling and analytical programs can result from many causes, including collection of unrepresentative samples, cross contamination between samples, unanticipated interferences between elements during laboratory analyses, equipment malfunctions and operator error. Inappropriate sampling, preservation, handling, storage and analytical techniques can also reduce the precision and accuracy of results.

In order to address these potential data quality issues, a field-based QC program was undertaken to measure the effectiveness of the QA procedures by comparison with acceptance criteria. The NEPM has documented procedures for QC sampling and analysis to ensure that the required degree of accuracy and precision is obtained. The NEPM and EPA guidelines recommend the use of two laboratories for the implementation of a field QC program in addition to the internal QC procedures followed by the laboratories, which are required in accordance with their NATA registration.

According to the NEPM the collection of intra and inter-laboratory duplicate samples is required, along with blank samples. Intra-laboratory and inter-laboratory samples are duplicates of primary samples that are collected in the field. Intra-laboratory samples are analysed by the primary laboratory and are used as a check on the precision of the sampling and analytical procedures. Inter-laboratory samples are analysed by a secondary laboratory and provide a check as to the accuracy of the analytical data. Field blank samples include rinsate blanks and trip blank samples.

Rinsate blanks are samples of water collected from field equipment after decontamination, and are used to determine the effectiveness of the decontamination procedures. Trip blanks are samples of deionised water prepared prior to sampling, and are stored and transported with the samples. They are used to identify laboratory errors or to identify sources of contamination due to sample storage and handling.

According to the NEPM a split of a minimum of 10% of the primary samples as field duplicate samples (5% inter-laboratory and 5% intra-laboratory) as well as blanks is required. Where less than 20 samples are to be analysed, a minimum of two field duplicate samples (one inter-laboratory and one intra-laboratory) and a blank is generally considered sufficient. Blanks are generally collected on each day that sampling is performed, and are analysed where necessary.

For this contamination assessment the following field quality control samples were collected and analysed:

- Two intra-laboratory duplicate soil samples;
- Two inter-laboratory duplicate soil samples;

In view of the rigorous field-based decontamination procedures that were implemented during the investigation and that the results of the PID survey showed that the soil samples were not likely to be significantly impacted with VOCs, the collection of rinsate and trip blank samples was not considered necessary.

11.2 Quality Control Criteria

A check on the comparability of the field duplicate sample results is achieved by calculating the Relative Percent Difference (RPD). RPDs are calculated as the absolute value of the difference between the primary and duplicate sample results, divided by the average value, expressed as a percentage.

According to AS 4482.1-2005 (and referenced in the NEPM) RPDs below 50% are considered to demonstrate good correlation between duplicate sample results. However, AS 4482.1-2005 also states that the acceptable variation between results can be higher for organic analytes than for inorganics, and for low concentrations of analytes. In view of this, and based on STS's experience, RPDs up to 70% are considered to be acceptable for organic species. RPDs of 100% or more are generally considered to demonstrate poor correlation unless results are less than five times the laboratory detection limits.

11.3 Laboratory Quality Control

A laboratory QC program involves the preparation and analysis of their own duplicate samples, reagent blanks and control samples (where the analyte concentration is known) or matrix spikes. Duplicate samples are subjected to the same preparation and analytical procedures as primary samples. The laboratories are required to analyse matrix spikes or control samples at a minimum frequency of 5% of the total number of primary samples in each sample batch.

The results of method blanks, duplicates and control sample analyses are compared by the laboratory to established quality assurance criteria for data precision and accuracy. If the results do not meet the criteria, then the analyses should be repeated. The relevant criteria are:

- Method blanks should not return any positives on analysis;
- Duplicate samples should not vary by more than 35% from the mean result; and
- Control samples should generally give a recovery of 75-125%.

12. ASSESSMENT CRITERIA

The quality criteria used during this investigation to appraise the significance of the contaminant concentrations in the soil and groundwater are outlined below.

12.1 Soil Criteria

Current EPA guidelines state that the key criteria for assessing potentially contaminated sites in New South Wales are the Soil Investigation Levels (SILs), which are outlined in *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (DEC, 2006). The SILs have been adopted from Schedule B(1) of the National Environmental Protection Council document *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (NEPM).

The NEPM criteria comprise Health-Based Investigation Levels (HILs) and the Ecologically-Based Investigation Levels (EILs). The HILs are threshold values that are indicative of potential adverse impacts to human health, whilst the EILs are values that indicate a potential phytotoxic effect to plants.

In recent years the 1999 NEPM has been under review, with an updated draft document being released in 2010. In April 2013 the updated NEPM was officially released and has since been endorsed by EPA. The new 2013 NEPM has been developed using essentially the same framework as the 1999 version, however, it does provide updated HIL criteria for a range of chemical contaminants. It also builds on the EILs provided in the 1999 NEPM by outlining a more comprehensive set of environmental screening levels (ESLs), which are designed not only to be indicative thresholds for phytotoxic effects to plants, but to be protective of ecosystems generally.

The ESLs/revised EILs are generally less conservative than the old EILs, however their use requires key soil chemistry data, specifically the pH and cation exchange capacity (CEC) of the soils on a particular site, and in some cases the percentage clay content of the soil. In the absence of pH and CEC data the phytotoxicity-based investigation levels (PILs) outlined in the NSW EPA *Guidelines for the NSW Site Auditor Scheme (2nd Edition)* may still be used as a screening tool. The PILs were adopted from the 1999 NEPM EIL criteria (i.e. they are the same).

Further, the 2013 NEPM outlines criteria for key volatile hydrocarbon compounds which are designed to be protective of human-health via a soil vapour inhalation exposure pathway (termed Health Screening Levels (HSLs)). The 2013 NEPM criteria should be used for environmental assessments in the Australian context as they are the most current and comprehensive set of screening criteria available. That is, they are used in preference to the SILs.

There are four main categories of HIL outlined in the 2013 NEPM, which are each used to appraise the risks posed by site contamination for different land use settings. These include:

Residential A: for a 'standard' residential land use with gardens and accessible soil, including children's day care centres, preschools and primary schools.

Residential B: for a residential land use with minimal opportunities for soil access, including properties with fully and permanently paved yard space such as high-rise apartments and flats

Recreational C: for parks, recreational open space, playing fields, including secondary schools

Commercial/Industrial D: for a commercial/industrial land use.

It is noted that the NEPM HILs do not provide criteria for some petroleum hydrocarbon compounds. In the absence of HIL criteria the '*threshold concentrations for a sensitive land use*' (EPA Threshold Concentrations) outlined in EPA's "*Guidelines for Assessing Service Station Sites*" (EPA, 1994) may be used as screening criteria, however, the 1999 NEPM HILs do provide threshold values for hydrocarbon fractions that may be adopted provided that speciation testing is undertaken for specific aromatic and aliphatic components.

Where a proposed land use will include more than one land use category (e.g. mixed residential/commercial development) the criteria which are protective of the most sensitive of the combined land uses should be adopted.

We understand that an ongoing commercial/industrial land use is for the site. Therefore, the HIL D criteria (for a commercial/industrial land use setting) are the most applicable and have been adopted for this investigation. The EPA Threshold Concentrations have also been adopted as screening criteria for petroleum hydrocarbon compounds in the absence of HIL criteria. In addition, the HSLs for vapour intrusion have been considered.

Given that almost the entire site is covered with hardstand pavements, there is a very limited growing medium for plants. Further, the sealed configuration of the land is likely to be retained of the site was refurbished or redeveloped. In view of this, the ESLs are not considered to be relevant and have therefore not been used for this investigation. This is in accordance with the decision tree for assessing urban development sites which is outlined in Appendix 1 of the *Guidelines for the NSW Site Auditor Scheme (2nd Edition)* (EPA, 2006), which states that environmentally based criteria do not need to be adopted for commercial/industrial sites. However, the ESLs for petroleum hydrocarbons have been adopted as preliminary screening criteria in the absence of HILs.

The criteria which has been used for this investigation is outlined in Table 12.1 on the next page.

TABLE 12.1 – SITE SOIL ASSESSMENT CRITERIA
(all concentrations in units of mg/kg)

Contaminant	HIL D (Commercial/ Industrial)	HSL D (Commercial/ Industrial)[3]	ESL (Commercial/ Industrial)[6]	EPA Threshold Concentrations
Inorganics				
Arsenic (total)	3000			
Beryllium	500			
Boron	300000			
Cadmium	900			
Chromium	3600[1]			
Cobalt	4000			
Copper	240000			
Lead	1500			
Manganese	60000			
Mercury	730[2]			
Nickel	6000			
Tributyl Tin	180[7]			
Zinc	400000			
Organics				
F1 TPH (C_6-C_{10})[4]		260	215	
F2 TPH (C_{10}-C_{16})[5]			170	
F3 TPH (C_{16}-C_{34})			1700	
F4 TPH (C_{34}-C_{40})			3300	
Benzene		3		1
Toluene				1.4
Ethyl benzene				3.1
Total Xylenes				14
Naphthalene				
Total PAHs	4000			
Carcinogenic PAHs	40			
Aldrin + Dieldrin	45			
Chlordane	530			
DDT+DDD+ DDE	3600			
Heptachlor	50			
PCBs	7			
Phenols	240000			
Cyanide	1 500[7]			

[1] Criterion for hexavalent chromium
[2] Criterion for inorganic mercury
[3] HSL for sandy soils within 1 m of the land surface
[4] F1 TPH = TPH (C_6-C_{10}) minus BTEX fraction
[5] F2 TPH = TPH (C_{10}-C_{16}) minus naphthalene fraction
[6] Criterion for coarse texture grades
[7] Criterion for free cyanide

13. ANALYTICAL RESULTS AND INTERPRETATION

The analytical results for the soil and groundwater samples are presented in the NATA endorsed laboratory reports included in Appendix H and are summarised in the Tables of Results attached to this report. The results exceeding the assessment criteria are highlighted in the tables accordingly.

13.1 Interpretation of Soil Sampling Results – Human-Health Appraisal

The analytical results for the soil samples are presented in Table A. The results show that the concentrations of organic and inorganic species analysed for are generally low and well below the NEPM HIL/HSL D criteria, the NEPM ESLs and the EPA Threshold Concentrations. However, asbestos fibres were detected in the fill at one sample directly south of the warehouse building.

13.2 Soil Exposure Pathways

The results of the sampling program performed for this investigation show that the concentrations of chemical contaminants measured in the soils across the site would not present an unacceptable risk to human-health for a commercial/industrial land use setting. However, the presence of asbestos fibres in the layer of fill material on the site could present a potential risk to human-health should an exposure (inhalation) pathway exist.

Active remediation of the asbestos impacted soil is not necessarily required to make the site suitable for an on-going commercial/industrial land use, as the existing concrete slabs which cover the site are considered to be an adequate barrier to prevent site occupants from coming being inadvertently exposed to the asbestos impacted soil. However, there is the potential that human-health and environmental exposures could occur should areas of concrete pavement be removed, either permanently or temporarily. In view of this, a Site Management Plan (SMP) should be prepared for the site, which will outline procedures to ensure that human-health and the environment is appropriately protected during sub-surface works.

13.3 Potential for Off-Site Migration of Contamination

Given that the majority of the site is covered with asphalt, concrete pavements and a layer of gravel in unsealed areas, off-site migration of contaminants via surface runoff or wind action is unlikely to have occurred.

13.4 Duty to Report Site Contamination

Under the provisions of the *Contaminated Land Management Act 1997* (CLM Act), a site owner or occupant has a duty to notify EPA of any significant contamination that has the potential to cause human-health or environmental impacts. The requirements for reporting contamination are outlined in EPA's *Guidelines on the Duty to Report Contamination Under the Contaminated Land Management Act 1997*, which became effective on 1 December 2009. This guideline outlines the specific triggers which need to be considered for notifiable contamination under the CLM Act.

For soil, the notification thresholds are the SILs, which are outlined in EPA's *Guidelines for the NSW Site Auditor Scheme (2nd Edition*). Where contaminants exceed their SIL criteria by more than 2.5 times or where the average concentrations of contaminants in soil exceed the applicable SILs, EPA must be notified. Further, it should be noted that the Duty to Report Guidelines do not define notification thresholds for all contaminants. EPA has advised that where no criteria are listed, the need to submit a notification (or otherwise) should be based on advice provided by an environmental consultant.

With regard to groundwater, EPA must be notified if elevated concentrations of contaminants are a) identified to be above criteria which are protective of drinking water (adopted from the *Australian Drinking Water Guidelines 6, 2011*) and b) due to sources on a particular site rather than being regional or background concentrations. Where impacted groundwater is likely to be discharging into a surface water body within 500 m of the contaminant source, criteria that are protective of aquatic ecosystems in both fresh and marine waters (outlined in the *ANZECC 2000 Guidelines on Fresh and Marine Water Quality*) also apply. The threshold criteria for notification in relation to groundwater impacts are provided in Appendices A and B of the Duty to Report Guidelines.

In addition, it should be noted that in view of the release of the 2013 NEPM (which provides the most current applicable assessment criteria), the Duty to Report Guidelines are currently being reviewed. However, EPA has advised that the current guideline remains relevant and should still be used in the intermediary period until the revised guidelines have been released.

The results of the soil sampling performed for this investigation show that the concentrations of contaminants in the soils are below the SIL (Column 4) criteria for a commercial/industrial land use setting. It is noted that there is currently no SIL criterion or any other notification thresholds for asbestos. However, we consider that the presence of asbestos fibres in the soil on the site does not present an immediate and unacceptable risk to human-health for an ongoing commercial/industrial use of the land provided that the sealed configuration of the site is retained and that a SMP be prepared and implemented. That is, with an SMP in place there would be no need to notify EPA in relation to the soil impacts based on currently available data.

13.5 Assessment Outcomes

Based on the results of this DSI, and that the areas of concern are covered in hardstand surfaces, the site is considered to be suitable for an on-going commercial/industrial use in its current condition. However, a SMP should be prepared and implemented in the short term. The purpose of the SMP is to outline procedures to a) ensure that the sealed configuration of the site is maintained and b) to protect human-health and the environment in the event that sub-surface works are ever required at the site.

14. EVALUATION OF QUALITY ASSURANCE

14.1 Field Duplicate Sample Results

The results of the field intra and inter-laboratory duplicate sample analyses for soils are compared to those of the corresponding primary samples in Table B.

The results for the soil duplicate samples show that the variations between the primary and duplicate sample concentrations exceed the allowable Relative Percentage Difference

(RPD) criteria of 50% for inorganic species and 70% for organic analytes in only one of the 72 comparable data sets, which is an acceptable rate of correlation. The discrepancies encountered are expected to be due to the heterogeneous distribution of heavy metals and petroleum hydrocarbons within fill material. Further, the concentrations of contaminants in both the primary and duplicate samples are below the assessment criteria which have been adopted for this investigation. That is, the RPD discrepancies do not affect the outcome of the investigation.

14.2 Laboratory Quality Control Program

Our review of the laboratory's internal QC program has shown that the majority of internal duplicate samples, spike recoveries, surrogate standards and laboratory blanks were within the laboratories' recommended range for acceptable reproducibility. Therefore, STS considers the laboratory data obtained in the sampling program to be of acceptable precision, accuracy and reliability and representative of the site conditions encountered.

14.3 Procedure Based Quality Control

An appraisal of the key procedure-based quality control aspects of the investigation are summarized in Table 14.1 below.

Table 14.1 Appraisal of Procedure-Based Quality Control

Item	Compliance	Reference/Comments
Appropriate sampling methods adopted?	Yes	Refer to Sections 10.1
Appropriate sample handling and transportation procedures implemented?	Yes	Refer to Sections 10.1 and COC documentation in Appendix G
Samples analysed within recommended laboratory holding times?	Yes	Refer to COC documentation in Appendix G and laboratory reports in Appendix H
NATA accredited laboratory testing methods used?	Yes	Refer to laboratory reports in Appendix H

15. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the DSI, the following conclusions and recommendations are made:

- The site has been used for commercial/industrial purposes since the 1970s. Activities that are either known or expected to have occurred at the site include various medium scale commercial companies involved in metal fabrication, rigging, construction and diary production.
- The results of the soil sampling program performed for this investigation show that the concentrations of chemical contaminants measured in the soils across the site are generally low and below criteria that are protective of human-health and the environment for a continued commercial/industrial land use setting. However, asbestos fibres have been identified in the soil at one location directly south of the warehouse building.
- The presence of asbestos fibres in the soil could present a potential risk to human-health where exposure pathways exist. However, over three quarters of the site is covered with continuous concrete pavements, which is considered to be an adequate barrier to prevent site occupants from being inadvertently exposed to the asbestos impacted soil. In view of this, active remediation of the asbestos impacted soil is not necessarily required to make the site suitable for an on-going commercial/industrial land use. However, a SMP should be prepared, which will outline procedures to ensure that human-health and the environment is appropriately protected during sub-surface works, should any be required in the future.
- If redevelopment occurs, it would be prudent to sample within the warehouse building, that could not be accessed during this investigation and to remediate the asbestos contaminated soil.
- Based on the results of this DSI, the site is considered to be suitable for an on-going commercial/industrial land use provided that the extent of hardstand surfaces is maintained and that a SMP is prepared and implemented.

16. LIMITATIONS

SMEC Testing Services Pty Limited has performed its services for this project in accordance with its current professional standards. Laboratory analyses were undertaken as part of this investigation by Australian Laboratory Services, who are NATA accredited for the analyses performed.

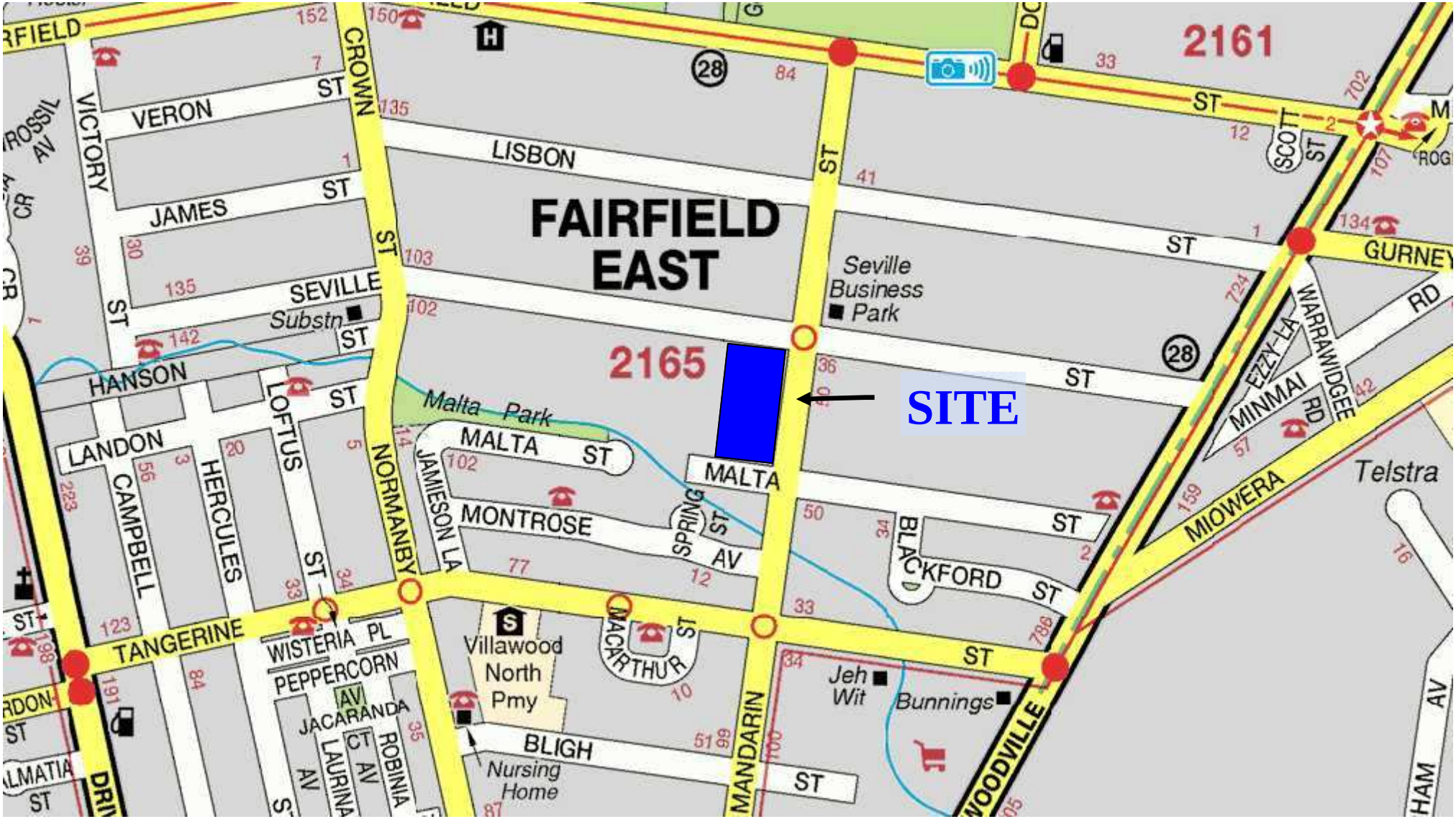
When assessing the extent of contamination across a site for a soil sampling program there is the possibility that variations may occur between sample locations and the actual presence of contaminated material at the site may differ from that referred to herein, since no sampling program, no matter how comprehensive, can reveal all anomalies and hot spots that may be present.

The data collected has been used to form an opinion about site contamination with regard to a continued commercial/industrial land use. If the nature of the proposed development changes, the conclusions given in this report may need to be revised. Also, regulatory evaluation criteria are constantly changing and as a consequence, concentrations of contaminants presently considered low may, in the future, fall under different regulatory standards that may alter the outcome of this investigation. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

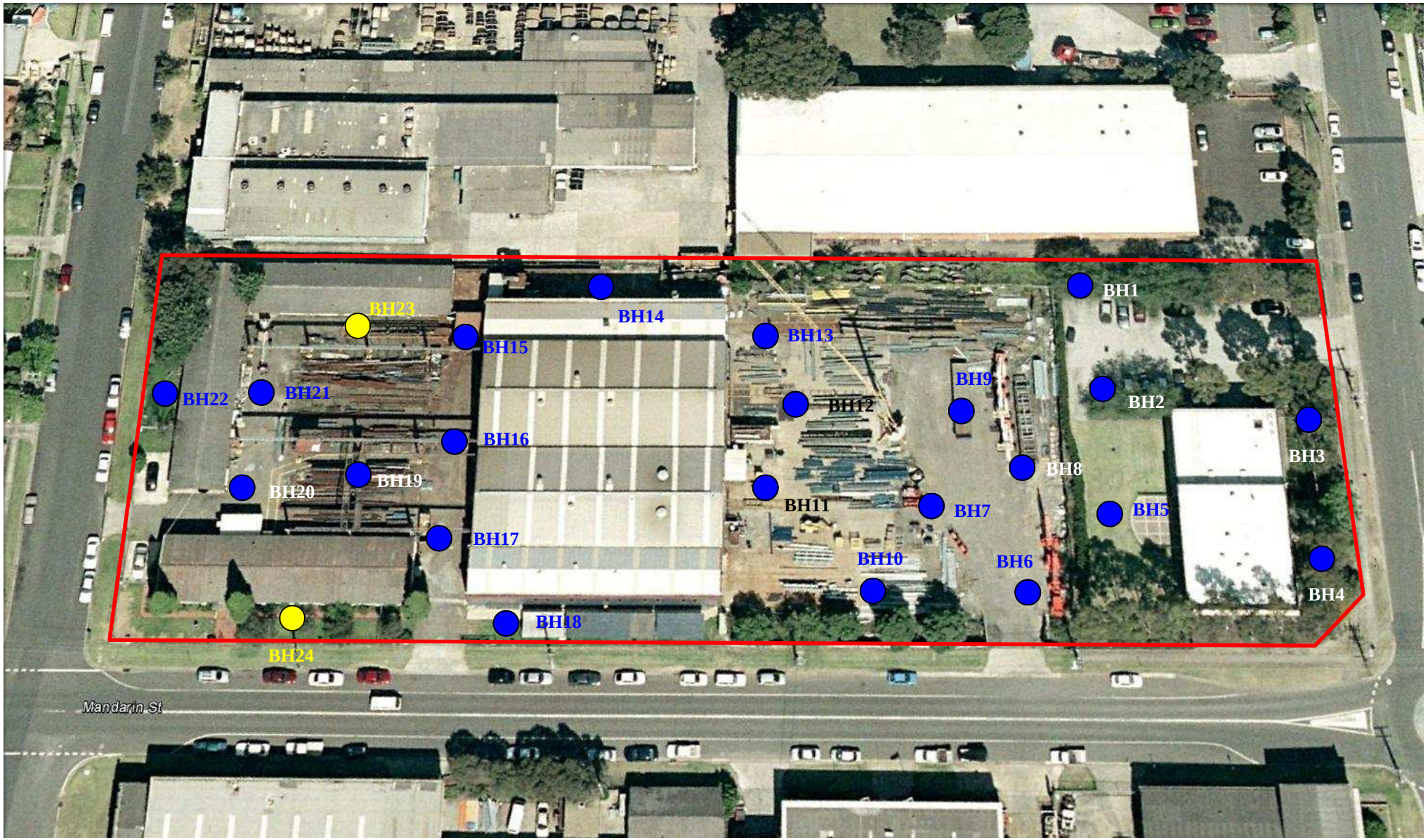
This document and the information herein have been prepared solely for the use of Merhis Pty Ltd for the purposes nominated in this report. No person or organization other than Merhis Pty Ltd is entitled to rely on any part of the report without the prior written consent of SMEC Testing Services Pty Ltd. Any third party relying on this report shall have no legal recourse against SMEC Testing Services Pty Ltd or its parent organizations or subsidiaries and shall indemnify and defend them from all and against all claims arising out of, or in conjunction with such use or reliance.

Natasha Ryan (BSc)
Environmental Scientist,
SMEC Testing Services Pty Limited

FIGURES



SMEC TESTING SERVICES Pty. Ltd.	Scale: Unknown	Date: September 2014
Client: MERHIS PTY LTD		
DETAILED SITE INVESTIGATION **65-67 MANADARIN & 38-42 SEVILLE STREETS, VILLAWOOD** **SITE LOCATION**	Project No. 19852/4618C	
	Drawing No: 14/1786/1	



Borehole location

Surface sample location

Site Boundary

N

SMEC TESTING SERVICES Pty. Ltd.	Scale: Unknown	Date: September 2014
Client: MERHIS PTY LTD		
DETAILED SITE INVESTIGATION 65-67 MANADARIN & 38-42 SEVILLE STREETS, VILLAWOOD BOREHOLE LOCATIONS	Project No. 19852/4618C	
	Drawing No: 14/1786/2	

TABLES OF RESULTS

Table A Analytical Results for Soil Samples

Analytes	Borehole No.	BH01	BH02	BH02	BH03	BH04	BH05	BH05	BH05	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH13	BH14	BH15	BH16	BH16	BH17	NEPM Background Ranges	NSW EPA Threshold Concentrations	NEPM 2013 ESLs for Commercial/Industrial Setting	NEPM 2013 HIL/HSL D Criteria - Commercial/Industrial
	Depth	0.2	0.2	1.0	0.2	0.2	0.2	0.8	1.0	1.5	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.2				
Metals																										
Arsenic		<5	<5	<5	<5	<5	<5	10	10	6	<5	<5	5	5	7	<5	<5	<5	6	6	5	<5	1-50			3,000
Cadmium		<1	3	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1			900
Chromium		11	9	15	10	9	57	18	18	16	9	9	11	11	16	10	10	15	21	22	16	12	5-1 000			3,600 (b)
Copper		10	12	10	22	17	24	15	14	16	12	113	22	19	19	13	15	83	50	52	20	14	2-100			240,000
Lead		32	167	60	66	54	66	23	41	13	14	17	27	24	18	8	24	14	17	31	33	17	2-200			1,500
Mercury		<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001-0.1 (a)			730 (c)
Nickel		5	7	8	8	4	11	17	8	6	25	16	20	18	10	8	39	69	33	38	7	11	5-500			6,000
Zinc		67	97	37	102	62	108	24	63	7	28	67	73	51	20	14	61	59	74	142	81	170	10-300			400,000
Monocyclic Aromatic Hydrocarbons (MAHs)																										
Benzene		<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	0.05-1 (a)	1	75 (e)	3 (d)
Ethylbenzene		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5		3.1	165 (e)	
Toluene		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	0.1-1 (a)	1.4	135 (e)	
Xylenes		<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	1.4	-	<1.0		14	180 (e)	230 (d)
Napthalene		<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1				
Total MAHs above detection limits		ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND	ND	ND	1.4	-	ND				
Total Petroleum Hydrocarbons (TPHs)																										
Total C_6-C_9		<10	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10		65		
F1 C_6-C_{10}[1]		<10	-	<10	<10	50	<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10			215 (e)	260 (d)
F2 C_{10}-C_{16}[1]		<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50			170 (e)	
F3 >C_{16}-C_{34}		480	-	<100	260	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	<100	<100	<100	<100	<100	<100	<100			1700 (e)	
F4 >C_{34}-C_{40}		<100	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	<100	<100	<100	<100	<100	<100	<100			3300 (e)	
Total C_{10}-C_{36}		550	-	<50	230	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50		1000		
Polycyclic Aromatic Hydrocarbons (PAHs)																										
Carcinogenic PAHs[2]		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5				40
Total PAHs above detection limits		<0.5	-	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	0.95-5 (a)			4,000
Organochlorine Pesticides (OCPs)																										
Total OCPs above detection limits		-	ND	-	-	-	-	ND	-	-	-	-	ND	-	ND	ND	-	-	-	ND	ND	ND				
Organophosphorus Pesticides (OPPs)																										
Total OPPs above detection limits		-	ND	-	-	-	-	ND	-	-	-	-	ND	-	ND	ND	-	-	-	ND	ND	ND				
Phenolic Compounds																										
Total Phenols		-	-	-	-	-	<1	<1	-	-	ND	ND	ND	ND	-	ND	<1	-	ND	ND	-	ND	0.03-0.5 (a)			240,000
Polychlorinated Biphenyls (PCBs)																										
Total PCBs above detection limits		-	-	-	-	-	-	<0.1	-	-	-	-	<0.1	-	-	<0.1	-	-	-	<0.1	-	<0.1	0.02-0.1 (a)			7
Total Cyanide		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-				1,500 (f)
Asbestos		-	-	-	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	-	CH,AM	-	-				

Notes : Results expressed as mg/kg unless otherwise indicated

ND = No individual species detected above laboratory detection limits.

[1] Calculated in accordance with Table 1A(3) of NEPM 2013

[2] Combined carcinogenic PAHs with relative potency to benzo(a)pyrene

CH = Chrysoltile asbestos fibres detected

AM = Amosite asbestos fibres detected

Results shaded green exceed the NSW EPA threshold concentrations for a sensitive land use.

Results shaded blue exceed the NEPM 2013 ESL criteria for a commercial/industrial land use setting

Results shaded red exceed the NEPM 2013 HIL/HSL D criteria for a commercial/industrial land use setting

(a) ANZECC background ranges used where no NEPM criteria available.

(b) Criterion for chromium (VI).

(c) Criterion for inorganic mercury.

(d) NEPM 2013 HSL criterion for vapour intrusion, 0-1m depth in sandy soils

(e) NEPM 2013 ESL criterion for coarse texture grade soils

(f) Criterion for free cyanide

SMEC Testing Services

Table A (cont) Analytical Results for Soil Samples

Analytes	Borehole No.	BH18	BH19	BH20	BH20	BH20	BH21	BH22	BH23	BH24	NEPM Background Ranges	NSW EPA Threshold Concentrations	NEPM 2013 ESLs for Commercial/Industrial Setting	NEPM 2013 HIL/HSL D Criteria - Commercial/Industrial
	Depth	0.2	0.2	0.2	0.7	1.0	0.2	0.1	0.1	0.1				
Metals														
Arsenic		<5	6	6	<5	8	<5	<5	-	-	1-50			3,000
Cadmium		<1	<1	<1	<1	<1	<1	<1	-	-	1			900
Chromium		13	18	15	695	90	15	11	-	-	5-1 000			3,600 (b)
Copper		28	47	40	97	130	44	10	-	-	2-100			240,000
Lead		38	21	22	455	97	77	13	-	-	2-200			1,500
Mercury		<0.1	<0.1	<0.1	0	<0.1	0.1	<0.1	-	-	0.001-0.1 (a)			730 (c)
Nickel		25	30	23	15	19	23	16	-	-	5-500			6,000
Zinc		109	82	80	1480	487	113	41	-	-	10-300			400,000
Monocyclic Aromatic Hydrocarbons (MAHs)														
Benzene		<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	-	0.05-1 (a)	1	75 (e)	3 (d)
Ethylbenzene		<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-		3.1	165 (e)	
Toluene		<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	0.1-1 (a)	1.4	135 (e)	
Xylenes		<1.0	<1.0	1.5	<1.0	-	<1.0	<1.0	-	-		14	180 (e)	230 (d)
Napthalene		<1	<1	<1	<1	-	<1	<1	-	-				
Total MAHs above detection limits		ND	ND	1.5	ND	-	ND	ND	-	-				
Total Petroleum Hydrocarbons (TPHs)														
Total C_6-C_9		<10	<10	<10	<10	-	<10	<10	-	-		65		
F1 C_6-C_{10} [1]		<10	<10	<10	<10	-	<10	<10	-	-			215 (e)	260 (d)
F2 C_{10}-C_{16} [1]		<50	<50	<50	<50	-	<50	<50	-	-			170 (e)	
F3 >C_{16}-C_{34}		<100	<100	<100	740	-	<100	<100	-	-			1700 (e)	
F4 >C_{34}-C_{40}		<100	<100	<100	170	-	<100	<100	-	-			3300 (e)	
Total C_{10}-C_{36}		<50	<50	<50	830	-	<50	<50	-	-		1000		
Polycyclic Aromatic Hydrocarbons (PAHs)														
Carcinogenic PAHs [2]		-	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-				40
Total PAHs above detection limits		-	<0.5	<0.5	0.8	-	<0.5	<0.5	-	-	0.95-5 (a)			4,000
Organochlorine Pesticides (OCPs)														
Total OCPs above detection limits		-	-	ND	-	ND	-	-	-	-				
Organophosphorus Pesticides (OPPs)														
Total OPPs above detection limits		-	-	ND	-	ND	-	-	-	-				
Phenolic Compounds														
Total Phenols		-	ND	ND	ND	-	ND	-	-	-	0.03-0.5 (a)			240,000
Polychlorinated Biphenyls (PCBs)														
Total PCBs above detection limits		-	-	<0.1	-	-	-	-	-	-	0.02-0.1 (a)			7
Total Cyanide		-	-	<1	-	-	-	-	-	-				1,500 (f)
Asbestos		-	-	ND	-	-	-	ND	ND	ND				

Notes :
Results expressed as mg/kg unless otherwise indicated
ND = No individual species detected above laboratory detection limits.
[1] Calculated in accordance with Table 1A(3) of NEPM 2013
[2] Combined carcinogenic PAHs with relative potency to benzo(a)pyrene
CH = Chrysoltile asbestos fibres detected
AM = Amosite asbestos fibres detected
Results shaded green exceed the NSW EPA threshold concentrations for a sensitive land use.
Results shaded blue exceed the NEPM 2013 ESL criteria for a commercial/industrial land use setting
Results shaded red exceed the NEPM 2013 HIL/HSL D criteria for a commercial/industrial land use setting

(a) ANZECC background ranges used where no NEPM criteria available.
(b) Criterion for chromium (VI).
(c) Criterion for inorganic mercury.
(d) NEPM 2013 HSL criterion for vapour intrusion, 0-1m depth in sandy soils
(e) NEPM 2013 ESL criterion for coarse texture grade soils
(f) Criterion for free cyanide

SMEC Testing Services

Table B Results of Quality Control - Intra Laboratory and Inter Laboratory Duplicate Soil Samples

Analyte	Sample Numbers											
	BH5_0.8	A[1]	RPD (%)	BH5_0.8	B[2]	RPD (%)	BH15_0.2	C[1]	RPD (%)	BH15_0.2	D[2]	RPD (%)
Metals												
Arsenic	10	11	10	10	11	10	6	6	0	6	5	18
Cadmium	<1	<1	<50	<1	<1	<50	<1	<1	<50	<1	<1	<50
Chromium	18	19	5	18	17	6	21	35	50	21	34	47
Copper	15	16	6	15	14	7	50	56	11	50	59	17
Lead	23	17	30	23	21	9	17	20	16	17	23	30
Mercury	<0.1	<0.1	<50	<0.1	<0.1	<50	<0.1	<0.1	<50	<0.1	<0.1	<50
Nickel	17	18	6	17	10	52	33	49	39	33	53	47
Zinc	24	20	18	24	19	23	74	84	13	74	99	29
Monocyclic Aromatic Hydrocarbons (MAHs)												
Benzene	<0.2	<0.2	<70	<0.2	<0.2	<70	<0.2	<0.2	<70	<0.2	<0.2	<70
Ethylbenzene	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70
Toluene	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70
Xylenes	<1.0	<1.0	<70	<1.0	<1.0	<70	*1.0*	1.0	0	*1.0*	1.5	40
Napthalene	<1	<1	<70	<1	<1	<70	<1	<1	<70	<1	<1	<70
Total Petroleum Hydrocarbons (TPHs)												
Total C_6-C_{10}	<10	<10	<70	<10	<10	<70	<10	<10	<70	<10	<10	<70
Total C_{10}-C_{16}	<50	<50	<70	<50	<50	<70	<50	<50	<70	<50	<50	<70
Total C_{16}-C_{34}	<100	<100	<70	<100	<100	<70	<100	<100	<70	*100*	110	10
Total C_{34}-C_{40}	<100	<100	<70	<100	<100	<70	<100	<100	<70	*100*	210	**71**
Polycyclic Aromatic Hydrocarbons (PAHs)												
Total PAHs above detection limits	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70	<0.5	<0.5	<70

Note: Results expressed as mg/kg dry weight.

[1] Denotes intra-laboratory duplicate sample analysed by primary laboratory (ALS Sydney)

[2] Denotes inter-laboratory duplicate sample analysed by secondary laboratory (ALS Brisbane)

Italic result denotes laboratory detection limit used

RPDs that have been shaded exceed the acceptance criteria

APPENDIX A

AERIAL PHOTOGRAPHY

Source: Department of Lands

2005 Aerial Photograph Showing the Site and its Surrounds

Source: Department of Lands

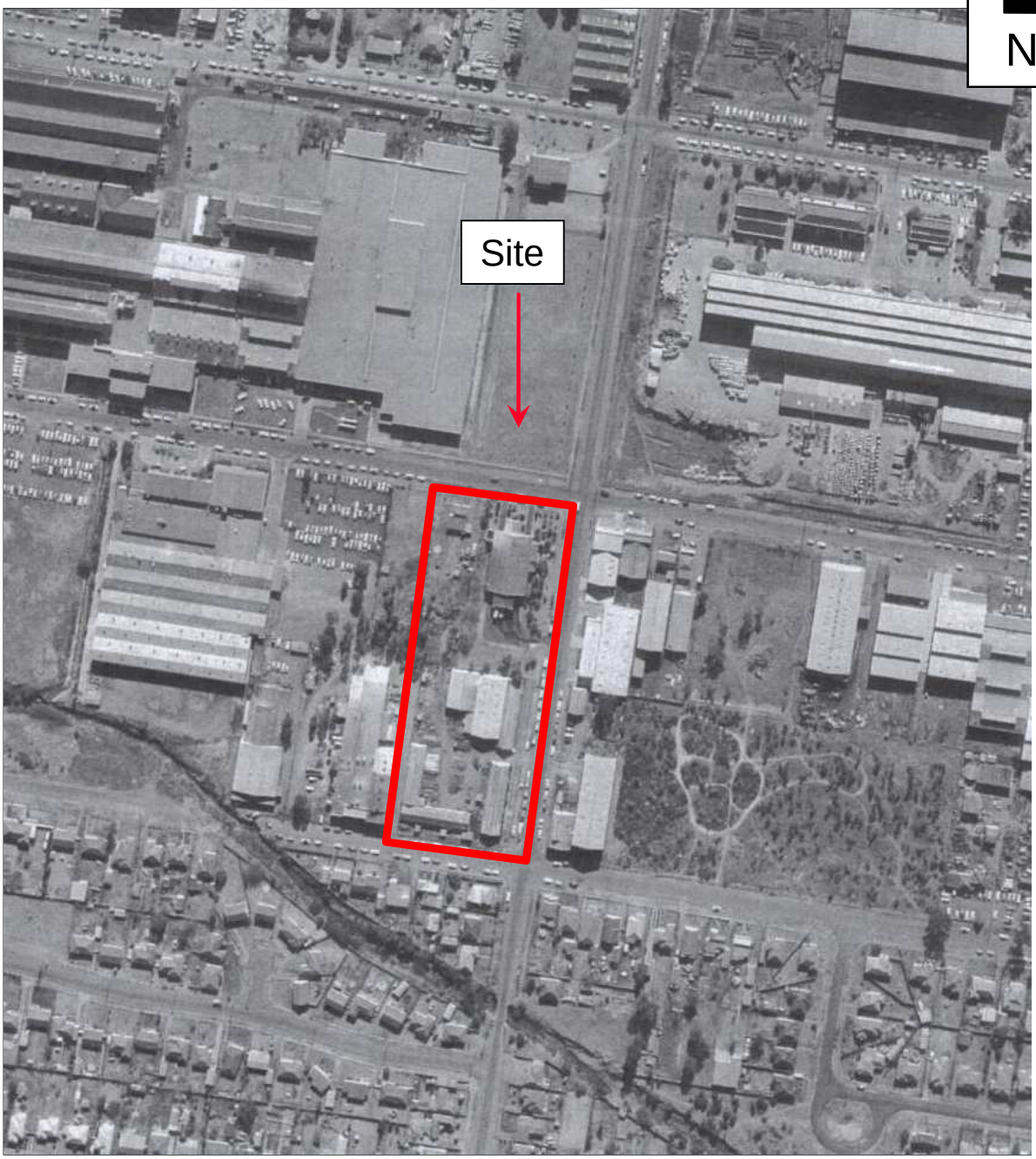
2002 Aerial Photograph Showing the Site and its Surrounds

Source: Department of Lands

1994 Aerial Photograph Showing the Site and its Surrounds

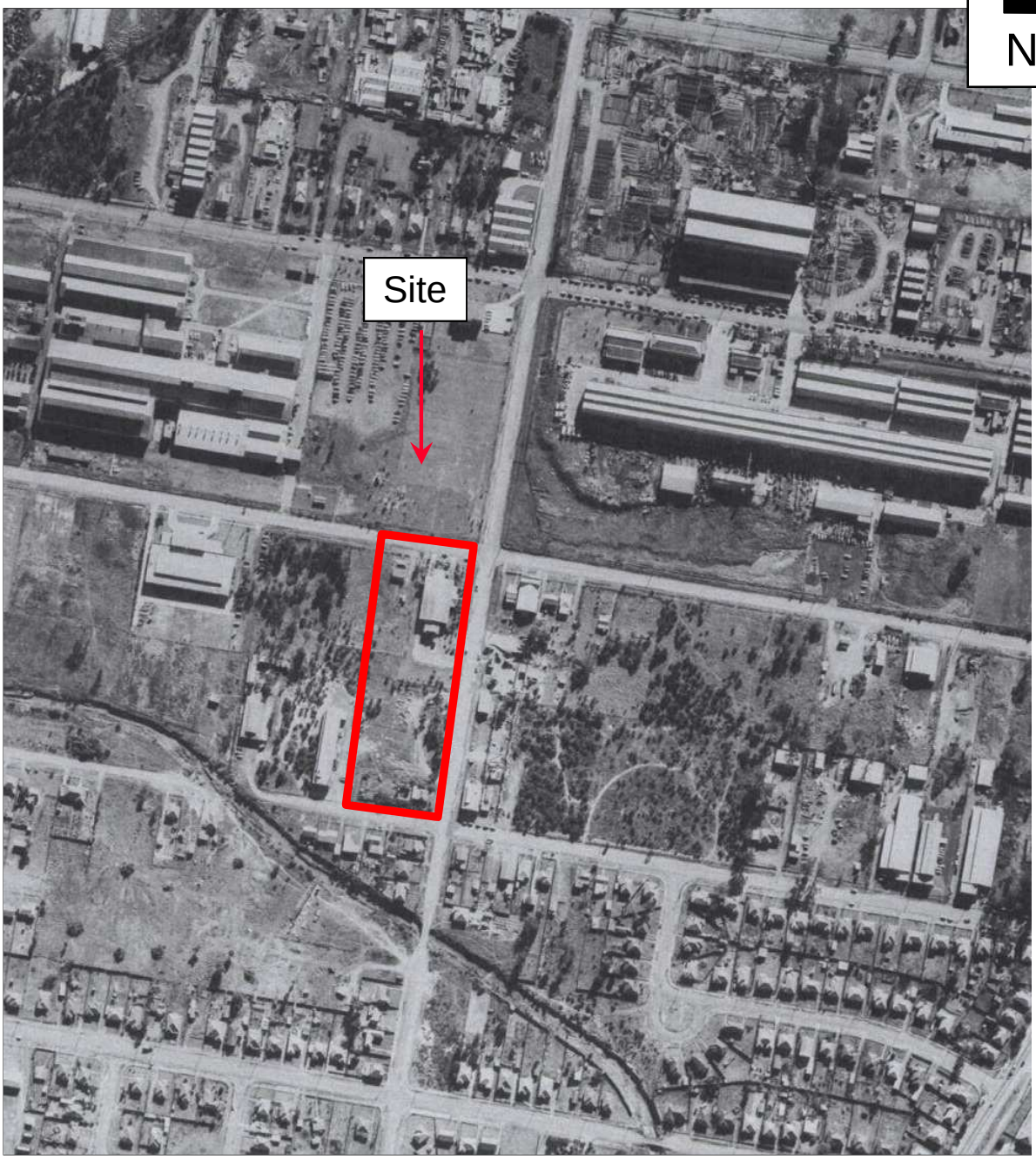
Source: Department of Lands

1986 Aerial Photograph Showing the Site and its Surrounds



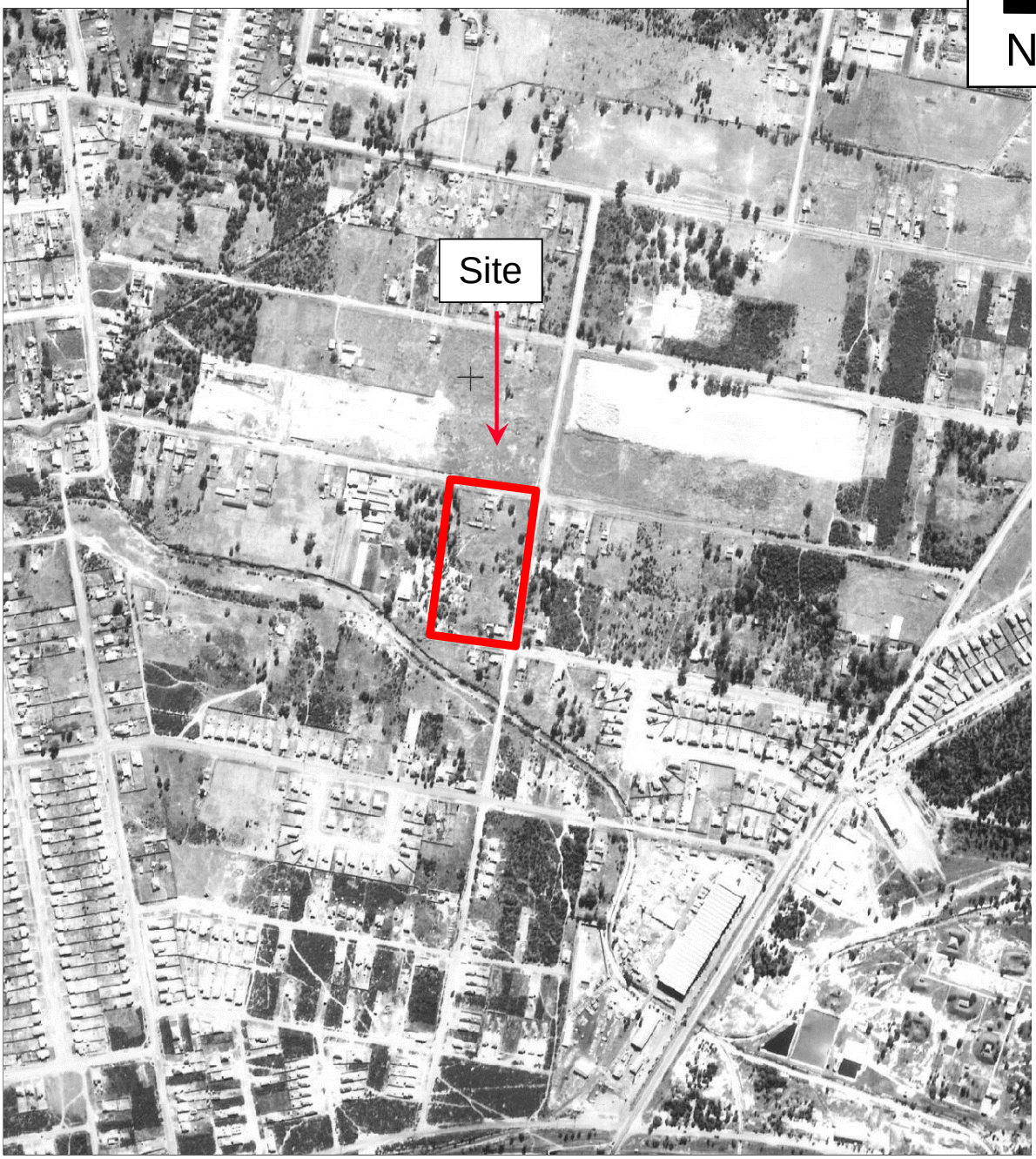
Source: Department of Lands

1970 Aerial Photograph Showing the Site and its Surrounds



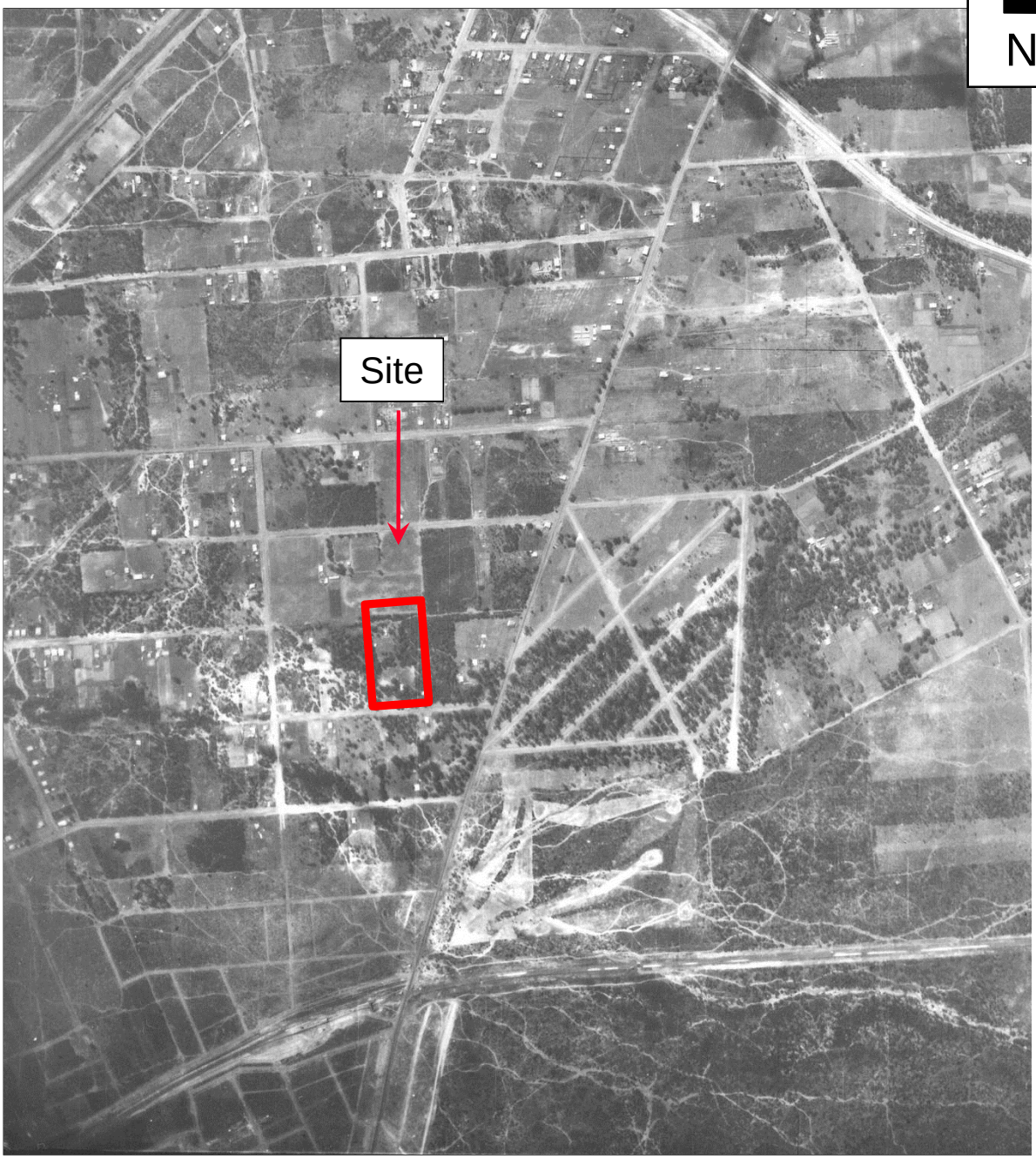
Source: Department of Lands

1961 Aerial Photograph Showing the Site and its Surrounds



Source: Department of Lands

1951 Aerial Photograph Showing the Site and its Surrounds



Source: Department of Lands

1930 Aerial Photograph Showing the Site and its Surrounds