GEOTECHNIQUE
PTY LTD

ABN 64 002 841 063

Member of
Australian Contaminated
Land Consultants Association Inc

Quality System
Quality
Endorsed
Company
ISO 9001 LIC11950
Standards Australia

DAVIDS GROUP PTY LTD

LOT 12 IN DP234581
164 STATION STREET
PENRITH

CONTAMINATION ASSESSMENT

REPORT NO 11761/1-AA 2 JUNE 2008

Lemko Place, Penrith NSW 2750 PO Box 880, Penrith NSW 2751
Telephone (02) 4722 2700 Facsimile (02) 4722 2777
e-mail: info@geotech.com.au www.geotech.com.au

GEOTECHNIQUE
PTY LTD

Member of
Australian Contaminated
Land Consultants Association Inc

Quality
Endorsed
Company
ISO 9001 LIC11950
Standards Australia

ABN 64 002 841 063

Job No: 11761/1
Our Ref: 11761/1-AA
2 June 2008

Davids Group Pty Ltd
Lot 1, Pier 8/9
23 Hickson Road
WALSH BAY NSW 2000

Attention: Mr J Lindsay

Dear Sir

re: **Proposed Retail and Residential Development**
Lot 12 in DP234581 – 164 Station Street, Penrith
Contamination Assessment

Please find herewith our *Contamination Assessment* report applicable to the above site.

The report presents all findings of a contamination assessment carried out for Panasonic AVC Networks Australia Pty Ltd and reported under Geotechnique Report No 2883/1-AF dated 4 May 2005. All findings have been re-assessed in light of the proposed change of land use. It is understood that, having purchased the site, Davids Group Pty Ltd were assigned ownership of the report.

The objective of the assessment presented herewith was to determine whether or not the soils or groundwater beneath the site present a risk of harm to human health and/or the environment, under the proposed land use, as a result of any past and/or present activities within the site.

The scope of work included a recent site inspection, review of the previous contamination assessment report (Reference 2883/1-AF), assessment of previous sampling and testing protocols against current guidelines and the assessment of previous test results against current applicable assessment criteria.

Reference should be made to Section 15.0 of the report for the conclusion and limitations of this assessment.

Should you have any questions relating to this report, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD

P. Gorman

PAUL GORMAN
Principal Environmental Engineer

Lemko Place, Penrith NSW 2750 PO Box 880, Penrith NSW 2751
Telephone (02) 4722 2700 Facsimile (02) 4722 2777
e-mail: info@geotech.com.au www.geotech.com.au

GEOTECHNIQUE PTY LTD

ABN 64 002 841 063

Member of
Australian Contaminated
Land Consultants Association Inc

Quality
Endorsed
Company
ISO 9001 LIC11950
Standards Australia

EXECUTIVE SUMMARY

This executive summary presents the results of a contamination assessment carried out on a parcel of land currently registered as Lot 12 in DP234581, located at 164 Station Street, Penrith, as indicated on Figure 1 (page 1 of the report).

A contamination assessment was initially undertaken for the site in 2005, for Panasonic AVC Networks Australia Pty Ltd. At the time the assessment was undertaken assuming continued light industrial use. Davids Group Pty Ltd purchased the site in March 2006. It is understood that the site is now proposed for redevelopment including retail, residential and open space facilities. The proposed residential development is to comprise several multi-storey residential apartment blocks. Open space / parkland areas will be designated between the proposed buildings.

In light of the proposed redevelopment, Geotechnique was commissioned by Davids Group to re-assess the site, utilising the previous findings.

The objective of this assessment was to determine whether or not the soils or groundwater beneath the site present a risk of harm to human health and/or the environment, under the proposed land use, as a result of any past and/or present activities within the site.

In order to achieve the objective of this assessment, the scope of work included a review of the contamination assessment report prepared for Panasonic in 2005 (Reference 2883/1-AF), a site inspection and interview to assess site uses since change of ownership in 2006, assessment of sampling and testing protocols adopted in 2005 and their current relevance, and assessment of laboratory test data against current applicable assessment criteria.

The scope of works involved in the 2005 assessment included a review of the site history information, a site inspection, review of soils and geological maps, soil and groundwater sampling, laboratory testing and preparation of this report.

The site is approximately trapezoidal in shape, with street frontages of 413.798 metres (m) to Station Street, 258.718m to Jamison Road and 320.015m to Woodriff Street. The total site area is 7.85 hectares. At the time of the site inspection and field work for the 2005 assessment (5 January to 22 February 2005), the north-eastern portion of the site was operating as a television assembly plant (Panasonic) run by Panasonic AVC Networks Australia Pty Ltd, whilst the south-western portion was vacant and unused. Since 2006, various buildings in the north-eastern portion of the site have been leased by PC Cranes, Design Suite (storage and distribution of furniture), Duramax (welding metal bins), former employees of Panasonic (consultancy), Gain (repair of earthmoving equipment), AirComp (fitting out of tankers) and Western Wheels and Castors (parts).

The primary features of the site are located in the north-eastern portion of the site and include a main factory / warehouse building, workshops, storage warehouses, flammable goods store, canteen, amenities, concrete access roads, gravel car parking areas, lawn and garden areas. The features are indicated on Drawing No 2883/1-AF1.

The south-western portion of the site is separated from the north-eastern portion by a fence line. The south-western portion is vacant and grass covered with a few scattered native trees. This portion is fully fenced.

The site is bound to the north-east by industrial units involved mainly in motor repairs, tyre services and other motor vehicle related activities. The site is bound to the north-west by Station Street, to the south by Jamison Road and to the south-east by Woodriff Street.

The field work conducted during the 2005 assessment revealed the north-eastern portion of the site to be underlain in part by fill materials to depths of up to about 1.3m, and partly by topsoil then alluvial clays and river gravels. The south-western portion of the site is underlain by topsoil, then residual clays and river gravels. The groundwater beneath the site sits approximately 8m below the existing ground level.

The site history information suggests that the site might have been used for market gardening in the 1940s and possibly before. Development of the north-eastern portion of the site commenced in about the late 1950s. Panasonic acquired the site from Singer Industries Pty Ltd in 1968. Davids Group purchased the site in 2006.

The potential for contamination within the site was considered to be related to the activities within the light industrial developed portion, the potential past market gardening and the presence of fill materials. The considered potential contaminants, and subsequent analyte list, included the following:

- Heavy Metals and metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, tin, zinc)
- Organochlorine Pesticides (OCP)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Total Petroleum Hydrocarbons (TPH)
- Benzene
- Toluene
- Ethyl Benzene
- Xylene
- Polychlorinated Biphenyls (PCB)
- Solvents
- Trichloroethylene
- Hexavalent Chromium
- Alkyl mercury
- Cyanide compounds
- Asbestos

In order to supplement the desktop study and identify the presence of the potential contaminants listed above, soil samples were recovered from eighty (80) locations spaced systematically across the site and groundwater was recovered from three monitoring wells. The sampling locations are shown on Drawing Nos 2883/1-AF2 and 2883/1-AF3. The samples were forwarded to a NATA accredited laboratory for analysis.

The Assessment Criteria adopted for this assessment of the soil test results were the available Health-Based Investigation Levels (HBIL) for residential development with minimal soil access and open space / parks, the EPA Provisional Phytotoxicity Based Investigation Levels (PPBIL), and the suggested Levels in the EPA service station guidelines. The assessment criteria adopted for the assessment of the groundwater samples included the trigger values used to assess impact on fresh water aquatic ecosystems, as published in the "*Australian and New Zealand Guidelines for Fresh and Marine Waters*" 2000, and the available concentration limits listed in the Clean Waters Regulations, 1972 (updated in 2003).

All laboratory data and/or data sets satisfied the criteria for stating that the analytes selected are either not present, or present in the soils at concentrations that do not pose a risk of hazard to human health or the environment under the proposed land use.

The laboratory data also revealed that there is no indication of contaminated groundwater beneath the site or contribution to groundwater contamination because of activities within the site.

The laboratory data also revealed that there is no indication of contaminated groundwater beneath the site or contribution to groundwater contamination due to activities within the site prior to 2005. More recent site uses are also considered not to have contributed to groundwater contamination beneath the site.

As stated in the introduction to the report, soil sampling was limited to areas outside the main buildings due to ongoing operations in 2005. As such, the contamination status of soils beneath the buildings could not be ascertained. The likelihood of soil contamination beneath the buildings is considered to be low, however, soil sampling and testing must be carried out to justify this statement. Soil sampling can take place after building demolition.

Reference should be made to Section 15.0 of the report and Appendix H, which set out details of the limitations of the report.

GEOTECHNIQUE PTY LTD

P. Gorman

TABLE OF CONTENTS

DRAWINGS

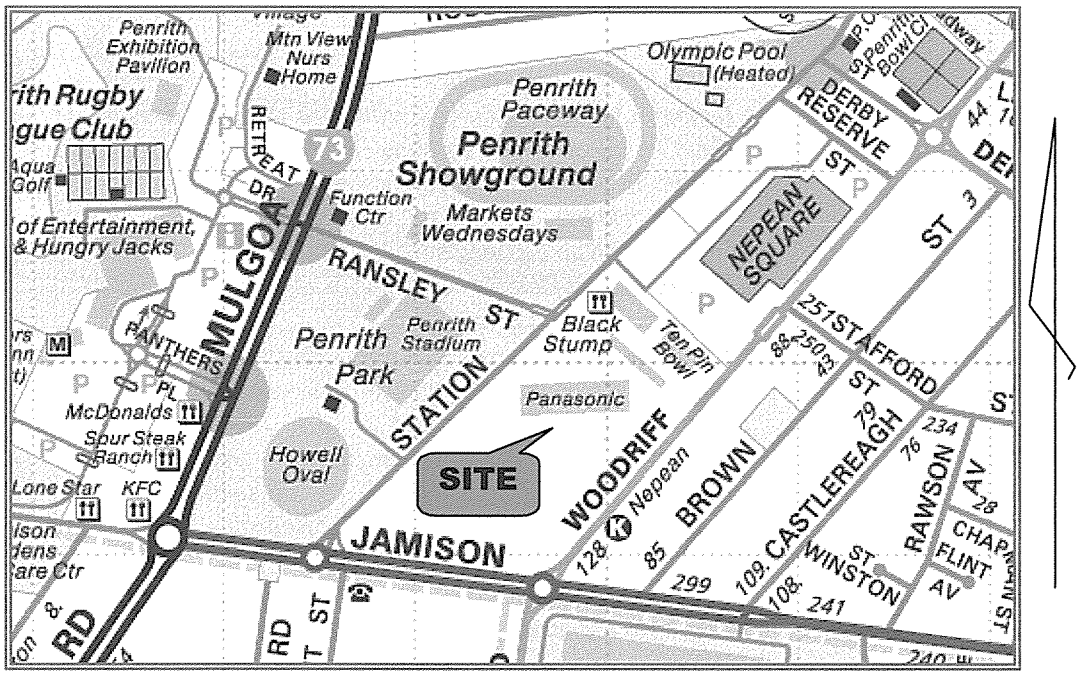
TABLES

APPENDICES

1.0 INTRODUCTION

This report presents the results of a contamination assessment at a parcel of land registered as Lot 12 in DP234581, located at 164 Station Street, Penrith, as indicated on Figure 1 below.

FIGURE 1



Mr D Lett of Panasonic AVC Networks Australia Pty Ltd, formerly known as Matsushita Electric Co (Aust) Pty Ltd, commissioned all works associated with the initial assessment in 2005. At the time of undertaking the initial assessment (2005) and preparing the contamination assessment report (Geotechnique Report Reference 2883/1-AF, dated 4 May 2005), it was understood that the contamination assessment was part of an internal requirement and that Matsushita Electric Company Pty Ltd was conducting (or had conducted) similar assessments at their factories globally.

Davids Group Pty Ltd purchased the site in March 2006. It is understood that the site is now proposed for redevelopment including retail, residential and open space facilities. The proposed residential development is to comprise several multi-storey residential apartment blocks. Open space / parkland areas will be designated between the proposed buildings.

In light of the proposed redevelopment, Geotechnique was commissioned by Davids Group to re-assess the site, utilising the previous findings.

The objective of this assessment was to determine whether or not the soils or groundwater beneath the site present a risk of harm to human health and/or the environment, under the proposed land use, as a result of any past and/or present activities within the site.

The format of this report follows that recommended in the NSW Environment Protection Authority (EPA), now the Department of Environment and Climate Change (DECC) "*Guidelines for Consultants Reporting on Contaminated Sites*" - 1997.

2.0 SCOPE OF WORK

The scope of work conducted in preparing this assessment was as follows:

- Review of the contamination assessment report prepared for Panasonic in 2005 (Reference 2883/1-AF).
- Site inspection and interview to assess site uses since change of ownership in 2006.
- Assessment of sampling and testing protocols adopted in 2005 and their current relevance.
- Assessment of laboratory test data against current applicable assessment criteria.

The scope of work conducted for the 2005 assessment was in accordance with our proposal to Panasonic dated 14 September 2004 (Reference PG.kn/Q1740A). The scope of work also complied with the NSW EPA *Guidelines for the NSW Site Auditor Scheme (1998),* the NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites*" – 1997 and the State Environmental Planning Policy (SEPP) No.55 – Remediation of Land (1998). The scope of work was developed in consultation with Matsushita Electric Co (Aust) Pty Ltd (Panasonic), in terms of potential contaminants and sampling locations.

The scope of work included in the assessment were as follows:

- A desktop study of the following in order to assist in identification of any areas of environmental concern:
  - Historical and current aerial photographs dating back to 1947.
  - Records of NSW Land & Property Information, with respect to past Land Titles.
  - Certificate under Section 149, obtained from Penrith City Council.
  - Records / file notes held by Penrith City Council.
  - Bore data held by the Department of Infrastructure Planning and Natural Resources (DIPNR).
- Review of soils and geological maps.
- A site inspection by the writer, in order to identify site features, detect any visible or olfactory signs/indicators of contamination and determine appropriate sampling locations.
- Consultation with Messrs D Lett and A Holmes of Panasonic with respect to the company activities, accessible soil and groundwater sampling locations, and appropriate analytes based on the substances used on site.
- Soil sampling by an Environmental Scientist in accordance with a pre-determined sampling plan, developed with reference to the NSW EPA *Sampling Design Guidelines* and aimed at ascertaining the presence or otherwise of soil contaminants, with respect to industrial development.

- Installation of groundwater monitoring wells, followed by groundwater sampling and testing aimed at assessing the potential for groundwater contamination as a result of activities within the site.
- Implementation of industry standard quality assurance (QA) and quality control (QC) measures in the field throughout the sampling process.
- Headspace screening of recovered soil samples using a calibrated Photo-ionisation Detector (PID) for the presence of volatile organic compounds.
- Laboratory chemical analysis by NATA accredited testing laboratories, in accordance with a chain of custody prepared by Geotechnique Pty Ltd.
- Assessment of the laboratory analytical results against current applicable guidelines.
- Assessment of field and laboratory QA and QC.

3.0 DATA QUALITY OBJECTIVES

The following table provides a list of the data quality objectives adopted for the 2005 assessment and the methods adopted in ensuring that the data quality objectives were met:

DATA QUALITY OBJECTIVE	METHODS OF ACHIEVEMENT
Documentation Completeness	Review of aerial photographs, records of NSW Land & Property Information, Section 149 Certificate, Council records, DIPNR records, soils and geological maps. Preparation of sample location plan and borehole logs Preparation of chain of custody records Laboratory sample receipt information NATA registered laboratory results certificates
Data Completeness	Appropriately systematic sampling, providing a suitable coverage of the accessible areas of the site On site visual assessment of soils Analysis for all potential contaminants of concern, based on site history information obtained and the processes involved on site
Data Comparability	Using appropriate techniques for sample recovery Using appropriate sample storage and transportation methods Use of NATA registered laboratories
Data Representativeness	Good sampling coverage of site Representative coverage of potential contaminants
Data Precision and Accuracy	Use of trained and qualified field staff Appropriate industry standard sampling equipment and decontamination procedures Field duplicates, inter-laboratory duplicates, rinsate blank water, and trip spike samples prepared and analysed Acceptable duplicate comparison Acceptable concentrations in trip spike samples Check of laboratory quality control methods and results

4.0 SITE IDENTIFICATION

The subject site is located on the south-eastern side of Station Street, Penrith, on the corner of Station Street and Jamison Road, as shown on Figure 1 on page 1 of this report. At the time of conducting the Land Titles search (10 October 2004), the site was registered to Matsushita Electric Co (Aust) Pty Ltd as Lot 12 in DP234581. It is understood that the site is now registered to Davids Group. The Lot boundaries are shown on the cadastral drawings in Appendix A of this report.

The site is approximately trapezoidal in shape, with street frontages of 413.798 metres (m) to Station Street, 258.718m to Jamison Road and 320.015m to Woodriff Street. The total site area is 7.85 hectares.

5.0 SITE HISTORY

A review of Certificates of Land Titles, historical aerial photographs and the Certificates under Section 149, was carried out to assist in identification of areas of environmental concern within the site.

A request was also made to Penrith City Council to obtain information pertaining to the site under the Freedom of Information Act.

Anecdotal information was provided by Panasonic regarding their use of the site.

Anecdotal information was provided by Davids Group on the activities of the recent tenants (since 2006).

The results of the study are presented in the following sub-sections.

5.1 Aerial Photographs

Aerial photographs taken in 1947, 1961, 1978, 1986 and 2002 were examined in order to gauge the changes in site features since 1947. Copies of the aerial photographs, showing the site boundary, are included in Appendix B of this report.

Due to the size of the site and the scale of the photographs, some features within the site are not clear and definitive statements regarding them and/or activities are difficult to make. As such, the descriptions provided in this section are only interpretations made by the writer. Furthermore, it should be noted that the photographs provide an impression of the site features at the time the photograph was taken. Other activities or changes to site features might have occurred between the dates the photographs were taken.

The following observations were made:

1947 The north-western and north-eastern portions of the site appear to be cultivated to some extent, possibly for market gardens. The remainder of the site is undeveloped, with grass cover and scattered tree growth. There does not appear to be any dwelling or other buildings within the site.

The site is bound to the north-west by Station Street, to the south by Jamison Road, to the south-east by Woodriff Street and to the north-east by rural and urban residential properties. All streets appear to be unsealed at this time.

1961 There is now a clear distinction between the north-eastern and south-western portions of the site. The north-eastern portion is now occupied by a large factory building with associated access roads, loading bays, and parking facilities, all essentially centrally located. The south-western portion of the site is vacant and grass covered with limited tree growth. There is no longer any evidence of land cultivation within the site.

The streets surrounding the site now appear to be sealed. Urban and rural residential properties remain to the north-east of the site.

1978 An elongated storage warehouse, and open parking has been added to the site along the north-eastern boundary, whilst another elongated building has been constructed to the south of the main factory building. The remainder of the site appears to be relatively unchanged since 1961.

Significant buildings have been constructed in the properties to the north-east of the site, whilst urban development has significantly increased since 1961.

1986 There does not appear to be any significant change in the site features since 1978. The northern corner of the site appears less active, with no noted vehicle parking.

The properties to the north-east of the site have been redeveloped into industrial units and a bowling centre. The units are likely to be used for automotive repairs and servicing, as is the case presently.

2002 An additional warehouse has been constructed to the south of the main factory building, together with an additional loading bay to the new building. Apart from additional landscaping, there have been no other obvious changes to the site features since 1986.

No significant changes observed for the neighbouring properties and streets.

5.2 Land Titles Records

The chronological list of past proprietors for the site is summarised in this section. Reference should be made to Appendix A for details of the Land Titles information obtained by Advance Legal Search Pty Limited.

Year	Proprietor
	(Lot 12 DP 234581)
1988 – 2006	Matsushita Electric Co (Australia) Pty Limited
	(Lot 12 DP 234581- CT Vol 10665 Fol 128)
1968 – 1988	Matsushita Electric Co (Australia) Pty Limited
1967 – 1968	Singer Industries Pty Limited
	(Lot 1 DP 218751- CT Vol 9489 Fol 237)
1962 – 1967	Singer Industries Pty Limited
	(Parish Mulgoa 8 Acres 1 Rood 35 ½ Perches, 6 Acres 0 Rood 32 ¼ Perches, 5 Acres 1 Rood 13 ¾ Perches, 1 Acre 0 Rood 3 ¾ Perches & 2 Acres 3 Rood 20 ¾ Perches)
1957 – 1962	Penrith Manufacturing Company Pty Limited
1956 – 1957	Albert Edward Flint, dairyman

1945 – 1956	Albert Royal Charles Flint, dairyman
1924 – 1945	Harley Reuben Croome Eaton, carrier
1923 – 1924	Frederick Daniel Woodriff, gentleman Mary Ann Catherine Woodriff, widow Albert Edward Baker, solicitor
1881 – 1923	Frederick Daniel Woodriff, gentleman

The land titles information indicates that the site was under personal ownership between 1881 and 1957. The site was initially developed (as seen on the 1961 aerial photograph) by Penrith Manufacturing Company Pty Limited, then utilised by Singer Industries Pty Limited and Matsushita Electric Co (Aust) Pty Ltd.

5.3 Planning Certificate under Section 149

A copy of the Planning Certificate under Section 149 of the Environmental Planning & Assessment Act 1979, dated 11 October 2004, was obtained from Penrith City Council. The following relevant information pertaining to the site is included under the certificate.

- The site is currently zoned as Light Industrial under the terms of the City of Penrith Planning Scheme.
- The land does not include or comprise critical habitat.
- The land is not within a conservation area.
- An item of environmental heritage is not situated on the land.
- There are no notices for the land under the Coastal Protection Act 1979.
- The land has not been proclaimed to be within a Mine Subsidence District.
- The site is not affected by road realignment or widening.
- The land is not affected by a policy adopted by Council that restricts the development of the land because of the likelihood of landslip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk.
- There are no matters arising under the Contamination Land Management Act 1997.

A copy of the Certificate is included in Appendix C of this report.

5.4 Penrith City Council Records

A request was made to Penrith City Council to view records or file notes pertaining to the site. File notes were observed by the writer in the presence of a Council officer. Some information within the files could not be viewed. The following information was observed in the records:

- The Council has no records applicable to the site before 1961
- A building application for a carport was dated 1961
- Other minor building applications were noted for carports and other buildings

Notably, no records were observed pertaining to Council inspections, recorded incidents or accidents, waste disposal or neighbour complaints.

5.5 Information from Panasonic AVC Networks Australia Pty Ltd

As part of this assessment and in developing the approach to sampling and testing, the writer was provided with information pertaining to the operations of the site and the substances used. The information provided is as follows:

- The main factory on site was used for assembling televisions since 1969 and is still used for this purpose.
- The main hazardous substances used in television assembly include lead solder, fluxes, paints and trichloroethylene.
- The hazardous substances used in the assembly process are stored in concrete bunded areas to prevent spillage, as noted on the plan in Appendix D of this report.
- There has been no burial of substances or incineration since 1969.
- There has not been any soil or groundwater contamination assessments carried out in the past.
- No underground storage tanks are known to exist beneath the site.
- There have been no recorded accidents or spillages on site that could cause soil or groundwater contamination.
- Target substances considered by Panasonic to be relevant to the assessment, based on the activities within the site, included Heavy Metals (cadmium, lead, mercury, selenium), Polychlorinated Biphenyls (PCB), asbestos, solvents, trichloroethylene, Hexavalent Chromium, arsenic, cyanide compounds.
- Asbestos has been used in various forms in the construction of the factory building, canteen / amenities building, fitters workshop and dangerous goods store. An asbestos management and removal policy is in place.

5.6 Information from Davids Group

Since acquiring the site in 2006, Davids Group has leased parts of the site to various tenants. Information pertaining to these tenants was provided by Mr Lindsay during a site inspection on 22 May 2008. The information obtained was as follows:

- The bulk of the main building in the north-eastern portion of the site has been leased to Design Suite for storage and distribution of furniture.
- The western portion of the same building has been leased to Duramax, which is involved in welding metal bins.
- A portion of the office area of the same building was being leased by former employees of Panasonic, who were involved with consultancy.
- The southernmost warehouse building in the north-eastern portion of the site has been leased in the past by PC Cranes for equipment (crane) storage. More recently, the building has been leased by Gain, which is involved in repair of earthmoving equipment.
- The northernmost warehouse in the north-eastern portion of the site has been leased by both AirComp (fitting out of tankers) and Western Wheels and Castors.

6.0 SITE CONDITION & SURROUNDING ENVIRONMENT

6.1 Site Features

At the time of the site inspection and field work, as part of the 2005 assessment (5 January to 22 February 2005), the north-eastern portion of the site was operating as a television assembly plant (Panasonic products) run by Panasonic AVC Networks Australia Pty Ltd, whilst the south-western portion was vacant and unused.

At the time of conducting an inspection of the site on 22 May 2008, Panasonic had vacated the premises and several buildings were being leased by various tenants (see Section 5.6).

The following features of the site were observed during the inspections:

North-Eastern Portion (2005)

- The main factory building is centrally located and elongated. The main television assembly takes place in this building. Several flues are present, which permit exhaust of fumes from the soldering, tinning and fluxing units within the factory.
- The main factory is surrounded by extensions, including an office / administration section, canteen, amenities and spray painting booth.
- A concrete access road encompasses the main factory building and permits access to other warehouse and storage areas.
- Two loading docks are present, one accessing the main factory and one the main storage warehouse.
- All storage facilities contain concrete floor slabs and are lockable enclosures.
- A gravel covered open car parking area is located along the north-eastern boundary.
- A large part of the area is grass covered and landscaped.

The features mentioned above are indicated on Drawing No 2883/1-AF1 (Site Features Plan).

North-Eastern Portion (2008)

- The building layout had not changed since 2005.
- The bulk of the main factory building in the centre contained various boxes and stored furniture pieces (Design Suite).
- A portion of the office area leased by formed employees of Panasonic.
- The western portion of the main factory, leased by Duramax, contained various storage shelves, welding equipment and metal bins.
- The southernmost warehouse building (leased by Gain) contained several large earthmoving machines undergoing repairs. There were drums of oil and equipment used in repair processes in various positions within the building.

- The southern portion of the northernmost warehouse (leased by Western Wheels and Castors) contained numerous shelves used for storing boxes of parts, presumably associated with wheels and castors.
- The northern portion of the northernmost warehouse (leased by AirComp) contained a few tankers being fitted out, plus all associated equipment used in the fitting process.
- Apart from a few vehicles and pallets, there was no significant use of the areas outside the buildings mentioned above.
- Those buildings not mentioned above were not in use.

South-Western Portion
The south-western portion of the site is separated from the north-eastern portion by a fence line. The south-western portion is vacant and grass covered with a few scattered native trees. This portion is fully fenced.

There were no obvious asbestos sheet/pieces observed on the ground surface, odour, discolouration of the soils and/or vegetation observed on the surface of the site. The presence of any of these items suggests the potential for soil contamination.

There has been no change to the appearance and use of this portion of the site between 2005 and 2008.

6.2 Surrounding Environment

The site is bound to the north-east by industrial units involved mainly in motor repairs, tyre services and other motor vehicle related activities. The site is bound to the north-west by Station Street, to the south by Jamison Road and to the south-east by Woodriff Street.

7.0 TOPOGRAPHY, GEOLOGY & HYDROGEOLOGY

The site is essentially flat and level.

The Soil Landscape Map of Penrith (soil Landscape Series Sheet 9030, Scale 1:100,000, 1989), prepared by the Soil Conservation Service of NSW, indicates that the site is located within the Richmond landscape area and typically consists of clays, clay loams, sands and ironstone nodules.

The Geological Map of Penrith (Geological Series Sheet 9030, Scale 1:100,000, Edition 1, 1991) published by the Department of Minerals and Energy indicates that the soils within the site are likely to comprise Quaternary Age soils of the Cranebrook Formation, comprising gravel, sand, silt and clay.

Reference should be made to Table 1 in Appendix E for details of the sub-surface soil profile encountered during field work for the 2005 assessment.

North-eastern portion

This portion of the site has been influenced by human activities including building and road construction. In general, the following soil profile was encountered:

Surface Cover	Concrete, in road areas, with total thickness ranging from 120mm to 250mm; thin sand or gravel sub-base encountered at some locations. Roadbase gravel layer, typically about 100mm thick, encountered in areas of gravel cover, such as the open car park along the north-eastern boundary. Grass cover over the remainder of this portion of the site
Topsoil	Silty clay, low plasticity, encountered essentially in undisturbed areas of this portion of the site, to depths ranging from 0.15m to 0.3m below existing ground level
Fill	Silty Sandy Clay or Silty Clay of low to medium plasticity, encountered in disturbed areas essentially around the buildings and beneath roads and parking areas, to depths ranging from 0.2m to 1.3m below existing ground level.
Natural Soil	Silty Sandy Clay of low plasticity to Silty Clay of high plasticity (variable), to depths typically of between 3.5m and 5.5m below existing ground level.
River gravels	Encountered at several locations at depths of between 3.5m and 5.5m below existing ground level. Continued at the three groundwater monitoring well locations to depths of up to 12m below existing ground level

No perched water was encountered at any of the borehole locations. Groundwater levels measured in the three groundwater monitoring wells ranged between 8.0m and 8.15 below existing ground level.

South-western portion

This portion of the site, based on the site history information, does not appear to have been significantly influenced by human activity, with the exception of potential market gardening. In general, the following soil profile was encountered:

Topsoil	Silty clay, low to medium plasticity, encountered to depths ranging from 0.2m to 0.3m below existing ground level.
Natural Soil	Silty Sandy Clay of low plasticity to Silty Clay of high plasticity (variable), encountered to borehole termination depths typically of about 1.0m below existing ground level and to depths of 6.0m and 6.3m below existing ground level at two deeper borehole locations.
River gravels	Encountered at two locations at depths of 6.0m and 6.3m below existing ground level.

All boreholes were be dry upon completion of drilling. The two deeper boreholes, in which groundwater monitoring wells were installed to 6.0m and 6.3m, were dry on several monitoring occasions after installation.

A search of registered bore data, for a radius of 2km from the site, was carried out through the Department of Infrastructure, Planning and Natural Resources (DIPNR). The information obtained revealed the following registered bores:

Bore	Date	Use	Depth (m)	Water Level (m)	Remarks
GW026231	January 1966	Irrigation	8.5	6.0	Gravels at water level
GW029710	April 1969	Domestic	7.9	6.0	Sand at water level
GW059108	June 1981	Irrigation	6.0	-	No water record
GW070248	May 1992	Domestic	48.0	-	No detail included
GW100759	Feb 1996	Irrigation	10.0	6.0	Gravels at water level
GW101178	Jan 1998	Recreation	11.2	8.0	Gravels at water level
GW103048	Jan 1990	Recreation	8.0	-	No detail
GW105004	Sept 2003	Recreation	183.0	6.0	Gravel at water level

The information shows that the regional groundwater is or has been in use for irrigation or recreation purposes and hence, should contaminants be found in the groundwater beneath the site, these end uses must be considered.

8.0 ENVIRONMENTAL CONCERNS / POTENTIAL CONTAMINANTS

Based on the information obtained from Panasonic AVC Networks Australia Pty Ltd, the main hazardous substances used in the television assembly activities within the site were as follows:

- Heavy Metals (cadmium, lead, mercury, selenium)
- Polychlorinated Biphenyls (PCB)
- Solvents
- Trichloroethylene
- Hexavalent Chromium
- Arsenic
- Cyanide compounds.

Other potential contaminants related to electrical works include Heavy Metals such as tin, copper, and mercury.

A number of the existing buildings contain asbestos materials and therefore it is possible that degraded asbestos has penetrated the soils in areas close to the buildings. Asbestos is therefore considered a potential soil contaminant at the site.

The field investigations revealed the presence of fill materials in the north-eastern portion of the site, in areas previously disturbed by human activities and construction. The fill composition did not include building rubble, asbestos or any other visual or olfactory indicators of potential contamination. A typical screen of soils that are not suspected to be contaminated, but are from an unknown source, includes the following:

- Heavy Metals and metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)
- Organochlorine Pesticides (OCP)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Total Petroleum Hydrocarbons (TPH)
- Benzene
- Toluene
- Ethyl Benzene
- Xylene
- Polychlorinated Biphenyls (PCB)

As observed on the aerial photographs, portions of the site appear to be cultivated in the past, indicating potential market gardening activities. Market gardening suggests that there is potential for applied insecticides, herbicides, fertilisers and/or pesticides in the past. As insecticides and herbicides generally have a short residual life, and any farming activities ceased before 1961, these are not of concern.

The use of some old fertilisers might lead to soil contamination by heavy metals and metalloids, such as arsenic, cadmium, chromium, copper, lead, mercury and zinc.

The possible soil contaminants resulting from application of pesticides are arsenic, lead, Organophosphate Pesticides (OPP) and persistent Organochlorine Pesticides (OCP), such as Dieldrin, Heptachlor and DDT, which have been either restricted or prohibited from agricultural use since 1986/1987. The predicted persistence of OPP is typically less than one year; therefore, these are not of concern.

With the exception of fill materials, the abovementioned potential contaminants are likely to be found at the highest concentrations in the surface soils, due to the potential application processes. Contaminants in fill materials could be present at any depth.

Based on our visual assessment of the soils and field screening of recovered samples, it was considered unlikely that the soils within the site would contain contaminants at concentrations not suitable for industrial forms of development.

Some of the activities noted within the site during the recent inspection (22 May 2008) typically lend themselves to potential soil and/or groundwater contamination with metals and hydrocarbons. However, all activities were noted to be occurring within the existing buildings, which all contain concrete floors. As such, the potential for the recent site activities to contribute to soil or groundwater contamination beneath the site is considered low.

9.0 CONTAMINATED LAND LEGISLATION

For information purposes, this section provides some guidance on the current state of contaminated land legislation, including the responsibilities of landowners and polluters, as well as the rights of the NSW EPA and Council.

9.1 Identification & Management of Contaminated Sites

The New South Wales (NSW) government introduced significant reforms to identification and management of contaminated sites in NSW. The reforms are designed to provide uniform control of investigation and remediation of contaminated land throughout NSW. The following documents outline the reforms undertaken:

- The *Contaminated Land Management Act 1997 (CLM Act)* establishes a process for investigating and remediating (where necessary) land where contamination presents a significant risk of harm to human health or the environment. The three particular objectives are as follows:
  a. To set out accountabilities for managing contaminated land, if a significant risk of harm is identified.
  b. To set out the role of the NSW Environment Protection Authority (EPA) in the supervision of contaminated site investigations and/or remediation.
  c. To ensure that contaminated land is managed with regard to the principals of ecologically sustainable development.
- The EPA *Guidelines on the Significant Risk of Harm from Contaminated Land and the Duty to Report, 1999* provide guidance on two issues:
  1. Assessing whether site contamination presents a significant risk of harm under the CLM Act
  2. The duty to report to the EPA if a site is known or suspected to present a significant risk of harm under the CLM Act
- The *State Environmental Planning Policy (SEPP) No.55 – Remediation of Land 1998,* prepared by Department of Urban Affairs and Planning (DUAP) is an environmental planning instrument that sets out matters which must be considered by local councils and other planning authorities when determining development applications, or making zoning or rezoning decisions. The *Managing Land Contamination: Planning Guidelines 1998,* prepared by DUAP and Environment Protection Authority (EPA), have been developed to further provide guidance to consent authorities on their responsibilities under SEPP55 and the Environmental Planning and Assessment Act 1979.
- Under the legislation, as set out in the previously mentioned documents, the following points should be noted in particular:
  1. The CLM Act sets out a positive duty on an owner, or person whose activities cause contamination, to notify the EPA if they are aware that the contamination presents a significant risk of harm. Monetary penalties can be issued by the EPA for failure to notify.

2. The SEPP55 sets out the definitions of Category 1 and Category 2 remediation works. Development consent is required for Category 1 remediation works, whereas Category 2 remediation works do not require consent. The relevant local council must be notified of all remediation works (30 days notification) **whether or not** development consent for the remediation is required.
3. Notice of validation of remediation work must be submitted to the local council within one month of completion of remediation.

Notice of validation of remediation work must be submitted to the local council within one month of completion of remediation.

9.2 Hazardous Materials

Hazardous materials, as defined in the EPA publication "*Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes*"-1999, arising from remediation work must be managed in accordance with the requirements of the NSW EPA and WorkCover Authority, together with the relevant regulations, listed as follows:

1. New South Wales Occupational Health and Safety Act 1983.
2. Regulation 84A-J "Construction Work Involving Asbestos or Asbestos Cement" 1983, as amended in 1984, 1986, 1990 and 1996 of the NSW Construction Safety Act 1912".
3. Occupational Health and Safety (Hazardous Substances) Regulation 1996.
4. Occupational Health and Safety (Asbestos Removal Work).
5. Contaminated Land Management Act and Regulations.
6. Environmentally Hazardous Chemicals Act.

According to Schedule 1 of the *Protection of the Environment Act 1997*, only EPA licensed persons can transport waste classified as Hazardous, Industrial or Groups A, B, and C liquid waste.

9.3 Disposal of Contaminated Soils/Liquids

The disposal of contaminated soils and liquids shall have regard to the provisions of both the *Protection of the Environment Operations Act (1997) and Regulations (PEO Act)* and the relevant EPA guidelines, such as "*Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes*"-1999.

The abovementioned Act, Regulation and guidelines generally contain the following:

- Definition of who is required to hold an environment protection license, issued by the EPA.
- Definitions of various waste categories and handling specifications.
- General environmental obligations for waste activities, waste facilities and waste transporters that are non-licensed.

- Provisions relating to matters such as contaminant immobilisation approvals and management of asbestos and clinical waste.

The PEO Act complements the provisions of the *Waste Minimization and Management Act 1995,* which includes, amongst others, the following:

- A target for reducing waste disposal.
- A waste management hierarchy, within which waste avoidance is a priority, followed by re-use and recycling / reprocessing, with disposal as a last resort.
- Industry waste reduction plans.

9.4 Site Audits

The NSW Site Auditor Scheme commenced on June 1, 1998. Site Auditors are experts in their field who can provide an independent review of the work of the primary consultant conducted for all types of contaminated sites. Part 4 of the CLM Act allows the EPA to accredit suitably qualified and experienced individuals as site auditors. A list of accredited Site Auditors is available from the NSW EPA.

The NSW EPA prepared "*Guidelines for the NSW Site Auditor Sceme*"-2006, which outline the process of appointing site auditors, and the legal, administrative and technical directions and guidelines for site auditors and the preparation of site audit statements.

Council may request that a site audit is undertaken for a particular site. The Site Auditor will be independent of the primary consultant and will provide a site audit statement, providing information on the suitable uses for the site, including any conditions on that suitability. The site audit statement is prepared on a prescribed form, included in the *Contaminated Land Management (Site Auditor) Regulation 1998.*

The Auditors report, prepared as an accompaniment to the site audit statement, will generally include the following as a minimum:

- Comments on the investigations carried out by the consultant and remediation actions recommended.
- What further investigations or remediation the Auditor considers are required before the land is deemed suitable for the intended use.
- Whether the auditor considers that the remediation works undertaken are adequate.
- Whether it can be concluded that there is no unacceptable potential for off-site migration of contaminants.

Further instructions are provided in the "*Guidelines for the NSW Site Auditor Sceme*"-2006.

9.5 Section 149 Certificates

Under Section 149 (s.149) of the *Environmental Planning & Assessment Act 1979* (EP&A Act) a person may request from Council a planning certificate containing advice on matters about the land that are prescribed in the *Environmental Planning & Assessment Regulation* (EP&A Regulation).

Section 149 certificates issued by Council will not necessarily contain specific details of actual or potential site contamination for individual parcels of land, however it is at the Council's discretion. Section 59(2) of the CLM Act, however, provides that specific notations relating to contaminated land issues must be included on s.149 certificates where:

- The land to which the certificate relates is within an investigation or remediation area.
- The land is subject to an investigation or remediation order by the EPA.
- The land is the subject of a voluntary investigation or remediation proposal.
- The land is the subject of a site audit statement.

10.0 SOIL SAMPLING & ANALYSIS PLAN & SAMPLING METHODOLOGY

The sampling and analyses carried out as part of the 2005 assessment were undertaken to supplement the findings of the desktop study and site inspection and to obtain sufficient information and data in order to make an assessment of the following:

1. The locations of contaminated or potentially contaminated soils.
2. The nature and likely extent of potential contaminants within the site.
3. The potential for off-site migration of contamination through impacts on groundwater.
4. The risks that the contaminants (if present) are likely to pose to human health or the environment under the conditions of industrial development.
5. Areas of the site requiring more detailed investigation to determine appropriate remediation methods if required.

Due to ongoing sensitive operations within the site in 2005, soil sampling was limited to areas outside the main buildings.

The risk of harm to human health and the environment was determined through comparison of test results with EPA produced or endorsed criteria available at the time, as discussed in Section 11.0 of this report.

Soil sampling was carried out between 5 and 10 January 2005, by an Environmental Scientist who was responsible for locating the boreholes, recovery of samples, Photo-ionisation detector (PID) screening, preparation of samples for delivery to NATA accredited laboratories and logging the sub-surface profile encountered at each sampling location.

As stated in Section 4.0 of this report, the total site area is 7.85 hectares. Of this total area, approximately 1.3 hectares is occupied by the existing buildings, which could not be accessed. The assessable area of the site, for the purpose of this assessment was approximately 6.5 hectares in area.

In accordance with the *Sampling Design Guidelines* - NSW Environment Protection Authority (EPA) 1995, for an area of about 6.5 hectares, eighty (80) sampling locations were adopted for the assessment. The samples were recovered using a bobcat mounted drilling rig equipped for environmental investigations. The boreholes were positioned in readily accessible areas of the site, clear of buried services and as close as possible to the target sampling locations.

The eighty (80) sampling locations were positioned generally in an approximate square grid pattern across the site. In order to address the environmental concerns mentioned in Section 8.0 of this report, a number of sampling locations were positioned in close proximity to the existing buildings. The remaining samples were positioned in the square grid across the remainder of the site.

The borehole locations are shown on Drawing Nos 2883/1-AF2 and 2883/1-AF3.

Representative samples of the surface soils, fill (where encountered) and residual soils were recovered for potential laboratory analysis. At all the sampling depths, two (2) samples were recovered, one for laboratory analysis, the other for head space screening, using the calibrated Photo-ionisation Detector (PID), for the presence or otherwise of volatile organic compounds. The PID readings are summarised in Table 1 of Appendix E of this report. Where elevated PID readings were recorded, deeper soil samples were recovered for potential laboratory analysis.

Prior to sampling, the borehole locations were scanned by a service locater, to avoid any underground services. The boreholes within the concrete paved area were cored by a decontaminated concrete coring machine, before sampling.

Industry standard sampling and decontamination procedures were adopted for the 2005 environmental assessment, as described below:

- All soil samples were collected using a "direct push" technique, which inserts small-diameter (57mm) sampling tools directly into the ground. This enables accurate sampling, with minimal disturbance to the sub-surface soil profile.
- Geoprobe soil samples were obtained continuously from ground level. The use of dedicated acetate sample liners during the sampling process minimises the possibility of cross contamination of samples from different horizons, as well as minimising potential loss of readily volatile compounds.
- All sampling equipment was thoroughly washed with biodegradable, phosphate-free detergent (Decon 90) and then rinsed thoroughly in clean tap water. This procedure was undertaken prior to sampling and after collection of samples.
- To prevent the potential loss of volatile compounds, the recovered soil sample was immediately transferred into a labelled, laboratory supplied, 250ml glass jar and sealed with an airtight, Teflon top lid. The fully filled jar was placed in a chilled container.
- Upon completion of field sampling, the chilled container was transported to our Penrith office. All the jars were then transferred to a refrigerator, where the temperature was maintained below 4 °C.

The day after field work, the jars were placed in the chilled containers and forwarded to the primary laboratory, SGS Environmental Services (SGS) and the secondary laboratory (Amdel), both NATA registered laboratories, under Chain of Custody (COC) conditions.

Upon receipt of the samples, the laboratories returned the Sample Receipt Confirmation, verifying the integrity of all the samples received.

In order to maximise spatial coverage of the testing, discrete topsoil and surface or near surface fill samples of similar composition were composited for chemical analysis. Compositing of soil samples is suggested in "*Sampling Design Guidelines for Contaminated Sites*"-1995, EPA and The Discussion Paper, "*Assessment of Orchard and Market Garden Contamination*" 1995, EPA.

The methodology for compositing samples was generally adapted from "*Composite Sampling, National Environmental Health Forum Monographs, Soil Services No 3*", 1996-William H Lock, as follows:

- Three (3) equal-mass constituent samples from nearby boreholes were included in a composite sample.
- Each constituent sample was homogenised before sub-sampling and compositing of material was undertaken.

The following table details the compositing undertaken:

Composite Sample	Sub-Samples
Composite A	BH26(0-0.15) + BH27(0-0.15) + BH28(0-0.15)
Composite B	BH29(0-0.15) + BH30(0-0.15) + BH32(0-0.15)
Composite C	BH33(0-0.15) + BH34(0-0.15) + BH35(0-0.15)
Composite D	BH36(0-0.15) + BH37(0-0.15) + BH38(0-0.15)
Composite E	BH39(0-0.15) + BH40(0-0.15) + BH41(0-0.15)
Composite F	BH43(0-0.15) + BH44(0-0.15) + BH45(0-0.15)
Composite G	BH46(0-0.15) + BH47(0-0.15) + BH55(0-0.15)
Composite H	BH48(0-0.15) + BH63(0-0.15) + BH64(0-0.15)
Composite I	BH49(0-0.15) + BH50(0-0.15) + BH51(0-0.15)
Composite J	BH42(0-0.15) + BH54(0-0.15) + BH57(0-0.15)
Composite K	BH52(0-0.15) + BH53(0-0.15) + BH58(0-0.15)
Composite L	BH59(0-0.15) + BH60(0-0.15) + BH61(0-0.15)
Composite M	BH62(0-0.15) + BH65(0-0.15) + BH66(0-0.15)
Composite N	BH67(0-0.15) + BH68(0-0.15) + BH69(0-0.15)
Composite O	BH70(0-0.15) + BH71(0-0.15) + BH72(0-0.15)
Composite P	BH73(0-0.15) + BH74(0-0.15) + BH75(0-0.15)
Composite Q	BH56(0-0.15) + BH76(0-0.15) + BH77(0-0.15)
Composite R	BH78(0-0.15) + BH79(0-0.15) + BH80(0-0.15)

Within the following allowable holding times, detailed in Schedule B(3) of The *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)* prepared by the National Environment Protection Council (NEPC), the recovered samples were analysed.

ANALYTE	HOLDING TIME
Heavy Metals *	6 months
Mercury	28 days
Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	14 days
Total Petroleum Hydrocarbons (TPH)	14 days
Polycyclic Aromatic Hydrocarbons (PAH)	14 days
Polychlorinated Biphenyls (PCB)	14 days
Organochlorine Pesticides (OCP)	14 days
Cyanide	14 days
Volatile Organic Compounds (VOC)	14 days

Heavy Metals include arsenic (As), boron (B), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), selenium (Se), Tin (Sn), zinc (Zn)

In order to monitor groundwater levels and the contamination status of the groundwater beneath the site, three groundwater monitoring wells, labelled as MW1, MW2 and MW3, were installed within the north-eastern portion of the site on 22 February 2005. Monitoring of groundwater beneath the undeveloped south-western portion of the site was not considered necessary as no contaminants were detected in the soils and no development has occurred within the portion of the site.

The groundwater flow, considering the position of the Nepean River, is considered to be towards the west in the vicinity of and beneath the site. As such, MW3 was installed to monitor the water quality entering the site; MW2 was installed to monitor the water quality beneath the site in the vicinity of the main factory and storage areas and MW1 was installed close to the north-western boundary to monitor the water quality exiting the site. The monitoring well locations are shown on Drawing No 2883/1-AF2.

The three wells were installed to depths ranging from 10.1m to 12.0m below the existing ground level in order to ensure that the groundwater was intercepted for a sufficient depth. The soil profile encountered at each location is described in Table 1 in Appendix E.

The wells comprised 6m of machine-slotted PVC at the base and non-slotted PVC for the remainder of the well. The annulus between the well and the borehole was filled with sand and a bentonite seal was installed close to the top, in order to prevent surface water infiltration into the borehole.

Two days after installation of the monitoring wells, the Environmental Scientist measured the groundwater levels and then developed the wells by pumping water using a Waterra pump until the water was visibly clean.

The Environmental Scientist measured the groundwater levels and then purged the monitoring wells on 1 March 2005, using the Waterra pump. A calibrated Water Quality Meter was used to measure Temperature, Oxidisation Reduction Potential (ORP), Dissolved Oxygen, Conductivity, and pH of the groundwater. After purging to about three volumes of the well size and reaching stable readings for Temperature, ORP, Dissolved Oxygen, Conductivity and pH, groundwater samples were collected.

The groundwater was sampled using the Waterra pump. The VOC vials, glass and plastic bottles were filled to zero headspace and sealed with air tight Teflon screw top lids. The fully filled VOC vials, glass and plastic bottles were labelled and placed in a chilled container. The recovered water samples were forwarded in chilled containers under Chain of Custody (COC) conditions to SGS.

The groundwater samples (GW1 to GW3) were scheduled for chemical analysis corresponding to the potential contaminants identified for the soils within the site. Fluoride was also added to the analysis.

Additional groundwater samples (GW1a to GW3a) were recovered on 6 April 2005 and forwarded for analyses of a number of the selected analytes in order to obtain test results to lowest possible detection limits.

The soil and groundwater chemical testing schedule is presented on the following table:

11761/1-AA
Lot 12 in DP234581, 165 Station Street, Penrith

LABORATORY TESTING SCHEDULE

Sample	Depth (m)	HEAVY METALS (1)	HEAVY METALS (2)	TPH / BTEX	PAH	OCP	PCB	Cyanide	Hexavalent Chromium	Alkyl Mercury	VOC	Fluoride	asbestos
Surface (or near surface) soil samples from close to existing buildings													
BH1	0.7-0.85	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH2	0.13-0.28	✔		✔	✔	✔	✔						
BH3	0.15-0.3	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH4	0.25-0.4	✔		✔	✔	✔	✔						
BH5	0.25-0.4	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH6	0.12-0.27	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH7	0.23-0.38	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH8	0.22-0.37	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH9	0.15-0.3	✔		✔	✔	✔	✔						
BH10	0.2-0.35	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH11	0-0.15	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH12	0-0.15	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH13	0-0.15	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH16	0.17-0.32	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH18	0-0.15	✔		✔	✔	✔	✔						
BH19	0-0.15	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH20	0.5-0.65	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH21	0.1-0.25	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH22	0.1-0.25	✔		✔	✔	✔	✔	✔	✔	✔	✔		✔
BH23	0.1-0.25	✔		✔	✔	✔	✔						
BH24	0.1-0.25	✔		✔	✔	✔	✔						
Discrete surface (or near surface) soil samples away from existing buildings													
BH25	0.1-0.25		✔	✔	✔	✔	✔						
BH31	0-0.15		✔	✔	✔	✔	✔						
Composited surface (or near surface) soil samples away from existing buildings													
Composite A	NA		✔			✔							
Composite B	NA		✔			✔							
Composite C	NA		✔										
Composite D	NA		✔			✔							
Composite E	NA		✔										
Composite F	NA		✔			✔							
Composite G	NA		✔			✔							
Composite H	NA		✔										
Composite I	NA		✔			✔							
Composite J	NA		✔										
Composite K	NA		✔			✔							
Composite L	NA		✔										
Composite M	NA		✔			✔							
Composite N	NA		✔										
Composite O	NA		✔			✔							
Composite P	NA		✔			✔							
Composite Q	NA		✔										
Composite R	NA		✔			✔							
Discrete non-surface fill samples													
BH25	0.25-0.4		✔										
BH31	0.15-0.3		✔										
Groundwater samples													
GW1			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
GW2			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
GW3			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	

Notes
HEAVY METALS (1): arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, tin, zinc
HEAVY METALS (2): arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc
PAH : Polycyclic Aromatic Hydrocarbons
TPH : Total Petroleum Hydrcarbons
BTEX : Benzene, Toluene, Ethyl Benzene, Xylene
OCP : Organochlorine Pesticides
PCB : Polychlorinated Biphenyls
VOC: Volatile Organic Compounds

11.0 ASSESSMENT CRITERIA

In assessing the suitability of the site for the proposed retail, residential and open space development, the following assessment criteria were adopted.

- The National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 1999) in the National Environment Protection Council (NEPC) publications provide risk-based Health Investigation Levels (Hills) for selected organic and inorganic chemicals in Table 5-A of Schedule B(1) – Guideline on the Investigation Levels for Soil and Groundwater. These levels are provided for a variety of exposure settings.

  With respect to human health, analytical results are assessed against risk based health investigation (HIL) guidelines appropriate for *residential development with minimal opportunities for soil access* (HIL 'D') and *parks, recreational open space and playing fields* (HIL 'E').

- The *Guidelines for Assessing Service Station Sites* (NSW EPA, 1994) provide guidance regarding petroleum hydrocarbons and BTEX compounds.

- There are currently no ecologically based investigation levels on a national level, as the receptors (or potential receptors) tend to be site or region specific. The NSW EPA has however, published interim (provisional) guidance levels for assessing phytotoxicity effects on plant species, i.e., the EPA Provisional Phytotoxicity-Based Investigation Levels (PPBIL), which have been published in the EPA *"Guidelines for the NSW Site Auditor Scheme" – 2006.* The levels are adopted for use as screening guidance for assessing the soil to be retained on-site that may potentially be exposed to the root zones of plant species under the proposed development.

- There are currently no NSW DECC produced or endorsed guidelines for the assessment of asbestos in soils. As such, a "zero tolerance" approach has been used to assess the presence or otherwise of asbestos contamination.

- The "*Australian and New Zealand Guidelines for Fresh and Marine Waters*" 2000, published by the Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), is adopted for assessing water quality.

The groundwater flowing beneath the site potentially feeds the Nepean River or its tributaries. As such, the main receptor for potentially contaminated groundwater is considered to be the ecosystems of the Nepean River or its tributaries.

In order to determine whether the groundwater may impact on aquatic life within the fresh water aquatic ecosystems, the groundwater test results were assessed against the available Trigger Values for a slightly / moderately disturbed freshwater system, at a protection level of 95% of species (ANZECC/ARMCANZ, 2000), which are extracted from the abovementioned guidelines.

The adopted assessment criteria for the soils are presented in the following tables.

Alkyl mercury is an organic functional mercury group, of which methyl mercury is the group that forms. As such, the threshold levels for methyl mercury have been used in the assessment of alkyl mercury.

Substances	ASSESSMENT CRITERIA (mg/kg)				Source
	HIL 'D'	HIL 'E'	PPBIL/EIL	NSW EPA	
INORGANICS					
Metals					
Arsenic	400	200	20	-	NEPM, 1999; NSW DECC, 2006
Boron	12,000	6,000	-	-	NEPM, 1999; NSW DECC, 2006
Cadmium	80	40	3	-	NEPM, 1999; NSW DECC, 2006
Chromium (III)	480,000	240,000	400	-	NEPM, 1999; NSW DECC, 2006
Chromium (VI)	400	200	-	-	NEPM, 1999; NSW DECC, 2006
Copper	4,000	2,000	100	-	NEPM, 1999; NSW DECC, 2006
Lead	1,200	600	600	-	NEPM, 1999; NSW DECC, 2006
Manganese	6,000	3,000	500	-	NEPM, 1999; NSW DECC, 2006
Mercury (Methyl/Inorganic)	40 / 60	20 / 30	1[a]	-	NEPM, 1999; NSW DECC, 2006
Nickel	2,400	600	60	-	NEPM, 1999; NSW DECC, 2006
Zinc	28,000	1,400	200	-	NEPM, 1999; NSW DECC, 2006
Cyanides (Total) (Free / Complex)	1000 / 2000	500 / 1000	-	-	NEPM, 1999
ORGANICS					
TPH/BTEX					
C_6 to C_9 Fraction	-	-	-	65	NSW EPA, 1994
C_{10} to C_{36} Fraction	-	-	-	1,000	NSW EPA, 1994
Benzene	-	-	-	1	NSW EPA, 1994
Toluene	-	-	-	1.4	NSW EPA, 1994
Ethylbenzene	-	-	-	3.1	NSW EPA, 1994
Total Xylenes	-	-	-	14	NSW EPA, 1994
PAH					
Benzo(z)pyrene	4	2	-	-	NEPM,1999
Total PAH	80	40	-	-	NEPM,1999
OCP					
Aldrin + Dieldrin	40	20	-	-	NEPM,1999
Chlordane	200	100	-	-	NEPM,1999
DDT+DDD+DDE	800	400	-	-	NEPM,1999
Heptachlor	40	20	-	-	NEPM,1999
PCB (Totals)	40	20	-	-	NEPM,1999

a: Total Mercury

Contaminant	Assessment Criteria (mg/L)		Source
	Fresh Water Trigger Value (slightly to moderately disturbed ecosystems – 95% protection)	Other	
Metals			
Arsenic	0.013-0.024	-	ANZECC/ARMCANZ, 2000
Boron	0.37	-	ANZECC/ARMCANZ, 2000
Cadmium	0.0002	-	ANZECC/ARMCANZ, 2000
Chromium (III)	0.0033*	-	ANZECC/ARMCANZ, 2000
Chromium (VI)	0.001*	-	ANZECC/ARMCANZ, 2000
Copper	0.0014	-	ANZECC/ARMCANZ, 2000
Lead	0.0034	-	ANZECC/ARMCANZ, 2000
Zinc	0.008	-	ANZECC/ARMCANZ, 2000
Nickel	0.011	-	ANZECC/ARMCANZ, 2000
Mercury	0.00006	-	ANZECC/ARMCANZ, 2000
Organics			
TPH/BTEX	-	-	
C_6 to C_9 Fraction	-	-	-
C_{10} to C_{36} Fraction	-	-	-
Benzene	0.95	-	ANZECC/ARMCANZ, 2000
Toluene	0.18*	-	ANZECC/ARMCANZ, 2000
Ethylbenzene	0.08*	-	ANZECC/ARMCANZ, 2000
Total Xylenes	0.075-0.35*	-	ANZECC/ARMCANZ, 2000
PAH			
Benzo(a)pyrene	0.0001*	-	ANZECC/ARMCANZ, 2000
Naphthalene	0.016	-	ANZECC/ARMCANZ, 2000
Anthrancene	0.00001*	-	ANZECC/ARMCANZ, 2000
Phenanthrene	0.0006*	-	ANZECC/ARMCANZ, 2000
Fluoranthene	0.001*	-	ANZECC/ARMCANZ, 2000
OCP			
HCB	0.05*	-	ANZECC/ARMCANZ, 2000
BHC	-	-	ANZECC/ARMCANZ, 2000
Lindane	0.0002	-	ANZECC/ARMCANZ, 2000
Heptachlor	0.00009	-	ANZECC/ARMCANZ, 2000
Methoxychlor	0.000005*	-	ANZECC/ARMCANZ, 2000
Aldrin	0.000001*	-	ANZECC/ARMCANZ, 2000
Dieldrin	0.00001*	-	ANZECC/ARMCANZ, 2000
Enrin	0.00002	-	ANZECC/ARMCANZ, 2000
Endosulfan – alpha	0.0000002*	-	ANZECC/ARMCANZ, 2000

Contaminant	Assessment Criteria (mg/L)		Source
Endosulfan - beta	0.000007*	-	ANZECC/ARMCANZ, 2000
Endosulfan	0.0000002	-	ANZECC/ARMCANZ, 2000
DDE	0.00003*	-	ANZECC/ARMCANZ, 2000
DDT	0.00001	-	ANZECC/ARMCANZ, 2000
Mirex	0.00004*	-	ANZECC/ARMCANZ, 2000
Toxaphene	0.0002	-	ANZECC/ARMCANZ, 2000
Chlordane	0.00008	-	ANZECC/ARMCANZ, 2000
PCB			
Arochlor 1016	0.000001*	-	ANZECC/ARMCANZ, 2000
Arochlor 1221	0.001*	-	ANZECC/ARMCANZ, 2000
Arochlor 1232	0.0003*	-	ANZECC/ARMCANZ, 2000
Arochlor 1242	0.0006	-	ANZECC/ARMCANZ, 2000
Arochlor 1248	0.00003*	-	ANZECC/ARMCANZ, 2000
Arochlor 1254	0.00003	-	ANZECC/ARMCANZ, 2000
Arochlor 1260	0.025*	-	ANZECC/ARMCANZ, 2000
Arochlor 1262	0.050*	-	ANZECC/ARMCANZ, 2000
Arochlor 1268	0.050*	-	ANZECC/ARMCANZ, 2000
Cyanide			
Cyanide	0.007	-	ANZECC/ARMCANZ, 2000

NOTES: * insufficient data for reliable trigger value (interim working value or low reliability value used)

The NEPM also provides guidance for assessment of a statistical distribution of contaminant concentrations taken from a data set of random samples. There are a number of criteria to be fulfilled in order to establish that a site (or study area) is not contaminated, which are:

- the arithmetic mean of the data set must be less than the relevant assessment criteria; that is, it is acceptable to have individual exceedences of the criteria, but the cumulative mean of the data set of soil sample results should not exceed the assessment criteria.
- the standard deviation of the data set should be less than 50% of the relevant assessment criteria
- no individual sample result should be greater than 250% of the relevant assessment criteria

This statistical approach has been adopted for assessment of the laboratory data provided (soils), where applicable. However, as opposed to the arithmetic mean, the 95% Upper Confidence Limit (UCL) of the mean, as discussed in Sections 5 of the EPA "*Sampling Design Guidelines for Contaminated Sites*" – 1995, has been adopted as the governing value.

12.0 LABORATORY TEST RESULTS, ASSESSMENT & DISCUSSION

Reference may be made to Appendix F for the actual laboratory test results certificates provided by SGS. The test results, with the exception of VOC, are also presented in the tables, together with statistical data (where applicable) and the adopted assessment criteria.

12.1 Soil Samples

In order to detect any potential "hot spots" of contamination within an individual composite sample, an adjusted assessment is recommended for the assessment of results of composite samples, based on Method 1, Section 6 of the EPA "*Sampling Design Guidelines*" 1995. The Adjusted Assessment Criteria presented in the applicable tables following were calculated by dividing the Assessment Criteria by three (i.e. three sub-samples comprised the composite). Individual composite samples were assessed against the adjusted assessment criteria, whilst the statistical results of the combined composite sample test results were assessed against the relevant assessment criteria (unadjusted).

The test results for the recovered soil samples, with the exception of VOC, are summarised in Tables A1 to A8, together with statistical analyses of the results and assessment criteria adopted.

As shown in Table A1, the 95% UCL of the mean concentrations of all metals and metalloids (including hexavalent chromium and alkyl mercury) were less than the assessment criteria adopted; the standard deviations were all less than 50% of the assessment criteria, and no single concentration exceeded the assessment criteria by more than 250%. As such, the Heavy Metals test data satisfy the criteria for stating that Heavy Metals contamination is not likely to be an issue within the surface or near surface soils in close proximity to the buildings within the site.

As indicated in Table A2, the 95% UCL of the mean concentrations of all Heavy Metals were less than the assessment criteria adopted; the standard deviations were all less than 50% of the assessment criteria, and no single concentration exceeded the assessment criteria by more than 250%. As such, the Heavy Metals test data satisfy the criteria for stating that Heavy Metals contamination is not likely to be an issue within the surface or near surface soils from areas of the site away from the existing buildings.

As indicated in Table A3, concentrations of TPH and BTEX were less than the laboratory practical quantitation limits (PQL) and/or less than the adopted assessment criteria shown in the table.

The PAH test results (Table A4) are presented as benzo(a)pyrene and Total PAH. Benzo(a)pyrene is a suspected human carcinogen and in high concentrations presents a significant human health risk. The NSW EPA has produced health based assessment criteria for benzo(a)pyrene, as well as the sum of PAH. As indicated in Table A4, both the benzo(a)pyrene and Total PAH concentrations were less than the laboratory detection limits and less than the assessment criteria adopted.

As indicated in Tables A5, A6 and A7, the concentrations of OCP, PCB and cyanides were less than the laboratory detection limits and less than the adopted assessment criteria or adjusted assessment criteria.

As shown in Table A8, asbestos was not detected in any of the soil samples analysed for asbestos.

As shown on the laboratory test results certificates, the concentrations of all VOC were less than the laboratory detection limits.

12.2 Groundwater Samples

The groundwater sample test results, with the exception of VOC, are presented in Tables B1 to B6, together with the assessment criteria adopted.

As indicated in Table B1, the trigger values for nickel and zinc have been adjusted to allow for water hardness. This adjustment is recommended for various heavy metals in the "*Australian and New Zealand Guidelines for Fresh and Marine Waters*" 2000.

As indicated in Table B1, the concentrations of all metals and metalloids were either less than the laboratory detection limits and/or less than the trigger values used to assess the impact on fresh water aquatic ecosystems. Note that Alkyl mercury was tested at an external laboratory to SGS and e reported to a higher detection limit. However, based on the total mercury concentrations reported by SGS (<0.0001 to 0.0002mg/L) the alkyl mercury concentrations would be less than the limit listed under the Clean Waters Regulations 1972.

As indicated in Tables B2 to B5, the concentrations of BTEX, PAH, OCP and PCB were less than the laboratory detection limits.

As shown in Table B6, the concentrations of phenols and cyanide were less than the laboratory detection limits and/or less than the threshold levels adopted, whilst the concentrations of fluoride were less than the assessment criteria adopted.

As shown on the laboratory test results certificates, the concentrations of all VOC were less than the laboratory detection limits.

13.0 SITE CHARACTERISATION

As presented in the summary tables and discussed in Section 12.0 of this report, all laboratory data and/or data sets satisfied the criteria for stating that the analytes selected are either not present, or present in the soils at concentrations that do not pose a risk of hazard to human health or the environment under a residential (with minimal soil access) or open space (park) land use.

The laboratory data also reveals that there is no indication of contaminated groundwater beneath the site or contribution to groundwater contamination because of past activities within the site.

There have been no recent activities within the site (since 2005) considered to have contributed to soil or groundwater contamination beneath the site.

Based on the field and laboratory test results, it is also considered that the site does not pose a significant risk of harm to human health or the environment, under the definition provided in the *Contaminated Land Management Act 1997 (CLM Act).*