PLANNING PROPOSAL APPLICATION

City of Canada Bay

LODGEMENT AND PAYMENT OF APPLICATION: You can lodge and pay for your application via:

Council: City of Canada Bay Civic Centre, 1A Marlborough Street, Drummoyne
8.30am-4pm, Monday-Friday – **Payment by CASH, CHEQUE OR CARD**

Mail: City of Canada Bay, Locked Bag 1470, Drummoyne NSW 1470 – **Payment by CHEQUE ONLY**

Please note: Your application will **NOT** be processed until **FULL** payment has been received.
If paying by CREDIT CARD, an additional 1.0% processing fee will apply.
If paying by AMEX CARD, an additional 1.0% processing fee will apply.

Office Use

Fee Paid: $60,000 *Receipt No:* 1405470 *Date:* 23.1.18

Application Number: PP2018/0001

Applicable fee

Minor LEP or DCP	☐	$10,000
Major LEP or DCP	☒	$60,000

Note: A Minor LEP generally refers to a single allotment spot rezoning generated by a planning anomaly or inconsistency, or minor amendments such as the modification of a development standard. These rezoning are generally not complex or contentious. A Major LEP refers to all other rezoning applications submitted to Council. Please confirm with Council's Strategic Planning Team whether the Planning Proposal is 'Minor' or 'Major' prior to submitting Planning Proposal. Fees for both major and minor LEP amendments are not refundable

Description of proposal

SEE ATTACHED REPORT.

SCANNED
23 JAN 2018

Property details

Address: Unit No: – House No: 176-184

Street: GEORGE STREET

Suburb: CONCORD WEST Postcode: 2138

Lot: DP: SP: Sec:

Site area: 8072 sqm SEE ATTACHED REPORT.

Applicant details

Surname:	HARB	First Name:	ALEX
Email:	A.HARB@ELOURAHOLDINGS.COM.AU		
Contact Number:	9642 5666		
Company name: (if applicable)	ELOURA HOLDINGS		
ABN: (if applicable)	89 117 032 103		
Postal Address:	REAR 53-57 COSGROVE ROAD		
Suburb:	SOUTH STRATHFIELD	Postcode:	2136

Statement of disclosure of political donations

Have you made a reportable political donation or gift within the two years preceding this application? (If a reportable political donation has been made, complete the disclosure form found on Council's webpage). ☐ Yes ☒ No

Have any consultants assisting you with this development been previously engaged by Council within the past five years for a project in excess of $5,000? ☐ Yes ☒ No

If **yes**, please ask your consultant to provide the following information:

Consultant:			
Project:		Year:	

I hereby apply for the proposal described above and I consent to Council copying this application, and any supporting material, for the purpose of obtaining public comment.

Signature:		Date:	

Owner's consent

Multiple owners

Every owner of the land must sign this form, or provide authorisation under separate cover (e.g. multiple individuals or multiple companies).

Individuals

If you are signing as the owner's legal representative, you must state the nature of your legal authority and attach documentary evidence under separate cover (e.g. Power of Attorney, Executor, Trustee etc.)

Strata Title and Community Title

If the property is a unit under strata title or a lot in a community title, then in addition to the owner's signature the common seal of the Owners Corporation must be stamped on this form over the signature of the owner and signed by the chairman of the Owners Corporation or the appointed managing agent.

Company [SEE ATTACHED LETTER]

If the owner is a company, a separate letter is to accompany this application stating acknowledgement and consent of this application. This letter is to be signed by an authorised director in accordance with the Company's Memorandum and Articles of Association.

Owner(s):	GEORGE CONCORD PTY LTD		
Email:			
Contact Number:			
Postal Address:			
Suburb:		Postcode:	

As owner of the land to which this application relates, I consent to this application. I also consent for authorised Council officers to enter the land to carry out inspections relating to this application.

Signature(s):		Date:	

Without the owner's consent we will not accept the application.

PLANNING PROPOSAL CHECKLIST

City of Canada Bay

Provide 4 paper copies and 1 digital copy of the following information.

- [x] Completed Application Form
- [x] Completed Statement of Disclosure of Political Donations
- [x] Application Fees

Background Information

- [x] Description of the subject land and locality.
- [x] A Survey Plan of the site drawn to scale identifying physical features such as trees, topography, existing buildings etc.

Planning Proposal

The Planning Proposal must be prepared in accordance with the Department of Planning and Infrastructure's Guide to Preparing Planning Proposals and Guide to Preparing Local Environmental Plans. The proposal must address and include the following essential parts:

- [x] Objectives or intended outcomes of the Planning Proposal.
- [x] An explanation of the provisions that are to be included in the LEP
- [x] Justification for those objectives, outcomes and provisions.
- [x] Relationship to the strategic planning framework, including compatibility with:
  - [x] Sydney Metropolitan Strategy and draft Inner West Subregional Strategy.
  - [x] Council's Community Strategic Plan and Local Planning Strategy
  - [x] Applicable State Environmental Planning Policies.
  - [x] Applicable Ministerial Directions (s 117 directions).
- [x] Environmental social and economic impacts.

Supporting documents

- [x] Copies of all supporting studies justifying the proposal must be submitted at the time of lodgement. This may include traffic studies, urban design analysis, heritage assessments or other technical studies/strategies.

Development Concept

- [x] An indicative development concept, illustrating the nature and scale of development envisaged for the site – built form, open space, vehicular and pedestrian access and relationship with surrounding area.
  This information could include a draft Development Control Plan (DCP) containing guidelines that would assist in providing a framework to assess future development on the site.

Notification Plans

- [x] Notification Plans for the proposal. Plans must be legible, including dimensions and text. The notification plans must be A4.

Electronic copies for Planning Proposals
Council will require all application forms, plans and associated documentation required for a Planning Proposal to be lodged in an electronic format.

In addition to hard copies, all documents and plans need to be submitted as an electronic version using a CD or USB or similar device.

All electronic documents submitted with a Planning Proposal need to satisfy the following criteria:

1. **PDF Format** – All documents, plans, application forms etc must be submitted as separate PDF files for each document or plan or application form e.g. survey plans must be one pdf document, supporting studies must be on another separate pdf document. Pdf documents can consist of numerous pages. Security setting must not be applied to electronic documents, this includes passwords.

2. **Documents** – must be A4 formatted and optimised for minimum size (on-line publishing). Files larger than 4Mb should be broken up into logical parts and supplied as separate files.

3. **Plans** - must be to scale and rotated to landscape.

4. **File Names** – file naming conventions will apply to all electronic documents, including plans and applications forms. Please see File Naming Protocol below.

5. **Accuracy** – electronic documents must be exact reproductions of the original hard copy documents or plans.

Electronic documents lodged with Council may be published on Council's webpage.

File Naming Protocol (where relevant)
1A Marlborough Street, Drummoyne – A – Planning Proposal Application Form
1A Marlborough Street, Drummoyne – B – Planning Proposal
1A Marlborough Street, Drummoyne – C – Survey Plan
1A Marlborough Street, Drummoyne – D – Development Concept Plans or draft DCP controls
1A Marlborough Street, Drummoyne – E – A4 Notification Plan
1A Marlborough Street, Drummoyne – F – Shadow diagrams
1A Marlborough Street, Drummoyne – G – Photo Montages
1A Marlborough Street, Drummoyne – H – SEPP 65 – Residential Flat Design Code assessment
1A Marlborough Street, Drummoyne – I – Heritage Impact Statement
1A Marlborough Street, Drummoyne – J – Contamination Report
1A Marlborough Street, Drummoyne – K – Transport & Traffic Assessment
1A Marlborough Street, Drummoyne – L – Economic Analysis
1A Marlborough Street, Drummoyne – M – Noise Assessment
1A Marlborough Street, Drummoyne – N – Arborist Report
1A Marlborough Street, Drummoyne – O – Flora and Fauna Assessment
1A Marlborough Street, Drummoyne – P – Geotechnical Investigation

George Concord Pty Ltd

ABN 30 147 065 941

53-57 Cosgrove Road

Strathfield South NSW 2136

Phone: 02 9642 5666

19 January 2018

General Manager
Canada Bay City Council
1A Marlborough Street
Drummoyne NSW 2047

Attention: Ms Karen Lettice

Dear Karen

PLANNING PROPOSAL – 176-184 GEORGE STREET CONCORD WEST

George Concord Pty Ltd as the owners of the abovementioned land authorise the lodgement of the enclosed Planning Proposal application.

Yours sincerely

Alex Harb
Authorised representative of George Concord Pty Ltd

Planning Proposal

Site specific amendment to Canada Bay Local Environmental Plan 2013

176-184 George Street, Concord West

Document Control
CLIENT: George Concord Pty Ltd
PROJECT: Planning Proposal for 176-184 George Street, Concord West
TITLE: Planning Proposal – Site specific amendment to Canada Bay Local Environmental Plan 2013 for 176-184 George Street, Concord West
DOCUMENT REFERENCE NO: 217.090
PROJECT MANAGER Helen Deegan FILE NO: 217.090

Document Details		Preparation & Self Check	Independent Review By:	Corrective Action Approved by:	Sent To/ Date:
Draft V1	Name:	Sonny Embleton			
	Date:	29.6.17			
Draft V2	Name:	Rebecca Gordon			
	Date:	16.08.18			
Draft V3	Name:	Rebecca Gordon			
	Date:	11.01.18			

TOWN PLANNING
AND URBAN DESIGN

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TOWN PLANNING
AND URBAN DESIGN

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Executive Summary

This report constitutes a Planning Proposal (PP) to seek amendments to the *Canada Bay Local Environmental Plan 2013* (CBLEP 2013) to allow a site specific rezoning and amendment to the maximum building height and floor space ratio (FSR) controls for the land at 176-184 George Street, Concord West.

This PP has been prepared on behalf of George Concord Pty Ltd (owner of the subject site) by TPG Town Planning and Urban Design (TPG). This PP is submitted to the City of Canada Bay Council for assessment and determination under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The subject site is illustrated as Figure 1.

Figure 1: Aerial Context of Site (Site defined by red outline) Source: Google Maps and Spatial Information Exchange (SIX)

This PP has been prepared with the purpose of amending the CBLEP 2013, being the principal environmental planning instrument applying to the land, so as to rezone the subject site to allow residential development to be permissible. It is considered that rezoning the land from its current IN1 General Industrial zoning to an R3 Medium Density Residential zone and amending the corresponding maximum building height and FSR maps, is the best means of achieving this outcome. This is also consistent with the intended outcomes of the Concord West Precinct Masterplan 2014, which identifies this and a number of other industrial sites for rezoning for residential purposes.

In particular, this PP seeks:

- an amendment to the Canada Bay Local Environmental Plan (CBLEP) 2013 Land Use Zoning map to rezone the site from IN1 General Industrial to R3 Medium Density Residential (refer Section 4.4 of report);
- an amendment to the CBLEP 2013 maximum height of buildings map to set a maximum height of 16 metres under the height designation of "O2" at the northern end of the site and a maximum height of 22 metres under the height designation of "R2" over the remaining portion of the site (refer Section 4.4 of report);
- an amendment to the CBLEP 2013 maximum floor space ratio (FSR) map to set a maximum FSR of 1.9:1 under the FSR designation of 'S6' (refer Section 4.4 of report);
- to address the "Gateway" assessment criteria under Part 3 of the EP&A Act; and
- to provide justification for the amendments to the CBLEP 2013.

1. Part 1: Objectives and Intended Outcomes

This PP seeks an amendment to the CBLEP 2013 so that the land use zoning, building height and floor space ratio will enable the future redevelopment of the subject site for medium density residential purposes as envisaged by the Concord West Precinct Masterplan and the Parramatta Road Corridor Urban Transformation Strategy.

2. Part 2: Explanation of Provisions

2.1.1 The Planning Proposal

This PP has been prepared to address the guidelines set out in 'A guide to preparing planning proposals' DPE 2016.

The PP has been prepared with the purpose of amending the CBLEP 2013 and is submitted to the City of Canada Bay Council for assessment under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

In particular, this PP seeks the following amendments to the CBLEP 2013:

- an amendment to the Land Use Zoning map to rezone the site from IN1 General Industrial to R3 Medium Density Residential (refer Section 4.4 of report);
- an amendment to the maximum height map to change the current blanket height limit of 12 metres to a maximum height of 16 metres under the height designation of "O2" at the northern end of the site and a maximum height of 22 metres under the height designation of "R2" over the remaining portion of the site (refer Section 4.4 of report).
- an amendment to the maximum FSR map to set a maximum FSR of 1.9:1 under the FSR designation of 'S6' (refer Section 4.4 of report). The site currently has an FSR of 1:1.

This PP is underpinned by the following strategic studies and technical investigations, which form part of the strategic context and support the proposed amendments to the CBLEP 2013:

- The Concord West Masterplan prepared by JBA May 2014 and supporting background documentation
- Parramatta Road Urban Transformation Strategy November 2016
- Detailed Site Investigation – SGA Environmental October 2010 (Appendix B)
- Remediation Action Plan – DLA Environmental February 2012 (Appendix C)
- Acid Sulfate Soils Assessment Report – DLA Environmental February 2010 (Appendix E)
- Flood Assessment - TTW February 2016 (Appendix F)
- Site Survey – Project Surveyors November 2011 (Appendix G)
- Geotechnical Report – Jeffry and Katauskas Pty Ltd February 2012 (Appendix H).

3. Part 3: Justification

3.1 Section A – Need for the Planning Proposal

3.1.1 Is the planning proposal a result of any strategic study or report?

This PP is underpinned by the following strategic studies:

- Concord West Precinct Masterplan (2014).
- Parramatta Road Corridor Urban Transformation Strategy (2016).

The following sections describe the response proposed by the PP to the above studies:

3.1.1.1 Concord West Precinct Masterplan 2014

The Concord West Precinct Masterplan 2014 encompasses land on the western side of the Northern Rail Line at Concord West. The Masterplan focuses on land currently zoned IN1 General Industrial, which has been identified by the City of Canada Bay Council for predominantly residential purposes.

The Masterplan seeks to establish new planning controls to guide the future development of sites currently zoned for industrial use within the identified study area. The objectives of the study are to:

- deliver high quality urban design and appropriate built form controls that are considerate of surrounding built form;
- mitigate impacts in relation to the use of private motor vehicles and promote the use of public transport, walking and cycling;
- identify opportunities for public domain improvements and connections;
- balance city-wide and regional goals with the existing community and its context;
- provide a coordinated planning approach to the redevelopment of the area;
- provide a sound methodology and a thorough, evidence based justification for planning, urban design and traffic recommendations provided; and
- undertake the study with Council, community and stakeholder engagement.

The Masterplan identifies seven (7) key sites with the subject site being nominated as Site 5. The Masterplan envisages that the built form on Site 5 will be six (6) storeys for the majority of the site, with a four (4) storey building at the northern end of the site. Extracts from the Concord West Precinct Masterplan are provided at **Figures 2 and 3.** The Masterplan also acknowledges that there are flooding/overland flow risks in the vicinity of the site. This issue is further discussed in Section 3.2.4.6.

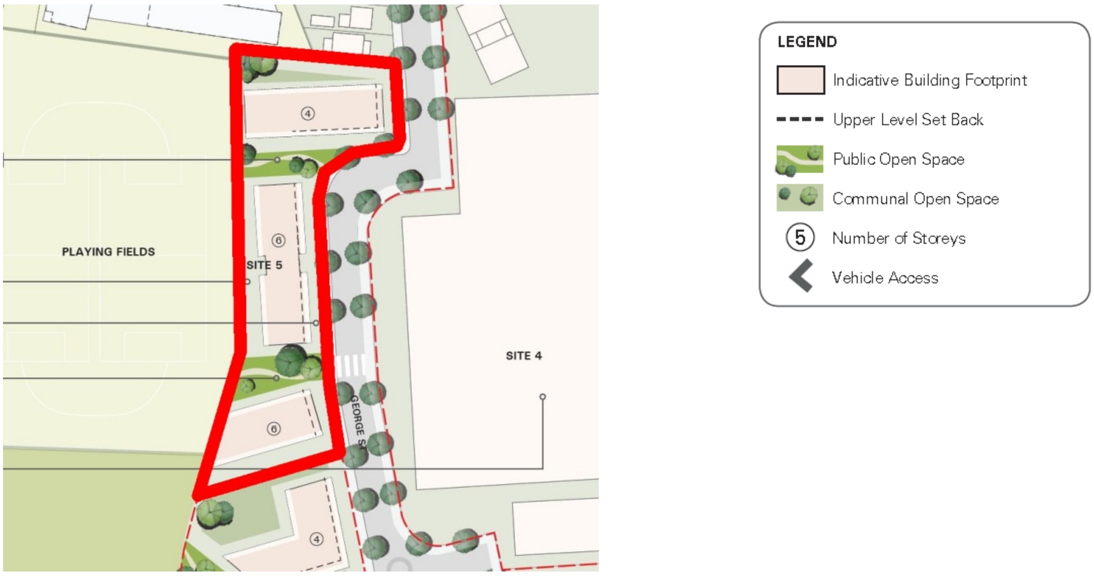

Figure 2 – Extract from Concord West Precinct Masterplan. (Site defined by red outline) (source JBA)

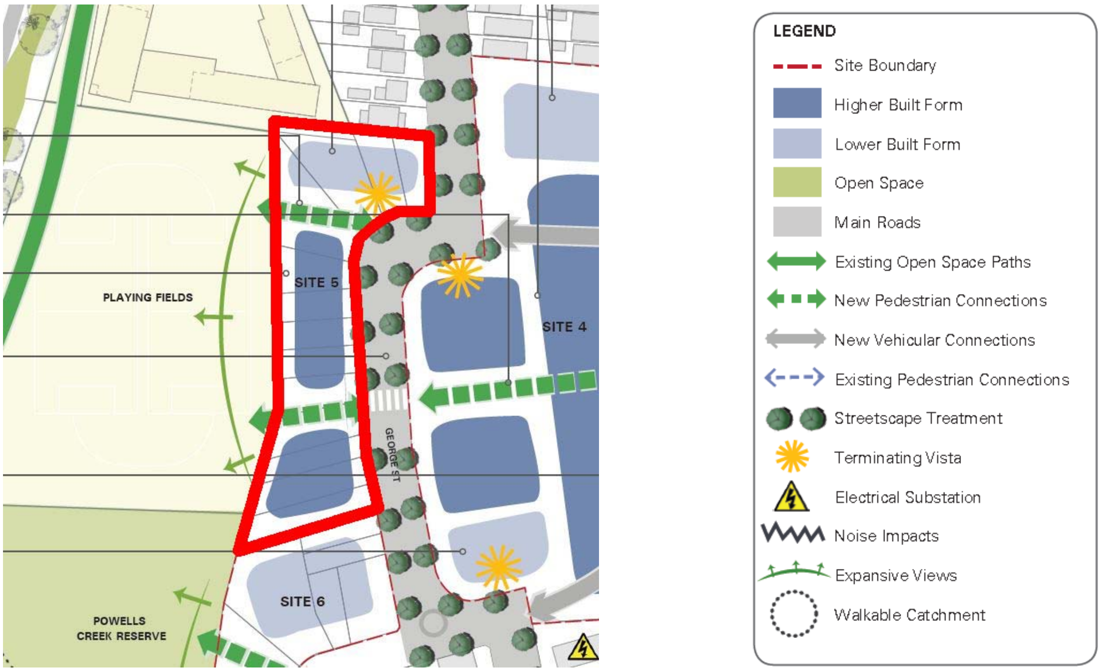

Figure 3 – Extract from Concord West Precinct Masterplan. (Site defined by red outline) (source JBA)

The Masterplan recommends a maximum building height of 16 metres at the northern end of the site and a maximum height of 22 metres over the remaining portion of the site. The Masterplan recommends a maximum FSR of 1.9:1. This is illustrated in **Figures 4 and 5.**

Figure 4 – Recommended maximum building height. (Site defined by red outline) (source Concord West Precinct Masterplan)

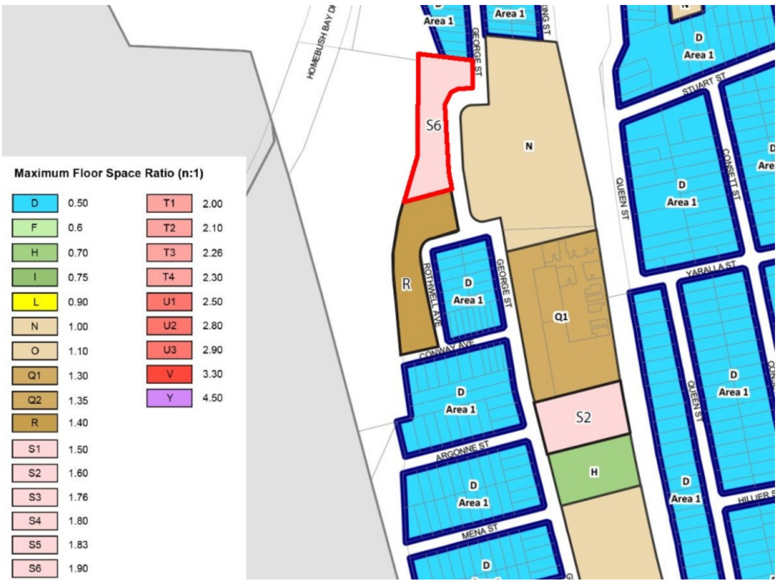

Figure 5 – Recommended maximum FSR. (Site defined by red outline) (source Concord West Precinct Masterplan)

This planning proposal is consistent with the vision and recommendations of the Concord West Precinct Masterplan 2014.

3.1.1.2 Draft DCP – Section 6.6.4 Concord West Precinct

The Concord West Precinct Masterplan 2014 has informed the preparation of a draft DCP, which was exhibited by Council in late 2016. The draft DCP includes the desired building setbacks, and the intended visual and pedestrian links between George Street and the Powells Creek Reserve. Figures 6-9 are extracts from the draft DCP.

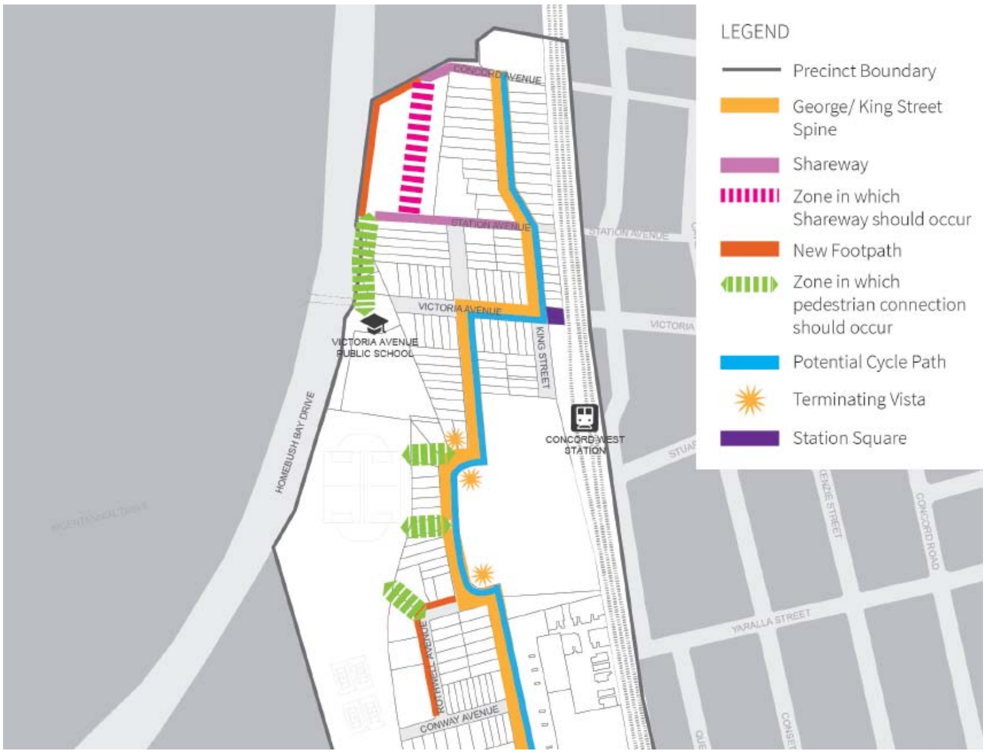

Figure 6 – Public Domain Plan – Draft DCP (Source City of Canada Bay)

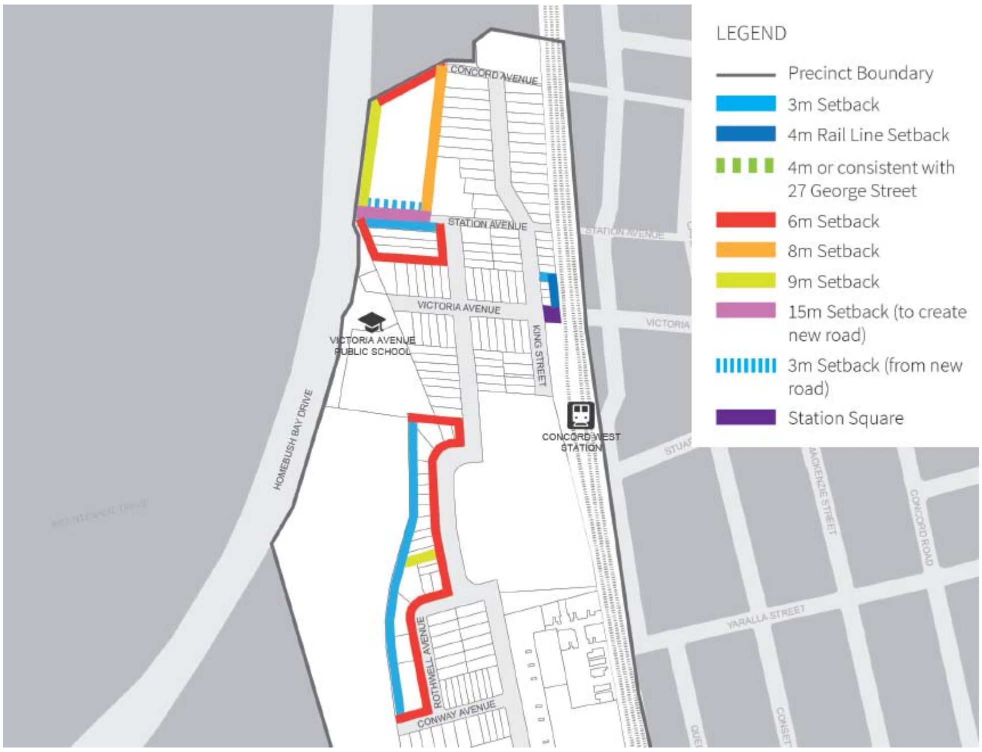

Figure 7 – Primary Setbacks – Draft DCP (Source City of Canada Bay)

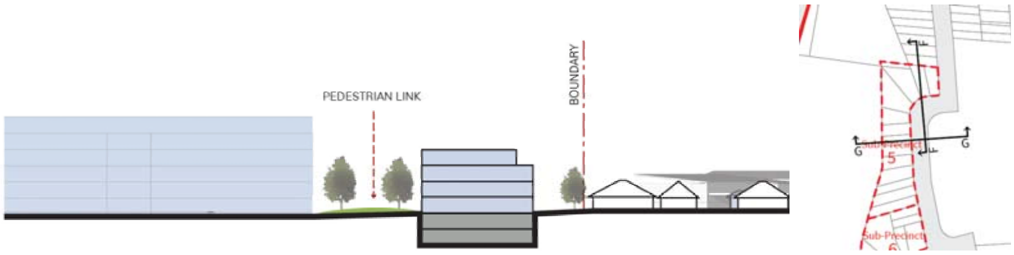

Figure 8 – Section FF George Street Interface – Draft DCP (Source City of Canada Bay)

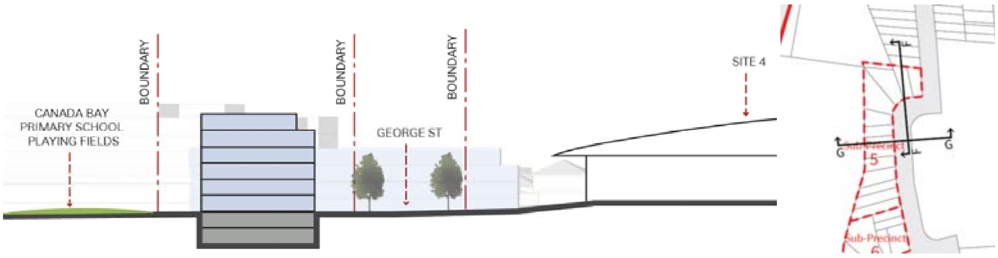

Figure 9 – Section GG George Street Interface – Draft DCP (Source City of Canada Bay)

This PP uses the Masterplan and draft DCP as a basis for the proposed zoning, height and FSR. As the proposed land use zoning, building height and FSR are consistent with the Masterplan, the proposed controls will enable the outcomes anticipated by the DCP to be delivered.

3.1.1.3 Parramatta Road Corridor Urban Transformation Strategy (2016)

The Parramatta Road Urban Transformation Strategy (PRUTS) sets a long term vision for the transformation and revitalisation of the Parramatta Road Corridor and includes eight identified growth precincts. The Strategy aims to accommodate 27,000 new homes and 50,000 new jobs across the corridor over the next 30 years. The Strategy has been adopted by the NSW Government and is given statutory effect by a Ministerial Direction under section 117 of the *Environmental Planning and Assessment Act 1979* (NSW) .

The subject site is located in the Homebush precinct of the PRUTS. This precinct is intended to be a focus for medium and high-density residential development, particularly in proximity to key transport nodes such as Concord West station. The PRUTS envisages that 19,500 new people 9,500 new homes and 12,900 new jobs will be created in the Homebush Precinct by 2050.

The associated Parramatta Road Corridor Planning and Design Guidelines (2016) makes recommendations for land use zoning, building height and FSR for the subject site. These recommendations mirror those outlined within the Concord West Precinct Masterplan 2014 and are illustrated in Figures 10-12.

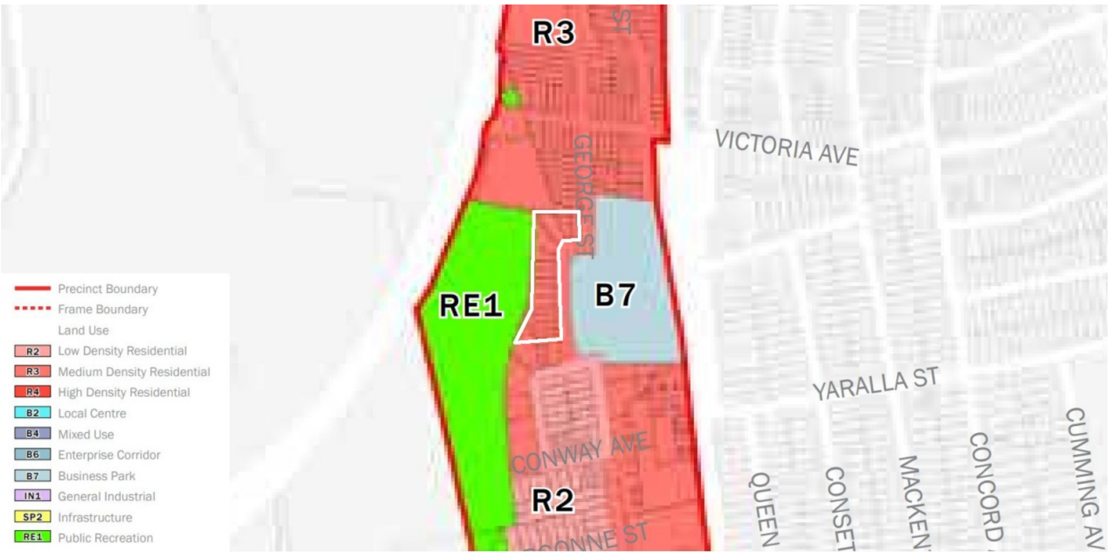

Figure 10 – Recommended land use zoning. (Site defined by white outline) (source Urban Growth)

Figure 11 – Recommended maximum building height. (Site defined by red outline) (source Urban Growth)

Figure 12 – Recommended maximum FSR. (Site defined by red outline) (source Urban Growth)

The PP will facilitate the medium to high density development of the subject site and will therefore contribute to increased housing provision in the Concord West locality. The recommended height and FSR as proposed by the PRUTS is aligned with the recommended outcomes of Council's Concord West Precinct Masterplan 2014. This PP is consistent with both the PRUTS and Masterplan.

3.1.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The site is identified as being suitable for residential purposes, however, is currently zoned industrial. It is considered that dealing with the PP as a site specific rezoning to amend CBLEP 2013, with associated amendments to the applicable height and FSR controls, is the best way to allow the future residential development of the site. The PP is seeking to permit residential development of the subject site that will be of a scale and nature that is consistent with the vision and principles of the Concord West Precinct Masterplan (2014) and Parramatta Road Corridor Urban Transformation Strategy (2016).

3.2 Section B – Relationship to Strategic Planning Framework

3.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including exhibited draft strategies)?

'A Plan for Growing Sydney', released in December 2014, is the current metropolitan strategic planning document for Sydney over the next 20 years. In November 2016 the Greater Sydney Commission (GSC) released its vision for the Sydney metropolitan area in its document 'Towards our Greater Sydney 2056' as an update to 'A Plan for Growing Sydney'. In October 2017 the GSC further released its 'Draft Greater Sydney Region Plan 2017' in its supporting document titled 'Our Greater Sydney 2056 A Metropolis of three cities – connecting people'. Following its exhibition and subject to its finalisation, it is expected that this plan will replace 'A Plan for Growing Sydney'. The relevant metropolitan and regional plans are discussed below.

3.2.1.1 A Plan for Growing Sydney 2014

The relevant metropolitan strategy relating to the proposed development is *A Plan for Growing Sydney* released by the NSW Department of Planning and Environment in December 2014. The plan identifies growth projections from a whole of Sydney perspective and specifically identifies Western Sydney as a key to Sydney's success.

The strategy seeks to achieve the following outcomes for Sydney:

Goal 1: A competitive economy with world-class services and transport.

Goal 2: A city of housing choice, with homes that meet our needs and lifestyles.

Goal 3: A great place to live with communities that are strong, healthy and well connected.

Goal 4: A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

The plan aims to better connect people to strategic centres and in doing so, connecting them to jobs, education facilities, health centres and hospitals and sporting, cultural and entertainment facilities.

The subject site is identified as being located within the Global Economic Corridor, which is comprised of a major band of employment nodes that extend from Port Botany through Sydney CBD to Macquarie Park, Parramatta CBD, Norwest, Rhodes and Sydney Olympic Park.

Rezoning the subject site to R3 Medium Density Residential, along with an increased height and FSR as per this PP, will directly assist in delivering the intended outcomes of the Plan as it will facilitate urban renewal and provide for additional housing opportunities that will take advantage of the subject site's favourable transit orientated development (TOD) location some 200 metres from Concord West Railway Station.

The PP will enable the future development of housing that provides an opportunity to connect new homes with a number of major and strategic employment centres including Sydney Olympic Park, Macquarie Park, Parramatta CBD and Sydney CBD via established suburban railway connections. These are accessible via Concord West Train Station, which is a short 3-5 minute walk from the subject site.

The PP meets the Goals, Principles and Directions of *A Plan for Growing Sydney* as the PP:

- seeks to establish planning controls that will assist in achieving outcomes envisaged by *Goal 2: A city of housing choice, with homes that meet our needs and lifestyles*, which aims to accelerate and diversify housing supply across existing infill areas of Sydney and improve housing choice and affordability in a location that is attractive to live with ready access to extensive open space and transport infrastructure;

- will increase housing supply, diversity and affordability close to the Concord West Railway Station, and by doing so will directly respond to *Principle 1: Increasing housing choice around all centres through urban renewal in established areas*; and

- deliver on *Action 2.1.1: Accelerate housing supply and local housing choices* and *Action 2.2.2: undertake urban renewal in transport corridors*, which are being transformed by investment in development, in and around strategic centres.

In this regard, the PP will establish appropriate planning controls that enable housing development in close proximity to the Concord West Railway Station, which is close to jobs and is serviced by frequent public transport services, capable of moving large numbers of people.

This PP seeks to facilitate a development outcome that provides housing supply and diversity in an area within close proximity to transport and a local town centre, and a wide range of strategic employment nodes. From a wider strategic perspective, the development will provide residents with superior access to key centres in Sydney that offer quality jobs, entertainment and leisure. The PP will assist in accommodating a changing and growing population, and provide more affordable and high amenity living options closer to accessible transport options.

3.2.1.2 Towards our Greater Sydney 2056

Towards our Greater Sydney 2056, prepared in November 2016 by the Greater Sydney Commission (GSC), outlines a draft amendment to *A Plan for Growing Sydney* and aligns with the vision established in the draft District Plans. It was the first step in a body of comprehensive work undertaken in 2017 to review *A Plan for Growing Sydney*.

This amendment reconceptualises Greater Sydney as a metropolis of three cities being the Eastern City, Central City and Western City as shown in map extract from *Towards our Greater Sydney 2056* at **Figure 13**. This Plan has been prepared in conjunction with five (5) draft District Plans and their subsequent revisions, to reflect the most contemporary thinking on Greater Sydney's future as the city grows and changes.

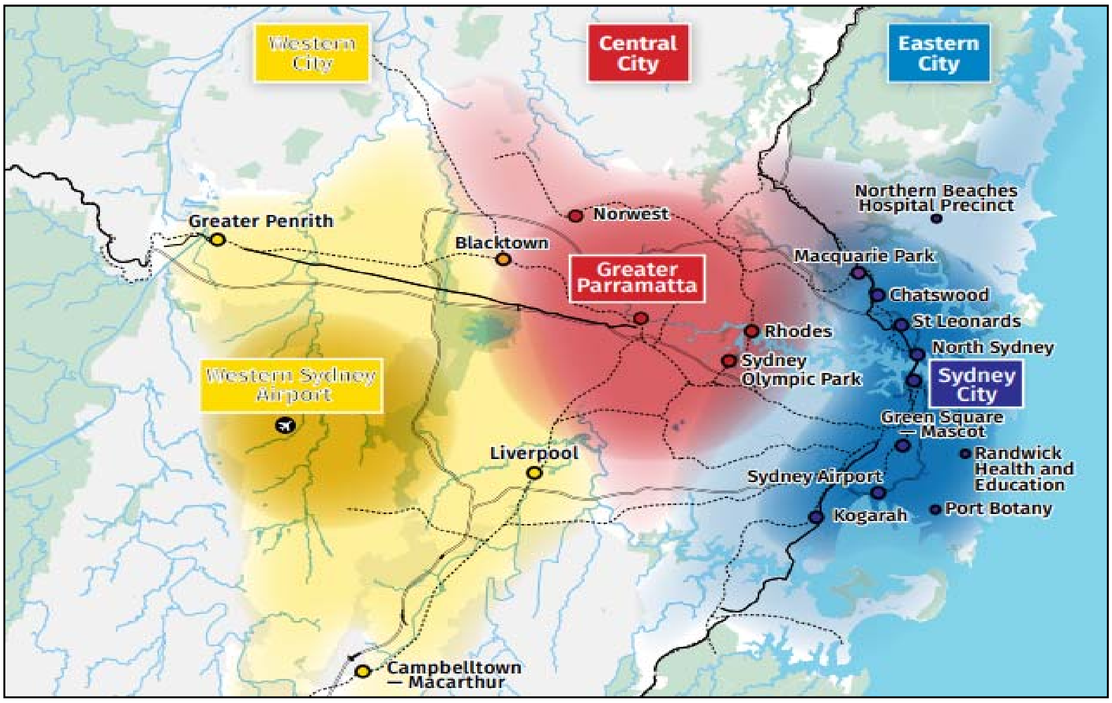

Figure 13: A metropolis of three cities: Global Sydney (Source: Towards our Greater Sydney 2056)

The amendment builds on *A Plan for Growing Sydney* by emphasising the need to accelerate housing supply through urban renewal and providing more diverse housing options in more easily accessible areas.

Further review of the plan has been undertaken following community and stakeholder consultation which concluded in March 2017 and has culminated in the release of a new draft regional plan for Sydney in October 2017. The draft *Greater Sydney Region Plan 2017* is discussed in more detail in **Section 3.2.1.4** of this PP.

3.2.1.3 Draft Central District Plan 2016 and Revised Draft Eastern City District Plan – Connecting Communities (October 2017)

Five (5) draft District Plans were released by the Greater Sydney Commission for public comment in November 2016. The draft Plans are a guide for implementing the draft Greater Sydney Region Plan at a District level and are a bridge between regional and local planning.

The local government area of Canada Bay is located in the revised draft Eastern City District Plan area. The draft Eastern City District Plan is a revised version of the draft Central District Plan. The revised Plan reflects feedback from the initial exhibition period and from consultation throughout the development of the draft Greater Sydney Region Plan.

The revised draft Eastern City District Plan provides a 20-year plan to manage growth and achieve the 40-year vision, while enhancing Greater Sydney's liveability, productivity and sustainability into the future. It recognises the importance of the Rhodes peninsula area for its contribution to health and open space, as well as its potential to accommodate increased housing provision.

To respond to population growth, the Plan focuses on a number of Planning Priorities. The PP is consistent with the revised draft Eastern City District Plan with respect to the following priority areas:

- Planning Priority E5 *'Providing housing supply, choice and affordability with access to jobs and services'.* This priority seeks to facilitate a higher quality of life, reduce commute time through collocation of housing, employment, services and public transport. This is relevant to the subject site as it is located within walking distance of the Concord West Train Station and local centre. The Plan acknowledges a preference for new housing to be located in renewal areas in close proximity to centres and public transport infrastructure. The proposal will assist in creating more affordable compact housing opportunities by diversifying the housing offered in this high amenity, transit oriented location.
- Planning Priority E6 'Creating and renewing great places and local centres, and respecting the District's heritage'. This planning priority seeks to improve liveability in urban environments though planning for a mix of high-quality places that engage, activate and connect people and communities. The Plan recognises that co-locating activities and social infrastructure in mixed use areas delivers more efficient use of land and enhances the viability of, and access to, great places, centres and public transport. The PP seeks to provide additional residential opportunities and choice within walking distance of the local centre and open spaces, and will directly deliver on this priority.
- Planning Priority E10 'Delivering integrated land use and transport planning and a 30-minute city'. The draft Eastern City District Plan recognises that improved connections between strategic centres within the District and the wider Greater Sydney area are important. The PP will provide additional residential accommodation within walking of a train station that provides transport to the Sydney CBD, Parramatta and other major metropolitan centres within 30 minutes.

As demonstrated above, the PP is aligned with the Eastern City District Plan and will contribute to delivering its envisaged outcomes.

3.2.1.4 Draft Greater Sydney Region Plan 2017

The draft *Greater Sydney Region Plan* has been prepared by the Greater Sydney Commission (GSC) and was released in October 2017. It is a 20-year plan to manage growth and change, and is built on a 40-year vision where the people of Greater Sydney live within 30 minutes of their jobs, education, health facilities, services and great places. This vision is consistent with the 10 Directions established in the *Directions for a Greater Sydney* that are a set of common guiding principles that will assist in navigating Greater Sydney's future as follows:

1. A city supported by infrastructure.
2. A collaborative city
3. A city for people.
4. Housing the city.
5. A city of great places.
6. A well connected city.
7. Jobs and skills for the city.
8. A city in its landscape.

9. An efficient city.
10. A resilient city.

Within the draft *Greater Sydney Region Plan* these Directions are presented through the three key themes of liveability, productivity and sustainability, with a continued focus on infrastructure and collaboration.

It also expands on the three cities concept established in the *Towards Our Greater Sydney 2056* document, with the cities being the Western Parklands City, Central River City and Eastern Harbour City.

The draft Plan is consistent with the regional plans that come before it in identifying urban renewal as a means of providing for more housing in locations where significant infrastructure has been made and access to transit corridors is available.

Concord West is nominated as an 'Urban Renewal Area' and is ideally located adjacent to a major road network and railway station. Future residents in this area will have good access to transport, making jobs highly accessible. Additional dwellings in this area will also support the existing local centres and enhance the character of the area. The PP is consistent with *Objective 10: Greater housing supply* and *Objective 11: Housing is more diverse and affordable* as it will provide new housing opportunities in close proximity to a railway station which is only 200 metres from the subject site.

3.2.2 Is the planning proposal consistent with the local council's Community Strategic Plan or other local strategic plan?

3.2.2.1 City of Canada Bay Local Planning Strategy 2010-2031

The *City of Canada Bay Local Planning Strategy 2010-2031* (LPS) is the principal document for communicating the future land use planning of Canada Bay. The LPS was adopted on 1 June 2010, with its aim to provide long term direction for the planning of Canada Bay, to assist future decision making in response to population growth and change. The LPS provides a strong statement for the future planning of Canada Bay, identifying key recommendations and work to be done.

Key directions of the LPS include:

Ensuring that the Metropolitan Strategy for Sydney and the draft Inner West Subregional Strategy are considered at a local level;

Providing a framework for future land use planning of the City of Canada Bay to guide the preparation of a new city-wide LEP and DCP;

Ensuring that future planning achieves principles of Ecologically Sustainable Development (ESD);

Provide housing and employment in locations that is designed and located to meet the requirements of existing and future population;

Support changing social needs of the City of Canada Bay community; including the ageing population and affordability;

Ensure that planning for land use and transport occurs in an integrated manner to reduce private car use.

The PP has considered the key directions of the LPS and has incorporated them into its justification below.

Canada Bay Local Planning Strategy Part 3 – Housing

The aim of the housing chapter of the LPS is to ensure that the key actions of the Metropolitan Strategy for Sydney are adequately considered during the preparation of an LEP for the City of Canada Bay. The LPS includes the following specific aim for housing:

> The encouragement of housing choice in the City of Canada Bay, including an adequate supply of housing for families, people with disabilities, affordability and the ageing population;
> The identification of how the City of Canada Bay dwelling target contained within the Inner West sub-regional strategy will be achieved.

The housing chapter summarises the relevant outcomes of the *Housing and Employment Study for Canada Bay* undertaken by SGS Economics and Planning (SGS). Future housing demand and future housing supply are both relevant issues which relate to the PP.

Future Housing Demand

The LPS references data from the Transport Data Centre (TDC) predicts that Canada Bay is likely to experience a 29% growth in population between 2006 and 2031. This is an increase of 20,076 people. According to SGS's estimates, the Canada Bay LGA will need to cater for approximately 9,700 additional dwellings between 2006 and 2031, representing a 37% increase in dwelling supply through to 2031.

Future Housing Supply

Under section 2.3.5 Future Housing Supply, the following is stated in regards to the location of housing supply:

> Most new housing supply is expected to be located within walking distance of transit nodes (6,467 dwellings or 64% of supply from 2004 onwards) – this primarily refers to the supply of new dwellings anticipated at Rhodes and Strathfield Triangle.

Whilst the site is not located at Rhodes or Strathfield, it is located in walking distance to the Concord West Railway Station. As such, with rail infrastructure in close proximity to the site, it is considered that the PP is consistent with the strategic directions which underpin the future housing demand and future housing supply of the Canada Bay LGA. The subject site presents a unique opportunity not only to contribute to the LGA's dwelling targets under the LPS, but to locate new housing in a location with good access to public transport infrastructure.

Objectives and Actions

The LPS lists a substantial number of Objectives and Actions relating to housing supply for the LGA of Canada Bay. The following are relevant to this PP:

> **Objective H5: Increase Residential Densities in Centres**
>
> Canada Bay's existing local centres that are served by good public transport and offer a range of retail and other services are a valuable attribute of the LGA. Maintaining the viability and vitality of these centres should be part of a strategy to ensure better liveability and sustainability into the future. Support and revitalisation of these local centres can be assisted by zoning for residential intensification.
>
> Maximum allowable densities in appropriate village and neighbourhood centres should be increased to stimulate growth required to ensure vibrant and viable mixed use centres that are well serviced by public transport.

The LPS underpins the importance of intensifying the density capabilities of residential development in and around centres which are serviced by public transport infrastructure. Action H12 goes further:

> **Action H12:** Increase residential densities in, and in the immediate vicinity of, the existing centres of Drummoyne, Five Dock, Concord, Concord West and North Strathfield.

The subject site lies within the existing centre of Concord West and has access to a variety of services and transport. For this reason, it is considered that this PP is consistent with Objective H5 and Action H12. The LPS acknowledges that whilst the low density and village feel in Canada Bay is valued by residents and businesses alike, a balance must be struck between retaining the existing character and ensuring densities support the public transport patronage.

The LPS envisages this as occurring through the following:

> This will require an adjustment to local zoning controls, shop-top provisions (to encourage residential), parking controls, and pedestrian and cycling facilities. Design guidelines should be prepared to protect amenity. Particular emphasis should be placed on achieving higher densities at close range, such as within 200 metres of existing retail areas and centres serviced by public transport.

As the subject site lies within 200 metres of Concord West Railway Station, it is considered that the PP is consistent with the LPS and will provide numerous public benefits. The PP is also consistent with the Concord West Precinct Masterplan 2014.

3.2.3 Is the planning proposal consistent with applicable State Environmental Planning Policies?

There are no existing State Environmental Planning Policies (SEPPs) or known draft policies which would prohibit or restrict the PP. A summary table of relevant State Environmental Planning Policies (SEPPs) is provided at Appendix A, while an assessment against the relevant SEPPs is provided below.

3.2.3.1 SEPP (Infrastructure) 2007

The proposed amendment to the CBLEP 2013 to rezone the subject site from IN1 General Industrial to R3 Medium Density Residential is unlikely to result in a development that is classified as "traffic generating" under the ISEPP. The site does not have access to a classified road, nor to a road that connects to a classified road under the Roads and Maritime Services' (RMS) *Schedule of Classified &*

State and Regional Roads. The criteria for whether residential development on site would be "traffic generating" is as follows:

Schedule 3 Traffic generating development to be referred to RMS

(Clause 104)

Column 1	Column 2	Column 3
Purpose of development **Note.** **The development may be the erection of new premises or the enlargement or extension of existing premises**	**Size or capacity—site with access to any road**	**Size or capacity—site with access to classified road or to road that connects to classified road (if access within 90m of connection, measured along alignment of connecting road)**
Apartment or residential flat building	300 or more dwellings	75 or more dwellings
Area used exclusively for parking or any other development having ancillary parking accommodation	200 or more motor vehicles	50 or more motor vehicles

The site is not located within 90m of a classified road. Considering the size of the subject site, when assessed against possible density yields arising from the current FSR and height controls which apply to residential zonings for Canada Bay, it is unlikely that any future development for the purposes of residential flat buildings will be "traffic generating" as defined under the ISEPP as it is unlikely to contain more than 300 units or 200 car spaces.

The planning proposal is consistent with the recommendations of Concord West Precinct Masterplan and Parramatta Road Urban Transformation Strategy documents. Each of these documents has been underpinned by rigorous traffic analysis, including a Traffic, Transport, Accessibility and Parking Report prepared by GTA. As this PP seeks to align with the expected outcomes of those documents, no further traffic investigations are considered necessary to support this PP.

Further consideration of traffic related issues would be addressed at the time a development application (DA) is lodged to develop the subject site.

3.2.3.2 SEPP 55 (Remediation of Land)

Given the conversion of industrial to residential uses, an important SEPP to consider is State Environmental Planning Policy No 55 (Remediation of Land) (SEPP 55). Clause 6 of SEPP 55 states as follows:

> (1) In preparing an environmental planning instrument, a planning authority is not to include in a particular zone (within the meaning of the instrument) any land specified in subclause (4) if the inclusion of the land in that zone would permit a change of use of the land, unless:
>
> (a) the planning authority has considered whether the land is contaminated, and
>
> (b) if the land is contaminated, the planning authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and
>
> (c) if the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning authority is satisfied that the land will be so remediated before the land is used for that purpose.
>
> Note. In order to satisfy itself as to paragraph (c), the planning authority may need to include certain provisions in the environmental planning instrument.

(2) Before including land of a class identified in subclause (4) in a particular zone, the planning authority is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the contaminated land planning guidelines

(3) If a person has requested the planning authority to include land of a class identified in subclause (4) in a particular zone, the planning authority may require the person to furnish the report referred to in subclause (2).

(4) The following classes of land are identified for the purposes of this clause:

(a) land that is within an investigation area,

(b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,

(c) to the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:

(i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and

(ii) on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).

(5) In this clause, planning authority has the same meaning as it has in section 145A of the Act.

A Detailed Site Investigation was undertaken by SGA Environmental in October 2010 (refer Appendix B). The 2010 SGA Environmental report recommends that remedial activities be undertaken if the site is to be redeveloped. In response, DLA Environmental prepared a Remediation Action Plan (RAP) for the subject site in February 2012 (refer Appendix C). Based on the analysis undertaken, DLA Environmental considers that an Excavate and Dispose Strategy is the optimal strategy for remediation of the subject site.

Relative benefits of the Excavate and Dispose strategy are as follows:

- The remedial costs are favourable to alternative strategies, such as Bioremediation or Cap and Contain;
- Bioremediation can also be incorporated in the remediation process to reduce unnecessary waste generation.
- The Excavate and Dispose Strategy has low health risks as it only involves a minimal disturbance of the contaminated soils. Other remediation schemes involve stockpiling the entire contaminated soil mass and may result in the release of hazardous vapors, and thereby create a human health risk to remediation workers, nearby residents and property occupants;
- The strategy would ensure end land-use suitability with no ongoing liability following remediation (i.e. the remediated site would be suitable for residential with minimal soil access land use);
- The time frame for implementation of the remediation system is relatively short compared to bioremediation or cap and contain methods; and
- No future ongoing monitoring would be required.

Based on the findings and recommendation of the RAP, the site can be made suitable for future residential purposes. Therefore the PP is consistent with the requirements of SEPP 55.

3.2.4 Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The PP is consistent with all applicable Ministerial Directions. A summary table of the Ministerial Directions under Section 117 of the EP&A Act that are relevant for consideration as part of this PP is provided at Appendix D, while an assessment against the relevant Ministerial Directions is provided below:

3.2.4.1 S.117 Direction - 1.1 Business and Industrial Zones

This direction applies when a relevant planning authority prepares a PP that will affect land within an existing or proposed business or industrial zone (including the alteration of any existing business or industrial zone boundary).

Whilst the PP is inconsistent with this Section 117 direction, it is considered that the inconsistency is justified by a strategic study in accordance with Clause (5)(b) of the direction, which states:

> (5) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:
>
> > (b) justified by a study (prepared in support of the planning proposal) which gives consideration to the objective of this direction, or

The subject site is considered suitable for rezoning from IN1 - General Industrial to R3 - Medium Density Residential based on recommendations of the Socio-Economic Impact Study undertaken by Hill PDA on behalf of Council in June 2013. This study supports the rezoning of the site to R3 Medium Density Residential and acknowledges the changing role of the precinct from an employment centre that has limited demand for industrial space and increasing vacancies.

This PP is in accordance with the recommendations of the 2013 study. A site specific economic analysis is therefore not considered warranted. This economic study was further used as input into the Concord West Precinct Masterplan which recognises the subject site as suitable for residential purposes.

More recently, the Parramatta Road Urban Transformation Strategy identifies the subject site for medium density residential purposes with a vision that is consistent with the Concord West Precinct Masterplan 2014.

3.2.4.2 S.117 Direction - 2.3 Heritage Conservation

This direction applies to all Councils preparing a draft LEP. In summary, a draft LEP is required to contain provisions that will facilitate the conservation of heritage items.

No items of heritage significance have been identified on the subject site. The site, however, is located adjacent to the existing heritage item I467 Powell's Creek Reserve. It is not considered that the PP will affect the heritage significance of that item, given the proposed future use of the site is consistent with existing uses in the locality, and is consistent with key local and State government strategic documents pertaining to the site and surrounds.

Further consideration of heritage issues would be addressed in a future DA to develop the subject site, however, it is considered that the redevelopment of the site from industrial to residential purposes would provide the opportunity to create a positive impact on the adjoining heritage item.

3.2.4.3 S.117 Direction - 3.1 Residential Zones

This direction applies when a relevant planning authority prepares a PP that will affect land within any zone in which significant residential development is permitted or proposed to be permitted. It is considered that the PP is consistent with the objectives this Ministerial Direction and if implemented will:

- Encourage a variety and choice of housing types for the Concord West locality to provide for existing and future housing needs;
- Make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, especially rail networks and open space;
- Minimise the impact of residential development on the environment and resource lands; and
- Reduce the consumption of land for housing and associated urban development on the urban fringe.

The PP does not contain any provision that will reduce the permissible residential density of the land, in accordance with the requirements of the Ministerial Direction.

3.2.4.4 S.117 Direction - 3.4 Integrating Land Use and Transport

This direction applies to all Councils when a PP is prepared that will create, alter or remove a zone or a provision relating to urban land, including land zoned for residential, business, industrial, village or tourist purposes. The PP has been considered against the provisions of this direction and is consistent with the objectives of this Ministerial Direction. It is considered that this PP, if implemented, will:

- Improve access to housing and housing opportunity near public transport;
- Reduce dependence on cars as the rezone will give rise to further opportunity within the Canada Bay LGA for transit orientated development; and
- Support the efficient and viable operation of public transport services.

The PP will allow for the future residential development of the site, which will take advantage of the existing public transport and open space infrastructure in close proximity to the site.

The PP seeks to enhance the existing Concord West locality by allowing the provision of the residential use of the subject site, which will capitalise on the services available in Concord West.

3.2.4.5 S.117 Direction - 4.1 Acid Sulphate Soils

The objective of this direction is to avoid significant adverse environmental impacts from the use of land containing acid sulfate soils. The relevant Council Acid Sulphate Soils Map identifies the subject site as being located within the following classification areas:

- Class 5 for the majority of the site; and
- Class 2 for small portions on the west side of the site.

DLA Environmental conducted preliminary assessments for the presence of Acid Sulfate Soils (ASS) on the site (refer to Appendix E). The site is at an elevation of between RL 4mAHD and RL 5.4mAHD, and is located in close proximity to Homebush Bay and class 2 acid sulphate soils. For this reason, DLA Environmental concluded that Acid Sulphate Soils could potentially occur at the site. Soil sampling was undertaken and established that in Borehole 1 a low potential acidity risk is present. Ground water levels in Borehole 1 indicated that natural soils come from an anoxic environment, which would indicate that soils will maintain the potential acidity risk if they are left undisturbed.

Laboratory analysis of soil from Borehole 2 indicated that the soil possesses nil actual and nil potential acidity risk. Analysis of natural soils in Borehole 3 indicated that the soil should be considered to be 'Actual Acid Sulphate Soil'. Soils from Borehole 3 were noted to be above the groundwater level resulting in an oxidising environment and the detected pH of less than 4.

Treatment of lime may be utilised to neutralise the actual acidity of the soils if the contact with the acid soils does not meet engineering criteria for concrete and steel structures. The laboratory recommended liming rate has been calculated at 1.96 and 10.1 kg/tonne for samples BH1 - 3 and BH3 – 1.5-1.9 respectively. The lime rate would neutralise the actual acidity eliminating any potential for acid generation.

As outlined, laboratory analytical results indicate that there are some areas of Actual Acid Sulphate Soils and areas of Potential Acid Sulphate Soils existing in the natural soils on site. Fill soils are noted to pose nil actual or potential acidity risk. Site observations indicate that the underlying soil profile consists of grey shale.

The detection of Actual Acid Sulphate Soils and the risk of potential acid sulphate soils indicate that an Acid Sulphate Soils Management Plan will be required to be produced for the Site. This plan will account for the management and monitoring of impacts on site during both the construction and operation phase of the proposed development.

It is considered that this issue can be further assessed and dealt with as part of any future DA for the subject site, at which time an Acid Sulphate Soils Management Plan can be submitted.

3.2.4.6 S.117 Direction - 4.3 Flood Prone Land

The objectives of this direction are to ensure that:

- development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005; and
- the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.

This direction applies when a relevant planning authority prepares a planning proposal that creates, removes or alters a zone or a provision that affects flood prone land such as this site.

A Flood Impact Assessment has been prepared by TTW. The report concludes that development is possible within the precinct, including on the subject site, and recommends management measures to ensure this occurs in an appropriate manner. Further detail regarding flood impacts are provided within the Flood Impact Assessment at **Appendix F**.

Council's specification for the Management of Stormwater sets out the following flood controls for any development of flood affected land:

> The minimum freeboard shall be as follows:
>
> - 150mm for roadways - between the 100-year ARI overland flow route and warehouse, factory, and garage floor levels and entrances to underground carparks.
> - 300mm for roadways - between the 100-year ARI overland flow route and office, living rooms, retail space, storeroom, and show room floor levels.
> - 300mm for surcharge paths e.g. easements - between the 100-year ARI overland flow route and all internal building floor levels, garages and basement carparks.
> - 500mm for channels, creeks and rivers - between the 100-year flood water level and all internal building floor levels, garages, and basement carparks.

The TTW report concludes that any future development at 176-184 George Street can be designed to reduce the flood impact on neighbouring properties and improve conditions for existing residents north of the site. The site is capable of accommodating a built form with finished floor levels that provide adequate freeboard to the 100-year ARI flood in accordance with Council's DCP.

TTW makes the following recommendations:

That the flood information presented in this report be reviewed when detailed designs are prepared including but not limited to:

- pits and headwall design taking into account hydraulic efficiency
- detailed design of pit 7 functioning as intended to be a surcharge pit.

- safety protection system of the open channel and culvert in conjunction with proposed landscaping works

Council has advised that it will provide the necessary stormwater infrastructure within the public domain in conjunction with the future development of the site. The provision of this infrastructure will benefit the wider precinct and will also enable the future development of nearby land parcels. Initial consultation with Council's drainage/flooding engineers indicate that they support the TTW concept design and overall recommendations.

Based on the above, this PP is consistent with this Direction.

3.2.4.7 S.117 Direction - 6.3 Site Specific Provisions

The objective of this direction is to discourage unnecessarily restrictive site specific planning controls. The PP is consistent with this direction as it does not seek to impose any development standards or requirements in addition to those already contained in the standard environmental planning instrument.

The PP does not seek to unnecessarily restrict the site. The planning proposal is consistent with clause 4 of this S.117 Direction in that it:

- proposes to amend only a height and FSR standard via the PP, which are development standards commonly used throughout NSW; and
- does not contain or refer to drawings that show details of any specific development proposal.

3.2.4.8 S.117 Direction - 7.1 Implementation of A Plan for Growing Sydney

The objective of this direction is to give legal effect to the planning principles, directions and priorities for sub-regions, strategic centres and transport gateways contained in *A Plan for Growing Sydney*. The Direction applies to a number of listed Local Government Areas (LGA) including Canada Bay.

This PP is consistent with this Direction in that it will assist in delivering on the outcomes envisaged by the strategy as outlined in Section 3.2.1.1.

3.2.4.9 S.117 Direction - 7.3 Parramatta Road Corridor Urban Transformation Strategy

The objective of this direction is to give legal effect to the planning principles, directions and priorities set out in the *Parramatta Road Corridor Urban Transformation Strategy.* The subject site is located within the Homebush precinct of the Strategy and therefore this Direction applies.

This PP is consistent with this Direction in that it will assist in delivering on the outcomes envisaged by the strategy as outlined in Section 3.1.1.3.

3.3 Section C – Environmental, Social and Economic Impact

3.3.1 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The site is already substantially cleared and altered and has been developed for industrial purposes. There is no critical habitat, threatened species populations or ecological communities, or their habitats on the site. There does not appear to be the need for a Local Environmental Study.

It is considered unlikely that the site will contain critical habitat as it has been cleared of all vegetation and has been used for the purposes of industrial warehousing.

3.3.2 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

This PP proposes to rezone the subject site and amend the corresponding maximum height and FSR standards. While this will result in a different building form and potentially an increase in building bulk over some portions of the site compared to what currently exists, the PP is consistent with the Concord West Precinct Masterplan and is not considered to result in any unreasonable impacts. All matters associated with the future building form will be appropriately managed and considered as part of a future DA.

3.3.2.1 Building height and density

The PP adheres to the principles of the Concord West Precinct Masterplan and Parramatta Road Urban Transformation Strategy and will not result in any additional impacts on the surrounding public realm or future residential development above those considered within those documents.

Building Height and Density

The PP proposes a height and density that is consistent with the Concord West Masterplan and Parramatta Road Urban Transformation Strategy for development up to 6 storeys (22m).

The following table considers the proposed building height in accordance with the clause 4.3 objectives set out under the CBLEP 2013.

Clause 4.3 Objective	PP Justification
(a) to ensure that buildings are compatible with the desired future character in terms of building height and roof forms,	• The proposed building heights allow for a transition in building heights across the site and ensures that any future development of the site is consistent with the Concord West Masterplan.
(b) to minimise visual impact,	• The draft DCP ensures that any future development provides suitable breaks

Clause 4.3 Objective	PP Justification
disruption of views, loss of privacy and loss of solar access to existing development.	between the buildings to ensure that views between George Street and Powells Creek Reserve are achieved as intended. • Views from a future development would be generally oriented towards Powells Creek Reserve and George Street. This would add to the passive surveillance and therefore the safety of the public realm. • Solar access to existing and proposed development can be achieved with minimal solar impacts as the PP is consistent with the heights recommended under the Concord West Masterplan.

The following table considers the proposed density in accordance with the clause 4.4 objectives set out under the CBLEP 2013.

Clause 4.4 Objective	PP Justification
(a) to ensure that buildings are compatible with the bulk and scale of the desired future character of the locality,	• The proposed FSR controls ensures that any future development of the site is consistent with the Concord West Masterplan.
(b) to provide a suitable balance between landscaping and built form,	• Under the proposed FSR controls, landscaped setbacks can be achieved to the street and public parks as desired under the Masterplan and draft DCP. • A future built form would include deep soil provisions as required under the Apartment Design Guide (ADG) to facilitate planting of larger tree species.
(c) to minimise the effects of bulk and scale of buildings.	• A future built form would be articulated to reduce the visual impacts of building bulk.

The above objectives of CBLEP 2013 would be required to be addressed as part of a future development application (DA).

3.3.2.2 Access, traffic and parking

Preparation of the Concord West Masterplan was supported by a Traffic, Transport, Accessibility and Parking Report prepared by GTA Consultants in May 2014. The study makes the following key conclusions:

- The study area has good accessibility to nearby public transport services and the surrounding walking and cycling network.
- There are opportunities to improve the existing pedestrian and cycle networks for the benefit of future sustainable transport mode choice.
- The rezoned lands are expected to generate up to 228 and 2,280 vehicle movements in any peak hour and daily respectively.

- All traffic to and from the study area is required to pass through the George Street/ Pomeroy Street intersection. A capacity assessment of the George Street/ Pomeroy Street intersection indicates that the study area could accommodate the traffic generation associated with the indicative dwelling yield of 785 dwellings.

The PP is consistent with the Concord West Precinct Masterplan and would result in a built form of equal height and density as recommended under the Plan. Given the traffic impacts have already been accounted for under that Plan, no further traffic investigations are considered necessary for the purpose of this PP.

It is understood that recently Council adopted a slightly lower rate for car parking generation based on advice from independent consultant and survey work undertaken at nearby higher density developments. This information is consistent with the PRUTS approach to assessing traffic generation. Given this, traffic generation from the proposed PP is likely to be less than that initially considered by the GTA May 2014 study.

Given the site is located within 800m of a railway station, State Environmental Planning Policy (SEPP) 65 further stipulates that any future residential flat development is required to comply with parking rates set out in the *Guide to Traffic Generating Developments,* or Council's DCP, whichever is the lesser. On-site parking will be addressed as part of any future DA.

3.3.2.3 Flooding

The site is subject to local flooding. Issues associated with flooding are addressed under section 3.2.4.6 'S.117 Direction – 4.3 Flood Prone Land' above.

There are currently no flood planning provisions provided for under the CBLEP 2013 for this site. It is TPG's understanding, however, that it is Council's intention to include all flood affected properties in the area, including the subject site, within the flood planning map and that this is being addressed as a separate matter.

Council has further advised that it will be undertaking necessary stormwater infrastructure within the public realm. The provision of this infrastructure will benefit the wider precinct and enable the future development of the subject site and other nearby land parcels.

3.3.3 How has the planning proposal adequately addressed any social and economic effects?

These considerations have been previously discussed in this PP and are addressed in detail in the Socio Economic Impact Study undertaken by Hill PDA on behalf of Council in June 2013. It is therefore considered that further economic analysis is not necessary.

The PP is intended to be a catalyst for positive change in this retail and transport hub, which is intended to grow in terms of its service level and population. The PP provides for new residential accommodation, which will support the existing and future town centre economic in terms of growth and sustainability.

The PP will support population growth, which in turn will result in greater utilisation of existing retail and transport infrastructure. The intended integration with the existing public realm is aimed at improving resident and community amenity and quality of life, as well as support economic development and revitalisation in the immediate locality.

The amendments to the CBLEP 2013 Land Use Map, Height of Buildings and FSR development standards on the subject site would deliver a number of positive of community benefits. It will establish the best use and a basis for the most economic and orderly development of land within walking distance of an existing train station and in an established and emerging mixed use retail, commercial and residential setting. The PP will facilitate passive surveillance of a street frontage which is currently inactive due to the redundancy of existing industrial uses in this location. This will also create opportunities for retail activities at street level which have potential to provide places for community interaction promoting greater social cohesion and community development.

In particular the PP will:

- allow for a higher density built form outcome to be achieved on the subject site that takes advantage of the site's proximity to a railway station, existing town centre amenities and large areas of public open space at Powells Creek Reserve;
- facilitate the urban renewal of an underutilised site within an identified revitalising area by supporting economic activity, and thereby enhance public enjoyment and safety by encouraging greater activity on the street and public places as well as increasing activity and passive surveillance from upper level residential land uses;
- allow for the provision of more housing choice for the subject site and in Concord West, in a location of high amenity and public transport accessibility;
- present an opportunity for a higher density residential development to take advantage of nearby rail and road based public transport opportunities, increasing the range of housing choices and general housing stock; and
- allow a more dense residential development that will provide the opportunity for greater urban consolidation in a location capable of accommodating it. In this regard, greater density in this location will take full advantage of an urban renewal opportunity and accommodating demand for housing without further exacerbating the need to extend Sydney's urban footprint.

The PP will result in a net community benefit as it will allow future development to take full advantage of its location in close proximity to transport hubs and infrastructure in the form of a transit oriented development, which has wider benefits than just for the local community. This encourages sustainable transport use and discourages car dependence, which in turn has positive flow-on effects for the local and wider traffic network such as reduced energy consumption and a smaller ecological footprint.

3.4 Section D – State and Commonwealth Interests

3.4.1 Is there adequate public infrastructure for the planning proposal?

Public transport and utility services infrastructure are available in the locality and within walking distance to the site. The Concord West railway station provides direct access to the North Shore, Northern and Western rail line.

The site has previously been used for urban purposes and is connected to existing infrastructure services.

3.4.2 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

No State or Commonwealth authorities have been consulted yet by the proponent. It is anticipated that the City of Canada Bay Council and Department of Planning and Environment will consultant with relevant public authorities in accordance with the provisions of the EP&A Act and Regulation.

4. Part 4: Mapping

4.1 The Site

4.1.1 Site Description

The site is located at 176-184 George Street, Concord West and includes a small land parcel at the north west corner of the site known as 176Z George Street, Concord West. The site is made up of 14 allotments of land with an area of approximately 8,000m^2 (refer Figures 14 and 15).

Figure 14: Aerial Context of Site (Site defined by red outline) Source: Google Maps and Spatial Information Exchange (SIX)

Figure 15: Site cadastral setting (bottom) (Site defined by red outline) Source: Google Maps and Spatial Information Exchange (SIX)

4.1.2 Legal Description

The subject site is comprised of the following land parcels (see Appendix G):

Lot	DP	Street Address
2	218758	176Z George Street Concord West
4	15973	176-184 George Street Concord West
5	15973	176-184 George Street Concord West
6	15973	176-184 George Street Concord West
7	15973	176-184 George Street Concord West
8	15973	176-184 George Street Concord West
9	15973	176-184 George Street Concord West
10	15973	176-184 George Street Concord West
11	15973	176-184 George Street Concord West
12	15973	176-184 George Street Concord West
1	226350	176-184 George Street Concord West
2	226350	176-184 George Street Concord West
15	15973	176-184 George Street Concord West
16	15973	176-184 George Street Concord West

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4.2 Context

4.2.1 Existing development

The subject site has been developed for a 5,649m^2 brick and metal clad warehouse building, with a number of loading docks and an at-grade car parking area.

The following photographs 1-6 demonstrate the existing site features:

Photograph 1: View of warehouse car park, looking west.

Photograph 2: View of warehouse, looking north-west.

Photograph 3: View of warehouse, looking north-west.

Photograph 4: View of office warehouse, looking north.

Photograph 5: View of warehouse, looking west.

Photograph 6: View of driveway at north of property, looking west

4.2.2 The Local Area

Figure 16 illustrates the local context surrounding the subject site. The site is located in close proximity to the Concord West Train Station. The recent development of an enclosed (fenced) sporting Oval for the Victoria Avenue Public School has resulted in limited access between the site and the Powells Creek reserve located adjacent to the southern portion of the site.

Figure 16 – Local Context

The site is surrounded by a mix of building types that vary in height and usage. The surrounding buildings are being used for residential, industrial, warehousing and commercial purposes.

Photographs 7 to 16 below demonstrate the existing development styles, heights of buildings and uses of buildings on properties immediately surrounding the subject site.

Photograph 7: View of industrial building along Conway Avenue, Concord West

Photograph 8: View of existing building along Rothwell Avenue, Concord West

Photograph 9: View of existing building along Rothwell Avenue, Concord West

Photograph 10: View of existing building along Rothwell Avenue, Concord West.

Photograph 11: View of residential property north of the subject site, along George Street.

Photograph 12: View of residential property north of the subject site, along George Street.

Photograph 13: View of business site along George Street opposite the subject site.

Photograph 14: View of business site along George Street opposite the subject site.

Photograph 15: View of ground floor retail along George Street, south of the subject site (Source Google Maps).

Photograph 16: View of residential apartment buildings and supermarket along George Street, south of the subject site.

North

Adjoining the northern boundary of the subject site is a detached two-storey dwelling house and the Victoria Avenue Public School. Further to the north, along George Street, are a mix of single and 2-storey residential dwellings.

West – Powells Creek Reserve

Directly abutting the western boundary of the site is the Victoria Avenue Public School's fenced sporting oval and Powells Creek Reserve. Further west is Powells Creek and Homebush Bay Drive.

Photograph 17: View of Powell's Creek Reserve, looking south-east.

Photograph 18: View of Powell's Creek reserve, looking south-east.

Photograph 19: View of Powell's Creek Reserve, looking south.

Photograph 20: View of Powell's Creek Reserve, looking south-east.

Photograph 21: View of Powell's Creek Reserve, looking south.

Photograph 22: View of bike track along Powell's Creek Reserve, looking south-west

East

To the east of the subject site, on the opposite side of George Street, is The Little Gantry Children's Centre and a Westpac commercial building.

South

To the south of the site, including along Rothwell Avenue, there is a mix of industrial and residential development.

4.2.3 Character

The site is located in a well-established urban area characterised by predominantly residential uses, with some industrial uses located throughout the area. The site is in close proximity to the "Northern Rail Line" but is not directly adjacent. Powells Creek Reserve adjoins the western boundary of the site (refer to figure 16).

The site is approximately 11.5 kilometres from Sydney's CBD and approximately 8.5 kilometres in a straight line distance from the Parramatta CBD, both being major commercial and retail centres with a wide range of services.

4.2.4 Accessibility and Transport

The site has vehicular access from George Street along its entire eastern frontage. George Street begins at Parramatta Road (Great Western Highway), Homebush to the south, and passes through North Strathfield and then along the subject site at Concord West heading north. Development in this portion of George Street is generally residential, with varying degrees of low-scale dwellings and medium/high density apartment building developments.

The subject site is located in close proximity to the M4 motorway which is currently undergoing an eastwards extension and will significantly improve regional connectivity of the Olympic Park, Homebush and Concord West localities.

The site is also well serviced by public transport with the subject site being located approximately 170-200 metres from Concord West Railway Station.

4.3 Current Planning Provisions

4.3.1.1 Land use zoning

The subject site is currently zoned IN1 General Industrial under the CBLEP 2013, which is illustrated in **Figure 17**.

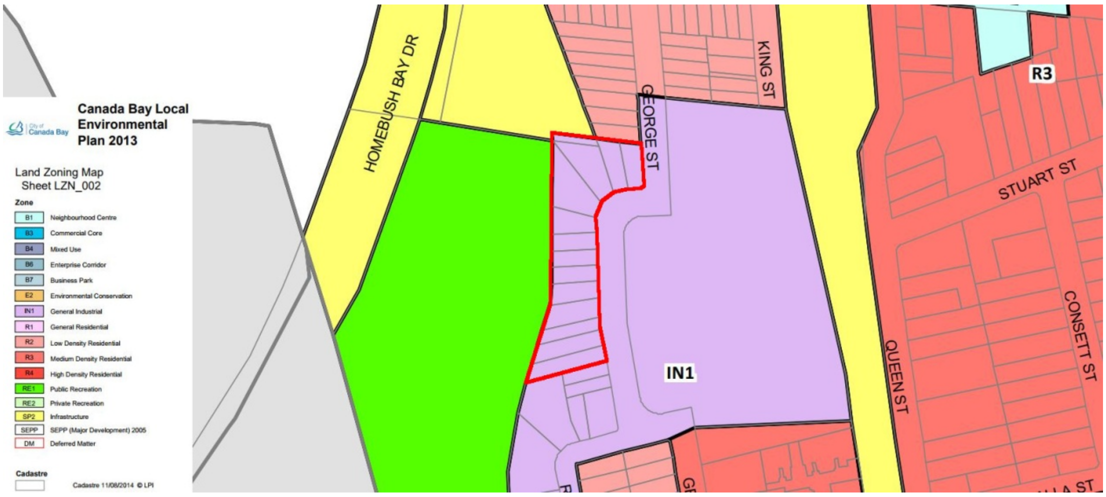

Figure 17: CLEP 2013 Land Zoning Map Extract (source NSW Legislation) Subject site in red

4.3.1.2 Building Height

The subject site is currently provided with a height designation of 'M' under the CBLEP 2013, which permits a maximum building height of 12m as illustrated in **Figure 18.**

Figure 18: CLEP 2013 Height of Buildings Map Extract (source NSW Legislation) Subject site in red

4.3.1.3 Floor Space Ratio

The subject site is currently provided with a floor space ratio of 'N' under the CBLEP 2013, which permits a maximum FSR of 1:1 as illustrated in **Figure 19.**

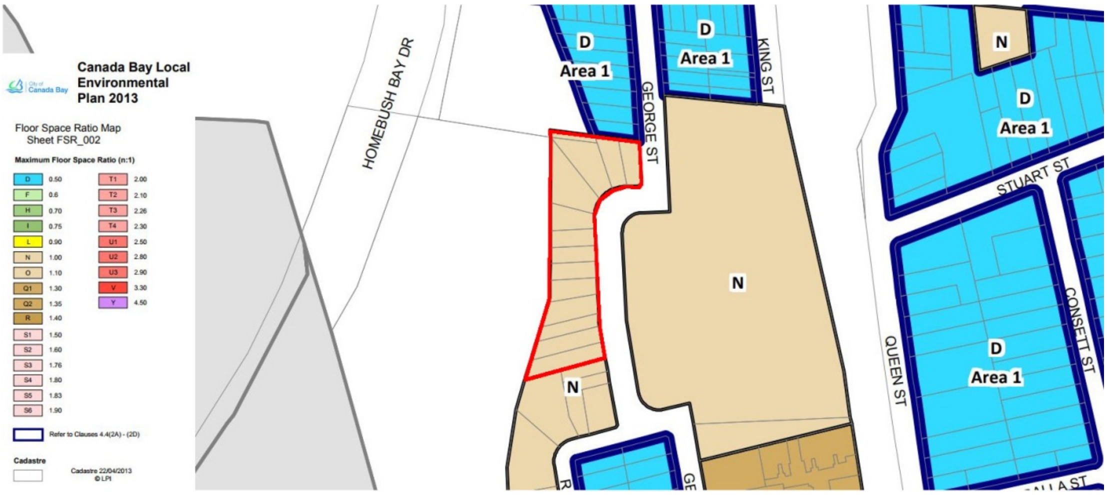

Figure 19: CLEP 2013 FSR Map Extract (source NSW Legislation) Subject site in red

4.3.1.4 Draft Flood Planning Provisions

There are currently no flood planning provisions provided for under the CBLEP 2013 for this site. In late 2016, Council publicly exhibited an addendum to a planning proposal for the nearby site at 2, 2A and 4 Rothwell Avenue, Concord West. This addendum sought to introduce flood planning provisions under the CBLEP 2013 and to identify that particular site as a flood planning area. The exhibited provisions are as follows:

6.8 Flood planning

(1) The objectives of this clause are as follows:

(a) to minimise the flood risk to life and property associated with the use of land,

(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,

(c) to avoid significant adverse impacts on flood behaviour and the environment.

(2) This clause applies to:

(a) land that is shown as "Flood planning area" on the Flood Planning Map, and

(b) other land at or below the flood planning level.

(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) is compatible with the flood hazard of the land, and

(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and

(c) incorporates appropriate measures to manage risk to life from flood, and

(d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and

(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

(4) A word or expression us

ed in this clause has the same meaning as it has in the NSW Government's Floodplain Development Manual published in 2005, unless it is otherwise defined in this clause.

(5) In this clause:

flood planning area means the land shown as "Flood planning area" on the Flood Planning Map.

flood planning level means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metres freeboard, or other freeboard contained in an approved development control plan.

Flood Planning Map means the Canada Bay Local Environmental Plan 2013 Flood Planning Map.

At the time of preparing this PP, the above flood planning provisions had not been formally adopted into the CBLEP 2013, however it is understood that once effective, it is Council's intention to include all flood affected properties, including the subject site within the flood planning map.

4.4 Proposed Planning Provisions

This PP seeks to amend to relevant land use zoning, height of building and floor space ratio mapping of the *Canada Bay Local Environmental Plan 2013* (CBLEP 2013) as they relate to the subject site. The subject site is currently zoned IN1 General Industrial, permits a maximum building height of 12m and a maximum FSR of 1:1 under the CBLEP 2013. Residential and mixed use developments are prohibited in the IN1 General Industrial zone. This PP specifically proposes to amend the CBLEP 2013 as follows:

4.4.1 Proposed Land Use Zoning

This PP seeks an amendment to the CBLEP 2013 to change the zoning from IN1 General Industrial to R3 Medium Density Residential via a Land Zoning (LZN) Map Amendment. This would facilitate the future development intent of the site for a "residential flat building" development and is consistent with the Concord West Precinct Masterplan. The proposed LZN mapping is provided at Figure 20.

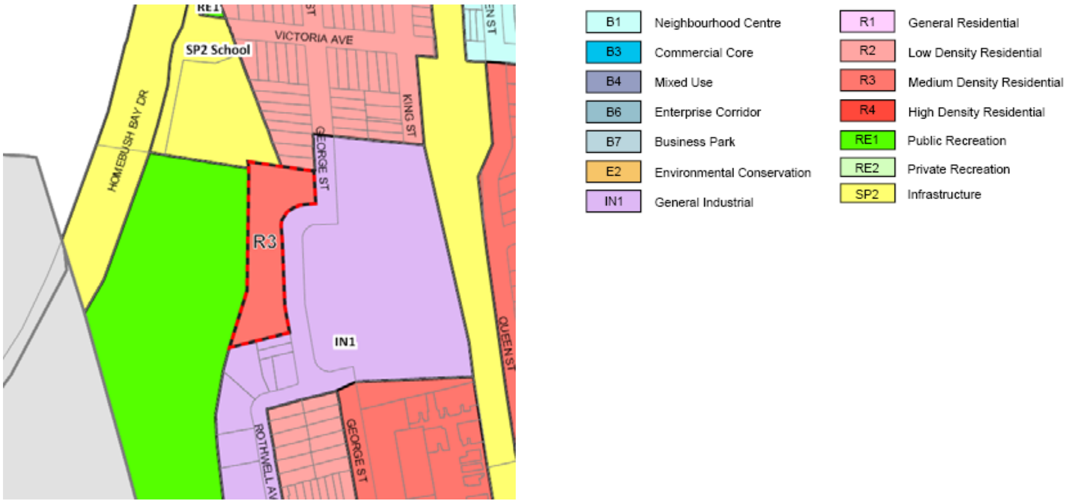

Figure 20: Proposed LZN mapping (Source Concord West Precinct Masterplan).

4.4.2 Proposed Height of Buildings

This PP seeks to amend the CBLEP maximum height of building (HOB) map to change the current blanket height limit of 12 metres to a maximum height of 16 metres under the height designation of "O2" at the northern end of the site and a maximum height of 22 metres under the height designation of "R2" over the remaining portion of the site. This is consistent with the Concord West Precinct Masterplan. The proposed height of building map is provided at Figure 21.

Figure 21: Proposed HOB mapping (Source Concord West Precinct Masterplan).

4.4.3 Proposed Floor Space Ratio

This PP seeks to amend the CBLEP maximum FSR map to change the current maximum FSR control of 1:1 to a maximum FSR of 1.9:1 under the FSR designation of ‘S6’. This is consistent with the Concord West Precinct Masterplan. The proposed FSR map is provided at Figure 22.

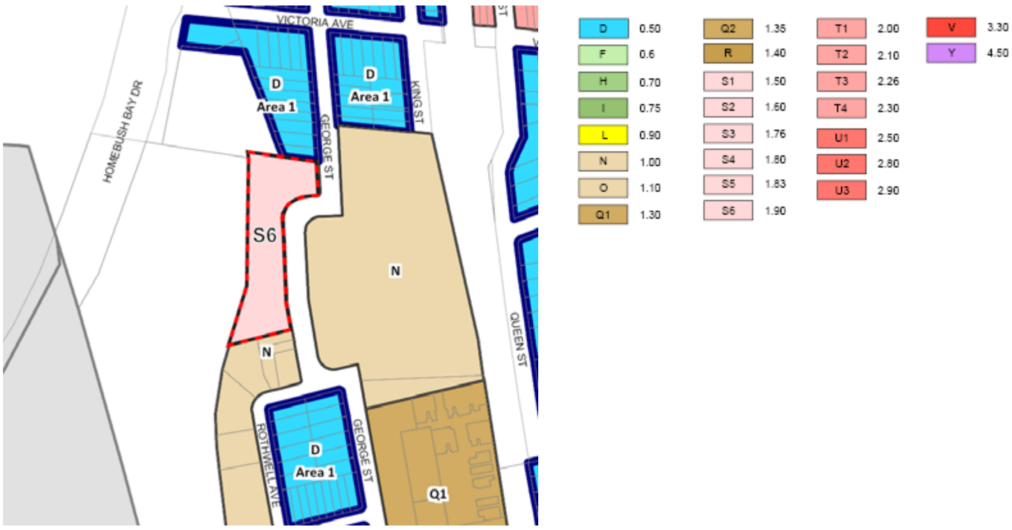

Figure 22: Proposed FSR mapping (Source Concord West Precinct Masterplan).

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5. Part 5: Community Consultation

Significant community and stakeholder consultation was undertaken in the preparation of the Concord West Precinct Masterplan and Parramatta Road Corridor Urban Transformation Strategy. This PP adheres to the outcomes envisaged by that strategy. This PP responds to the principles of the strategy and will enable the precinct to develop in accordance with the Strategy's vision and intent. As the PP is generally in accordance with the Masterplan and Strategy, further community consultation beyond the statutory requirements is considered unnecessary with respect to this PP.

It is anticipated that the planning authorities in the City of Canada Bay Council and Greater Sydney Commission will conduct community consultation in accordance with the relevant provisions of the EP&A Act and Regulation which includes newspaper advertisement, public exhibition at Council offices and on Council's website and notification letters to adjacent property owners.

6. Part 6: Project Timeline

The following indicative project timeline is provided in accordance with *'A guide to preparing planning proposals'* prepared by the Department of Planning and Environment (2012).

	2017												2018		
Month	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**
Proposal Lodged with Council															
Council Endorsement															
DPE Assessment															
Gateway Determination															
Agency Consultation															
Community Consultation															
Consideration of Proposal Post Exhibition															
Council Assessment															
Submission to DP&E to finalise LEP															
DPE Assessment															
Plan Making															

7. Conclusion

This PP has been prepared to request that Canada Bay Council amend the planning controls contained within the CBLEP 2013 to enable a site specific rezoning from IN1 General Industrial to R3 Medium Density Residential, including associated amendments to the building height and FSR standards at 176-184 George Street, Concord West.

It is concluded that this PP is appropriate in that it:

- Has been prepared to ensure all matters required to be addressed under the requirements for a planning proposal have been adequately addressed;
- Is consistent with State Government policies and has demonstrated that any future DA will be capable of meeting the requirements of relevant State Environmental Planning Policies;
- Is consistent with *A Plan for Growing Sydney* and the revised draft *Eastern City District Plan* priorities, including in particular in relation to housing supply through urban renewal along the Burwood, Homebush, North Strathfield corridor.
- Is consistent with all relevant Ministerial Directions under Section 117 of the EP&A Act;
- Is consistent with the principles of the Parramatta Road Corridor Urban Transformation Strategy and the Concord West Precinct Masterplan;
- Is consistent with the desired future scale and character of the area as envisaged by the Concord West Precinct Masterplan, and is compatible with surrounding land uses;
- Is considered to the best means of achieving the objectives and intended outcomes of the Concord West Precinct Masterplan;
- Is suitable for the site and will not adversely impact any existing or future centres in Concord West;
- Provides for increased dwelling capacity in a location where public transport and utility infrastructure is already available; and
- Is located where environmental planning issues and potential impacts are not of such significance as to preclude the proposal, and can be managed in the planning and design of a future DA.

Given the above strategic planning merit and justification, Council is requested to proceed to forward this planning proposal to the Minister or his delegate for a gateway determination under section 56 of the EP&A Act to enable the proposal to be exhibited for public, community and stakeholder input.

APPENDIX A: TABLE OF SEPPS

SEPP	Not Relevant	Justifiably Inconsistent	Consistent
SEPP 1 - Development Standards	✓		
SEPP 10 - Retention of Low-Cost Rental Accommodation	✓		
SEPP 14 - Coastal Wetlands	✓		
SEPP 19 - Bushland in Urban Areas	✓		
SEPP 21 – Caravan Parks (formerly Movable Dwellings)	✓		
SEPP 26 - Littoral Rainforests	✓		
SEPP 30 - Intensive Agriculture	✓		
SEPP 33 - Hazardous and Offensive Development	✓		
SEPP 36 - Manufactured Home Estates	✓		
SEPP 41 - Casino/Entertainment Complex	✓		
SEPP 44 - Koala Habitat Protection	✓		
SEPP 47 - Moore Park Showground	✓		
SEPP 50 - Canal Estates	✓		
SEPP 52 - Farm Dams and Other Works in Land and Water Management Plan Areas	✓		
SEPP 55 - Remediation of Land			✓
SEPP 56 - Sydney Harbour Foreshores and Tributaries	✓		
SEPP 62 - Sustainable Aquaculture	✓		
SEPP 64 - Advertising and Signage	✓		
SEPP 65 - Design Quality of Residential Flat Development			✓
SEPP 70 - Affordable Housing (Revised Schemes)	✓		

SEPP	Not Relevant	Justifiably Inconsistent	Consistent
SEPP 71 - Coastal Protection	✓		
SEPP (Affordable Rental Housing) 2009	✓		
SEPP (Building Sustainability Index: BASIX) 2004	✓		
SEPP (Exempt and Complying Development Codes) 2008	✓		
SEPP (Housing for Seniors or People with a Disability) 2004	✓		
SEPP (Infrastructure) 2007			✓
SEPP (Integration and Repeals) 2016	✓		
SEPP (Kosciuszko National Park—Alpine Resorts) 2007	✓		
SEPP (Kurnell Peninsula) 1989	✓		
SEPP (Mining, Petroleum Production & Extractive Industries) 2007	✓		
SEPP (Miscellaneous Consent Provisions) 2007	✓		
SEPP (Penrith Lakes Scheme) 1989	✓		
SEPP (Rural Lands) 2008	✓		
SEPP (SEPP 53 Transitional Provisions) 2011	✓		
SEPP (State and Regional Development) 2011	✓		
SEPP (Sydney Drinking Water Catchment) 2011	✓		
SEPP (Sydney Region Growth Centres) 2006	✓		
SEPP (Three Ports) 2013	✓		
SEPP (Urban Renewal) 2010	✓		
SEPP (Western Sydney Employment Area) 2009	✓		

SEPP	Not Relevant	Justifiably Inconsistent	Consistent
SEPP (Western Sydney Parklands) 2009	✓		

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AND URBAN DESIGN

Appendix B: Detailed Site Investigation

sga Environmental

176 - 184 George Street Concord West, NSW

Detailed Site Investigation

Project No. 91949

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October 2010

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CERTIFIED PROFESSIONAL SOIL SCIENTIST

1.0 EXECUTIVE SUMMARY

Taylor Woodings commissioned SGA Environmental to undertake a Detailed Site Investigation (DSI) at 176-184 George Street, Concord West, NSW. The works were requested by Taylor Woodings as part of their Vendor due diligence program for the site and were undertaken to identify potential impacts to soil from chemicals of concern (COCS) resulting from recent site uses (post 2000) by the current site owners/occupiers Chippendale Printing Co.

The DSI comprised a desktop review of the site characteristics, site history, past reports as well as undertaking an intrusive soil investigation. Laboratory analysis of soil samples was undertaken for the nominated COCS including petroleum hydrocarbons, polycyclic aromatic hydrocarbons, monoaromatic hydrocarbons (including benzene, toluene, ethyl benzene and xylene), polychlorinated biphenyls, organochlorine/organophosphate pesticides (OCPs/OPPs), volatile/semi-volatile organic compounds (VOCs/SVOCs) and heavy metals.

An initial field investigation comprising a total of twenty sampling locations identified the presence of a contamination hotspot in fill material located within the south western corner under the southern car park. Upon discussions with Taylor Woodings, an additional field investigation was undertaken to delineate the extent of the contamination hotspot. The final field investigation comprised a total of twenty nine sampling locations undertaken across the site in accessible areas.

The desktop review identified that site was previously used for commercial/industrial purposes from at least 1943, and had underground storage tanks and varnish pits onsite from at least 1961. Historically, the site has been subject to the importation of significant volumes of fill from unknown sources.

A previous detailed site investigation (DSI), undertaken in 2000 (Reference 11), stated that the site free from significant contamination. Furthermore, a Site Audit Statement (SAS) issued by a NSW EPA accredited site auditor in 2002, stated that the site was suitable for commercial/industrial use.

More recent site uses have included the use of the site for printing by the Chippendale Printing Co. Site activities included printing processes, the storage of associated chemicals, the use of wash down pits, and the storage of printing material for onward sale/distribution.

The identified potential historical sources (pre 2000) of contamination included:

- the historical use of imported filling materials
- the presence of underground storage tanks and varnish pits
- historical chemical storage

The identified recent sources (post 2000) of contamination included:

- a dangerous goods store
- wash down pit
- printing processes and associated chemicals

The DSI was undertaken to evaluate these potential sources of contamination.

The DSI undertaken by SGA Environmental identified the following:

- fill material was present throughout the site and consisted of a mixture of clay, shale, building rubble, gravel, ash, slag, glass and minor charcoal. Fill material was encountered at ground level along the north eastern boundary to 3.8 metres along the north western boundary
- laboratory analysis identified that levels of COCs were below the commercial/industrial site criteria within all but two of the samples collected during the investigation
- a contamination hot spot was located in the south west corner of the car park in the vicinity of sampling location BH09. The contamination hotspot comprised:
    - elevated concentrations within sample BH09 (3.1-3.2m) of total PAH (7,267 mg/kg) and Benzo(a)pyrene (BaP) (440 mg/kg) in excess of the commercial/industrial site criteria of 100 mg/kg and 5 mg/kg respectively.
    - leachability analysis undertaken on samples containing elevated concentrations of BaP did not report leachable concentrations of Benzo(a)pyrene. The BaP is therefore considered to be immobile.

  - analysis of a sample from sampling location BH09 (3.3-3.4m) directly below the fill material, which consisted of natural shale, did not record PAHs or BaP above the site criteria
  - the hotspot has been estimated as comprising approximately 590 tonnes of soil impacted by Polycyclic Aromatic Hydrocarbons (PAHs) and BaP above the commercial/industrial land use criteria
  - the source of the BaP and PAHs has been attributed to the presence of pyrogenic waste from the incomplete combustion of coal
  - the contaminants in the impacted soil are considered immobile and therefore do not require remediation unless the car park surface is breached or the site is redeveloped for a more sensitive use

- a minor exceedance of the industrial site criteria was reported in sample BH10 (0.3-0.4 m) with BaP reported at a level of (6mg/kg) just above the commercial/industrial guidelines (5 mg/kg). The total PAH value for the sample was below the commercial/industrial land use guidelines
- analysis of a sample consisting of natural clay, directly beneath the fill material within BH10 (0.6-.7m), reported PAHs below the laboratory detection limit

A statistical summary of the data collected in this investigation is presented in on the following page.

Statistical Summary of Data

	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Min	1.3	0.5	1.2	7.6	8.4	0.35	1.6	5.3
Max	34	1.2	77	3920	350	1.2	60	1270
Average	8.60	0.74	20.69	349.74	64.30	0.85	16.52	200.51
Standard Deviation	6.46	0.32	17.73	809.72	87.13	0.44	17.65	329.19
95 UCL	10.55	1.09	27.95	1693.00	127.60	NC	22.89	746.40
95% UCL method *	Gamma UCL	Gamma UCL	Gamma UCL	Chebyshev (Mean, Sd) UCL	Chebyshev (Mean, Sd) UCL	NC	Gamma UCL	Chebyshev (Mean, Sd) UCL
Guideline	500	100	600000	5000	1500	50	3000	35000
50% Guideline	250	50	300000	2500	750	25	1500	17500
250% Guidelines (hotspot)	1250	250	1500000	12500	3750	125	7500	87500
CV	0.75	0.44	0.86	2.32	1.36	0.52	1.07	1.64

	Benzo(a)pyrene	Total PAHs	Benzo(a)pyrene (excluding hot spot)	Total PAHs (excluding hot spot)
Min	0.55	0.55	0.55	0.55
Max	440	7267	6	41.34
Average	89.68	916.66	2.38	3.47
Standard Deviation	195.85	2565.96	2.61	14.72
95 UCL	2519.00	9943.00	0.90	12.38
95% UCL method *	Adj Gamma UCL	Chebyshev (Mean, Sd) UCL	Student t test	Chebyshev (Mean, Sd) UCL
Guideline	5	100	5	100
50% Guideline	2.5	50	2.5	50
250% Guidelines (hotspot)	12.5	250	12.5	250
CV	2.18	2.80	2.18	2.80

Notes:
*** calculated in Pro UCL**

Based on the identified decisions and decision rules discussed in the Data Quality Objectives (Section 3.0) and the results of this investigation, elevated concentrations of COCs are present on site in excess of the industrial/commercial site criteria. However, the PAHs present onsite are considered immobile, and the presence of the overlying concrete slab mitigates potential human exposure to the subsurface PAH contamination.

As such, the site is considered suitable for continued industrial/commercial land use in its current form, so long as exposure to the elevated PAHs is mitigated through site management. Any future development of the site may require remedial activities.

SGA Environmental does not consider the hotspot will warrant DECCW regulation.

We confirm that this report has been prepared for the benefit of Taylor Woodings Pty Ltd, and is readily assignable to a purchaser of the property by mutual written agreement upon completion. This report is not to be produced, in whole or in part, without the express written authorisation of SGA Environmental.

2.0 BACKGROUND & SCOPE OF WORKS

Taylor Woodings commissioned SGA Environmental to undertake a Detailed Site Investigation (DSI) of 176 – 184 George Street, Concord West, NSW (the site – Figure 1) as part of a vendor due diligence program. It is understood that the current site owners (Chippendale Printing Co.) have gone into receivership, and Taylor Woodings have been appointed as liquidators.

The proposed scope of works (as outlined in the SGA Environmental proposal to Taylor Woodings, (dated 9 August 2010), for the DSI included:

- reviewing title history to determine past site owners and occupants and to assess historical site activities that may have the potential to impact the site
- reviewing past reports if made available
- reviewing historical aerial photographs to assess past site uses and configuration
- reviewing government databases/registers to identify any existing environmental notices regarding contaminated land or the environment
- reviewing soil, geology and groundwater documentation to assess the environmental risk setting that the site is situated in and assess the mobility of potential chemicals of concern (if present)
- undertaking a detailed and thorough inspection of the subject site to identify any potential or existing sources of chemicals of concern
- undertaking a dial before you dig search and location of underground services using a Telstra accredited service locator
- undertaking a ground penetrating radar (GPR) survey of areas where potential underground storage tank (UST) infrastructure may be located
- drilling of up to 18 boreholes in targeted locations (dictated by site access constraints) across the site (up to 4.8 metres in depth). This sampling density was designed to meet the NSW DECCW guidelines for a site of this size (based upon our measurement of 0.8 hectares)
- installation of up to 3 groundwater wells if groundwater was encountered within the depth of the investigation

- soil samples were to be collected within any fill, disturbed or visually impacted layers
- laboratory analysis of soil samples for chemicals of concern (COCs) including petroleum hydrocarbons, monoaromatic hydrocarbons (including benzene, toluene, ethyl benzene and xylene), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organochlorine/organophosphate pesticides (OCPs/OPPs), volatile/semi-volatile organic compounds (VOCs/SVOCs) and heavy metals
- provision of an Environmental Site Investigation report detailing the findings of the field investigation and the laboratory results. Results were to be reviewed in terms of the current National Environmental Protection Measure (NEPM) guidelines (Reference 3)

Following the findings of the initial field investigation and discussions with Taylor Woodings, SGA was instructed to undertake an additional soil investigation in the south eastern corner of the southern carpark to delineate the extent of a contamination hotspot.

The scope of works undertaken to delineate the hot spot included:

- undertaking a dial before you dig search and location of underground services using a Telstra accredited service locator
- undertaking a ground penetrating radar (GPR) survey of areas where potential underground infrastructure may be located
- drilling of up to 6 boreholes on a grid pattern (dictated by site access constraints) within the south western carpark. This sampling design would allow SGA to delineate the extent of the contamination hot spot
- a further borehole location would be drilled within the south western section of the loading dock – considered to be down gradient of the contamination hotspot
- soil samples were to be collected within any fill, disturbed or visually impacted layers

- laboratory analysis of soil samples for chemicals of concern (COCs) including polycyclic aromatic hydrocarbons (PAHs), volatile/semi-volatile organic compounds (VOCs/SVOCs) and heavy metals
- provision of a Detailed Site Investigation report detailing the findings of the field investigation and the laboratory results. Results were to be reviewed in terms of the current National Environmental Protection Measure (NEPM) guidelines (Reference 3)

The investigation is subject to the limitations presented in Section 12.0 of this report.

3.0 DATA QUALITY OBJECTIVES

Development of data quality objectives (DQOs) for each project is a requirement of National Environment Protection Council (NEPC) (1999) – *National environment protection (assessment of site contamination) measure 1999* (Reference 3). This is based on a DQO process formulated by the United States Environmental Protection Agency (USEPA) for contaminated land assessment and remediation. The method provides sound guidance for a consistent approach in understanding site assessment and remediation.

The DQO process has seven steps. Each of these steps has been given due consideration in the undertaking of this project. In brief, these steps are:

Step 1: State the problem and establish the DQO team.

Step 2: Determine the possible and probable actions that will resolve the problems.

Step 3: Identify the informational inputs to assist in the problem resolution.

Step 4: Define the boundaries of the study (geographical, temporal, etc).

Step 5: Develop and define decision rules.

Step 6: Specify tolerable limits to reduce probability of incorrect decisions.

Step 7: Ensure the quality of the information obtained.

3.1 Step 1 — State the Problem

Members of the planning team included:

- Nicolas Kuerzinger – Environmental Consultant SGA Environmental - Project Manager
- Dahmon Sorongan – Senior Environmental Consultant SGA Environmental – Internal reviewer
- Client Representative

The preliminary decision makers were the team from SGA Environmental who undertook the investigation.

The Problem:

Taylor Woodings require a Detailed Site Investigation (DSI) to delineate any potential impacts of chemicals of concern (COCs) as a result of recent (post 2000) site uses. The purpose of the DSI was to assess the environmental condition of the site and to determine whether the site is suitable for continued commercial/industrial land use.

Background:

The site has been identified as having previously been used for commercial/industrial land use from at least 1943, with underground storage tanks and pits present onsite from at least 1961. Historically, the site has been subject to the importation of significant volumes of fill from unknown sources. A previous detailed site investigation (DSI), undertaken in 2000, stated that the site, including fill material was free from significant contamination. Furthermore, a Site Audit Statement (SAS) issued in 2002 stated that the site was suitable for commercial/industrial use (a review of the 2000 DSI and 2002 SAS has been undertaken in Section 4.8 of this report).

More recent site uses have included printing processes, with the storage of associated chemicals and wash down pits, and the storage of printing material for onward sale/distribution (Figure 2). Chemicals of Concern (COCs) associated with recent site activities include petroleum hydrocarbons (including benzene, toluene, ethyl benzene and xylene), polycyclic aromatic hydrocarbons and heavy metals.

3.2 Step 2 — Identify the Decision

The purpose of this investigation was to provide an indication of the level of potential impact to soil from COCs on site, as a result of the recent/current site uses. The level of environmental impact was determined based on the existing approved NSW DECCW guidelines for industrial/commercial land use.

The principal decisions to be made were:

- are elevated concentrations of chemicals of concern present on site which may limit ongoing commercial/industrial use of the site?
- are concentrations of the nominated chemicals of concern onsite in excess of the approved DECCW Guidelines (commercial/industrial) for human health and the environment? (these guidelines are discussed Section 7.0)
- is the site suitable for its current land use?

3.3 Step 3 — Identify the Inputs to the Decision

The study inputs include existing information and information collected during this site investigation. The existing information included a previous environmental assessment and site audit statement, historical data (e.g. aerial photographs) and environmental information contained in relevant government databases.

The information collected from this assessment included visual and/or olfactory evidence of potential COC impact, results of field assessment of soils, soil profiles from the boreholes drilled and laboratory analysis of soil samples.

Information required to resolve the question included:

- a review of the activities undertaken onsite
- the conceptual site model derived from the site assessment
- the measured concentrations of CoCs within the soil samples
- the DECCW approved human health guidelines for commercial/industrial land use

The sources of this information included:

- site environmental setting (Section 4.3)
- the field investigation (Section 5.0)
- soil sampling results reported from laboratories using NATA accredited methods (Section 9.0 and Appendix C)

3.4 Step 4 — Define the Study Boundaries

The physical boundary of the study area is defined in Section 4.0 and on Figure 2. Temporally the study is limited to site conditions at the time of the investigation. The scope of the study is limited to that described in Section 3.0.

The nominated Chemicals of Concern (CoCs) for soil are based on the Dangerous Goods registers onsite, the relevant laboratory analytical techniques available, the key contaminated site CoCs identified by the DECCW approved guidelines, findings from previous site investigations and general site history. The following groups of CoCs have been derived from this information:

- petroleum hydrocarbons as reported by the total petroleum hydrocarbon (TPH) and the aliphatic/aromatic speciation analytical technique
- mono aromatic hydrocarbons (including benzene,, toluene, ethyl benzene, and xylene)
- polycyclic aromatic hydrocarbons (PAHs)
- polychlorinated biphenyls (PCBs)
- organochlorine/organophosphate pesticides (OCPs/OPPs)
- volatile organic hydrocarbons as reported by the USEPA 8260 volatile organics screen
- semi volatile organics screen as reported by the USEPA 8270 semi volatile organics screen
- heavy metals

A list of the CoCs reported is presented within the laboratory transcripts within Appendix H

Individual sample results were directly compared to the nominated site criteria to assess the type and extent of impact.

All soil data was considered to be part of the same population and no stratification is proposed to be undertaken. There was an inherent bias towards the sampling population to contain elevated concentrations of CoC as all samples were targeted or undertaken within close vicinity of the source of contamination. This bias essentially results in the site being assessed to a higher standard than what is necessary which is a favourable outcome for site occupants and the environment.

The decision scale was limited to the area of the investigation presented on Figure 2.

The number of sampling locations was based on the requirements of the NSW EPA (1995) — *Contaminated sites: sampling design guidelines* (Reference 6), which indicate a total of 19 sampling locations should be undertaken on a site area of 0.8 hectares to detect a contamination hotspot of 24.2 metres diameter. Samples were collected from soil within close vicinity of potential sources of contamination (based on the limitations posed by OH&S and physical constraints).

Practical constraints to the collection of data included:

- the scope of the study is limited to that described in Section 4.0
- the physical constraints posed by buildings and site structures
- the OH&S issues posed by sampling around underground services

3.5 Step 5 — Develop and Define Decision Rules

Under the DQO process, it is important to nominate action levels for decision making.

Environmental analytical data was compiled and evaluated against relevant published NSW DECCW endorsed human health and environmental criteria. Conceptual modelling of the subsurface conditions also played an important role in developing conclusions regarding the site. Final decisions were made utilising a combination of laboratory results, interpretation of field data and integration of the conceptual model of the site with these results and the field data.

Acceptable limits for field data analysis (relative percent differences (RPDs) for primary and duplicate results) are between 50 and 150 percent (depending on the origin of the sample and volatility of the chemicals present). Acceptable limits for laboratory duplicate analysis were set based on site specific information such as background concentrations. These are summarised in Table 1 as the measurement data quality indicators (MDQIs), which were used to establish whether the DQOs were met.

It should be noted that Standards Australia procedures specify MDQIs for precision should be ≤50% RPD. However, they also acknowledge that low concentrations and organic compounds in particular can be acceptably outside this range. AS 4482.1 (Reference 10) suggests that ≤50% RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.

Table 1 Measurement Data Quality Indicators

Parameter	Procedure	Minimum Frequency	>5<10 x LOR[4]	>10 x LOR
Precision (Repeatability)	Field Duplicates	1 in 20 (for metals and semi volatiles)	<80-100 RPD	<50-80 RPD
	Field Duplicates	1 in 20 (volatiles)	<150 RPD	<130 RPD
	Lab Replicate	1 in 20	<50 RPD	<30 RPD
Accuracy	Reference Material	1 in 10	60% to 140% R	80% to 120% R
	Matrix spikes	1 in 10	60% to 140% R	80% to 120% R
	Surrogate spikes	1 in 10	60% to 140% R	80% to 120% R
Representativeness	Reagent Blanks	1 per batch	No detection	No detection
	Holding Times	Every sample		
Blanks*	Trip Blank	1 per batch	No detection	No detection
	Rinsate Blanks	1 per batch	No detection	No detection
Sensitivity	Limit of Reporting	Every sample	2 x LOR	< investigation criteria

Note(s):
1. RPD – relative percentage difference
2. % R – percent recovery
3. LOR – limit of reporting
4. no limit at <5x LOR
5. the MDQI is usually specified in the standard method. If not, use the default values set out in this table
6. * only necessary when measuring dissolved metals and volatile organic compounds in water samples where potential for cross contamination exists.

Once laboratory data for the chemicals of concern were deemed suitable for use, based on the Measurement Data Quality Indicators presented in Table 1 the following decision rules were used to make the final decision:

NEPM decision rules:

- the mean concentration of the chemicals of concern must be below the nominated industrial criteria
- no single sample concentration can exceed 250% of the nominated criteria
- the standard deviation of the chemical of concern population must be below 50% of the nominated industrial criteria

The nominated criteria were the DECCW endorsed human health criteria for industrial/commercial land use and the ecological investigation levels which are presented in Reference 3 and discussed in Section 7.0.

As such, if statistical analysis of concentrations of individual chemicals of concern were in agreement with the NEPM decision rule then concentrations of chemicals of concern onsite were considered to be below the DECCW approved commercial/industrial criteria and the site would be considered suitable for industrial and commercial land use. If the contrary occurs, the site would not be considered suitable for commercial/industrial landuse and remedial or management activities would be required.

3.6 Step 6 — Specify Tolerable Limits on Decision Errors

There are two types of decision errors. If one assumes that the site is impacted by chemicals of concern (the null hypothesis):

a) deciding that the site is not impacted when it actually is (Type I error). The consequence of this error may be unacceptable ecological or health risk for future users of the site

b) deciding that the site is impacted when it is not (Type II error). The consequence of this error is that the client or a future potential owner will pay for further investigation / remediation that is not necessary

In using the NEPM decision rules of National Environment Protection Council (1999) – National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (Reference 3), a 95% upper confidence mean is calculated for each individual COC. If the null hypothesis position that the site is impacted is adopted, the calculation of a 95% UCL will reduce the occurrence of decision Error (a) errors to 5%. This is consistent with DECCW requirements.

3.7 Step 7 — Optimise the Design

Through the DQO process, the sampling design was optimised through several iterations. Optimisation of the design included the following steps:

- selection of the minimum number of sampling locations as per the NSW EPA Sampling design guidelines
- review of previous assessments/investigations, the historical review, discussion with site management and a site walkover identifying potential areas of environmental concern
- discussion with site representatives regarding past site use
- a review of recent site uses and operations, including the storage of dangerous goods, a wash down bay and printing facilitates. Therefore, sampling locations were distributed throughout the site in order to provide a general indication as to whether recent site activities, and COCs used, have impacted the site soils.
- during the drilling program sufficient access could not be obtained to position the sample locations on a systematic grid. Additionally, the drill rig met refusal on shale/concrete in a number of locations. In response to this, SGA Environmental repositioned the affected sampling locations which resulted in twenty nine boreholes being drilled in total
- after an initial field investigation, a contamination hot spot was identified in sample location borehole BH09. As a response, SGA Environmental were requested to undertake further clarification by assessing an additional seven sample locations. These locations were progressively positioned away from borehole BH09 to allow delineation of the hot spot.
- a detailed discussion of the sampling program is presented in Section 5.0.
- The final field program and sampling pattern is considered optimal taking into account the purpose of the investigation and access constraints.

4.0 SITE CHARACTERISTICS

4.1 Site Location

The site is located at 176-184 George Street, Concord West, New South Wales. The site is located to the north west of the junction of George Street and Rothwell Avenue. The site location is presented in Figure 1.

4.2 Site Details

Site details are summarised in Table 2 and the site layout is presented in Figure 2:

Table 2 Site Details

Item	Details
Address	176-184 George Street, Concord West NSW
Lot & DP Number	Lot 4-12, 15-16 in DP15973 and Lots 1-2 in DP 226350
Total Site Area	Approximately 0.8 Ha
Total Warehouse Area	Approximately 0.49 Ha
Local Government Authority	Canada Bay Council
Locality Map	Refer to Figure 1
Site Map	Refer to Figure 2

4.3 Review of Soil, Geology and Hydrogeology

The geology underlying the site, as described in the Geological Survey NSW (1983) – *Sydney 1:100,000 Geological sheet 9130* (Reference 7), consists of Triassic aged Ashfield Shale of the Wianamatta Group including black to dark grey shale and laminate.

The Australian Soil Resource Information System (ASRIS) (Reference 1) describes the soil on the site as falling within the Kurosol soil order, using the Australian Soil Classification System. Kurosols are soils with strong texture contrast between A horizons and strongly acid B horizons.

A review of the Australian Soil Resource Information System (ASRIS) Coastal Acid Sulphate Soil Risk Map (Reference 1) has determined that the site is located over an area of low probability of acid sulphate soils.

The hydrogeology of the area has been based on a search of the Department of Natural Resources Groundwater Atlas (Reference 8). The search did not locate any groundwater bores of relevance within a 1 km radius of the site. Given the close proximity of Powell's Creek, 150 metres to the west of the site, it was expected that groundwater would be located within 4 metres of the natural ground level and flow towards the west.

Based on the soil and geological review, the site is located over sparingly permeable clay soils, overlying moderate to deep, relatively impermeable, shale units. Interface drainage is likely to be encountered between the lower clays and upper shale units with higher yielding water bearing units found deeper within the shales. The potential migration of any COCs within this geological system is expected to be low.

4.4 Search of Contaminated Land Record of DECCW Notices

A search of the NSW DECCW record of notices under section 58 of the Contaminated Land Management Act 1997 has determined that the site is not:

- land declared to be an investigation area or remediation site under Part 3 of the Contaminated Land Management Act 1997
- subject to an investigation order or a remediation order within the meaning of the Contaminated Land Management Act 1997
- the subject of a voluntary investigation proposal (or voluntary remediation proposal) under Section 19 or 26 of the Contaminated Land Management Act 1997

4.5 Search of Public Register of POEO Licenses

A search of the NSW DECCW Protection of the Environmental Operations Act 1997 (POEO) register did not identify any current licenses or prosecutions regarding the site.

4.6 Search of WorkCover NSW Dangerous Goods Records

A search of the WorkCover NSW Dangerous Goods (DGs) Stored Chemical Information Database (SCID) found the information presented in Appendix E. The following is a summary of the records obtained:

- Licence number 35/000757 – Grinnell Asia Pacific P/L and O'Donnell Griffin – 16 October 1998
  - Underground tank for 16,000 Litres of petrol
  - Roof store for Acetone – 20 Litres
  - Roof store for Ethanol – 20 Litres
  - Roof store for Paint – 1,500 Litres
  - Roof store for Xylenes – 200 Litres
  - Roof store for Oil – 1,000 Litres
  - Stored in shed for Araldite – 500 kg
  - Stored in shed for Hardener – 108 kg
  - Stored in shed for Araldite – 40 kg
  - Stored in shed for Hardener – 60 kg
  - Stored in shed for Methylated Spirites – 40 Litres
  - Stored in shed for Isonel 300 – 40 Litres
  - Stored in shed for Xylene – 20 Litres
  - Stored in shed for Mineral Turps – 40 Litres
  - Stored in shed for Acetone – 20 Litres
  - Stored in shed for Eposolve 70 – 20 Litres
  - Stored in shed for N-Hexane #2 – 6.5 kg
  - Stored in shed for MEK – 20 Litres
  - Stored in shed for Bostik Adhesive – 80 Litres
  - Stored in shed for Bostik Solvent – 40 Litres
  - Stored in shed for Gloss Enamel Paint – 1500 mls

An application for renewal of Licence number 35/000757 was issued and approved 28/02/2002 under the trading name of Chippendale Printing Company Pty Ltd.

- Licence number 35/000757 – Grinnell Asia Pacific P/L and O'Donnell Griffin - 14 October 1996
  - Underground tank for 16,000 Litres Petrol
  - Roof store for Xylenes – 200 Litres
  - Roof stored for Paint Related Material – 1340 Litres
  - Roof stored for Acetone – 20 Litres
  - Roof stored for Ethanol – 40 Litres
  - Roof stored for Petroleum Oil – 40 Litres
- Licence number 35/000757 – Grinnell Asia Pacific P/L – 28 July 1993
  - Underground tank for 16,000 Litres Petrol
  - Roof store for Xylenes HFP – 200 Litres
  - Roof stored for Electro Solve– 200 Litres
  - Roof stored for Acrylic Enamel – 300 Litres
  - Roof stored for Bearing Oil – 60 Litres
  - Roof stored for Araldite LC177B – 50 kg
  - Roof stored for Araldite Hardener – 200 kg
  - Roof stored for Bostik Solvent – 80 Litres
  - Roof stored for Isonol – 40 Litres
  - Roof stored for Genesolv DMS – 300 kg
  - Roof stored for Eposolve 70 – 40 Litres
  - Roof stored for Acetone – 20 Litres
  - Roof stored for Metho – 40 Litres
  - Roof stored for X60 Solvent – 40 Litres
  - Roof stored for Polymer II – 36 kg
- Licence number 00757 – O'Donnell Griffin Pty Ltd – 11 February 1980
  - Roof package store - 7,000 Litres for class 3.1, 3.2 and 3.3 Dangerous Goods
  - Underground tank – 16,2000 Litres Petrol

- Licence number (unknown) – O'Donnell Griffin Pty Limited – 23 March 1972
  - Shed – mineral spirits, mineral oil, Class 1 and Class 2 Dangerous Goods – 500 Gallons
  - Underground tank – 2,000 Gallons – Mineral spirits

A contractor's certificate was attached to the Dangerous Goods records. The certificate stated that the 2,000 Gallon underground storage tank had been abandoned with the removal of all inflammable liquid, with the filling and sealing to the requirements of the Explosives Branch. Method of abandonment was listed as water and rust inhibitor with the report dated 14 January 1980. No further decommissioning/removal details for any of the USTs were provided in the DG records obtained.

4.7 Review of NSW Heritage Office Database

A review of the database did not identify a heritage listed building on the site.

4.8 Review of Previous Reports

4.8.1 Stage 2 Detailed Site Investigation (2000)

A review of BC Furr Environmental Services Pty Ltd (BCF) (2000) – *Stage 2 Detailed Site Investigation, 176-184 George Street, Concord West* (Reference 11) was undertaken as part of this investigation.

The purpose of the investigation was to assess the extent of contamination on the site and to determine if the site could be re-developed for residential use. Therefore, the investigation results were assessed against residential criteria.

The BCF investigation was undertaken at a time when the site incorporated a lot located to the south of the current site boundary and a lot to the north of the current site boundary. The northern lot was reportedly leased from the local council. It should be noted that these two lots are not included within the current investigation as the southern lot has been sold since the BCF report was completed and the leased land is subject to a separate agreement between the the current land owner and the local council.

The BCF investigation consisted of 24 boreholes drilled on a roughly square grid pattern, with soil samples analysed for a suite of heavy meals, pesticides, total petroleum hydrocarbons, poly aromatic hydrocarbons, phenolics and volatile and semi volatile compounds.

The report stated that the site was substantially free from significant contamination with the exception of a ‘hotspot’ in the south of the eastern part of the site, which was contaminated with heavy metals in excess of the residential site criteria. Furthermore, arsenic, petroleum hydrocarbons and volatile compounds were present in fill material within the Council owned land. The presence of these substances were not believed to be due to activities carried out on the site but rather from previous land filling of the Council property with industrial waste.

Two underground storage tanks (USTs) were identified on the site. Conclusions stated in the report included that the USTs would need to be removed and the soil remediated as necessary and that the minor zinc contamination in fill across the site would need to be remediated before the site could be considered suitable for use for residential purposes. Furthermore, the Council land to the north should be addressed before the site could be considered suitable for use as residential land.

No groundwater was encountered during the BCF investigation.

BCF reviewed a previous site investigation undertaken by Environmental Management Australia Pty Ltd (EMA) in 1997 as part of their 2000 report. BCF stated that the EMA investigation was limited and comprised the drilling of only 5 boreholes in the vicinity of two underground storage tanks as well as in the north and south west corner of the site. Results indicated that the site had been filled and that significant contamination was not noted.

4.8.2 Status Report - Remedial Works (2002)

A review of Peter J Ramsey and Associates (2002) *Status report of Remedial Works at 176-184 George Street, Concord West* (Reference 12) was undertaken as part of this investigation. The status report stated the sampling at the insitu underground storage tanks (USTs) had been completed in February 2002 and that all the laboratory analysis results were below the laboratory detection limits, which indicated that the tank had not leaked.

Furthermore, the status report stated that apart from decommissioning of the tank, all the environmental works had been completed. Within the report, requests had been made for additional information regarding a work plan for the decommissioning works, which was stated as being a requirement by the Site Auditor.

4.8.3 Site Audit Statement (2002)

A review of the NSW Environment Protection Authority (2002) – *Site Audit Statement No: FM39* (Reference 13) was undertaken as part of this assessment. The Site Audit Statement (SAS) was issued for all lots subject to the current investigation, as well as the southern lot which has since been sold off. The SAS stated that a site audit had been completed and a review of reports and information with due regard to relevant laws and guidelines. The SAS certified that the site was suitable for commercial/industrial use.

4.9 Review of Site History

4.9.1 Historical Aerial Photographs

A review of aerial photographs from 1930 to 2007 was undertaken as part of this investigation. Photographs reviewed are listed in Table 3 and presented in Appendix B.

Table 3 Historical Aerial Photographs Reviewed

Date	Run	Photo No
1930	N/A	N/A
1943	N/A	Spatial Information Exchange Department of Lands
1951	12	467-129
1961	33	1068-5025
1972	8	2011-5023
1986	11	4029
2007	N/A	Google Earth

The findings of the review are presented below:

1930 – at this time the site was vacant and it appeared that earthworks were being undertaken throughout the site and neighbouring areas to the west. George Street was present but appeared to be unsealed. Surrounding areas had been partially developed to the east and north with commercial/industrial and residential buildings.

1943 – at this time a square industrial building was located on the northern half of the site. The southern and north eastern sections of the site remained clear of buildings and vegetation. No significant earthworks appear to have been undertaken from the 1930 photograph. Residential housing bordered the south eastern corner and northern boundary. Land to the east of George Street had undergone further commercial/industrial development, including warehouse structures.

1951 – the former square industrial building had been removed, with the site comprised of vacant land with little of no vegetation or buildings. No significant variation in the ground surface level was noted from the 1943 photo. Land to the west appeared to have been filled to straighten and canalise Powell Creek.

1961 – at this time the site remained largely vacant with the exception of a small shed to the south east corner. Earthworks, including filling to raise the site above the open space to the west of the site, had been undertaken, with particular reference to the western and northern sections of the site. Land to the east of George Street had undergone further development including

1972 – a large industrial building had been constructed with in the centre, northern and north eastern sections of the site, with loading bays and car park facilities to the southern section. No significant changes to surrounding landuse were noted.

1986 – the site building remained largely unchanged from the 1972 photograph, with the exception of an extension to the southern section over the pre-existing loading bay.

2007 – at this time the site appeared in its current configuration, incorporating a large warehouse with ancillary offices in the north eastern corner. A car parking area was located on the southern half of the site.

4.9.2 Review of Historical Title Search

A review of titles for Lot 4-12, 15-16 in DP15973 and Lots 1-2 in DP 226350 was undertaken as part of this investigation. The review identified the ownership/occupation history presented below:

- circa 2002 – Chippendale Printing Co Pty Ltd
- 1990 – Datapal Pty Ltd
- 1945 – Property including the present site or parts thereof, transferred to Robert James Conway
- 1928 – Property including the present site or parts therof, transferred to Robert James Conway – speculator
- 1926 – Property including present site or parts thereof, transferred to Eadith Campbell Walker – spinster
- 1911 – Property including the present site or parts thereof, transferred to Eadith Campbell Walker - spinster
- 1806 – Part of Crown Grant granted to Mary Green

4.9.3 Site Walkover

A site walkover was undertaken on 17 September 2010.

The site is reported to be 0.76 Ha in area with a building area of approximately 0.49 Ha. Based on the inspection, approximately 95% of the site area was covered by concrete hardstand. The unsealed portions of the site consisted of landscaped areas along the eastern perimeter and throughout the car park.

The site contained a singular “L” shaped building, comprised of warehouse space and office areas to the north eastern corner of the site. Vehicle entry to the site was via driveways along the eastern boundary.

At the time of the inspection the site was non operational due to the current site tenants being in receivership. A discussion with a site representative indicated that the site was formerly used for printing purposes. Printed materials varied from cardboard and paper to plastics.

Land immediately surrounding the site was occupied by residential properties to the north and south, a sports oval to the west and commercial/industrial properties to the east of George Street.

During the site inspection, the following pertinent observations were made with regard to potential site contamination as a result of recent/current site uses:

- minor to moderate volumes of Dangerous Goods or current potential sources of chemicals of concern (COCs) were identified during the site inspection, including lubrication oils, paints and solvents in the northern and south western sections of the warehouse
- there was evidence of former manufacturing/printing activities as indicated by the presence of a large industrial scale printer in the north western corner of the warehouse
- a wash down bay in the north eastern corner of the warehouse
- minor volumes of liquids and oils on the northern section of the warehouse floor slab, as a result of dismantling practices

These features are presented in Figure 2.

4.10 Potential for Contamination

The site has undergone a Detailed Site Investigation in 2000 in which it was reported that the site was free from significant contamination. Subsequently, a Site Audit Statement (SAS) (Reference 13), was issued by a NSW EPA accredited site auditor in 2002, stating that the site was suitable for commercial/industrial land use. Therefore, historical site use has not significantly impacted the site.

Since the issue of the 2002 SAS, the potential sources of contamination stem from the use of the site for printing purposes undertaken post 2002. Site activities since 2002 include printing processes undertaken in the northern section of the warehouse, Dangerous Goods stored in the south eastern and northern sections of the warehouse and a wash down bay located in the north eastern corner of the warehouse.

A request for further documentation regarding the chemicals stored/used for the onsite printing processes was not received within the timeframe of this investigation.

5.0 FIELD INVESTIGATION

5.1 Sampling and Analysis Plan

A sampling and analysis plan was developed based on the site history, accessible areas of the site, COCS potentially present and iterations throughout the DQO process. The positions of the sampling locations are shown on Figure 2. The use of judgmental sampling is justified as the locations of the main potential for contamination (recent/current site activities undertaken including printing processes) were known. This follows guidance provided by the NSW EPA (Reference 6) and the National Environment Protection Council (NEPC) (1999) - *National environmental protection (assessment of site contamination) measure 1999* (Reference 3).

An initial investigation was undertaken on 20-21 September 2010 which identified a contamination hot spot. An additional investigation was undertaken on 12 October 2010 to delineate this hot spot.

The justification for the sampling locations is presented in Table 4 and the position of the sampling locations is presented on Figure 3.

Table 4 Sampling Location Rationale

Sampling Location	Positioning Rationale
BH01	Site coverage, assess presence of fill and north of wash down pit
BH02	Site coverage, assess presence of fill and north of wash down pit
BH03	Site coverage, assess presence of fill
BH04	Site coverage, assess presence of fill
BH05	Site coverage, assess presence of fill and adjacent to former UST
BH06	Site coverage, assess presence of fill and adjacent to former UST
BH07	Site coverage, assess presence of fill
BH08	Site coverage, assess presence of fill
BH09	Site coverage, assess presence of fill
BH10	Additional borehole as drill refusal within BH07
BH11	Site coverage, assess presence of fill
BH12	Site coverage, assess presence of fill
BH13	Site coverage, assess presence of fill and adjacent to Dangerous Goods store
BH14	Assess soils down gradient of former printing facilities
BH15	Assess soils adjacent to former printing facilities
BH16	Assess soils adjacent to former printing facilities
BH17	Site coverage, assess presence of fill and adjacent to former printing facilities
BH18	Site coverage, assess presence of fill material
BH19	Site coverage, assess presence of fill material
BH20	Site coverage, assess presence of fill material
BH21	Site coverage, assess presence of fill material
BH22	Adjacent to Dangerous Goods store and considered down gradient from hot spot
BH23	Site coverage, assess extent of hot spot to north
BH24	Site coverage, assess extent of hot spot to south
BH25	Site coverage, assess extent of hot spot to east
BH26	Site coverage, assess extent of hot spot to north east
BH27	Site coverage, assess extent of hot spot to east
BH28	Site coverage, assess extent of hot spot to north east
BH29	Site coverage, assess extent of hot spot to east

5.1.1 Fieldwork

The intrusive field investigation was managed by Nicolas Kuerzinger (Environmental Consultant) of SGA Environmental on 20 September to 21 September 2010. The hot spot delineation investigation was undertaken on 12 October 2010 by Amber Lepparde (Environmental Consultant) and Nicolas

Kuerzinger (Environmental Consultant) of SGA Environmental. The investigation included the following activities:

- service clearance was undertaken using an accredited service locator to ensure that underground services were not affected by drilling activities
- a ground penetrating radar (GPR) survey of the areas suspected to contain underground storage tanks (USTs) and to located underground services
- 21 sampling locations (BH01-BH21) were investigated using the Macquarie Drilling drill rig
- 8 sampling locations (BH22-BH29) were investigated using the EPOCA drill rig
- detailed logging of boreholes including description of colour, odour, texture and any unusual features
- collection of soil samples for analysis
- boreholes were backfilled, compacted and concreted
- the area surrounding the sampling locations was cleaned

No underground storage tanks were identified during the service location, GPR survey or during the field investigation.

A former varnish pit, which SGA had knowledge of but was not previously identified, was encountered during the drilling program at borehole BH15. Subsequently, borehole BH15 was moved approximately 0.3 metres south of the original target location. This enabled the drill rig to proceed to the natural soil level.

Refusal on concrete at 0.5 metres below surface level was encountered at borehole BH14. Due to tenant access constraints and warehouse infrastructure, no alternative drilling location was made possible in the immediately surrounding area.

Refusal on natural hard shale was encountered in all locations.

Minor hydrocarbon odour was detected during drilling of BH23.

Minor hydrocarbon odour was detected during drilling of BH09, located within the south western section of the car park and BH15, located adjacent to the former varnish pit.

5.1.2 Sampling Procedures

Boreholes were drilled using the Macquarie Drilling 7720 and EPOCA Terrior drill rig utilising a Geoprobe push tube and, where applicable, a hand auger. Samples were collected in laboratory supplied 100mL glass jars.

All soil sampling equipment was decontaminated using surfactant between sampling events and field sampling procedures included the use of dedicated sampling collection equipment, such as nitrile gloves, sampling tools and spatula/trowel.

5.2 Quality Assurance

The quality assurance and quality control (QA/QC) procedures undertaken with reference to the National Environment Protection Council (1999) — *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) (Reference 3) are outlined in Appendix F of this report.

6.0 SITE STRATIGRAPHY

The stratigraphy encountered is shown in detail on the borehole logs in Appendix C. In general, the stratigraphy can be described as follows:

- the surface layer in the majority of the external locations consisted of concrete up to 0.22 metres thick. Three external locations were drilled in areas with no concrete surface layer. The concrete surface layer within the warehouse generally consisted of concrete up to 0.39 metres. Borehole BH14 encountered the concrete slab to at least 0.5 metres.
- fill material was encountered in all borehole locations. Fill material consisted of a mixture of clay, shale, building rubble, gravel, ash, slag, glass and minor charcoal. Fill material was encountered from a depth of 0.9 metres along the north eastern boundary to 3.8 metres along the north western boundary
- redistributed natural soils were encountered in several locations beneath the fill material. These soils consisted of clay and shale
- natural soil profiles encountered beneath the fill material consisted of firm-stiff clay and/or shale
- no groundwater was encountered during the field investigation (maximum depth of drilling 4.8 mbgl)
- minor hydrocarbon odours were encountered within boreholes BH09 at 3.2mbgl, BH15 at 3.0mbgl, BH16 at 2.8mbgl and BH23 at 3.3mbgl

A cross section of the southern carpark is shown in Figure 5.

7.0 GUIDELINES

The environmental investigation criteria used to evaluate the soil analytical results were based on the NSW DECCW endorsed National Environment Protection Council (1999) – *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) (Reference 3) and the NSW EPA (1994) – *Guidelines for Assessing Service Station Sites* (Reference 5). These guidelines include:

- Health Based Soil Investigation Levels (HILs) (Reference 2)
- Ecological Investigation Levels (EILs) (Reference 3)
- NSW EPA (1994) – *Guidelines for Assessing Service Station Sites* (Reference 5)

As the site is currently used as a warehouse, the commercial/industrial criteria presented within Reference 2 were referred to.

The HILs presented in the National Environment Protection Council (1999) – *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) (Reference 3) do not contain levels of volatile organic compounds such as Benzene, Toluene, Ethyl Benzene and Xylene (BTEX) or C_6-C_9 petroleum hydrocarbons. As such substitute levels from the NSW EPA (1994) – Guidelines for assessing service stations sites (Reference 5) were used.

These guidelines have been reproduced in Appendix C, and are referred to as the ‘site criteria’.

8.0 LABORATORY ANALYSIS

A total of 66 soil samples (including six duplicates) were sent to the National Measurement Institute (NMI) for laboratory analysis for organic and inorganic compounds. NMI is a National Association of Testing Authorities (NATA) accredited laboratory. Soil analysis undertaken included:

- heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)
- petroleum hydrocarbons
- benzene, toluene, xylene and ethyl-benzene (BTEX)
- poly aromatic hydrocarbons (PAHs)
- polychlorinated biphenyls (PCBs)
- organochlorine and organophosphate pesticides (OCPs/OPPs)
- semi volatile organic compounds (SVOCs)
- volatile organic compounds (VOCs)
- a soil leachate analysis for Benzo(a)pyrene

Soil samples selected for analysis were based on sample location (i.e. to obtain satisfactory site coverage) or field observations including the presence of contamination indicators such as anthropogenic (e.g. ash, product), odours and/or staining.

Laboratory results are presented in Table D1 (Appendix D), where they are compared to the investigation criteria nominated in Section 7.0. Laboratory transcripts of analysis are included in Appendix H.

Four duplicate soil samples were collected and analysed as part of the quality control procedure. A discussion on the results of quality control procedures has been included in Appendix F.

9.0 LABORATORY RESULTS

The soil laboratory analysis results are presented in Table D1 (Appendix D) where they are compared to the site criteria.

Concentrations for the majority of inorganic and organic chemicals of concern (COCs) tested for were reported to be below the site criteria. In addition, the majority of laboratory results for organic COCs tested for were at concentrations below laboratory detection limits.

The following is a summary of the samples containing concentrations of COCs in excess of the site industrial criteria:

Polycyclic aromatic hydrocarbons (PAHs):

- BH09 (3.1-3.2m)
  - Benzo(a)pyrene 440 mg/kg (site criteria 5 mg/kg)
  - Total PAHs 7267 mg/kg (site criteria 100 mg/kg)
- BH10 (0.3-0.4m)
  - Benzo(a)pyrene 6.0 mg/kg (site criteria 5 mg/kg)

Concentrations of a soil leachate analysis for Benzo(a)pyrene undertaken on boreholes BH09 (3.1-3.2), BH23 (3.3-3.4) and BH24 (1.8-1.9) were reported to be below the laboratory detection limit.

A summary of the exceedences of the industrial site criteria are shown on Figure 3.

9.1 Statistical data evaluation

As required under the DQO decision rules, statistical analysis of the data was undertaken. The statistical evaluation of the data is presented in Table 5 and compares the summary statistics for each of the applicable COC against the NEPM decision rules and criteria.

A statistical summary of the data collected in this investigation is presented below:

Table 5 Statistical Data Summary

	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Min	1.3	0.5	1.2	7.6	8.4	0.35	1.6	5.3
Max	34	1.2	77	3920	350	1.2	60	1270
Average	8.60	0.74	20.69	349.74	64.30	0.85	16.52	200.51
Standard Deviation	6.46	0.32	17.73	809.72	87.13	0.44	17.65	329.19
95 UCL	10.55	1.09	27.95	1693.00	127.60	NC	22.89	746.40
95% UCL method *	Gamma UCL	Gamma UCL	Gamma UCL	Chebyshev (Mean, Sd) UCL	Chebyshev (Mean, Sd) UCL	NC	Gamma UCL	Chebyshev (Mean, Sd) UCL
Guideline	500	100	600000	5000	1500	50	3000	35000
50% Guideline	250	50	300000	2500	750	25	1500	17500
250% Guidelines (hotspot)	1250	250	1500000	12500	3750	125	7500	87500
CV	0.75	0.44	0.86	2.32	1.36	0.52	1.07	1.64

	Benzo(a)pyrene	Total PAHs	Benzo(a)pyrene (excluding hot spot)	Total PAHs (excluding hot spot)
Min	0.55	0.55	0.55	0.55
Max	440	7267	6	41.34
Average	89.68	916.66	2.38	3.47
Standard Deviation	195.85	2565.96	2.61	14.72
95 UCL	2519.00	9943.00	0.90	12.38
95% UCL method *	Adj Gamma UCL	Chebyshev (Mean, Sd) UCL	Student t test	Chebyshev (Mean, Sd) UCL
Guideline	5	100	5	100
50% Guideline	2.5	50	2.5	50
250% Guidelines (hotspot)	12.5	250	12.5	250
CV	2.18	2.80	2.18	2.80

Notes:
*** calculated in Pro UCL**

10.0 DISCUSSION

SGA Environmental undertook a DSI at 176-184 George Street, Concord West, NSW to determine whether the site was suitable for ongoing commercial/industrial use. The drilling program was designed with reference to a previous site investigation undertaken in 2000 and a Site Audit Statement (SAS) issued in 2002 by a NSW EPA accredited site auditor. The previous investigation did not find significant contamination in fill or natural soil located on the site. As a result, the SAS was issued and concluded that the site was suitable for use as a commercial/industrial site.

The DSI undertaken included sampling locations located in the vicinity of printing infrastructure, a wash down pit, dangerous goods storage area and former UST area (Figure 2). Locations were also chosen to identify potential contamination as a results of recent (post 2002) printing activities undertaken onsite. Other sampling locations were chosen in order to provide adequate site coverage, taking into account the site history and that fill material had been used to provide an elevated building footprint. Samples collected for analysis were selected based on field observations such as olfactory assessment, stains, and presence of inclusions which indicate potential chemicals of concern (COCS).

The DSI identified the following exceedances of the industrial site criteria:

- BH09 (3.1-3.2m)
  - BaP 440 mg/kg (guideline 5 mg/kg) the laboratory was contacted to re-analyse the sample and the results were considered representative
  - Total PAHS 7267 mg/kg (guideline 100 mg/kg) the laboratory was contacted to re-analyse the sample and the results were considered representative
  - Concentrations of both BaP and total PAH are in excess of 250% of the site criteria

- BH10 (0.3-0.4m)
  - BaP 6 mg/kg (guideline 5mg/kg)

A summary of these exceedance is presented as Figure 3.

These samples which were reported to contain concentrations of PAHs and BaP in excess of the site criteria were identified as containing ash, cinder and slag which are considered to be pyrogenic waste from the incomplete combustion of coal or coke. It is likely that this material was used as fill material during historical levelling of the site. Additional leachability testing was undertaken on samples BH09 (3.1-3.2), BH23 (3.3-3.4) and BH24 (1.8-1.9). The results of the leachability analysis reported that the BaP and total PAH are not leacheable. This is consistent with the pyrogenic source of PAHs from the incomplete combustion of coal and coke. This immobile form of the PAHs is recognised by the DECCW General Immobilisation approval 1999/05 (Reference 14). Laboratory analysis of the sample of natural soil from beneath sample BH09 (3.1-3.2m) and sample BH10 (0.3-0.4m) did not report concentrations of BAP or total PAHs in excess of the site criteria, which also supports that the BaP and PAHs are in an immobile form.

Concentrations of PAHs and BaP within sampling location BH09 at levels which exceed the industrial site criteria are considered to be a contamination “hotspot”. This area has been delineated and is shown on Figure 4. The estimated area of the impacted material is 110 m^2, and assuming the thickness of impacted fill is ~2.95m (refer to cross section presented as Figure 5) with an assumed bulk density of 1.8 tonnes/m^3, it is estimated that there is approximately 590 tonnes of BaP and PAH impacted material onsite.

The statistical summary indicates that;

- the arithmetic average of BaP and Total PAHs exceed the site criteria
- concentrations of BaP and Total PAHs exceed the site criteria
- the standard deviation of BaP and PAHs exceed the site criteria

As such, based on the decision rules presented in the DQO (Section 3.0) concentrations of COCs are in excess of the industrial/commercial site criteria and the site may require further remediation if it were to be redeveloped. Although this is the case, concentration of COCs are not considered to be mobile or immediately available to humans or the environment due to the presence of an overlying concrete slab. Therefore, if the site is left in its current state and future exposure is restricted (i.e. by ensuring the slab remains in place), the site would be suitable for continued industrial/commercial land use.

Recalculation of the statistical data summary excluding the contamination hotspot data resulted in the site being suitable for industrial/commercial redevelopment and land use using the NEPM decision rules.

SGA consider that the level or type of contamination onsite will not warrant DECCW regulation.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Taylor Woodings Pty Ltd commissioned SGA Environmental to undertake a Detailed Site Investigation at 176-184 George Street, Concord West, NSW. The purpose of the investigation was to identify potential impacts to soil from chemicals of concern (COCS) resulting from recent site uses (post 2000) by the current site owners/occupiers Chippendale Printing Co.

The investigation identified that recent use of the land for printing purposes has not resulted in impacts to the site's soil. The investigation did identify a contamination hotspot which has resulted from the historical use of imported fill material containing ash and cinders. This hot spot was reported to contain concentrations of BAP and total PAHs above the commercial/industrial guidelines.

SGA estimate that the contamination hotspot comprises approximately 590 tonnes of material.

Based on the DSI undertaken, the site is suitable for industrial/commercial use if the site is left in its current stage and exposure to the contamination hotspot is restricted.

SGA Environmental do not consider the hotspot will warrant DECCW regulation.

SGA Environmental recommends:

- that a plan be developed to restrict future exposure to the impacted fill material or
- remedial activities be undertaken if the site is to be redeveloped

12.0 LIMITATIONS

This report has been prepared by SGA Environmental in response to and subject to the following limitations:

1. The specific instructions received from Taylor Woodings.
2. The report has been prepared to a specific scope of works as set out in SGA Environmental fee proposal Taylor Woodings dated 9 August 2010 and additional works detailed in SGA Environmental e-mail dated 1 October 2010. The limitations within this proposal are applicable to this report.
3. The report may not be relied upon by any third party not named in this report for any purpose except with the prior written consent of SGA Environmental (which consent may or may not be given at the discretion of SGA Environmental Pty Ltd). It is understood that this report will be issued to prospective purchasers as part of a vendor due diligence package. The report is readily assignable to a purchaser of the property by mutual written agreement upon completion.
4. This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason.
5. The report only relates to the site referred to in the scope of works being located at 176-184 George Street, Concord West, NSW (“the site”).
6. The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities.
7. No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report.
8. Fill, soil, groundwater and rock to the depth tested on the site may be fit for the use specified in this report. Unless it is expressly stated in this report, the fill, soil and/or rock may not be suitable for classification as virgin excavated natural material if deposited off site

13.0 REFERENCES

1. CSIRO Australia (2006) – *Australian Soil Resource Information System. www.asris.csiro.au.*

2. National Environmental Health Forum (NEHF) (1996) – *Health-based soil investigation levels*

3. National Environment Protection Council (1999) – *National Environment Protection (Assessment of Site Contamination) Measure (NEPM)*

4. NSW EPA (1998) – *Contaminated sites: Guidelines for the NSW site auditor scheme*

5. NSW EPA (1994) – *Contaminated sites: guidelines for assessing service station sites*

6. NSW EPA (1995) – *Contaminated sites: sampling design guidelines*

7. NSW Geological Survey (1983) – *Sydney 1:100,000 Geological sheet 9130*

8. NSW Government – *NSW Natural Resource Atlas* www.nratlas.nsw.gov.au

9. Standards Australia (1999) – AS4482.2-1999 Guide to the investigation and sampling of sites with potentially contaminated soil. Part 2 Volatile compounds

10. Standards Australia (2005) – *AS4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1 Non-volatile and semi volatile compounds*

11. BC Furr Environmental Services (2000) – *Stage 2 Detailed Site Investigation: 176-184 George Street, Concord West*

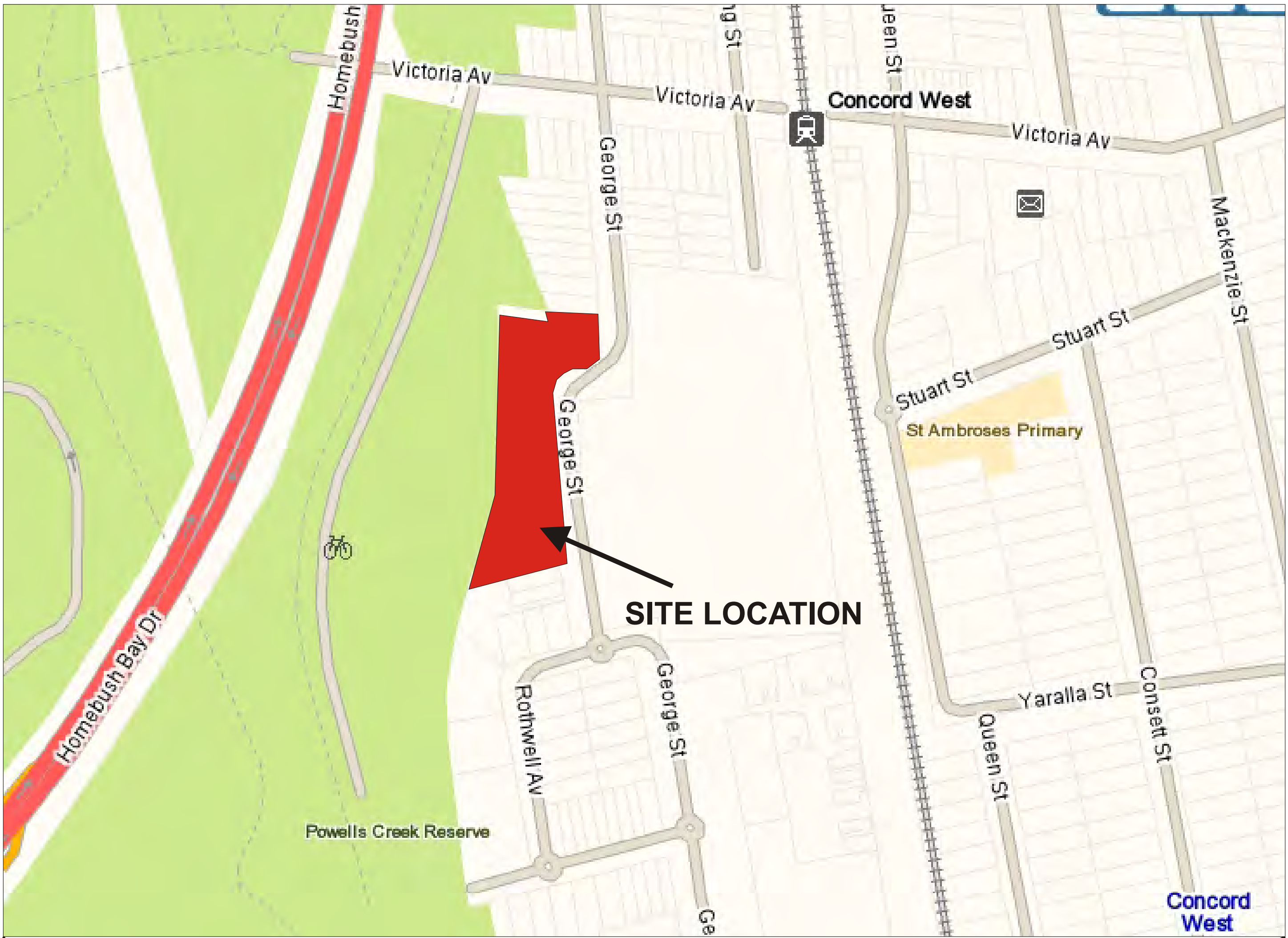
12. Peter J Ramsey and Associates (2002) – Status Report of Remedial Works 176-184 George Street, Concord West.

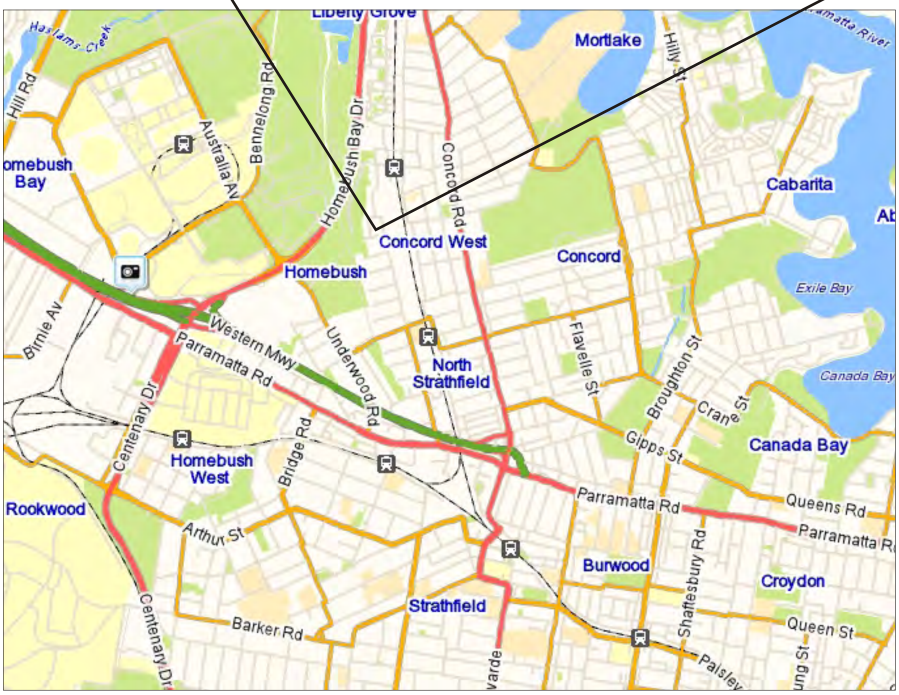
13. NSW Environmental Protection Authority: Site Audit Statement No. FM39 (2002) – *prepared by Environmental Resource Management*.

14. NSW Environmental Protection Authority: General Immobilization Approval 1999/05 http://www.environment.nsw.gov.au/resources/waste/GenImmobApp_1999-05_Ash_ACNEM_or_CCNEM.pdf

APPENDIX A

SITE FIGURES





N

Source: Whereis.com

CLIENT				
Taylor Woodings				
PROJECT				
176-184 George Street, Concord West, NSW				
TITLE				
Figure 1 - Site Location				
SCALE NTS		DATE 17/10/2010	DRAWING No. 91949_Fig1	ISSUE A
DRAWN N.K.	CHECKED D.S.	JOB No. 91949		

SGA Environmental
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CLIENT	TAYLOR WOODINGS
PROJECT	176-184 George Street, Concord West, NSW
TITLE	Figure 2 - Site Building

SCALE	DATE	DRAWING No.	ISSUE
NTS	15/10/10	91949_Fig2	A

DRAWN	CHECKED	JOB No.
A.L.	N.K.	91949

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N

Legend

- Approximate site boundary
- Sampling locations where exceedance reported 20-21/10/2010
- Sampling locations of 20-21/10/2010 field work
- Sampling locations of 12/10/10 field work

0 — **Approximate Scale (m)** — 40

CLIENT	**TAYLOR WOODINGS**
PROJECT	**176-184 George Street, Concord West, NSW**
TITLE	**Figure 3 - Sampling Locations**

SCALE	DATE	DRAWING No.	ISSUE
NTS	20/10/10	91949_Fig3	A
DRAWN A.L. / CHECKED N.K.	JOB No. 91949		

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N

Approximate size of contamination Hot Spot

Site Boundary

Sampling location

0 10
Approximate Scale (m)

Cross Section (refer Figure 5)

CLIENT	**TAYLOR WOODINGS**
PROJECT	**176-184 George Street, Concord West, NSW**
TITLE	**Figure 4 - Area of Contamination Hot Spot**

SCALE	DATE	DRAWING No.	ISSUE
NTS	20/10/10	91949_Fig4	A
DRAWN N.K. / CHECKED D.S.	JOB No. 91949		

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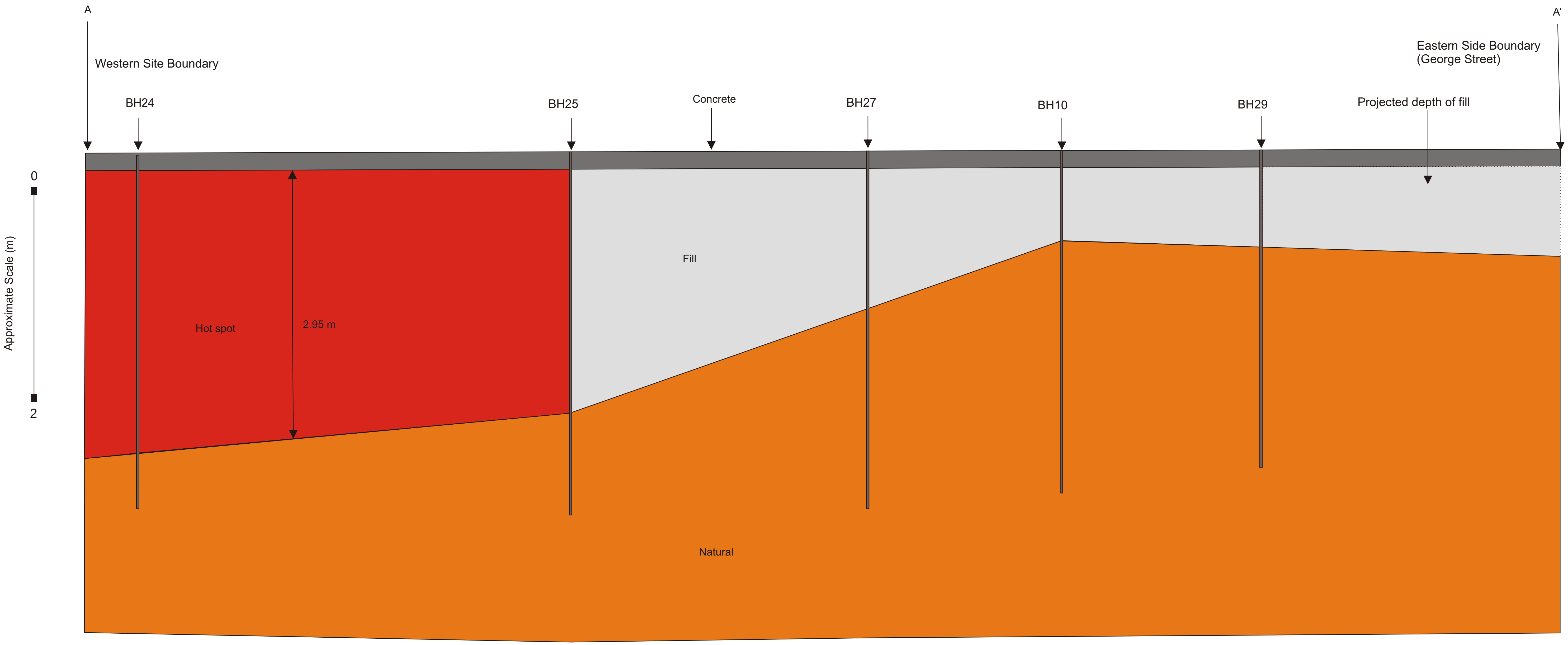

Approximate cross section of contamination Hot Spot

Fill Material

Natural Soil

0 5

Approximate Scale (m)

N

Location of cross section shown on Figure 4

CLIENT	TAYLOR WOODINGS			
PROJECT	176-184 George Street, Concord West, NSW			
TITLE	Figure 5 - Cross Section A - A'			
SCALE NTS	DATE 20/10/10		DRAWING No. 91949_Fig5	ISSUE A
DRAWN N.K.	CHECKED D.S.	JOB No. 91949		

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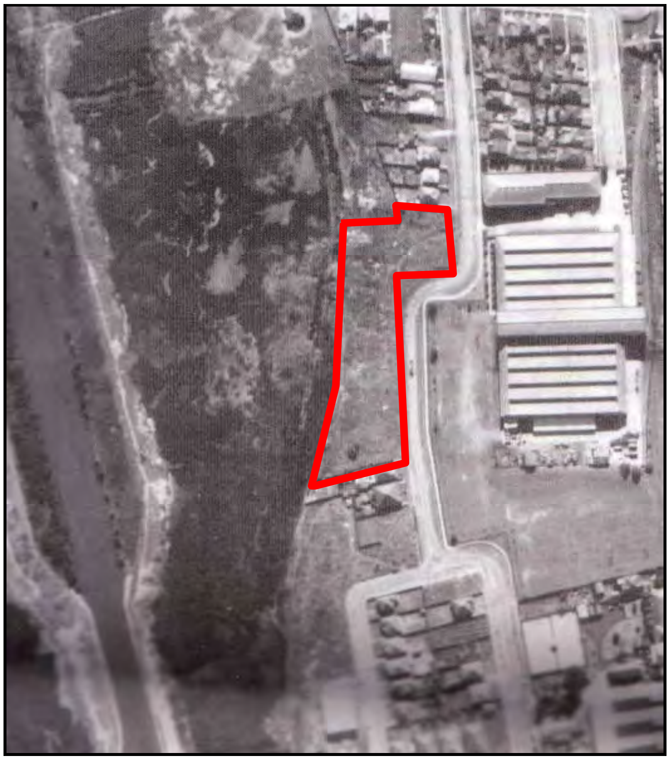
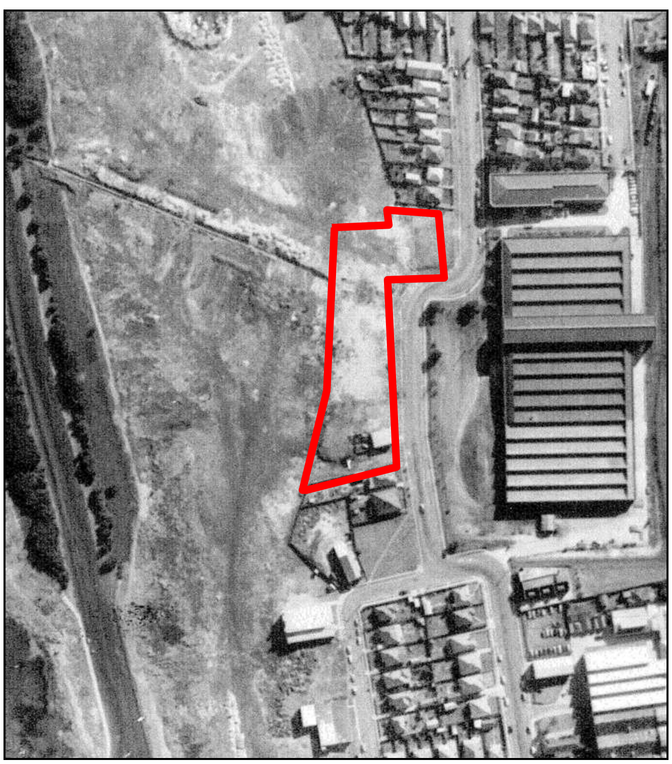
APPENDIX B

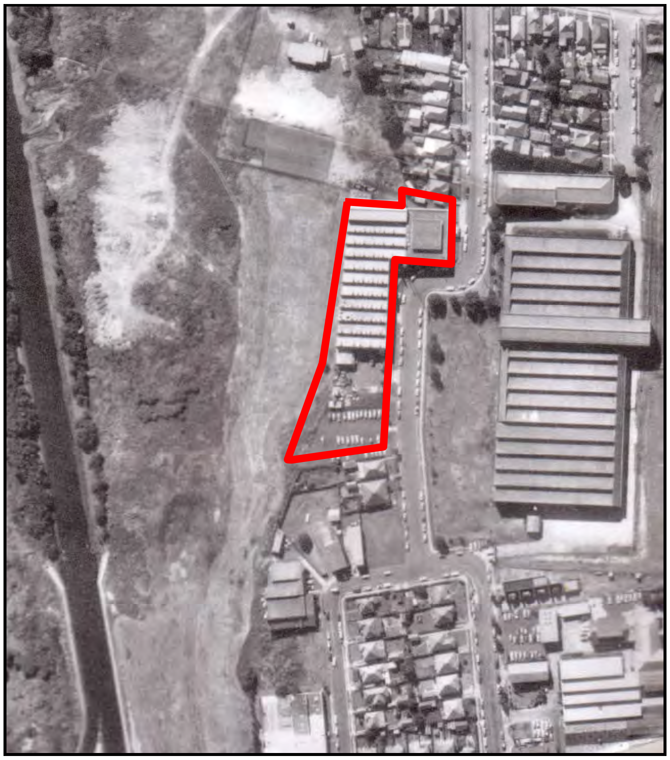
HISTORICAL AERIAL PHOTOGRAPHS



1951 Aerial Photograph



1961 Aerial Photograph



1972 Aerial Photograph

1982 Aerial Photograph

APPENDIX C
GUIDELINES

GUIDELINES FOR SOIL

Table C1 NEPM Health Based Soil Investigation levels and Ecological Investigation Levels

Substance	Health-based Soil Investigation Levels (HILs) (mg/kg)				Ecological Investigation Levels (EILs)
	Standard Residential	High Density Residential	Parks & Open Spaces	Commercial & Industrial	
Aldrin + Dieldrin	10	40	20	50	-
Arsenic (total)	100	400	200	500	20
Benzo (a) pyrene	1	4	2	5	-
Beryllium	20	80	40	100	-
Boron	3 000	12 000	6 000	15 000	-
Cadmium	20	80	40	100	3
Chlordane	50	200	100	250	-
Chromium (III)	12%	48%	24%	60%	400
Chromium (VI)	100	400	200	500	1
Cobalt	100	400	200	500	-
Copper	1 000	4 000	2 000	5 000	100
Cyanides (complexed)	500	2 000	1 000	2 500	-
DDT+DDD+DDE	200	800	400	1 000	-
Heptachlor	10	40	20	50	-
Lead	300	1 200	600	1 500	600
Manganese	1 500	6 000	3 000	7 500	500
Methyl mercury	10	40	20	50	-
Mercury (inorganic)	15	60	30	75	1
Nickel	600	2 400	600	3 000	60
Total PAH	20	80	40	100	-
PCBs (total)	10	40	20	50	-
Phenol	8 500	34 000	17 000	42 500	-
TPH >C16-C35 aromatics	90	360	180	450	-
TPH >C16-C35 aliphatics	5 600	22 400	11 200	28 000	-
TPH >C35	56 000	224 000	112 000	280 000	-
Zinc	7 000	28 000	14 000	35 000	200

Notes:
Guidelines taken from National Environment Protection Council (1999) — *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM. Shading indicates most applicable criteria

Table C2 NSW EPA. (1994). Contaminated sites: guidelines for assessing service station sites – Threshold concentrations for the sensitive land use - soils

Analytes	Threshold Concentrations	Sources
	mg/kg dry weight	
TPH: C_6-C_9	65	See note [d]
TPH: C_{10}-C_{40}	1000	See note [e]
Benzene	1[f]	ANZECC 1992
Toluene	1.4[g]/130[h]	Netherlands 1994
Ethylbenzene	3.1[i]/50[j]	Netherlands 1994
Total Xylenes	14[k]/25[j]	Netherlands 1994
Total Lead	300	ANZECC 1992
Total PAHs	20	ANZECC 1992

Notes:

[d] The TPH C_6-C_9 threshold concentration applies to soil containing 10% natural organic matter. This concentration has been calculated assuming- that there has been a recent spill, -that the aromatic content of the petrol is 30%; and - that the resultant BTEX soils concentrations are at their lower thresholds. TPH C_6-C_9 concentrations above the relevant threshold may indicate that BTEX concentrations are above their thresholds. The threshold concentration should be interpreted as only an approximate indicator of potential contamination;

[e] The TPH C_{10}-C_{40} threshold concentration is based on consideration of both the Netherlands Intervention Level for TPH C_{10}-C_{40} range and commonly reported analytical detection limits. The Netherlands intervention value is 5,000 mg/kg dry weight;

[f] a lower benzene threshold concentration may be needed to protect groundwater;

[g] the toluene threshold concentration is the Netherlands MPC to protect terrestrial organisms in soil. The value was obtained by applying a US EPA assessment factor for terrestrial chronic (NOEC) data. The MPC is an indicative value;

[h] human health and ecologically based protection level for toluene. The threshold concentration used here is the Netherlands intervention value for the protection of terrestrial organisms. Other considerations such as odours and the protection of groundwater may require a lower remedial criterion;

[I] the ethyl benzene threshold concentration is the Netherlands MPC for the protection of terrestrial organisms in soil. No terrestrial ecotoxicological data could be found for use in the Netherlands derivation. Therefore equilibrium partitioning has been applied to the MPC for water to obtain estimates for the MPC for soil. The MPC for water has been derived from aquatic ecotoxicological data;

[j] Human health based protection level for ethyl benzene or total xylenes as shown. The threshold concentration presented here is the Netherlands intervention value. Other considerations such as odour and the protection of groundwater may require a lower remediation criterion;

[k] the xylene threshold concentration is the Netherlands MPC for the protection of terrestrial organisms in soil. No terrestrial ecotoxicological data could be found for use in the Netherlands criteria derivation. Therefore equilibrium partitioning has been applied for the MPC for water to obtain an estimate of the MPC for soil. The MPC for water has been derived from aquatic ecotoxicological data. The concentration shown applies to total xylenes and is based on the arithmetic average of the individual xylene MPCs.

APPENDIX D
LABORATORY RESULTS

Table D1 - Soil Analytical Results

Borehole	Sample Depth (m)	Description	Heavy Metals	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Polycyclic Aromatic Hydrocarbons (PAHs)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)&(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene	Total PAHs	TCLP BaP Leachability
NEPM Ecological Investigation Levels (EILs)				20	3	400	100	600	1	60	200																		
NEPM HILs Column F for commercial/industrial landuse				500	100	600000	5000	1500	50	3000	35000													5				100	
NSW EPA (1995) Sensitive landuse criteria				100	20		1000	300		600	7000																	20	
Method detection limit (MDL)				**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.2**	**0.5**	**0.5**		**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**<1**	**0.5**	**0.5**	**0.5**	**0.5**		**0.5 ug/L**
Borehole	**Sample Depth (m)**	**Description**		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.		3.3	<0.5	3	26	23	<0.2	1.7	11		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.		11	<0.5	23	22	44	<0.2	9.7	42		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.		14	<0.5	29	24	19	<0.2	2.4	11		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.		3.6	<0.5	13	22	31	<0.2	5.5	36																	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.		9.1	<0.5	1.3	23	8.4	<0.2	1.9	11		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.		3.8	<0.5	8.1	20	20	<0.2	4.3	16		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.		11	<0.5	56	7.6	33	<0.2	11	17		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.		9.2	<0.5	14	22	28	<0.2	11	42		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH08	3.45-3.50	Brown sand.		11	1.2	77	3920	350	<0.2	60	1270		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.		8.9	1.1	15	150	180	1.2	53	590		510	30	200	240	1400	370	1200	1100	410	370	570	440	180	57	190	7267	ND
BH09	3.3-3.4	Hard brown/dark grey shale.		9.3	<0.5	13	46	20	<0.2	39	250		<0.5	<0.5	<0.5	<0.5	1.6	<0.5	1.3	1.2	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	4.1	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.		6.1	<0.5	21	36	70	<0.2	7.5	37		<0.5	<0.5	<0.5	<0.5	1.7	0.62	5.8	5.9	3.9	3.5	8	6	2.7	0.82	3	41.94	-
BH10	0.6-0.7	Stiff brown clay with ironstone.		7.8	<0.5	28	18	27	<0.2	15	23		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.		7.9	<0.5	21	36	59	<0.2	8.1	75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.		4.6	<0.5	4.8	20	9.3	<0.2	1.6	6.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.		16	<0.5	18	17	39	<0.2	4.1	190		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	0.55	<0.5	<0.5	<0.5	0.55	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.		11	<0.5	38	1880	160	<0.2	36	800		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.		3.4	<0.5	8.4	37	22	<0.2	4	37		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		12	0.51	20	1260	200	<0.2	23	890		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.53	0.51	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	1.04	-
BH15	3.0-3.1	Firm dark grey clay.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.6-3.7	Stiff grey shaley clay.		<0.5	<0.5	<0.5	84	13	<0.2	6.1	29		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.		2.5	<0.5	<0.5	21	25	<0.2	2.4	12		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		22	0.6	28	1070	240	<0.2	33	790		<0.5	<0.5	<0.5	<0.5	0.53	<0.5	0.89	0.92	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	2.34	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.		3.7	<0.5	<0.5	54	18	<0.2	7.9	24		<0.5	<0.5	<0.5	<0.5	1.7	<0.5	2.2	2.2	1.1	0.92	1.4	1	<0.5	<0.5	<0.5	10.52	-
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.		1.3	<0.5	<0.5	18	21	<0.2	1.7	8.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.		8.7	0.5	11	2180	320	<0.2	21	890		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.		<0.5	<0.5	14	8.9	18	<0.2	2.5	7.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.		5.7	<0.5	23	23	25	<0.2	9.4	29		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.		17	<0.5	<0.5	11	9.1	<0.2	1.7	7.7		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.		5.4	<0.5	6.6	55	25	<0.2	48	150		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.		7	<0.5	1.2	38	25	<0.2	31	120		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.		34	<0.5	13	27	33	<0.2	33	24		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.		6.5	<0.5	53	640	63	0.35	49	330		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	2.5-2.6	Hard brown clay with yellow mottling.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	ND
BH23	3.4-3.5	Hard grey weathered shale.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	ND
BH24	3.25-3.35	Hard grey weathered shale.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.92	1.1	0.6	0.62	1.2	0.84	<0.5	<0.5	0.51	5.79	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH27	1.8-1.9	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH28	1.7-1.8	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
BH29	2.7-2.8	Soft grey clay with red mottling.		-	-	-	-	-	-	-	-		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
Dup 1 (20-21/09/2010)				3.7	<0.5	<0.5	27	23	<0.2	3.5	17		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)				3.7	<0.5	1.7	13	12	<0.2	1.8	5.3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
Dup 3 (20-21/09/2010)				-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)				2.1	<0.5	<0.5	24	23	<0.2	3	9.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND	-
Dup 1 (12/10/2010)				6.2	0.51	37	710	79	1	41	410		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)													<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	ND-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

Environmental

Table D1 - Soil Analytical Results

Borehole	Sample Depth (m)	Description	Benzene, Toluene, Ethyl Benzene, Xylene (BTEX)	Benzene	Toluene	Ethyl Benzene	m, p - Xylene	o - Xylene	Total xylene	Total Petroluem Hydrocarbons (TPH)	TPH C6 - C9	TPH C10 - C14	TPH C15 - C28	TPH C29 - C36	TPH C10-C40*	TPH C16 - C35 Aliphatic	TPH C16 - C35 Aromatic
NEPM Ecological Investigation Levels (EILs)																	
NEPM HILs Column F for commercial/industrial landuse																28000	450
NSW EPA (1995) Sensitive landuse criteria				1	130	50			25		65				1000		
Method detection limit (MDL)				**0.5**	**0.5**	**0.5**	**1**	**0.5**			**25**	**50**	**100**	**100**		**100**	**100**
Borehole	**Sample Depth (m)**	**Description**		-	-	-	-	-	-		-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.		-	-	-	-	-	-		<25	<50	<100	<100	ND	-	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	170	110	280	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	1200	18000	7400	26600	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH11	2.7-2.8	Stiff to hard grey shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.		-	-	-	-	-	-		<25	<50	<100	<100	ND	-	-
BH15	3.6-3.7	Stiff grey shaley clay.		-	-	-	-	-	-		<25	<50	<100	<100	ND	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.		-	-	-	-	-	-		-	-	-	-	-	<100	<100
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	50	130	<100	180	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.		<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH22	2.5-2.6	Hard brown clay with yellow mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.		-	-	-	-	-	-		-	-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.		-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)				-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)				-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)				<0.5	<0.5	<0.5	<1	<0.5	ND		<25	<50	<100	<100	ND	-	-
Dup 5 (20-21/10/2010)				-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 1 (12/10/2010)				-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 3 (12/10/2010)				-	-	-	-	-	-		-	-	-	-	-	-	-

Borehole	Sample Depth (m)	Monocyclic Aromatic Hydrocarbons (MAHs)	Benzene	Toluene	Ethyl Benzene	m, p - Xylene	o - Xylene	Total Xylene	Styrene	Isopropylbenzene	n-Propylbenzene	1,3,5-Trimethylbenzene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	n-Butylbenzene
NEPM Ecological Investigation Levels (EILs)																	
NEPM HILs Column F for commercial/industrial landuse																	
NSW EPA (1995) Sensitive landuse criteria			1	130	50			25									
Method detection limit (MDL)			**<1**	**<1**	**<1**	**<2**	**<1**		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**
Borehole	**Sample Depth (m)**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH02	1.1-1.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH03	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	3.45-3.50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	2.0-2.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	3.9-4.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.0-3.1		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH15	3.6-3.7		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH16	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	3.2-3.3		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH17	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	3.8-3.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH21	3.0-3.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9		<1	<1	<1	<2	<1	ND	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH22	2.5-2.6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.4-3.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	3.25-3.35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.6-1.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	0.8-0.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

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Table D1 - Soil Analytical Results

Borehole	Sample Depth (m)	Description	Halogenated Aliphatics Hydrocarbons	Chloromethane	Vinyl chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethane	Dichloromethane	trans-1,2-Dichloroethene	1,1-Dichloroethene	2,2-Dichloropropane	cis-1,2-Dichloroethene	Bromochloromethane	1,1,1-Trichloroethane	Carbon tetrachloride	1,1-Dichloropropene	1,2-Dichloroethane	Trichloroethene	1,2-Dichloropropane	Dibromomethane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	Tetrachloroethene	1,3-Dichloropropane	1,2-Dibromoethane	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane	1,2-Dibromo-3-chloropropane	Hexachlorobutadiene
NEPM Ecological Investigation Levels (EILs)																																	
NEPM HILs Column F for commercial/industrial landuse																																	
NSW EPA (1995) Sensitive landuse criteria																																	
Method detection limit (MDL)				<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Borehole	**Sample Depth (m)**	**Description**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH15	3.6-3.7	Stiff grey shaley clay.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.		<5	<2	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH22	2.5-2.6	Hard brown clay with yellow mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)

Exceeds NEPM HILs Column F for commercial/industrial landuse

Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

			Halogenated Aromatics Hydrocarbons	Chlorobenzene	Bromobenzene	2-Chlorotoluene	4-Chlorotoluene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	1,2,3-Trichlorobenzene	PCB Aroclors	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB's (as above)	Organophosphate (OP) Pesticides	Dichlorvos	Demeton-S-Methyl	Diazinon	Dimethoate	Chlorpyrifos	Chlorpyrifos Methyl	Malathion	Fenthion	Ethion	Fenitrothion	Chlorfenvinphos (E)	Chlorfenvinphos (Z)	Parathion (Ethyl)	Parathion Methyl
NEPM Ecological Investigation Levels (EILs)																																				
NEPM HILs Column F for commercial/industrial landuse																					50															
NSW EPA (1995) Sensitive landuse criteria																					10															
Method detection limit (MDL)				**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<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**	**<0.1**	**<0.1**
Borehole	**Sample Depth (m)**	**Description**		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.		<1	<1	<1	<1	<1	<1	<1	<1	<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
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.		<1	<1	<1	<1	<1	<1	<1	<1	<1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		<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
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.		<1	<1	<1	<1	<1	<1	<1	<1	<1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.6-3.7	Stiff grey shaley clay.		<1	<1	<1	<1	<1	<1	<1	<1	<1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.		<1	<1	<1	<1	<1	<1	<1	<1	<1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.		-	-	-	-	-	-	-	-	-		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.		<1	<1	<1	<1	<1	<1	<1	<1	<1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	2.5-2.6	Hard brown clay with yellow mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)				-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

Table D1 - Soil Analytical Results

			Pirimiphos Methyl	Pirimiphos Ethyl	Azinphos Methyl	Azinphos Ethyl	Trihalomethanes NMI 1120 Screen	Chloroform	Bromodichloromethane	Dibromochloromethane	Bromoform	Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Scre	Naphthalene	Poly Aromatic Hydrocarbons NMI 1122 Screen	Acenaphthylene	Naphthalene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b,k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Phenols NMI 1122 Screen	Phenol	2-Chlorophenol	2-Methylphenol	3&4-Methylphenol	2-Nitrophenol	2,4-Dimethylphenol	2,4-Dichlorophenol
NEPM Ecological Investigation Levels (EILs)																																					
NEPM HILs Column F for commercial/industrial landuse																										5											
NSW EPA (1995) Sensitive landuse criteria																																					
Method detection limit (MDL)			**<0.1**	**<0.1**	**<0.1**	**<0.1**		**<1**	**<1**	**<1**	**<1**		**<1**		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<2**	**<1**	**<1**	**<1**	**<1**		**<1**	**<1**	**<1**	**<2**	**<1**	**<1**	**<1**
Borehole	**Sample Depth (m)**	**Description**	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.	<0.1	<0.1	<0.1	<0.1		<1	<1	<1	<1		<1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.	-	-	-	-		<1	<1	<1	<1		<1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.	<0.1	<0.1	<0.1	<0.1		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.	-	-	-	-		<1	<1	<1	<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1		<1	<1	<1	<2	<1	<1	<1
BH15	3.6-3.7	Stiff grey shaley clay.	-	-	-	-		<1	<1	<1	<1		<1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.	-	-	-	-		<1	<1	<1	<1		<1		<1	<1	<1	<1	1.5	<1	2.2	2.2	<1	<1	<2	<1	<1	<1	<1		<1	<1	<1	<2	<1	<1	<1
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.	-	-	-	-		<1	<1	<1	<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1		<1	<1	<1	<2	<1	<1	<1
BH22	2.5-2.6	Hard brown clay with yellow mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.	-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-	-		-	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

Table D1 - Soil Analytical Results

sga Environmental

			2,6-Dichlorophenol	4-Chloro-3-methylphenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,3,4,6-Tetrachlorophenol	Pentachlorophenol	Oxygenated Compounds NMI 1120 Screen	Acetone	2-Butanone (MEK)	2-Hexanone (MBK)	4-Methyl-2-pentanone (MIBK)	Methyl tert-Butyl Ether (MTBE)	Vinylacetate	Sulfonated Compounds NMI 1120 Screen	Carbon disulfide	Phthalates NMI 1122 Screen	Dimethyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Butyl benzyl phthalate	Bis(2-ethylhexyl) phthalate	Di-n-octyl phthalate	Chlorinated Hydrocarbons NMI 1122 Screen	2-Chloronaphthalene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	Hexachlorobenzene	1,2,4-Trichlorobenzene	Hexachloroethane	Hexachlorocyclopentadiene	Hexachloro-1,3-butadiene
NEPM Ecological Investigation Levels (EILs)																																		
NEPM HILs Column F for commercial/industrial landuse																																		
NSW EPA (1995) Sensitive landuse criteria																																		
Method detection limit (MDL)			**<1**	**<2**	**<2**	**<2**	**<2**	**<2**		**<5**	**<5**	**<5**	**<5**	**<5**	**<5**		**<5**		**<1**	**<1**	**<1**	**<1**	**<2**	**<1**		**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**
Borehole	**Sample Depth (m)**	**Description**	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.	-	-	-	-	-	-		<5	<5	<5	<5	<5	<5		<5		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.	-	-	-	-	-	-		<5	<5	<5	<5	<5	<5		<5		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.	<1	<2	<2	<2	<2	<2		<5	<5	<5	<5	<5	<5		<5		<1	<1	<1	<1	<2	<1		<2	<2	<2	<2	<2	<2	<2	<2	<2
BH15	3.6-3.7	Stiff grey shaley clay.	-	-	-	-	-	-		<5	<5	<5	<5	<5	<5		<5		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.	<1	<2	<2	<2	<2	<2		<5	<5	<5	<5	<5	<5		<5		<1	<1	<1	<1	<2	<1		<2	<2	<2	<2	<2	<2	<2	<2	<2
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.	<1	<2	<2	<2	<2	<2		<5	<5	<5	<5	<5	<5		<5		<1	<1	<1	<1	<2	<1		<2	<2	<2	<2	<2	<2	<2	<2	<2
BH22	2.5-2.6	Hard brown clay with yellow mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.	-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-	-	-	-		-	-	-	-	-	-		-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)

Exceeds NEPM HILs Column F for commercial/industrial landuse

Exceeds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

Table D1 - Soil Analytical Results

sga Environmental

Borehole	Sample Depth (m)	Description	Ethers NMI 1122 Screen	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	Bis(2-chloroethyl)ether	Bis(2-chloroethoxy)methane	Bis(2-chloroisopropyl)ether
NEPM Ecological Investigation Levels (EILs)								
NEPM HILs Column F for commercial/industrial landuse								
NSW EPA (1995) Sensitive landuse criteria								
Method detection limit (MDL)				<2	<2	<2	<2	<2
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.		-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.		-	-	-	-	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.		-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.		-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.		-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.		-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.		-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.		-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.		-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.		-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.		-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.		-	-	-	-	-
BH08	3.45-3.50	Brown sand.		-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.		-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.		-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.		-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.		-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.		-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.		-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.		-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.		-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.		-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.		-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.		-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.		-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.		<2	<2	<2	<2	<2
BH15	3.6-3.7	Stiff grey shaley clay.		-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.		-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.		-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.		<2	<2	<2	<2	<2
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.		-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.		-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.		-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.		-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.		-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.		-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.		-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.		-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.		-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.		-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.		<2	<2	<2	<2	<2
BH22	2.5-2.6	Hard brown clay with yellow mottling.		-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.		-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.		-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.		-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.		-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.		-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.		-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.		-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.		-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.		-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.		-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.		-	-	-	-	-
Dup 1 (20-21/09/2010)				-	-	-	-	-
Dup 2 (20-21/09/2010)				-	-	-	-	-
Dup 3 (20-21/09/2010)				-	-	-	-	-
Dup 5 (20-21/10/2010)				-	-	-	-	-
Dup 1 (12/10/2010)				-	-	-	-	-
Dup 3 (12/10/2010)				-	-	-	-	-

Borehole	Sample Depth (m)	Amines Nitroaromatics & Nitrosamines NMI 1122 Screen	Azobenzene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Nitrobenzene	N-Nitrosodimethylamine	N-Nitrosodiphenylamine	N-Nitrosodi-n-propylamine	Aniline	4-Chloroaniline	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline
NEPM Ecological Investigation Levels (EILs)														
NEPM HILs Column F for commercial/industrial landuse														
NSW EPA (1995) Sensitive landuse criteria														
Method detection limit (MDL)			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH01	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH02	1.1-1.2		-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-
BH03	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-
BH04	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-
BH05	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-
BH05	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3		-	-	-	-	-	-	-	-	-	-	-	-
BH08	3.45-3.50		-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-
BH12	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-
BH13	2.0-2.1		-	-	-	-	-	-	-	-	-	-	-	-
BH13	3.9-4.0		-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.0-3.1		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH15	3.6-3.7		-	-	-	-	-	-	-	-	-	-	-	-
BH16	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-
BH16	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-
BH16	3.2-3.3		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH17	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-
BH17	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-
BH17	3.8-3.9		-	-	-	-	-	-	-	-	-	-	-	-
BH18	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-
BH19	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-
BH19	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-
BH20	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8		-	-	-	-	-	-	-	-	-	-	-	-
BH21	3.0-3.1		-	-	-	-	-	-	-	-	-	-	-	-
BH22	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH22	2.5-2.6		-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.4-3.5		-	-	-	-	-	-	-	-	-	-	-	-
BH24	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-
BH24	3.25-3.35		-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-
BH26	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-
BH26	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.6-1.7		-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-
BH29	0.8-0.9		-	-	-	-	-	-	-	-	-	-	-	-
BH29	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-

Borehole	Sample Depth (m)	Organochlorine Pesticides NMI 1122 Screen	Aldrin	a-BHC	b-BHC	g-BHC (Lindane)	d-BHC	4,4 '-DDD	4,4 '-DDE	4,4 '-DDT	Dieldrin	Endosulphan I	Endosulphan II	Endosulfan sulphate	Endrin	Endrin Aldehyde	Heptachlor
NEPM Ecological Investigation Levels (EILs)																	
NEPM HILs Column F for commercial/industrial landuse																	50
NSW EPA (1995) Sensitive landuse criteria																	10
Method detection limit (MDL)			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH01	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	1.1-1.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	0.2-0.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	3.45-3.50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	1.4-1.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	2.0-2.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	3.9-4.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	3.0-3.1		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH15	3.6-3.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	0.3-0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	3.2-3.3		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH17	0.4-0.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	2.8-2.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	3.8-3.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	4.7-4.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH21	3.0-3.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	0.6-0.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH22	1.8-1.9		<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
BH22	2.5-2.6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.3-3.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23	3.4-3.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24	3.25-3.35		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.1-3.2		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH25	3.2-3.3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	0.7-0.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH26	2.9-3.0		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH27	1.8-1.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.6-1.7		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH28	1.7-1.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	0.8-0.9		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH29	2.7-2.8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

Table D1 - Soil Analytical Results

sga Environmental

			Heptachlorepoxide	Aldrin + Dieldrin	DDT+DDD+DDE	Organophosphate Pesticides NMI 1122 Screen	Dimethoate	Diazinon	Fenitrothion	Malathion	Chlorpyrifos	Ethion	Others	Dichlorobenzidine	2-Methylnaphthalene	Isophorone	Benzyl alcohol	Carbazole	Dibenzofuran
NEPM Ecological Investigation Levels (EILs)																			
NEPM HILs Column F for commercial/industrial landuse				50	1000														
NSW EPA (1995) Sensitive landuse criteria				10	200														
Method detection limit (MDL)			<2	<2			<2	<2	<2	<2	<2	<2		<2	<1	<2	<2	<2	<2
Borehole	Sample Depth (m)	Description	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH01	0.3-0.4	Stiff grey mottled yellow, orange clay with gravel (minor) and shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH01	3.3-3.4	Hard dark grey/brown shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH02	1.1-1.2	Stiff dark brown clay with manganese, shale, red mottling, grey clay.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH02	3.1-3.2	Stiff grey shaley clay with orange layering.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH03	0.4-0.5	Firm sandy brown clay with ironstone and manganese.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH04	1.8-1.9	Stiff orange/grey clay with ironstone and shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH05	0.3-0.4	Very firm brown clay with shale, glass, gravel, manganese & grey/organge mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH05	3.3-3.4	Hard grey/orange layered shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH06	0.6-0.7	Stiff grey/brown/orange clay matrix with shale and minor manganese.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH06	1.4-1.5	Firm brown clay with minor orange mottling and manganese.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH06	3.3-3.4	Stiff grey shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH08	0.2-0.3	Stiff brown clay with shale, ironstone, sand, gravel and sandstone layers.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH08	3.45-3.50	Brown sand.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH09	3.1-3.2	Very firm brown sandy clay with sandstone, gravel, ash, slag, ironstone & shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH09	3.3-3.4	Hard brown/dark grey shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH10	0.3-0.4	Firm brown clay with ash, slag, ironstone, shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH10	0.6-0.7	Stiff brown clay with ironstone.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH11	0.7-0.8	Dark brown clay with orange mottling, manganese, some charcoal.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH11	1.4-1.5	Stiff grey/red clay with orange mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH11	2.7-2.8	Stiff to hard grey shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH12	0.7-0.8	Firm brown/orange clay with red mottling, manganese and minor sandstone.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH12	2.8-2.9	Stiff to hard grey shale with orange layering.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH13	0.4-0.5	Very dense grey/black clayey sand with shale, gravel, brick, sandstone, ash & slag.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH13	2.0-2.1	Stiff brown/grey clay with shale and ironstone.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH13	3.9-4.0	Stiff grey weathered shale with dark brown and orange lenses.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH15	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH15	3.0-3.1	Firm dark grey clay.	<2	ND	ND		<2	<2	<2	<2	<2	<2		<2	<1	<2	<2	<2	<2
BH15	3.6-3.7	Stiff grey shaley clay.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH16	0.3-0.4	Very firm to stiff brown/grey/red/orange clay matrix with shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH16	2.8-2.9	Dense dark brown/black clayey sand with ash and clinker.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH16	3.2-3.3	Soft to firm grey clay with orange layering.	<2	ND	ND		<2	<2	<2	<2	<2	<2		<2	<1	<2	<2	<2	<2
BH17	0.4-0.5	Stiff grey/orange/red/brown clay matrix.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH17	2.8-2.9	Dense dark brown/black clayey sand with minor ash and clinker.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH17	3.8-3.9	Very firm grey clay with orange lenses and minor shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH18	2.9-3.0	Dark brown clay with manganese minor orange shale layering.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH19	2.7-2.8	Stiff dark brown clay with shale and gravel.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH19	3.2-3.3	Stiff grey shaley clay with orange/brown shale lenses.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH20	3.3-3.4	Stiff colour matrix clay with shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH20	4.7-4.8	Stiff to hard dark grey shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH21	3.0-3.1	Stiff dark brown clay with manganese, minor ironstone, sandstone and shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH22	0.6-0.7	Sandy clay gravel and sand matrix with clinker ash and slag.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH22	1.8-1.9	Sandy clay gravel and sand matrix with clinker ash and slag.	<2	ND	ND		<2	<2	<2	<2	<2	<2		<2	<1	<2	<2	<2	<2
BH22	2.5-2.6	Hard brown clay with yellow mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH23	3.3-3.4	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH23	3.4-3.5	Hard grey weathered shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH24	1.8-1.9	Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH24	3.25-3.35	Hard grey weathered shale.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH25	3.1-3.2	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH25	3.2-3.3	Clayey sand matrix with ash, shale, glass, brick, clinker and glass.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH26	0.7-0.8	Clayey sand matrix with orgainic, ash, clinker and glass.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH26	2.9-3.0	Soft brown clay with yellow mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH27	1.7-1.8	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH27	1.8-1.9	Soft brown clay with red mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH28	1.6-1.7	Clayey sand matrix with ironstone, sandstone, ash, clinker and brick.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH28	1.7-1.8	Soft brown clay with red mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH29	0.8-0.9	Clayey sand matrix with sandstone, organic matter and clinker.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
BH29	2.7-2.8	Soft grey clay with red mottling.	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 1 (20-21/09/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 2 (20-21/09/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 3 (20-21/09/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 5 (20-21/10/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 1 (12/10/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-
Dup 3 (12/10/2010)			-	-	-		-	-	-	-	-	-		-	-	-	-	-	-

Notes:

Exceeds NEPM Ecological Investigation Levels (EILs)
Exceeds NEPM HILs Column F for commercial/industrial landuse
Excceds NSW EPA (1995) Sensitive landuse criteria

* Represents approximate value.

APPENDIX E
BOREHOLE LOGS

Borehole Log: BH01

sga Environmental

Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
	Ground Surface						
0.00	***Concrete***	0.00					
	Fill Stiff grey clay with yellow mottling and gravel	0.21		Undist		Moist	FD1
0.50							
	Stiff dark brown clay with ironstone	0.80		Undist			
1.00							
1.50	Firm brown clay with red mottling	1.50					
	Natural Firm grey clay with ironstone and orange mottling	1.80		Undist		Dry/moist	
2.00							
	Firm grey clay with orange mottling	2.20					
2.50							
	Stiff grey weathered shale	2.60		Undist		Dry	
3.00	Hard grey weathered shale	2.90					
				Undist			No odour throughout
3.50	EOH @ 3.4 m refusal on shale	3.40					
4.00							
4.50							
5.00							

Drilled By: **Macquarie Drilling**	*Drill Rig:* **Geoprobe 7720**	*Hole Size:* **65mm**
Drill Method: **Push Tube**	*Easting:* **-**	*Datum:* **-**
Drill Date: **20/09/2010**	*Northing:* **-**	*Sheet:* **1 of 1**

sga Environmental

Level 2, 120 Clarance Street
Sydney NSW 2000

Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Borehole Log: BH02

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00		Ground Surface						
		Concrete	0.00					
0.50		***Fill*** Firm dark brown clay with orange mottling with brick pieces	0.20		Undist			
1.00							Moist	
		Stiff dark brown clay with shale and red mottling	1.10		Undist			
1.50								
2.00								
2.50		Firm brown clay with orange mottling and shale	2.20					
3.00		Brick fragments	2.90				Moist	
		Natural Firm grey clay with orange mottling and shale			Undist			
			3.40					
3.50		EOH @ 3.5m refusal on shale	3.50					No odour throughout
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **65mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH03

sga Environmental
Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Fill*** Dense dark brown clayey sand with minor asphalt fragments	0.00		Undist			
		Moderately dense sand with gravel	0.20					
0.50		Firm brown sandy clay with ironstone	0.40		Undist		Moist	
		Stiff brown clay with red mottling and some manganese	0.60		Undist			
1.00		EOH @ 0.9m refusal on floater	0.90					No odour throughout
1.50								
2.00								
2.50								
3.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **-** *Hole Size:* **65mm**

Drill Method: **Hand Auger** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH04

sga Environmental
Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00	Ground Surface						
	Concrete	0.00					
	Fill Stiff brown clay with grey clay mottling and shale	0.17		Undist			
0.50							
	Redistributed Natural Stiff dark brown clay with orange mottling and ironstone	0.90		Undist			
1.00							
1.50							
	Natural Stiff brown orange grey clay with red mottling and some manganese	1.80		Undist			FD 2
2.00							
	EOH @ 2.4m target depth	2.40					No odour throughout
2.50							
3.00							
3.50							
4.00							
4.50							
5.00							

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH05

sga Environmental

Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	**Symbol**	**Description**	**Depth/Elev.**	**Sample Depth**	**Sample type**	**pH**	**Moisture**	**Comments**
		Ground Surface						
0.00		***Fill*** Dense brown sand with high organic content and gravel	0.00					
		Dense yellow sand	0.25		Undist		Dry/moist	
0.50		Hard brown clay with shale and gravel						
1.00								
		Natural Stiff brown clay with orange layering	1.30		Undist			
1.50								
		Firm dark brown clay with orange layering	1.90		Undist			
2.00							Moist	
		Stiff hard grey shale	2.20		Undist		Dry	
2.50								
		Hard grey/orange shale	2.80					
3.00								
					Undist			No odour throughout
		EOH @ 3.4m refusal on hard shale	3.40					
3.50								
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH06

sga Environmental
Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Fill*** Dense brown sand with high organic content	0.00					
		Firm brown sandy clay with red mottling and shale	0.25		Undist		Dry	
0.50		Hard brown clay with shale and minor manganese	0.50		Undist			
1.00								
1.50		***Natural*** Firm brown clay with orange mottling and manganese	1.40		Undist		Dry/moist	
2.00							Moist	
		Stiff grey clay with weatherd shale and orange lenses	2.20		Undist			
2.50								
3.00		Stiff hard grey shale	2.90					
					Undist			
3.50		EOH @ 3.4m refusal on hard shale	3.40					No odour throughout
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

sga Environmental

Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Borehole Log: BH07

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface	0.00					
0.00		***Concrete***	0.00					No odour throughout
		Gravel						
		Concrete						
0.50		EOH @ 0.3m refusal on concrete						
1.00								
1.50								
2.00								
2.50								
3.00								
3.50								
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Borehole Log: BH08

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Stiff brown clay with shale, ironstone and sandstone layers	0.20		Dist			
0.50								
1.00								
		Void	1.20					
1.50								
2.00								
2.50								
3.00								
3.50		Brown sand	3.45					No odour throughout
		EOH @ 3.5m refusal on concrete						
4.00								
4.50								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH09

sga Environmental
Level 2, 120 Clarance Street Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Firm to hard brown sandy clay with sandsone, gravel ash, slag, ironstone and shale lenses	0.20		Undist		Dry/moist	
0.50								
1.00								
1.50								
2.00					Undist		Moist Dry	
2.50								
3.00					Undist			Minor Hydrocarbon burnt odour
		Natural Hard brown/grey shale	3.20		Undist			
		EOH @ 3.4m refusal on hard shale	3.40					
3.50								
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH10

sga Environmental
Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Asphalt and gravel	0.20		Undist		Dry/moist	
0.50		Firm brown clay with ash, slag, ironstone and shale						
		Natural Stiff brown clay with minor ironstone	0.60		Undist			
1.00								
1.50		Stiff brown clay with high ironstone content	1.30					
		Stiff grey clay with red mottling	1.70		Undist			
2.00							Dry	
		Stiff grey weathered shale with red mottling	2.30		Undist			
2.50								
3.00								
		Hard grey shale	3.30		Undist			
3.50		EOH @ 3.5 target depth						No odour throughout
4.00								
4.50								
5.00								
5.50								
6.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH11

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00		Ground Surface						
		Concrete	0.00					
		Fill Firm dark brown sandy clay with sandstone gravel			Undist			
0.50								
		Firm dark brown clay with orange mottling and manganese	0.70		Undist			No odour throughout
1.00		Stiff brown/red clay	1.00					
1.50		***Natural*** Stiff grey/red clay with orange mottling	1.40		Undist			FD3
2.00		Stiff grey/orange weathered clay	1.90					
2.50		Stiff grey shale	2.50		Undist			
		EOH @ 2.8m refusal on shale	2.80					
3.00								
3.50								
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **0** *Datum:*

Drill Date: **20/09/2010** *Northing:* **0** *Sheet:* **1 of 1**

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Borehole Log: BH12

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00		Ground Surface						
		Concrete	0.00					
		Fill Firm brown sandy clay with shale and glass	0.20		Undist		Dry/moist	
0.50								
		Firm brown clay with orange mottling and manganese	0.70		Undist		Moist	
1.00								
		Soft to firm light brown clay with red mottling	1.30					
1.50								
		Natural Firm dark brown clay	1.90		Undist		Moist	
2.00								
		Soft to firm grey clay with orange mottling and shale fragments	2.40		Undist			
2.50								
		Stiff grey shale	2.60		Undist			
		EOH @ 2.9m refusal on shale	2.90					No odour throughout
3.00								
3.50								
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH13

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample type	pH	Moisture	Comments
0.00	Ground Surface					
0.00	***Concrete***	0.00				
0.30	***Fill*** Very dense black clayey sand with shale, gravel, brick, ash and slag	0.30	Undist		Dry/moist	
			Undist		Moist	
2.00	Stiff brown/grey clay with shale	2.00	Undist		Moist	
			Undist			
			Undist			
2.90	Stiff grey clay with orange mottling, shale and charcoal	2.90				
3.20	***Natural*** Stiff grey weathered shale	3.20				
4.00	EOH @ 4.0m target depth	4.00				No odour throughout

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **20/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH14

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
0.50		EOH @ 0.52 refusal on concrete	0.52					
1.00								
1.50								
2.00								
2.50								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH15

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger**   *Logged by:* **N Kuerzinger**

STRATIGRAPHY / SAMPLE

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Gravel and asphalt	0.25		Undist		Dry/moist	
0.50		Firm brown clay with shale and ash	0.70					
1.00		Stiff brown clay with orange layering and shale	1.30		Undist			
1.50								
2.00		Stiff dark brown clay with orange mottling	2.20		Undist		Dry/moist	
2.50		Dense dark brown clayey sand with ash and clinker	2.80		Undist			
3.00		***Natural*** Hard grey/orange shale	3.05		Undist Undist		Dry	Minor hydrocarbon odour
3.50		Stiff grey clay with shale	3.60		Undist			FD4
4.00		Grey orange shale	3.90		Undist			
4.50		EOH @ 4.40m refusal on shale	4.40					
5.00								

Drilled By: **Macquarie Drilling**   *Drill Rig:* **Geoprobe 7720**   *Hole Size:* **60mm**

Drill Method: **Push Tube**   *Easting:* **-**   *Datum:* **-**

Drill Date: **21/09/2010**   *Northing:* **-**   *Sheet:* **1 of 1**

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Borehole Log: BH16

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Gravel and asphalt and sand	0.23		Undist			
0.50		Firm brown/grey clay matrix in shale						
1.00							Dry/moist	
1.50		Stiff brown clay with orange layering and shale	1.40				Dry/moist	
		Stiff dark brown clay with red mottling and shale	1.70		Undist			
2.00							Dry	
2.50								
		Dense dark brown clayey sand with ash and clinker	2.80		Undist			Minor hydrocarbon / burnt odour
3.00		Soft dark grey clay	3.00		Undist		Moist	
		Natural Soft to firm grey clay with orange layering			Undist		Moist	
3.50		Hard grey orange shale	3.50					
4.00								
4.50					Undist			
		EOH @ 4.6m refusal on shale	4.60					
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH17

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Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Gravel and asphalt and sand	0.25					
0.50					Undist			FD 5
1.00								
		Firm brown/grey clay matrix with shale	1.30					
1.50					Undist			
2.00								
2.50								
		Dense dark brown black clayey sand with ash and clinker	2.80		Undist			
3.00								
		Firm dark brown/grey clay matrix	3.10		Undist			
3.50								
		Natural Firm grey/orange clay with shale	3.80		Undist			
4.00								
4.50								
					Undist			
		EOH @ 4.8m target depth	4.80					No odour throughout
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH18

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
	Ground Surface						
0.00	***Concrete***	0.00					
0.50	***Fill*** Stiff dark grey/brown sandy clay matrix with brick, shale and sandstone	0.30		Undist		Dry/moist	
1.00	Firm brown/grey clay matrix with red mottling and shale	1.20		Undist		Moist	
1.50							
2.00							
2.50							
3.00	Dense dark brown clay with shale	2.90		Undist			
3.50	***Natural*** Stiff grey clay with red and orange lenses and ironstone throughout	3.30		Undist		Moist	
4.00							
4.50	Hard orange/grey shale	4.20		Undist			
5.00	EOH @ 4.8m target depth	4.80					No odour throughout

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH19

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00	Ground Surface						
0.00	***Concrete***	0.00					
0.30	***Fill*** Stiff dark grey/brown sandy clay matrix with brick, shale and sandstone	0.30		Undist			
				Undist		Moist	
2.70	Stiff dark brown clay with shale and gravel	2.70		Undist			
3.00	Dense red/brown clayey sand with ash and clinker	3.00		Undist			
3.20	***Natural*** Stiff grey shaley clay with orange lenses	3.20		Undist		Dry/moist	FD6
				Undist			
4.80	EOH @ 4.8m target depth	4.80					No odour throughout

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

Borehole Log: BH20

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Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00	Ground Surface						
0.00	***Concrete***	0.00					
0.30	***Fill*** Stiff dark brown clay with ironstone, brick and manganese	0.30	▯	Undist			
1.50			▯	Undist		Moist	
2.80	***Natural*** Stiff shale	2.80	▯	Undist			
3.30	Stiff grey clay in shale	3.30	▯	Undist		Dry/moist	
3.70	Stiff grey shale	3.70					
3.90	Stiff brown clay with shale	3.90	▯	Undist			
4.40	Hard dark grey shale	4.40	▯	Undist			
4.80	EOH @ 4.8m target depth	4.80					No odour throughout

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH21

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **N Kuerzinger**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
0.50		***Fill*** Stiff red/brown clay with manganese ironstone and shale	0.45		Undist		Dry/moist	
1.00								
1.50							Dry/moist	
2.00		Stiff dark brown clay with manganese, ironstone and minor shale	2.10		Undist Undist			
2.50								
3.00		***Natural*** Stiff grey clay in orange/grey shale	3.10		Undist Undist			
3.50		EOH @ 3.4m target depth	3.40					No odour throughout
4.00								
4.50								
5.00								

Drilled By: **Macquarie Drilling** *Drill Rig:* **Geoprobe 7720** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **21/09/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH22

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
0.00	Ground Surface						
0.00	***Concrete***	0.00					
0.20	***Fill*** Gravel with silty clay	0.20		Undist		Moist	
	Sandy clay gravel and sand matrix with clinker ash and slag			Undist		Dry	FD1 (12/10/2010)
				Undist			
2.50	***Natural*** Hard brown clay with yellow mottling	2.50		Undist			
				Undist			
3.10	Hard grey weathered red shale with yellow mottling	3.10		Undist			
3.40	EOH @ 3.4m refusal on shale	3.40					No odour throughout

Depth scale: 0.00, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH23

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass				7		
0.50					Undist		Dry	
1.00					Undist		Dry/moist	
1.50						7		
2.00								
2.50					Undist	6.5	Dry	
3.00					Undist		Dry/moist	
			3.40		Undist		Dry	Slight Hydrocarbon odour
3.50		***Natural*** Hard grey weathered shale			Undist			
		EOH @ 3.5m refusal on shale						
4.00								
4.50								
5.00								

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH24

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Clayey sand matrix with ash, shale, ironstone, brick, clinker and glass	0.20		Undist	7	Dry	FD2 (12/10/2010)
0.50								
1.00					Undist	6-6.5	Dry	
1.50					Undist	6-6.5	Dry/moist	
2.00								
2.50								
3.00					Undist		Dry	No odour throughout
					Undist		Dry	
		Natural Hard grey weathered shale	3.25					
3.50		EOH @ 3.35m refusal on shale						
4.00								
4.50								
5.00								

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH25

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

STRATIGRAPHY / SAMPLE

Depth (mbgl)	Description	Depth/Elev.	Sample type	pH	Moisture	Comments
	Ground Surface					
0.00	***Concrete***	0.00				
	Fill Clayey sand matrix with ash, shale, glass, brick, clinker and glass	0.20				
0.50			Undist	6	Dry	
1.00						
1.50					Dry/moist	
			Undist	6		
			Undist		Dry/moist	
2.00						
			Undist		Moist	
2.50	Wet clay	2.50				
					Moist	
3.00				6.5		
	Clayey sand matrix with ash, shale, glass, clinker, brick	3.10	Undist			
			Undist		Dry	
3.50	***Natural*** Hard grey weathered shale					No odour throughout
	EOH @ 3.55 m on shale	3.55				
4.00						
4.50						
5.00						

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH26

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

STRATIGRAPHY				SAMPLE				
Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Clayey sand matrix with orgainic, ash, clinker and glass	0.20					
0.50					Undist	6	Dry/moist	FD3 (12/10/2010)
1.00								
1.50								
2.00						6		
		Natural Soft to firm brown clay	2.10					
2.50							Dry/moist	
		Soft brown clay with yellow mottling	2.60					
3.00					Undist Undist Undist	6	Dry/moist	
		Hard grey weathered shale	3.10				Dry	
		EOH @ 3.4m refusal on shale	3.40					No odour throughout
3.50								
4.00								
4.50								
5.00								

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH27

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Clayey sand matrix with ironstone, sandstone, ash, clinker and brick	0.20					
0.50					Undist	6	Dry	
1.00								
1.50					Undist		Dry/moist	
					Undist			
		Naural Soft brown clay with red mottling	1.80		Undist			
2.00								
						6-6.5		
2.50								
		Hard grey weathered shale	2.90		Undist		Dry	
3.00		EOH @ 3.0m refusal on shale						No odour throughout
3.50								
4.00								
4.50								
5.00								

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

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Borehole Log: BH28

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

Depth (mbgl)	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
	Ground Surface						
0.00	***Concrete***	0.00					
	Fill Clayey sand matrix with ironstone, sandstone, ash, clinker and brick	0.20					
0.50				Undist	6		
1.00						Dry/moist	
1.50				Undist	6.5		FD4 (12/10/2010)
	Soft brown clay with red mottling	1.70		Undist			
2.00							
	Soft grey clay with red mottling	2.20					
2.50							
3.00				Undist		Dry/moist	
				Undist			No odour throughout
	Natural Hard grey weathered shale	3.30					
3.50	EOH @ 3.4m refusal on shale						
4.00							
4.50							
5.00							

Drilled By: **EPOCA Environmental** *Drill Rig:* **Terrier** *Hole Size:* **60mm**

Drill Method: **Push Tube** *Easting:* **-** *Datum:* **-**

Drill Date: **12/10/2010** *Northing:* **-** *Sheet:* **1 of 1**

sga Environmental

Level 2, 120 Clarance Street
Sydney NSW 2000
Ph: + 61 2 9299 2988
Fx: + 61 2 9299 5288

Borehole Log: BH29

Project No.: **91949**

Client: **Taylor Woodings**

Location: **176 - 184 George St, Concord West, NSW**

Project Manager: **N Kuerzinger** *Logged by:* **A Lepparde**

Depth (mbgl)	Symbol	Description	Depth/Elev.	Sample Depth	Sample type	pH	Moisture	Comments
		Ground Surface						
0.00		***Concrete***	0.00					
		Fill Clayey sand matrix with sandstone, organic and clinker	0.20					
0.50					Undist	6		
					Undist			
1.00		***Natural*** Soft grey clay with red mottling	1.00				Dry/moist	
1.50								
						6.5		
2.00							Dry/moist	
2.50								
					Undist		Moist	
		Hard grey weathered shale	2.80		Undist		Dry	
3.00		EOH @ 2.9m refusal on shale						No odour throughout
3.50								
4.00								
4.50								
5.00								

Drilled By: **EPOCA Environmental**	*Drill Rig:* **Terrier**	*Hole Size:* **60mm**
Drill Method: **Push Tube**	*Easting:* **-**	*Datum:* **-**
Drill Date: **12/10/2010**	*Northing:* **-**	*Sheet:* **1 of 1**

APPENDIX F
QUALITY CONTROL AND ASSURANCE

Table of Contents

1.0 INTRODUCTION

1.1 Introduction

The quality assurance and quality control (QA/QC) program is undertaken to ensure the data delivered is precise, accurate, reproducible and representative of what is sampled.

QA/QC should be considered both in the field and within the laboratory. The objective is to enable evaluation and identification of the data quality objectives (DQOs), the method data quality objectives (MDQOs) and the data quality indicators (DQIs) which we use to assess whether the DQOs have been met.

Development of data quality objectives (DQOs) for each project is a requirement of National Environment Protection Council (NEPC) (1999) — *National environment protection (assessment of site contamination) measure 1999*. This is based on a DQO process formulated by the USEPA for contaminated land assessment and remediation. DQOs have been developed in Section 4 of the report.

Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters. The PARCC (and additional QA) parameters are discussed within the report.

The QA/QC is representative of the two field investigation stages, and where applicable, the field investigation (20-21/09/2010) and the field investigation (12/10/2010) will be referred to separately.

2.0 SAMPLING AND ANALYSIS PLAN

2.1 Rationale sampling pattern selection and sampling density

Sampling locations were positioned based on the site history, adequate site coverage, accessible areas of the site and Chemicals of Concern (COCs) potentially present.

As stated in the DQO section the sampling program was optimized through a number of iterations.

Soil samples were selected for laboratory testing based upon field observations with guidance from the NSW EPA (1995) — *Contaminated sites: sampling design guidelines*. Each sample was collected with disposable nitrile gloves and placed into glass jars for laboratory analysis. Each sample container was clearly labelled with a waterproof marker with the project number, sample location and date of sample collection. Section 6 further discusses the sampling program.

2.2 Sampling methods

Boreholes were drilled using the Macquarie Drilling 7720 and EPOCA Terrior drill rig utilising a Geoprobe push tube and, where applicable, a hand auger. Detailed logging of the stratigraphy encountered was undertaken by an experienced environmental consultant. Samples were selected based upon sample location (i.e. to obtain satisfactory site coverage) or field observations including the presence of contamination indicators such as anthropogenic (e.g. ash), odours and/or staining. Samples were collected in laboratory supplied 100mL glass jars.

2.3 Rationale for laboratory analysis schedule

Table F1 identifies the laboratory analysis schedule for soil samples collected during the investigation.

The analytes selected are based on determination of the chemicals of concern (COCs) for the site, and their potential derivatives. The COCs were determined based upon current/recent site usage as a printing facility and the presence of fill material throughout the site. The COCs for the field investigation (12/10/2010) were determined based upon the finding of the field investigation (20-21/09/2010) and the presence of a former Dangerous Goods store within the south western section of the southern loading bay.

The analytical methods selected are based on those recommended by the laboratories and publications such as Rayment & Higginson (1992) *Australian laboratory handbook of soil and water chemical methods*.

Table F1 Analytical schedule

Soil Analytes	Total No. Soil Samples	Duplicates
Heavy Metals	32	4
Polycyclic Aromatic Hydrocarbons (PAHs)	37	3
Petroleum Hydrocarbons (TPH C_6-C_{36})	11	1
Aliphatic/Aromatic Hydrocarbon Split	1	0
Benzene, Toluene, Ethyl Benzene & Xylene (BTEX)	9	1
Organochlorine/Organophosphate Pesticides (OCPs/OPPs)	2	0
Polychlorinated Biphenyls (PCBs)	1	0
Volatile Organic Compounds (US EPA 8260)	6	0
Semi-Volatile Organic Compounds (US EPA 8270)	3	0
TCLP – B(a)P	1	0

Note:
Methods used are reported in the laboratory transcripts appended and are detailed in the APHA Standard methods for the examination of water and waste-water 19th or 20th Edition (for example) and/or Rayment & Higginson (1992) Australian laboratory handbook of soil and water chemical methods

3.0 QUALITY CONTROL AND QUALITY ASSURANCE

3.1 Measurement data quality objectives

Step 3 of the DQO process (Section 3.0) is a focus on the quality of the information by measurement; which are referred to as the measurement data quality objectives (MDQOs). The MDQOs are described in Section 3.0 of the main report.

All soil sampling procedures need to be undertaken according to a standard procedure, in particular those procedures set out in:

- Standards Australia AS 4482.1 (1997) – Guide to the sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi-volatile compounds)
- Standards Australia AS 4482.1 (1999) – Guide to the sampling and investigation of potentially contaminated soil (Part 2: Volatile substances)
- National Environment Protection Council (NEPC) (1999) – National environment Protection (assessment of site contamination) measure (1999) – referred to as the NEPM

Measurement data quality is typically discussed in terms of *Measured Parameters* and *Assessed Parameters*. Methods of assessing measured parameters include duplicate samples for repeatability (comparability) and internal laboratory tests on accuracy and precision. Methods of analysing assessed parameters include sample documentation (completeness), representation of site conditions undertaken by development of a conceptual site model, and the comparison of results/investigation criteria to the sensitivity of analytical methods.

The laboratories used should be NATA accredited for the analytical methods preformed. Containers, sample preservation (if necessary) and holding times should be consistent with industry practices as set out in NEPM and as defined by ASTM.

The QA parameters selected and the criteria used to evaluate the analytical data are defined below and summarised in Table 5 of Section 4.0 of the main report.

3.1.1 Repeatability (Field collected intra-laboratory duplicates)

These samples provide a check on the analytical performance of the laboratory. At least 5 percent of soil samples (1 in 20) from a site should be collected in duplicate. For split samples, because of error associated with field splitting, a relative percentage difference (RPD) of between <50% and <150% (depending on the substance) will be allowed as the MDQI. Soil heterogeneity due to the “nugget effect” could result in significantly greater difference, particularly for metals. Consequently, samples with the most observable field homogeneity are selected.

Any value >50% RPD will be noted and discussed, as per Standards Australia requirements, with respect to its acceptability for inclusion in the data-set.

3.1.2 Precision

Precision is a measure of the reproducibility of results, and is assessed on the basis of agreement between a set of replicate results obtained from duplicate analyses. The precision of a duplicate determination can be measured as relative percentage difference (RPD), and is calculated from the following equation:

$$\text{RPD} = \left[\frac{\text{X1 - X2}}{\left(\frac{X1 + X2}{2} \right)} \right] \times 100$$

where: X1 is the first duplicate value

X2 is the second duplicate value

The field blind duplicate results and calculated RPDs are presented in Table F2.

Table F2 Soil field blind duplicate QA/QC results

Analyte	MDL	BH01 0.3-0.4	FD1 (20-21/09/2010)	RPD	BH04 1.8-1.9	FD2 (20-21/09/2010)	RPD	BH11 1.4-1.5	FD3 (20-21/09/2010)	RPD	BH17 0.4-0.5	FD5 (20-21/09/2010)	RPD	BH22 0.6-0.7	FD1 (12/10/2010)	RPD	BH26 0.7-0.8	FD2 (12/10/2010)	RPD
TPH C6-C9	25	-	-	-	-	-	-	<25	<25	NC	-	-	-	-	-	-	-	-	-
TPH C10 - C14	50	-	-	-	-	-	-	<50	<50	NC	-	-	-	-	-	-	-	-	-
TPH C15 - C28	100	-	-	-	-	-	-	<100	<100	NC	-	-	-	-	-	-	-	-	-
TPH C29 - C36	100	-	-	-	-	-	-	<100	<100	NC	-	-	-	-	-	-	-	-	-
Benzene	0.5	-	-	-	-	-	-	<0.5	<0.5	NC	-	-	-	-	-	-	-	-	-
Toluene	0.5	-	-	-	-	-	-	<0.5	<0.5	NC	-	-	-	-	-	-	-	-	-
Ethyl Benzene	0.5	-	-	-	-	-	-	<0.5	<0.5	NC	-	-	-	-	-	-	-	-	-
m, p - Xylene	1.0	-	-	-	-	-	-	<1.0	<1.0	NC	-	-	-	-	-	-	-	-	-
o - Xylene	0.5	-	-	-	-	-	-	<0.5	<0.5	NC	-	-	-	-	-	-	-	-	
PAHs	<1	-	-	-	<1	<1	NC	-	-	-	<1	<1	NC	-	-	-	<1	<1	NC
Arsenic	0.5	3.3	3.7	11.4	14	3.7	**116**	-	-	-	1.3	2.1	47	6.5	3.7	**54.9**	-	-	-
Cadmium	0.5	<0.5	<0.5	NC	<0.5	<0.5	NC	-	-	-	<0.5	<0.5	NC	<0.5	0.51	1.9	-	-	-
Chromium	0.5	3	<0.5	**142**	29	1.7	**177**	-	-	-	<0.5	<0.5	NC	53	37	35.5	-	-	-
Copper	0.5	26	27	3.7	24	13	**59**	-	-	-	18	24	28	640	710	10.3	-	-	-
Lead	0.5	23	23	NC	19	12	45	-	-	-	21	23	9	63	79	22.5	-	-	-
Mercury	0.2	<0.2	<0.2	NC	<0.2	<0.2	NC	-	-	-	<0.2	<0.2	NC	0.35	1	**96.3**	-	-	-
Nickel	0.5	1.7	3.5	**69**	2.4	1.8	28	-	-	-	1.7	3	**55**	49	41	17.7	-	-	-
Zinc	0.5	11	17	43	11	5.3	**70**	-	-	-	8.2	9.6	15	330	410	21.6	-	-	-

Note(s):

1 MDL = method detection limit
2 RPD = relative percentage difference
3 NA = not analysed
4 NC = not calculable
5 all units in mg/kg
7 no limit applies to < 5x MDL
8 Acceptance Criteria (see Table 1) 80-150% for low level (<10 x MDL) 50-130% for medium to high level (>10 x MDL)

For the field blind soil sample FD1(20-21/09/2010) (duplicate of BH01 0.3-0.4), the RPDs for the following heavy metals were above 50%:

- Chromium 142%
- Nickel 69%

For the field blind soil sample FD2 (20-21/09/2010) (duplicate of BH04 1.8-1.9), the RPDs for the following heavy metals were above 50%:

- Arsenic 116%
- Chromium 177%
- Copper 59%
- Zinc 70%

For the field blind soil sample FD5 (20-21/09/2010) (duplicate of BH17 04-0.5) the RPDs for the following heavy metal was above 50%:

- Nickel 55%

These RPD's are not within the acceptable range as specified in the MDQIs. The sample for FD1 and FD5 were collected from within heterogenous fill profile. The differences between the results are considered to be related to the varying nature of the fill. The variance of the metals can also be attributed to the low levels detected. The MDQIs specify that an RPD of <80-100 % is allowable for low concentrations.

The sample for FD2 was collected from within a natural soil profile consisting of stiff clay with ironstone and shale. The differences between the results are considered to be the result of variances within field splitting.

The results are still considered to be valid and suitable for inclusion in the assessment.

The RPD's for Cadmium, Lead, Mercury, PAHs, TPH and BTEX were not calculable as all results were reported below laboratory detection limits. Therefore, these results are considered to be within the acceptable range.

For the field blind soil sample FD1 (12/10/2010) (duplicate of BH22 (0.6-0.7), the RPDs for the following heavy metals were above 50%:

- Arsenic 54.9%
- Mercury 96.3%

These RPD's are not within the acceptable range as specified in the MDQIs. The sample for FDI was collected from within heterogenous fill profile. The differences between the results are considered to be related to the varying nature of the fill. The variance of the metals can also be attributed to the low to moderate levels detected. The MDQIs specify that an RPD of <80-100 % is allowable for low concentrations.

The results are still considered to be valid and suitable for inclusion in the assessment.

The RPD's PAHs were not calculable as all results were reported below laboratory detection limits. Therefore, these results are considered to be within the acceptable range.

3.1.3 Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. The determination of accuracy can be achieved through the analysis of known reference materials or assessed by the analysis of matrix spikes. Accuracy is measured in terms of percentage recovery as defined by the following equation:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: %R = percentage recovery of the spike

SSR = spiked sample result

SR = sample result (native)

SA = spike added

Laboratory personnel calculate percentage recoveries of spiked compounds, which are evaluated against control or acceptance limits taken from the appropriate method or the Contract Laboratory Program Statement of Work. If the spike recovery for a sample does not fall within the prescribed control limits, laboratory based corrective action is required.

Surrogate spikes consist of spiking non-target compounds into the sample prior to analysis. The spiked compounds are expected to behave during analysis in the same way as the target compounds. Every sample is spiked prior to extraction or analysis with surrogate compounds that are representative of the analysis. If surrogate spike recovery does not meet the prescribed control limits, samples should be reanalysed.

3.1.4 Representativeness

Data Point Evaluation

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition.

Representativeness is primarily dependent on the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of cross-contamination, adherence to sample handling and analysis protocols, and use of proper chain-of-custody and documentation procedures. Blanks, holding times and field duplicates are all QA parameters that can assist in the analysis of representativeness for data point evaluation and will need to be analysed as part of the measurement data quality assessment.

Data Set Evaluation

Whether the data is representative of the site is checked in part by undertaking an evaluation of the whole data set to establish the data is compatible. Data compatibility is authenticated by confirming that the laws of chemistry are upheld, that intra-laboratory analysis relationships are consistent (i.e. BTEX is a subset of the TPH C_6-C_9 fraction), that observations and field measurements are in agreement with other field data and the laboratory data, and that results are consistent with the geology, history and logic.

3.1.5 Completeness

The following information is required to check for completeness of data sets:

- chain-of-custody forms (completed by SGA Environmental and the laboratory)
- sample receipt forms
- all requested sample results reported
- all blank data reported
- all laboratory duplicates reported and relative percent differences (RPDs) calculated
- all surrogate spike data reported

- all matrix spike data reported
- NATA stamp on reports

3.1.6 Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity, sampling procedures) under which separate sets of data are produced to ensure minimal common error. Data comparability should be demonstrated by the use of standardised sampling and analysis procedures. Data comparability was maintained by undertaking the investigations as follows:

- the soil samples were collected during the investigation by a trained scientist using standard operating procedures
- the same laboratory (NMI) was used for organic and inorganic analysis for all relevant samples using the same NATA approved analytical methods.

3.1.7 Sensitivity

When interferences are present in the sample, a loss of sensitivity can occur resulting in an increase in the method detection limit. In some instances (e.g. where one or more compounds have particularly high concentrations) the sample must be diluted for analysis. This increases the method detection limit by the dilution factor.

The detection limits achieved by the laboratory, when adjusted for dry weight and interferences from the presence of other chemicals within the sampled matrix, must be less than half the site criteria for all analytes tested (i.e. 2 x LOR <site criteria).

3.1.8 Blanks

To meet the QC acceptance criteria, laboratory blanks should have no detectable concentrations of the target compounds. Trip blanks (taken to and returned from the field) and rinsate blanks (taken in the field) were not collected and analysed as part of this investigation.

3.1.9 Holding times

Where standard holding times are exceeded, a discussion, using professional judgement, as to the integrity of the data will be required, taking into account such factors as field storage, laboratory storage and sample bottle characteristics. All samples were analysed within the required holding times.

3.1.10 Procedures for anomalous samples and confirmation checking

All results should be checked for discrepancies by the project manager, against the anticipated results and all other results, within 8 hours of receipt of the results from the laboratory.

Any result that is considered by the supervising scientist to be unusually high or at variance with other results is automatically re-analysed. A significantly different result requires immediate remedial action on the whole sample batch (retesting or using an alternative analytical method).

After appropriate checking by laboratories, all sample analysis results work-sheets, including those of duplicates and replicate analyses, should be checked by the project manager.

Once confirmation checking is completed the final laboratory report is issued.

For blind duplicates, if one sample has more than two analytes exceeding the data quality objectives, the sample is carefully checked. If the error is not apparent, the sample is rejected. If more than three samples are rejected, all the samples collected at that time are rejected. These samples are then re-sampled and re-analysed.

3.2 Field QA/QC

3.2.1 Details of sampling team

For the field investigation (20-21/09/2010) soil sampling was conducted over a 2 day period by Nicolas Kuerzinger of SGA Environmental and drill rig operators from Macquarie Drilling.

For the field investigation (12/10/2010) soil sampling was conducted over a 1 day period by Amber Lepparde of SGA Environmental and drill rig operators from EPOCA Environmental.

3.2.2 Sampling controls

Decontamination procedures carried out between sampling events

All soil sampling equipment was decontaminated using surfactant between sampling events.

Sample notation details

The chemical analyses to be performed on each sample are presented on the chain of custody documentation (Appendix B) which also identify for each sample – the sampler, nature of the sample, collection date, analyses to be performed, sample preservation method (if any), departure time from the site and dispatch courier.

Duplicate sampling

Duplicate samples for the were collected at a rate of 10 duplicates per 131 samples collected (13.1%). The number of duplicates collected and analysed for each analytical method is provided in Table F1, while duplicate analysis results are presented in Table F2.

Blanks, spikes and rinsate samples

The scope of this project did not include analysis of trip and field blanks, rinsate samples or laboratory prepared trip spikes.

SGA Environmental did not consider analysis of trip blanks, background samples, rinsate blanks or trip spikes necessary for the following reasons:

- a **trip blank** is used to document contamination attributable to shipping procedures for volatile components. For this project, shipping was closely monitored, with collected samples immediately placed upright within a chilled Esky and passed directly from the field scientist to a laboratory specific courier. This process is documented within the chain of custody documentation. A field blank is used to document contamination attributable to field handling. The measurement of volatiles present within samples due to field handling procedure is a measurement of false positives. False positives was not considered to be a major concern for this project
- **rinsate samples** are a measure of potential cross contamination between samples due to contamination on sampling equipment. Rinsate samples were not collected due to field sampling procedures which included use of dedicated sampling collection equipment (nitrile gloves)
- laboratory prepared **trip spikes** are used to measure potential volatile contaminant loss due to transport and field handling procedures. SGA Environmental follows strict sample handling procedures and consider the potential for volatile loss during handling and transport low. For this reason project laboratory prepared trip spikes were not used for this project.

3.3 Laboratory QA/QC

Analysis for this project was completed by the National Measurement Institute (NMI). The National Measurement Institute are accredited by NATA for the methods used, details of this accreditation can be viewed at http://www.nata.asn.au/, while details of the samples sent to the laboratory and the analysis requested are contained in the chain of custody documentation held in Appendix B. The collection date of samples, laboratory extraction date and allowable holding time are presented in Appendix B. All analysis was completed within the allowable holding times.

The National Measurement Institute complete laboratory control samples, laboratory blanks, sample duplicates, surrogate spikes and matrix spikes. These results are presented in the NMI reports in Appendix B.

These reports include details of surrogates and spikes used, percent recoveries of surrogates and spikes used, the instrument detection limits, the method detection limits, the practical quantification limits and the reference sample results.

3.4 QA/QC data evaluation

Based on information presented in Sections 3.1, 3.2 and 3.3 it can be confidently stated that the MDQO's for this project have been met and the data set is considered to be reliable. The DQOs are assessed within Section 4.0 in the main body of the report.

APPENDIX G

WORKCOVER DANGEROUS GOODS RECORDS

WORKCOVER NEW SOUTH WALES

Licence No. 35/000757

APPLICATION FOR RENEWAL
OF LICENCE TO KEEP DANGEROUS GOODS

ISSUED UNDER AND SUBJECT TO THE PROVISIONS OF THE DANGEROUS GOODS ACT, 1975 AND REGULATION THEREUNDER

DECLARATION: Please renew licence number 35/000757 to 29/11/1999 . I confirm that all the licence details shown below are correct (amend if necessary).

Brian Aboozaid .... BRIAN ABOOZAID .... 12/11/98 ....
(Signature) *(Please print name)* *(Date signed)*
for: GRINNELL ASIA PACIFIC P/L

*THIS **SIGNED** DECLARATION SHOULD BE **RETURNED TO:***

WorkCover New South Wales
Dangerous Goods Licensing Section (Level 3)
GPO BOX 5364
SYDNEY 2001

Enquiries: **ph (02) 9370 5187**
fax (02) 9370 6105

Details of licence on 16 October 1998

Licence Number 35/000757 **Expiry Date** 29/11/1998

AW 30/12/98

Licensee GRINNELL ASIA PACIFIC P/L ACN 003 905 093
O'DONNELL GRIFFIN / Energy Control

Postal Address: 184 GEORGE ST CONCORD WEST NSW 2138

Licensee Contact ~~ROB HAVEBOND~~ BRIAN ABOOZAID Ph. 02 ~~743 0221~~ 97364800 Fax. 02 743 5658

Premises Licensed to Keep Dangerous Goods Trading name
GRINNELL ASIA PACIFIC P/L O'DONNELL GRIFFIN / Energy Control.
184 GEORGE ST CONCORD WEST 2138

Nature of Site ELECTRONIC EQUIPMENT MANUFACTURING

Major Supplier of Dangerous Goods VARIOUS

Emergency Contact for this Site ~~GREG CRISP~~ BRIAN ABOOZAID . Ph. 02 ~~743 0221~~ 97364800

Site staffing 10HRS 5DAYS

RECEIVED
13 NOV 1998
SCIENTIFIC SERVICES

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot		Qty
1	ROOFED STORE	Class 3		7000 L
	UN 1090 ACETONE			20 L
	UN 1170 ETHANOL (ETHYL ALCOHOL)			40 L
	Increase UN 1263 PAINT, ~~(ZINC RICH KIT)~~		1500 L	~~1340 L~~
	Delete ~~UN 1270 PETROLEUM FUEL [AUST.]~~ Diesel oil		1000 L	~~40 L~~
	UN 1307 XYLENES			200 L
2	UNDERGROUND TANK	Class 3		16000 L
	UN 1203 PETROL			16000 L
New 1A	Roof Store	C2	1000 L	
	00 C2 oil		1000 L	

NB. Please See attached sheet

PTO

WF ENERGY CONTROLS
HAZARDOUS MATERIAL STORED IN SHED

Description	**UN Number**	**Quantity**	
1. Araldite LC 177 B	Free	500 kg	
2. Hardener LC 177	Free	108 kg	
3. Araldite LC 191	Free	40 kg	
4. Hardener HY 2964	2735	60 kg	Class 8
5. Genesolv 2000	-	350 lbs	
6. X-60 Solvent	1271	20 ltrs	
7. Methylated Spirits	1170	40 ltrs	3
8. Isonel 300	-	40 ltrs	
9. Xylene	1307	20 ltrs	3
10. Mineral Turps.	1300	40 ltrs	3
11. Acetone	1090	20 ltrs	3
12. Eposolve 70	1993	20 ltrs	3
13. N-Hexane #2	InfoSafe SI 100	6.5 kg	
14. MEK	1193	20 ltrs	
15. Bostik Solvent	1142	80 ltrs	
16. Bostik Adhesive	1133	40 ltrs	
17. Gloss Enamel Paint	-	1500 mls	

****

J. De Lellis
OHS Officer

Date: 11/11/98

Application for Licence to Keep Dangerous Goods

D02/008321

WorkCover NEW SOUTH WALES

Application for ☐ new licence ☑ amendment ☐ transfer ☐ renewal of expired licence

0/35/000757

PART A – Applicant and site information

See page 2 of Guidance Notes.

1 Name of applicant: CHIPPENDALE PRINTING PTY LTD.
ACN: 001 265 372

2 Postal address of applicant: 176-184 GEORGE ST.
Suburb/Town: CONCORD WEST
Postcode: 2138.

3 Trading name or site occupier's name: CHIPPENDALE PRINTING COMPANY PTY LTD.

Contact for licence inquiries
Phone: 02 9736 2888
Fax: 9736 1337
Name: TONY DOBSON

5 Previous licence number (if known): 35/

6 Previous occupier (if known):

7 Site to be licensed
No: 176-184
Street: GEORGE ST.
Suburb / Town: CONCORD WEST
Postcode: 2138.

8 Main business of site: PRINTING.

Site staffing: Hours per day: 24
Days per week: 6

10 Site emergency contact
Phone: TONY DOBSON
Name: 0410 315 531

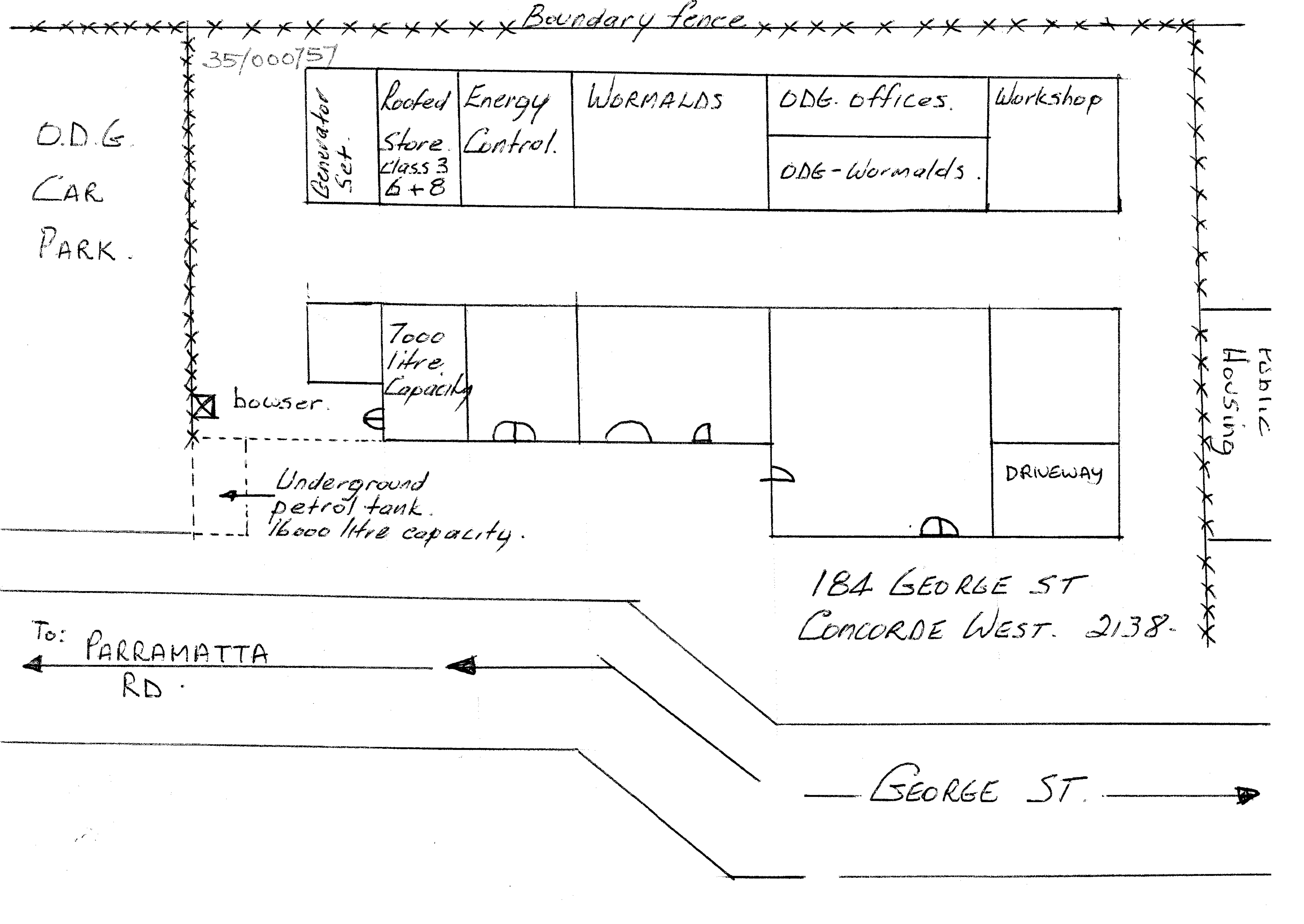
11 Major supplier of dangerous goods: BOTCHER, TOYO, KNAB.

12 If a new site or for amendments to depots – see page 4 of Guidance Notes.
Plan stamped by:
Name of Accredited Consultant: J.G. BONE
Date stamped: 30.1.02

I certify that the details in this application (including any accompanying computer disk) are correct and cover all licensable quantities of dangerous goods kept on the premises.

13 Signature of applicant: M Hanks
Printed name: MATTHEW HANKS
Date: 28-02-02

Please send your application, marked *CONFIDENTIAL*, to: Dangerous Goods Licensing, WorkCover NSW, Level 3, GPO Box 5364, SYDNEY NSW 2001



Boundary fence
35/000757
O.D.G.
CAR
PARK.
Generator Set.
Roofed Store. class 3 6+8
Energy Control.
WORMALDS
ODG. offices.
ODG-Wormalds.
Workshop
7000 litre Capacity
bowser.
Underground petrol tank. 16000 litre capacity.
DRIVEWAY
Public Housing
184 GEORGE ST
CONCORDE WEST. 2138.
To: PARRAMATTA RD.
GEORGE ST.

Complete 1 section per depot

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot number	Type of depot	Class	Licensed maximum storage capacity
1	Roofed Store	3 & 8.	7000 Litres.

UN number	Shipping name	Class	Pkg. Group	EPG	Product or common name	Typical quantity	Unit eg. L, kg, m³
1307		3			XYLENE HFP	200	L
2810		6	III		Electro Solve	200 exempt	L
		3			Acrylic Enamel	300	L
					Bearing oil	60	L
Free					Araldite LC177B	500	Kg
Free							
2735		8	III		Araldite hardener	200 Exempt	Kg
1142		3			Bostik Solvent	80	L
1263					Isonol	40	L
Free					Genesolv DMS	300	Kg
1142		3			Eposolve 70	40	L
1307		3			Xylene	20	L
1090		3			Acetone	20	L
1170		3			Metho	40	L
1270		3			X66 Solvent	40	L
1760		8	III		Polymer 11	36 Exempt	Kg
~~1866~~		~~6~~			~~Urothane 53-201~~	~~40~~	~~L~~

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot number	Type of depot	Class	Licensed maximum storage capacity
2	Underground Tank	3	16000 Litres

UN number	Shipping name	Class	Pkg. Group	EPG	Product or common name	Typical quantity	Unit eg. L, kg, m³
		3	II		PETROL	16000	L

(*delete whichever is not required)

FEE: $10.00 per Depot

Name of Applicant in full (see over)	O'Donnell Griffin Pty. Ltd. Surname ... Given Names ...
Trading name or occupier's name (if any)	
Postal address	184 GEORGE ST CONCORD WEST Postcode 2138 2807 14/03/00 03A
Telephone number of applicant	STD Code Number 730 221
Address of the premises in or on which the depot or depots are situated (including street number, if any)	184 George Street Concord West Postcode 2138
Nature of premises (see over)	

~~PLEASE ATTACH SITE PLAN~~

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (see over)	Storage capacity	Dangerous goods 00 : 002 · 020 · 0	
			Product being stored	C & C Office use only
1	Rooked Package Store	7000 Litre	3.1, 3.2, 3.3.	6 · 020 73
2	Underground Tank	16200 Litre	3.1. Petrol	2 · 020 24
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Name of company supplying flammable liquid (if any)

Have premises previously been licensed? Yes

If known, state name of previous occupier As above Licence No. 00757

Signature of applicant ... Date 11-2-80

For external explosives magazine(s), please fill in side 2.

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, William A. Madison being an Inspector under the Dangerous Goods Act, 1975, do hereby certify that the premises described above do comply with the requirements of the Dangerous Goods Act, 1975, and the Dangerous Goods Regulation with regard to their situation and construction for the keeping of dangerous goods of the nature and in the quantity specified.

Signature of Inspector ...

Date 23.5.80

TO : CHIEF INSPECTOR,
DANGEROUS GOODS BRANCH,
P.O. BOX 846,
DARLINGHURST. 2010

INFLAMMABLE LIQUID ACT, 1915

CONTRACTOR'S CERTIFICATE

UNDERGROUND TANKS

I hereby certify that the tank(~~s~~) indicated below have been abandoned by the removal of all inflammable liquid, filling and sealing to the requirements of the Explosives Branch.

PETROLEUM COMPANY ... THE SHELL COMPANY OF AUSTRALIA LIMITED ...

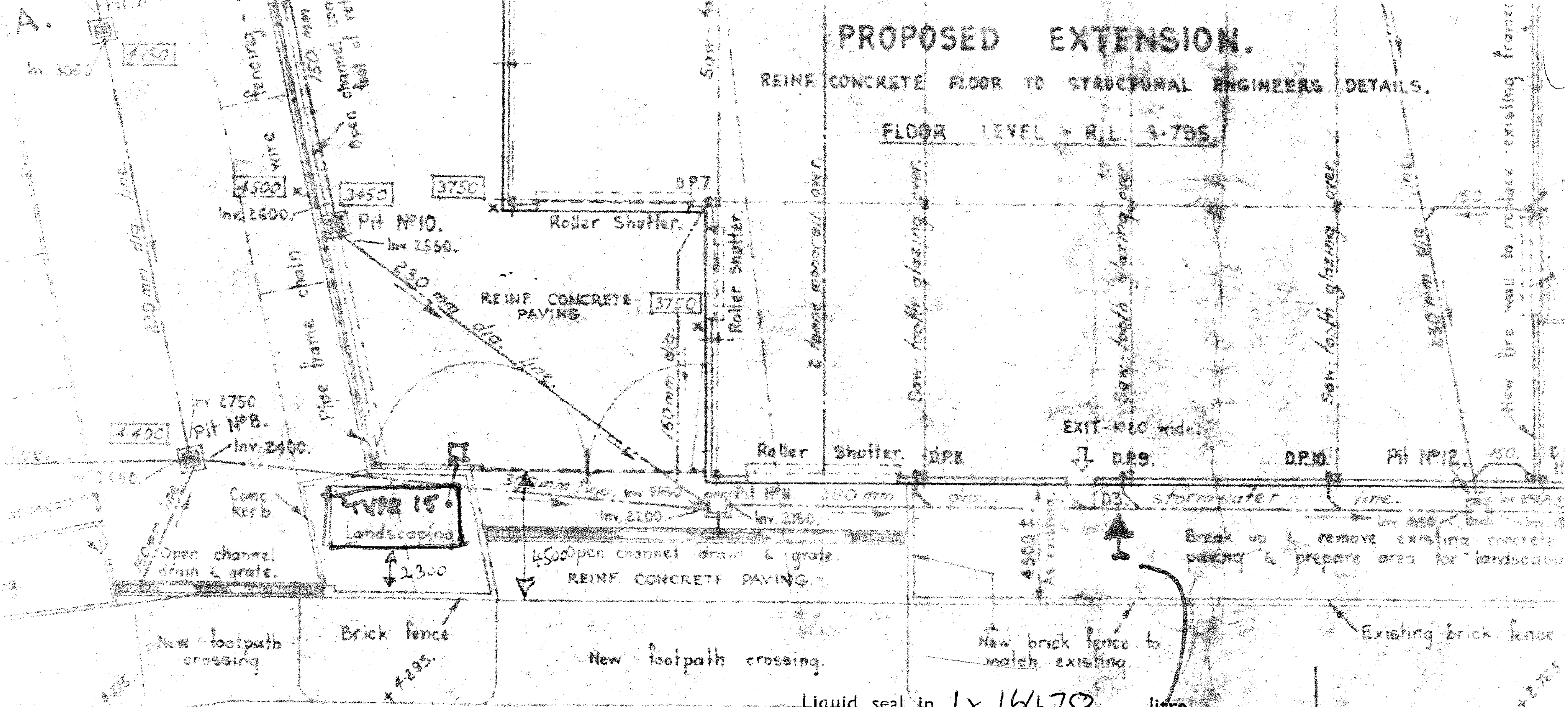
CUSTOMER ... O'Donnell Griffin Pty Ltd ...

ADDRESS OF CUSTOMERS PREMISES ... 184 George Street
... Concord West ...

EQUIPMENT ... 1 x 2000 gls. u/g tank ...

METHOD OF ABANDONED BY
(1) WATER & RUST INHIBITOR
(2) ~~CONCRETE SLURRY~~
(3) ~~TANKS REMOVED~~

CONTRACTOR ... E. J. HERRMANN P/LTD
SIGNED ... J. Herrmann ...
DATE ... 14-1-80 ...



Liquid seal in 1 x 16470 litre U/G tank as per drawing No. 127390. Tank to be installed as per Shell Company's specification No. 016.

EXISTING PUMP + TANK

GEORGE

THE SHELL COMPANY OF AUSTRALIA LIMITED SYDNEY

Proposed installation of 1 x 16470 l. U/G tank for motor spirit

O'Donnell Griffin
184 George St
Concord West

SITE & DRAINAGE PLAN.

DIRECTIONS

1. Applications must be forwarded to the Chief Inspector of Inflammable Liquid, Explosives Department, Box R.216, Royal Exchange Sydney, N.S.W. 2000 and must be accompanied by the prescribed fee, as set out hereunder:

Registration of Premises (Fee $3.00 p.a.) – For quantities not exceeding 300 gallons of mineral oil and 100 gallons of mineral spirit, if kept together; or 800 gallons of mineral oil and 100 gallons of mineral spirit, if kept in separate depots; or 500 gallons of mineral spirit, if kept in an underground tank depot; or 800 gallons of mineral oil and 500 gallons of mineral spirit, if mineral spirit is kept in an underground tank depot.

In addition to, or in lieu of the above, similar quantities of Dangerous Goods of Classes 1 and 2 may be kept under the like conditions; reading Dangerous Goods of Class 1 for the words Mineral Spirit and Dangerous Goods of Class 2 for the words Mineral Oil.

Store License, Div. A (Fee, $6.50 p.a.) – For quantities in excess of those stated above, but not exceeding 4,000 gallons mineral oil and/or mineral spirit, and/or Dangerous Goods of Classes 1, 2 and 9.

Store License, Div. B (Fee, See Regulation 7) – For quantities exceeding 4,000 gallons of mineral spirit, and/or dangerous goods of Classes 1 and 2, and/or dangerous goods of Class 3.

For the keeping of Dangerous Goods of Classes 3 and/or 4. ($15.00 p.a.).

Fees for the keeping of inflammable liquid and dangerous goods in excess of the above stated quantities and also for Liquid Petroleum Gas storage are set out in Regulation 7.

1. Name of occupier including full christian names. O'Donnell Griffin Pty Ltd

2. Trading Name (if any)

3. Locality of the premises in which the depot or depots are situated

No. or Name 184

Street George Street

Town Concord West

Postcode 2138

4. Postal address

5. Occupation

6. Nature of premises (dwelling, garage etc.)

7. Particulars of construction of depots and maximum quantities of inflammable liquid and/or Dangerous Goods to be kept at any one time.

PLEASE ATTACH PLAN OF PREMISES

Depot No.	Construction of depots* Walls	Roof	Floor	Inflammable liquid: Mineral spirit gallons	Mineral oil gallons	Dangerous goods: Class 1 gallons	Class 2 gallons	Class 3 lb	Class 4 cu ft	Class 5A water gal	Class 9 gallons
1	Fibro	Fibro	Concrete		500						
2	Underground tanks			2000							
3											
4											
5											
6											
7											
8											
9											
10											

PUBLIC REVENUE N.S.
$19.50
.. 2. 76
Date
Receipt No. 213

* If product is kept in tanks describe depots as underground or aboveground tanks.

O'DONNELL GRIFFIN PTY. LIMITED

Signature of applicant

CHIEF ACCOUNTANT

Date of application __________, 19___

CERTIFICATE OF INSPECTION

I, William A. Macleod being an Inspector under the Inflammable Liquid Act, 1915 (as amended), do hereby certify that the premises or store herein referred to and described is suitable with regard to its situation and construction for the safe keeping of inflammable liquid and/or dangerous goods in quantity and nature specified.

Signature of Inspector W. A. Macleod

1. SUPER 75						
2.						
3.						

ELECTRIC METER PUMPS: SPECIAL DETAILS

Is electrical power connected? YES A.C. or D.C. A.C. Voltage (Refer to Switchboard) 240 V

Distance from Pump to Switchboard 80 FT

Is power available at pump? (Conversion Manual to Meter) N.A.

NOTE: G.F. assumes obligation to CONNECT to switchboard only: Be certain client understands meter pump CANNOT BE INSTALLED UNLESS SWITCHBOARD CAPACITY IS SUFFICIENT. Each pump whether single or dual must have its own circuit fuse: Single 4½ Amps. — Dual 9 Amps.

Be certain client understands HE must arrange for any necessary adjustments to the switchboard.

GENERAL DETAILS

Distance from Pump Block to Tank/s 10 FT Distance from Tank/s to Fill Point/s DIRECT FILL

(Explosives Regulations provide that the Fill Point cannot be inside a building or within 5 feet of a doorway or window.)

Distance from Tank/s to Nearest Wall 5 FT Height of Wall 1 FT

Will Tank/s be inside Building? NO If so, under what surface (wood, concrete, etc.)? —

If Tank/s to be outside building describe present surface (Earth, Concrete, gravel, etc.) GRAVEL / EARTH

Excavation for Tank/s — Describe type of soil (sand, clay, rock, etc.) EARTH

If local labour available for excavations (Country Only) state contractor's name and address —

LOCAL COUNCIL REQUIREMENTS

Name of Municipality N.A.

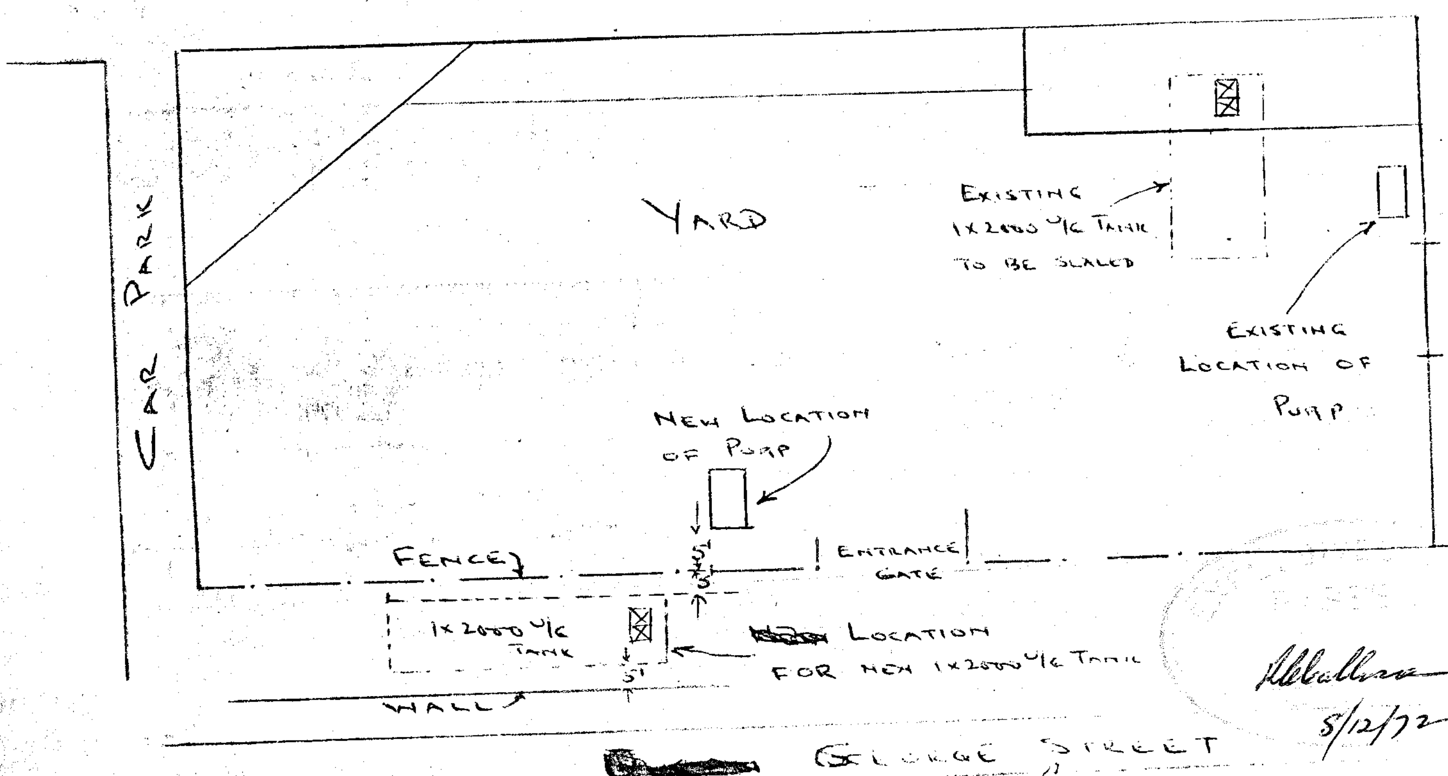
Has Council Permit been obtained?

Are there any special council requirements?

Prepare below Sketch Plan of Driveway Area showing details of Pump, Tank and Fill Point including location of other Company Pumps in relation to the Building. Frontages of property, distance between pumps, width of driveways, etc., to be included.

Show Single Pumps

Dual Pumps

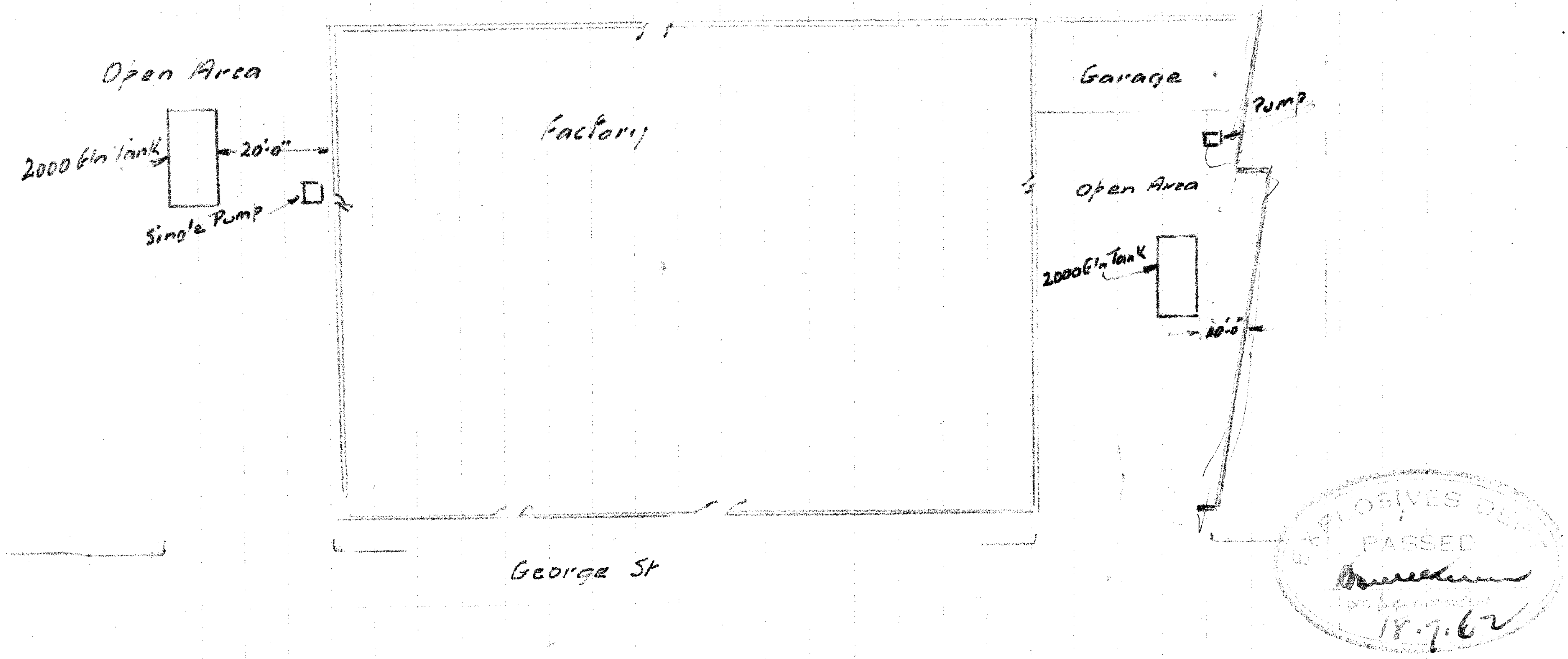


5/12/72

District Supervisor

O'Donnell Griffin
George St
Concord West

Installation of 2×2000Gln
Underground Tank



APPENDIX H

LABORATORY TRANSCRIPTS

Australian Government

National Measurement Institute

REPORT OF ANALYSIS

Report No. RN817572

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025516	BH01	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.3-0.4)
N10/025518	BH02	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (1.1-1.2)
N10/025522	BH05	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.3-0.4)
N10/025524	BH06	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.6-0.7)

Lab Reg No.		N10/025516	N10/025518	N10/025522	N10/025524	
Sample Reference	Units	BH01	BH02	BH05	BH06	Method
Trace Elements						
Arsenic	mg/kg	3.3	11	3.6	3.8	NT2_49
Cadmium	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NT2_49
Chromium	mg/kg	3	23	13	8.1	NT2_49
Copper	mg/kg	26	22	22	20	NT2_49
Lead	mg/kg	23	44	31	20	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	NT2_49
Nickel	mg/kg	1.7	9.7	5.5	4.3	NT2_49
Zinc	mg/kg	11	42	36	16	NT2_49
Total Solids	%	84.4	82.8	83.9	81.7	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817572

Client	: SGA PROPERTY CONSULTANCY P/L	Job No.	: SGAP01/100923
	LEVEL 2 / 120 CLARENCE STREET	Quote No.	: QT-01493
	SYDNEY 2001 NSW	Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025525	BH06	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (1.4-1.5)
N10/025556	DUP1	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10

Lab Reg No.		N10/025525	N10/025556			
Sample Reference	Units	BH06	DUP1			Method
Trace Elements						
Arsenic	mg/kg	11	3.7			NT2_49
Cadmium	mg/kg	< 0.5	< 0.5			NT2_49
Chromium	mg/kg	56	< 0.5			NT2_49
Copper	mg/kg	7.6	27			NT2_49
Lead	mg/kg	33	23			NT2_49
Mercury	mg/kg	< 0.2	< 0.2			NT2_49
Nickel	mg/kg	11	3.5			NT2_49
Zinc	mg/kg	17	17			NT2_49
Total Solids	%	82.2	89.1			NT2_49

Zheng

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

All results are expressed on a dry weight basis.

1 Suakin Street, Pymble NSW 2073 Tel: +61 2 9449 0111 Fax: +61 2 9449 1653 www.measurement.gov.au

REPORT OF ANALYSIS

ACCREDITED FOR TECHNICAL COMPETENCE

This report is issued in accordance with NATA's accreditation requirements.
Accreditated for compliance with ISO/IEC 17025.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: RN817571

REPORT OF ANALYSIS

Report No. RN817573

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025517	BH01	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.3-3.4)

Lab Reg No.		N10/025517				
Sample Reference	Units	BH01				Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	< 0.5				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	< 0.5				NGCMS_1111
Pyrene	mg/kg	< 0.5				NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5				NGCMS_1111
Chrysene	mg/kg	< 0.5				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1				NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
Organochlorine (OC) Pesticides						
HCB	mg/kg	< 0.01				NR_19
Heptachlor	mg/kg	< 0.01				NR_19
Heptachlor epoxide	mg/kg	< 0.01				NR_19
Aldrin	mg/kg	< 0.01				NR_19
gamma-BHC (Lindane)	mg/kg	< 0.01				NR_19
alpha-BHC	mg/kg	< 0.01				NR_19
beta-BHC	mg/kg	< 0.01				NR_19
delta-BHC	mg/kg	< 0.01				NR_19
trans-Chlordane	mg/kg	< 0.01				NR_19
cis-Chlordane	mg/kg	< 0.01				NR_19
Oxychlordane	mg/kg	< 0.01				NR_19
Dieldrin	mg/kg	< 0.01				NR_19
pp-DDE	mg/kg	< 0.01				NR_19
pp-DDD	mg/kg	< 0.01				NR_19

REPORT OF ANALYSIS

Report No. RN817573

Lab Reg No.		N10/025517				
Sample Reference	Units	BH01				Method
Organochlorine (OC) Pesticides						
pp-DDT	mg/kg	< 0.01				NR_19
Endrin	mg/kg	< 0.01				NR_19
Endrin Aldehyde	mg/kg	< 0.01				NR_19
Endrin Ketone	mg/kg	< 0.01				NR_19
alpha-Endosulfan	mg/kg	< 0.01				NR_19
beta-Endosulfan	mg/kg	< 0.01				NR_19
Endosulfan Sulfate	mg/kg	< 0.01				NR_19
Methoxychlor	mg/kg	< 0.01				NR_19
Organophosphate (OP) Pesticides						
Dichlorvos	mg/kg	< 0.1				NR_19
Demeton-S-Methyl	mg/kg	< 0.1				NR_19
Diazinon	mg/kg	< 0.1				NR_19
Dimethoate	mg/kg	< 0.1				NR_19
Chlorpyrifos	mg/kg	< 0.1				NR_19
Chlorpyrifos Methyl	mg/kg	< 0.1				NR_19
Malathion	mg/kg	< 0.1				NR_19
Fenthion	mg/kg	< 0.1				NR_19
Ethion	mg/kg	< 0.1				NR_19
Fenitrothion	mg/kg	< 0.1				NR_19
Chlorfenvinphos (E)	mg/kg	< 0.1				NR_19
Chlorfenvinphos (Z)	mg/kg	< 0.1				NR_19
Parathion (Ethyl)	mg/kg	< 0.1				NR_19
Parathion Methyl	mg/kg	< 0.1				NR_19
Pirimiphos Methyl	mg/kg	< 0.1				NR_19
Pirimiphos Ethyl	mg/kg	< 0.1				NR_19
Azinphos Methyl	mg/kg	< 0.1				NR_19
Azinphos Ethyl	mg/kg	< 0.1				NR_19
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817573

Lab Reg No.	Units	N10/025517				Method
Sample Reference		BH01				
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817573

Lab Reg No.	Units	N10/025517				Method
Sample Reference		BH01				
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Surrogate						
Surrogate semivolatile Rec.	%	93				
Surrogate volatile Rec	%	102				
Surrogate OC Rec.	%	99				NR_19
Surrogate OP Rec.	%	81				NR_19
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817573

Lab Reg No.		N10/025517				
Sample Reference	Units	BH01				Method
Trace Elements						
Total Solids	%	93.2				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

All results are expressed on a dry weight basis.

NATA
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This Report supersedes reports: RN817508 RN817509 RN817544 RN817567

Australian Government

National Measurement Institute

REPORT OF ANALYSIS

Report No. RN817574

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025519	BH02	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.1-3.2)

Lab Reg No.		N10/025519				
Sample Reference	Units	BH02				Method
BTEX						
Benzene	mg/kg	< 0.5				NGCMS_1121
Toluene	mg/kg	< 0.5				NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5				NGCMS_1121
m, p - Xylene	mg/kg	< 1				NGCMS_1121
o - Xylene	mg/kg	< 0.5				NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120

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Lab Reg No.	Units	N10/025519				Method
Sample Reference		BH02				
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817574

Lab Reg No.		N10/025519				
Sample Reference	Units	BH02				Method
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Surrogate						
Surrogate volatile Rec	%	94				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

Lab Reg No.		N10/025519				
Sample Reference	Units	BH02				Method
Trace Elements						
Total Solids	%	84.4				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817574

All results are expressed on a dry weight basis.

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Australian Government

National Measurement Institute

REPORT OF ANALYSIS

Report No. RN817575

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025520	BH03	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.4-0.5)

Lab Reg No.		N10/025520				
Sample Reference	Units	BH03				Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	< 0.5				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	< 0.5				NGCMS_1111
Pyrene	mg/kg	< 0.5				NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5				NGCMS_1111
Chrysene	mg/kg	< 0.5				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1				NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	88				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817575

Lab Reg No.		N10/025520				
Sample Reference	Units	BH03				Method
Trace Elements						
Total Solids	%	85.1				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

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This Report supersedes reports: RN817508 RN817567

REPORT OF ANALYSIS

Report No. RN817576

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025533	BH11	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.7-0.8)

Lab Reg No.		N10/025533				
Sample Reference	Units	BH11				Method
Organochlorine (OC) Pesticides						
HCB	mg/kg	< 0.01				NR_19
Heptachlor	mg/kg	< 0.01				NR_19
Heptachlor epoxide	mg/kg	< 0.01				NR_19
Aldrin	mg/kg	< 0.01				NR_19
gamma-BHC (Lindane)	mg/kg	< 0.01				NR_19
alpha-BHC	mg/kg	< 0.01				NR_19
beta-BHC	mg/kg	< 0.01				NR_19
delta-BHC	mg/kg	< 0.01				NR_19
trans-Chlordane	mg/kg	< 0.01				NR_19
cis-Chlordane	mg/kg	< 0.01				NR_19
Oxychlordane	mg/kg	< 0.01				NR_19
Dieldrin	mg/kg	< 0.01				NR_19
pp-DDE	mg/kg	< 0.01				NR_19
pp-DDD	mg/kg	< 0.01				NR_19
pp-DDT	mg/kg	< 0.01				NR_19
Endrin	mg/kg	< 0.01				NR_19
Endrin Aldehyde	mg/kg	< 0.01				NR_19
Endrin Ketone	mg/kg	< 0.01				NR_19
alpha-Endosulfan	mg/kg	< 0.01				NR_19
beta-Endosulfan	mg/kg	< 0.01				NR_19
Endosulfan Sulfate	mg/kg	< 0.01				NR_19
Methoxychlor	mg/kg	< 0.01				NR_19
Organophosphate (OP) Pesticides						
Dichlorvos	mg/kg	< 0.1				NR_19
Demeton-S-Methyl	mg/kg	< 0.1				NR_19
Diazinon	mg/kg	< 0.1				NR_19
Dimethoate	mg/kg	< 0.1				NR_19
Chlorpyrifos	mg/kg	< 0.1				NR_19
Chlorpyrifos Methyl	mg/kg	< 0.1				NR_19
Malathion	mg/kg	< 0.1				NR_19

REPORT OF ANALYSIS

Report No. RN817576

Lab Reg No.		N10/025533				
Sample Reference	Units	BH11				Method
Organophosphate (OP) Pesticides						
Fenthion	mg/kg	< 0.1				NR_19
Ethion	mg/kg	< 0.1				NR_19
Fenitrothion	mg/kg	< 0.1				NR_19
Chlorfenvinphos (E)	mg/kg	< 0.1				NR_19
Chlorfenvinphos (Z)	mg/kg	< 0.1				NR_19
Parathion (Ethyl)	mg/kg	< 0.1				NR_19
Parathion Methyl	mg/kg	< 0.1				NR_19
Pirimiphos Methyl	mg/kg	< 0.1				NR_19
Pirimiphos Ethyl	mg/kg	< 0.1				NR_19
Azinphos Methyl	mg/kg	< 0.1				NR_19
Azinphos Ethyl	mg/kg	< 0.1				NR_19
Surrogate						
Surrogate OC Rec.	%	102				NR_19
Surrogate OP Rec.	%	92				NR_19
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

Lab Reg No.		N10/025533				
Sample Reference	Units	BH11				Method
Trace Elements						
Arsenic	mg/kg	7.9				NT2_49
Cadmium	mg/kg	< 0.5				NT2_49
Chromium	mg/kg	21				NT2_49
Copper	mg/kg	36				NT2_49
Lead	mg/kg	59				NT2_49
Mercury	mg/kg	< 0.2				NT2_49
Nickel	mg/kg	8.1				NT2_49
Zinc	mg/kg	75				NT2_49
Total Solids	%	77.7				NT2_49

REPORT OF ANALYSIS

Report No. RN817576

Lab Reg No.	Units	N10/025533				Method
Sample Reference		BH11				

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

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This Report supersedes reports: RN817509 RN817571

REPORT OF ANALYSIS

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025534	BH11	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (1.4-1.5)
N10/025554	BH20	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (4.7-4.8)

Lab Reg No.		N10/025534	N10/025554			
Sample Reference	Units	BH11	BH20			Method
BTEX						
Benzene	mg/kg	< 0.5	< 0.5			NGCMS_1121
Toluene	mg/kg	< 0.5	< 0.5			NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5	< 0.5			NGCMS_1121
m, p - Xylene	mg/kg	< 1	< 1			NGCMS_1121
o - Xylene	mg/kg	< 0.5	< 0.5			NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25	< 25			NGCMS_1121
TPH C10 - C14	mg/kg	< 50	50			NGCMS_1112
TPH C15 - C28	mg/kg	< 100	130			NGCMS_1112
TPH C29 - C36	mg/kg	< 100	< 100			NGCMS_1112
Surrogate						
Surrogate volatile Rec	%	112	108			
Dates						
Date extracted		23-SEP-2010	23-SEP-2010			
Date analysed		24-SEP-2010	24-SEP-2010			

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817577

Lab Reg No.		N10/025534	N10/025554			
Sample Reference	Units	BH11	BH20			Method
Trace Elements						
Arsenic	mg/kg	4.6	5.4			NT2_49
Cadmium	mg/kg	< 0.5	< 0.5			NT2_49
Chromium	mg/kg	4.8	6.6			NT2_49
Copper	mg/kg	20	55			NT2_49
Lead	mg/kg	9.3	25			NT2_49
Mercury	mg/kg	< 0.2	< 0.2			NT2_49
Nickel	mg/kg	1.6	48			NT2_49
Zinc	mg/kg	6.9	150			NT2_49
Total Solids	%	84.0	93.9			NT2_49

Zheng

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

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National Measurement Institute

REPORT OF ANALYSIS

Report No. RN817578

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025542	BH15	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.0-3.1)

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817578

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120
Poly Aromatic Hydrocarbons NMI 1122 Screen						
Acenaphthylene	mg/kg	< 1				NGCMS_1122
Naphthalene	mg/kg	< 1				NGCMS_1122
Acenaphthene	mg/kg	< 1				NGCMS_1122
Fluorene	mg/kg	< 1				NGCMS_1122
Phenanthrene	mg/kg	< 1				NGCMS_1122

REPORT OF ANALYSIS

Report No. RN817578

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Poly Aromatic Hydrocarbons NMI 1122 Screen						
Anthracene	mg/kg	< 1				NGCMS_1122
Fluoranthene	mg/kg	< 1				NGCMS_1122
Pyrene	mg/kg	< 1				NGCMS_1122
Benz(a)anthracene	mg/kg	< 1				NGCMS_1122
Chrysene	mg/kg	< 1				NGCMS_1122
Benzo(b,k)fluoranthene	mg/kg	< 2				NGCMS_1122
Benzo(a)pyrene	mg/kg	< 1				NGCMS_1122
Indeno(1,2,3-cd)pyrene	mg/kg	< 1				NGCMS_1122
Dibenz(a,h)anthracene	mg/kg	< 1				NGCMS_1122
Benzo(g,h,i)perylene	mg/kg	< 1				NGCMS_1122
Phenols NMI 1122 Screen						
Phenol	mg/kg	< 1				NGCMS_1122
2-Chlorophenol	mg/kg	< 1				NGCMS_1122
2-Methylphenol	mg/kg	< 1				NGCMS_1122
3&4-Methylphenol	mg/kg	< 2				NGCMS_1122
2-Nitrophenol	mg/kg	< 1				NGCMS_1122
2,4-Dimethylphenol	mg/kg	< 1				NGCMS_1122
2,4-Dichlorophenol	mg/kg	< 1				NGCMS_1122
2,6-Dichlorophenol	mg/kg	< 1				NGCMS_1122
4-Chloro-3-methylphenol	mg/kg	< 2				NGCMS_1122
2,4,5-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,4,6-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,3,4,6-Tetrachlorophenol	mg/kg	< 2				NGCMS_1122
Pentachlorophenol	mg/kg	< 2				NGCMS_1122
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Phthalates NMI 1122 Screen						
Dimethyl phthalate	mg/kg	< 1				NGCMS_1122
Diethyl phthalate	mg/kg	< 1				NGCMS_1122
Di-n-butyl phthalate	mg/kg	< 1				NGCMS_1122
Butyl benzyl phthalate	mg/kg	< 1				NGCMS_1122
Bis(2-ethylhexyl) phthalate	mg/kg	< 2				NGCMS_1122
Di-n-octyl phthalate	mg/kg	< 1				NGCMS_1122
Chlorinated Hydrocarbons NMI 1122 Screen						
2-Chloronaphthalene	mg/kg	< 2				NGCMS_1122
1,4-Dichlorobenzene	mg/kg	< 2				NGCMS_1122

REPORT OF ANALYSIS

Report No. RN817578

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Chlorinated Hydrocarbons NMI 1122 Screen						
1,2-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
1,3-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachlorobenzene	mg/kg	< 2				NGCMS_1122
1,2,4-Trichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachloroethane	mg/kg	< 2				NGCMS_1122
Hexachlorocyclopentadiene	mg/kg	< 2				NGCMS_1122
Hexachloro-1,3-butadiene	mg/kg	< 2				NGCMS_1122
Ethers NMI 1122 Screen						
4-Bromophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
4-Chlorophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethyl)ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethoxy)methane	mg/kg	< 2				NGCMS_1122
Bis(2-chloroisopropyl)ether	mg/kg	< 2				NGCMS_1122
Amines Nitroaromatics & Nitrosamines NMI 1122 Screen						
Azobenzene	mg/kg	< 2				NGCMS_1122
2,4-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
2,6-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
Nitrobenzene	mg/kg	< 2				NGCMS_1122
N-Nitrosodimethylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodiphenylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodi-n-propylamine	mg/kg	< 2				NGCMS_1122
Aniline	mg/kg	< 2				NGCMS_1122
4-Chloroaniline	mg/kg	< 2				NGCMS_1122
2-Nitroaniline	mg/kg	< 2				NGCMS_1122
3-Nitroaniline	mg/kg	< 2				NGCMS_1122
4-Nitroaniline	mg/kg	< 2				NGCMS_1122
Organochlorine Pesticides NMI 1122 Screen						
Aldrin	mg/kg	< 2				NGCMS_1122
a-BHC	mg/kg	< 2				NGCMS_1122
b-BHC	mg/kg	< 2				NGCMS_1122
g-BHC (Lindane)	mg/kg	< 2				NGCMS_1122
d-BHC	mg/kg	< 2				NGCMS_1122
4,4 ’-DDD	mg/kg	< 2				NGCMS_1122
4,4 ’-DDE	mg/kg	< 2				NGCMS_1122
4,4 ’-DDT	mg/kg	< 2				NGCMS_1122
Dieldrin	mg/kg	< 2				NGCMS_1122
Endosulphan I	mg/kg	< 2				NGCMS_1122
Endosulphan II	mg/kg	< 2				NGCMS_1122
Endosulfan sulphate	mg/kg	< 2				NGCMS_1122
Endrin	mg/kg	< 2				NGCMS_1122
Endrin Aldehyde	mg/kg	< 2				NGCMS_1122
Heptachlor	mg/kg	< 2				NGCMS_1122
Heptachlorepoxide	mg/kg	< 2				NGCMS_1122

REPORT OF ANALYSIS

Report No. RN817578

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Organophosphate Pesticides NMI 1122 Screen						
Dimethoate	mg/kg	< 2				NGCMS_1122
Diazinon	mg/kg	< 2				NGCMS_1122
Fenitrothion	mg/kg	< 2				NGCMS_1122
Malathion	mg/kg	< 2				NGCMS_1122
Chlorpyrifos	mg/kg	< 2				NGCMS_1122
Ethion	mg/kg	< 2				NGCMS_1122
Surrogate						
Surrogate semivolatile Rec.	%	75				
Surrogate volatile Rec	%	102				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				
Others						
Dichlorobenzidine	mg/kg	< 2				NGCMS_1122
2-Methylnaphthalene	mg/kg	< 1				NGCMS_1122
Isophorone	mg/kg	< 2				NGCMS_1122
Benzyl alcohol	mg/kg	< 2				NGCMS_1122
Carbazole	mg/kg	< 2				NGCMS_1122
Dibenzofuran	mg/kg	< 2				NGCMS_1122

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

Lab Reg No.		N10/025542				
Sample Reference	Units	BH15				Method
Trace Elements						
Total Solids	%	77.2				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

All results are expressed on a dry weight basis.

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This Report supersedes reports: RN817544 RN817567

REPORT OF ANALYSIS

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025543	BH15	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.6-3.7)

Lab Reg No.		N10/025543				
Sample Reference	Units	BH15				Method
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817579

Lab Reg No.		N10/025543				
Sample Reference	Units	BH15				Method
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817579

Lab Reg No.	Units	N10/025543				Method
Sample Reference		BH15				
Oxygenated Compounds NMI 1120 Screen						
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Surrogate						
Surrogate volatile Rec	%	110				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

Lab Reg No.	Units	N10/025543				Method
Sample Reference		BH15				
Trace Elements						
Arsenic	mg/kg	< 0.5				NT2_49
Cadmium	mg/kg	< 0.5				NT2_49
Chromium	mg/kg	< 0.5				NT2_49
Copper	mg/kg	84				NT2_49
Lead	mg/kg	13				NT2_49
Mercury	mg/kg	< 0.2				NT2_49
Nickel	mg/kg	6.1				NT2_49
Zinc	mg/kg	29				NT2_49
Total Solids	%	85.0				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

All results are expressed on a dry weight basis.

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This Report supersedes reports: RN817544 RN817571

REPORT OF ANALYSIS

Report No. RN817580

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025546	BH16	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.2-3.3)

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	1.7				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	2.2				NGCMS_1111
Pyrene	mg/kg	2.2				NGCMS_1111
Benzo(a)anthracene	mg/kg	1.1				NGCMS_1111
Chrysene	mg/kg	0.92				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	1.4				NGCMS_1111
Benzo(a)pyrene	mg/kg	1.0				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
Aliphatic Total Petroleum Hydrocarbons						
TPH C16-C35 Aliphatic	mg/kg	< 100				NGCMS_1112
Aromatic Total Petroleum Hydrocarbons						
TPH C16-C35 Aromatic	mg/kg	< 100				NGCMS_1112
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817580

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817580

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120
Poly Aromatic Hydrocarbons NMI 1122 Screen						
Acenaphthylene	mg/kg	< 1				NGCMS_1122
Naphthalene	mg/kg	< 1				NGCMS_1122
Acenaphthene	mg/kg	< 1				NGCMS_1122
Fluorene	mg/kg	< 1				NGCMS_1122
Phenanthrene	mg/kg	1.5				NGCMS_1122
Anthracene	mg/kg	< 1				NGCMS_1122
Fluoranthene	mg/kg	2.2				NGCMS_1122
Pyrene	mg/kg	2.2				NGCMS_1122
Benz(a)anthracene	mg/kg	< 1				NGCMS_1122
Chrysene	mg/kg	< 1				NGCMS_1122
Benzo(b,k)fluoranthene	mg/kg	< 2				NGCMS_1122
Benzo(a)pyrene	mg/kg	< 1				NGCMS_1122
Indeno(1,2,3-cd)pyrene	mg/kg	< 1				NGCMS_1122
Dibenz(a,h)anthracene	mg/kg	< 1				NGCMS_1122
Benzo(g,h,i)perylene	mg/kg	< 1				NGCMS_1122
Phenols NMI 1122 Screen						
Phenol	mg/kg	< 1				NGCMS_1122
2-Chlorophenol	mg/kg	< 1				NGCMS_1122
2-Methylphenol	mg/kg	< 1				NGCMS_1122
3&4-Methylphenol	mg/kg	< 2				NGCMS_1122
2-Nitrophenol	mg/kg	< 1				NGCMS_1122
2,4-Dimethylphenol	mg/kg	< 1				NGCMS_1122
2,4-Dichlorophenol	mg/kg	< 1				NGCMS_1122
2,6-Dichlorophenol	mg/kg	< 1				NGCMS_1122
4-Chloro-3-methylphenol	mg/kg	< 2				NGCMS_1122
2,4,5-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,4,6-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,3,4,6-Tetrachlorophenol	mg/kg	< 2				NGCMS_1122
Pentachlorophenol	mg/kg	< 2				NGCMS_1122
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN817580

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Oxygenated Compounds NMI 1120 Screen						
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Phthalates NMI 1122 Screen						
Dimethyl phthalate	mg/kg	< 1				NGCMS_1122
Diethyl phthalate	mg/kg	< 1				NGCMS_1122
Di-n-butyl phthalate	mg/kg	< 1				NGCMS_1122
Butyl benzyl phthalate	mg/kg	< 1				NGCMS_1122
Bis(2-ethylhexyl) phthalate	mg/kg	< 2				NGCMS_1122
Di-n-octyl phthalate	mg/kg	< 1				NGCMS_1122
Chlorinated Hydrocarbons NMI 1122 Screen						
2-Chloronaphthalene	mg/kg	< 2				NGCMS_1122
1,4-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
1,2-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
1,3-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachlorobenzene	mg/kg	< 2				NGCMS_1122
1,2,4-Trichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachloroethane	mg/kg	< 2				NGCMS_1122
Hexachlorocyclopentadiene	mg/kg	< 2				NGCMS_1122
Hexachloro-1,3-butadiene	mg/kg	< 2				NGCMS_1122
Ethers NMI 1122 Screen						
4-Bromophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
4-Chlorophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethyl)ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethoxy)methane	mg/kg	< 2				NGCMS_1122
Bis(2-chloroisopropyl)ether	mg/kg	< 2				NGCMS_1122
Amines Nitroaromatics & Nitrosamines NMI 1122 Screen						
Azobenzene	mg/kg	< 2				NGCMS_1122
2,4-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
2,6-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
Nitrobenzene	mg/kg	< 2				NGCMS_1122
N-Nitrosodimethylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodiphenylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodi-n-propylamine	mg/kg	< 2				NGCMS_1122
Aniline	mg/kg	< 2				NGCMS_1122
4-Chloroaniline	mg/kg	< 2				NGCMS_1122
2-Nitroaniline	mg/kg	< 2				NGCMS_1122
3-Nitroaniline	mg/kg	< 2				NGCMS_1122
4-Nitroaniline	mg/kg	< 2				NGCMS_1122
Organochlorine Pesticides NMI 1122 Screen						
Aldrin	mg/kg	< 2				NGCMS_1122

REPORT OF ANALYSIS

Report No. RN817580

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Organochlorine Pesticides NMI 1122 Screen						
a-BHC	mg/kg	< 2				NGCMS_1122
b-BHC	mg/kg	< 2				NGCMS_1122
g-BHC (Lindane)	mg/kg	< 2				NGCMS_1122
d-BHC	mg/kg	< 2				NGCMS_1122
4,4 '-DDD	mg/kg	< 2				NGCMS_1122
4,4 '-DDE	mg/kg	< 2				NGCMS_1122
4,4 '-DDT	mg/kg	< 2				NGCMS_1122
Dieldrin	mg/kg	< 2				NGCMS_1122
Endosulphan I	mg/kg	< 2				NGCMS_1122
Endosulphan II	mg/kg	< 2				NGCMS_1122
Endosulfan sulphate	mg/kg	< 2				NGCMS_1122
Endrin	mg/kg	< 2				NGCMS_1122
Endrin Aldehyde	mg/kg	< 2				NGCMS_1122
Heptachlor	mg/kg	< 2				NGCMS_1122
Heptachlorepoxide	mg/kg	< 2				NGCMS_1122
Organophosphate Pesticides NMI 1122 Screen						
Dimethoate	mg/kg	< 2				NGCMS_1122
Diazinon	mg/kg	< 2				NGCMS_1122
Fenitrothion	mg/kg	< 2				NGCMS_1122
Malathion	mg/kg	< 2				NGCMS_1122
Chlorpyrifos	mg/kg	< 2				NGCMS_1122
Ethion	mg/kg	< 2				NGCMS_1122
Surrogate						
Surrogate semivolatile Rec.	%	115				
Surrogate volatile Rec	%	113				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				
Others						
Dichlorobenzidine	mg/kg	< 2				NGCMS_1122
2-Methylnaphthalene	mg/kg	< 1				NGCMS_1122
Isophorone	mg/kg	< 2				NGCMS_1122
Benzyl alcohol	mg/kg	< 2				NGCMS_1122
Carbazole	mg/kg	< 2				NGCMS_1122
Dibenzofuran	mg/kg	< 2				NGCMS_1122

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817580

Lab Reg No.		N10/025546				
Sample Reference	Units	BH16				Method
Trace Elements						
Arsenic	mg/kg	3.7				NT2_49
Cadmium	mg/kg	< 0.5				NT2_49
Chromium	mg/kg	< 0.5				NT2_49
Copper	mg/kg	54				NT2_49
Lead	mg/kg	18				NT2_49
Mercury	mg/kg	< 0.2				NT2_49
Nickel	mg/kg	7.9				NT2_49
Zinc	mg/kg	24				NT2_49
Total Solids	%	82.8				NT2_49

Zheng

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

All results are expressed on a dry weight basis.

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This Report supersedes reports: RN817508 RN817571

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REPORT OF ANALYSIS

Report No. RN817581

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025550	BH18	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (2.9-3.0)

Lab Reg No.		N10/025550				
Sample Reference	Units	BH18				Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	< 0.5				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	< 0.5				NGCMS_1111
Pyrene	mg/kg	< 0.5				NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5				NGCMS_1111
Chrysene	mg/kg	< 0.5				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1				NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
PCB Aroclors						
Aroclor 1016	mg/kg	< 0.1				NR_19
Aroclor 1221	mg/kg	< 0.1				NR_19
Aroclor 1232	mg/kg	< 0.1				NR_19
Aroclor 1242	mg/kg	< 0.1				NR_19
Aroclor 1248	mg/kg	< 0.1				NR_19
Aroclor 1254	mg/kg	< 0.1				NR_19
Aroclor 1260	mg/kg	< 0.1				NR_19
Total PCB's (as above)	mg/kg	< 0.1				NR_19
Surrogate						
Surrogate semivolatile Rec.	%	79				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

REPORT OF ANALYSIS

Report No. RN817581

Lab Reg No.		N10/025550				
Sample Reference	Units	BH18				Method

Luke Baker, Analyst
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Lab Reg No.		N10/025550				
Sample Reference	Units	BH18				Method
Trace Elements						
Total Solids	%	79.2				NT2_49

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REPORT OF ANALYSIS

Report No. RN817582

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025523	BH05	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.3-3.4)
N10/025528	BH08	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.45)
N10/025529	BH09	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.1-3.2)
N10/025530	BH09	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.3-3.4)

Lab Reg No.		N10/025523	N10/025528	N10/025529	N10/025530	
Sample Reference	Units	BH05	BH08	BH09	BH09	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	510	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	30	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	200	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	240	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	1400	1.6	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	370	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	1200	1.3	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	1100	1.2	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	410	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	370	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	570	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	440	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	180	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	57	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	190	< 0.5	NGCMS_1111
BTEX						
Benzene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25	< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg	< 50	< 50	1200	< 50	NGCMS_1112

REPORT OF ANALYSIS

Report No. RN817582

Lab Reg No.		N10/025523	N10/025528	N10/025529	N10/025530	
Sample Reference	Units	BH05	BH08	BH09	BH09	Method
Total Petroleum Hydrocarbons						
TPH C15 - C28	mg/kg	< 100	170	18000	< 100	NGCMS_1112
TPH C29 - C36	mg/kg	< 100	110	7400	< 100	NGCMS_1112
Surrogate						
Surrogate semivolatile Rec.	%	73	120	134	75	
Surrogate volatile Rec	%	110	115	113	112	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

Luke Baker, Analyst
Organics - NSW
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28-SEP-2010

Lab Reg No.		N10/025523	N10/025528	N10/025529	N10/025530	
Sample Reference	Units	BH05	BH08	BH09	BH09	Method
Trace Elements						
Arsenic	mg/kg	9.1	11	8.9	9.3	NT2_49
Cadmium	mg/kg	< 0.5	1.2	1.1	< 0.5	NT2_49
Chromium	mg/kg	1.3	77	15	13	NT2_49
Copper	mg/kg	23	3920	150	46	NT2_49
Lead	mg/kg	8.4	350	180	20	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	1.2	< 0.2	NT2_49
Nickel	mg/kg	1.9	60	53	39	NT2_49
Zinc	mg/kg	11	1270	590	250	NT2_49
Total Solids	%	91.0	93.7	87.2	93.5	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817582

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025553	BH20	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.3-3.4)

Lab Reg No.		N10/025553				
Sample Reference	Units	BH20				Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	< 0.5				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	< 0.5				NGCMS_1111
Pyrene	mg/kg	< 0.5				NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5				NGCMS_1111
Chrysene	mg/kg	< 0.5				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1				NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
BTEX						
Benzene	mg/kg	< 0.5				NGCMS_1121
Toluene	mg/kg	< 0.5				NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5				NGCMS_1121
m, p - Xylene	mg/kg	< 1				NGCMS_1121
o - Xylene	mg/kg	< 0.5				NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Surrogate						
Surrogate semivolatile Rec.	%	116				
Surrogate volatile Rec	%	109				
Dates						
Date extracted		23-SEP-2010				

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Report No. RN817582

Lab Reg No.		N10/025553				
Sample Reference	Units	BH20				Method
Dates						
Date analysed		24-SEP-2010				

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Lab Reg No.		N10/025553				
Sample Reference	Units	BH20				Method
Trace Elements						
Arsenic	mg/kg	7				NT2_49
Cadmium	mg/kg	<0.5				NT2_49
Chromium	mg/kg	1.2				NT2_49
Copper	mg/kg	38				NT2_49
Lead	mg/kg	25				NT2_49
Mercury	mg/kg	<0.2				NT2_49
Nickel	mg/kg	31				NT2_49
Zinc	mg/kg	120				NT2_49
Total Solids	%	88.1				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
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28-SEP-2010

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REPORT OF ANALYSIS

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REPORT OF ANALYSIS

Report No. RN817583

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025526	BH06	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.3-3.4)
N10/025535	BH11	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (2.7-2.8)
N10/025537	BH12	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (2.8-2.9)
N10/025540	BH13	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.9-4.0)

Lab Reg No.		N10/025526	N10/025535	N10/025537	N10/025540	
Sample Reference	Units	BH06	BH11	BH12	BH13	Method
BTEX						
Benzene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25	< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg	< 50	< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg	< 100	< 100	< 100	< 100	NGCMS_1112
TPH C29 - C36	mg/kg	< 100	< 100	< 100	< 100	NGCMS_1112
Surrogate						
Surrogate volatile Rec	%	110	105	110	112	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

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28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817583

Lab Reg No.		N10/025526	N10/025535	N10/025537	N10/025540	
Sample Reference	Units	BH06	BH11	BH12	BH13	Method
Trace Elements						
Total Solids	%	88.7	85.6	90.0	90.9	NT2_49

Zheng

Anna Zheng, Analyst
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Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817583

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025558	DUP3	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10

Lab Reg No.		N10/025558				
Sample Reference	Units	DUP3				Method
BTEX						
Benzene	mg/kg	< 0.5				NGCMS_1121
Toluene	mg/kg	< 0.5				NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5				NGCMS_1121
m, p - Xylene	mg/kg	< 1				NGCMS_1121
o - Xylene	mg/kg	< 0.5				NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Surrogate						
Surrogate volatile Rec	%	109				
Dates						
Date extracted		23-SEP-2010				
Date analysed		24-SEP-2010				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817583

Lab Reg No.		N10/025558				
Sample Reference	Units	DUP3				Method
Trace Elements						
Total Solids	%	82.3				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

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REPORT OF ANALYSIS

Report No. RN817584

Client	: SGA PROPERTY CONSULTANCY P/L	Job No.	: SGAP01/100923
	LEVEL 2 / 120 CLARENCE STREET	Quote No.	: QT-01493
	SYDNEY 2001 NSW	Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025521	BH04	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (1.8-1.9)
N10/025527	BH08	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.2-0.3)
N10/025531	BH10	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.3-0.4)
N10/025532	BH10	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.6-0.7)

Lab Reg No.		N10/025521	N10/025527	N10/025531	N10/025532	
Sample Reference	Units	BH04	BH08	BH10	BH10	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	1.7	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	0.62	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	5.8	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	5.9	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	3.9	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	3.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	8.0	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	6.0	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	2.7	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	0.82	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	3.0	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	106	88	99	121	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

REPORT OF ANALYSIS

Report No. RN817584

Lab Reg No.		N10/025521	N10/025527	N10/025531	N10/025532	
Sample Reference	Units	BH04	BH08	BH10	BH10	Method

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Lab Reg No.		N10/025521	N10/025527	N10/025531	N10/025532	
Sample Reference	Units	BH04	BH08	BH10	BH10	Method
Trace Elements						
Arsenic	mg/kg	14	9.2	6.1	7.8	NT2_49
Cadmium	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NT2_49
Chromium	mg/kg	29	14	21	28	NT2_49
Copper	mg/kg	24	22	36	18	NT2_49
Lead	mg/kg	19	28	70	27	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	NT2_49
Nickel	mg/kg	2.4	11	7.5	15	NT2_49
Zinc	mg/kg	11	42	37	23	NT2_49
Total Solids	%	83.0	89.6	75.9	74.5	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817584

Client	: SGA PROPERTY CONSULTANCY P/L	Job No.	: SGAP01/100923
	LEVEL 2 / 120 CLARENCE STREET	Quote No.	: QT-01493
	SYDNEY 2001 NSW	Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025536	BH12	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.7-0.8)
N10/025538	BH13	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (0.4-0.5)
N10/025539	BH13	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (2.0-2.1)
N10/025541	BH15	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (2.8-2.9)

Lab Reg No.		N10/025536	N10/025538	N10/025539	N10/025541	
Sample Reference	Units	BH12	BH13	BH13	BH15	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	0.53	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	0.51	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	0.55	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	106	103	105	96	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

REPORT OF ANALYSIS

Report No. RN817584

Lab Reg No.		N10/025536	N10/025538	N10/025539	N10/025541	
Sample Reference	Units	BH12	BH13	BH13	BH15	Method

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Lab Reg No.		N10/025536	N10/025538	N10/025539	N10/025541	
Sample Reference	Units	BH12	BH13	BH13	BH15	Method
Trace Elements						
Arsenic	mg/kg	16	11	3.4	12	NT2_49
Cadmium	mg/kg	< 0.5	< 0.5	< 0.5	0.51	NT2_49
Chromium	mg/kg	18	38	8.4	20	NT2_49
Copper	mg/kg	17	1880	37	1260	NT2_49
Lead	mg/kg	39	160	22	200	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	NT2_49
Nickel	mg/kg	4.1	36	4	23	NT2_49
Zinc	mg/kg	190	800	37	890	NT2_49
Total Solids	%	83.5	91.6	80.0	88.6	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
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REPORT OF ANALYSIS

Report No. RN817584

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025544	BH16	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (0.3-0.4)
N10/025545	BH16	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (2.8-2.9)
N10/025547	BH17	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (0.4-0.5)
N10/025548	BH17	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (2.8-2.9)

Lab Reg No.		N10/025544	N10/025545	N10/025547	N10/025548	
Sample Reference	Units	BH16	BH16	BH17	BH17	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	0.53	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	0.89	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	0.92	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	104	91	100	96	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

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Lab Reg No.		N10/025544	N10/025545	N10/025547	N10/025548	
Sample Reference	Units	BH16	BH16	BH17	BH17	Method

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Lab Reg No.		N10/025544	N10/025545	N10/025547	N10/025548	
Sample Reference	Units	BH16	BH16	BH17	BH17	Method
Trace Elements						
Arsenic	mg/kg	2.5	22	1.3	8.7	NT2_49
Cadmium	mg/kg	< 0.5	0.6	< 0.5	0.5	NT2_49
Chromium	mg/kg	< 0.5	28	< 0.5	11	NT2_49
Copper	mg/kg	21	1070	18	2180	NT2_49
Lead	mg/kg	25	240	21	320	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	NT2_49
Nickel	mg/kg	2.4	33	1.7	21	NT2_49
Zinc	mg/kg	12	790	8.2	890	NT2_49
Total Solids	%	86.0	88.5	87.2	89.3	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

REPORT OF ANALYSIS

Report No. RN817584

Client	: SGA PROPERTY CONSULTANCY P/L	Job No.	: SGAP01/100923
	LEVEL 2 / 120 CLARENCE STREET	Quote No.	: QT-01493
	SYDNEY 2001 NSW	Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025549	BH17	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.8-3.9)
N10/025551	BH19	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (2.7-2.8)
N10/025552	BH19	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.2-3.3)
N10/025555	BH21	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10 (3.0-3.1)

Lab Reg No.		N10/025549	N10/025551	N10/025552	N10/025555	
Sample Reference	Units	BH17	BH19	BH19	BH21	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	96	116	123	116	
Dates						
Date extracted		23-SEP-2010	23-SEP-2010	23-SEP-2010	23-SEP-2010	
Date analysed		24-SEP-2010	24-SEP-2010	24-SEP-2010	24-SEP-2010	

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Report No. RN817584

Lab Reg No.		N10/025549	N10/025551	N10/025552	N10/025555	
Sample Reference	Units	BH17	BH19	BH19	BH21	Method

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Lab Reg No.		N10/025549	N10/025551	N10/025552	N10/025555	
Sample Reference	Units	BH17	BH19	BH19	BH21	Method
Trace Elements						
Arsenic	mg/kg	< 0.5	5.7	17	34	NT2_49
Cadmium	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NT2_49
Chromium	mg/kg	14	23	< 0.5	13	NT2_49
Copper	mg/kg	8.9	23	11	27	NT2_49
Lead	mg/kg	18	25	9.1	33	NT2_49
Mercury	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2	NT2_49
Nickel	mg/kg	2.5	9.4	1.7	33	NT2_49
Zinc	mg/kg	7.6	29	7.7	24	NT2_49
Total Solids	%	79.4	82.2	83.2	64.8	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
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REPORT OF ANALYSIS

Report No. RN817584

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025557	DUP2	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10
N10/025559	DUP5	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 21/09/10

Lab Reg No.		N10/025557	N10/025559			
Sample Reference	Units	DUP2	DUP5			Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1			NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5			NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	126	126			
Dates						
Date extracted		23-SEP-2010	23-SEP-2010			
Date analysed		24-SEP-2010	24-SEP-2010			

Luke Baker, Analyst
Organics - NSW
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REPORT OF ANALYSIS

Report No. RN817584

Lab Reg No.	Units	N10/025557	N10/025559			Method
Sample Reference		DUP2	DUP5			
Trace Elements						
Arsenic	mg/kg	3.7	2.1			NT2_49
Cadmium	mg/kg	< 0.5	< 0.5			NT2_49
Chromium	mg/kg	1.7	< 0.5			NT2_49
Copper	mg/kg	13	24			NT2_49
Lead	mg/kg	12	23			NT2_49
Mercury	mg/kg	< 0.2	< 0.2			NT2_49
Nickel	mg/kg	1.8	3			NT2_49
Zinc	mg/kg	5.3	9.6			NT2_49
Total Solids	%	83.3	88.3			NT2_49

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Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

28-SEP-2010

All results are expressed on a dry weight basis.

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This Report supersedes reports: RN817508 RN817571

Australian Government
National Measurement Institute

REPORT OF ANALYSIS

Report No. RN820434

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/101013
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027330	BH22	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (0.6-0.7)
N10/027347	DUP1	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949

Lab Reg No.		N10/027330	N10/027347			
Sample Reference	Units	BH22	DUP1			Method
Trace Elements						
Arsenic	mg/kg	6.5	6.2			NT2_49
Cadmium	mg/kg	<0.5	0.51			NT2_49
Chromium	mg/kg	53	37			NT2_49
Copper	mg/kg	640	710			NT2_49
Lead	mg/kg	63	79			NT2_49
Mercury	mg/kg	0.35	1			NT2_49
Nickel	mg/kg	49	41			NT2_49
Zinc	mg/kg	330	410			NT2_49
Total Solids	%	93.4	91.1			NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

15-OCT-2010

All results are expressed on a dry weight basis.

REPORT OF ANALYSIS

Report No. RN820434

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This Report supersedes reports: RN820416

REPORT OF ANALYSIS

Report No. RN820439

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/101013
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027331	BH22	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.8-1.9)

Lab Reg No. / Sample Reference	Units	N10/027331 / BH22				Method
Monocyclic Aromatic Hydrocarbons NMI 1120 Screen						
Benzene	mg/kg	< 1				NGCMS_1120
Toluene	mg/kg	< 1				NGCMS_1120
Ethylbenzene	mg/kg	< 1				NGCMS_1120
m & p-Xylenes	mg/kg	< 2				NGCMS_1120
o-Xylene	mg/kg	< 1				NGCMS_1120
Styrene	mg/kg	< 1				NGCMS_1120
Isopropylbenzene	mg/kg	< 1				NGCMS_1120
n-Propylbenzene	mg/kg	< 1				NGCMS_1120
1,3,5-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
tert-Butylbenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trimethylbenzene	mg/kg	< 1				NGCMS_1120
sec-Butylbenzene	mg/kg	< 1				NGCMS_1120
4-Isopropyltoluene	mg/kg	< 1				NGCMS_1120
n-Butylbenzene	mg/kg	< 1				NGCMS_1120
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
Chloromethane	mg/kg	< 5				NGCMS_1120
Vinyl chloride	mg/kg	< 2				NGCMS_1120
Bromomethane	mg/kg	< 5				NGCMS_1120
Chloroethane	mg/kg	< 5				NGCMS_1120
Trichlorofluoromethane	mg/kg	< 5				NGCMS_1120
1,1-Dichloroethane	mg/kg	< 1				NGCMS_1120
Dichloromethane	mg/kg	< 1				NGCMS_1120
trans-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
1,1-Dichloroethene	mg/kg	< 1				NGCMS_1120
2,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
cis-1,2-Dichloroethene	mg/kg	< 1				NGCMS_1120
Bromochloromethane	mg/kg	< 1				NGCMS_1120
1,1,1-Trichloroethane	mg/kg	< 1				NGCMS_1120
Carbon tetrachloride	mg/kg	< 1				NGCMS_1120
1,1-Dichloropropene	mg/kg	< 1				NGCMS_1120

REPORT OF ANALYSIS

Report No. RN820439

Lab Reg No.		N10/027331				
Sample Reference	Units	BH22				Method
Halogenated Aliphatics Hydrocarbons NMI 1120 Screen						
1,2-Dichloroethane	mg/kg	< 1				NGCMS_1120
Trichloroethene	mg/kg	< 1				NGCMS_1120
1,2-Dichloropropane	mg/kg	< 1				NGCMS_1120
Dibromomethane	mg/kg	< 1				NGCMS_1120
cis-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
trans-1,3-Dichloropropene	mg/kg	< 1				NGCMS_1120
1,1,2-Trichloroethane	mg/kg	< 1				NGCMS_1120
Tetrachloroethene	mg/kg	< 1				NGCMS_1120
1,3-Dichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromoethane	mg/kg	< 1				NGCMS_1120
1,1,1,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,1,2,2-Tetrachloroethane	mg/kg	< 1				NGCMS_1120
1,2,3-Trichloropropane	mg/kg	< 1				NGCMS_1120
1,2-Dibromo-3-chloropropane	mg/kg	< 1				NGCMS_1120
Hexachlorobutadiene	mg/kg	< 1				NGCMS_1120
Halogenated Aromatics Hydrocarbons NMI 1120 Screen						
Chlorobenzene	mg/kg	< 1				NGCMS_1120
Bromobenzene	mg/kg	< 1				NGCMS_1120
2-Chlorotoluene	mg/kg	< 1				NGCMS_1120
4-Chlorotoluene	mg/kg	< 1				NGCMS_1120
1,3-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,4-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2-Dichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,4-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
1,2,3-Trichlorobenzene	mg/kg	< 1				NGCMS_1120
Trihalomethanes NMI 1120 Screen						
Chloroform	mg/kg	< 1				NGCMS_1120
Bromodichloromethane	mg/kg	< 1				NGCMS_1120
Dibromochloromethane	mg/kg	< 1				NGCMS_1120
Bromoform	mg/kg	< 1				NGCMS_1120
Polycyclic Aromatic Hydrocarbons(volatile) NMI 1120 Screen						
Naphthalene	mg/kg	< 1				NGCMS_1120
Poly Aromatic Hydrocarbons NMI 1122 Screen						
Acenaphthylene	mg/kg	< 1				NGCMS_1122
Naphthalene	mg/kg	< 1				NGCMS_1122
Acenaphthene	mg/kg	< 1				NGCMS_1122
Fluorene	mg/kg	< 1				NGCMS_1122
Phenanthrene	mg/kg	< 1				NGCMS_1122
Anthracene	mg/kg	< 1				NGCMS_1122
Fluoranthene	mg/kg	< 1				NGCMS_1122
Pyrene	mg/kg	< 1				NGCMS_1122
Benz(a)anthracene	mg/kg	< 1				NGCMS_1122
Chrysene	mg/kg	< 1				NGCMS_1122

REPORT OF ANALYSIS

Report No. RN820439

Lab Reg No.		N10/027331				
Sample Reference	Units	BH22				Method
Poly Aromatic Hydrocarbons NMI 1122 Screen						
Benzo(b,k)fluoranthene	mg/kg	< 2				NGCMS_1122
Benzo(a)pyrene	mg/kg	< 1				NGCMS_1122
Indeno(1,2,3-cd)pyrene	mg/kg	< 1				NGCMS_1122
Dibenz(a,h)anthracene	mg/kg	< 1				NGCMS_1122
Benzo(g,h,i)perylene	mg/kg	< 1				NGCMS_1122
Phenols NMI 1122 Screen						
Phenol	mg/kg	< 1				NGCMS_1122
2-Chlorophenol	mg/kg	< 1				NGCMS_1122
2-Methylphenol	mg/kg	< 1				NGCMS_1122
3&4-Methylphenol	mg/kg	< 2				NGCMS_1122
2-Nitrophenol	mg/kg	< 1				NGCMS_1122
2,4-Dimethylphenol	mg/kg	< 1				NGCMS_1122
2,4-Dichlorophenol	mg/kg	< 1				NGCMS_1122
2,6-Dichlorophenol	mg/kg	< 1				NGCMS_1122
4-Chloro-3-methylphenol	mg/kg	< 2				NGCMS_1122
2,4,5-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,4,6-Trichlorophenol	mg/kg	< 2				NGCMS_1122
2,3,4,6-Tetrachlorophenol	mg/kg	< 2				NGCMS_1122
Pentachlorophenol	mg/kg	< 2				NGCMS_1122
Oxygenated Compounds NMI 1120 Screen						
Acetone	mg/kg	< 5				NGCMS_1120
2-Butanone (MEK)	mg/kg	< 5				NGCMS_1120
2-Hexanone (MBK)	mg/kg	< 5				NGCMS_1120
4-Methyl-2-pentanone (MIBK)	mg/kg	< 5				NGCMS_1120
Methyl tert-Butyl Ether (MTBE)	mg/kg	< 5				NGCMS_1120
Vinylacetate	mg/kg	< 5				NGCMS_1120
Sulfonated Compounds NMI 1120 Screen						
Carbon disulfide	mg/kg	< 5				NGCMS_1120
Phthalates NMI 1122 Screen						
Dimethyl phthalate	mg/kg	< 1				NGCMS_1122
Diethyl phthalate	mg/kg	< 1				NGCMS_1122
Di-n-butyl phthalate	mg/kg	< 1				NGCMS_1122
Butyl benzyl phthalate	mg/kg	< 1				NGCMS_1122
Bis(2-ethylhexyl) phthalate	mg/kg	< 2				NGCMS_1122
Di-n-octyl phthalate	mg/kg	< 1				NGCMS_1122
Chlorinated Hydrocarbons NMI 1122 Screen						
2-Chloronaphthalene	mg/kg	< 2				NGCMS_1122
1,4-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
1,2-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
1,3-Dichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachlorobenzene	mg/kg	< 2				NGCMS_1122
1,2,4-Trichlorobenzene	mg/kg	< 2				NGCMS_1122
Hexachloroethane	mg/kg	< 2				NGCMS_1122

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Lab Reg No.	Units	N10/027331				Method
Sample Reference		BH22				
Chlorinated Hydrocarbons NMI 1122 Screen						
Hexachlorocyclopentadiene	mg/kg	< 2				NGCMS_1122
Hexachloro-1,3-butadiene	mg/kg	< 2				NGCMS_1122
Ethers NMI 1122 Screen						
4-Bromophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
4-Chlorophenyl phenyl ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethyl)ether	mg/kg	< 2				NGCMS_1122
Bis(2-chloroethoxy)methane	mg/kg	< 2				NGCMS_1122
Bis(2-chloroisopropyl)ether	mg/kg	< 2				NGCMS_1122
Amines Nitroaromatics & Nitrosamines NMI 1122 Screen						
Azobenzene	mg/kg	< 2				NGCMS_1122
2,4-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
2,6-Dinitrotoluene	mg/kg	< 2				NGCMS_1122
Nitrobenzene	mg/kg	< 2				NGCMS_1122
N-Nitrosodimethylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodiphenylamine	mg/kg	< 2				NGCMS_1122
N-Nitrosodi-n-propylamine	mg/kg	< 2				NGCMS_1122
Aniline	mg/kg	< 2				NGCMS_1122
4-Chloroaniline	mg/kg	< 2				NGCMS_1122
2-Nitroaniline	mg/kg	< 2				NGCMS_1122
3-Nitroaniline	mg/kg	< 2				NGCMS_1122
4-Nitroaniline	mg/kg	< 2				NGCMS_1122
Organochlorine Pesticides NMI 1122 Screen						
Aldrin	mg/kg	< 2				NGCMS_1122
a-BHC	mg/kg	< 2				NGCMS_1122
b-BHC	mg/kg	< 2				NGCMS_1122
g-BHC (Lindane)	mg/kg	< 2				NGCMS_1122
d-BHC	mg/kg	< 2				NGCMS_1122
4,4 '-DDD	mg/kg	< 2				NGCMS_1122
4,4 '-DDE	mg/kg	< 2				NGCMS_1122
4,4 '-DDT	mg/kg	< 2				NGCMS_1122
Dieldrin	mg/kg	< 2				NGCMS_1122
Endosulphan I	mg/kg	< 2				NGCMS_1122
Endosulphan II	mg/kg	< 2				NGCMS_1122
Endosulfan sulphate	mg/kg	< 2				NGCMS_1122
Endrin	mg/kg	< 2				NGCMS_1122
Endrin Aldehyde	mg/kg	< 2				NGCMS_1122
Heptachlor	mg/kg	< 2				NGCMS_1122
Heptachlorepoxide	mg/kg	< 2				NGCMS_1122
Organophosphate Pesticides NMI 1122 Screen						
Dimethoate	mg/kg	< 2				NGCMS_1122
Diazinon	mg/kg	< 2				NGCMS_1122
Fenitrothion	mg/kg	< 2				NGCMS_1122
Malathion	mg/kg	< 2				NGCMS_1122

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Lab Reg No.	Units	N10/027331				Method
Sample Reference		BH22				
Organophosphate Pesticides NMI 1122 Screen						
Chlorpyrifos	mg/kg	< 2				NGCMS_1122
Ethion	mg/kg	< 2				NGCMS_1122
Surrogate						
Surrogate semivolatile Rec.	%	103				
Surrogate volatile Rec	%	104				
Dates						
Date extracted		13-OCT-2010				
Date analysed		13-OCT-2010				
Others						
Dichlorobenzidine	mg/kg	< 2				NGCMS_1122
2-Methylnaphthalene	mg/kg	< 1				NGCMS_1122
Isophorone	mg/kg	< 2				NGCMS_1122
Benzyl alcohol	mg/kg	< 2				NGCMS_1122
Carbazole	mg/kg	< 2				NGCMS_1122
Dibenzofuran	mg/kg	< 2				NGCMS_1122

Luke Baker, Analyst
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Accreditation No. 198

15-OCT-2010

Lab Reg No.	Units	N10/027331				Method
Sample Reference		BH22				
Trace Elements						
Total Solids	%	95.2				NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

15-OCT-2010

REPORT OF ANALYSIS

Report No. RN820439

All results are expressed on a dry weight basis.

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This Report supersedes reports: RN820415 RN820417

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REPORT OF ANALYSIS

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/101013
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027332	BH22	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (2.5-2.6)
N10/027333	BH23	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.3-3.4)
N10/027334	BH23	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.4-3.5)
N10/027335	BH24	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.8-1.9)

Lab Reg No.		N10/027332	N10/027333	N10/027334	N10/027335	
Sample Reference	Units	BH22	BH23	BH23	BH24	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	109	103	112	97	
Dates						
Date extracted		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	
Date analysed		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	

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Report No. RN820449

Lab Reg No.		N10/027332	N10/027333	N10/027334	N10/027335	
Sample Reference	Units	BH22	BH23	BH23	BH24	Method

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Lab Reg No.		N10/027332	N10/027333	N10/027334	N10/027335	
Sample Reference	Units	BH22	BH23	BH23	BH24	Method
Trace Elements						
Total Solids	%	83.2	91.7	91.9	74.0	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
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REPORT OF ANALYSIS

Report No. RN820449

Client	: SGA PROPERTY CONSULTANCY P/L	Job No.	: SGAP01/101013
	LEVEL 2 / 120 CLARENCE STREET	Quote No.	: QT-01493
	SYDNEY 2001 NSW	Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027336	BH24	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.25-3.35)
N10/027337	BH25	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.1-3.2)
N10/027338	BH25	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.2-3.3)
N10/027339	BH26	SOIL PROJECT 176-784 GEORGE STREET CONCORD WEST NSW JOB 91949 (0.7-0.8)

Lab Reg No.		N10/027336	N10/027337	N10/027338	N10/027339	
Sample Reference	Units	BH24	BH25	BH25	BH26	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	110	103	106	111	
Dates						
Date extracted		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	
Date analysed		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	

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Report No. RN820449

Lab Reg No.		N10/027336	N10/027337	N10/027338	N10/027339	
Sample Reference	Units	BH24	BH25	BH25	BH26	Method

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Lab Reg No.		N10/027336	N10/027337	N10/027338	N10/027339	
Sample Reference	Units	BH24	BH25	BH25	BH26	Method
Trace Elements						
Total Solids	%	91.3	71.5	90.3	78.9	NT2_49

Anna Zheng, Analyst
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REPORT OF ANALYSIS

Report No. RN820449

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No. Quote No. Order No. Date Sampled Date Received	: SGAP01/101013 : QT-01493 : : 12-OCT-2010 : 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027340	BH26	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (2.9-3.0)
N10/027341	BH27	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.7-1.8)
N10/027342	BH27	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.8-1.9)
N10/027343	BH28	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.6-1.7)

Lab Reg No.		N10/027340	N10/027341	N10/027342	N10/027343	
Sample Reference	Units	BH26	BH27	BH27	BH28	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	0.92	< 0.5	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	1.1	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	0.60	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	0.62	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	1.2	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	0.84	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	0.51	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	111	119	115	107	
Dates						
Date extracted		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	
Date analysed		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	

REPORT OF ANALYSIS

Report No. RN820449

Lab Reg No.		N10/027340	N10/027341	N10/027342	N10/027343	
Sample Reference	Units	BH26	BH27	BH27	BH28	Method

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Lab Reg No.		N10/027340	N10/027341	N10/027342	N10/027343	
Sample Reference	Units	BH26	BH27	BH27	BH28	Method
Trace Elements						
Total Solids	%	63.7	81.0	83.8	78.2	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

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REPORT OF ANALYSIS

Report No. RN820449

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/101013
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027344	BH28	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.7-1.8)
N10/027345	BH29	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (0.8-0.9)
N10/027346	BH29	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (7.7-2.8)
N10/027348	DUP3	SOIL PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949

Lab Reg No.		N10/027344	N10/027345	N10/027346	N10/027348	
Sample Reference	Units	BH28	BH29	BH29	DUP3	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Acenaphthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluorene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Phenanthrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Fluoranthene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(a)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Chrysene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1	< 1	< 1	< 1	NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	124	116	121	119	
Dates						
Date extracted		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	
Date analysed		13-OCT-2010	13-OCT-2010	13-OCT-2010	13-OCT-2010	

REPORT OF ANALYSIS

Lab Reg No.		N10/027344	N10/027345	N10/027346	N10/027348	
Sample Reference	Units	BH28	BH29	BH29	DUP3	Method

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

15-OCT-2010

Lab Reg No.		N10/027344	N10/027345	N10/027346	N10/027348	
Sample Reference	Units	BH28	BH29	BH29	DUP3	Method
Trace Elements						
Total Solids	%	78.1	83.3	82.4	83.6	NT2_49

Anna Zheng, Analyst
Inorganics - NSW
Accreditation No. 198

15-OCT-2010

All results are expressed on a dry weight basis.

ACCREDITED FOR TECHNICAL COMPETENCE

This report is issued in accordance with NATA's accreditation requirements.
Accreditated for compliance with ISO/IEC 17025.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: RN820415 RN820417

Australian Government

National Measurement Institute

REPORT OF ANALYSIS

Report No. RN820451

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/101013
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	: 12-OCT-2010
		Date Received	: 13-OCT-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George St. Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/027333/T	BH23	SOIL LEACHATE PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (3.3-3.4)
N10/027335/T	BH24	SOIL LEACHATE PROJECT 176-184 GEORGE STREET CONCORD WEST NSW JOB 91949 (1.8-1.9)

Lab Reg No.		N10/027333/T	N10/027335/T			
Sample Reference	Units	BH23	BH24			Method
Poly Aromatic Hydrocarbons						
Benzo(a)pyrene	ug/L	< 0.5	< 0.5			NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	106	110			
Dates						
Date extracted		13-OCT-2010	13-OCT-2010			
Date analysed		13-OCT-2010	13-OCT-2010			

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

15-OCT-2010

Lab Reg No.		N10/027333/T	N10/027335/T			
Sample Reference	Units	BH23	BH24			Method
TCLP						
Soil pH		7.2	7.5			NW_SL9
pH of Initial Extract		4.9	4.9			NW_SL9
pH of Final Extract		5.1	5.0			NW_SL9
Buffer Used		pH = 4.93	pH = 4.93			NW_SL9

REPORT OF ANALYSIS

Report No. RN820451

Lab Reg No.		N10/027333/T	N10/027335/T			
Sample Reference	Units	BH23	BH24			Method

Wei Huang, Analyst
Inorganics - NSW
Accreditation No. 198

15-OCT-2010

20g of sample was leached for 18 hours with 400mL buffer at pH 4.93 and the leachate tested for the above analyte.

ACCREDITED FOR TECHNICAL COMPETENCE

This report is issued in accordance with NATA's accreditation requirements.
Accreditated for compliance with ISO/IEC 17025.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: RN820438   RN820445

REPORT OF ANALYSIS

Client	: SGA PROPERTY CONSULTANCY P/L LEVEL 2 / 120 CLARENCE STREET SYDNEY 2001 NSW	Job No.	: SGAP01/100923
		Quote No.	: QT-01493
		Order No.	:
		Date Sampled	:
		Date Received	: 23-SEP-2010
Attention	: NICOLAS KUERZINGER	Sampled By	: CLIENT
Project Name	: 176-184 George Street Concord		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N10/025529/T	BH09	SOIL JOB 91949 PROJECT 176-184 GEORGE STREET CONCORD WEST NSW 20/09/10 (3.1-3.2)

Lab Reg No.		N10/025529/T				
Sample Reference	Units	BH09				Method
Poly Aromatic Hydrocarbons						
Benzo(a)pyrene	ug/L	< 0.5				NGCMS_1111
Surrogate						
Surrogate semivolatile Rec.	%	98				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

13-OCT-2010

Lab Reg No.		N10/025529/T				
Sample Reference	Units	BH09				Method
TCLP						
Soil pH		8.4				NW_SL9
pH of Initial Extract		4.9				NW_SL9
pH of Final Extract		5.2				NW_SL9
Buffer Used		pH = 4.93				NW_SL9

Wei Huang, Analyst
Inorganics - NSW
Accreditation No. 198

13-OCT-2010

REPORT OF ANALYSIS

Report No. RN820096

One part of sample was leached for 18 hours with 20 parts of buffer at pH 4.93 and the leachate tested for the above analyte.

This report is issued in accordance with NATA's accreditation requirements.
Accreditated for compliance with ISO/IEC 17025.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: RN819962 RN820095

SGAPD/101013

CHAIN OF COUNTY

15/10/10 L.A

Australian Government
National Measurement Institute

NMI

Sent by (Company Name):	SGA Property Consultancy	PROJECT NAME: 176-184 George Street, Concord West, NSW
Address:	Level 2, 120 Clarence Street Sydney NSW 2000	NMI Quote Number: PL10/0119C Your Purchase Order Number:
Phone: (02) 9299 2988	Fax: (02) 9299 5288 Mob: 0448 210 475	Your Job Number: 91949
Contact Person : Nicolas Kuerzinger		Results due date (as agreed with NMI): 15/10/2010
Email: : nkuerzinger@sgaproperty.com		

SEND TO:
NMI (National Measurement Institute)
1 Suakin Street, PYMBLE, NSW 2073, Australia
Phone: +61 2 9449 0111
E-mail: customerservice@measurement.gov.au
NMI Contact Person : BRIAN WOODWARD

NMI SAMPLE NUMBER (NMI USE ONLY - please do not write in this column)	Your Sample ID / Description / Number	Collection Information	Sample type	PAH	TCLP B(a)P routine level	HM	8260/8270	COMMENTS
N1C/027330	BH22 (0.6-0.7)	12/10/2010	Soil			X		TAT: COB FRIDAY
N1C/027331	BH22 (1.8-1.9)	12/10/2010	Soil				X	
N1C/027332	BH22 (2.5-2.6)	12/10/2010	Soil	X				
N1C/027333	BH23 (3.3-3.4)	12/10/2010	Soil	X	X			N1C/027333 /T
N1C/027334	BH23 (3.4-3.5)	12/10/2010	Soil	X				
N1C/027335	BH24 (1.8-1.9)	12/10/2010	Soil	X	X			N1C/027335 /T
N1C/027336	BH24 (3.25-3.35)	12/10/2010	Soil	X				
N1C/027337	BH25 (3.1-3.2)	12/10/2010	Soil	X				
N1C/027338	BH25 (3.2-3.3)	12/10/2010	Soil	X				
N1C/027339	BH26 (0.7-0.8)	12/10/2010	Soil	X				
N1C/027340	BH26 (2.9-3.0)	12/10/2010	Soil	X				RECEIVED
N1C/027341	BH27 (1.7-1.8)	12/10/2010	Soil	X				13 OCT 2010
N1C/027342	BH27 (1.8-1.9)	12/10/2010	Soil	X				BY: SH 2:00 C
N1C/027343	BH28 (1.6-1.7)	12/10/2010	Soil	X				
N1C/027344	BH28 (1.7-1.8)	12/10/2010	Soil	X				

Relinquished by:		NMI USE ONLY: Received at NMI laboratory by:	PAGE No: 1 of 2 PAGES
Print Name:	Nicolas Kuerzinger	Print Name:	
Date & Time:	13/10/2010 11:00	Date & Time: / / : hrs	If multiple pages, ensure ALL pages are stapled together
Signature:	Nicolas Kuerzinger	Signature:	

All work is carried out subject to NMI's current terms and conditions

CHAIN OF CUSTODY

NMI

Australian Government
National Measurement Institute

Sent by (Company Name):	SGA Property Consultancy	PROJECT NAME: 176-184 George Street, Concord West, NSW	SEND TO:
Address:	Level 2, 120 Clarence Street	NMI Quote Number: PL10/0119C	NMI (National Measurement Institute)
	Sydney NSW 2000	Your Purchase Order Number:	1 Suakin Street, PYMBLE, NSW 2073, Australia
Phone: (02) 9299 2988	Fax: (02) 9299 5288 Mob: 0448 210 475	Your Job Number: 91949	Phone: +61 2 9449 0111
Contact Person : Nicolas Kuerzinger		Results due date (as agreed with NMI): 15/10/2010	E-mail: customerservice@measurement.gov.au
Email: : nkuerzinger@sgaproperty.com			NMI Contact Person : BRIAN WOODWARD

NMI SAMPLE NUMBER (NMI USE ONLY - please do not write in this column)	Your Sample ID / Description / Number	Collection Information	Sample type	PAH	TCLP B(a)P routine level	HM	8260/8270	COMMENTS
N 10/027345	BH29 (0.8-0.9)	12/10/2010	Soil	x				
N 10/027346	BH29 (2.7-2.8)	12/10/2010	Soil	x				
N 10/027347	Dup 1	12/10/2010	Soil			x		
N 10/027348	Dup 3	12/10/2010	Soil	x				

RECEIVED
13 OCT 2010
BY: SH 2:00 C

Relinquished by:	Nicolas Kuerzinger	NMI USE ONLY: Received at NMI laboratory by:	PAGE No: 2 of 2 PAGES
Print Name:	Nicolas Kuerzinger	Print Name:	
Date & Time:	13/10/2010 11:00	Date & Time: / / : hrs	If multiple pages, ensure ALL pages are stapled together
Signature:	Kuerzinger	Signature:	

All work is carried out subject to NMI's current terms and conditions

Australian Government

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

To: SGA PROPERTY CONSULTANCY P/L
Attn: NICOLAS KUERZINGER
From: Laboratory Services Unit
Date: 13-OCT-2010
Email:

If you have any queries or wish to make any adjustments to analyses requested, please contact Susanne Neuman immediately on 02 9449 0181

Project:	176-184 George St. Concord
Order No.:	Not Provided
NMI Job No:	SGAP01/101013
Total Number of Samples:	20
LRN Range:	N10/027330 to N10/027348
Date received by NMI:	13-OCT-2010
Estimated Report Date:	15-OCT-2010

Comments:

Samples received	Chilled
NMI quotation number provided	No
Complete documentation received	Yes

If NO please contact Susanne Neuman on 02 9449 0181 to clarify. Note: incomplete or unclear information about samples or required testing will delay the start of the analysis work

Unless advised otherwise sample analysis will commence regardless of integrity issues
Relevant non-conformances will be recorded on the final report.

SGAP01/100923
DUE 27/9/10
LA

CHAIN OF CUSTODY

NMI

Australian Government
National Measurement Institute

Sent by (Company Name): SGA Property Consultancy
Address: Level 2, 120 Clarence Street
Sydney NSW 2000
Phone: (02) 9299 2988 Fax: (02) 9299 5288 Mob: 0448 210 475
Contact Person : Nicolas Kuerzinger
Email: : nkuerzinger@sgaproperty.com

PROJECT NAME: 176-184 George Street, Concord West, NSW
NMI Quote Number: PL10/0119C
Your Purchase Order Number:
Your Job Number: 91949
Results due date (as agreed with NMI): 27/09/2010

SEND TO:
NMI (National Measurement Institute)
1 Suakin Street, PYMBLE, NSW 2073, Australia
Phone: +61 2 9449 0111
E-mail: customerservice@measurement.gov.au
NMI Contact Person : BRIAN WOODWARD

NMI SAMPLE NUMBER (NMI USE ONLY - please do not write in this column)	Your Sample ID / Description / Number	Collection Information	Sample type	Heavy Metals	PAH	TPH	TPH/BTEX	TPH/BTEX/PAH	TPH/PAH	OCP/OPP	VOC	PCB	8260/8270	Aromatic/Aliphatic Split				COMMENTS
N1C/025516	BH01 (0.3-0.4)	20/09/2010	Soil	x														
N1C/025517	BH01 (3.3-3.4)	20/09/2010	Soil		x	x				x	x							
N1C/025518	BH02 (1.1-1.2)	20/09/2010	Soil	x														
N1C/025519	BH02 (3.1-3.2)	20/09/2010	Soil				x				x							
N1C/025520	BH03 (0.4-0.5)	20/09/2010	Soil		x													
N1C/025521	BH04 (1.8-1.9)	20/09/2010	Soil	x	x													
N1C/025522	BH05 (0.3-0.4)	20/09/2010	Soil	x														
N1C/025523	BH05 (3.3-3.4)	20/09/2010	Soil	x				x										
N1C/025524	BH06 (0.6-0.7)	20/09/2010	Soil	x														
N1C/025525	BH06 (1.4-1.5)	20/09/2010	Soil	x														
N1C/025526	BH08 (3.3-3.4)	20/09/2010	Soil				x											
N1C/025527	BH08 (0.2-0.3)	20/09/2010	Soil	x	x													
N1C/025528	BH08 (3.45)	20/09/2010	Soil	x				x										
N1C/025529	BH09 (3.1-3.2)	20/09/2010	Soil	x				x										
N1C/025530	BH09 (3.3-3.4)	20/09/2010	Soil	x				x										

Relinquished by:
Print Name: Nicolas Kuerzinger
Date & Time: 23/09/2010 09:00
Signature:

NMI USE ONLY: Received at NMI laboratory by:
Print Name:
Date & Time: / / : hrs
Signature:

PAGE No: 1 of 3 PAGES

If multiple pages, ensure ALL pages are stapled together

TAT: COB

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23 SEP 2010
BY: NN 11:30

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NMI

Australian Government
National Measurement Institute

Sent by (Company Name):	SGA Property Consultancy	PROJECT NAME: 176-184 George Street, Concord West, NSW	SEND TO:
Address:	Level 2, 120 Clarence Street	NMI Quote Number: PL10/0119C	NMI (National Measurement Institute)
	Sydney NSW 2000	Your Purchase Order Number:	1 Suakin Street, PYMBLE, NSW 2073, Australia
Phone: (02) 9299 2988	Fax: (02) 9299 5288 Mob: 0448 210 475	Your Job Number: 91949	Phone: +61 2 9449 0111
Contact Person : Nicolas Kuerzinger		Results due date (as agreed with NMI): 27/09/2010	E-mail: customerservice@measurement.gov.au
Email: : nkuerzinger@sgaproperty.com			NMI Contact Person : BRIAN WOODWARD

NMI SAMPLE NUMBER (NMI USE ONLY - please do not write in this column)	Your Sample ID / Description / Number	Collection Information	Sample type	Heavy Metals	PAH	TPH	TPH/BTEX	TPH/BTEX/PAH	TPH/PAH	OCP/OPP	VOC	PCB	8260/8270	Aromatic/Aliphatic Split				COMMENTS
N1C/025531	BH10 (0.3-0.4)	20/09/2010	Soil	X	X													
N1C/025532	BH10 (0.6-0.7)	20/09/2010	Soil	X	X													
N1C/025533	BH11 (0.7-0.8)	20/09/2010	Soil	X						X								
N1C/025534	BH11 (1.4-1.5)	20/09/2010	Soil	X			X											
N1C/025535	BH11 (2.7-2.8)	20/09/2010	Soil				X											
N1C/025536	BH12 (0.7-0.8)	20/09/2010	Soil	X	X													
N1C/025537	BH12 (2.8-2.9)	20/09/2010	Soil				X											
N1C/025538	BH13 (0.4-0.5)	20/09/2010	Soil	X	X													
N1C/025539	BH13 (2.0-2.1)	20/09/2010	Soil	X	X													
N1C/025540	BH13 (3.9-4.0)	20/09/2010	Soil				X											
N1C/025541	BH15 (2.8-2.9)	21/09/2010	Soil	X	X													
N1C/025542	BH15 (3.0-3.1)	21/09/2010	Soil			X			A-B X				X					client confirmed A-B
N1C/025543	BH15 (3.6-3.7)	21/09/2010	Soil	X		X					X							
N1C/025544	BH16 (0.3-0.4)	21/09/2010	Soil	X	X													
N1C/025545	BH16 (2.8-2.9)	21/09/2010	Soil	X	X													

Relinquished by:	Nicolas Kuerzinger	NMI USE ONLY: Received at NMI laboratory by:	
Print Name:	Nicolas Kuerzinger	Print Name:	PAGE No: 2 of 3 PAGES
Date & Time:	23/09/2010 09:00	Date & Time: / / : hrs	
Signature:		Signature:	If multiple pages, ensure ALL pages are stapled together

TAT

RECEIVED 23 SEP 2010 BY: NN 11:30

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NMI

Australian Government
National Measurement Institute

Sent by (Company Name): SGA Property Consultancy
Address: Level 2, 120 Clarence Street
Sydney NSW 2000
Phone: (02) 9299 2988 Fax: (02) 9299 5288 Mob: 0448 210 475
Contact Person : Nicolas Kuerzinger
Email: : nkuerzinger@sgaproperty.com

PROJECT NAME: 176-184 George Street, Concord West, NSW
NMI Quote Number: PL10/0119C
Your Purchase Order Number:
Your Job Number: 91949
Results due date (as agreed with NMI): 27/09/2010

SEND TO:
NMI (National Measurement Institute)
1 Suakin Street, PYMBLE, NSW 2073, Australia
Phone: +61 2 9449 0111
E-mail: customerservice@measurement.gov.au
NMI Contact Person : BRIAN WOODWARD

NMI SAMPLE NUMBER (NMI USE ONLY - please do not write in this column)	Your Sample ID / Description / Number	Collection Information	Sample type	Heavy Metals	PAH	TPH	TPH/BTEX	TPH/BTEX/PAH	TPH/PAH	OCP/OPP	VOC	PCB	8260/8270	Aromatic/Aliphatic Split				COMMENTS
N1C/025546	BH16 (3.2-3.3)	21/09/2010	Soil	x	x								x	x				
N1C/025547	BH17 (0.4-0.5)	21/09/2010	Soil	x	x													
N1C/025548	BH17 (2.8-2.9)	21/09/2010	Soil	x	x													
N1C/025549	BH17 (3.8-3.9)	21/09/2010	Soil	x	x													
N1C/025550	BH18 (2.9-3.0)	21/09/2010	Soil		x							x						
N1C/025551	BH19 (2.7-2.8)	21/09/2010	Soil	x	x													
N1C/025552	BH19 (3.2-3.3)	21/09/2010	Soil	x	x													
N1C/025553	BH20 (3.3-3.4)	21/09/2010	Soil	x	x		x											
N1C/025554	BH20 (4.7-4.8)	21/09/2010	Soil	x			x											
N1C/025555	BH21 (3.0-3.1)	21/09/2010	Soil	x	x													
N1C/025556	Dup 1	20/09/2010	Soil	x														
N1C/025557	Dup 2	20/09/2010	Soil	x	x													
N1C/025558	Dup 3	20/09/2010	Soil				x											
N1C/025559	Dup 5	21/09/2010	Soil	x	x													

Relinquished by: Nicolas Kuerzinger
Print Name: Nicolas Kuerzinger
Date & Time: 23/09/2010 09:00
Signature:

NMI USE ONLY: Received at NMI laboratory by:
Print Name:
Date & Time: / / : hrs
Signature:

PAGE No: of 3 PAGES

If multiple pages, ensure ALL pages are stapled together

All work is carried out subject to NMI's current terms and conditions

2010 C.
NN 11:30

Clientforms: 91949 - NMI_COC

Australian Government

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

To: SGA PROPERTY CONSULTANCY P/L
Attn: NICOLAS KUERZINGER
From: Laboratory Services Unit
Date: 23-SEP-2010
Email:

If you have any queries or wish to make any adjustments to analyses requested, please contact Susanne Neuman immediately on 02 9449 0181

Project:	176-184 George Street Concord
Order No.:	Not Provided
NMI Job No:	SGAP01/100923
Total Number of Samples:	44
LRN Range:	N10/025516 to N10/025559
Date received by NMI:	23-SEP-2010
Estimated Report Date:	27-SEP-2010

Comments:

Samples received	Chilled
NMI quotation number provided	Yes
Complete documentation received	Yes

If NO please contact Susanne Neuman on 02 9449 0181 to clarify. Note: incomplete or unclear information about samples or required testing will delay the start of the analysis work

Unless advised otherwise sample analysis will commence regardless of integrity issues
Relevant non-conformances will be recorded on the final report.

TOWN PLANNING
AND URBAN DESIGN

Appendix C: Remediation Action Plan

DLA environmental

Remediation Action Plan

176-184 George Street

Concord West 2134

Lots 4-12 & 15-16 DP 15973

and Lots 1 & 2 DP 226350

Prepared for

George Concord Pty Ltd

Rear 53-57 Cosgrove Road

South Strathfield

NSW 2136

Prepared by

DAVID LANE ASSOCIATES

DL2853

February 2012

Sydney
Unit 2B 30 Leighton Place
Hornsby NSW 2077
Phone: 9476 1765
Fax: 9476 1557
Email: dlassociates@bigpond.com

Newcastle
PO Box 137
Branxton NSW 2335
Phone: 4938 3800
Fax: 4938 3811
Email: dolane@bigpond.com

ABN 36 926 003 197

Executive Summary

DLA Environmental (DLA) was commissioned by George Concord Pty Ltd, to prepare a Remediation Action Plan (RAP) on the property identified as 176-184 George Street, Concord West, 2134 (Site) (Lots 4-12, 15 & 16 DP 15973 and Lots 1 & 2 DP 226350). The Site is located approximately twelve kilometres (12km) west of the Sydney CBD on George Street, Concord West. The land covers an area of approximately 0.76ha. This RAP considers the findings of the Detailed Site Investigation (DSI) undertaken by SGA Environmental (Project No. 91949) dated October 2010.

Refer to **Figure 1** – *Site Location*

The Site is currently occupied by a disused industrial and commercial building. The warehouse is approximately 0.49ha, L shaped with offices in the north and surrounding car parking. The Site is to be redeveloped to accommodate a new residential tower block with basement parking.

Initial field investigation for the DSI on the 20th-21st of September 2010 identified a contamination hotspot of Total Recoverable Hydrocarbons (TRH), Polycyclic Aromatic Hydrocarbons (PAH), and Benzo(a)pyrene (BaP) in the south west of the site. A subsequent investigation was undertaken on the 12th October 2010 to delineate this hotspot.

Refer to **Figure 2** – *SGA Environmental Site Layout and Sampling Locations*

At the majority of external locations sampled a surface layer of concrete up to 0.22m thick was encountered. This surface layer of concrete increased up to 0.39m thick within the warehouse with borehole BH14 encountering a concrete slab of 0.5m thick before refusal. Fill material was found at all locations with redistributed natural material found underneath fill material in several locations. No groundwater was encountered during the field investigation.

The 2010 DSI considered the Site in relation to Industrial/Commercial land use criteria. However once the hotspot is remediated and any underground storage tanks (USTs) are removed the Site will qualify as the more stringent Residential with minimal soil access land use.

The identified areas of potential environmental concern within the Site are the existing contamination hotspot and the presence of underground storage tanks (USTs). The source of the hotspot contamination is felt to be pyrogenic waste used as fill material. USTs have been historically identified on site and decommissioned however the current DSI was unable to confirm the presence or absence of USTs.

Based on the analysis undertaken, considering the nature of the proposed development, specifically the excavation of an underground car park; the **Excavate and Dispose** strategy is the optimal strategy for remediation of the 176-184 George Street, Concord West Site. It is recognised that some dust may be generated and would need mitigation measures. Excavations are not expected to cause any offensive odour to persons other than those directly engaged in the remediation works.

At the completion of the remedial works a Validation Report stating that the Site is suitable for its intended land use and documenting the works as completed will be prepared. Validation sample collection should include upper and lower soil samples from the excavation walls and from the base of the excavation, to be analysed for the Contaminants of Concern. Sample numbers and analysis will be dependent on area and a review of initial assessment data to conform to EPA NSW Contaminated Sites*: Sampling Design Guidelines (1995)* and *Guidelines for Assessing Service Station Sites (1994)*

A major component of the remedial works shall involve the installation and maintenance of a Site Environmental Management Plan. The Site Environmental Management Plan will provide details of the environmental protection and pollution control measures to be implemented during the operational phase of the remedial works.

In conclusion the RAP:

- Has been developed in a manner consistent with current industry practice;
- Has selected a preferred remediation strategy based on the site-specific issues and currently available technologies;
- Has presented an outline of the Environmental Management Plan (EMP) and associated contingency plans to ensure the environment is appropriately protected during the proposed works;
- Has presented an information and consultation program to ensure the stakeholders are informed of the works as they proceed; and,
- Has outlined the means of validation of the completed works.

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FIGURES

1.0 INTRODUCTION

1.1 General

David Lane Associates (DLA) was commissioned by George Concord Pty Ltd, to prepare a Remediation Action Plan (RAP) on the property identified as Lots 4-12, 15 and 16 DP15973 and Lots 15 & 16 DP226350 located at 176-184 George Street, Concord West, NSW. This RAP considers the findings of the Detail Site Investigation undertaken by SGA Environmental (project no. 91949) dated October 2010.

Based on the results of the Detailed Site Investigation a RAP was required by The City of Canada Bay Council to be developed and implemented to remediate the site and surrounds if the site was to be redeveloped, to render them suitable for the proposed use. This Remedial Action Plan (RAP) has been prepared on the basis of the information obtained during the above listed study and from experience, knowledge and current industry practice in remediation of similar sites.

1.2 Objectives of the Remedial Action Plan

The NSW OEH indicates that a Remedial Action Plan should:

- Set remediation goals that ensure the remediated site will be suitable for the proposed use and will pose no unacceptable risk to the human health or the environment;
- Document the procedures and plans to be implemented to reduce the risk of significant harm to acceptable levels;
- Establish the environmental safeguards required in completing the remediation in an environmentally acceptable manner; and,
- Identify necessary approvals and licences required by regulatory authorities.

This report provides:

- A brief summary of the history of the Site
- A description of the site, and the surrounding environment, including a summary of the site geology and hydrogeology;
- A summary of the contamination status;

- A review of the currently available remediation/management options which could achieve the remediation goals, as well as the limitations of each method and comparison of the options;
- Details of the preferred remediation strategy, and an outline of the methodology for the implementation of the selected strategy;
- A brief outline of environmental pollution control, community health and safety, and occupational health and safety measures that should be implemented during remedial works;
- An outline of regulatory approvals and licenses which may be required to adopt the preferred remedial strategy; and
- Conclusions.

1.3 Remediation Goals

Based on the NSW OEH and The City of Canada Bay Council requirements, the primary objectives of the remediation program at the Site are:

- To negate any appreciable risk of human or environmental exposure to contaminated soils or groundwater.
- To halt the possible migration of impacted soil; and,
- To provide an end product desirable for the preferred intended land use.

Although the current Detailed Site Investigation (DSI) Site Acceptance Criteria (SAC) was based on the approach outlined in NSW DECC Contaminated Sites: Guidelines for the NSW Site Auditor Scheme - 2006 2nd Edition (NEHF A) and Schedule B1 Guidelines on the Investigation Levels for Soil and Groundwater from the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) 1999 – Table 5A - Column F – Commercial Industrial once the hotspot identified in the DSI is and any potential Underground Storage tanks (USTs) are removed the site will qualify for the more stringent Table 5A - Column D – Residential with minimal soil access.

2.0 SITE DETAILS

2.1 Site Identification

The Site is located approximately twelve kilometres (12km) west of the Sydney CBD on George Street, Concord West. The land covers an area of approximately 0.76ha.

Refer to Site Location in **Figure 1**

The Site consists of a warehouse of approximately 0.49ha and surrounding parking areas. The building on the site is an L shaped warehouse with office areas in the north east of the site. Approximately 95% of the site is covered with concrete hardstand with the unsealed portions consisting of landscaped areas in the car park and along the eastern boundary of the site.

Refer to **Figure 2 –** Site Layout

The closest identified down gradient environmental receptors is likely to be Powells creek, located approximately 150m to the west, which flows north to Homebush Bay

2.2 Environmental Setting

2.2.1 Site Topography

The Site is relatively flat with a slope down to the north with a change in surface elevation of approximately 1m from the South Eastern corner to the Northern boundary.

2.2.2 Site Geology and Soils

The Sydney 1:100,000 Geological Series Sheet 9130 shows that the site is underlain by Triassic aged Ashfield Shale of the Wianamatta Group.

The Sydney 1:100,000 Soil Landscape Series Sheet 9130 (1989) shows that the site is located within the Blacktown soil landscape grouping, which comprises gently undulating rises on Wianamatta Group Shales and Hawkesbury Shale. The soils within this landscape group are shallow to moderately deep Red and Brown Podzolic Soils on crests, upper slopes and well drained areas; and Yellow Podzolic Soils and Soloths on lower slopes and in areas of poor drainage. The limitations of this landscape grouping include moderately reactive highly plastic subsoil, low soil fertility and poor soil drainage.

The current field investigation indicates that the subsurface profile comprises areas of natural silty clays and areas of fill underlain by shale.

The Australian Soil Research Information Service (ASRIS) Map (CSIRO Land and Water, 2006), indicates the site as having a low probability for Acid Sulphate Soils

2.2.3 Site Hydrology and Hydrogeology

A groundwater bore search of the Department of Natural Resources (DNR) website database was conducted. The search identified no groundwater bores of relevance within one (1) km of the site.

Surface water flow is expected to be to the north consistent with the local topography and the provision of hardstand surfacing, to be collected in the existing stormwater system.

2.2.4 Site Meteorology

The Department of Meteorology NSW presents the average rainfall for the Concord West area at 1136.3 mm annually. The annual maximum daytime average temperature ranges from 16.7°- 26.6° C.

2.2.5 Flora and Fauna

No endangered or threatened terrestrial species of flora or fauna have been identified on the study site. The Site is not known to contain dependant populations, or to be representative of unique habitat.

2.3 Land Use

2.3.1 Current Land Use

The Site is currently occupied by a unused warehouse with offices and is surrounded by the following environment:

North	=	Residential Land Use
East	=	George Street with Commercial Land use beyond
South	=	Residential Land use
West	=	Powells Creek Reserve

Neighbouring premises are considered unlikely to pose a significant pollution risk to the Site.

2.3.2 Selected Aerial Photographs

A review of seven *(7)* selected historical aerial photographs (years 1930, *1943,* 1951, 1961, 1972, 1986, and 2007) was conducted in order to assess the site conditions, especially the presence of any former old buildings within the Site.

The 1930 photograph shows the site as vacant land with earthworks being undertaken throughout the site and in neighbouring areas to the west. Commercial/Industrial and residential buildings appear to the east and the north. In 1943 a square industrial building was located in the northern half of the site with the southern and north eastern sections remaining clear. The square industrial building had been removed by 1951 with the site comprising of vacant land with no vegetation or buildings. Powell creek appeared to have been straightened and canalised. The site was vacant in 1961 except for a small shed in the south eastern corner. A large industrial building had been constructed by 1972 with loading bays and a car park in the south. An extension of the southern section over the pre existing loading bays had occurred by 1986 with the site appearing in its current configuration by 2007.

2.4 Future Land Use

The proposed development consists of a change of land zoning and the construction of a residential apartment building over basement car parking.

2.5 Contamination Status

2.5.1 Previous Reports

Four (4) site investigations have been undertaken for the Site. Environmental Management Australia Pty Ltd conducted a limited site investigation in 1997 that concluded that the site had been filled and no significant contamination had been noted.

BC Furr Environmental Services Pty Ltd conducted a Detailed Site Investigation (DSI) in 2000. This DSI assessed the extent of contamination on Site to determine if it would be possible to redevelop the Site for a residential land use. The report stated that the Site was free from significant contamination with the exception of a hotspot of heavy metal contamination in the south of the eastern part of the site and two underground storage tanks (USTs) that would need to be removed for the site to be considered suitable for residential purposes. Contamination was also present in fill material on a lot to the north that is no longer included in the Site.

A Status Report of Remedial Works was undertaken by Peter J Ramsey and Associates in 2002. This report stated that apart from the decommissioning of the USTs all environmental works had been completed. The report also stated that sampling at the storage tanks in 2002 indicated that the tanks had not leaked.

A Site Audit Statement (SAS) was issued in 2002 for all lots subject to the current investigation. The SAS certified the site was suitable for commercial/industrial land use.

2.5.2 Current Investigation

Environmental investigations were carried out between the 20th and the 21st of September 2010 with additional investigation undertaken on the 12th October 2010. Initial investigation comprised of twenty one (21) boreholes (BH01 to BH21) with the additional investigation comprising of eight (8) additional boreholes (BH22 to BH29) to determine the extent of hotspot contamination. During this investigation the maximum drilling depth was 4.8 mbgl and no groundwater was encountered.

Refer to **Figure 2** – Borehole locations.

A varnish pit that was known but not previously identified was encountered at Borehole BH15. Subsequently borehole BH15 was moved 0.3m south of the original location. Underground service location, the field investigation and the Ground Penetrating Radar (GPR) survey were unable to identify any USTs on site. Minor hydrocarbon odour was detected during the drilling of borehole BH09, borehole BH15, borehole BH16 and borehole BH23.

The surface layer in the majority of external locations consisted of concrete up to 0.22m thick, whilst inside the warehouse the concrete surface layer was generally up to 0.39m thick. Borehole BH14 encountered a concrete layer of at least 0.5m thick. Fill material comprising of a mixture of clay, shale, building rubble, gravel, ash, slag, glass and minor charcoal was encountered in all borehole locations. Redistributed natural soils were encountered in several locations below fill material. The natural soil profile encountered beneath the fill material was firm-stiff clay and/or shale.

Soil samples from the Site were analysed for common contaminants of potential concern; heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and total xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs), organochlorine pesticides (OCs), organophosphate pesticides (OPs), polychlorinated biphenyls (PCBs) and a soil leachate analysis for Benzo(a)pyrene (BaP).

The BC Furr Environmental Services Pty Ltd DSI and subsequent SAS stated the site was free from significant contamination and suitable for commercial/industrial land use. Therefore in this current investigation historical land use has not significantly impacted on this site. The areas of environmental concern for this investigation are; the possible presence of underground storage tanks (USTs), a hotspot of BaP, Total PAHs and TRH at borehole BH09 and a minor exceedence of BaP at borehole BH10.

2.5.3 Soil Analytical Results

All results, unless otherwise specified, are expressed as mg/kg.

In all samples analysed BTEX, OC pesticides, OP pesticides and PCBs were not detected above the limit of reporting (LOR). The concentrations of heavy metals were below the Health Investigation Levels (HILs) for Residential with minimal soil access land use, as indicated in **Table 2a**.

Provisional Phytotoxicity Investigation Levels (PPILs) were exceeded in locations for arsenic, copper, zinc and mercury. Phytotoxicity (i.e. toxicity to plants) is used as the indicative environmental effect to be dealt with in the context of land redevelopment. The use of single number criteria for all ecosystems has significant limitations as biological responses to the chronic or acute effects of toxicity vary significantly between species. Bioavailability depends on soil conditions, geography, climate and species behaviour, which govern exposure pathways and need to be factored into any assessment. The provisional phytotoxicity-based investigation levels are criteria that are intended for use as a screen guide only.

In the majority of the samples analysed, PAH and TRH (C10-C36) were either not detected above the LORs or were below the threshold levels. Sample BH10 0.3-0.4 exceeded SAC for BaP reporting a level of 6mg/kg, where the criteria for Residential with Minimal Soil Access is 4mg/kg.

Table 2a – Heavy Metal Concentrations in Soils

Analytes	Detected Concentration	NSW Site Auditor Scheme Criteria	
	(mg/kg)	HIL	PPIL
Arsenic	1.3 to 34	400	20
Cadmium	0.5 to 1.2	80	3
Chromium (III + IV)	1.2 to 77	400(CrVI) 48,000 (Cr III)	1(CrVI) 400 (Cr III)
Copper	7.6 to 3920	4,000	100
Lead	8.4 to 350	1,200	600
Nickel	1.6 to 60	2,400	60
Zinc	5.3 to 1270	28,000	200
Mercury	0.35 to 1.2	60	1

Sample BH09 3.1-3.2 was identified as a exceeding the SAC for TRH (C10-C36), Total PAH and BaP. Concentrations of 26,600mg/kg of TRH (C10-C36), 7,267mg/kg of total PAH and 440 mg/kg of BaP were recorded with the threshold levels of 1,000 mg/kg, 80 mg/kg and 4 mg/kg respectively.

2.5.4 Assessment of Risk

There are two main identified areas of potential environmental concern within the Site, the presence of USTs on the site and the hotspot of TRH, PAH and BaP in the south west of the car park. Additionally there was a minor exceedence of SAC in sample BH10 0.3-0.4 with BaP levels reported at 6mg/kg, just above the residential with minimal soil access criteria of 4mg/kg.

USTs were present on site from at least 1961. A search of NSW WorkCover Dangerous Goods Stored Chemical Information Database (SCID) found information on a 16,000L underground tank for petrol and a 2000 Gallon underground tank for mineral spirits. A certificate dated the 14th January 1980 was attached to the Dangerous Goods search stating that the 2000 Gallon UST had been abandoned to the requirements of the Explosives Branch with no further decommissioning or removal details were provided in the Dangerous Goods search. A 2002 remedial works status report found that the USTs had not leaked but had yet to be decommissioned with a Site Audit Statement requiring the decommissioning of the USTs issued the same year. During the field investigation service location and Ground Penetrating Radar (GPR) was unable to conclusively indicate the presence or absence of USTs in the area.

The DSI by SGA Environmental also identified a hotspot of contamination in the south west corner of the car park in the vicinity of borehole BH09. Sample BH09 3.1-3.2 reported TRH, total PAH and BaP levels exceeding the SAC. Leachability analysis of samples containing elevated concentrations of BaP did not report leachable concentrations. This contaminated fill material is likely to be pyrogenic waste from the incomplete combustion of coal or coke. The additional investigation on the 12th October 2010 attempted to delineate the lateral extent of this contamination hotspot. The estimated area of impacted materials is 110m^2. The DSI assumed the thickness of impacted fill is approximately 2.95m with a bulk density of 1.8 tonnes/m^3, giving a total of approximately 590 tonnes of impacted material at the Site.

3.0 REMEDIATION OPTIONS

3.1 Overview

With regard to site remediation, the NSW Office of Environment and Heritage (OEH formerly the NSW DECCW, formerly the DECC) endorses the policy of the 1992 Australian and New Zealand Environment and Conservation Council (ANZECC) and National Health and Medical Research Council (NHMRC) Guidelines for the Assessment and Management of Contaminated Sites. Furthermore, the threshold concentrations presented in the NSW DECC Second Edition 2006 Guidelines for the NSW Site Auditor Scheme and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM) are considered as appropriate soil and groundwater assessment criteria.

For groundwater, the ANZECC 2000 Guidelines for Fresh and Marine Water Quality have been generally accepted by the NSW OEH as appropriate investigation levels as well as further criteria outlined in the National Environment Protection (Assessment of Site Contamination) Measure 1999. The NSW EPA Service Station Guidelines also provide reference guidelines. In addition, the NSW EPA 2008 Waste Classification Guidelines have been used as the basis of technical review for the waste disposal options most applicable to the site.

The preferred order of options for site remediation and management is:

- On-Site Bioremediation
- Excavate and Dispose
- Cap and Contain

The above strategies are in accordance with the Australian and New Zealand Guidelines for Assessment and Management of Contaminated Sites (1992) and the hierarchal management of Wastes as outlined in the NSW DECC Guidelines for the NSW Site Auditor Scheme (Second Edition, 2006).

The following Sections of the RAP look at the particular circumstances available to the site and compare the feasibility of the remediation hierarchy to the most suitable alternatives available.

3.2 Selecting Remediation Technologies and Methods

A risk management approach has provided the basic principle of the remediation technologies/methods selected for the site. This approach is consistent with the strategy outlined in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC, 1992) and the National Environment Protection (Assessment of Site Contamination) Measure 1999, which are endorsed by NSW OEH.

A contaminated site, as defined by the NEPM 1999 and the ANZECC 1992, is a site at which hazardous substances occur at concentrations above background levels, and where assessment indicates it poses, or is likely to pose, an immediate or long term hazard to human health or the environment.

Wherever human health is at risk, either on or off-site, or the off-site environment is at risk, a contaminated site should be remediated to the extent necessary in order to minimise such risks in both the short and long terms.

However, in cases where there is no threat to human health and the environment is not at risk, it may be appropriate to accept a strategy of managing contaminants on the site, or use planning controls to manage and minimise risk.

Environmental and Human Health Risk is based on exposure to potential hazards and is defined as:

Risk = Hazard x Exposure

The elimination of the risk can be achieved by the removal of the hazard and/or the exposure pathway. Remediation is defined as any measure that removes the risk to an acceptable level by negating the hazard or exposure pathway.

Therefore, remediation can involve removal of the hazard (i.e. no risk remains) or alternatively, management of the risk by removal of the exposure pathway even if the hazard remains. Exposure pathways to contaminated material can be managed by undertaking a physical action (e.g. erection of a fence, installation of cap etc) and/or a management plan, which prevents exposure to contaminants (e.g. use of planning controls, management of site activities etc).

Planning controls are a means to control future changes in the land use. These controls can take several forms, from leasing/selling arrangements through to specific planning legislation controls. For example, if contaminated soil is buried/capped in a particular zone, that zone may be designated to have a particular land use, e.g. public open space or roadways. This enables the material to be placed in less sensitive land use areas (i.e. under roadways) within the residential land.

3.3 Available Remediation Technologies/Methods

There are ranges of different remediation technologies that are available for the remediation of contaminated sites. Some of these technologies are proven while others have not yet been successfully implemented in Australia, and/or there is limited local expertise for implementation.

A review of the available remediation methods and technologies indicates that the following strategies may be applicable to the remediation of the 176-184 George Street, Concord West Site.

Excavate and Off-Site Disposal

Landfill disposal is the simplest of all remediation methods, and involves the excavation of the contaminated materials, and disposal off-site to a NSW OEH approved landfill disposal site with appropriate environmental safeguards. The formed excavation is generally then backfilled using clean, validated fill materials.

NSW OEH permits disposal of contaminated material subject to an approval landfill. The DECC *Waste Classification Guidelines* (2008) document sets out the methodology for assessing and classifying wastes to be disposed to landfill. Essentially, wastes are classified into General Solid (Non-putrescible), General Solid (Putrescible), General Solid – *Special Waste Asbestos*, General Solid – *Restricted Waste* and *Hazardous Waste*.

The principal test used for assessing waste is the Toxicity Characteristic Leaching Procedure (TCLP), which estimates the potential for the waste to release chemical contaminants into a leaching liquid. The OEH has set two standard pHs for the leaching solution:
The pH of the solution used is dependent upon the pH of the waste. The TCLP simulates the effects of an acidic leaching medium, and involves agitation of soil in a solution of dilute acetic acid for a prescribed period, followed by analysis of the acid solution or “leachate” for the contaminants of concern; and,

The second test used to complete the classification of wastes is the Specific Contaminant Concentration (SCC) test, which is a measure of the total concentration of the contaminants in the waste.

In their document the DECCW provide criteria for TCLP and SCC results for a range of contaminants for the various waste classifications. If the contaminant of concern is not included in the list, then the DECCW advises to discuss the classification with them.

The selection of an appropriate landfill will normally depend largely upon the results of classification of the wastes. It is sometimes necessary for heavily contaminated soils to be pre-treated prior to disposal, to reduce the concentrations or minimise the mobility of the contaminants.

Special criteria are sometimes applicable to certain categories of waste. Contaminants covered by Chemical Control Orders have restrictions placed on their handling and disposal.

On-site Capping and Containment

On-site capping and containment involves the installation of a physical barrier around the contaminated area to prevent contaminants migrating from the area. Any groundwater within the containment wall may need to be collected and disposed (possibly only after treatment) or recycled through the containment cell. Obviously, it is preferable to cap the containment cell with an impermeable material so that the amount of surface water entering the cell is minimised.

Thus, when used in combination, capping and containment essentially involves the construction of an on-site landfill, which effectively isolates the contaminated soil from the surrounding area. The inclusion of an effective low permeability capping system and appropriate surface water controls/management should result in a minimisation of groundwater generated within the cell.

Several material types and mixtures have been developed to act as capping barriers. These include low permeability soil such as clayey soils, soil/bentonite mixes, synthetic material liners and asphalt and concrete layers.

A site management plan would normally need to be implemented for capping to ensure that future excavation work is minimised and where necessary, carried out in strict accordance with appropriate occupational health and safety procedures.

The NSW DECC Contaminated Sites: Guidelines for the NSW Site Auditor Scheme Second Edition, 2006 provides a checklist to ensure the following technical issues associated with cap and containment is identified:

- That the design maximises the long term engineering security of the works and, where applicable, minimises the potential for leachate formation and/or;
- Does not include the erection of structures on the capped or contained area that may result in risk of harm to the public health or the environment, and;
- Includes a notification mechanism to ensure that the capped or contained areas are protected from any unintentional or uncontrolled disturbance that could breach the integrity of the physical barrier.

On-Site Bioremediation

Bio-remediation involves the use of microbial organisms to break down contaminants into less toxic constituents. Aerobic bioremediation processes occur in the presence of oxygen, and generally result in the production of carbon dioxide, water and proteins. Artificial stimulation of micro-organisms by aeration and the addition of nutrients can be used to enhance the process.

The main application of bioremediation technology is to destroy organic contaminants such as petroleum products, phenol's, solvents, coal tars, polycyclic aromatic hydrocarbons (PAH's) and some organochlorines.

If the hazardous organic chemicals are found in nature, e.g. petroleum hydrocarbons, it is extremely probable that a group of micro-organisms exists in soil or water which is able to grow on and completely decompose the contaminant to form carbon dioxide, water and other inorganics, e.g. nitrate and phosphate.

Some artificial chemical substances such as polychlorinated biphenyls (PCBs) and pesticides often prove to be very resistant to biochemical modification. This is because their chemical structures are not found in nature and organisms have not been able to evolve enzyme mechanisms to either modify or detoxify them. Specially adapted Micro-organisms are now being developed by scientists to cope with these so-called xenobiotic compounds, but currently their success is limited. One of the greatest advantages of bioremediation over other contaminated soil clean-up technologies is that it enables soils to be rehabilitated to a near-natural ecological state.
Soil bioremediation may be undertaken either in-situ or ex-situ:

In situ: contaminated soils are left in the ground and bio-remediated via nutrient injection wells, air sparging systems or other in-situ bioremediation technologies. The process will generally involve some soil mixing, as well as the injection of water and surfactants.

Ex situ: contaminated soils are excavated and bio-remediated either on-site or elsewhere in managed stockpiles. In this case, soils may be excavated, screened and bio-remediated, with the remediated soil mass subsequently replaced on site, or taken elsewhere for disposal.

Note; Bioremediation techniques are not effective in dealing with heavy metal contamination and therefore can only be effective with simultaneous excavate and dispose options.

4.0 SELECTION OF PREFERRED REMEDIAL STRATEGY

The following section provides a rationale for the selection of the remedial (or management) strategies to be adopted for:

176-184 George Street, Concord West, NSW.

In the following sections an assessment is made (including both a technical and economic appraisal) of the various broad options available for the remediation of the Site. Section 4.3 provides a summary of these appraisals, and hence a rationale for the selection of the preferred remedial strategy.

4.1 Technical Appraisal

Important considerations (from a technical perspective) in selecting and effectively implementing one of the available remediation strategies (as outlined in Section 4) for the site are as follows:

Human Health issues - volatile emissions (such as with organics) need to be minimised at all times (both during and after remediation). Works that involve the disturbance of contaminated soils and groundwater can result in significant releases of volatile gases, which can create health risk concerns to both site workers and the general public.

Reliability - this is a measure of the degree of certainty that the remedial system will succeed in meeting the site remediation goals (as outlined in Section 1.3) in both the short and long term.

Regulatory Approvals - any remediation system needs to be endorsed by the relevant regulatory authorities. The difficulty in obtaining regulatory approvals will be largely dependent upon the nature of the remediation system proposed.

Disruptions to Site Structures and Activities - remediation of the site will invariably involve some disturbance, both to the existing site structures, as well as to underground services present in the remediation area. For example, any work involving excavation of the contaminated soil mass will involve the removal of any structures located above the excavation zone.

Ongoing Liabilities (Maintenance and Monitoring Requirements) - Any remediation system that does not involve the complete removal of all contaminants from the site will necessitate some form of ongoing maintenance and/or monitoring to ensure the longer term integrity of the remediation system adopted.

Contractor Experience - the success and cost effectiveness of any remediation system will be at least partially dependant upon the experience contractors have in undertaking the type of remediation works proposed.

Availability of Appropriate Disposal Sites (for excavation and off-site disposal) - any works involving landfill disposal of contaminated soil will only be feasible if a landfill site is available which is licensed to accept the contaminated soils excavated from the site.

Implementation Time Frame - provides an indication as to the likely time frame involved in implementing each type of remediation strategy.

A summary of these issues, as they relate to each of the possible remedial strategies, is provided in Table 4a. Whilst any of the main remediation schemes outlined in Section 4 would be technically feasible, it should be noted that a number of limitations and risks are associated with each system.

Table 4a - Remediation Options – Contamination Hotspot 176-184 George Street, Concord West

Technical Characteristics	Option 1 Excavate and Off-Site Disposal	Option 2 Capping & Containment	Option 3 On-Site Bio-Remediation
Human Health Risks	Relatively low – excavation and direct off site disposal will minimise personal contact	Minimal soil disturbance involved. Limited personal contact.	Relatively low – excavation and land farming requires management to minimise personal contact
Reliability	Excellent – system ensures the removal of all contaminated materials.	Sound – some potential may exist for contaminant break though if cap not impermeable.	Variable – In-situ bioremediation presents only a low potential to adequately remediate all organic species. Ex-situ is more reliable, due to the more complete mixing of organisms, nutrients and oxygen with the contamination
Regulatory Approvals	Satisfactory – Compliance with Regulatory Authorities. Based on Assessment, Material would be characterised as General Solid Waste in accordance with the NSW DECC 2008 Waste Classification Guidelines for which Licensed landfills are readily available.	Generally satisfactory – whilst on-site containment is not the OEH's preferred option; it is often accepted as a feasible option.	Satisfactory – Compliance with Regulatory Authorities.
Disruption to Site Structures and Activities	Minor – Existing site structures have already been demolished. Remediation areas can be excavated and treated.	Very low – some disruption likely to proposed underground services	Minor – Existing site structures have already been demolished. Remediation areas can be excavated and treated.
Ongoing Liabilities	Minimal – all contaminated materials removed	Moderate – capping system need to be maintained	Minimal – all contaminated materials removed
Contractor Experience	Good – relatively simple strategy involving only basic technologies	Moderate – contractors available with experience in the implementation of cap and contain systems	Good – relatively simple strategy involving only basic technologies
Availability of Disposal Sites	Good – landfills available to accept waste	Not applicable	Excellent- All treatment will allow reuse on site. Only minor waste for disposal
Implementation Time Frame	Short	Short to moderate	Short to moderate

Based on the analysis undertaken in Table 4a, the following conclusions are made regarding the technical suitability of the various remedial options available for the Site in order of technical preference:

Excavation and Off-Site Disposal

Excavation and off-site disposal to landfill of contaminated soils has been the most common remediation method used in Australia to date. Its advantages are that it is quick, there are no long-term liabilities and there are no constraints on future land use.

The number of additional truck movements on public roadways would be minimal; considering the planned excavation of basement car parking in the proposed development.

On-site Capping and Containment

Capping and containment systems for contaminants have been used for remediation of many contaminated sites in and around Sydney. The NSW OEH has approved these strategies within many sites.

The remediation method is a proven technology, which is reliable, has relatively low to moderate capital costs, and can be implemented, in a relatively short time frame.

The method has moderate to low health risks as it involves a substantial disturbance of the contaminated soils. There is a range of local contractors experienced in undertaking works of this nature.

The major disadvantages associated with this remediation method include potential ongoing liabilities which may arise should the containment system be breached. The site is regarded as containing contamination and is titled accordingly.

On Site Ex-Situ Bio-Remediation

Considering the expected volume of contaminated material (approximately 325m^3), the excavation and on-site remediation of the hydrocarbon-impacted soils is likely to be achievable with minimal risk. The area available for controlled land farming is >100m^2

which should be adequate if required. This would be considered also as a supplementary technique in conjunction with other methods for specific contamination.

The remediation would involve excavation of impacted fill material with all contamination being 'chased out'. Contaminated soils are then stockpiled and remediated onsite to reduce the associated hazard to an acceptable level in accordance with the Site Remediation Policy outlined in the NSW DECC Guidelines for the NSW Site Auditor Scheme (Second Edition, 2006).

The disadvantage is the time frame required for implementation.

4.2 Economic Appraisal

Below are indicative cost estimates for undertaking remediation of the contaminated area in accordance with each of the broad remediation options discussed previously. A breakdown of the estimated costs associated with each of the available remediation strategies is provided in Table 4b.

In developing these cost estimates, the following primary assumptions have been made:

- Total expected volume of contaminated soil, requiring remediation or management may be approximately 325 m^3 at depths ranging up to 3m;
- An acceptable landfill is available to receive waste from the site.

Table 4b - Summary of Indicative Remediation Costs

Remediation Option	Element No.	Details of Remediation Element	Indicative Cost Estimate
Bioremediation (Ex-situ)	1	Site Establishment / Preparation	$2,000.00
	2	Excavation of contaminated materials	$5,000.00
	3	Mixing and Pre-Treatment of Contaminated Material	$3,000.00
		Indicative Total	**$10,000.00**
Excavate, and Dispose	1	Site establishment	$1,500.00
	2	Excavation of contaminated materials	$5,000.00
	4	Transport and Landfill Disposal Fees	$76,700.00
	5	Supply and place clean fill	NA
		Indicative total	**$83,200.00**
Cap and Contain	1	Site establishment	$1,500.00
	2	Excavation of contamination	$5,000.00
	3	Excavation of repository	$5,000.00
	4	Cap Construction (including supply, placement and compaction of sub-grade)	$8000.00
	5	On-going monitoring and maintenance (including site rehabilitation, Groundwater monitoring, cap maintenance – 20 years)	$120,000.00
	6	Site Environmental Management Plan	$6,000.00
		Indicative total	**$145,500.00**

Excavation and Off-Site Disposal

The cost of this option at approximately $83,200 is more expensive than the Bioremediation option, however it has the benefit of being much more time efficient. The development proposes to excavate basement car park as part of the residential building and will therefore be required to remove excavated soils from the Site.

On-site Capping and Containment

The cost projection of the cap and contain strategy is higher than the disposal option taking into consideration long-term liabilities. The efficiency of this method can be doubted for this particular site due to the proposed excavation of basement car park at the site. The costs also do not reflect the impact on property value and offer little benefit with respect to time savings.

Bio-remediation

The cost of remediation is low in comparison to other options. It is relatively inexpensive and does not generate materials requiring treatment or disposal. This method will guarantee that the hydrocarbon contamination at the Site is completely remediated.

Although this method is not the most time efficient, it has cost benefits and a low long term liabilities. There is a range of local contractors experienced in undertaking works of this nature.

4.3 Preferred Strategy

The site remediation strategy selected must be the most cost-effective solution, which does not bring about unacceptable long-term liabilities, and which does not impose unreasonable constraints on future site developments or present operations.

Based on the analysis undertaken in the previous sections, considering the nature of the proposed development; the **Excavate and Dispose** strategy is the optimal strategy for remediation of the 176-184 George Street Concord West Site. It is recognised that some dust may be generated and would need mitigation measures. Excavations are not expected to cause any offensive odour to persons other than those directly engaged in the remediation works.

Relative benefits of the **Excavate and Dispose** strategy are as follows:

- the remedial costs are favourable to alternative strategies, such as Bioremediation or Cap and Contain;
- Bioremediation can also be incorporated in the remediation process to reduce unnecessary waste generation.
- The excavate and dispose strategy has low health risks as it only involves a minimal disturbance of the contaminated soils. Other remediation schemes involve stockpiling the entire contaminated soil mass and may result in the release of hazardous vapours, and thereby create a human health risk to remediation workers, nearby residents and property occupants;
- The strategy would ensure end land-use suitability with no ongoing liability following remediation (i.e. the remediated site would be suitable for residential with minimal soil access land use);
- The time frame for implementation of the remediation system is relatively short compared to bioremediation or cap and contain methods; and,
- No future ongoing monitoring would be required.

The primary drawback to an Excavate and Dispose would be as follows:

- The strategy may require an increase in the number of truck movements in and around the site.

5.0 IMPLEMENTATION OF SELECTED REMEDIAL STRATEGY

5.1 Introduction

The remediation strategy developed for the Site will be required to achieve three (3) main aims, namely:

- To negate any appreciable risk of human exposure to contaminated soils and therefore relieve the possibility for Significant Risk of Harm;
- To halt the migration of impacted soil; and,
- To provide an end product desirable for the preferred intended land use.

A ranges of technical inputs need to satisfy the functional requirements involved in providing the effective remediation of soils. Increasing the complexity of contamination treatment systems does not necessarily result in a higher level of efficiency. Site-specific constraints may heavily influence the choice of a preferred methodology.

The Onsite Remediation strategy proposed incorporates the following elements:

1. Stakeholder consultation;
2. Implementation of an accepted Environmental Management Plan (EMP);
3. Excavation and stockpiling;
4. Remediation of soil;
5. Monitoring and,
6. Organisation of an appropriate landfill if required

A brief outline of each of these elements is outlined in the following sections

5.1.1 ELEMENT 1 – Stakeholder Consultation

On approval of the remediation strategy the Stakeholders including on-site Management will be informed of the intentions and the progress at all stages of the remedial works.

5.1.2 ELEMENT 2 – Implementation of Environmental Management Plans

An Environmental Management Plan (EMP) covering the remedial works will be prepared for the site. Before work commences it is imperative that all issues relating to potential impacts have been reviewed. The major impacts have been identified as Air Quality, Erosion Sedimentation Control, Contamination Containment, Noise and Vibration and Traffic Management.

5.1.3 ELEMENT 3–Excavation and Stockpiling

All excavation will have to be conducted in accordance with the Environmental Management Plan. Run-off in the event of rainfall will be controlled. No oily sheen to leave the area.

During initial excavation of the area and in order to control the run-off from the excavated material in the event stockpiling is required, the following system, as a minimum will be adopted:

A hay baled and geofabric lined area will be constructed in close proximity to the excavation.

5.1.4 ELEMENT 4– Land Farming

Soils suitable for bioremediation are those that contain only organic contaminants such as hydrocarbons. Where these are identified, they should be placed in a hard stand area with appropriate sediment control and covered until concentrations are shown to comply with the target criteria.

5.1.5 ELEMENT 5 – Waste Classification and Disposal

Since identified soils do not meet the SAC due to the contamination of TRH, PAH and BaP and are unable to be on-site remediated, they will be disposed of in accordance with the 2009 NSW DECCW *Waste Classification Guidelines* and any WorkCover requirements.

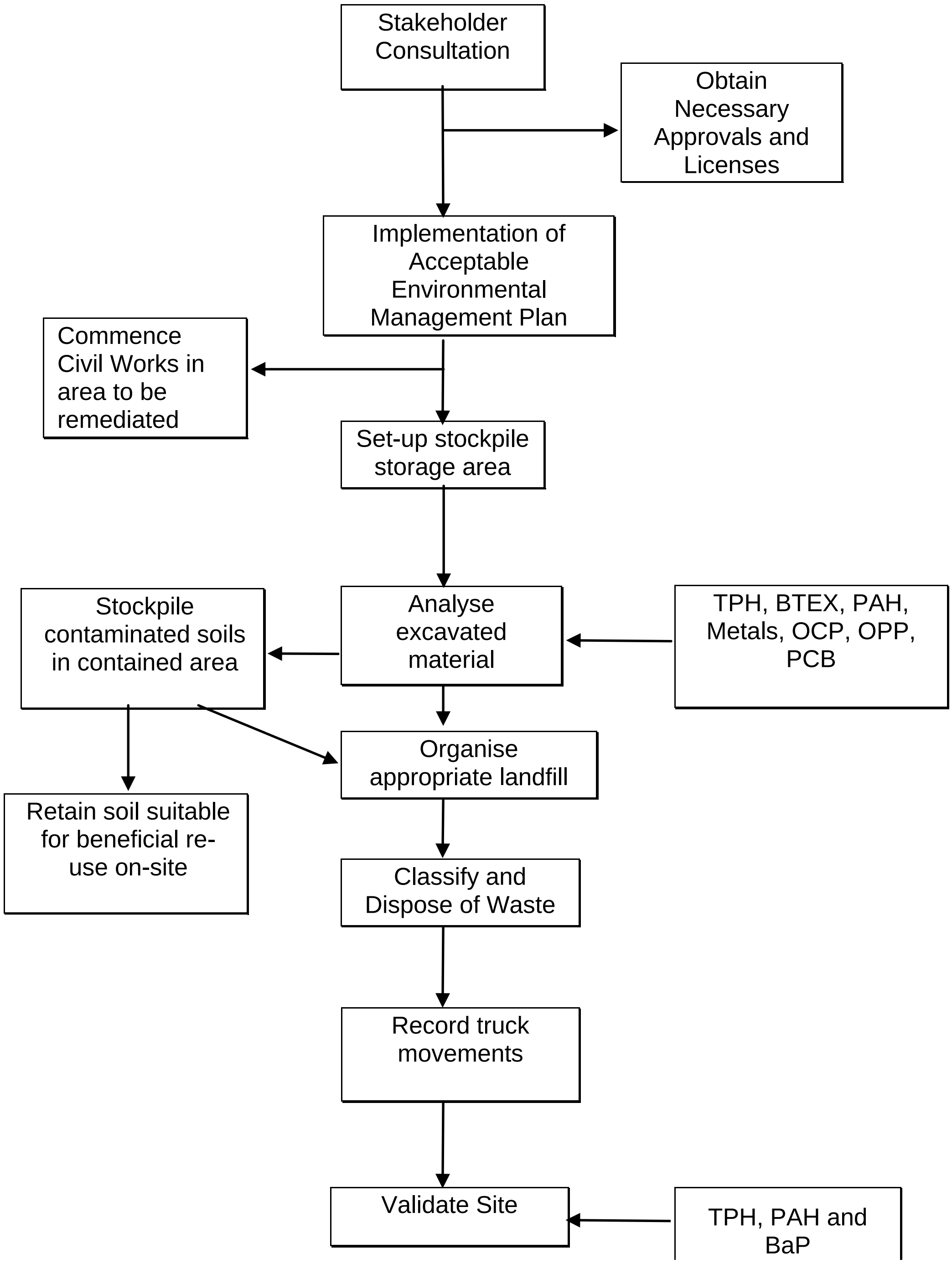
Arrangements will be made with a facility licensed to receive the designated material. Authorisation for disposal will be obtained prior to any material leaving the site. The disposal Contractor will provide tip dockets to George Concord Pty Ltd following disposal.

5.1.6 ELEMENT 6 – Validation

Validation will be conducted by analysing samples of soils during remediation to determine when remediation is complete. Testing will be carried out to determine the suitability of soils for reuse on the site or if disposal is required.

A schematic of the **Remediation Process** is set out below:

REMEDIATION PROCESS



6.0 IMPLEMENTATION AND STAGING OF REMEDIATION STRATEGY

There are a number of different stages that are required to be completed when implementing the remediation strategy. These include some works prior to the actual commencement of the remedial works. An outline of the stages and the activities required are presented below.

Stage 1 Securing All Necessary Approvals and Auditor's Concurrence

The first stage to be undertaken after agreement is reached with relevant stakeholders on the Remedial Action Plan is to secure all necessary approvals. A list of the regulatory licenses/approvals, which may be required prior to the commencement of remedial work, is contained in Section 9 of this Report.

Stage 2 Tendering and Contractor Selection

Following receipt of all necessary approvals, the next stage will be to prepare tender documents detailing the technical specifications of the remediation system.

These documents should then be used as a basis in calling for tenders from specialist contractors to complete the site remediation system.

Stage 3 Commencements of Site Remedial Works

Stage 3a Establishment

Initial activities at the site shall involve the establishment on site of all plant and equipment necessary for the remediation works. This shall include:

- Establishment of a Project Manager/Contractor's site office of temporary work sheds and amenities for site workers;
- Establishment of a car parking area for site workers and visitors to the site; and,
- Establish the site environmental monitoring program.

Prior to the commencement of any earthmoving activities, it will also be necessary to install environmental protection safeguards, as well as site security measures. These measures are included as part of the Environmental Management Plan contained within this report.

Stage 3b Site Pre Works

To facilitate the excavation of contamination the following site preparation is required in the first week.

- Construction of a bunded hardstand treatment area to preclude run-off onto the surrounding site.
  - Bioremediation area will be approximately $100m^2$ allowing for all material.
  - Areas designated for any stockpiling are located on a level hardstand within reasonable logistical distance from the excavation.
  - Bunding will consist of GeoFabric lined hay bales arranged to constrain all soils and runoff to the remediation area.

Stage 3c Excavation

The main activities to be undertaken during these works will include:

- Excavation and segregation of identified contaminated material;
  - Identification will be by way of visual determination in the first instance and confirmed by Asbestos or TPH analysis from the walls and base of the excavation.
- Remediation will continue until the materials comply with the HIL.

Stage 3d Validation

To ensure successful remediation of the excavated material:

- Periodic sampling and analysis will be conducted on the excavated material at a rate of 1 sample/$100m^3$ for the purposes of waste classification.
- Samples will be obtained from the base and walls of any resulting excavation.
- Samples will be analysed by a NATA certified laboratory for hydrocarbon concentrations and asbestos;
- Validation will be achieved when TRH, PAH and BaP concentrations comply with the EPA, 1994 Criteria.

Stage 4 Validation Report

At the completion of the remedial works a Remediation Works and Validation Report documenting the works as completed will be prepared.

Validation sample collection should include upper and lower soil samples from the excavation walls and from the base of the excavation, to be analysed for the Contaminants of Concern. Sample numbers and analysis will be dependent on area and a review of initial assessment data to conform to EPA NSW Contaminated Sites*: Sampling Design Guidelines (1995)* and *Guidelines for Assessing Service Station Sites (1994).*

In accordance with the NSW EPA *Contaminated Sites: Sampling Design Guidelines,* September 1995 the validation of the remediation area requires statistical interpretation. The statistical analysis performed should determine if the site acceptance criteria have been achieved. Remediation of the material will be deemed successful on compliance with the site acceptance criteria; that being the 95% Upper Confidence Level (UCL) of the average concentration for each analyte is below the acceptance respective limit.

The Quality Assurance (QA) program for the Site will ensure the representativeness and integrity of samples and accuracy and reliability of the analysis results. This includes cleaning of tools before and between sampling, cleaning of containers and delivery of samples to the laboratory within holding times, and in good condition.

The Quality Control (QC) program for site will monitor and measure the effectiveness of the QA procedures. This will involve the use of field duplicates, inter and intra laboratory checks, trip blanks, rinsate checks, trip spikes, surrogate spikes, and the use of laboratory internal standards.

Duplicate samples will be collected to verify the QA/QC of the soil samples collected at a frequency of 1/10 (10%) intra-laboratory, and 1/20 (5%) inter-laboratory. The samples will be transported in a chilled and security sealed esky to a NATA registered laboratory and analysed for Contaminants of Concern.

The NSW DECCW has issued a number of guidelines relevant to the development of Remediation Action Plans and the clean up of contaminated sites. The National Environmental Protection Council formulated the National Environment Protection (Assessment of Site Contamination) Measure 1999.

The relevant guidelines most applicable to the remediation are:

- *NSW EPA Guidelines for the NSW Site Auditor Scheme (Second Edition, 2006)*
- *NSW EPA Guidelines for Assessing of Service Station Sites (December 1994);*
- *NSW EPA Contaminated Sites - Sampling Design Guidelines (September 1995);*
- *NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (November 1997);*
- *NSW DECCW Waste Classification Guidelines 2008, and;*
- *National Environmental Protection (Assessment of Site Contamination) Measure 1999 – Schedule B.*

7.0 SITE ENVIRONMENTAL MANAGEMENT PLAN

7.1 Introduction

A major component of the remedial works shall involve the installation and maintenance of a Site Environmental Management Plan. The Site Environmental Management Plan will provide details of the environmental protection and pollution control measures to be implemented during the operational phase of the remedial works.

The pollution control measures have the objective of removing/minimising any adverse impact on the surrounding environment. Details of the pollution control measures to be implemented are documented in the Environmental Management Plan (EMP) for the remediation works which is prepared (and approved) prior to commencement of remedial works.

In order to prepare the Environmental Management Plan for the remedial works a review will be undertaken to identify possible impacts on the surrounding environment. For each potential impact identified the range of pollution control measure(s) available for mitigating the impact was reviewed and the most practicable, efficient and cost effective were identified for implementation.

It was envisaged that there would be a series of control measures that would be common to the various elements of the remedial works. In addition, there are supplementary control measures that would be specific to particular elements of the remedial works.

In the following sections, outlines have been presented of the various pollution control measures that would be implemented during most elements of the remedial works. These form the basis of the Environmental Management Plan that should be read in conjunction with this document.

It is appropriate for the Contractor to develop EMP control measures for their component of the works based on the broad guidelines of the RAP.

7.2 Erosion Sedimentation Control Plan

Erosion and run-off control measures will be implemented during all elements of remedial works undertaken. Typically, these measures will be designed to prevent the transport of pollutants (including sediments) out of the remediation area via stormwater/surface run-off. Generally, no surface run-off and/or water from excavations/pits and trenches within the remediation area will be permitted to discharge, without regulatory authority approval, to the surrounding environment. Run-off control measures will be developed giving consideration to the site conditions in each remediation area, and are likely to include (but not necessarily be limited to) the following:

- Diversion drains, berms, sumps and pumping systems to prevent runoff entering or leaving excavation areas. All water in contact with works will be diverted through the treatment system;
- Truck cleaning areas for use in washing down all vehicles potentially coming into contact with contaminated soil leaving a remediation area; and,
- Use of silt fencing, hay bales and/or oil absorbing booms, as required.

7.3 Noise Control Plan

The impact of noise associated with the site remediation works is acknowledged as a potentially important environmental effect. It will be necessary to minimise noise in accordance with NSW OEH Standards. The methods used to control noise will be dependent upon the equipment being used for particular remedial activities however, it would be expected that the methods would include those commonly used during normal construction and demolition works.

Noise control measures will be developed giving consideration to the site conditions in each remediation area, and are likely to include (but not necessarily be limited to) the following:

- Site work will be restricted to the hours specified below;
- The use of construction vehicles on-site will be kept to a minimum;
- All equipment in operation in open areas on-site shall comply with the requirements of AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*; and,
- Noise monitoring may be conducted during the site remediation program.

7.4 Dust Control Plan

During the course of remediation works dust control measures shall be undertaken to ensure that dust generated from the site is controlled within acceptable levels. These control measures will be developed giving consideration to the site conditions in each remediation area, and are likely to include (but not necessarily be limited) to the following:

- All vehicles leaving the site will be cleaned on site to remove any potentially contaminated dust;
- Access to water sprays shall be available to water down the excavation/loading if dust generation becomes significant;
- Plastic sheeting shall be available to cover excavation faces and stockpiles; and,
- An ambient air-monitoring program shall monitor dust levels at the site boundary, as necessary.

7.5 Odour Control Plan

During the course of remediation works odour control measures shall be undertaken to ensure that possible odours generated on-site are controlled to within acceptable levels. These control measures will be developed giving consideration to the site conditions in each remediation area, and are likely to include (but not necessarily be limited) to the following:

- The prevailing weather conditions shall be considered in the manner in which work is undertaken;
- Plastic sheeting (such as VLDPE or PVC) will be made available at all times on-site to allow for any excavated or disturbed contaminated soils to be covered, if necessary to reduce odour;
- Odour masking agents (such as Biosolve) will be available for use on-site to suppress any nuisance odours not controlled by the above actions, so that ambient air quality at the site boundary is not adversely impacted.
- Application of Biosolve at a rate of 1 part to 5 parts water will be by way of hand held pressure applicator.

7.6 Health and Safety

7.6.1 Occupational Health and Safety

An Occupational Health and Safety (OH&S) plan is an essential part of all remediation projects, to ensure the health and safety of all personnel working on or visiting the site. All remediation work would be undertaken in accordance with the provisions set out by the *Occupational Health and Safety Act* (2000) and associated Regulations 2001, and any other regulations or directions set out by regulatory authorities.

Typically the OH&S plan would consider a broad range of issues including (but not limited to) the following:

- Characterisation of potential hazards including hazardous materials and site activities (e.g. excavation);
- Air and dust monitoring required within and at the boundary of the remediation area;
- Personnel and equipment movements to and from the remediation area;
- Training, instruction, and induction of site workers/visitors;
- Clear outline of responsibilities for health and safety; and,
- Emergency response plan for injuries or chemical exposure.

Prior to commencing any remediation works, a specific OH&S Plan would be prepared by the Remediation Contractor covering the following aspects:

- Identification of the remediation area and exclusion zones;
- Induction of personnel;
- Hazard identification/locations;
- Identification of contaminants of concern and their physical and toxicological properties;
- Description of exposure pathways and personal protection requirements;
- Location of all underground/aboveground services;
- Details of specific work practice procedures to be followed within the designated contaminated areas;
- Monitoring protocols to identify a potentially hazardous practice;

- Emergency information; and,
- Incident reporting.

Occupational Health and Safety Planning involves the development and implementation of systems and procedures into a Health and Safety Plan included in a site Work Method statement. The objectives of these documents are to ensure the health and safety of those undertaking specific tasks on site and the wider community if necessary.
A Health and Safety Plan should be developed for any site work and would typically include the following:

- A clear health and safety policy;
- Requirements for worker health assessments and inductions;
- Identified health and safety training requirements;
- Requirements for occupational health protection and monitoring;
- Site/location specific emergency plan;
- Site/location specific emergency contact details;
- Permit to work/clearance procedures, and
- Task specific safe work method statements.

7.6.2 Personal Hygiene and Decontamination

Appropriate hygiene and decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from the site to more sensitive home environments.

The following activities are prohibited while working in the hazardous materials area:

- eating;
- drinking;
- chewing gum, and;
- smoking.

Practices that involve contact between the hands and the mouth increase the risk of chemical ingestion. Hands should be thoroughly washed with soap and water after completing work activities and before meal breaks.

Personal decontamination is required to minimise workers' exposure to, and indirect transportation of potential chemicals of concern.

Decontamination involves physically removing material from personnel and equipment. Protective equipment, tools and other equipment are decontaminated by cleaning with detergent water using a soft-bristle brush followed by rinsing with a sufficient quantity of water.
Decontamination should be conducted before meal breaks, and at the end of a day's work.

7.6.3 Community Health and Safety

The health and safety of the surrounding community is very important for any remediation works. While it is possible to control the activities of personnel within the remediation area (e.g. ensuring appropriate OH&S procedures and equipment are utilised) it is not normally possible to control the activities of the surrounding community. Therefore, to protect the community health and safety it is necessary to control the remedial works so that no fugitive emissions occur during the remedial works that could have an adverse impact on the surrounding community.

These controls are documented in the Environment Management Plan for the remedial works, although monitoring requirements to confirm the effectiveness of the measures may also be documented in the OH&S Plan. The methodology that would normally be used to develop the control measures is described below.

Firstly, the portions of the community that may be impacted by any fugitive emissions will be identified. Secondly an assessment of the hazard posed by the contaminants and the proposed remedial methodology/technology would be undertaken. This assessment would define the hazard posed by the particular contaminants present in the remediation area using risk assessment techniques (i.e. identifying the hazard or contaminants and the exposure pathway that the potentially at risk community could be exposed to the hazard).

Once these have been identified, a review will be undertaken of control measures available to remove or minimise the risk posed to the surrounding community during the remedial works. Typically the control measures would comprise removal/minimisation of the exposure pathway to the community. As indicated above it may be necessary to undertake monitoring to confirm the effectiveness of the control measures, and if the monitoring indicates a possibility for exposure then contingency measures may need to be implemented. By way of example control mechanisms could include (but not necessarily limited to) the following:

- Site security measures to prevent access to the contaminated material by the public;
- Dust suppression measures to minimise inhalation and ingestion exposure; and,
- Not undertaking certain work if winds are unfavourable etc.

7.7 Traffic Control Plan

Movement of excavation equipment, trucks and other vehicles involved in the remediation works, to and from the site will be strictly controlled and restricted to a minimum and only take place during approved working hours. All potentially contaminated vehicles leaving the site will be decontaminated in an appropriate truck wash-down area. All vehicles will be visually free of soil before permission to leave a remediation area is granted.

7.8 Hours of Operation

Working hours for any on-site remedial works would be set in consultation with the Council, but it is envisaged the likely hours would be as follows:

- Mondays to Fridays 7:00 am to 5:00 pm
- Saturdays 7:00 am to 3:00 pm
- Sundays and Public Holidays No Work Permitted

7.9 Emergency and Out of Hours Contact Numbers

David Lane Associates		**94761765**
	David Lane	**0410494810**
George Concord Pty Ltd	Jason Youssef	**96425666**
NSW OEH		**99955000**
WorkCover NSW		**43215000**

8.0 REMEDIATION WORKS MANAGEMENT

8.1 Regulatory Approvals/Licences

Prior to the commencement of remedial work, all relevant regulatory approvals will need to be obtained. Such approvals/licenses will include (but may not be limited) to the following:

- Appropriate approvals for disposal of wastes to landfill e.g. contaminated soils, concrete demolition waste etc in accordance with the POEO Act 1997,
- Regulatory Authority consent for Category 1 or 2 remedial activities, in accordance clause 16 (3) of State Environmental Planning Policy SEPP – No 55 – *Remediation of Land*.

8.2 Environmental Protection and Pollution Control

8.2.1 General

When the remedial works are being planned an assessment of potential mechanism for fugitive emissions from the remediation area will be completed. Contingency plans shall then be developed to deal with any identified emissions. The contingency plans will detail the response procedures to be implemented immediately after detection of a fugitive emission to the surrounding environment. The contingency plan will include details of the potential emissions identified and the appropriate response measures. The following outlines some examples of unexpected situations that may arise and may require response measures:

- Dust, noise, odour levels measured at site boundary may exceed acceptable levels; or,
- Surface water run-off may leave the site;

Typically, in cases where fugitive emissions are identified, the Project Manager/Superintendent will stop work and appropriate situation specific responses will be taken. By way of example these could include: reducing dust by further water spraying, reducing machinery on-site to minimise noise, intercepting run-off with diversion drains and a pumping system, backfilling an excavation to remove an unpleasant odour etc.

8.2.2 Buffer Zone

Wherever possible, a buffer zone will be established around remedial works. The effect of this buffer zone will to minimise the potential for impacts on the surrounding open space and residential areas as well as the community as a whole. The location and layout of the buffer zone will be determined by consideration of (but not necessarily limited to) the following:

- Hazards associated with, and exposure pathways to the main contaminants in the remediation area;
- Surrounding land uses;
- Prevailing weather conditions; and,
- Existing physical barriers (e.g. fences, buildings etc).

Access to the area within the buffer zone would be restricted to persons directly involved in the remedial works. If it is not possible to establish an adequate buffer zone in some areas where remedial works are to be undertaken, consideration will be given to other means of ensuring that there are no adverse impacts on the surrounding land users. This could include, for example minimising or restricting the extent of any excavations or other activities that would effectively limit exposure to contamination.

8.2.3 Remediation Contingency

If there are events or discoveries made at the site that would prevent the proposed remediation works complying with the validation criteria, or if the selected remedial strategy is not able to precede then the following actions can be taken:

1. Continue controlled excavation until validation is achieved.
2. Reassessment of remedial options for excavated materials, **including Bioremediation or Cap and Contain Options.**

8.3 Community Relations Plan

8.3.1 Communications Plan

Extensive consultation has been conducted on the Project to date. Meetings with stakeholders have kept information on the Project flowing to involved groups. It is envisaged that the remediation program will be developed in consultation with the stakeholders prior to implementation.

It is likely that the plan would intend to:

- Provide the stakeholders with information about the remedial works project;
- Enable the stakeholders to raise questions/concerns and other suggestions regarding the remedial works project; and,
- Co-ordinate matters of concern in relation to the remedial works project with Council and Regulatory Authorities with a stake in the project.

8.3.2 Complaint Response Measures

A complaint response system has been developed for dealing with any complaints received.

The system includes:

- Identification of the individuals (e.g. Project Manager etc) with overall responsibility of ensuring all complaints are dealt with in an appropriate manner;
- A clearly documented procedure for receiving, logging and passing on details of any complaints to the appropriate personnel. Refer to Environmental Management Plan;
- Clearly defined roles for personnel working on the project in relation to complaint reporting and response;
- A complaint register, which will record details of complaints, the party making the complaint, the parties, notified of the complaint, and actions arising from the complaint;
- Mechanisms for advising Council and Regulatory Authorities of complaints in there jurisdiction;

- Mechanisms for disseminating information (as appropriate) to the local community and/or committee regarding complaints and the response to the complaints; and,
- Procedure for following up on the satisfactory resolution of any complaints.

8.4 STAGED PROGRESS REPORTING

It is envisaged that staged progress reporting will be undertaken throughout the remedial works program. It is likely that these will comprise preparation and submission of regular status reports to the appropriate interested parties.. The status reports would be expected to include a summary of:

- Results of any monitoring work undertaken during the reporting period;
- Details of the work undertaken during the reporting period;
- Details of any environmental incidents during the reporting period and the actions arising from these incidents;
- Details of any unexpected situations encountered in undertaking the remedial work during the reporting period and the response to these situations;
- Details of any variations required to the RAP for which approval has been sought; and,
- Updates on project schedule.

Additionally, the occurrence of any event which causes or is likely to cause substantial pollution of the environment or represents a human health risk would be notified to the appropriate Regulatory Authority(s) as soon as practicable after it becomes known to the Project Manager, Remediation Contractor or Council. Should such an event occur a written report shall be supplied to the appropriate Regulatory Authority(s) within 21 days of the event. Such a report would include full details of the incident, including time and duration of the event, the type and volume of any pollutants discharged, any remedial activities undertaken and any measures taken to prevent or mitigate against a recurrence of such an event.

Upon completion of the site remediation works a Validation Report shall be prepared and issued. The report will be prepared in accordance with the NSW EPA's *Guideline for Consultants Reporting on Contaminated Sites (1997*) and the National Environment Protection Measure (NEPM) 1999.

9.0 CONCLUSION

In conclusion the RAP:

- Has been developed in a manner consistent with current industry practice;
- Has selected a preferred remediation strategy based on the site-specific issues and currently available technologies;
- Has presented an outline of the Environmental Management Plan (EMP) and associated contingency plans to ensure the environment is appropriately protected during the proposed works;
- Has presented an information and consultation program to ensure the stakeholders are informed of the works as they proceed; and,
- Has outlined the means of validation of the completed works.

10.0 REFERENCES

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National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)

Contaminated Sites: Guidelines on Significant risk of Harm from Contaminated land and the Duty to Report, 1999, NSW Environment Protection Authority (NSW EPA 1999).

Managing Land Contamination: Planning Guidelines, SEPP 55 - Remediation of Land (1998), Department of Urban Affairs and Planning/ NSW EPA.

Contaminated Land Management Act (1997), NSW Government, Sydney, NSW.

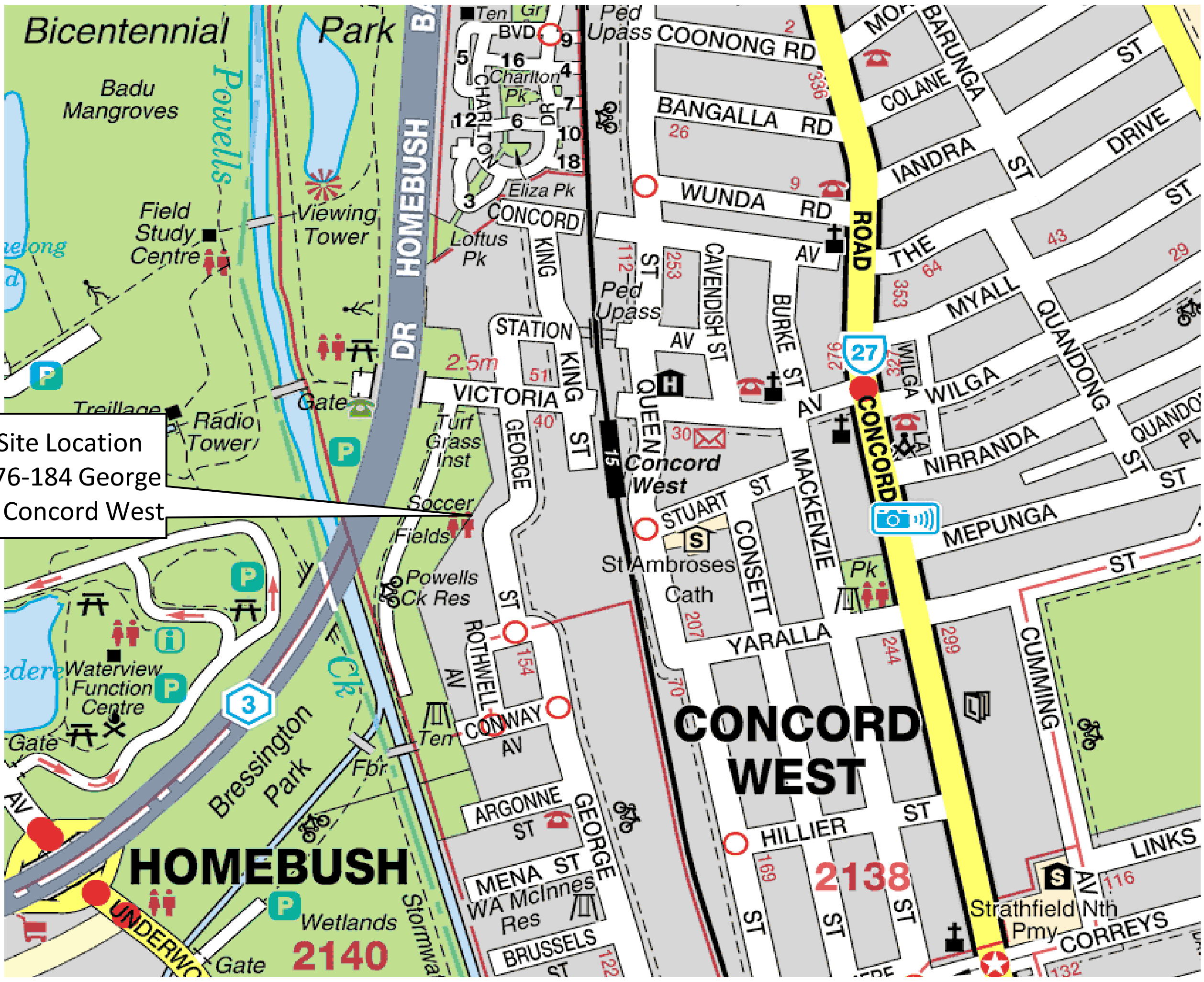
Waste Classification Guidelines, NSW DECC 2008.

Checklist Information Required for Completion of Remediation Action Plan

Item	Description	Addressed
	Planning information	
	Designated development (EP&A Act 1997):	NA
	EPA licence:	NA
	SEPP 55 requirements: **Council Requirements**	YES
	Planning instruments (Council contaminated land policies, DCPs, etc.):	YES
	ANZECC 1992 remediation hierarchy:	YES
	DNR Part 3A permit:	NA
	Work Cover Dangerous Goods Branch (UST removal):	YES
	Chemical Control Orders:	NA
	Others:	NA
	Remedial Action Plan	
	Remediation goals:	YES
	Discussion of the extent of remediation required:	YES
	Discussion of possible remedial options and how risk can be reduced:	YES
	Rationale for the selection of recommended remedial option:	YES
	Proposed testing to validate the site after remediation:	YES
	Contingency plan if the selected remediation strategy fails:	YES
	Interim site management plan (fencing, warning signs, storm water, etc.):	YES
	Site management plan (operation phase): **included**	YES
	Remediation schedule:	YES
	Hours of operation:	YES
	Contingency plans to respond to site incidents or offsite impacts:	YES
	Identification of regulatory compliance requirements:	YES
	Names/phone numbers to contact during remediation:	YES
	Community relations plans, where applicable:	YES
	Staged progress reporting, where appropriate:	YES
	Long-term site management plan:	NA

Figure 1

Site Location



DLA environmental Unit 2b/30 Leighton Place Hornsby, NSW 2077	DESIGNED: DLA	SITE LOCATION	
	COMPILED: AR	CLIENT: Pinestreet Developments Pty Limited	DRAWING: 10/02/2012
	PROJ. No. DL2853	LOCATION: 176-184 George Street, Concord West 2134	FIGURE: 1

Figure 2
SGA Environmental
Site Layout with Sample Locations

Legend

- Approximate site boundary
- Sampling locations where exceedance reported 20-21/10/2010
- Sampling locations of 20-21/10/2010 field work
- Sampling locations of 12/10/10 field work

Approximate Scale (m)

0 — 40

CLIENT	TAYLOR WOODINGS
PROJECT	176-184 George Street, Concord West, NSW
TITLE	Figure 3 - Sampling Locations

SCALE	DATE	DRAWING No.	ISSUE
NTS	20/10/10	91949_Fig3	A

DRAWN	CHECKED	JOB No.
A.L.	N.K.	91949

SGA Environmental
Level 2
120 Clarence Street
Sydney
NSW
2000
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Offices in Sydney, Melbourne, Brisbane, Perth, New Zealand & Hong Kong

TOWN PLANNING
AND URBAN DESIGN

Appendix D: Section 117 Ministerial Directions

TOWN PLANNING
AND URBAN DESIGN

	Ministerial Direction	Not Relevant	Justifiably Inconsistent	Consistent
1.	**Employment & Resources**			
1.1	Business and Industrial Zones			✓
1.2	Rural Zones	✓		
1.3	Mining, Petroleum Production and Extractive Industries	✓		
1.4	Oyster Aquaculture	✓		
1.5	Rural Lands	✓		
2	**Environment & Heritage**			
2.1	Environmental Protection Zones	✓		
2.2	Coastal Protection	✓		
2.3	Heritage Conservation			✓
2.4	Recreation Vehicle Areas	✓		
2.5	Application of E2 and E3 Zones and Environmental Overlays in Far North Coast LEPs	✓		
3	**Housing, Infrastructure and Urban Development**			
3.1	Residential Zones			✓
3.2	Caravan Parks and Manufactured Home Estates	✓		
3.3	Home Occupations	✓		
3.4	Integrating Land Use and Transport			✓
3.5	Development Near Licensed Aerodromes	✓		
3.6	Shooting Ranges	✓		
4	**Hazard and Risk**			

	Ministerial Direction	Not Relevant	Justifiably Inconsistent	Consistent
4.1	Acid Sulfate Soils			✓
4.2	Mine Subsidence and Unstable Land	✓		
4.3	Flood Prone Land			✓
4.4	Planning for Bushfire Protection	✓		
5	**Regional Planning**			
5.1	Implementation of Regional Strategies	✓		
5.2	Sydney Drinking Water Catchments	✓		
5.3	Farmland of State and Regional Significance on the NSW Far North Coast	✓		
5.4	Commercial and Retail Development along the Pacific Highway, North Coast	✓		
5.5	Development in the vicinity of Ellalong, Paxton and Millfield (Cessnock LGA)	✓		
5.6	Sydney to Canberra Corridor	✓		
5.7	Central Coast	✓		
5.8	Second Sydney Airport: Badgerys Creek	✓		
5.9	North West Rail Link Corridor Strategy	✓		
5.10	Implementation of Regional Plans	✓		
6	**Local Plan Making**			
6.1	Approval and Referral Requirements	✓		
6.2	Reserving Land for Public Purposes	✓		
6.3	Site Specific Provisions			✓

	Ministerial Direction	Not Relevant	Justifiably Inconsistent	Consistent
7	**Metropolitan Planning**			
7.1	Implementation of A Plan for Growing Sydney			✓
7.2	Implementation of Greater Macarthur Land Release Investigation	✓		
7.3	Parramatta Road Corridor Urban Transformation Strategy			✓
7.4	Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	✓		

TOWN PLANNING
AND URBAN DESIGN

APPENDIX E: ACID SULFATE SOILS ASSESSMENT

TOWN PLANNING
AND URBAN DESIGN

Sydney
Unit 2B 30 Leighton Place
Hornsby NSW 2077
Phone: 9476 1765
Fax: 9476 1557
Email: dlassociates@bigpond.com

Newcastle
PO Box 137
Branxton NSW 2335
Phone: 4938 3800
Fax: 4938 3811
Email: dolane@bigpond.com

DLA environmental

ASSESSMENT REPORT

ACID SULFATE SOILS

176 – 184 George Street

Concord West NSW 2134

Prepared for

George Concord Pty Ltd
Rear 53-57 Cosgrove Road
South Strathfield NSW 2136

Prepared by

DAVID LANE ASSOCIATES

February 2010

DL2853

Sydney
Unit 2B 30 Leighton Place
Hornsby NSW 2077
Phone: 9476 1765
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Email: dlassociates@bigpond.com

Newcastle
PO Box 137
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ABN 36 926 003 197

1.0 INTRODUCTION

1.1 General

George Concord Pty Ltd commissioned DLA Environmental (DLA) to conduct preliminary assessments for the presence of Acid Sulfate Soils (ASS), on the property located at 176-184 George Street, Concord West NSW (Site) (refer to **Table 1a** for lot and development plan numbers) to support a Development Application to be submitted to the City of Canada Bay Council.

Table 1a – Site Development Plan and Lot Numbers

Development Plan Number	Lot Numbers
15973	4, 5, 6, 7, 8, 9, 10, 11, 12, 15 and 16
226350	1 and 2

Refer to **Figure 1** – *Site Location*

The Site is located within the City of Canada Bay Council Local Environmental Plan 2008 Acid Sulfate Soils Map. The Site is located in a Class 5 Acid Sulfate Soils zone, denoting that it falls within 500m of a Class 1-4 ASS zoning. Class 5 Acid Sulfate Soils require investigation due to their proximity to other ASS (Class1-4) zoned areas. Class 5 ASS generally are not occupied by ASS though and act as a buffer zone to protect the environment from the potential effects of ASS release. Preliminary testing is required to be conducted to confirm the presence of potential or actual acid sulfate soils (see **1.3 What are Acid Sulfate Soils?**).

Refer to **Figure 3** – *City of Canada Bay Acid Sulfate Soil Map*.

Testing is to be conducted in accordance with the City of Canada Bay Council Local Environmental Plan 2008 requirement, that developments on land identified as being subject to actual acid sulfate soils or potential acid sulfate soils be assessed in accordance with the Acid Sulfate Soils Assessment Guidelines (NSW ASSMAC August 1998).

Where the presence of such soils are confirmed suitable management techniques are to be implemented by way of an Acid Sulfate Soil Management Plan (ASSMP) that should contain the results of the soils assessment and provide adequate guidance and procedures to be implemented where necessary to prevent the generation of acid leachate.

The Acid Sulfate Soil Management Plan should be developed to address the Department of Planning and NSW EPA's requirements and to ensure that the proposed excavation activities can be undertaken without undue impact on the environment.

1.2 Proposed Development

The Site is currently occupied by a disused industrial and commercial building. The warehouse is L shaped with offices in the north and approximately 0.49ha with surrounding car parking. The Site is to be redeveloped to accommodate a new residential tower block with basement parking.

1.3 What are Acid Sulfate Soils?

Acid sulfate soil is the common name given to sediment and soil containing iron sulphides (principally contain iron pyrite or iron di-sulfide). The exposure of pyrite in these soils to oxygen by drainage or excavation leads to the generation of sulfuric acid. Acidic leachate can dissolve clay and release toxic concentrations of aluminium, iron or other metals into water bodies . Drainage waters from areas of acid sulfate soils will affect water quality and can lead to death or disease of aquatic organisms.

Acid sulfate soils, which have already been exposed to air, are called "actual acid sulfate soils and tend to have a pH of 4.5 or less as they are generating acid from the oxidation of iron sulfide minerals in the soil. Soils, which have not been exposed to air, are called "potential acid sulfate soils". These soils have the potential for future oxidation of pyrite and the generation of acid. The pH of these soils in their undisturbed state may be neutral or slightly alkaline. However they generally pose the greatest environmental risk when disturbed. Actual and potential acid sulfate soils are often found in the same soil profile, with actual acid sulfate soils generally overlying potential acid sulfate soil horizons.

The majority of acid sulfate sediments were formed by natural processes under very restricted conditions in the Holocene geological period. The special conditions required the presence of iron-rich sediments from a river, sulfate from sea water, the presence of sulfate reducing bacteria and a plentiful supply of organic matter (usually mangroves). It should be noted that these conditions still exist at the bottom of coastal rivers and lakes with the formation of pyritic material when there are high levels of organics in the sediment.

The relatively restricted conditions under which acid sulfate soils are formed limit their formation to low lying parts of coastal floodplains, rivers and creeks. This will include areas with saline or brackish water such as deltas, coastal flats, back swamps and seasonal or permanent freshwater swamps that were formerly brackish. Due to flooding and stormwater erosion, these acid sulfate sediments may continue to be distributed through the sands of the estuarine flood plain region. Pyrite sediment may be found at any depth in the soil layer in suitable coastal sediments, usually beneath the water table.

1.4 The Environmental Impact of Acid Sulfate Soils

The oxidation of acid sulfate soils and pyritic hard rock produces acidic leachate, which affect the water quality in:

- bore-water;
- groundwater;
- drainage water; and,
- streams.

These acidic waters will not meet water quality criteria and will cause environmental impacts in five main areas:

- plant growth;
- sickness or death of aquatic life;
- release of heavy metals;
- animal and human health; and,
- corrosion and weakening of engineering structures.

1.5 Where are Acid Sulfate Soils Found?

The exact distribution of recent pyritic sediment around the Australian coast is unknown. However, pyritic sediment deposited during the Holocene epoch (<11000 years before present) is unlikely to be further inland than the present **coastal river tidal limit, or higher than 5 m above high water levels.**

The current hypothesis is that the source of pyritic material in coastal floodplains is “recent” Holocene deposits. It is known that Pleistocene age sediment is also in coastal floodplains at elevations below 3 m Australian Height Datum (AHD). Low sea levels 100,000 to 20,000 years ago have exposed these materials to air for a substantial period of time. The assumption is that any pyrite, which existed in Pleistocene sediment, will have long been completely oxidised.

The first reported findings of acid sulfate sediment in Australia were in the floodplain of the Macleay River in northern NSW in 1972. This was followed by descriptions of acid sulfate sediment on the floodplains of the Shoalhaven, Hawkesbury, Nambucca, Clarence, Richmond and Tweed Rivers of NSW, Botany Bay and in the Logan River in southern Queensland.

There have also been findings as far south as the Clyde River on the NSW South Coast, at Geroa, the Hunter, Myall and Manning Rivers and Byron Bay.

It is clear that all major coastal bays and estuaries in NSW have acid sulfate or potential acid sulfate sediment.

2.0 ACID SULFATE SOIL INVESTIGATION

2.1 Acid Sulfate Soil Assessment

The sampling protocol for this project was determined by:

- Review of the Property;
- Examination of the proposed construction activities, trenching and excavations;
- Consideration of the existing soil conditions (disturbed or undisturbed); and,
- Review of the ASSMAC Guideline requirements for sample density and analytical requirements.

Three (3) boreholes were excavated on the Site. One borehole was in the northern car park and the other two in the southern car park. Four (4) soil samples were collected from the boreholes with the locations and depths shown in **Table 2a**.

Refer to **Figure 2** – *Site Layout with Sampling Locations.*

Table 2a – Sample Location and Depth

Sample	Borehole	Depth (m)
BH1 - 3	1	3
BH2 - 6	2	6
BH2 - 6.8	2	6.8
BH3 - 1.5-1.9	3	1.5-1.9

2.1.1 Assessment Criteria

Standard approved methods have been developed for routine laboratory analysis of soil samples. The approved methods include:

- SPOCAS Suspension Peroxide Oxidation Combined Acidity and Sulfate.

The SPOCAS Method is in accordance with the *Acid Sulfate Soils Laboratory Methods Guidelines, ASSMAC, Wollongbar NSW.*

For assessment purposes, and for the development of effective management strategies, TOS results will need to be complemented with the SPOCAS method for a fuller understanding of the oxidisable sulphur content of the soil.

The criteria (based on oxidisable sulphur) which should trigger management action are grouped into three broad texture categories in **Table 2b**. For this study, the action criteria for the **Fine** texture action category were selected on the basis that the soil type most closely resembles the silty clays found in the study area. In order to assess the potential for acid generation the action levels applicable to a disturbance of less than 1000 tonnes has been used.

Levels of oxidisable sulphur (Spos%) within a soil or sediment can indicate the level of risk to the environment if the soil is disturbed. For all soils with oxidisable sulphur values greater than the action criteria (>0.06%) a management plan must be developed to manage the potential acid generation. As a general rule, the highest result (by either the sulphur or the acid trail) should be used as the action criteria. Existing acidity (TAA) needs to be included in the assessment.

The definition of Potential Acid Sulfate Soils (PASS) as defined in the Acid Sulfate Soil Assessment Guide produced by the NSW Acid Sulfate Soils Management Advisory Committee in August 1998 indicates that PASS soils have a pH of less than 4. The guidelines also stipulate that Actual Acid Sulfate Soils have a soil pH of less than 4.

Table 2b
Action Criteria 1-1000 tonnes disturbed

Texture	Approximate Clay Content	Sulphur Trail S_{pos}%	Acid Trail TPA Mol H^+/tonne
Coarse Texture Sands to Loamy Sands	<5.0%	0.03	18
Medium Texture Sandy Loams to Light Clays	5-40%	0.06	36
Fine Texture Medium to Heavy Clays and Silty Clays	>40%	0.1	62

Texture Range as describe by McDonald et al (1990)

For environmental purposes, **the highest result by either the sulphur or the acid trail** is generally used as the action criteria unless mitigating factors are established eg. The quantity, fineness and reactivity of neutralising material such as shell etc.

3.0 RESULTS

Four (4) soil samples were collected for analysis from the Site. The samples were submitted to the Sydney Environmental Soils Laboratory for SPOCAS testing.

Table 3a
Acid Sulfate Soil Analysis for Defined Soil Texture Categories

Sample ID	Depth (meters)	Texture	pH in kcl	Sulphur Trail Spos%	Acid Trail TPA Mol H+/tonne
BH1 - 3	3	Silty Clay	5.22	0.02	3.38
BH2 – 6	6	Fill: Gravelly Clay	8.48	0.02	-
BH2 – 6.8	6.8	Fill: Gravelly Clay	8.84	0.04	-
BH3 – 1.5-1.9	1.5-1.9	Silty Clay	3.98	0.01	135

Reported pH in **Table 3a** indicates that samples from Boreholes 1 and 3 were acidic, whilst samples from Borehole 2 were alkaline:

BH1 – 3 was below both the Sulphur Trail and Acid Trail TPA Action Criteria for fine texture soils with results of 0.02 Spos% and 3.38 Mol H+/tonne respectively. These results indicate nil actual and a very low potential acidity risk.

Both BH2 - 6 and BH2 – 6.8 came from fill material overlying natural shales and were alkaline (pH in kcl of 8.48 and 8.84 respectively). These samples were reported to pose nil actual and nil potential acidity risk.

The acid trail TPA for BH3 – 1.5-1.9 (135 Mol H+/tonne) however exceeded the Action Criteria for fine texture soils of 62 Mol H+/tonne indicating a very significant actual acidity risk and that an Acid Sulfate Management Plan is required

4.0 DISCUSSION

Considering the Site is at an elevation of between RL 4mAHD and RL 5.4mAHD, the close proximity of Homebush Bay and class 2 acid sulphate soils, Acid Sulphate Soils could potentially occur at the Site. The analysis of the samples indicated that natural soils in Borehole 1 can be considered to pose a low Potential Acidity risk. Ground water levels in Borehole 1 indicate that natural soils come from an anoxic environment, which would indicate soils will maintain the potential acidity risk if they are left undisturbed.

Laboratory analysis of soil from Borehole 2 indicate that the soil possesses nil actual and nil potential acidity risk. Analysis of natural soils in Borehole 3 indicated the soil should be considered to be Actual Acid Sulphate Soil. Soils from Borehole 3 were noted to be above the groundwater level resulting in an oxidising environment and the detected pH of less than 4.

Treatment of lime may be utilised to neutralise the actual acidity of the soils if the contact with the acid soils does not meet engineering criteria for concrete and steel structures. The laboratory recommended liming rate has been calculated at 1.96 and 10.1 kg/tonne for samples BH1 - 3 and BH3 – 1.5-1.9 respectively. The lime rate would neutralise the actual acidity and there is no potential for acid generation

5.0 CONCLUSION AND RECOMMENDATIONS

Laboratory analytical results indicate that there are areas of Actual Acid Sulphate Soils and areas of Potential Acid Sulphate Soils existing in the natural soils on the Site. Fill soils are noted to pose nil actual or potential acidity risk. Site observations indicate that the underlying soil profile consists of grey shale.

The detection of Actual Acid Sulphate Soils and the risk of potential acid sulphate soils indicate that an Acid Sulphate Soils Management Plan will be required to be produced for the Site. This plan will account for the management and monitoring of impacts on Site during both the construction and operation phase of the proposed development.

6.0 REFERENCES

Acid Sulfate Soil Manual – Acid Sulfate Soils Management Advisory Committee (ASSMAC) August 1998

Acid Sulfate Soils Assessment and Management - Environment Protection Authority, December 1995.

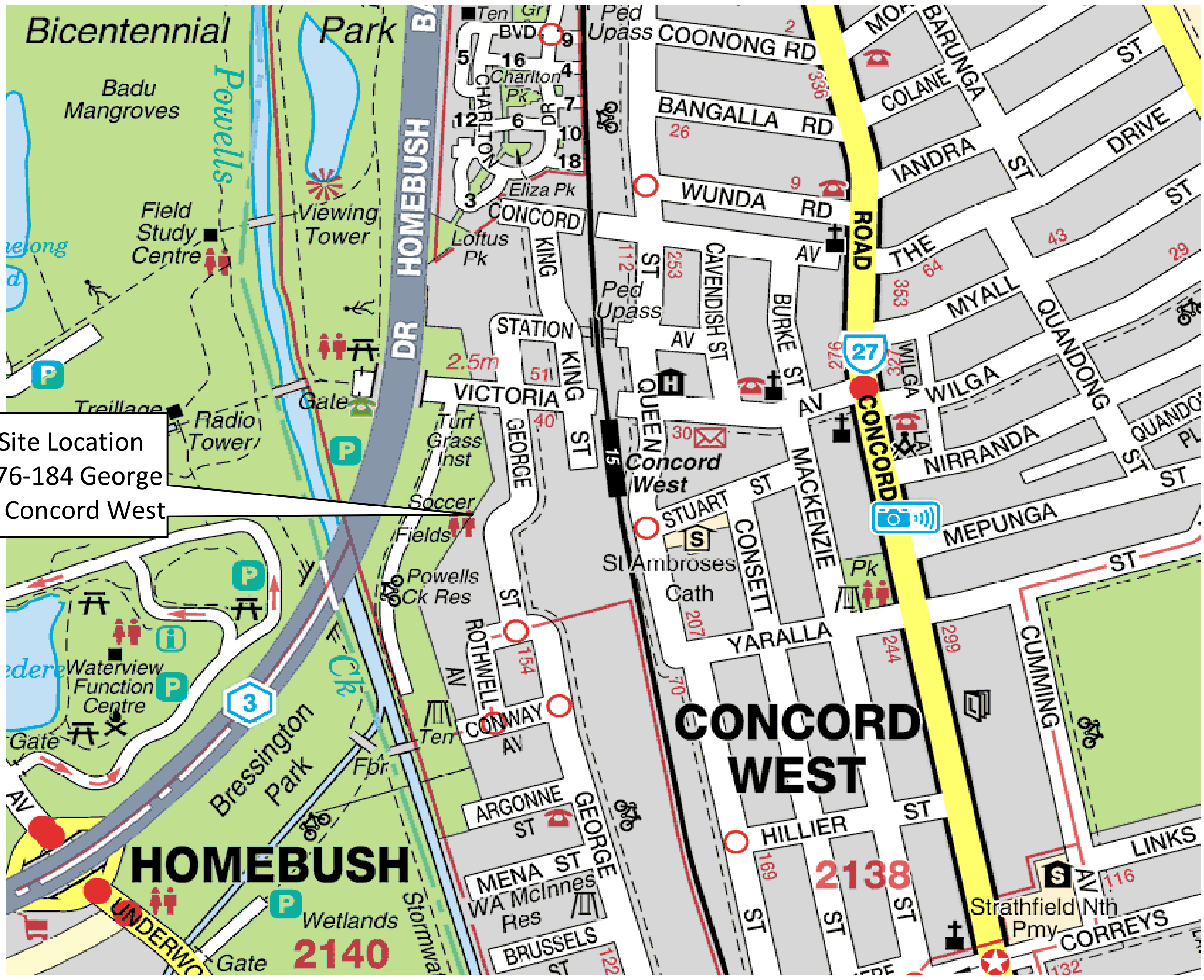
Department of Planning NSW website (iPlan) Acid Sulfate Soils

City of Canada Bay's Canada Bay Local Environmental Plan 2008 – Acid Sulfate Soil Soils Map Sheet ASS 004

Environment Protection Authority NSW, 2004: *Environmental Guidelines: Assessment, Classification & Management of Liquid and Non-Liquid Wastes,* EPA 99/21.

Figure 1

Site Location



DLA environmental Unit 2b/30 Leighton Place Hornsby, NSW 2077	DESIGNED: DLA	SITE LOCATION		
	COMPILED: AR	CLIENT:	Pinestreet Developments Pty Limited	DRAWING: 10/02/2012
	PROJ. No. DL2853	LOCATION:	176-184 George Street, Concord West 2134	FIGURE: 1

Figure 2

Site Layout with Sampling Location

Legend

Borehole

Site Boundary

0 10 20m

Approximate Scale

DLA environmental	Site Layout with Sampling Locations			
	Title: 176-184 George St	Figure No: 2		Date: 10/2/12
	Newcastle Office Phone (02) 4949 3800 Fax (02) 4949 3811 / Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557	Scale As shown	Sheet 1 of 1	Revision

Figure 3

City of Canada Bay Council Acid Sulfate Soil Map

Canada Bay Local Environmental Plan 2008

City of Canada Bay Council

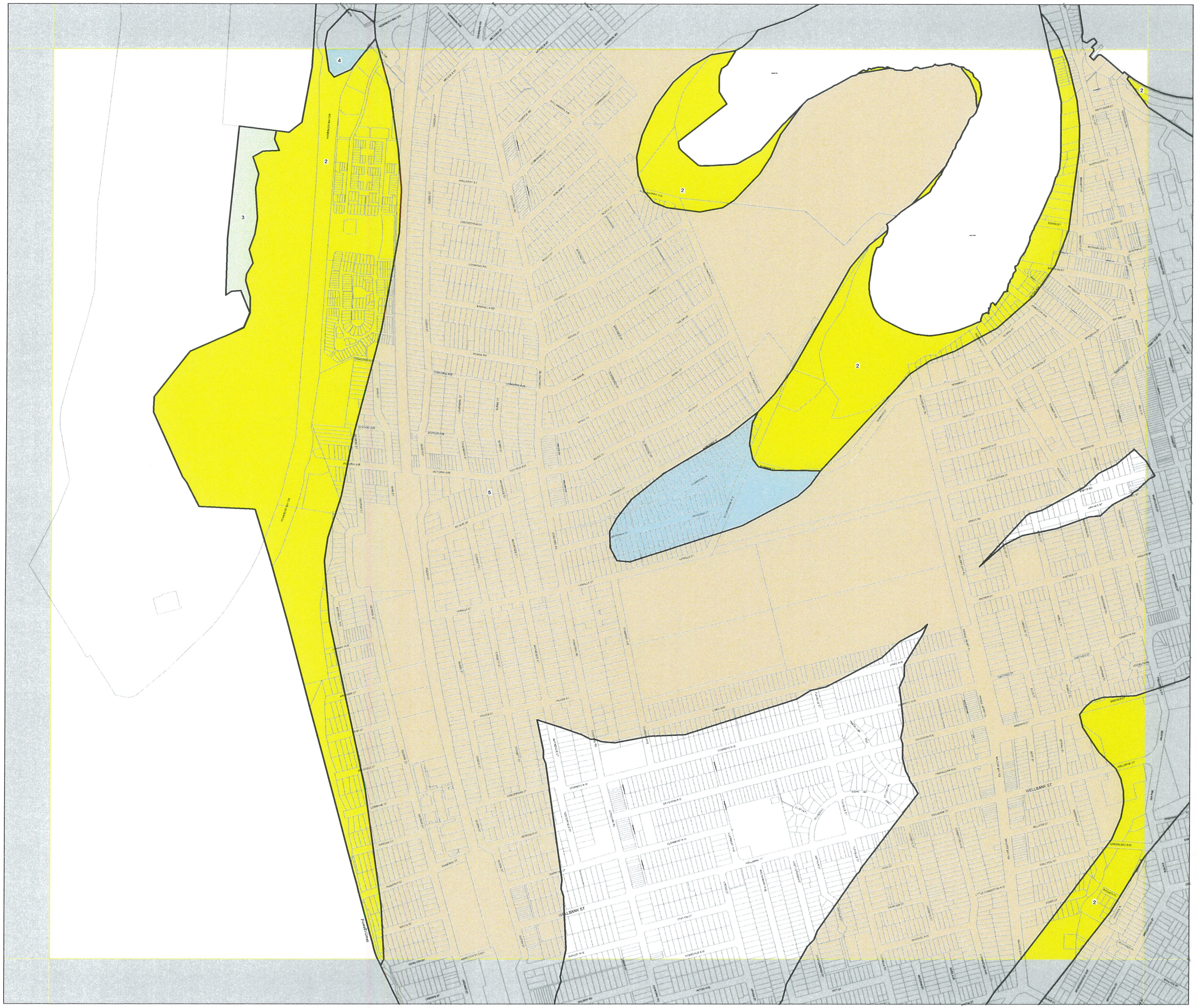
Acid Sulfate Soils Map - Sheet ASS 002

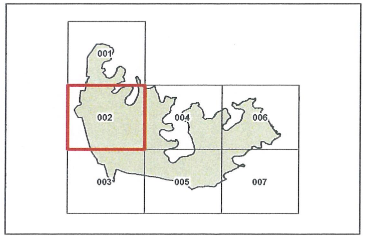
Acid Sulfate Soils

- 2 Class 2
- 3 Class 3
- 4 Class 4
- 5 Class 5

Cadastre

- Cadastre copyright Dept of Lands 20071207





N

0 200 400 Metres

Scale: 1: 10,000 @ A3

Projection: GDA 1994 Zone 56

Map identification number: 1520_COM_ASS_002_010_20071207

Appendix 1

NATA Certified Analytical Results

AUSTRALIA'S MOST TRUSTED EARTH SCIENCE SERVICES

SPOCAS

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 02 9980 6554
Fax: 02 9484 2427
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 21303 **Sample N°: 1** **Date Received: 3/2/12** **Report Status:** ○ **Draft** ◉ **Final**

Client Name: **David Lane Associates (DLA**
Client Contact: **Anthony Richard**
Client Job N°: **DL2853**
Client Order N°:
Address: **"Ayrfield' Lot 18 Old North Rd NORTH ROTHBURY NSW 2335**

Project Name: **George St - Concord West**
Location: **176-184 George St - Concord West**
SESL Quote N°:
Sample Name: **BH1 -3m**
Description: **Soil**
Test Type: **sPOCAS**

Analysis	Unit	Result	Comment
pH kcl	pH units	5.22	Strong Acidity
TAA pH 6.5	moles H^+/t	11.5	
s-TAA pH 6.5	%w/w S	0.02	
pH Ox	pH unit	5.79	Medium Acidity
TPA pH 6.5	moles $H^{+/}$t	3.38	Insignificant Potential Acidity
s-TPA pH 6.5	%w/w S	0.01	
TSA pH 6.5	moles H^+/t	0.00	Nil Sulfidic Acidity
s-TSA pH 6.5	%w/w S	0.00	
ANC E	% $CaCO_3$		
a-ANC E	moles H^+/t		
s-ANC E	%w/w S		
S KCl	%w/w S	0.02	Insignificant Sulfidic Acidity
SP	%w/w	0.04	Minor Sulfidic Acidity
SPOS	%w/w	0.02	Insignificant Sulfidic Acidity
a-SPOS	moles H^+/t	14.7	
Ca KCl	%w/w	0.09	
Ca P	%w/w	0.09	
Ca A	%w/w	0.00	
Mg KCl	% w/w	0.07	
MgP	% w/w	0.07	
MgA	% w/w	0.00	
SRAS	% w/w	NR	
SHCl	% w/w S	0.03	
SNAS	% w/w S	0.02	
a-SNAS	molesH^+/t	9.67	
s-SNAS	% w/w S	0.02	
a-Net Acidity	molesH^+/t	26.2	
Liming Rate	kg $CaCO_3$/t	1.96	Low Treatment Level
a-Net Acidity without ANCE	molesH^+/t		
Liming Rate without ANCE	kg $CaCO_3$/t		

AS 4969 SPOCAS

For the purpose of acid sulphate soil assessment according to the Acid Sulfate Soil Manual (ASSMAC, 1998), this sample shows strong acidity and nil pH drop with nil sulfur generation after oxidation.

In conclusion SESL recommends that this soil poses **nil actual acidity risk and an insignificant potential acidity risk**. Liming of this material is required.

Consultant: Luke Jacovides

Authorised Signatory: Ryan Jacka

Method References:
Ahern CR, Blunden B and Stone Y (eds.) (1998). *Acid Sulphate Soils Laboratory Methods* Guidelines Published by the Acid Sulphate Soil Management Advisory committe, Wollongbar, NSW, Australia

Date of Report: 10/02/2012

END OF REPORT

SPOCAS

SESL AUSTRALIA
AUSTRALIA'S MOST TRUSTED EARTH SCIENCE SERVICES

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 02 9980 6554
Fax: 02 9484 2427
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 21303 **Sample N°: 2** **Date Received: 3/2/12** **Report Status:** ○ **Draft** ◉ **Final**

Client Name:	**David Lane Associates (DLA**	Project Name:	**George St - Concord West**
Client Contact:	**Anthony Richard**	Location:	**176-184 George St - Concord West**
Client Job N°:	**DL2853**	SESL Quote N°:	
Client Order N°:		Sample Name:	**BH2 -6m**
Address:	**"Ayrfield' Lot 18 Old North Rd NORTH ROTHBURY NSW 2335**	Description:	**Soil**
		Test Type:	**sPOCAS**

Analysis	Unit	Result	Comment
pH kcl	pH units	8.48	Moderate Alkalinity
TAA pH 6.5	moles H^+/t	0.00	
s-TAA pH 6.5	%w/w S	0.00	
pH Ox	pH unit	7.98	Slight Alkalinity
TPA pH 6.5	moles $H^{+/}$t		
s-TPA pH 6.5	%w/w S		
TSA pH 6.5	moles H^+/t		
s-TSA pH 6.5	%w/w S		
ANC E	% $CaCO_3$	0.46	
a-ANC E	moles H^+/t	0.00	
s-ANC E	%w/w S	0.00	
S KCl	%w/w S	0.02	Insignificant Sulfidic Acidity
SP	%w/w	0.04	Minor Sulfidic Acidity
SPOS	%w/w	0.02	Insignificant Sulfidic Acidity
a-SPOS	moles H^+/t	13.9	
Ca KCl	%w/w	0.19	
Ca P	%w/w	0.22	
Ca A	%w/w	0.03	
Mg KCl	% w/w	0.02	
MgP	% w/w	0.03	
MgA	% w/w	0.01	
SRAS	% w/w	NR	
SHCI	% w/w S	0.04	
SNAS	% w/w S	0.02	
a-SNAS	molesH^+/t	13.5	
s-SNAS	% w/w S	0.02	
a-Net Acidity	molesH^+/t	0.00	
Liming Rate	kg $CaCO_3$/t	0.00	Nil Treatment Level
a-Net Acidity without ANCE	molesH^+/t	0.00	
Liming Rate without ANCE	kg $CaCO_3$/t	0.00	

AS 4969 SPOCAS

For the purpose of acid sulphate soil assessment according to the Acid Sulfate Soil Manual (ASSMAC, 1998), this sample shows moderate alkalinity and a minor pH drop with insignificant sulfur generation after oxidation.

In conclusion SESL recommends that this soil poses **nil actual acidity risk and nil potential acidity risk**.

Consultant: Luke Jacovides

Authorised Signatory: Ryan Jacka

Method References:
Ahern CR, Blunden B and Stone Y (eds.) (1998). *Acid Sulphate Soils Laboratory Methods* Guidelines Published by the Acid Sulphate Soil Management Advisory committe, Wollongbar, NSW, Australia

Date of Report: 10/02/2012

END OF REPORT

Total No Pages: 1

AUSTRALIA'S MOST TRUSTED EARTH SCIENCE SERVICES

SPOCAS

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 02 9980 6554
Fax: 02 9484 2427
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 21303 **Sample N°: 3** **Date Received: 3/2/12** **Report Status:** ○ **Draft** ◉ **Final**

Client Name: **David Lane Associates (DLA**
Client Contact: **Anthony Richard**
Client Job N°: **DL2853**
Client Order N°:
Address: **"Ayrfield' Lot 18 Old North Rd NORTH ROTHBURY NSW 2335**

Project Name: **George St - Concord West**
Location: **176-184 George St - Concord West**
SESL Quote N°:
Sample Name: **BH2 -6.8m**
Description: **Soil**
Test Type: **sPOCAS**

Analysis	Unit	Result	Comment
pH kcl	pH units	8.84	Strong Alkalinity
TAA pH 6.5	moles H^+/t	0.00	
s-TAA pH 6.5	%w/w S	0.00	
pH Ox	pH unit	8.36	Moderate Alkalinity
TPA pH 6.5	moles $H^{+/}$t		
s-TPA pH 6.5	%w/w S		
TSA pH 6.5	moles H^+/t		
s-TSA pH 6.5	%w/w S		
ANC E	% $CaCO_3$	0.77	
a-ANC E	moles H^+/t	0.00	
s-ANC E	%w/w S	0.00	
S KCl	%w/w S	0.02	Insignificant Sulfidic Acidity
SP	%w/w	0.07	Minor Sulfidic Acidity
SPOS	%w/w	0.04	Minor Sulfidic Acidity
a-SPOS	moles H^+/t	26.2	
Ca KCl	%w/w	0.21	
Ca P	%w/w	0.37	
Ca A	%w/w	0.16	
Mg KCl	% w/w	0.02	
MgP	% w/w	0.07	
MgA	% w/w	0.05	
SRAS	% w/w	NR	
SHCl	% w/w S	0.07	
SNAS	% w/w S	0.05	
a-SNAS	molesH^+/t	31.8	
s-SNAS	% w/w S	0.05	
a-Net Acidity	molesH^+/t	0.00	
Liming Rate	kg $CaCO_3$/t	0.00	Nil treatment level
a-Net Acidity without ANCE	molesH^+/t	0.00	
Liming Rate without ANCE	kg $CaCO_3$/t	0.00	

AS 4969 SPOCAS

For the purpose of acid sulphate soil assessment according to the Acid Sulfate Soil Manual (ASSMAC, 1998), this sample shows strong alkalinity and a minor pH drop with insignificant sulfur generation after oxidation.

In conclusion SESL recommends that this soil poses **nil actual acidity risk and nil potential acidity risk**.

Consultant: Luke Jacovides

Authorised Signatory: Ryan Jacka

Method References:
Ahern CR, Blunden B and Stone Y (eds.) (1998). *Acid Sulphate Soils Laboratory Methods* Guidelines Published by the Acid Sulphate Soil Management Advisory committe, Wollongbar, NSW, Australia

Date of Report: 10/02/2012

END OF REPORT

AUSTRALIA'S MOST TRUSTED EARTH SCIENCE SERVICES

SPOCAS

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 02 9980 6554
Fax: 02 9484 2427
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 21303 **Sample N°: 4** **Date Received: 3/2/12** **Report Status:** ○ Draft ◉ **Final**

Client Name: **David Lane Associates (DLA**
Client Contact: **Anthony Richard**
Client Job N°: **DL2853**
Client Order N°:
Address: **"Ayrfield' Lot 18 Old North Rd NORTH ROTHBURY NSW 2335**

Project Name: **George St - Concord West**
Location: **176-184 George St - Concord West**
SESL Quote N°:
Sample Name: **BH3 -1.5-1.9m**
Description: **Soil**
Test Type: **sPOCAS**

Analysis	Unit	Result	Comment
pH kcl	pH units	3.98	Extreme Acidity
TAA pH 6.5	moles H^+/t	130	
s-TAA pH 6.5	%w/w S	0.21	
pH Ox	pH unit	5.00	Very Strong Acidity
TPA pH 6.5	moles $H^{+/}$t	135	Very Significant
s-TPA pH 6.5	%w/w S	0.22	
TSA pH 6.5	moles H^+/t	5.20	Insignificant Sulfidic Acidity
s-TSA pH 6.5	%w/w S	0.01	
ANC E	% $CaCO_3$		
a-ANC E	moles H^+/t		
s-ANC E	%w/w S		
S KCl	%w/w S	0.02	Insignificant Sulfidic Acidity
SP	%w/w	0.03	Minor Sulfidic Acidity
SPOS	%w/w	0.01	Nil Sulfidic Acidity
a-SPOS	moles H^+/t	4.35	
Ca KCl	%w/w	0.00	
Ca P	%w/w	0.00	
Ca A	%w/w	0.00	
Mg KCl	% w/w	0.03	
MgP	% w/w	0.03	
MgA	% w/w	0.00	
SRAS	% w/w	0.00	
SHCl	% w/w S	0.04	
SNAS	% w/w S	0.02	
a-SNAS	molesH^+/t	10.5	
s-SNAS	% w/w S	0.02	
a-Net Acidity	molesH^+/t	134.1	
Liming Rate	kg $CaCO_3$/t	10.1	Medium Treatment Level
a-Net Acidity without ANCE	molesH^+/t		
Liming Rate without ANCE	kg $CaCO_3$/t		

AS 4969 SPOCAS

For the purpose of acid sulphate soil assessment according to the Acid Sulfate Soil Manual (ASSMAC, 1998), this sample shows extreme acidity and nil pH drop with insignificant sulfur generation after oxidation.

In conclusion SESL recommends that this soil poses **a very significant actual acidity risk and a nil potential acidity risk**. Liming of this material is required.

Consultant: Luke Jacovides

Authorised Signatory: Ryan Jacka

Method References:

Ahern CR, Blunden B and Stone Y (eds.) (1998). *Acid Sulphate Soils Laboratory Methods* Guidelines Published by the Acid Sulphate Soil Management Advisory committe, Wollongbar, NSW, Australia

Date of Report: 10/02/2012

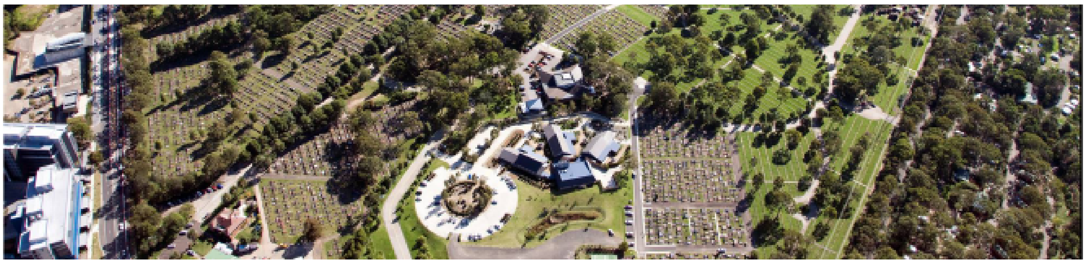
END OF REPORT

APPENDIX F: FLOOD ASSESSMENT

TOWN PLANNING
AND URBAN DESIGN

Civil

TaylorThomsonWhitting



Flood Assessment of Masterplan Development 176-184 George Street, Concord

for George Concord Pty Ltd

24 February 2016

151350 P

Taylor Thomson Whitting (NSW) Pty Ltd Consulting Engineers ACN 113 578 377
48 Chandos Street St Leonards NSW 2065 PO Box 738 Crows Nest 1585
T 61 2 9439 7288 F 61 2 9439 3146 ttwsyd@ttw.com.au www.ttw.com.au

SYDNEY
CANBERRA
MELBOURNE
QEC 22375

Certified System Quality ISO 9001 SAI GLOBAL

TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION

This flood study has been prepared by TTW to determine the flood planning level and flood impact at the proposed development at 176-184 George Street, Concord.

1.1 The Site

The site is located in Concord, approximately 11.5km west of Sydney's CBD. It is located between the northern railway line and Powell's Creek. The site is within the City of Canada Bay Council local government area.

The area is a mix of warehouses in the immediate vicinity, free standing houses to the north, a school to the northwest, and low rise apartments as well as free standing houses to the south.

The existing site consists of a warehouse building. There is a low point in George Street near the subject site.

Figure 1 shows an aerial photo of the existing site and surrounds. Figure 2 shows the site survey. Figure 3 gives the ground floor plans of the proposed development.

Figure 1 Aerial Photo (source: NearMap)

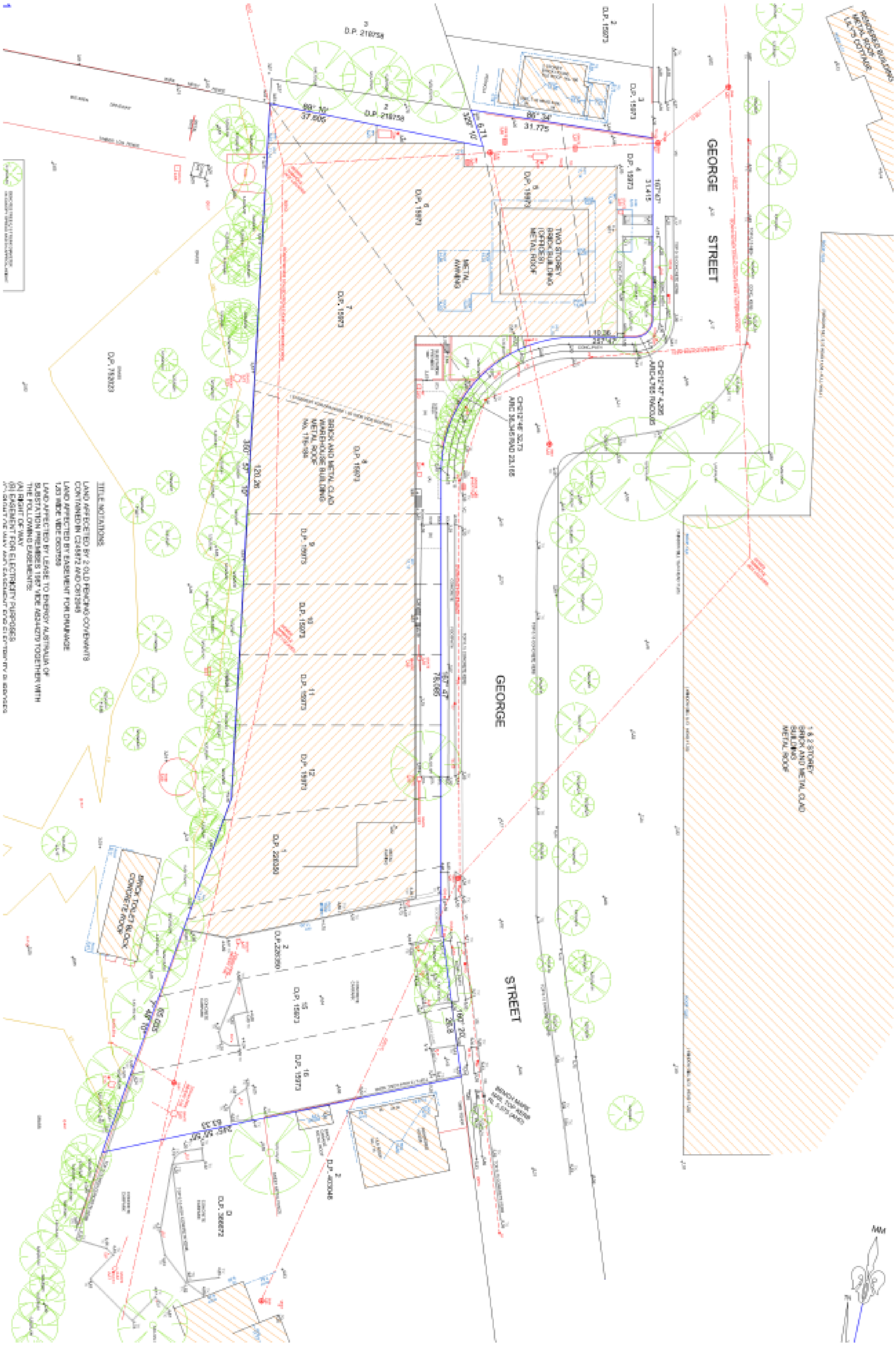


Figure 2 Site Survey

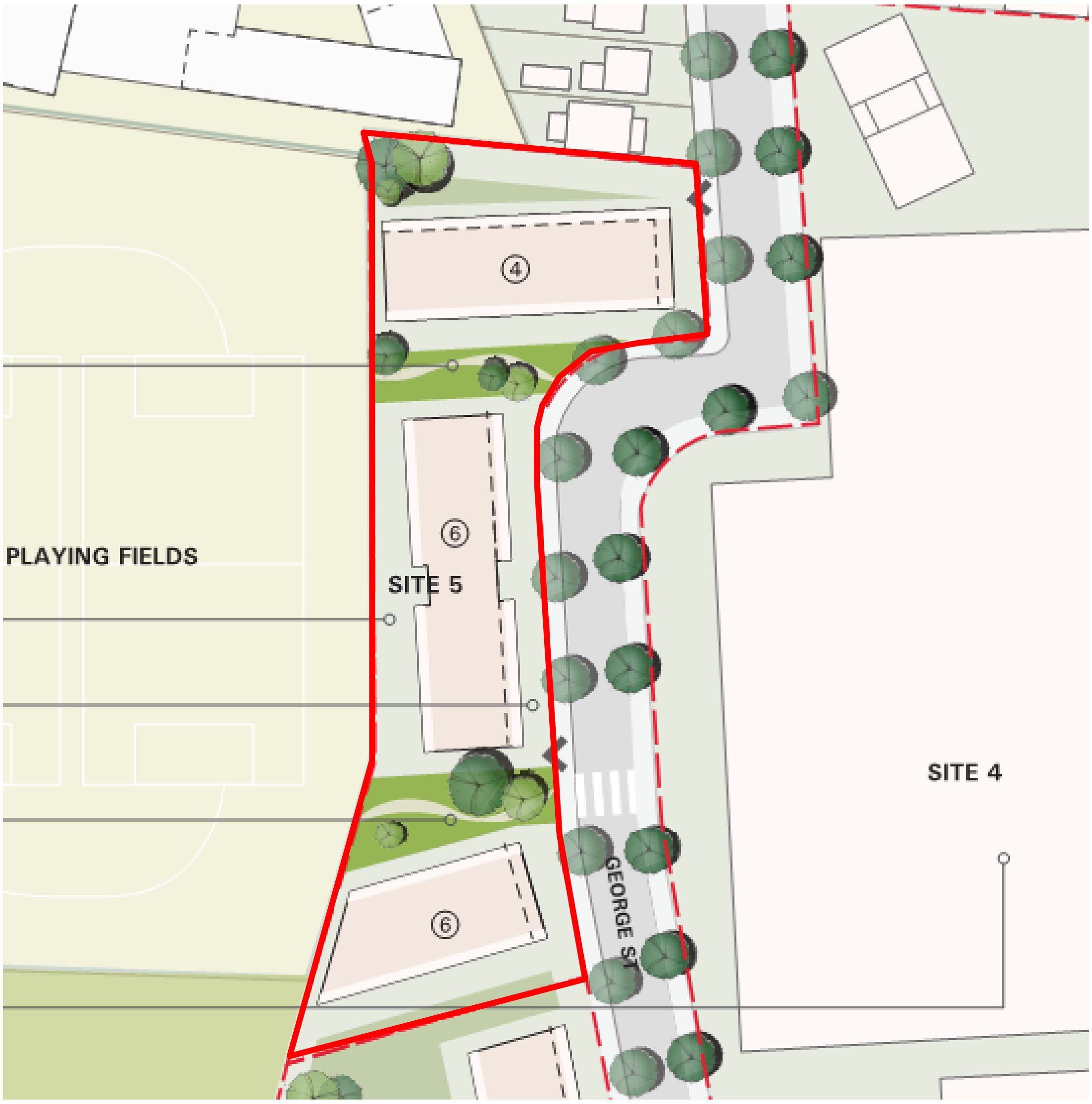


Figure 3 Site master plan (source: Concord West Precinct Master Plan, JBA, 2 May 2014)

2.0 AVAILABLE INFORMATION

2.1 Existing Documents

The following documents have been reviewed as part of this flood study

- Concord West Precinct Master Plan Urban Design Study (JBA, 2 May 2014);
- Survey by Project Surveyors dated November 2013;
- Concord West Precinct Master Plan Flood Study (Jacobs, draft 1 16/03/2015)
    - Tuflow flood model files for the above study.
- Specification for the Management of Stormwater (City of Canada Bay, February 2009)
- ARR revision Book 9 Chapter 6: Safety Design Criteria (Grantley Smith, Ron Cox, draft 9/12/2013)

2.2 Council Requirements

Council's Specification for the Management of Stormwater sets out the following flood controls for the developments relevant to the subject site:

The minimum freeboard shall be as follows:

- *150mm for roadways - between the 100-year ARI overland flow route and warehouse, factory, and garage floor levels and entrances to underground carparks.*
- *300mm for roadways - between the 100-year ARI overland flow route and office, living rooms, retail space, storeroom, and show room floor levels.*
- *300mm for surcharge paths e.g. easements - between the 100-year ARI overland flow route and all internal building floor levels, garages and basement carparks.*
- *500mm for channels, creeks and rivers - between the 100-year flood water level and all internal building floor levels, garages, and basement carparks.*

2.3 Concord West Precinct Mater Plan Flood Study

City of Canada Bay Council engaged Jacobs to prepare a flood assessment for the Concord West Precinct Master Plan. The report determined existing flood levels, as well as the impact of proposed mitigation works.

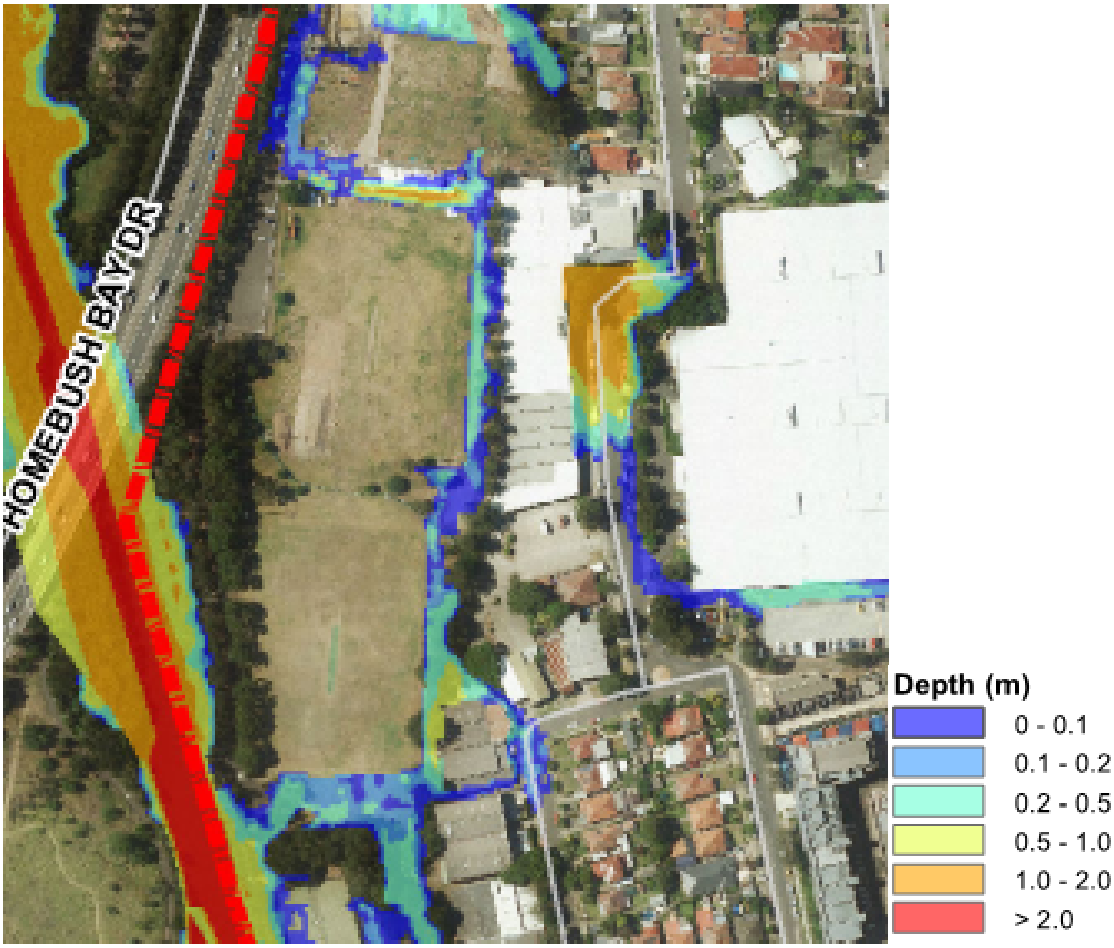


Figure 4 Jacobs Flood Study Extract - 100-year Baseline Model

The report identifies the George Street sag point as a flood prone area, and proposes a mitigation strategy to reduce the flood risk in the area as well as a safe vehicular passage for stroms up to and inlufding the 100-year ARI event. The strategy includes:

- regrading of George Street to reduce the depth of the sag point;
- high capacity pits to capture
- construction of an overland flow path from the sag point through to Powells Creek Reserve;
- construction of a floodway through the playing fields to drain flows to Powells Creek; and,
- a low profile kerb (approx. 50mm) on the western side of George Street to minimise ponding on the road before overflow to the overland flow route.

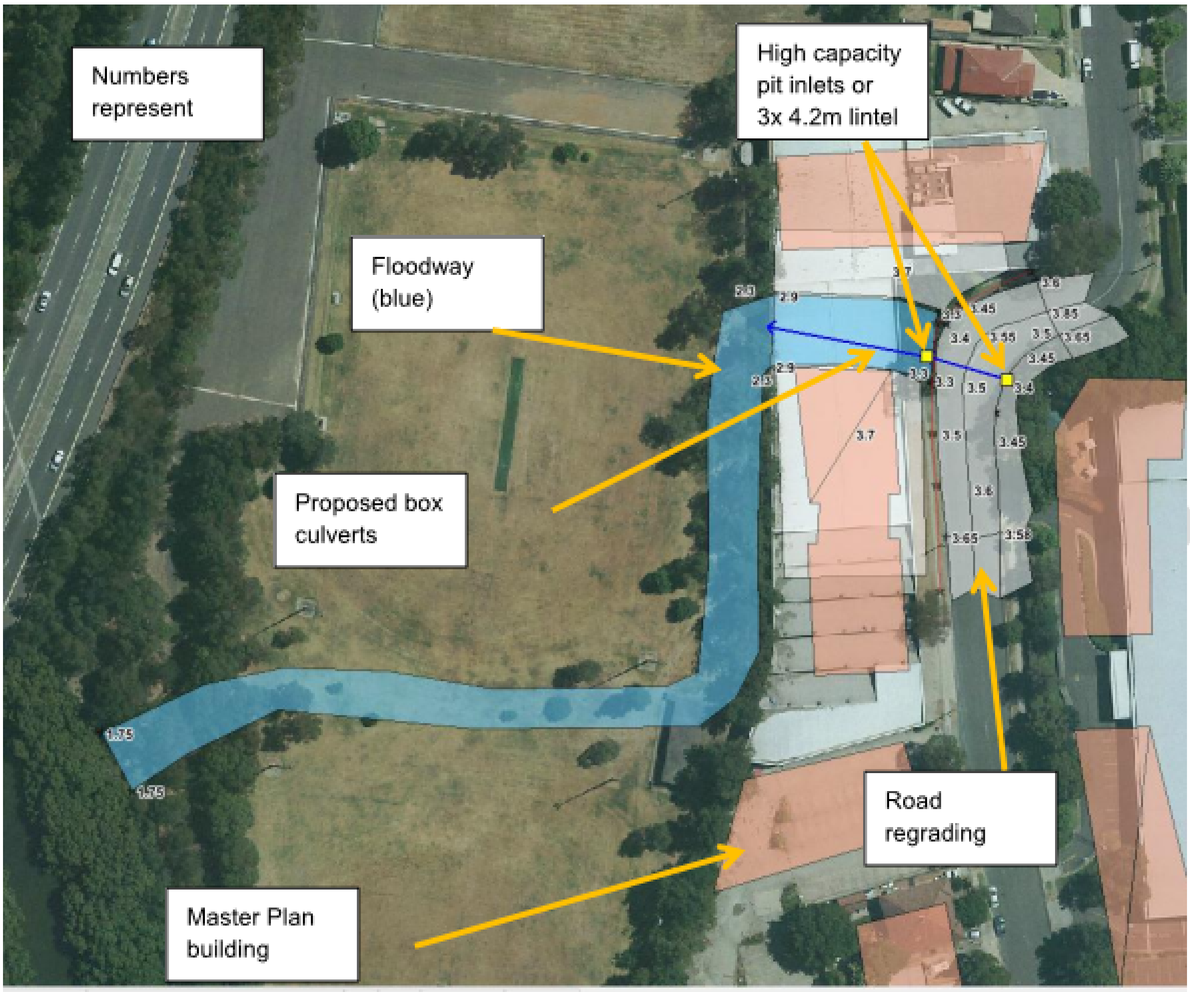


Figure 5 Jacobs Flood Study Extract - Flood Mitigation Option

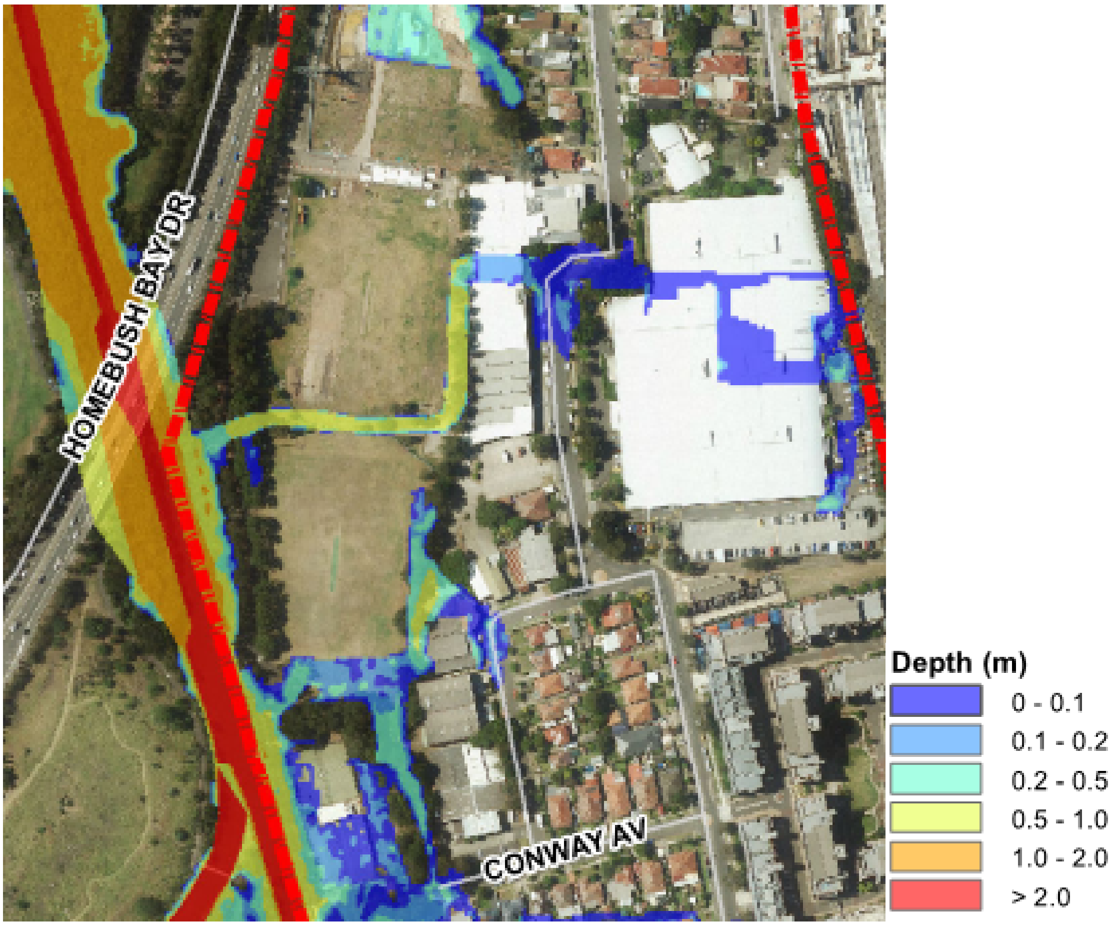


Figure 6 Jacobs Flood Study Extract - 100-year with mitigation works

3.0 FLOOD MODELLING

3.1 TUFLOW

The flood model built by Jacobs was used under a licence agreement through Council by TTW for the purpose of establishing flood levels in this report.

The baseline model was run to verify the results were equivalent to those produced by Jacobs. The difference in flood levels between the two models was generally no more than 2mm. We attribute the small difference in flood levels to the use of a later version of TUFLOW in this assessment (build 2013-12-AD in this study, 2013-12-AA in Jacobs' study).

3.2 Ground Surface

The ground surface model used in the TUFLOW model was compared to the field survey obtained for George Street. The levels in the survey data used in the TUFLOW model (from AAM Hatch LiDAR) are typically within 150mm of the field survey. As a result, we consider the flood levels may be conservative. The TUFLOW existing ground survey model files were used to ensure consistency across models.

3.3 Mitigation Works

The mitigation works, including road raising, and the overland flow route between the buildings and between the ovals was designed using civil design software 12d.

The existing buildings in the model were removed and replaced with the three buildings from masterplan.

In addition to the mitigation measures recommended in Jacobs' report, the following changes have been made:

- Relocate 900mm diameter pipe under George Street to suit proposed building layout
- Culvert provided in south-east corner of playing fields to avoid the existing change rooms, extending to a pit to the west of the fields
- Twin 900mm diameter pipes discharge stormwater from the proposed culvert to Powells Creek.

4.0 100-year ARI Flood Results

4.1 Existing conditions

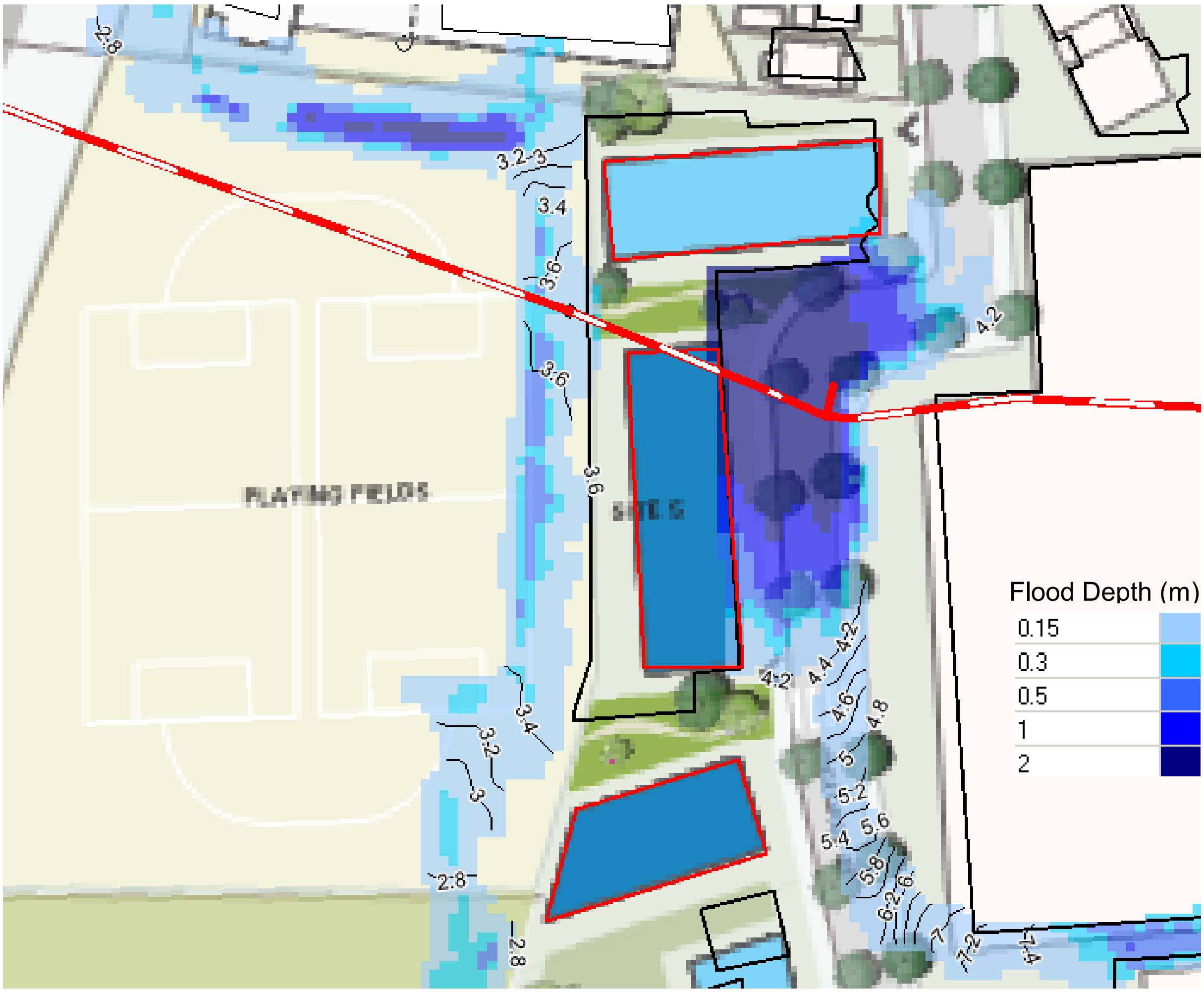


Figure 7 Existing 100-year ARI Flood

4.2 Proposed Development

The proposed development and mitigation measures were added to the model to determine the flood impact of the development. The mitigation measures are shown on the civil siteworks **concept plan** in **Appendix A**. This concept plan is subject to detailed design and Council formal approval through Section 138 of the Roads Act 1993.

Figure 8 shows the flood depth with the mitigation measures in place.

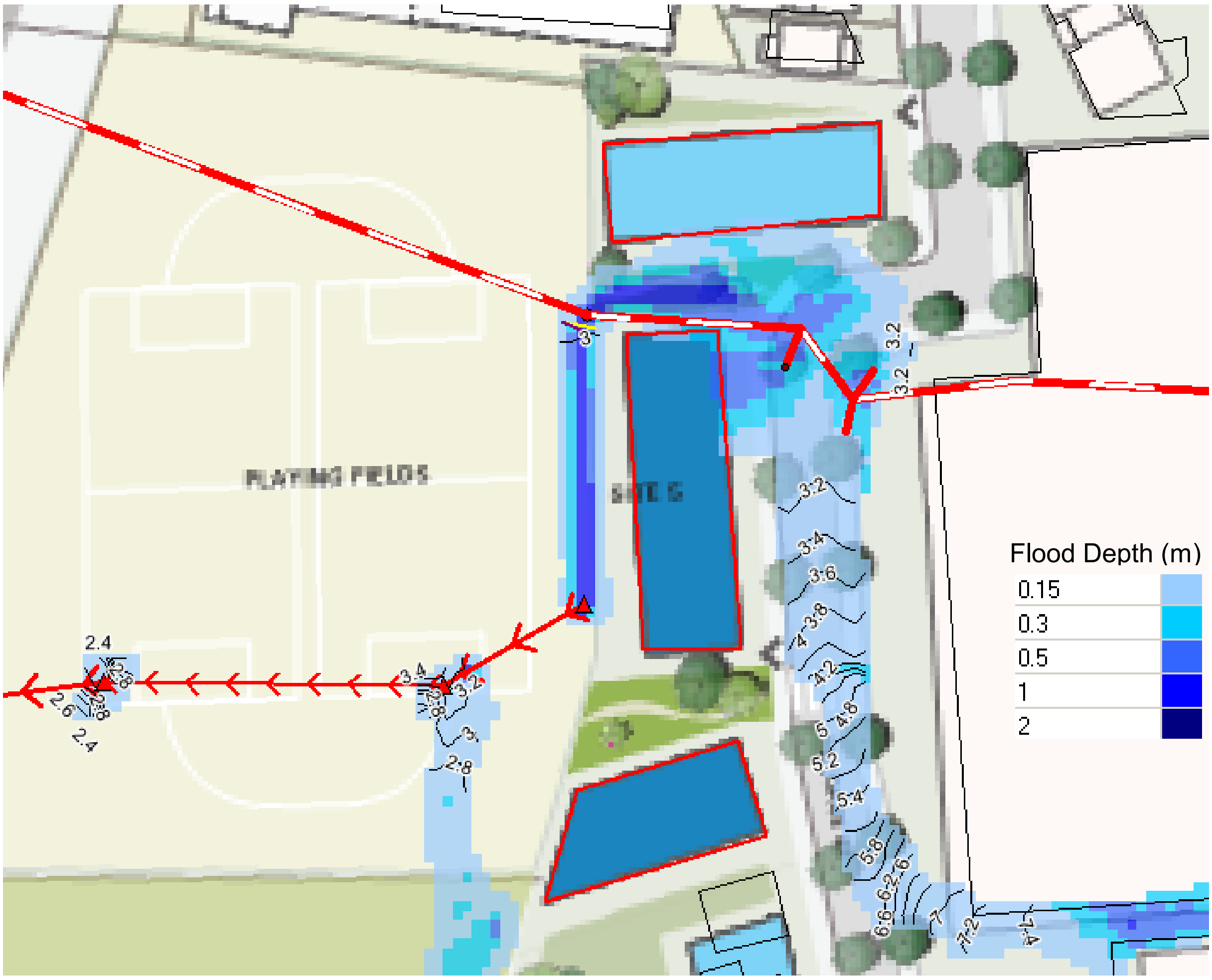


Figure 8 100-year Flood with mitigation

Figure 9 shows the flood hazard plan in accordance with the NSW government's "Floodplain Development Manual" April 2005 to enable Canada Bay Council assess the risk on their assets. High Hazard exists within the proposed open channel to the west of the proposed site. A safety protection treatment is recommended in the form of signage and/or fencing to eliminate or reduce the hazard. The appropriate safety protection treatment is subject to detailed design and coordination with landscaping works.

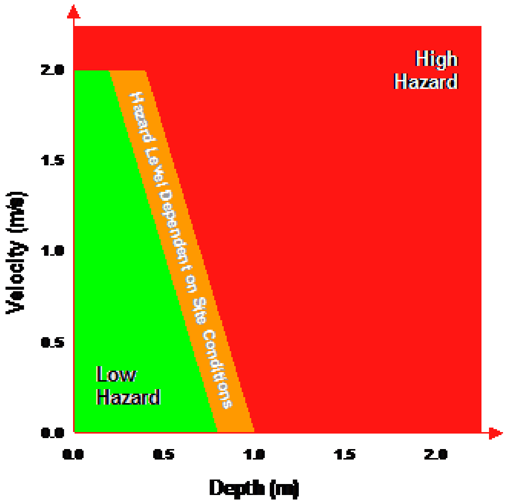


Figure 9: Flood Hazard Map

5.0 FLOOD PLANNING LEVELS

FPLs across the building have been determined based on the requirements of the DCP, the flood modelling and the masterplan layouts. The FPLs are presented in Figure 10.

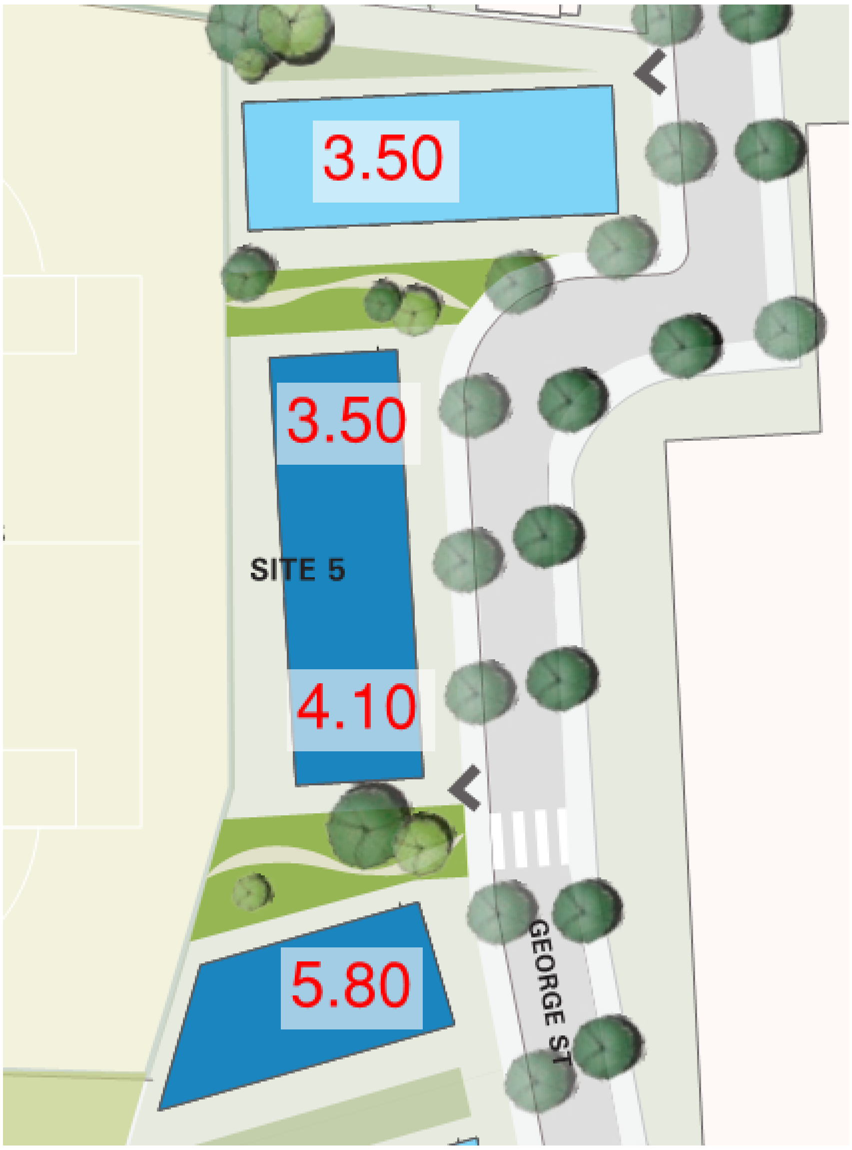


Figure 10 Flood Planning Levels

5.1 Basement Entrance

It is understood that the development of the site will likely consider basement car parking. Under the DCP, the basement must be above the 100-year flood level with some freeboard, 300mm for this site. Basement entrances must be elevated to the flood planning levels in Figure 10 before ramping down to the basement.

It is recommended that TTW is contacted to provide advice on FPLs regarding the design of entries and openings to the basement.

5.2 Overland Flow Route

The overland flow route from the sag point on George Street through to the playing fields is a critical part of the flood mitigation design. Consideration should be given during the detailed design phase of the project including the basement underneath.

The masterplan has an allowance for shown as a connection between George Street and Powell's Creek Reserve. The finished levels are to be in accordance with the levels used in the flood modelling. As such it is recommend that TTW be contacted to advise on the overland flow route design during detailed design stage of the building structure.

6.0 EVACUCATION, GEORGE STREET AND VEHICLE STABILITY

George Street is an evacuation route for more than 100 residences and a school. Regrading George Street has the benefit of making the evacuation route trafficable during flood events. Under the current conditions, the flood depth at the say point is greater than 2m. This is clearly not passable, and dangerous for all vehicles.

6.1 Vehicle Stability

The Australian Rainfall and Runoff (ARR) revision project gives guidance on vehicle stability in Book 9 Chapter 6 Safety Design Criteria (draft 9/12/2013). The following figure is an extract from the above.

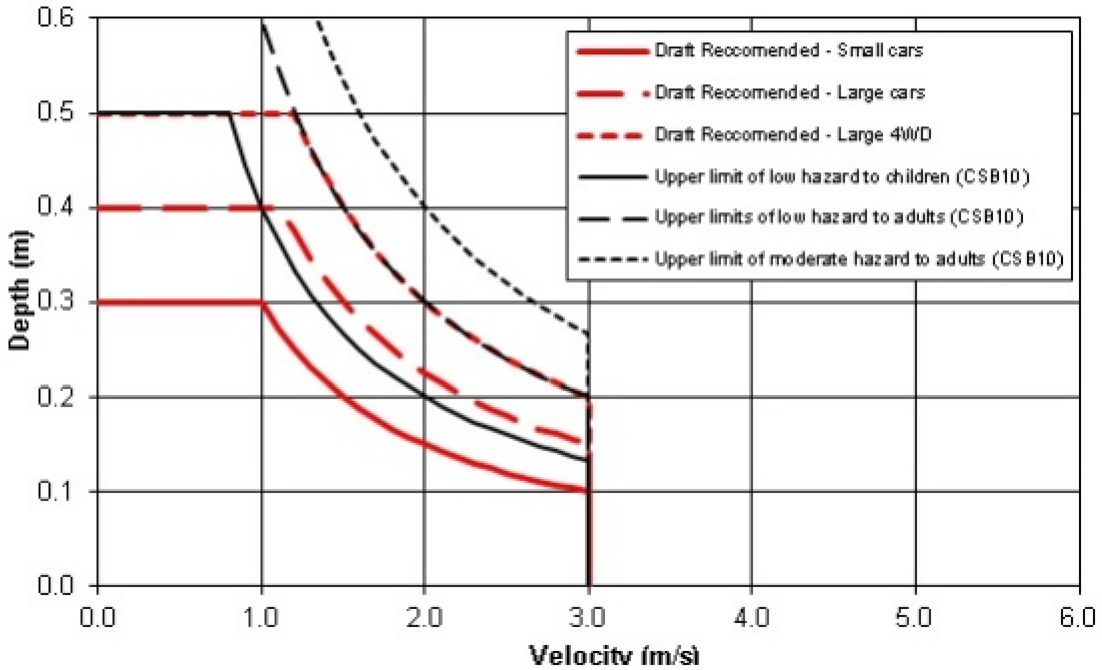


Figure 9.6.6. Interim Safety Criteria for Vehicles in Variable Flow Conditions (After Shand et al, 2011)

Figure 9Vehicle Stability in Flood Waters

With velocities less than 1 m/s at the George Street sag point with the proposed regarding, the draft recommended stability criteria for small cars is a flood depth of 300mm.

Under the design condition, during a 100-year ARI flood event, there is a width of approximately 9m along the crown at the sag point where the flood depth is less than 300mm and small vehicles can safely pass. Refer to Figure 10.

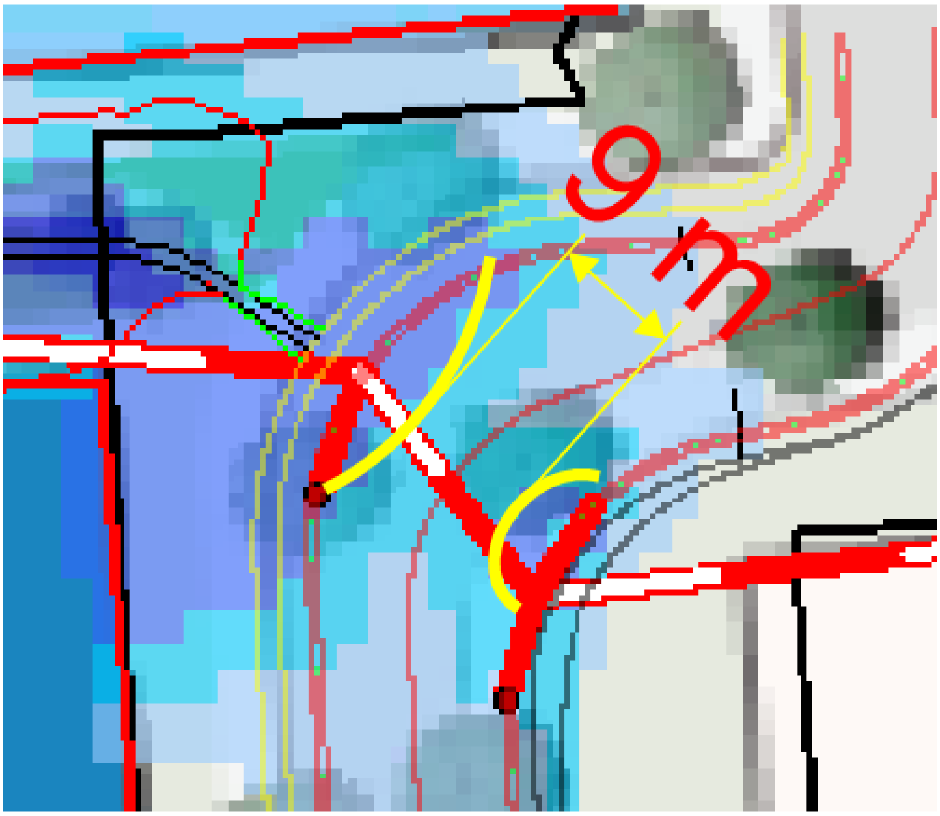


Figure 10 Safe width for cars in a 100-year flood event under proposed conditions

TTW recommends that appropriate flood signage and depth markers are installed as part of the regrading works. It is also recommended that the road does not have any median islands through the sag point to allow vehicles to navigate flood waters through the area with the smallest flood depth.

7.0 CONCLUSIONS AND RECCOMENDATIONS

The proposed development at 176-184 George Street can be designed to reduce the flood impact on neighbouring properties and improve conditions for existing residents north of the site. The finished floor levels provide adequate freeboard to the 100-year ARI flood in accordance with Council's DCP.

This report has been prepared based on the masterplan documents. We recommend:

- That the flood information presented in this report is reviewed when detailed designs are prepared including but not limited to

  - pits and headwall design taking into account hydraulic efficiency
  - detailed design of pit 7 functioning as intended to be a surcharge pit.
  - safety protection system of the open channel and culvert in conjunction with proposed landscaping works

- minimising potential blockages of the proposed open channel and box culverts (eg, self cleansing if achievable) considering the site's levels constranst s.

- That the proposed discharge outlet to Powell's creek be detailed and submitted to Department of Lands/ NSW's Ofiice of Water and Fisheries for their approval and acceptance during detailed design stage
- That the civil siteworks concept plan as shown in **Appendix A** be adopted subject to detailed design and formal approval by City of Cananda Bay Council through the Section 138 of the Roads Act 1993

Prepared by:
TAYLOR THOMSON
WHITTING (NSW) PTY LTD

Tim Henderson
Engineer

Authorised by:
TAYLOR THOMSON
WHITTING (NSW) PTY LTD

Nemesio Biason
Associate

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APPENDIX A

CIVIL SITEWORKS CONCEPT PLANS

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING S0001

176-184 GEORGE STREET CONCORD WEST

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer .
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
6. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
PROJECT SURVEYORS	SURVEY	B1060	1	NOV 2011

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels : SSM 114416
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : ISG OR MGA OR LOCAL
Survey prepared by : PROJECT SURVEYORS
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENT NOTE

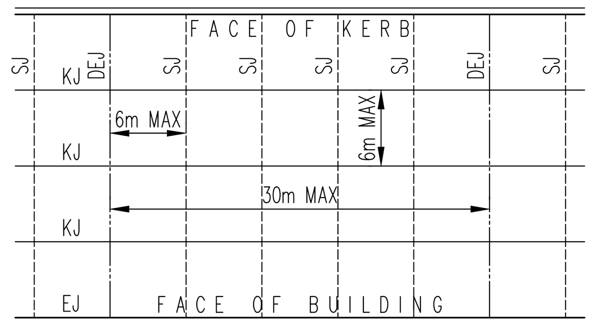
The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : CONTACT THE SURVEYOR

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

JOINTING NOTES

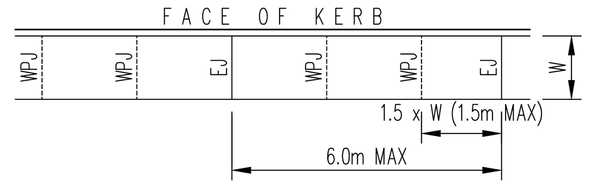
Vehicular Pavement Jointing

1. All vehicular pavements to be jointed as shown on drawings.
2. Keyed construction joints should generally be located at a maximum of 6m centres.
3. Sawn joints should generally be located at a maximum of 6m centres or 1.5 x the spacing of keyed joints, where key joint spacing is less than 4m, with dowelled expansion joints at maximum of 30m centres.
4. Provide 10mm wide full depth expansion joints between buildings and all concrete or unit pavers.
5. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
6. Vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres.
2. Weakened plane joints are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows (uno).



KERBING NOTES

Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
   Existing road pavement is to be sawcut 900mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
   Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
   Existing kerbs are to be completely removed where new kerbs are shown.

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

CONCRETE NOTES

EXPOSURE CLASSIFICATION : External : A2
Internal : A1

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
KERBS, FOOTPATHS	S25	80	20
FOOTINGS, PAVEMENTS	S32 at 90 days	80	20

1. Use Type 'GP' cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. For all falls in slab, drip grooves, reglets, chamfers etc. refer to Architects drawings and specifications.
5. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
6. No holes or chases shall be made in the slab without the approval of the Engineer.
7. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
8. Slurry used to lubricate concrete pump lines is not to be used in any structural members.
9. All slabs cast on ground require sand blinding with a Concrete Underlay

FORMWORK

1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control plan shall be implemented and adopted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

SITEWORKS LEGEND

● F22.20	Finished surface level
F22.00	Finished contour
K&G	Kerb and gutter
KO	Kerb only
FK	Flush kerb
DD	Dish drain
MK	Mountable kerb
MIK	Mountable integral kerb
MIK+TE	Mountable integral kerb with thickened edge
IK+TE	Integral kerb with thickened edge
TE	Thickened edge
IK	Integral kerb
IK+ED	Integral kerb with edge downturn
K&T	Kerb and toe
	Stormwater pit, flow direction and line with
IL10.00	Invert level upstream
600 ø '2'	Pipe size and class
1.25%	Pipe grade
Q=345 L/s	Flow (Litres per second)
IL9.65	Invert level downstream
GD	Grated drain
IR	Intermediate riser with subsoil drainage line (100 dia)
FP	Flushing point with subsoil drainage line (100 dia)
DP	Down pipe
RP	Rodding point
	Concrete encased stormwater line
	Stormwater line with pipe taper and flow direction
	Taper kerb to zero height over 500 mm
	Wheelstop
RW#	Blockwork retaining wall
RW#	Brickwork retaining wall
DEJ	Dowelled expansion joint
SJ	Sawn joint
KJ	Keyed construction joint
WPJ	Weakened plane joint
EJ	Expansion joint
TKJ	Tied keyed joint
	Grass catch drain
	Overland flow path
	Guard Rail

SITEWORKS NOTES

1. All basecourse material to comply with RTA specification No 3051 and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

RETAINING WALLS

1. Drainage shall be provided as shown on the drainage drawings.
2. Backfilling shall be carried out after grout or concrete has reached a minimum strength of 0.85 f'c. Backfilling shall be approved granular material compacted in layers not exceeding 200mm to 95% Standard compaction unless noted otherwise.
3. Provide waterproofing to back of walls as specified or noted.
4. Where retaining walls rely on connecting structural elements for stability, do not backfill against the wall unless it is adequately propped or the elements have been constructed and have sufficient strength to withstand the loads.
5. For all temporary batters obtain geotechnical engineers recommendations.

STORMWATER DRAINAGE NOTES

1 Stormwater Design Criteria :
   (A) Average recurrence interval –
      1:100 years for roof drainage to first external pit
      1:20 years for paved and landscaped areas
   (B) Rainfall intensities –
      Time of concentration: 6 minutes
      1:100 years = 25 mm/hr
      1:20 years = 52 mm/hr
   (C) Runoff coefficients –
      Roof areas: C_{100} = 1.0
      Roads and paved areas: C_{20} = 1.0
      Landscaped areas: C_{20} = 0.3
2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia shall be sewer grade uPVC with solvent welded joints.
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Precast pits may be used external to the building subject to approval by Engineer
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
8. Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
9. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
10. Care is to be taken with levels of stormwater lines. Grades shown are not to be reduced without approval.
11. All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
12. Subsoil drains to be slotted flexible uPVC U.N.O.
13. Adopt invert levels for pipe installation (grades shown are only nominal).

PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheets – **C???**
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)	Number
A	Kerb inlet pit 2400 lintel	450 x 900 Class D galvanised mild steel grate hinged to frame	2,3,4,5,6
B	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame	7,11,12
	Surface inlet pit	2400 x 1200 Class D galvanised mild steel grate hinged to frame	9,10
C	Junction pit	900 x 900 Class D cast iron cover with concrete infill	7,11,12
D	Headwall		8

BULK EARTHWORKS NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All batters at a slope of 2 (H) : 1 (V) U.N.O.
3. Excavated material may be used as structural fill provided,
   (i) it complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with select fill U.N.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report prepared by –
   Enviro West
   R11035g 21/03/2011

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions.
Refer to geotechnical report by (Enviro West) for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practises as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by (Enviro West) for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

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PRELIMINARY

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P6	ISSUE FOR APPROVAL	NB	NB	24.02.16
P5	ISSUE FOR COMMENT	NB	TB	30.11.15
P4	ISSUE FOR COMMENT	NB	TB	12.11.15
P3	ISSUE FOR COMMENT	NB	TB	28.10.15
P2	ISSUE FOR COMMENT	NB	TB	22.09.15
P1	ISSUE FOR INFORMATION	NB	JW	24.06.15

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Project
176-184 GEORGE STREET CONCORD WEST

Sheet Subject
NOTES & LEGENDS SHEET

Scale : A1 NO SCALE
Drawn NB
Authorised
Job No 151350
Drawing No C01
Revision P6
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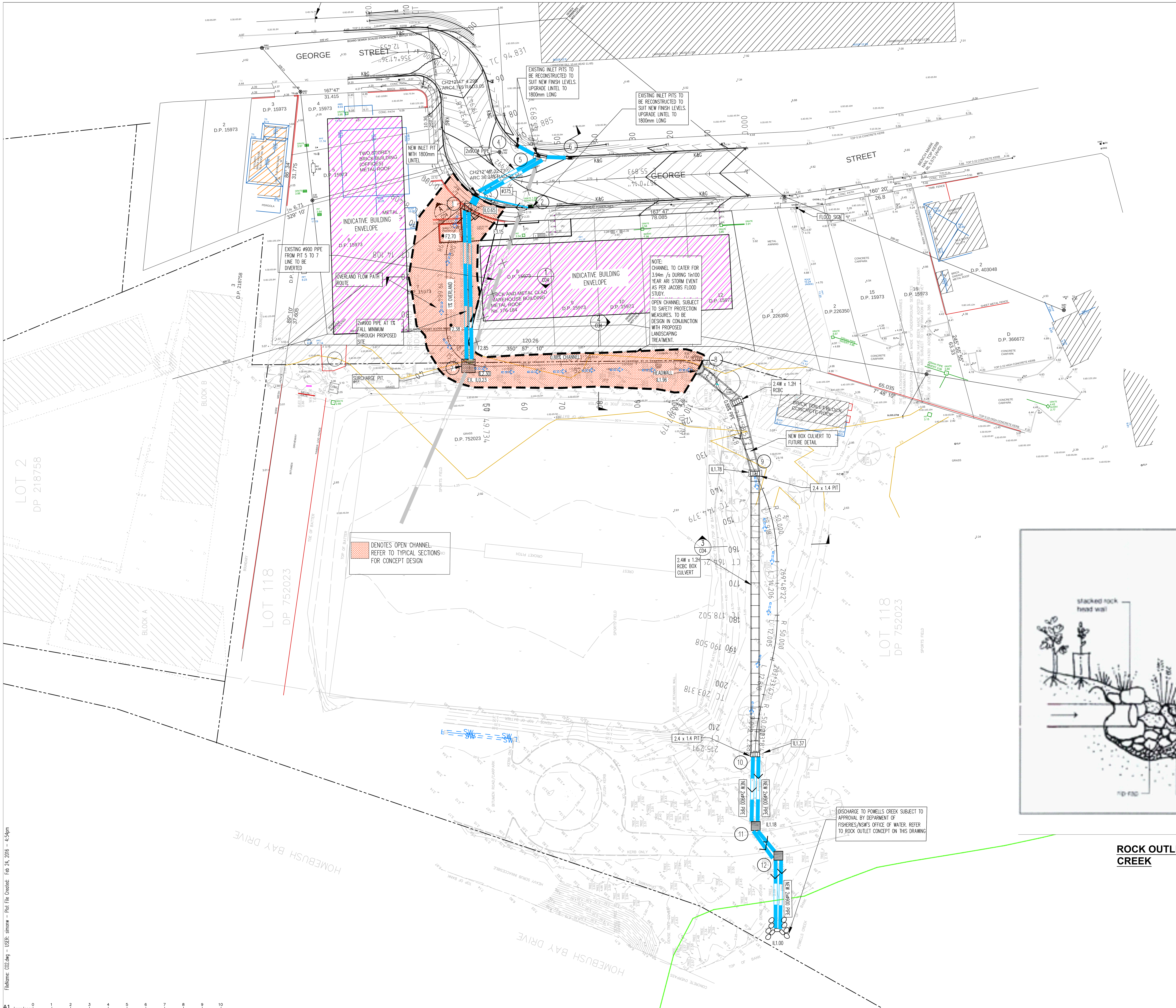

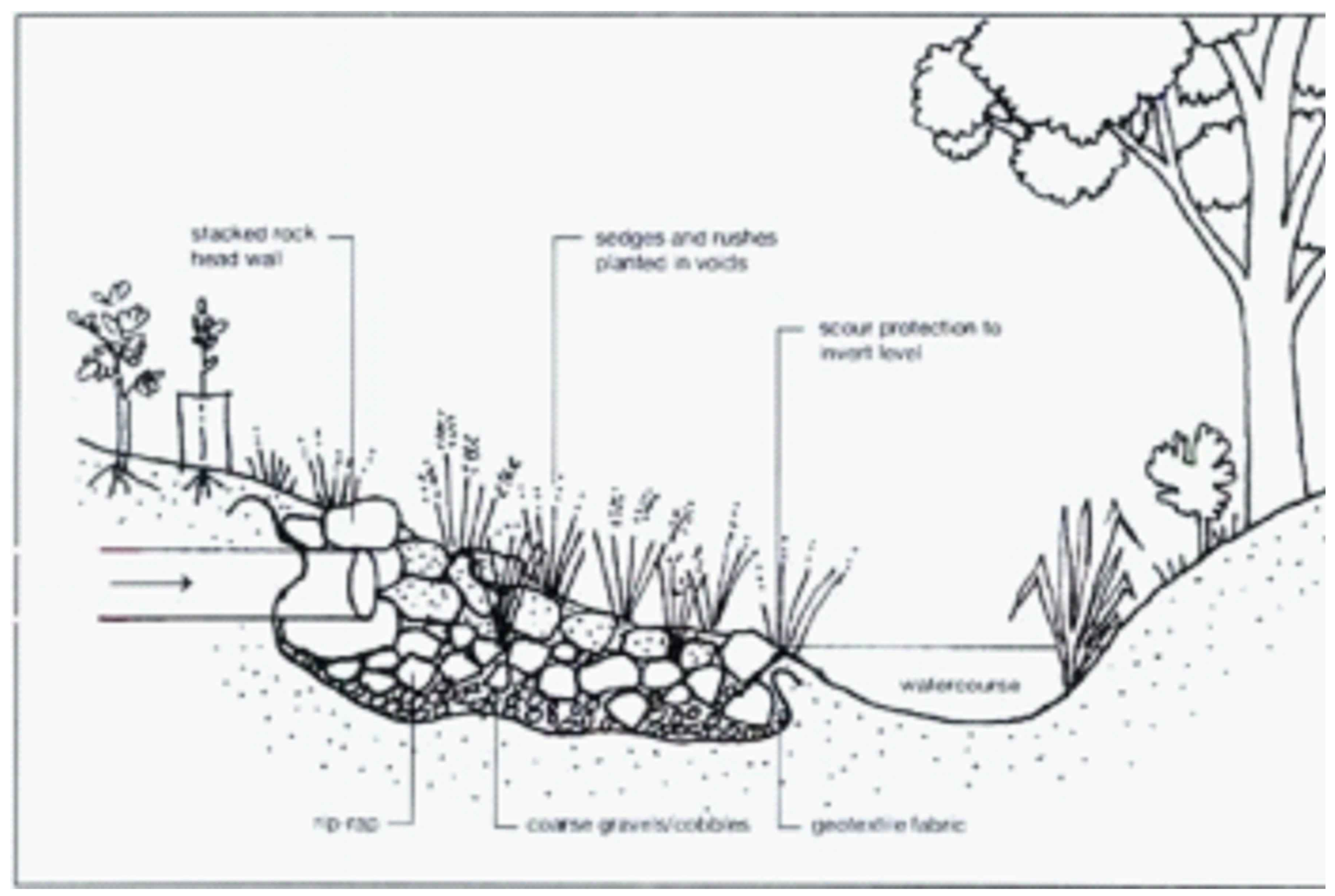

ROCK OUTLET DISCHARGE TO POWELLS CREEK

PRELIMINARY

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P6	ISSUE FOR COMMENT	NB	TB	30.11.15										
P5	ISSUE FOR COMMENT	NB	TB	12.11.15										
P4	ISSUE FOR COMMENT	NB	TB	28.10.15										
P3	ISSUE FOR COMMENT	NB	TB	22.09.15										
P2	ISSUE FOR COMMENT	NB	TB	10.08.15										
P1	ISSUE FOR INFORMATION	NB	JW	24.06.15	P7	ISSUE FOR APPROVAL	NB	NB	24.02.16					

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Project
176-184 GEORGE STREET CONCORD WEST

Sheet Subject
OVERALL SITEWORKS PLAN

Scale : A1 1:500 | Drawn NB | Authorised
Job No 151350 | Drawing No C02 | Revision P7

Plot File Created: Feb 24, 2016 - 4:54pm

FileName: C02.dwg – USER: simonw – Plot File Created: Feb 24, 2016 – 4:54pm

Rev	Description	Eng	Draft	Date
P6	ISSUE FOR APPROVAL	NB	NB	24.02.16
P5	ISSUE FOR COMMENT	NB	TB	30.11.15
P4	ISSUE FOR COMMENT	NB	TB	12.11.15
P3	ISSUE FOR COMMENT	NB	TB	28.10.15
P2	ISSUE FOR COMMENT	NB	TB	22.09.15
P1	ISSUE FOR INFORMATION	NB	JW	24.06.15

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Project
176-184 GEORGE STREET
CONCORD WEST

Sheet Subject
GEORGE STREET - ROAD RAISING PLAN

Scale : A1	Drawn	Authorised
1:500	NB	

Job No	Drawing No	Revision
151350	C03	P6

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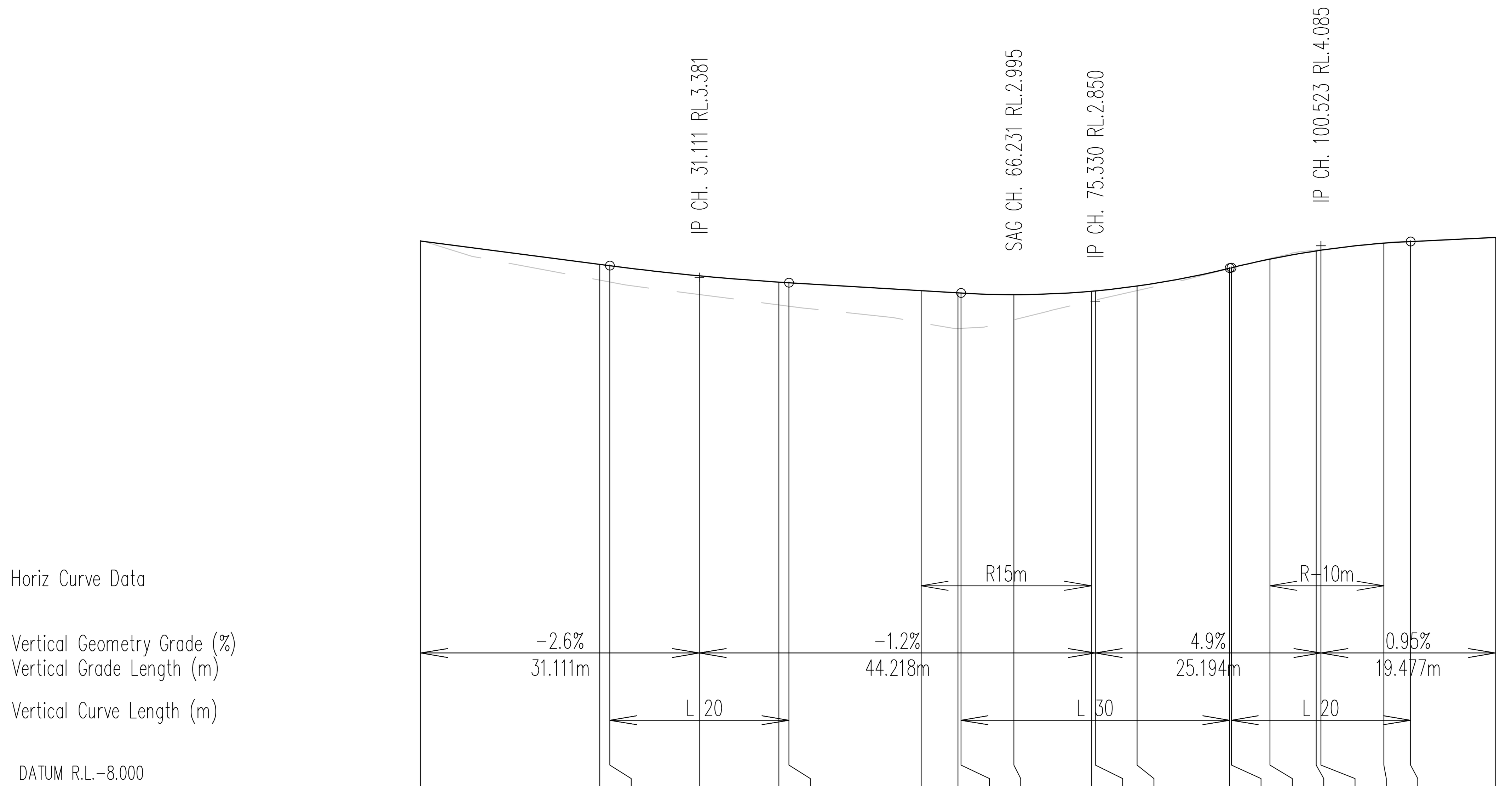
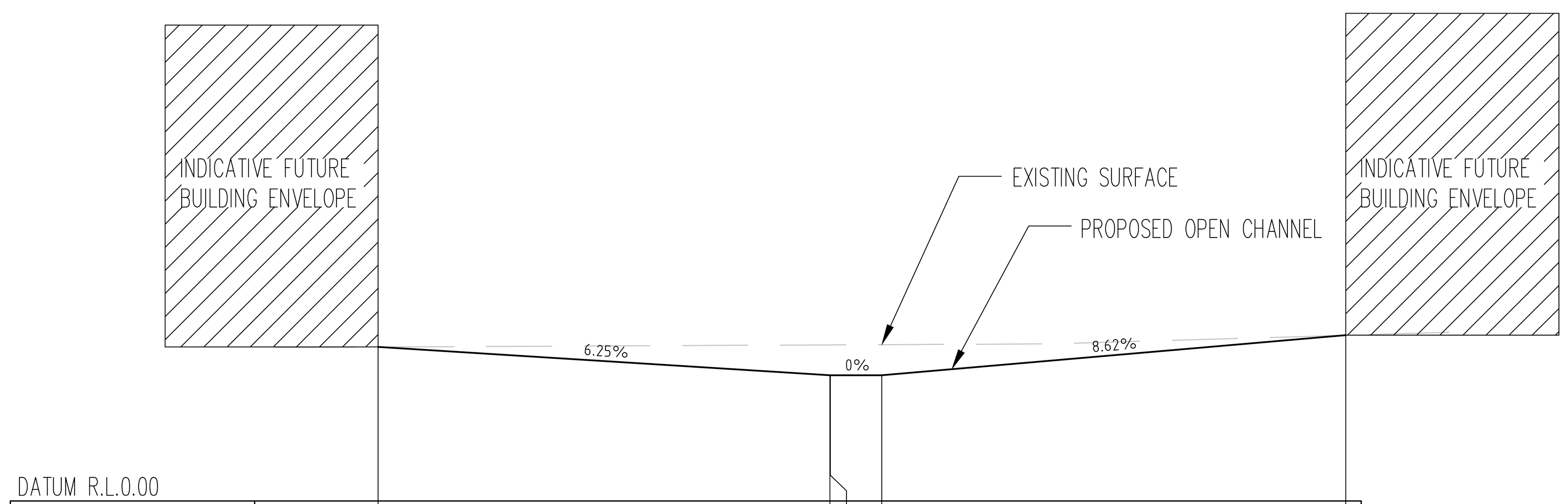


CHAINAGE	NAT. SURFACE ON ROAD CENTRELINE	CUT / FILL DEPTH	DESIGN LEVELS ON ROAD CENTRELINE
0	4.185	-0.005	4.190
20	3.318	-0.352	3.670
21.111	3.276	-0.365	3.641
31.111	2.997	-0.419	3.416
40	2.767	-0.508	3.275
41.111	2.738	-0.523	3.261
55.893	2.366	-0.718	3.084
60	2.242	-0.793	3.034
60.33	2.244	-0.787	3.030
66.231	2.432	-0.563	2.995
74.885	2.855	-0.217	3.071
75.33	2.875	-0.205	3.079
80	3.085	-0.103	3.188
90.33	3.576	-0.009	3.586
90.523	3.586	-0.009	3.595
94.831	3.801	0.014	3.788
100	3.989	0.018	3.971
100.523	4.000	0.013	3.986
107.547	4.150	0.007	4.143
110.523	4.188	0.008	4.180
120	4.266	-0.004	4.270

GEORGE STREET LONG SECTION

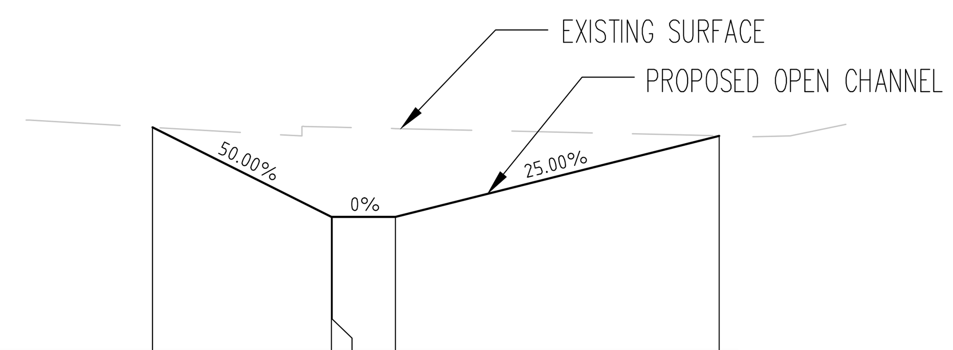
SCALE 1:500 HORIZONTAL

1:100 VERTICAL



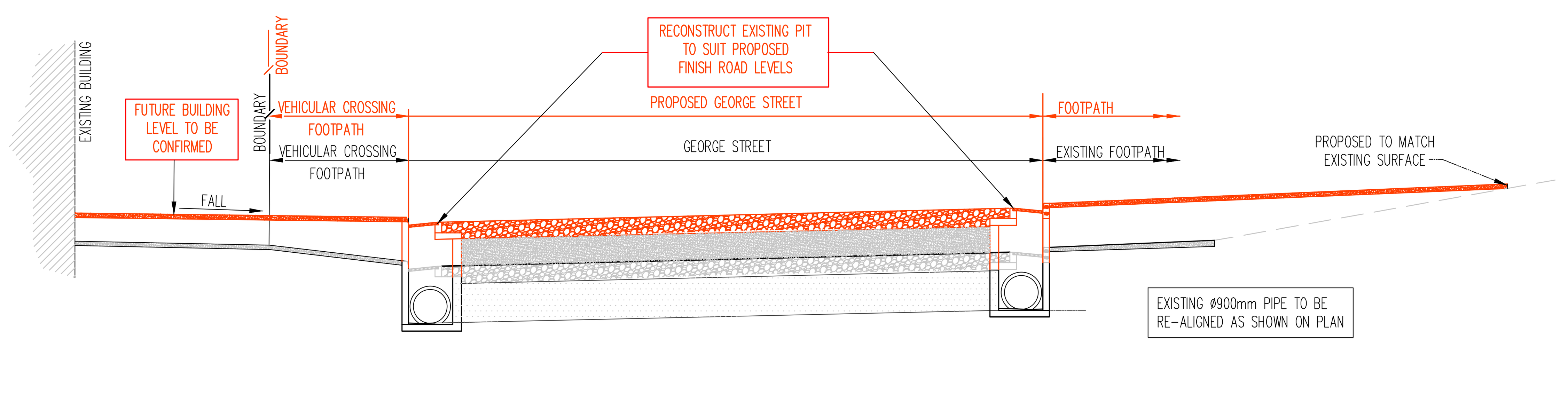
OFFSET	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
-8.791	2.993	2.993
-0.01	2.444	3.034
0	2.444	3.034
1	2.444	3.038
10.02	3.221	3.221

SECTION 1



OFFSET	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
-2.837	3.528	3.528
-0.01	2.114	3.531
0	2.114	3.531
1	2.114	3.508
6.118	3.394	3.394

SECTION 2

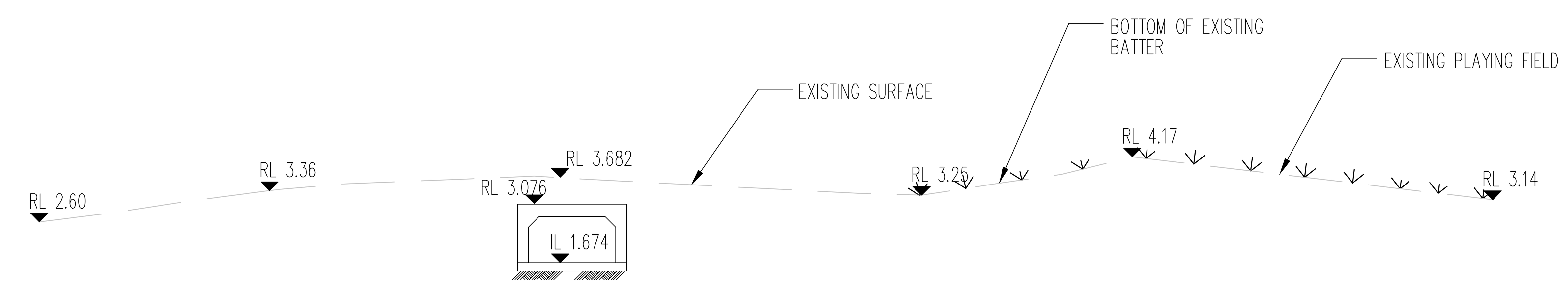


DATUM RL. -2.00

TYPICAL SECTION - GEORGE STREET

SECTION A C03

SCALE 1:20



SECTION 3 DATUM R.L.-1.00

SCALE 1:10

PRELIMINARY

FileName: C04.dwg - USER: simonw - Plot File Created: Feb 24, 2016 - 4:57pm

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Rev	Description	Eng	Draft	Date
P5	ISSUE FOR APPROVAL	NB	NB	24.02.16
P4	ISSUE FOR COMMENT	NB	TB	12.11.15
P3	ISSUE FOR COMMENT	NB	TB	28.10.15
P2	ISSUE FOR INFORMATION	NB	TB	22.09.15
P1	ISSUE FOR INFORMATION	NB	JW	24.06.15

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Project
TEST PROJECT NAME
NEW TITLE BLOCK LOGO
CHANDOS STREET ST. LEONARDS

Sheet Subject
DETAIL & SECTION SHEET

Scale : A1	Drawn	Authorised
NTS	NB	

Job No	Drawing No	Revision
151350	C04	P5

Plot File Created: Feb 24, 2016 - 4:57pm

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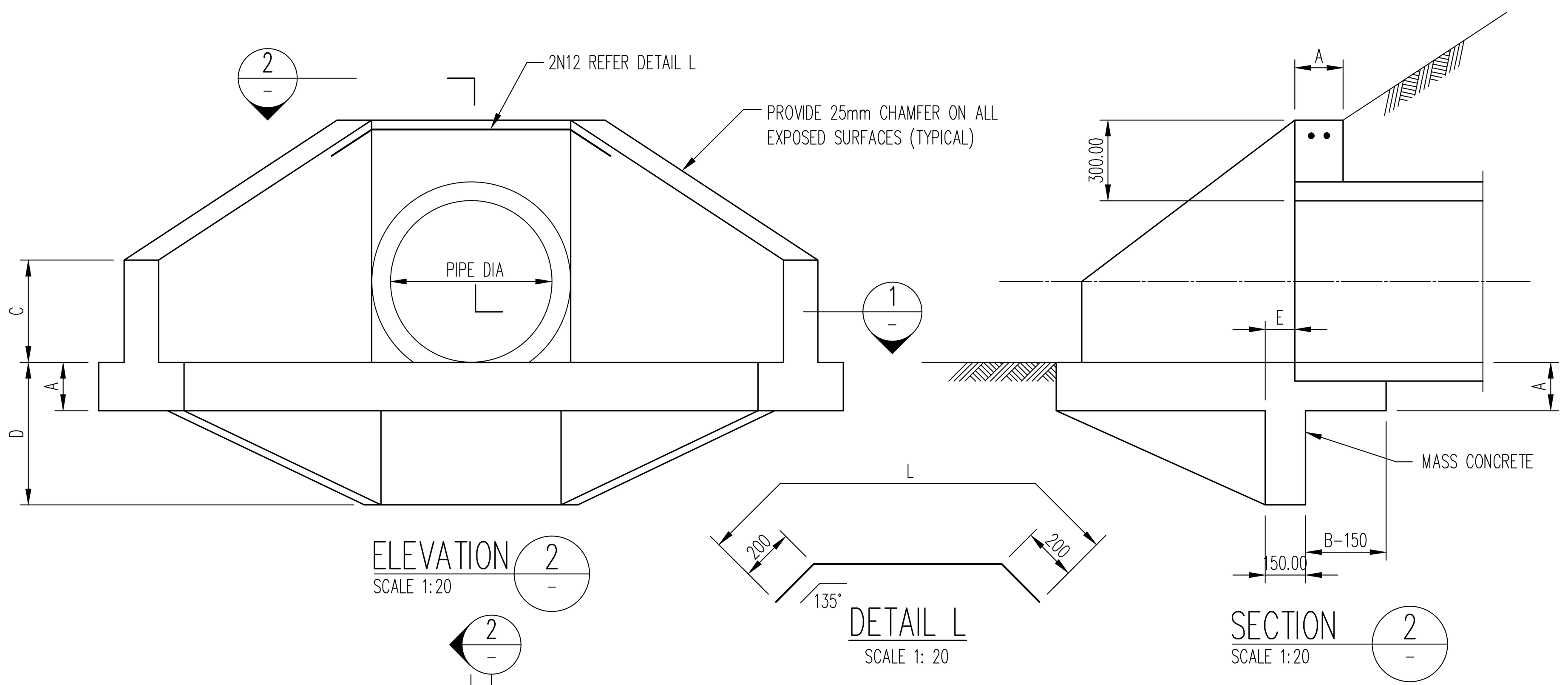
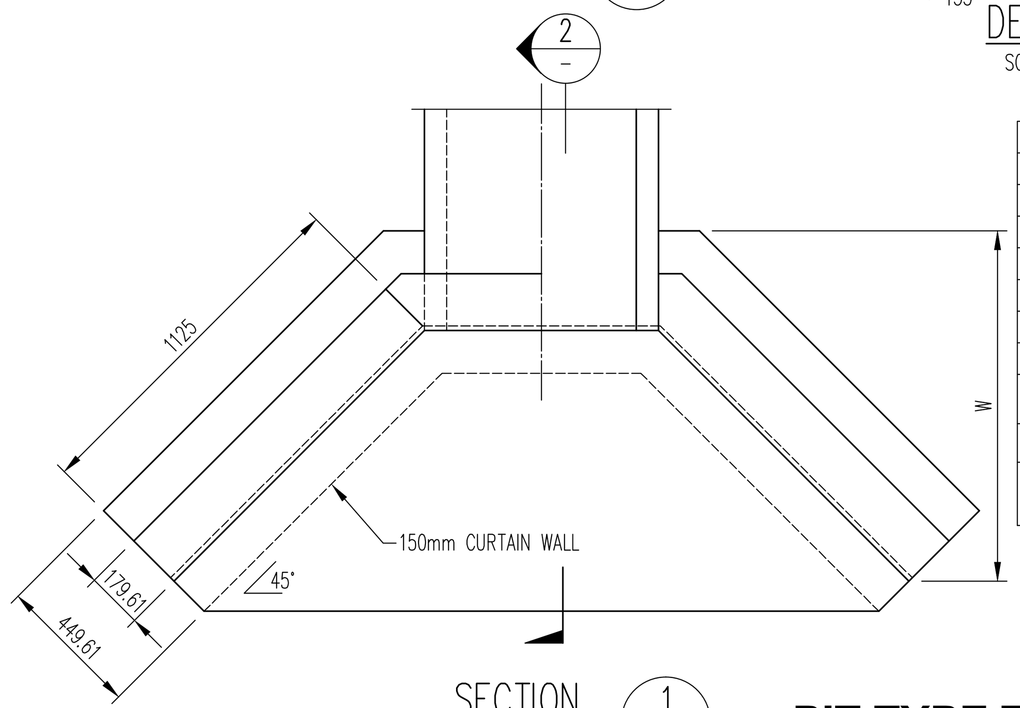


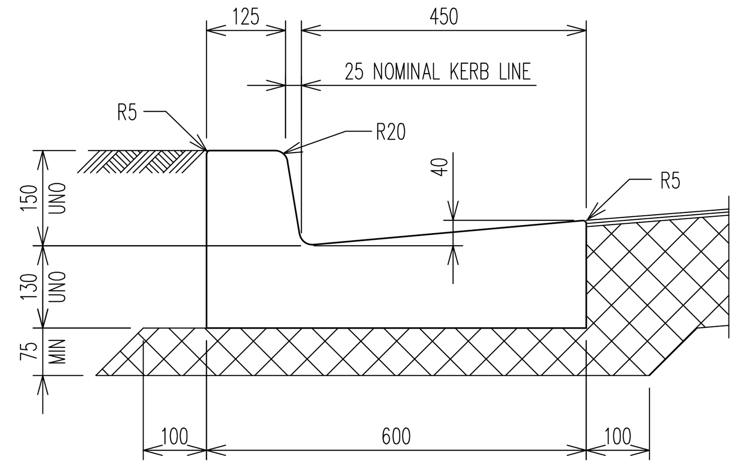


SECTION 1
SCALE 1:20

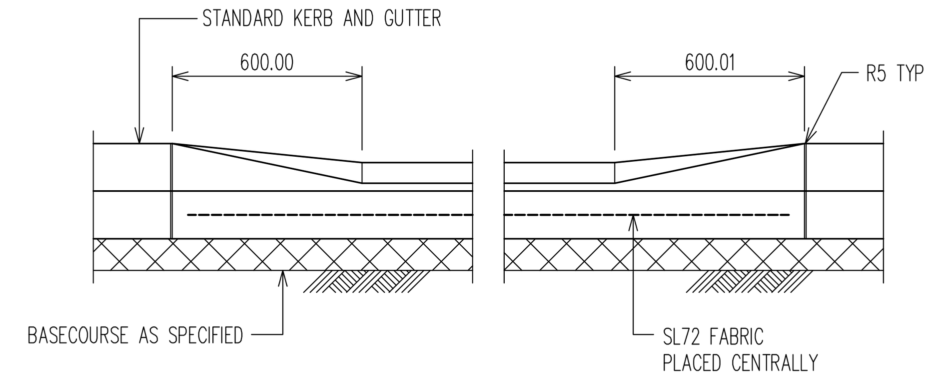
PIT TYPE E

PIPE DIAMETER		300	375	450	525	600	750	900
A		150	150	150	150	180	205	230
B		300	300	300	300	450	450	450
C		300	300	300	300	380	380	380
D		380	380	380	380	530	530	530
E		75	75	75	75	110	110	110
W		690	690	840	990	1120	1450	1780
L		840	840	915	990	1100	1250	1400
CONCRETE QUANTITY (cubic metres)		0.25	0.27	0.325	0.38	0.67	1.02	1.40
REINFORCEMENT DIAMETER		10	10	10	10	12	12	12
REINFORCEMENT	LENGTH (mm)	1680	1680	1830	1845	2200	2500	2800
	MASS (kg)	1.1	1.1	1.2	1.3	2.0	2.6	2.95

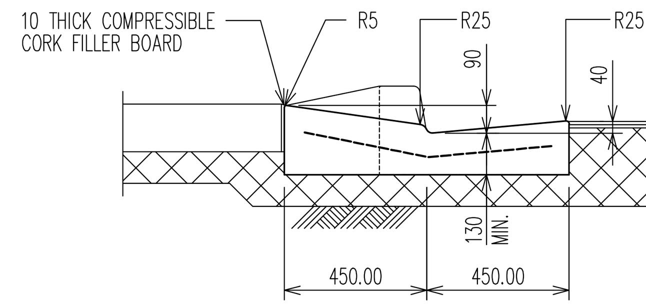
NOTE
COMPRESSIVE STRENGTH (F'c) FOR CAST IN-SITU CONCRETE TO BE A MINIMUM OF 25MPa AT 28 DAYS.



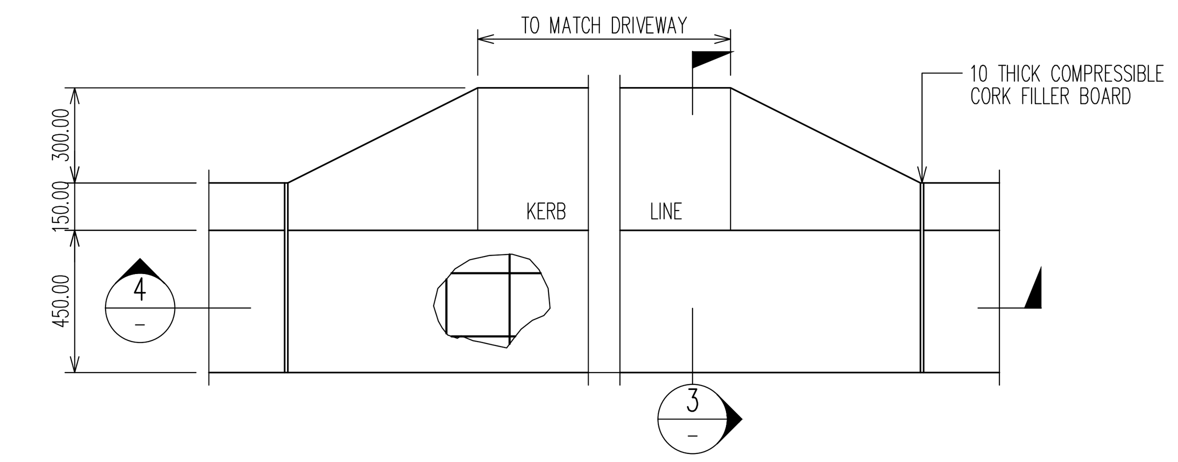
KERB AND GUTTER (K&G)
SCALE 1:10



SECTION 4
SCALE 1:20



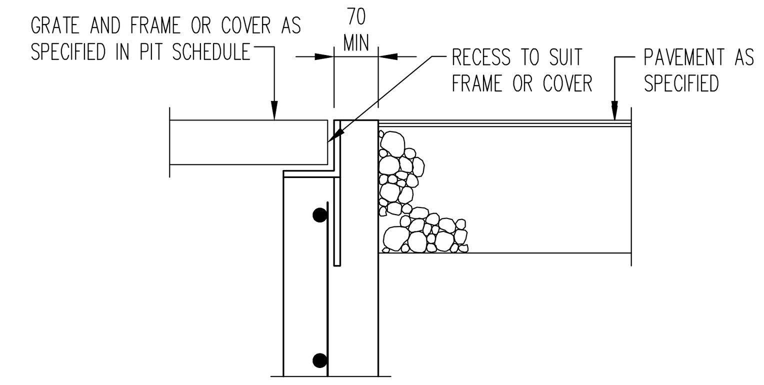
SECTION 3
SCALE 1:20



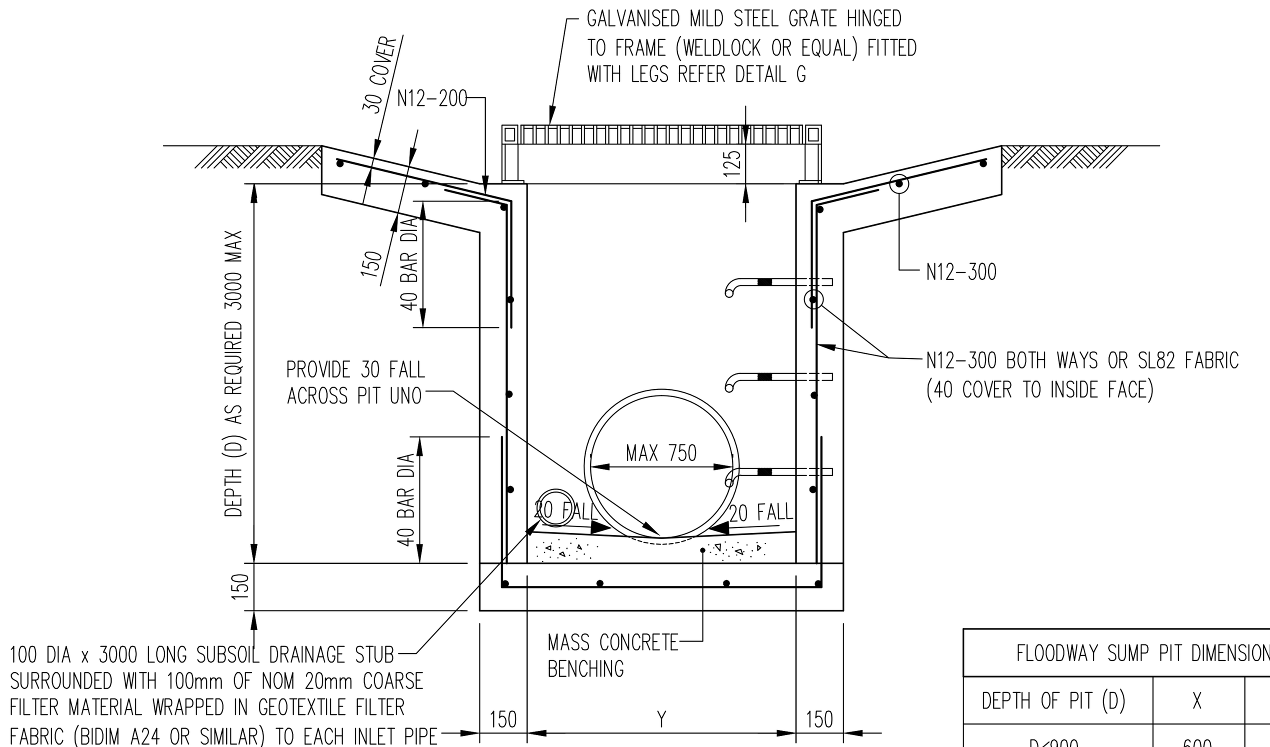
PLAN

NOTE
FOR VEHICULAR CROSSINGS IN PUBLIC ROADS, BUILDER TO CONFIRM LOCAL GOVERNMENT OR ROAD AUTHORITIES REQUIREMENTS BEFORE CONSTRUCTION

VEHICULAR CROSSING
SCALE 1:20



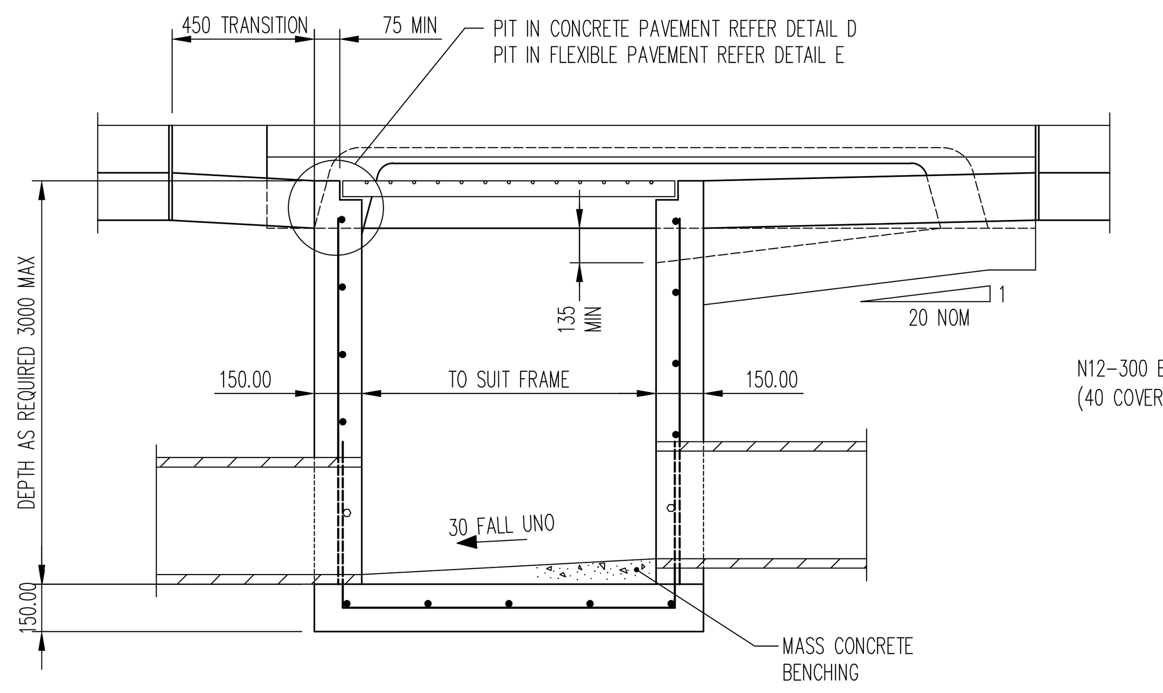
DETAIL E
SCALE 1: 10



NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS

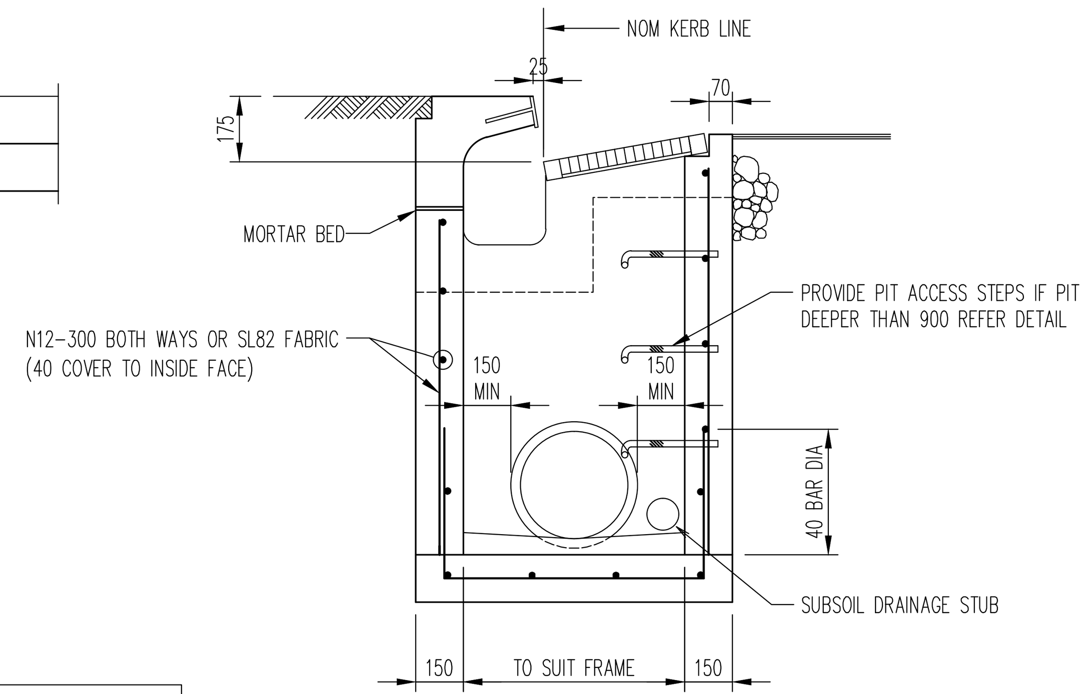
SECTION 8
SCALE 1:20

FLOODWAY SUMP PIT DIMENSIONS		
DEPTH OF PIT (D)	X	Y
D<900	600	600
D>900	900	900

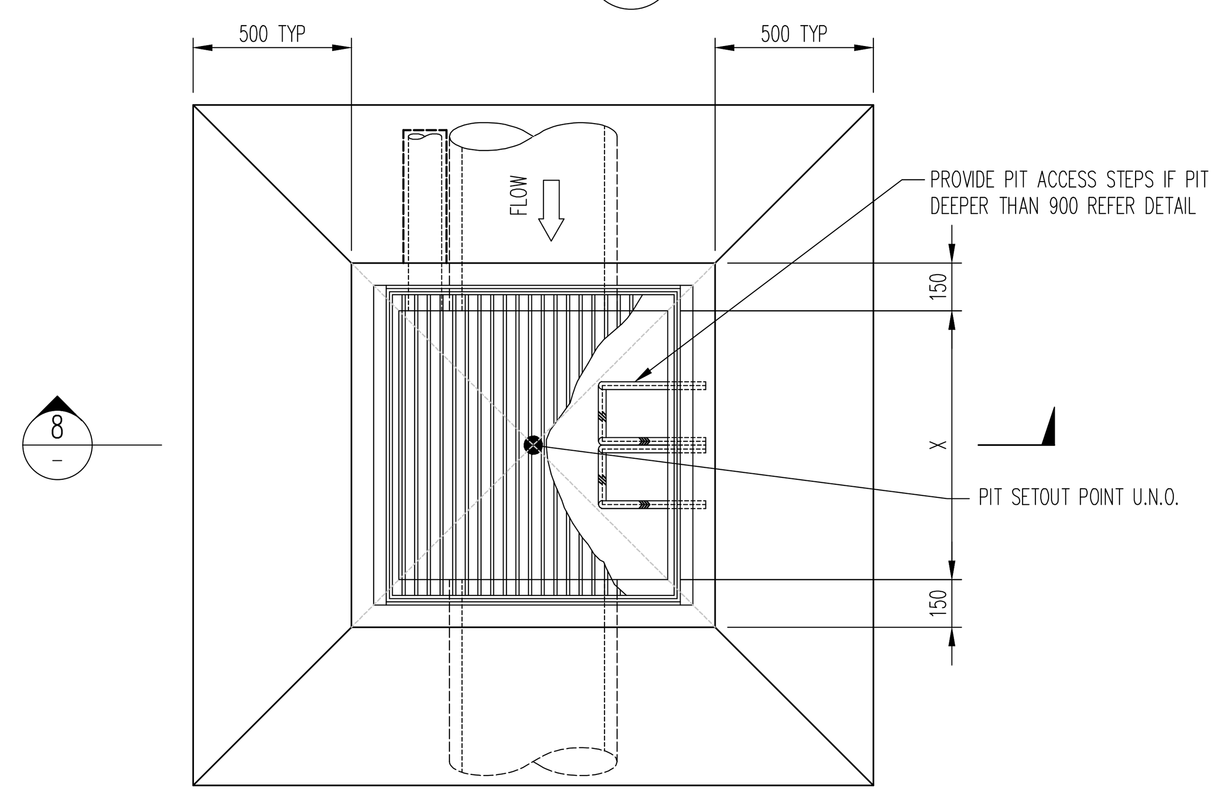


SECTION 7
SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS

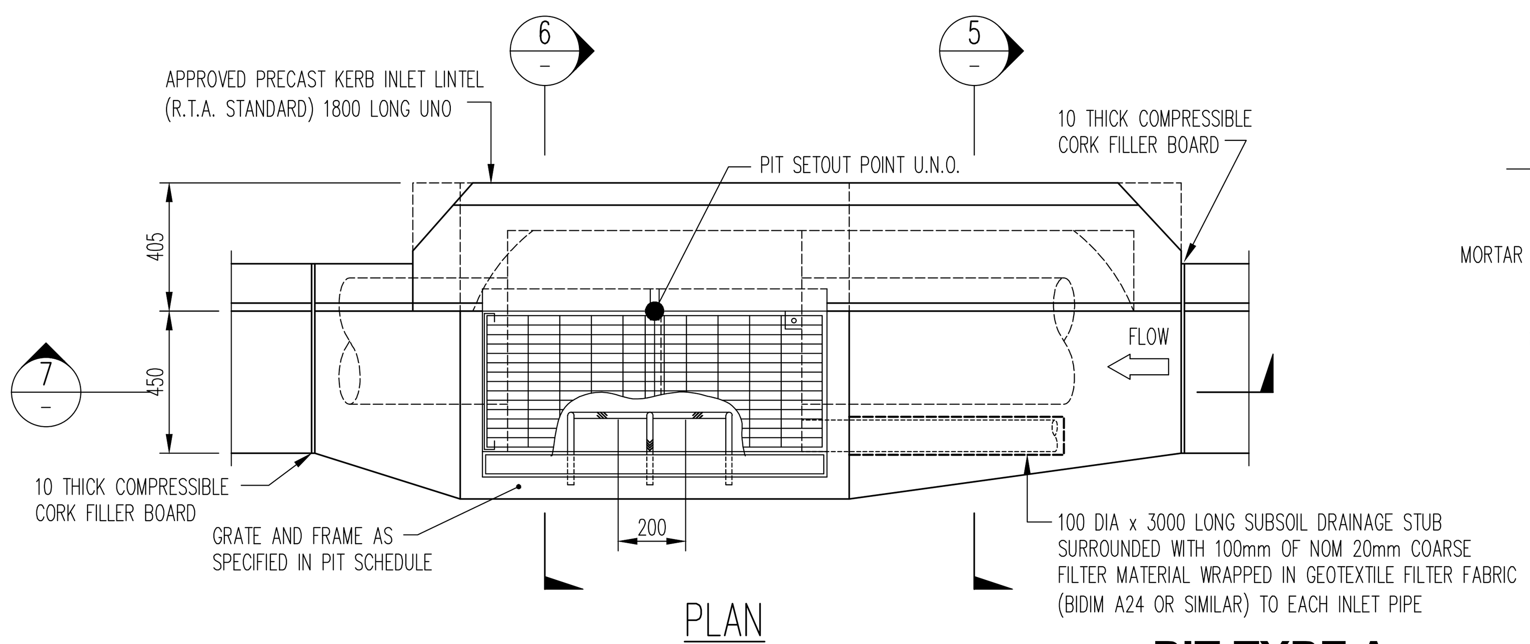


SECTION 6
SCALE 1:20



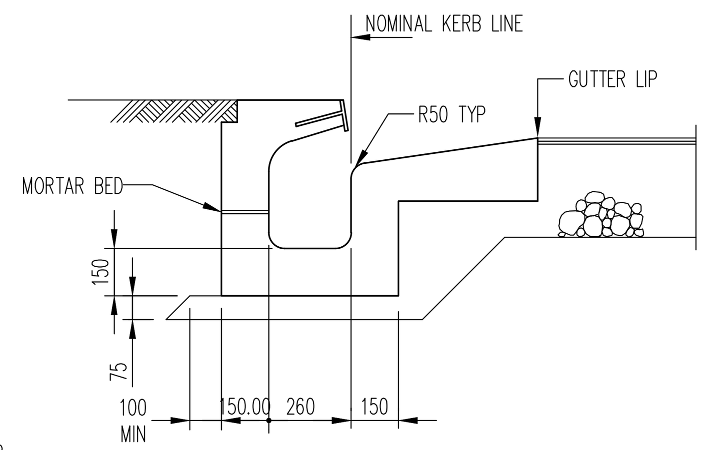
PLAN
SCALE 1: 20

PIT TYPED

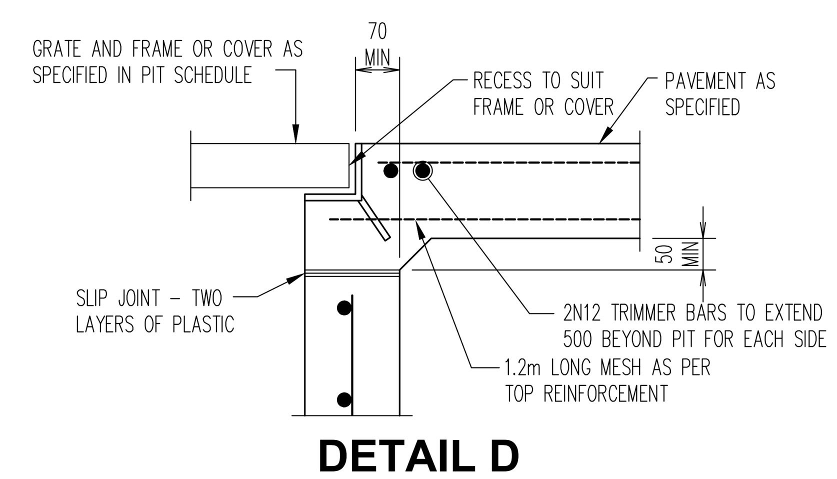


PLAN
SCALE 1: 20

PIT TYPE A



SECTION 5
SCALE 1:20



DETAIL D
SCALE 1: 10

FileName: C05.dwg – USER: simone – Plot File Created: Feb 24, 2016 – 4:58pm

A1 0 1 2 3 4 5 6 7 8 9 10

PRELIMINARY

Rev	Description	Eng	Draft	Date
P5	ISSUE FOR COMMENT	NB	NB	24.02.16
P4	ISSUE FOR COMMENT	NB	TB	12.11.15
P3	ISSUE FOR COMMENT	NB	TB	28.10.15
P2	ISSUE FOR COMMENT	NB	TB	22.09.15
P1	ISSUE FOR INFORMATION	NB	JW	24.06.15

Architect
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Taylor Thomson Whitting (NSW) Pty Ltd A.C.N. 113 578 377

Project
176-184 GEORGE STREET
CONCORD WEST

Sheet Subject
DETAILS SHEET

Scale : A1 AS SHOWN
Drawn NB
Authorised
Job No 151350
Drawing No C05
Revision P5
Plot File Created: Feb 24, 2016 - 4:58pm

TOWN PLANNING
AND URBAN DESIGN

APPENDIX G: SITE SURVEY

TITLE NOTATIONS

LAND AFFECTED BY 2 OLD FENCING COVENANTS
CONTAINED IN C245872 AND C612045

LAND AFFECTED BY EASEMENT FOR DRAINAGE
1.83 WIDE VIDE D637559

LAND AFFECTED BY LEASE TO ENERGY AUSTRALIA OF
SUBSTATION PREMISES 1987 VIDE AB244279 TOGETHER WITH
THE FOLLOWING EASEMENTS:
(A) RIGHT OF WAY
(B) EASEMENT FOR ELECTRICITY PURPOSES
(C) RIGHT OF WAY AND EASEMENT FOR ELECTRICITY PURPOSES

NOTES :
* THIS DETAIL SURVEY IS NOT A 'SURVEY' AS DEFINED BY THE SURVEYING ACT,2002.
* BEARINGS AND DISTANCES ARE BY TITLE AND ARE SUBJECT TO SURVEY INVESTIGATION
* BEARINGS RELATE TO MAGNETIC NORTH AS SHOWN ON DP 15973
* TOTAL SITE AREA IS 8072m²
CALCULATED FROM TITLE INFORMATION
* THE POSITION OF IMPROVEMENTS IN RELATION TO BOUNDARIES IS DIAGRAMMATIC ONLY
* NEIGHBOURING HOUSES , RIDGE AND ROOF POSITIONS ARE APPROXIMATE ONLY
* VISIBLE, ACCESSIBLE SERVICES ONLY HAVE BEEN LOCATED
* NOT ALL SERVICES ARE SHOWN
* THE EXISTENCE OF UNDERGROUND SERVICES HAS NOT BEEN ESTABLISHED. IF THESE ARE CRITICAL IT IS ESSENTIAL THE APPROPRIATE AUTHORITIES BE CONTACTED PRIOR TO DEVELOPMENT WORKS.
* EXISTENCE OF SERVICES MUST BE VERIFIED BY CONTACTING DIAL BEFORE YOU DIG (DBYD) PH 1100. CRITICAL SERVICES MUST BE EXPOSED AND LOCATED. (NOT ALL SERVICE PROVIDERS ARE MEMBERS OF DBYD)
* THIS TITLE BLOCK IS AN INTEGRAL PART OF THIS DRAWING WHICH IS NOT TO BE REMOVED
* THIS PLAN SHOULD BE READ IN CONJUNCTION WITH REPORT OF THE SAME REFERENCE

LEGEND
ELP - ELECTRIC LIGHT POLE
HYD - HYDRANT
PP - POWER POLE
SMH - SEWER MANHOLE
SP - SIGN POST
SV - STOP VALVE
TEL - TELSTRA PIT
VC - VEHICLE CROSSING
WM - WATER METER
S - SEWER LAMP HOLE
TW - TOP WALL
TK - TOP KERB
BOL - STEEL BOLLARD

REV	AMENDMENTS	DATE

CLIENT: GEORGE CONCORD PTY LTD
PLAN OF: No176–184 GEORGE ST, CONCORD
SHOWING: GENERAL DETAIL AND SITE LEVELS
PURPOSE: ARCHITECTURAL DESIGN COUNCIL SUBMISSION
SHEET 1 OF 1

SCALE 1:300
0 10 20 30

SURVEYOR :	SCOTT D
DATUM :	AUSTRALIAN HEIGHT DATUM
ORIGIN :	SSM 114416 RL 2.059
JOB REF. :	B1060
COMPUTER REF. :	B1060.DWG
DRAWING No.	B1060–1
CHECKED :	
DATE OF SURVEY:	NOVEMBER 2011
REDUCTION RATIO :	1:300

MACQUARIE PARK
PO Box 4004
MACQUARIE CENTRE NSW 2113
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PROJECT SURVEYORS
Professional Innovative... Results.

APPENDIX H: GEOTECHNICAL REPORT

AS/NZS ISO 9001
Certified
Davis Langdon Certification Services

REPORT

TO

GEORGE CONCORD PTY LTD

ON

GEOTECHNICAL ASSESSMENT

FOR

MEDIUM DENSITY RESIDENTIAL DEVELOPMENT

AT

176-184 GEORGE STREET, CONCORD WEST

Date: 15 February 2012

Ref: 25506Lrpt

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Postal Address: PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 • Fax: 02 9888 5001 • Email: engineers@jkgroup.net.au • ABN 17 003 550 801

TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of a geotechnical assessment for the site at 176-184 George Street, Concord.

We understand that it is proposed to rezone the existing site with a view to construction of a new residential development. At this stage no specific details of the proposed development have been provided to us, however we understand that the proposed residential development will likely include a number of residential tower blocks (ranging from about 3 to 8 storeys) over two levels of basement car parking. Excavation to maximum depths of about 6m will be required for the basement car parking

The purpose of the geotechnical assessment was to carry out a desktop assessment of geotechnical investigations on nearby sites and to combine this with some limited subsurface investigations on the subject site. Based on the results of these assessments and investigations we have provided our opinions on the geotechnical suitability of the site for proposed residential development as well as preliminary geotechnical recommendations on excavation conditions, shoring and footings.

Previous environmental studies have been carried out across the site including a report by SGA Environmental, Project Number 91949, dated October 2010. While we have reviewed the borehole logs from that previous environmental investigation and report by SGA, our report is to address geotechnical aspects only and further advice from the environmental consultants are required to address environmental issues affecting the site.

Our investigation was carried out concurrently with DLA Environmental who undertook additional soil and groundwater samples for environmental purposes.

2 INVESTIGATION PROCEDURE

2.1 Desktop Assessment

Our desktop assessment has included a review of the extensive Jeffery and Katauskas geographical database, to look for nearby sites where geotechnical subsurface investigations have been completed. We have also reviewed the environmental borehole logs from the SGA Environmental report dated October 2010.

Our desktop review has revealed that we have carried out geotechnical investigations at the following nearby sites;

- St Ambrose Primary School to the west in 2009
- A small residential development in Concord Avenue to the north in 1997, and
- A couple of boreholes at 184 George Street in 1986.

Further details of the subsurface conditions encountered in those previous investigations are discussed in Section 3.2.1 below.

2.2 Current Investigations

The fieldwork for this current investigation was carried out on 1 February 2012 and comprised the drilling of four boreholes (BH1, BH2, BH2a and BH3). The boreholes were drilled to depths ranging from 5.6m to 9.0m below existing surface levels using our track mounted JK250 drilling rig.

The borehole locations were nominated by DLA Environmental who were completing additional groundwater sampling and testing at the site. The locations are shown on the attached Figure 1 and they were set out by taped measurements from existing site features shown on the survey plan by Project Surveyors, Job Reference No. B1060, survey date November 2011. The approximate surface levels, as shown on the borehole logs, were estimated by interpolation between spot levels shown on the survey plan. The datum of levels is Australian Height datum (AHD).

Within the boreholes, the apparent compaction of the fill and the strength of the underlying soils were assessed from the Standard Penetration Test (SPT) 'N' values, supplemented with hand penetrometer tests on cohesive samples recovered in the split spoon sampler. The strength of the underlying shale bedrock was assessed by observation of the drilling resistance of a tungsten carbide (TC) bit attached to the augers, together with examination of the recovered rock chips and subsequent correlation with laboratory moisture contents.

Groundwater observations were made in each borehole during and on completion of drilling. A groundwater monitoring well was installed in each borehole (with the exception of BH2a) to allow environmental groundwater sampling by DLA Environmental. No longer term geotechnical groundwater level monitoring has been carried out.

Our engineering geologist Ms Dawn Willemsen, was present on site during the fieldwork, and she set out the borehole locations, nominated the sampling and testing locations, and prepared logs of the strata encountered. The borehole logs, which include field test results and groundwater observations are attached to this report together with a set of explanatory notes, which describe the investigation techniques, and their limitations, and define the logging terms and symbols used.

Selected rock chip samples were tested by Soil Test Services (STS) and Envirolab Services Pty Ltd, both NATA registered laboratories to determine moisture content, soil pH, soil sulphate content and soil chloride content. The laboratory moisture content results from STS are attached as Table A, while the laboratory results from Envirolab are summarised in the attached Envirolab Report Number 68474.

Contamination testing of the site soils was not carried out by Jeffery and Katauskas and further advice from SGA Environmental and/or DLA Environmental should be obtained for recommendations and advice regarding soil or groundwater contamination.

3 RESULTS OF INVESTIGATION

3.1 Site Description

The site is located within gently sloping topography. The site itself slopes down to the west at about 1°.

At the time of investigation, the site comprised a 2 to 3-storey brick and metal clad warehouse and two concrete surfaced car parks at the northern and southern ends. On cursory inspection, the existing warehouse appeared in good external condition. The car parks are generally in good condition except for a crack (>1m length) within the northern car park driveway.

The site has frontages to George Street to the east. George Street slopes down to the north at approximately 2° and becomes fairly level just north of the site. Some trees, up to 12m high, are found in localised areas between the warehouse and George Street.

The site is bound to the west by an open playing field. Within 4m of the fenced western boundary is a row of tall bushes and trees (up to 10m high) that extends the entire length of the site. The playing fields slope down to the west towards the stormwater canal that drains out to the north and then into the Parramatta River

The site is bound to the north by a two-storey brick house and to the south by a one-storey rendered house. The exterior walls of both houses are approximately 2m from the northern and southern common boundaries, respectively. On cursory inspection, both houses appeared in good external condition.

At the south-western corner of the site, the car park extends to the south towards a private car park. Two one-storey brick and metal clad buildings are located just south of the private carpark.

The site is retained by an approximately 1.5m high retaining wall at the western boundary and by a retaining wall at the northern boundary whose height could not be determined during inspection.

3.2 Subsurface Conditions

The Sydney 1:100,000 geological map indicates that the site is located close to the geological boundary between the Ashfield Shales of the Wianamatta Group of rocks and the man made fills and alluvial silts and clays associated with Homebush Bay. Generally the boreholes encountered fill overlying a relatively thin layer of inferred residual soils and then weathered shale bedrock. Some of the more pertinent subsurface features are discussed further below.

3.2.1 Nearby Subsurface Conditions

The following summarises some of the subsurface conditions encountered in close proximity to the subject site, which have been taken from previous investigations carried out by Jeffery and Katauskas.

- Previous subsurface investigations at 184 George Street have encountered poorly compacted fill extending to depths ranging from about 2.6m to 3.6m deep. The fills were underlain by a thin inferred alluvial silty sandy gravel and then weathered shale bedrock of typically low to medium strength at depths of

3.3m to 3.6m below existing surface levels. Strong groundwater seepage occurred at about 2.7m depth with groundwater levels measured soon after drilling between 3m and 3.9m depth.

- Previous investigations to the north of the site encountered about 1m of fill overlying alluvial soils comprising soft to firm organic clayey silt.
- To the west of the site, a more typical residual soil and weathered rock profile was encountered, and it comprised a thin surficial fill layer overlying hard silty clay residual soils and then weathered shale at depths ranging from about 1.4m to 1.6m. Low to medium strength shale was encountered at about 2m depth. Boreholes were dry on completion of drilling.

3.2.2 Subsurface Conditions from SGA Environmental Report October 2010

A total of 29 boreholes were drilled across the site for environmental purposes by SGA Environmental. In summary the boreholes have disclosed the following subsurface conditions. For more detailed descriptions reference should be made to the borehole logs in the SGA Environmental report.

- Fill was encountered in the majority of boreholes and comprised essentially clayey soils with inclusions of shale, building rubble, other gravels, ash and slag with some proportions of charcoal. The fill extended to depths ranging from about 0.9m along the eastern boundary to at least 3.8m along the western boundary.
- In some boreholes natural soils (either residual or alluvial) were encountered below the fill but they were relatively thin.
- Weathered shale bedrock was encountered below the fill or natural soils in most boreholes, with refusal on the shales occurring at depths ranging from about 2.8m to 4.6m. However some boreholes toward the western side of the site extended to greater depths of about 4.8m and shale was not encountered.

- The report states that no groundwater was encountered within the maximum depth of investigation (being 4.8m) during the drilling.

3.2.3 Current Subsurface Conditions

The four boreholes drilled by Jeffery and Katauskas during this current investigation have generally disclosed the following subsurface profile. For specific details reference should be made to the attached borehole logs.

- Reinforced concrete slabs ranging from 150mm to 170mm thickness.
- A deep fill profile ranging from 1.2m deep in BH3 to 8.1m deep in BH2. The fill comprised clayey gravels, gravelly clays, silty sands and silty clays with inclusions of slag, glass, metal fragments, igneous and sandstone gravels and charcoal. Some of the deeper fill in BH2 and BH2a, appeared to also comprise larger sized shale cobbles (and possibly boulders) at depth. The fill was typically assessed to be poorly compacted although the shallower fill in BH3 was assessed to be moderately compacted. We note that the fill in BH2 and BH2a was significantly deeper than that encountered in BH1 and BH3, as well as other previous investigations. It is possible that the deeper fill at this location is associated with the nearby sewer, although we have no details at this stage on the depth of the sewer.
- Inferred residual soils were encountered below the fill in BH1 and BH3. The residual soils comprised silty clays of medium plasticity and very stiff to hard strength.
- Weathered shales were encountered at depths of 3.3m (BH1), 8.1m (BH2), 8.0m (BH2a) and 2.1m in BH3. In BH1 and BH3, the upper shale was assessed to be of extremely low to very low strength with a general increase in strength with depth until refusal of the drilling rig occurred at depths of 6.7m and 5.6m respectively. In BH2 and BH2a, medium to high or high strength shale was encountered on first rock contact.

- Groundwater seepage was encountered at a depth of 6.2m during drilling then at 3.6m (6 hours after completion of drilling). In BH2 groundwater seepage was encountered at a depth of 7.4m during drilling. In BH2a groundwater was encountered at a depth of 8.5m on completion of drilling. BH3 was dry both during and on completion of drilling. Groundwater monitoring standpipes were installed in BH1, BH2 and BH3. No longer term groundwater monitoring has been carried out to date.

3.3 Laboratory Test Results

The laboratory moisture content tests have generally confirmed our field assessment of rock strengths. Soil pH, sulphate and chloride tests were carried out within both the fill and inferred residual silty clays. The pH tests have given values ranging from 4.7 to 8.5. Sulphate contents ranged from less than 2mg/kg to 320mg/kg, while the chloride contents ranged from 7mg/kg to 25mg/kg. Based on these chemical results, the soils would classify as Exposure Classification B1 for concrete within such an environment in accordance with Table 5.2 of AS2870-2011.

4 COMMENTS AND RECOMMENDATIONS

4.1 General Overview

Jeffery and Katauskas have carried out a geotechnical desktop assessment of the site, which has been supplemented with some limited subsurface data. On the basis of our assessment we consider that from a geotechnical perspective the site is suitable for proposed residential development provided the following general comments and recommendations are followed. Further geotechnical investigations are essential for detailed design and to confirm and amplify the preliminary recommendations below. In particular some of the key geotechnical issues for the site are as follows;

- The presence of a deep, variable and poorly compacted fill. The fill will be unsuitable to support structural loads and could also be problematic for floor slabs and pavements. If the fill is not excavated during bulk excavation works then it is highly likely that it will need at least some excavation and replacement to engineering standards or slabs will need to be suspended.
- Groundwater appears like it will be moderately high and possibly within the depth of a single level of basement and almost certainly within the depth of two basement levels. It is unlikely that permanent dewatering will be allowed and therefore the basement slab will need to be designed as a tanked structure for hydrostatic uplift pressures. These pressures could be quite large.
- Bulk excavations close to the site boundaries will require properly designed anchored or propped insitu shoring systems which are effectively 'watertight'. These would need to extend to at least below the base of the bulk excavation level, and may encounter high strength shale bedrock which would be difficult to drill requiring large piling rigs.
- Footings for any new structural elements will need to be uniformly founded on the underlying shale bedrock.

4.2 Excavation Conditions

All excavations at the site should comply with Workcovers Code of Practice 'Excavation Work', Cat No. 312 dated 31 March 2000.

Where two basement levels are being proposed, excavation will extend down to depths of about 6m below existing surface levels. Excavation to these depths will extend through the fill and natural residual soils. We expect that the weathered shale bedrock will also be encountered within the excavation depth over most of the site, with the only exception likely to be along the extreme western side, where deeper fill and natural soils may be encountered.

Excavation of the fill and residual soils will be achievable with the buckets of conventional hydraulic earthmoving equipment (such as tracked excavators and dozers). The upper weathered shale of extremely to very low strength should also be able to be excavated with the buckets of moderately sized hydraulic excavators or with the use of ripping tynes attached to excavators or dozers. The low and low to medium strength shale would require the use of dozers (say D6 to D7) fitted with ripping tynes or hydraulic impact hammers. Where medium to high or high strength shale is encountered these will present ‘hard rock’ excavation conditions. Such rock may be effectively ‘unrippable’, but at the very least will require the use of large dozers such as D10 or similar size. It is highly likely that excavation of this strength rock will require the use of hydraulic impact hammers.

If hydraulic impact hammers are to be used then care will be required that any excavation vibrations do not cause damage to adjoining buildings, structures or services. At the commencement of any excavation using hydraulic impact hammers, we recommend that some quantitative vibration monitoring be carried out to assess the vibration emissions and check that they are within tolerable limits. If vibrations are found to be excessive then alternative lower vibration emitting equipment will be required (such as smaller hammers, rock grinders or rock saws).

We expect that groundwater levels will be above bulk excavation for two level basement excavations. Even with an effectively ‘watertight’ shoring system, seepage will occur into the excavation. However provided the shoring system is socketted into the underlying weathered shale we expect that seepage during excavation will be able to be controlled by conventional sump and pump techniques.

If single level basements are being considered and they are located well clear of site boundaries, then temporary excavation batters may be feasible (subject to further assessment of groundwater levels). Assuming groundwater levels are below the bulk excavation level, then temporary batters (of maximum 3m height) through the fill and natural soils may be battered at not steeper than 1 Vertical (V) in 1 Horizontal (H), provided any surcharge loads are located at least 2H from the crest of the batter slope. Any proposed permanent batters would be subject to specific advice from the geotechnical engineers after an inspection of the exposed conditions.

4.3 Shoring Systems

Where the development will comprise two levels of basement, a properly designed insitu shoring system will be required. Due to the likely presence of groundwater and sandy fill materials, we consider that the most suitable shoring system will likely comprise an anchored grout injected secant pile wall which is embedded at least 1.0m below bulk excavation level, including allowances for local excavations (such as footings or services trenches etc). Greater embedment may be required to reduce seepage flows or for overall global stability. The shoring system would need to be progressively anchored or otherwise laterally supported as excavation proceeds. Alternative shoring systems could be considered once details of any proposed development are known.

For preliminary design of shoring systems we recommend the following characteristic earth pressure coefficients and subsoil parameters.

- For progressively propped or anchored shoring systems, where minor movements can be tolerated (such as along boundaries where there are no adjoining buildings, structures or services), a uniform rectangular earth pressure distribution of 6H (kPa) should be adopted for the soil profile, where H is the retained height on metres. Through the underlying weathered shale we recommend a uniform rectangular earth pressure of 10kPa be applied to the shoring system to account for joints within the rock. The design should also be checked such that it can also support a 45° wedge of soil and rock extending from the bulk excavation level up to the ground surface.

- For progressively propped or anchored shoring systems, which are located in areas that are sensitive to lateral movements, we recommend a uniform rectangular earth pressure distribution of 8H (kPa) should be adopted for the soil profile, where H is the retained height on metres. As above a uniform 10kPa earth pressure should be applied through the weathered shale and the design should be checked such that it can also support a 45° wedge of soil and rock extending from the bulk excavation level up to the ground surface.

- The toe resistance for the retention system embedded into weathered shale of at least low strength may be based on an allowable rectangular lateral resistance of 200kPa. This lateral resistance should only apply for that portion of the shoring system embedded deeper than 0.5m below bulk excavation level and other local excavations, and assumes a horizontal ground surface in front of the shoring system.

- Any surcharge (including pavements, traffic etc) affecting the walls should be allowed in the design and are additional to the above earth pressure recommendations.

- Hydrostatic pressures also need to be considered in the wall design and these are additional to the earth pressure recommendations above. Particular attention needs to be given to the hydrostatic pressures during dewatering (or during construction) as differential water pressures will occur and will have a significant impact on the wall stability and loads.

- Anchors used for lateral support of the shoring system should be bonded into the weathered shale if possible (this may be difficult toward the west of the site where it is anticipated that the depth to shale will likely be quite significant and drop away). Nevertheless anchors bonded into weathered shale of at least very low strength may be designed for a maximum allowable bond stress of 200kPa. Anchors should have a minimum bond length of 3m into the rock and a minimum free length of 4m. Where anchors are installed below adjoining properties then permission will need to be obtained from the adjoining property owners prior to installing anchors. All anchors must be proof loaded to at least 1.3 times their working load under the supervision of an experienced engineer independent of the anchor contractor.

- In order to maintain a 'dry' excavation during basement construction, internal dewatering will be required as discussed in Section 4.2 above. It is important to note that no matter how deep the shoring wall is embedded or how 'waterproof' the shoring system is, there will still be seepage into the basement excavation both in the short term and long term. Following additional geotechnical investigations, we recommend some seepage analysis be carried out to provide further details on likely seepage volumes.

4.4 Footings

Following bulk excavation for the two levels of basement, we expect that shale bedrock will be exposed over the majority of the basement area. Therefore we recommend that all footings be uniformly founded on the underlying shale bedrock. Further geotechnical investigations are required to provide detailed advice on bearing pressures for footings.

Where bedrock is not encountered at bulk excavation level then piers will be required. Bored piers are likely to collapse due to water inflow and therefore we recommend that allowance be made for the use of grout injected piles to support structural loads.

For preliminary design of footings we consider that pad/strip footings or piers founded on shale bedrock of at least low strength may be designed for a maximum allowable bearing pressure of 1000kPa. Higher bearing pressures may be feasible on the medium and high strength shale, but will require more substantial additional footing proving such as cored boreholes.

Pad/strip footings should be inspected by a geotechnical engineer to confirm that the founding material is suitable for the required bearing pressure. It is not possible to inspect the founding material for grout injected piles, therefore for such footings, the geotechnical engineer should be engaged to inspect the pile drilling to confirm that pile depths are consistent with expectations from nearby borehole data. Water should not be allowed to pond in the base of pad/strip footings as this may soften the founding material. All footings should be excavated, inspected and poured with minimal delay.

4.5 Basement Floor Slab

As discussed above we expect that the majority of the bulk excavation for a two level basement car park will expose shale bedrock. As such no specific subgrade preparation is required for those areas. However the basement slab should be underlain by a good quality granular subbase material (such as DGB20) to provide uniform support to the slab and to provide a separation layer. Any areas where shale bedrock is not encountered will either need specific subgrade preparation or will need to be suspended on piles.

Due to the likelihood that the basement will be below groundwater levels with no permanent pumping allowed, the basement slab will need to be designed as a tanked basement. The tanked basement slab (long term condition) must be designed to resist hydrostatic uplift pressures. Currently we do not have any specific details of long term groundwater levels and this will need to be further assessed during addition geotechnical investigations. However as an initial guide based on existing data, uplift pressures in the order of 30kPa to 40kPa and possibly higher should not be unexpected. Pressure relief valves would be advisable in the basement in the event that uplift pressures exceeded those assume din the design. Care is required with the tanking details, particularly at footing or piled footing locations and at wall to floor joints.

4.6 Additional Geotechnical Input

The above comments and recommendations have been based on a desktop assessment and limited geotechnical subsurface data. The recommendations are provided to supplement the re-zoning application and to enable preliminary planning and costing for proposed development. Prior to detailed design it is essential that additional geotechnical subsurface investigations are carried out. We consider that as a minimum the following would be necessary to enable sufficient geotechnical data for design.

- Geotechnical boreholes drilled across the site to assess the fill depths and quality of bedrock. Cored boreholes would enable optimisation of bearing pressures,.
- Additional groundwater monitoring to provide further advice for dewatering and design of basement floor slabs.
- Seepage analysis to provide an assessment of likely seepage volumes.
- Detailed shoring analysis which is based on the results of the additional subsurface investigations.

5 GENERAL COMMENTS

The recommendations presented in this report are preliminary and include specific issues to be addressed prior to or as part of detailed design and then during the construction phase of the project. In the event that any of the recommendations presented in this report are not implemented, the general recommendations may become inapplicable and Jeffery and Katauskas Pty Ltd accept no responsibility whatsoever for the performance of the structure where recommendations are not implemented in full and properly tested, inspected and documented.

Occasionally, the subsurface conditions between the completed boreholes may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact this office.

This report provides advice on geotechnical aspects for the proposed civil and structural design. As part of the documentation stage of this project, Contract Documents and Specifications may be prepared based on our report. However, there may be design features we are not aware of or have not commented on for a variety of reasons. The designers should satisfy themselves that all the necessary advice has been obtained. If required, we could be commissioned to review the geotechnical aspects of contract documents to confirm the intent of our recommendations has been correctly implemented.

A waste classification will need to be assigned to any soil excavated from the site prior to offsite disposal. Subject to the appropriate testing, material can be classified as Virgin Excavated Natural Material (VENM), General Solid, Restricted Solid or Hazardous Waste. If the natural soil has been stockpiled, classification of this soil as Excavated Natural Material (ENM) can also be undertaken, if requested. However, the criteria for ENM are more stringent and the cost associated with attempting to meet these criteria may be significant. Analysis takes seven to 10 working days to complete, therefore, an adequate allowance should be included in the construction program unless testing is completed prior to construction. If contamination is encountered, then substantial further testing (and associated delays) should be expected. We strongly recommend that this issue is addressed prior to the commencement of excavation on site.

If there is any change in the proposed development described in this report then all recommendations should be reviewed.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. Copyright in this report is the property of Jeffery and Katauskas Pty Ltd. We have used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report. The report shall not be reproduced except in full.

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

L J Speechley

L J SPEECHLEY
Principal
For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD.

115 Wicks Road
Macquarie Park, NSW 2113
PO Box 976
North Ryde, BC 1670
Telephone: 02 9888 5000
Facsimile: 02 9888 5001

SOIL TEST SERVICES
ABN 43 002 145 173

TABLE A
MOISTURE CONTENT TEST REPORT

Client:	Jeffery & Kataukas Pty Ltd	**Ref No:**	25506L
Project:		**Report:**	A
Location:	Concord West	**Report Date:**	13/02/2012
		Page 1 of 1	

AS 1289 **TEST METHOD** **2.1.1**

BOREHOLE NUMBER	DEPTH	MOISTURE CONTENT
	m	%
1	3.00-3.45	17.6
1	3.60-3.90	7.7
1	4.50-5.00	8.7
3	2.50-3.00	7.8
3	4.00-4.50	6.6
3	4.80-5.20	5.5
3	5.40-5.60	4.0

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 1

1/1

BOREHOLE LOG

Client: GEORGE CONCORD PTY LTD

Project: PROPOSED RESIDENTIAL DEVELOPMENT

Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L **Method:** SPIRAL AUGER JK250 **R.L. Surface:** ≈ 4.0m

Date: 1-2-12 **Datum:** AHD

Logged/Checked by: D.W./

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			CONCRETE: 160mm.t				5mm DIA. REINFORCEMENT, 60mm TOP COVER
					-	FILL: Clayey gravel, fine to medium grained sub angular igneous, dark grey.	W	-	-	
		N = 10 4,6,4	1			FILL: Gravelly clay, medium plasticity, brown and grey, fine to medium grained sub angular ironstone gravel, charcoal and sand.	MC>PL		250 330	APPEARS POORLY TO MODERATELY COMPACTED MONITORING WELL INSTALLED TO 6.6m DEPTH, CLASS 18 PVC SLOTTED BETWEEN 6.6m AND 3.6m. SAND FILTER FROM 6.6m TO 3.0m BENTONITE SEAL, FROM 3.0m TO 1.45m, BACKFILLED 1.45m TO SURFACE, GATIC COVER AT SURFACE.
		N = 5 2,2,3	2			as above, but mottled dark brown.			250 200	
		N = 19 4,8,11	3		CL	SILTY CLAY: medium plasticity, grey mottled brown.	MC>PL	VSt	- 290 390 220	
					-	SHALE: grey.	XW	EL		
AFTER 6 HRS			4			as above, but with M strength iron indurated bands.	DW	L		LOW 'TC' BIT RESISTANCE
			5					L-M		LOW TO MODERATE RESISTANCE BANDS OF HIGH RESISTANCE LOW TO MODERATE RESISTANCE
ON COMPLETION			6			SHALE: grey.		M-H		HIGH RESISTANCE
			7			END OF BOREHOLE AT 6.7m				'TC' BIT REFUSAL

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Borehole No.
2
1/2

BOREHOLE LOG

Client: GEORGE CONCORD PTY LTD
Project: PROPOSED RESIDENTIAL DEVELOPMENT
Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L
Date: 1-2-12
Method: SPIRAL AUGER JK250
Logged/Checked by: D.W./ ff
R.L. Surface: ≈ 4.7m
Datum: AHD

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			CONCRETE: 170mm.t				6mm DIA. REINFORCEMENT, 90mm TOP COVER
	DS	N = 17 8,9,8				FILL: Clayey gravel, fine to medium grained igneous and shale, with coarse grained sandstone gravel, concrete fragments, trace of sand and slag.	M	-	-	APPEARS WELL COMPACTED
	DS	N = 9 4,4,5	1			FILL: Silty sand, fine grained, black, trace of glass, metal and fabric fragments, fine to medium grained sandstone and shale gravel, clay, ash and slag.	D			APPEARS POORLY COMPACTED
	DS	N = 5 2,3,2	2 – 3							
		Nc = 3, 3, 3	4			as above, but with igneous, sandstone and shale gravel.				
	DS	N > 9 4,3,6/ 70mm REFUSAL	5 – 6			FILL: Gravelly clay, low to medium plasticity, brown and grey, with shale and ironstone gravel, trace of glass fragments.	MC>PL			
						as above, but with shale cobbles.				
			7			FILL: Shale gravel & cobbles, dark grey.	M			LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS

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BOREHOLE LOG

Borehole No. 2

2/2

Client: GEORGE CONCORD PTY LTD

Project: PROPOSED RESIDENTIAL DEVELOPMENT

Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L **Method:** SPIRAL AUGER JK250 **R.L. Surface:** ≈ 4.7m

Date: 1-2-12 **Datum:** AHD

Logged/Checked by: D.W./

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
▶				■		8			FILL: Shale gravel and cobbles, dark grey.	M W			LOW RESISTANCE WITH MODERATE BANDS
						9 10 11 12 13 14			END OF BOREHOLE AT 8.1m				'TC' BIT REFUSAL ON INFERRED HIGH STRENGTH SHALE MONITORING WELL INSTALLED TO 7.7m DEPTH, CLASS 18 PVC SLOTTED BETWEEN 7.7m AND 4.7m SAND FILTER FROM 7m TO 4m, BENTONITE SEAL FROM 4m TO 1.6m, BACKFILLED 1.6m TO SURFACE, GATIC COVER AT SURFACE

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Borehole No.
2a
1/2

BOREHOLE LOG

Client: GEORGE CONCORD PTY LTD
Project: PROPOSED RESIDENTIAL DEVELOPMENT
Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L
Date: 1-2-12
Method: SPIRAL AUGER JK250
Logged/Checked by: D.W./
R.L. Surface: ≈ 4.7m
Datum: AHD

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			CONCRETE: 150mm.t				6mm DIA. REINFORCEMENT, 70mm TOP COVER
								-	FILL: Clayey gravel, fine to medium grained igneous, shale and sandstone, dark grey and brown,	M	-	-	
						1			FILL: Silty sand, fine grained, black, with slag, glass and metal fragments, trace of shale, igneous and sandstone gravel.	D			
						2							
						3							
						4							
						5							
						6							
						7							

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CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. **2a**

BOREHOLE LOG

Client: GEORGE CONCORD PTY LTD

Project: PROPOSED RESIDENTIAL DEVELOPMENT

Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L

Date: 1-2-12

Method: SPIRAL AUGER JK250

Logged/Checked by: D.W./

R.L. Surface: ≈ 4.7m

Datum: AHD

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									FILL: Silty sand, fine grained, black, with slag, glass and metal fragments, trace of shale, igneous and sandstone gravel.	D			
						8		-	SHALE: dark grey.	DW	M-H	-	HIGH 'TC' BIT RESISTANCE
ON COMPLETION													MODERATE TO HIGH RESISTANCE
						9			END OF BOREHOLE AT 9.0m				
						10							
						11							
						12							
						13							
						14							

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Borehole No. 3

1/1

BOREHOLE LOG

Client: GEORGE CONCORD PTY LTD

Project: PROPOSED RESIDENTIAL DEVELOPMENT

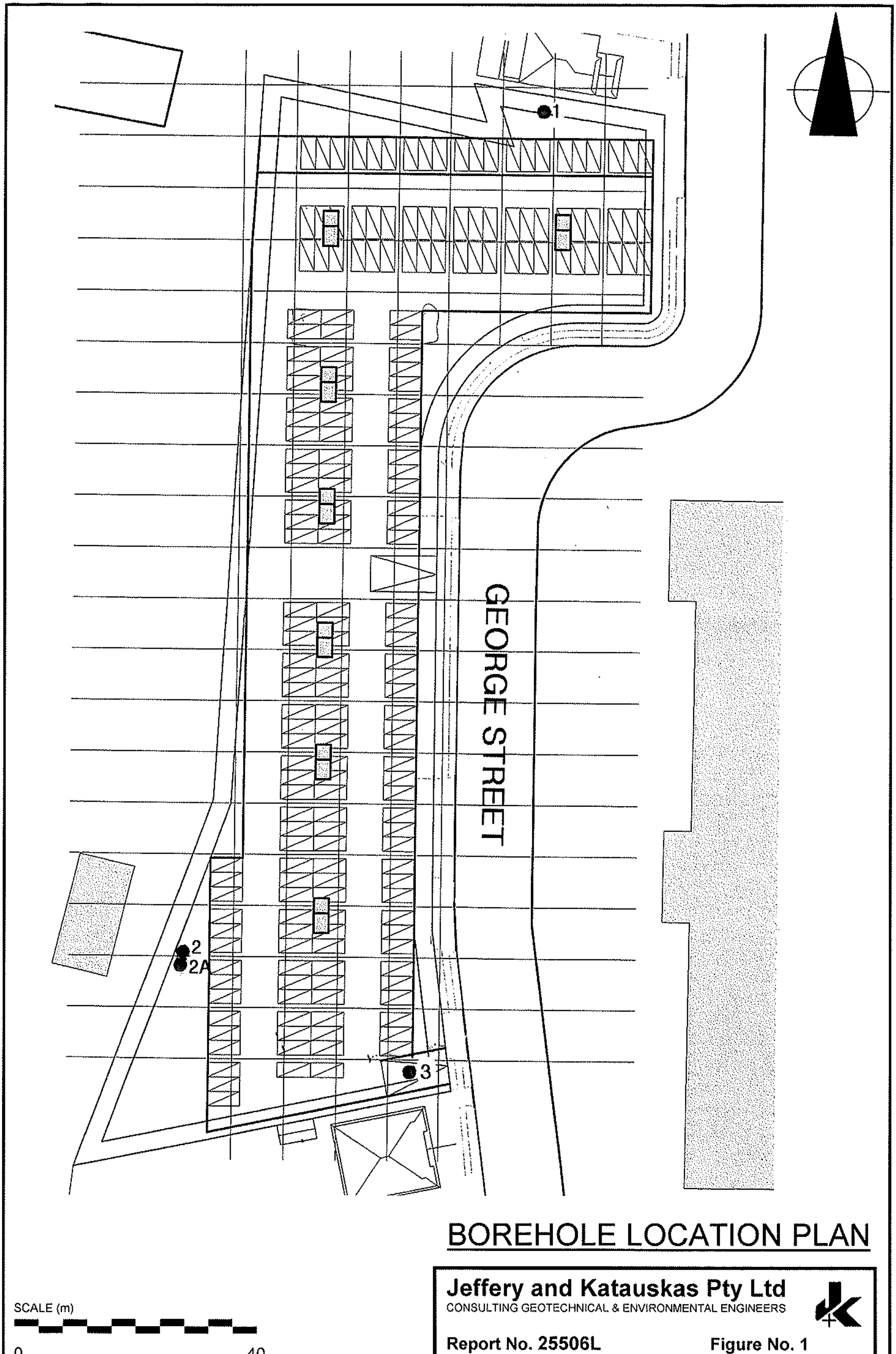
Location: 176-184 GEORGE STREET, CONCORD WEST, NSW

Job No. 25506L | **Method:** SPIRAL AUGER JK250 | **R.L. Surface:** ≈ 5.2m

Date: 1-2-12 | **Datum:** AHD

Logged/Checked by: D.W./

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION		0		CONCRETE: 150mm.t				6mm DIA. REINFORCEMENT, 80mm TOP COVER
			-	FILL: Gravelly clay, low to medium plasticity, brown and grey.	MC<PL	-	-	
	N = 10 2,4,6			FILL: Silty clay, medium to high plasticity, red brown mottled brown grey, with ironstone gravel and ash.			240 570 470	APPEARS MODERATELY COMPACTED
		1	CL	SILTY CLAY: medium plasticity, grey mottled red brown, trace of ironstone gravel.	MC<PL	VSt-H	-	
	N = 18 4,7,11						300 490 500	
		2	-	SHALE: dark grey.	DW	VL	-	VERY LOW TO LOW 'TC' BIT RESISTANCE
						L-M		LOW TO MODERATE RESISTANCE
		3						
		4						
		5				M		MODERATE RESISTANCE
						M-H		HIGH RESISTANCE
								'TC' BIT REFUSAL
				END OF BOREHOLE AT 5.6m				MONITORING WELL INSTALLED TO 5.0m DEPTH, SLOTTED BETWEEN 5m & 2m. SAND FILTER FROM 5m TO 1.8m, BENTONITE FROM 1.8m TO 0.2m, GATIC COVER AT SURFACE
		6						
		7						



BOREHOLE LOCATION PLAN

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Report No. 25506L **Figure No. 1**

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 68474

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: DW

Sample log in details:

Your Reference:	**25506L, Concord West**	
No. of samples:	6 soils	
Date samples received / completed instructions received	03/02/12	/ 03/02/12

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	9/02/12	/ 9/02/12
Date of Preliminary Report:	Not Issued	

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Simon Mills
Group R&D/Quality Manager

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Miscellaneous Inorg - soil						
Our Reference:	UNITS	68474-1	68474-2	68474-3	68474-4	68474-5
Your Reference	-------------	BH1	BH1	BH2	BH2	BH3
Depth	------------	0.5-0.95	3.0-3.3	0.5-0.95	3.0-3.45	0.5-0.95
Date Sampled		01/02/2012	01/02/2012	01/02/2012	01/02/2012	01/02/2012
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/02/2012	07/02/2012	07/02/2012	07/02/2012	07/02/2012
Date analysed	-	07/02/2012	07/02/2012	07/02/2012	07/02/2012	07/02/2012
pH 1:5 soil:water	pH Units	4.7	5.5	8.5	8.5	4.8
Chloride, Cl 1:5 soil:water	mg/kg	7	11	22	8	25
Sulphate, SO4 1:5 soil:water	mg/kg	170	130	<2	3	320

Miscellaneous Inorg - soil		
Our Reference:	UNITS	68474-6
Your Reference	-------------	BH3
Depth	------------	1.5-1.95
Date Sampled		01/02/2012
Type of sample		Soil
Date prepared	-	07/02/2012
Date analysed	-	07/02/2012
pH 1:5 soil:water	pH Units	4.8
Chloride, Cl 1:5 soil:water	mg/kg	24
Sulphate, SO4 1:5 soil:water	mg/kg	81

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 21st ED, 4500-H+.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 21st ED, 4110 -B.

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			07/02/2012	68474-1	07/02/2012 || 07/02/2012	LCS-1	07/02/2012
Date analysed	-			07/02/2012	68474-1	07/02/2012 || 07/02/2012	LCS-1	07/02/2012
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	68474-1	4.7 || 4.7 || RPD: 0	LCS-1	100%
Chloride, Cl 1:5 soil:water	mg/kg	2	Inorg-081	<2	68474-1	7 || 7 || RPD: 0	LCS-1	102%
Sulphate, SO4 1:5 soil:water	mg/kg	2	Inorg-081	<2	68474-1	170 || 150 || RPD: 12	LCS-1	111%

Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
ABN 17 003 550 801

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (eg sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

Sampling is carried out during drilling or from other excavations to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.

Static Cone Penetrometer Testing and Interpretation: Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed <u>or</u> where only a limited investigation has been completed <u>or</u> where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site.

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL

- FILL
- TOPSOIL
- CLAY (CL, CH)
- SILT (ML, MH)
- SAND (SP, SW)
- GRAVEL (GP, GW)
- SANDY CLAY (CL, CH)
- SILTY CLAY (CL, CH)
- CLAYEY SAND (SC)
- SILTY SAND (SM)
- GRAVELLY CLAY (CL, CH)
- CLAYEY GRAVEL (GC)
- SANDY SILT (ML)
- PEAT AND ORGANIC SOILS

ROCK

- CONGLOMERATE
- SANDSTONE
- SHALE
- SILTSTONE, MUDSTONE, CLAYSTONE
- LIMESTONE
- PHYLLITE, SCHIST
- TUFF
- GRANITE, GABBRO
- DOLERITE, DIORITE
- BASALT, ANDESITE
- QUARTZITE

DEFECTS AND INCLUSIONS

- CLAY SEAM
- SHEARED OR CRUSHED SEAM
- BRECCIATED OR SHATTERED SEAM/ZONE
- IRONSTONE GRAVEL
- ORGANIC MATERIAL

OTHER MATERIALS

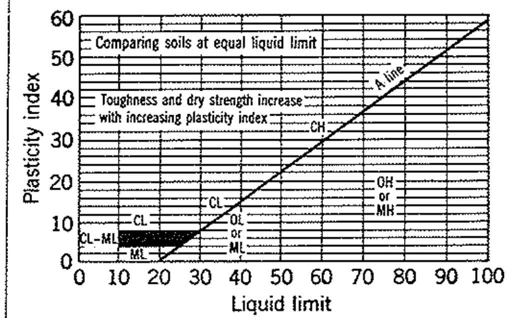
- CONCRETE
- BITUMINOUS CONCRETE, COAL
- COLLUVIUM

UNIFIED SOIL CLASSIFICATION TABLE

(The 75 µm sieve size is about the smallest particle visible to naked eye)

Major division	Subdivision		Field Identification Procedures (Excluding particles larger than 75 µm and basing fractions on estimated weights)	Group Symbols[a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria	
Coarse-grained soils More than half of material is *larger* than 75 µm sieve size[b]	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand,* gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 µm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines			Not meeting all gradation requirements for *GW*
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures			Atterberg limits below "A" line, or *PI* less than 4 Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures			Atterberg limits above "A" line, with *PI* greater than 7
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	*SW*	Well graded sands, gravelly sands, little or no fines			$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines			Not meeting all gradation requirements for *SW*
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures			Atterberg limits below "A" line or *PI* less than 5 Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures			Atterberg limits below "A" line with *PI* greater than 7

Major division	Subdivision	Identification Procedures on Fraction Smaller than 380 µm Sieve Size: Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)	Group Symbols	Typical Names	Information Required for Describing Soils
Fine-grained soils More than half of material is *smaller* than 75 µm sieve size	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt,* brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)
		Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity	
	Silts and clays liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays	
		Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity	
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils	



Plasticity chart for laboratory classification of fine grained soils

NOTE: 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e.g. GW-GC, well graded gravel-sand mixture with clay fines).

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

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LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown.
		Extent of borehole collapse shortly after drilling.
		Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
(Cohesionless Soils)	D	DRY - runs freely through fingers.
	M	MOIST - does not run freely but no free water visible on soil surface.
	W	WET - free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT - Unconfined compressive strength less than 25kPa
	S	SOFT - Unconfined compressive strength 25-50kPa
	F	FIRM - Unconfined compressive strength 50-100kPa
	St	STIFF - Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF - Unconfined compressive strength 200-400kPa
	H	HARD - Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** — **SPT 'N' Value Range (Blows/300mm)**
	VL	Very Loose <15 — 0-4
	L	Loose 15-35 — 4-10
	MD	Medium Dense 35-65 — 10-30
	D	Dense 65-85 — 30-50
	VD	Very Dense >85 — >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

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LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL		Easily remoulded by hand to a material with soil properties.
		0.03	
Very Low:	VL		May be crumbled in the hand. Sandstone is "sugary" and friable.
		0.1	
Low:	L		A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
		0.3	
Medium Strength:	M		A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
		1	
High:	H		A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
		3	
Very High:	VH		A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
		10	
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

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