

Conybeare Morrison International Pty Ltd

**Proposed Mixed Use Development, Gosford
Town Centre**

Phase 1 Contamination Assessment - Site B

29 May 2020



Pour trust
into your
foundations
and you
can build
anything

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Proposed Mixed Use Development, Gosford Town Centre

Prepared for
Conybeare Morrison International Pty Ltd

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Executive summary

The Lederer Group has engaged several consultants to assist it with the re-development of the various land parcels from initial concept designs to full detailed design. Conybeare Morrison International Pty Ltd ("CM+") is the principal project manager managing the development process.

Conybeare Morrison has engaged Coffey to prepare a Phase 1 Contamination Assessment Report for each of the three main land parcels (designated as Site A, Site B, and Site C). These reports will form part of the documentation that is required to support the DA application for re-development. This report presents the Phase 1 Contamination Assessment (Phase 1 CA) for Site B.

The proposed re-development is for combined residential and commercial use on Sites A and B, and includes a park/leisure facility on Site C.

The objectives of the Phase 1 CA were to:

- Identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past;
- Assess Areas of Environmental Concern (AEC's) and Chemicals of Potential Concern (COPC's) for the site, and develop a preliminary Conceptual Site Model (CSM); and,
- Provide recommendations for future site investigations to support the development of the concept and detailed designs.

In order to meet the above objectives, Coffey carried out the following works:

- A desktop study and historical review of past activities;
- A site walkover to help identify AECs and COPCs; and,
- Preparation of this report.

The site history review indicated that the site has been used for commercial/industrial purposes since at least 1954. The uses of the site prior to the shopping centre, which was constructed about 1978, are not well known, with the site owned by numerous individuals with different occupations. It appears that portions of the western side of the site were used for sawmilling, a fire/ambulance station, and other commercial/industrial purposes, and the north-west corner may have been used as a corner-store. The remainder of the site was occupied by buildings which appeared to be residential.

Most of the activities associated with commercial/industrial uses, typically cause "top-down" contamination. The exception to this would be if wells or other underground infrastructure (i.e. tanks) were installed.

The current shopping centre was constructed in about 1978. It is not known if surface soils on the site were removed during construction of the current shopping centre. It is possible imported fill material was used to level the site or provide a base for concrete slabs.

Based on the above, the potential for soil contamination to be present is medium. The potential for groundwater contamination to be present is not known, as the source for groundwater contamination would be contaminated soil and at this stage the presence of soil contamination has not been assessed.

Based on the outcomes of the PCA, Coffey concludes that the site can be made suitable for the proposed mixed-use development in accordance with the requirements of State Environmental Planning Policy No. 55 (SEPP 55) provided the following is undertaken:

- Obtaining NSW WorkCover dangerous goods records for the site, if available, to assess if dangerous goods such as fuel tanks may be present;
- A hazardous materials survey of the existing buildings, prior to demolition, and a hazardous materials clearance, after demolition of the buildings, to ensure hazardous materials were removed;
- A visual inspection of the site, after demolition of the existing buildings, to assess the presence of potential former wells or other underground infrastructure such as storage tanks as well as fill and potential asbestos containing materials;
- Completion of a Detailed Site Investigation (DSI) at the Site following demolition of existing buildings. A Sampling and Analysis Quality Plan (SAQP) must be prepared to guide the DSI and the minimum number of samples must comply with the NSW EPA (1995) Sampling Design Guidelines;
- If soil contamination is identified, the risk of groundwater contamination should be assessed and groundwater sampling carried out if required;
- If volatile substances are identified, the risk of vapour contamination should be assessed, and vapour sampling carried out if required;
- Following completion of the DSI, should contamination be found at levels requiring remediation and/or management, a Remediation Action Plan (RAP) must be prepared. The RAP must include remedial/management methodology for identified contamination. The RAP must also include validation requirements and methodology to verify the suitability of the site for proposed end use following the completion of remediation; and,
- If materials are proposed to be removed from site for the development, the material will require waste classification in accordance with the NSW EPA (2014) Waste Classification Guidelines.

This report must be read in conjunction with the attached sheet entitled '*Important Information about your Coffey Environmental Report*', which can be found at the end of this report.

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Important Information about your Coffey Environmental Report

Appendices

Appendix A - Registered groundwater bore information

Appendix B – Historical land titles

Appendix C – Aerial photographs

Appendix D – Site photographs

Appendix E – Section 149 certificates

Appendix F – NSW EPA records

1. Introduction

1.1. General

The Lederer Group ('Lederer') is the landowner of a number of parcels of land and buildings within the Gosford CBD on the Central Coast, NSW. The Lederer Group has engaged several consultants to assist it with the re-development of the various land parcels from initial concept designs to full detailed design. Conybeare Morrison International Pty Ltd ('CM+') is the principal project manager managing the development process, including the Development Approval ('DA') application to Gosford City Council.

Conybeare Morrison has engaged Coffey to prepare a Geotechnical Assessment Report and a Phase 1 Contamination Assessment Report for each of the three main land parcels (designated as Site A, Site B, and Site C). These reports form part of the documentation that is required to support the DA application for re-development.

This report presents the Phase 1 Contamination Assessment (Phase 1 CA) for Site B. The location of the site is shown on Figure 1. Separate reports are provided for Sites A and C, as well as separate reports for each of the three sites that present the Geotechnical Assessments.

The proposed re-development is for combined residential and commercial use on Sites A and B, and includes a park/leisure facility on Site C.

This report has been written in general accordance with the relevant sections in the NSW OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. This report must be read in conjunction with the attached sheet entitled '*Important Information about your Coffey Environmental Report*', which can be found at the end of this report.

1.2. Objectives

The objectives of the Phase 1 CA were to:

- Identify potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past;
- Assess Areas of Environmental Concern (AEC's) and Chemicals of Potential Concern (COPC's) for the site, and develop a preliminary Conceptual Site Model (CSM); and,
- Provide recommendations for future site investigations to support the development of the concept and detailed designs.

1.3. Scope of works

In order to meet the above objectives, Coffey carried out the following works:

- A desktop study and historical review of past activities;
- A site walkover to help identify AECs and COPCs; and,
- Preparation of this report.

2. Site description

2.1. Site location and identification

General site information is provided below in Table 2.1.

Table 2.1: Summary of site details

Site Location:	The site is located on the corner of Donnison Street and Henry Parry Drive, Gosford, NSW. The site location is shown on Figure 1 and the site layout is shown on Figure 2.
Approximate Total Site Area:	1.45ha
Title Identification Details	The site comprises: <ul style="list-style-type: none"> • Lot 6 DP 598833 • Lot 7 DP 6039 in the Parish of Gosford and the County of Northumberland
Current ownership	Gosford City Council
Previous Landuse:	Previous site uses included: <ul style="list-style-type: none"> • Various commercial uses, including general retail purposes, food outlets, and car parking; • Potential commercial/industrial use for manufacturing, electric retailer, and bus depot.
Current Landuse:	Commercial use – shopping centre and car park
Proposed Landuse:	Multi-storey commercial and residential development
Adjoining Site Uses:	<ul style="list-style-type: none"> • Donnison Street and commercial properties to the south. • Henry Parry Drive and commercial properties to the west (Site C). • William Street and commercial properties to the north (Site A to the north west). • Albany Street and commercial properties to the east.
Site Coordinates:	The centre of the site is located approximately at 33°25'37"S, 151°20'44"E.

2.2. Site topography and drainage

Reference to the 1:25,000 Topographic Map for Gosford (<http://maps.six.nsw.gov.au/>) indicates that the site is situated in a low-lying area in the centre of Gosford. The topographic map indicates that the elevation of the site is between 10m and 20m AHD, with the eastern boundary at about 20m AHD.

During the site walkover, the site surface was observed to be sloping to the west. Surface water would be expected to run off concrete and hard surfaces into municipal stormwater drains. Stormwater is anticipated to flow into Broadwater located approximately 630m south-west of the site.

2.3. Regional geology and soils

The Gosford 1:100,000 Scale Geological Sheet indicates that the site is underlain by sedimentary rock strata of the Terrigal Formation (part of the Triassic age Narrabeen Group). The bedrock comprises interbedded laminites, sandstones with subordinate shale horizons.

Quaternary-age alluvial soils overlie the bedrock, which can be significantly deep along the centre alignment of the alluvial valley draining into The Broadwater. There is also a possibility of paleo-channels that are incised into the bedrock, formed during periods of lower sea level, which are infilled with older alluvium.

Reference to the CSIRO's Soil and Landscape Grid of Australia (<http://www.clw.csiro.au/aclep/soilandlandscapegrid/ViewData-KML.html>) indicated that the soil profile from surface to approximately 200mm below ground surface (bgs) consisted of silts (15% to 20%), sands (40% to 60%) and clays (10% to 20%). The pH of the soil ranges from 3 to 4.8 and effective Cation Exchange Capacity (CEC) ranges from 5 to 10 meq/100g.

2.4. Hydrogeology

Groundwater beneath the site is anticipated to be present in an unconfined aquifer within about 10m (bgs). Other deeper semi-confined aquifers may be present within the bedrock.

Regional groundwater flow direction within the unconfined aquifer is expected to be to the west to south-west and discharge into The Broadwater located approximately 630m south-west of the site.

A search of the NSW Office of Water database for registered groundwater bores located within a 1km radius of the site was undertaken. The search revealed that there are three bores registered within this radius. A copy of the groundwater bore search is provided in Appendix A, and the results of the search are summarised in Table 2.2 below.

Table 2.2: Summary of groundwater bore search results

Bore ID	Status	Authorised Use	Standing Water Level (m bgs)	Distance and Direction from Site
GW053790	Cancelled	Industrial	Not known	900m north west (up/cross gradient)
GW201679	Cancelled	Irrigation	Not known	600m south west (down gradient)
GW201893	Active	Recreation (Groundwater)	Not known	600m south west (down gradient)

2.5. Coastal acid sulfate soils

The Australian Source Resource Information System (ASRIS) Acid Sulfate Soil Risk Map indicates that the site is within an area of Extremely Low Probability of encountering acid sulphate soils (ASS) within the development site. However, it should be noted that ASS map boundaries are approximate, and the area is relatively close to the alluvial channel zone, draining into The Broadwater, where the ASRIS map shows a zone of High Probability of encountering ASS. Therefore, the possibility cannot be ruled out that the development site may encounter some natural soils (beneath fill layers) that have a high ASS potential.

The geotechnical report for Site A (ref: GEOTLCOV25439AA-AA) provides further information on ASS including the ASRIS map overlaying the site plan, and the results of previous investigations on nearby properties. The geotechnical report should be referred to for this information.

3. Site history review

A site history review was undertaken as part of the Phase 1 CA, and included:

- A review of selected historical titles for the site;
- A review of aerial photography from the past 60 years;
- A site walkover to help identify current and previous activities carried out on the site, identify surrounding land uses, and assess AECs and COPCs;
- Interviews with people familiar with the site history;
- A review of selected Section 149 Planning Certificates obtained from Gosford City Council; and
- A review of NSW EPA notices applying to the site and nearby properties.

The information provided from the above reviews is summarised in the sections below.

3.1. Historical titles search

A search of historical titles for the site was undertaken by Advanced Legal Searchers Pty Ltd. A list of past registered proprietors for Lot 6 DP 598833 was obtained dating back to 1903. The results of the search are included in Appendix B and presented below in Table 3.1.

Lot 6 DP 598833 was previously numerous lots which were consolidated into Lot 6 in 1978. Table 3.1 below provides the former lot numbers up to 1978, to show the various site uses across the site.

Table 3.1: Summary of historical titles

Lot No.	Date	Proprietor	Inferred Land Use
Lot 2 DP 540292	1903 to 1961	<ul style="list-style-type: none"> • James MacDowell Conroy, licensed surveyor • Charlotte Susannah Johnson, widow • Ethel Maud Clifton, wife of veterinary surgeon • John Joseph Allwood, pensioner • Jeremiah James Mason, gentleman • Public Trustee • Jack Roberts, bus proprietor • Walter James King, factory proprietor • Lease to Bonds Wear Pty Ltd 1964 to 1970 	Private
	1961 to 1978	<ul style="list-style-type: none"> • Gosford Credit Union • Brumond Pty Limited • Norman Dyett Pty Limited • Waltons Insurance Company Limited • Lease to Bonds Wear Pty Ltd 1964 to 1970 	Commercial
	1974 to 1978	<ul style="list-style-type: none"> • Sterland Bros. Property Pty Limited • Waltons Insurance Company Pty Limited 	Commercial
Lot 11 DP 534758	1903 to 1973	<ul style="list-style-type: none"> • James MacDowell Conroy, licensed surveyor • Joseph Aggett, contractor • Ethel May Aggett, widow • Henry Griffith Parry, nurseryman • Leslie Reginald Parry, nurseryman 	Private

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Lot No.	Date	Proprietor	Inferred Land Use
	1973 to 1978	<ul style="list-style-type: none"> Loogooboo Holding Pty Limited Waltons Insurance Company Pty Limited 	Commercial
Lot B DP 379991	1903 to 1954	<ul style="list-style-type: none"> James MacDowell Conroy, licensed surveyor Amelia Stoneham, widow Claude Delandre, store keeper Norah Delandre, widow Colin Edward Blank, orchardist Thomas Mark Mulcahy, taxi proprietor 	Private
	1954 to 1958	<ul style="list-style-type: none"> Gosford Motors Pty Limited 	Commercial
	1958 to 1969	<ul style="list-style-type: none"> Owen William Gannon, cost clerk Alfred Edward Owen Keeves, hairdresser Mervyn Augustine Wilson, hairdresser John Alexander Corner, company representative Gwen Lila Corner Asca Investments Pty Ltd 	Private/commercial
	1969 to 1978	<ul style="list-style-type: none"> Edwards and Jaco Investments Pty Limited Waltons Insurance Company Limited 	Commercial
Lot 2 to Lot 4 Section 2 DP 6039	1903 to 1978	<ul style="list-style-type: none"> James Macdowell Conroy, licensed surveyor Charles Archibald Pile, gardener Annie Amelia Ash, widow Jeremiah James Mason, retired civil servant Public Trustee Arthur Stephen Sterland, merchant John Alphaeus Sterland, merchant Pearl Sterland Maurice Arthur Sterland Claire Sterland Earl Sterland 	Private
	1951 to 1978	<ul style="list-style-type: none"> Sterland Bros. Property Pty Limited Waltons Insurance Company Pty Limited 	Commercial
Lot D DP 394267	1903 to 1956	<ul style="list-style-type: none"> James MacDowell Conroy, licensed surveyor Joseph Aggett, contractor Ethel May Aggett, widow Henry Griffith Parry, nurseryman Leslie Reginald Parry, nurseryman 	Private
	1956 to 1978	<ul style="list-style-type: none"> Brisbane Water (NSW) Legacy War Orphans Fund Waltons Insurance Company Pty Limited 	Commercial
Lot A DP 379991	1903 to 1973	<ul style="list-style-type: none"> James MacDowell Conroy, licensed surveyor Amelia Stoneham, widow Claude Delandre, store keeper Norah Delandre, widow Colin Edward Blank, orchardist George Anderson, French polisher Florence Anderson Alex Charles Thomson, builder 	Private
	1973 to 1978	<ul style="list-style-type: none"> Sterland Bros. Property Pty Limited Waltons Insurance Company Pty Limited 	Commercial

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Lot No.	Date	Proprietor	Inferred Land Use
Lot C DP 375821	1903 to 1973	<ul style="list-style-type: none"> James MacDowell Conroy, licensed surveyor Amelia Stoneham, widow Claude Delandre, store keeper Norah Delandre, widow John Joseph Toohey, labourer Dorothy May Toohey Harold Gordon Little, departmental manager 	Private
	1973 to 1978	<ul style="list-style-type: none"> Sterland Bros. Property Pty Limited Waltons Insurance Company Pty Limited 	Commercial
Lot 1 Section 2 DP 6039	1903 to 1938	<ul style="list-style-type: none"> James MacDowell Conroy, licensed surveyor Sarah Jane Barnett Southwell, married woman George Richard May, laundry proprietor Margaret Hannah Linley, widow 	Private
	1938 to 1978	<ul style="list-style-type: none"> Board of Fire Commissioners of New South Wales Sterland Bros. Property Pty Limited Waltons Insurance Company Pty Limited 	Commercial
Lot 6 Section 2 DP 6039	1903 to 1973	<ul style="list-style-type: none"> James MacDowall Conroy, licensed surveyor Edward Henry Codley, iron monger Jessie Augusta Mason, wife of freeholder Jeremiah James Mason, gentleman Public Trustee Stanley Robert Hubbard, bread carter John Maitland Grahame, minor James Henry Quigley, labourer 	Private
	1973 to 1978	<ul style="list-style-type: none"> Waltons Insurance Company Pty Limited 	Commercial
Lot 13 & 14 Section 2 DP 6039	1903 to 1973	<ul style="list-style-type: none"> James MacDowall Conroy, licensed surveyor Jeremiah James Mason, gentleman John Joseph Allwood, pensioner Mary Ann Grieg, widow Amy Leah Nicholson, wife of agent Jack Roberts, bus proprietor Leslie John Summer, electric retailer Walter James King, manufacturer / factory proprietor Leo Gerard Dibben, oil depot proprietor Eric Hextall, motor trimmer 	Private
	1973 to 1978	<ul style="list-style-type: none"> Waltons Insurance Company Pty Limited 	Commercial
Lot 5 Section 2 DP 6039	1903 to 1965	<ul style="list-style-type: none"> James MacDowall Conroy, licensed surveyor Hubert Stephen Grigg, bootmaker Clara Rosina Stephens, saddler John Pete Tooby, timber merchant Albert Edward Clayton, builder James Edward Manning, hairdresser Owen Andrews, railway employee 	
	1965 to 1978	<ul style="list-style-type: none"> Sterland Bros. Property Pty Limited Waltons Insurance Company Pty Limited 	Commercial
Lot 6 DP 598833	1978 to 1980	<ul style="list-style-type: none"> Waltons Insurance Company Limited 	Commercial

Lot No.	Date	Proprietor	Inferred Land Use
	1980 to 2011	<ul style="list-style-type: none"> Central Coast Shopping Centres Pty Limited Westpoint Nominees Pty Ltd P.T. Limited Pluteus (No.302) Pty Limited Bellevista Pty Limited Gosford Market Place Pty Limited Various leases known as Marketown Shopping Centre from 1978 to 2006 Current lease to Sydney County Council of substation No 2061 from 2006 to current 	Commercial (shopping centre)
	2011 to current	<ul style="list-style-type: none"> Gosford City Council Current lease to Sydney County Council of substation No 2061 from 2006 to current 	Commercial

The historical titles search indicated that the site was generally owned by private landholders, who may have been operating commercial businesses, until the 1950's to 1970's. Since 1970's the site has been owned by various companies and private individuals, and appears to have been used as a shopping centre.

3.2. Aerial photograph review

Aerial photographs of the site were purchased from the Department of Land and Property Information and assessed by a Coffey environmental scientist. The results of the aerial photograph review are summarised below in Table 3.2. The aerial photographs are presented in Appendix C.

Table 3.2: Aerial photograph review

Year	Site	Surrounding Land
1954	<p>The site appears to contain mixed commercial and residential buildings. There appears to be two residential buildings and allotments on the north-east side of the site. To the west of these is a large commercial sized building, followed by vacant land with materials stockpiled. It is not clear what the materials may be. On the north-west corner there appears to be another residential building and allotment, the building may be a corner store.</p> <p>The southern side of the site appears to be mainly residential with some vacant land. The south-east corner is bushland.</p>	The surrounding area is similar to the site, with mixed residential and commercial uses. To the east and south-east is undeveloped bushland.
1964	<p>The two apparent residences on the north-east portion and the residence/corner store on the north-west corner are still present.</p> <p>The large commercial sized building has been extended to the west, south and south-west, and there are trucks or materials stored to the west of the building.</p> <p>There appears to still be a residence and allotment on the southern side. The bushland on the south-east portion has been cleared.</p>	The surrounding area is similar to the site, with mixed residential and commercial uses. To the east and south-east is undeveloped bushland.

Year	Site	Surrounding Land
1976	The site is similar to the 1964 photograph. The residences on the north-eastern portion have been removed. The residence/corner store on the north-west corner has been replaced by a car park. The residence on the southern portion has been removed, and the allotment is vacant. Another building has been constructed in the south-east portion; it appears to be commercial in size.	The majority of the residential buildings have been replaced by commercial buildings and car parks. The bushland to the east and south-east is still undeveloped.
1986	The site has been redeveloped and covered by one large building, with cars parked on the roof.	The surrounding land is similar to 1976. To the east, there have been commercial developments.
1994	The site is similar to 1986.	The surrounding land is similar to 1986.
2006	The site is similar to 1994.	The surrounding land is similar to 1994.

3.3. Site observations

A Coffey environmental scientist visited the site on 17 November 2015. Selected site photographs are presented in Appendix D.

- The site is currently occupied by a commercial shopping centre and car park;
- The buildings appeared to be constructed from concrete, brick, steel and glass;
- Car parking comprises above-ground car parking; and
- The entire land parcel is developed with no open unpaved areas.

3.4. Section 149 planning certificate

A copy of the Section 149 certificates for Lot 6 DP 598833 was obtained from Gosford City Council. A copy of the certificate is provided in Appendix E. The information contained in the certificate is summarised below:

- The site is zoned as B4 Mixed Use, under the Gosford Local Environmental Plan 2014;
- The site does not comprise a critical habitat;
- The site is not situated within a conservation area;
- There are no environmental heritage items situated on the land;
- The site not within the coastal zone as defined by the Coastal Protection Act 1979;
- The site is not within a proclaimed mine subsidence district;
- The site is not within flood prone land;
- The site is bushfire prone; and
- There are no contamination notices for the site under the Contaminated Land Management Act 1997.

3.5. NSW EPA records

A search of the NSW EPA database revealed that six properties within the Gosford City Council area are registered as having current and/or former notices. A copy of the search is provided in Appendix F. Table 3.3 provides a summary of the sites.

Table 3.3: Summary of NSW EPA Listed Contaminated Sites

Address	Use	Location from site
110 Peats Ridge Road, Calga	Former service station	14km west
44 Victoria Street, East Gosford	Mobil service station	8km south-east
1 Aston Road, Erina	Former frozen food distribution depot	5km east
356 Manns Road, West Gosford	Metro meat	2km west
66 Memorial Ave, Woy Woy	Bogas service station	13km south
177-181 Blackwall Road, Woy Woy	Mobil former Woy Woy service station and adjacent land	11km south

These six properties are located at least 2km distance from the site. Based on this it is considered unlikely that contamination on these properties would pose a risk to the site.

3.6. Anecdotal information

Steve Lacey of the Lederer Group provided the following information in a telephone call on 1 December 2015:

- He is not aware of the site's history prior to the shopping centre; and,
- No fill has been imported to the site that he knows of, although he believes there may be some cut to fill on the site based on the topography.

Deborah Warwick, centre manager of the Imperial Shopping Centre, provided the following information in a telephone call on 1 December 2015:

- The Sterland brothers were timber cutters. As far as she was aware there was no treatment of timber on the site;
- The Sterland brothers built new premises on the Marketown Shopping Centre premises (Site B) after having sold the property where the Imperial Shopping Centre is now located (Site A);
- Site B also had a Fire/Ambulance station and some residences in the past.

3.7. Summary of site history

The information obtained from the site history review has been summarised below:

- The site was owned by various private individuals from 1903 to the 1950's to 1970's, and was then owned by various companies until 2011;
- The current site owner, Gosford City Council, has owned the site since 2011;
- Aerial photographs show that the site formerly comprised numerous buildings until sometime between 1976 and 1986:
 - The eastern portion of the site appeared to be used primarily for residential purposes;
 - The western portion appeared to be used primarily for commercial/industrial purposes. Based on the titles and the anecdotal information, it appears that these including sawmilling and a fire/ambulance station.
 - The occupations on the historical titles were numerous and variable. Some of these included manufacturer/factory proprietor, bus proprietor, electrical retailer, oil depot proprietor and merchant. It is possible each of these occupations was carried out on the western portion of the site;
 - The north-west corner may have been used as a corner-store, although no general store owners were listed in the titles. It is noted that in the past general and corner-stores often stored and sold fuel;
- The aerial photographs show the current shopping centre was constructed between 1976 and 1986. Based on the historical titles, it was likely this was constructed about 1978; and
- In general the site appears to have been used for commercial purposes (shopping centre) for about 35 years. Prior to this the site appears to have been used for a combination of residential and commercial/industrial uses since at least 1954.

3.8. Gaps in the site history

Whilst the site history is reasonably comprehensive there are some gaps identified in the review as follows:

- The activities carried out on the site prior to the shopping centre (1978) are not well known. There were numerous site owner occupations in the historical titles, and it is not known whether these occupations were carried out on the site;
- If there was possibly a corner-store on the north-west corner, and there may be fuel infrastructure remaining underground;
- Some of the activities may have required a water source, and there may be wells on the site. This would not be able to be confirmed until the building has been removed; and
- It is not known if the former or current buildings contained hazardous materials such as asbestos containing materials (ACM) and/or lead paint.

4. Preliminary conceptual site model

Based on the site history and site observations noted by Coffey, a conceptual site model (CSM) has been developed.

4.1. Known and potential sources of contamination

Table 4.1 shows the AECs and associated COPCs identified.

Table 4.1: Potential AECs and COPCs

AEC	Potentially Contaminating Activity	COPCs	Likelihood of Contamination*
Former and current buildings	Use of hazardous building materials Use of termiticides	Asbestos, lead (paint), termiticides	Medium to high
Former saw milling activities	Potential use of timber treatment chemicals Use of fuels and lubricants Burial of saw dust and wood shavings	Copper-chrome-arsenic compounds, pentachlorophenol, OCPs, TRH, BTEX, PAH methane, carbon dioxide	Low to medium – timber was most likely hard woods from local region which are not typically treated
Former commercial/industrial activities	Former fire/ambulance station. Unknown former commercial/industrial uses. Potential storage of fuel.	TRH, VOCs, PAHs, OCPs, OPPs, phenols, metals, asbestos	Medium to high
Fill materials	Potential use of fill of unknown quality and origin Fill, if present, would most likely have been imported from surrounding area, and there was little heavy industry in the area at the time	TRH, BTEX, PAHs, metals, asbestos	Low to medium

NOTES:

* = It is important to note that this is not an assessment of the financial risk associated with the AEC in the event contamination is detected, but a qualitative assessment of the probability of contamination being detected at the potential AEC.

Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc; BTEX - Benzene, Toluene, Ethylbenzene and Xylenes; TRH - Total Recoverable Hydrocarbons; PAH - Polycyclic Aromatic Hydrocarbons; OCPs – Organochlorine Pesticides; OPPs – Organophosphorous Pesticides (OPPs); VOCs – volatile organic compounds

4.2. Potentially affected media, receptors and exposure pathways

Table 4.2 summarises the potentially affected media, potential receptors to contamination, and potential and complete exposure pathways.

Table 4.2: Summary of potentially affected media, receptors and exposure pathways

Consideration	Information
Potentially affected media	Soil Groundwater
Potential transport mechanisms and exposure pathways	Direct dermal contact with contaminated soil and/or groundwater Ingestion of contaminated soil and/or groundwater Inhalation of hydrocarbon vapours Inhalation of contaminated soil (as dust) and asbestos fibres Leaching of soil contaminants to groundwater Groundwater discharge to The Broadwater
Potential receptors of contamination	Site occupants, construction and maintenance workers Potential exposure via dermal contact with soil and groundwater, ingestion of soil and groundwater, inhalation of hydrocarbon vapours, and inhalation of soil (as dust) and asbestos fibres. Buildings and structures Contaminants could degrade foundations or underground services. Users of groundwater and freshwater/marine ecosystems Contaminants could leach from soils into groundwater that may migrate off-site to Broadwater.

4.3. Potential and complete exposure pathways

Table 4.3 summarises the potential and complete exposure pathways.

Table 4.3: Potential and complete exposure pathways

Receptor	Exposure Pathway	Comment
Construction/maintenance workers	Potentially complete	There is a potential for construction workers to be exposed to contaminated soil and groundwater and associated vapours.
Site occupants and maintenance workers (after development)	Potentially complete	There is a potential for site occupants to be exposed to contaminated soil and groundwater and associated vapours. Once the development is complete, site occupants may not have access to soil or groundwater depending on whether the development has open spaces with accessible soils. Depending on the development, the exposure pathway may not be completed.
Buildings and underground services	Potentially complete	There is a potential for buried structures and services to be exposed to contaminated soil and groundwater.

5. Conclusions and recommendations

The site history review indicated that the site has been used for commercial/industrial purposes since at least 1954. The uses of the site prior to the shopping centre, which was constructed about 1978, are not well known, with the site owned by numerous individuals with different occupations. It appears that portions of the western side of the site were used for sawmilling, a fire/ambulance station, and other commercial/industrial purposes, and the north-west corner may have been used as a corner-store. The remainder of the site was occupied by buildings which appeared to be residential.

Most of the activities associated with commercial/industrial uses, typically cause “top-down” contamination. The exception to this would be if wells or other underground infrastructure (i.e. tanks) were installed.

The current shopping centre was constructed in about 1978. It is not known if surface soils on the site were removed during construction of the current shopping centre. It is possible imported fill material was used to level the site or provide a base for concrete slabs.

Based on the above, the potential for soil contamination to be present is medium. The potential for groundwater contamination to be present is not known, as the source for groundwater contamination would be contaminated soil and at this stage the presence of soil contamination has not been assessed.

Based on the outcomes of the PCA, Coffey concludes that the site can be made suitable for the proposed mixed-use development in accordance with the requirements of State Environmental Planning Policy No. 55 (SEPP 55) provided the following is undertaken:

- Obtaining NSW WorkCover dangerous goods records for the site, if available, to assess if dangerous goods such as fuel tanks may be present;
- A hazardous materials survey of the existing buildings, prior to demolition, and a hazardous materials clearance, after demolition of the buildings, to ensure hazardous materials were removed;
- A visual inspection of the site, after demolition of the existing buildings, to assess the presence of potential former wells or other underground infrastructure such as storage tanks as well as fill and potential asbestos containing materials;
- Completion of a Detailed Site Investigation (DSI) at the Site following demolition of existing buildings. A Sampling and Analysis Quality Plan (SAQP) must be prepared to guide the DSI and the minimum number of samples must comply with the NSW EPA (1995) Sampling Design Guidelines;
- If soil contamination is identified, the risk of groundwater contamination should be assessed, and groundwater sampling carried out if required;
- If volatile substances are identified, the risk of vapour contamination should be assessed, and vapour sampling carried out if required;
- Following completion of the DSI, should contamination be found at levels requiring remediation and/or management, a Remediation Action Plan (RAP) must be prepared. The RAP must include remedial/management methodology for identified contamination. The RAP must also include validation requirements and methodology to verify the suitability of the site for proposed end use following the completion of remediation; and,

- If materials are proposed to be removed from site for the development, the material will require waste classification in accordance with the NSW EPA (2014) Waste Classification Guidelines.

This report must be read in conjunction with the attached sheet entitled '*Important Information about your Coffey Environmental Report*', which can be found at the end of this report.

6. Limitations

In preparing this report, current guidelines for assessment of contaminated land were followed. This work has been conducted in good faith in accordance with Coffey's understanding of the client's brief and general accepted practice for environmental consulting.

This report was prepared for Conybeare Morrison International Pty Ltd and the Lederer Group with the objectives of identifying potentially contaminating activities that are currently being performed on the site and that may have been performed on the site in the past, developing a CSM for the site, and providing recommendations on the scope of further assessments. No warranty, expressed or implied, is made as to the information and professional advice included in this report. Third parties cannot rely on the data and interpretation presented in this report and should satisfy themselves concerning their applicability and, where necessary, should seek expert advice in relation to contamination conditions of the site.

This report does not cover hazardous building materials issues.

7. References

Advanced Legal Searchers Pty Ltd (2015) Historical Titles Search for Gosford

Department of Land and Property Information (2015) Aerial Photography for Gosford (1954, 1964, 1976, 1986, 1994, 2006).

Geological Survey of NSW (1966) 1:100,000 Sydney Geological Series Sheet.

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013, National Environment Protection Council.

NSW EPA (2015) Register of Contaminated Sites: Gosford City Council Local Government Area, accessed from <http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx>

NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites.

NSW Office of Water (2015) Groundwater Bore Search – Gosford.

Gosford City Council (2015) Section 149 Planning Certificate, 42 William Street, Gosford Certificate No 140141, dated 17 November 2015.

Gosford City Council (2015) Section 149 Planning Certificate, 136-146 Donnison Street, Gosford, Certificate No 140140, dated 17 November 2015.

Soil Conservation Service of NSW (1995) 1:25,000 Gosford Acid Sulfate Soils Risk Map, Edition 1. Topographic map for Gosford (<http://imagery.maps.nsw.gov.au/>), accessed on 20 November 2015.

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept apprised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statutes and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such

assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figures

PLOT DATE: 17/11/2015 12:09:52 PM DWG FILE: F:\GEO\TECHNICS\PROJECTS\GEOTLCOV25439AA GOSFORD MIXED USE DEVELOPMENT\CAD\GEOTLCOV25439AA-AB.DWG



LEGEND

- SITE B BOUNDARY
- 10— ELEVATION CONTOURS (mAHD)



Scale (metres) 1:5000

SOURCE: TOPOGRAPHIC DATA SUPPLIED BY CONYBEARE INTERNATIONAL

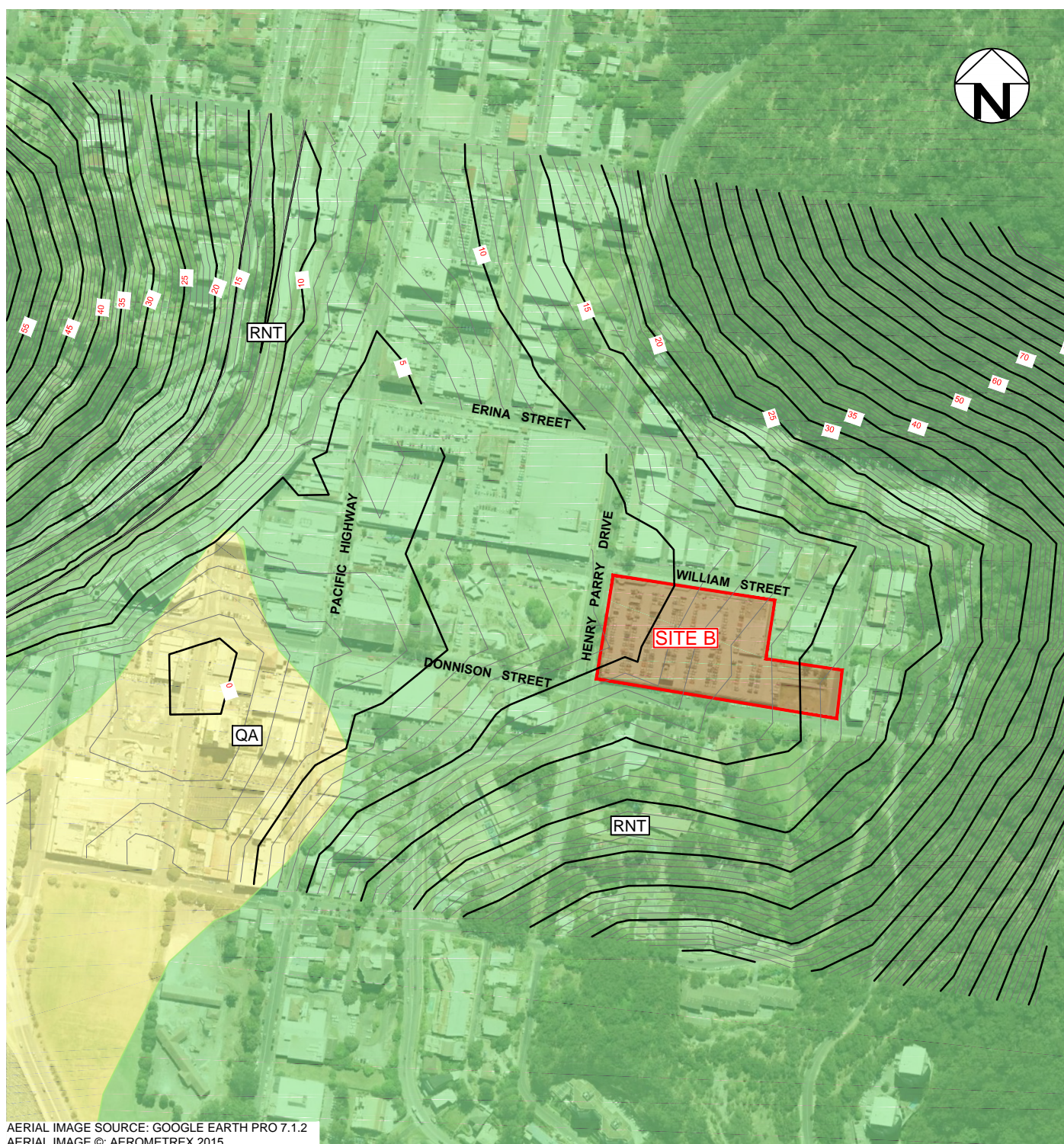
AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2
AERIAL IMAGE ©: AEROMETREX 2015

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approved	-
date	17 / 11 / 15
scale	AS SHOWN
original size	A4



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project:	GOSFORD DEVELOPMENT PROJECT		
title:	SITE LOCATION AND TOPOGRAPHY		
project no:	GEOTLCOV25439AA-AB	figure no:	FIGURE 1
		rev:	A

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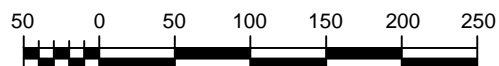


AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2
AERIAL IMAGE ©: AEROMETREX 2015

LEGEND

- SITE B BOUNDARY
- QA ALLUVIUM, GRAVEL, SAND, SILT CLAY
- RNT INTERBEDDED LAMINITE, SHALE AND SANDSTONE
- 10— ELEVATION CONTOURS (mAHd)

SOURCE: TOPOGRAPHIC DATA SUPPLIED BY CONYBEARE INTERNATIONAL



Scale (metres) 1:5000

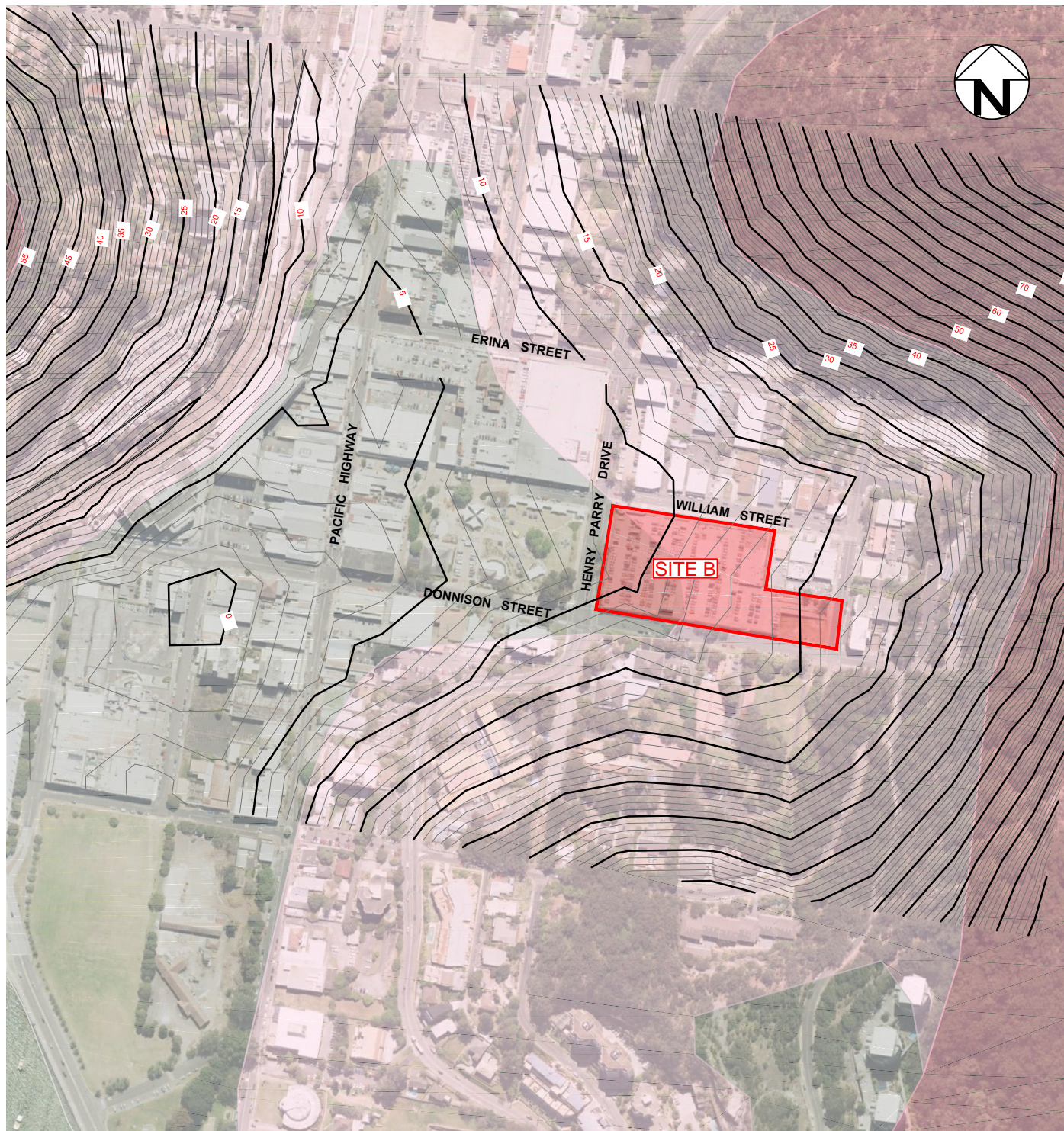
SOURCE: NSW DEPT OF MINERAL RESOURCES - SHEET GOSFORD 9131

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approved	-
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project:	GOSFORD DEVELOPMENT PROJECT		
title:	INFERRED GEOLOGY		
project no:	GEOTLCOV25439AA-AB	figure no:	FIGURE 2
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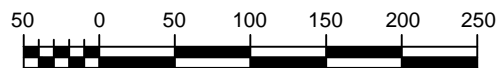
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LEGEND

- SITE B BOUNDARY
- DISTURBED TERRAIN
- EROSIONAL
- COLLUVIAL
- 10— ELEVATION CONTOURS (mAHD)

SOURCE: TOPOGRAPHIC DATA SUPPLIED BY CONYBEARE INTERNATIONAL



Scale (metres) 1:5000

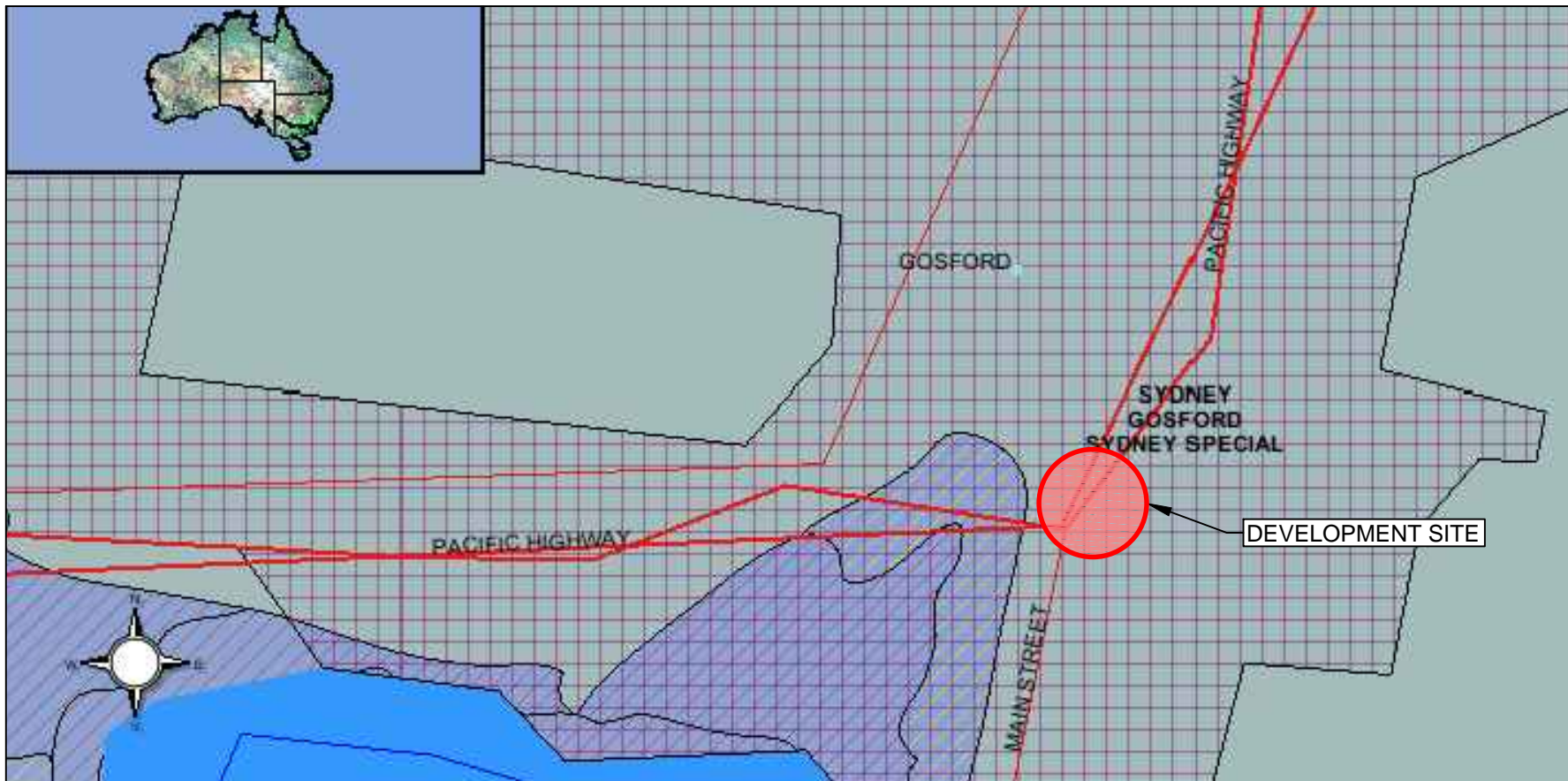
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AERIAL IMAGE ©: AEROMETREX 2015

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approved	-
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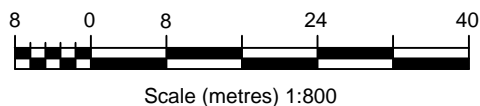
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National ASS Atlas, 1 feature found

Rec	Acid Sulfate Soil Class	Acid Sulfate Soil Probability	Confidence	Scale of source map
1	Cq(p4)	Extremely Low Probability of Occurrence	4	1:2M



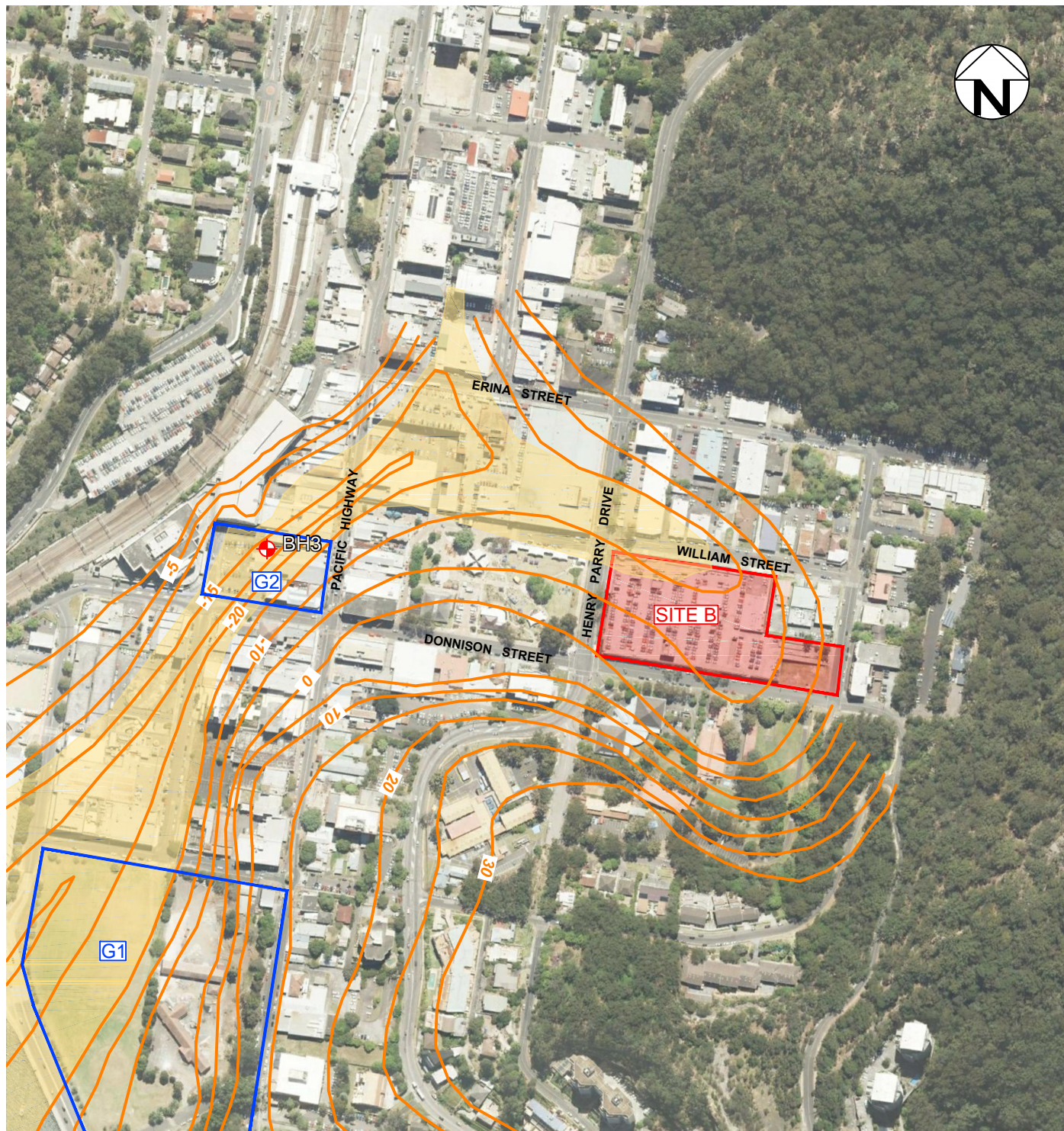
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drawn	RR / AW
approved	-
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project:	GOSFORD DEVELOPMENT PROJECT		
title:	ACID SULFATE SOIL (ASS) RISK MAP		
project no:	GEOTLCOV25439AA-AB	figure no:	FIGURE 4
		rev:	A

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LEGEND

- SITE B BOUNDARY
- 30 — INDICATIVE TOP OF BEDROCK (mAHD)
- PALAEO-CHANNEL

COFFEY LIBRARY SERVICES

- G1 GOSFORD LANDING STUDY
- G2 188-120 MANN STREET, INVESTIGATION



Scale (metres) 1:5000

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2
AERIAL IMAGE ©: AEROMETREX 2015

drawn	RR / AW
approved	-
date	17 / 11 / 15
scale	AS SHOWN
original size	A4



client:	CONYBEARE MORRISON INTERNATIONAL		
project:	GOSFORD DEVELOPMENT PROJECT		
title:	BEDROCK CONTOURS AND HISTORICAL DATA		
project no:	GEOTLCOV25439AA-AB	figure no:	FIGURE 5
		rev:	A

Appendices

Appendix A – Site Photos (walkover)

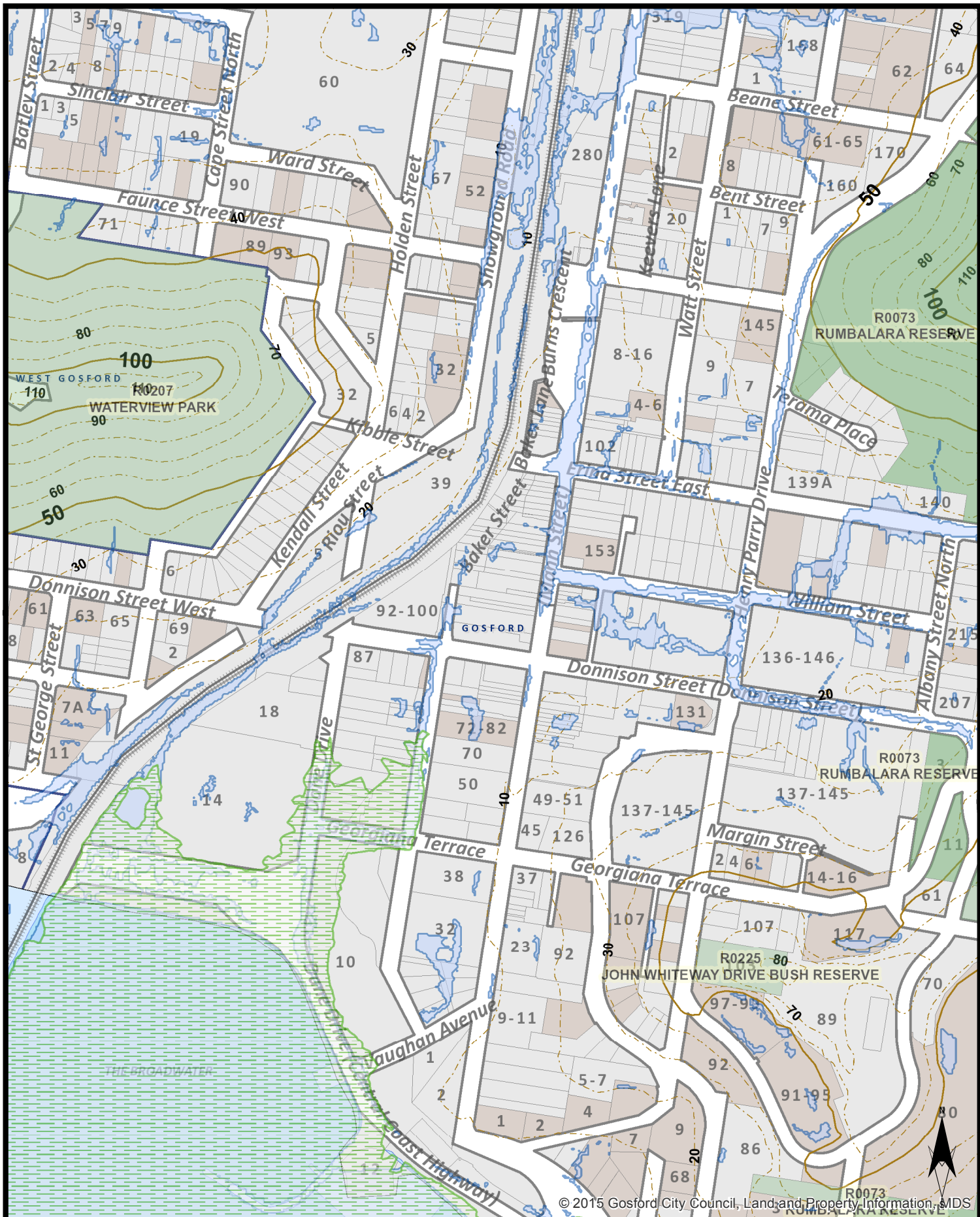


PHOTO 1: View of car park entrance ramp on William Street (view to east)



PHOTO 2: Ground level entrance on William Street (view to west)

Appendix B – 1% AEP Flood Extents Map



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 © 2014 Land Property Information
 © 2014 SKM - 2014 Aerial Photography
 © 2012 Vekta - 2012 Aerial Photography
 © 2010 SKM - 2010 Aerial Photography
 © 2007 SKM - 2007 Aerial Photography
 © 2005 AAM - 2005 Aerial Photography
 © 2011 MapData Sciences Pty Ltd, PSMA.

Gosford Electronic Mapping System

0 40 80 160 240 320
 Metres

Date: 1/12/2015 Time: 12:47:22 PM

Projection: GDA_1994_Transverse_Mercator; GCS_GDA_1994
 Created using ESRI ArcGIS 10.2

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Appendix C – BH3 log (108-117 Mann Street)

Engineering Log - Borehole

client: **GOSFORD CITY DEVELOPMENTS**

principal:

project: **108-118 MANN STREET, GOSFORD**

location: **GOSFORD**

Borehole ID. **BH 3**

sheet: 1 of 4

project no. **GEOTLCOV25137AA**

date started: **12 Jun 2014**

date completed: **12 Jun 2014**

logged by: **AWJ**

checked by:

position: E: 345788; N: 6300220 (MGA94 Zone 56) surface elevation : 3.50m (AHD) angle from horizontal: 90°
drill model: Geoprobe mounting: Track hole diameter : 100 mm

drilling information					material substance									
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations		
ADIT N W	3	20/06/14 08:00	E					FILL: Sandy GRAVEL: fine to medium grained, sub-angular, dark grey, fine to coarse grained sand, some fines.	M		100	FILL PID: 0.4 ppm		
				-3			FILL: Sandy CLAY: high plasticity, pale brown, some pale grey, trace gravel and wood.		200					
			E				SC	Clayey SAND fine to medium grained, pale grey mottled orange, clay of low plasticity.	>Wp	St	300	ALLUVIUM PID: 0.9 ppm		
			SPT 2, 3, 4 N*=7	1.0					400					
				-2										
							SM	Silty SAND fine and medium grained, pale grey and orange brown.	W	MD				Faint sulfur odour
			SPT 4, 6, 7 N*=13	2.0										
				-1										
							CH	CLAY: high plasticity, grey-pale grey, trace of black organic content.	>Wp	St				
			SPT 3, 4, 5 N*=9	4.0										
				SP	SAND: medium grained, pale grey, pockets of Clayey SAND to 7.0m.	W	MD							
						</								

method AD auger drilling* AS auger screwing* RR roller/tricone W washbore CT cable tool HA hand auger DT diatube B blank bit V V bit T TC bit * bit shown by suffix e.g. AD/T	support M mud C casing N nil	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	classification symbol & soil description based on Unified Classification System moisture D dry M moist W wet Wp plastic limit WL liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
--	--	--	--	--

Engineering Log - Borehole

client: **GOSFORD CITY DEVELOPMENTS**

principal:

project: **108-118 MANN STREET, GOSFORD**

location: **GOSFORD**

Borehole ID: **BH 3**

sheet: 2 of 4

project no. **GEOTLCOV25137AA**

date started: **12 Jun 2014**

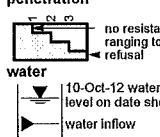
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logged by: **AWJ**

checked by:

position: E: 345788; N: 6300220 (MGA94 Zone 56) surface elevation : 3.50m (AHD) angle from horizontal: 90°
drill model: Geoprobe mounting: Track hole diameter : 100 mm

drilling information						material substance						
method & support	penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
method & support	1	water	samples & field tests	RL (m)	depth (m)	graphic log	SM	Silty SAND fine and medium grained, grey.	W	L - MD	100	ALLUVIUM
	2										200	
	3										300	
											400	
			SPT 1, 1, 1 N*=2	-5								
					9.0							
				-6								
			SPT 2, 3, 4 N*=7		10.0							
				-7								
					11.0				MD			
			SPT 6, 8, 5 N*=13		12.0							
				-8								
					13.0		CH	CLAY: high plasticity, dark grey, some fine grained sand, trace wood, pockets of sand.	>Wp	S - F		
			SPT 0, 0, 0 N*=0		14.0							
				-9								
					15.0		CH	Sandy CLAY: high plasticity, dark grey, fine to medium grained sand.				
			SPT 0, 0, 2 N*=2		16.0							
				-10								
					17.0							
				-11								
					18.0							
				-12								

method AD auger drilling* AS auger screwing* RR roller/tricone W washbore CT cable tool HA hand auger DT diatube B blank bit V V bit T TC bit * bit shown by suffix e.g. AD/T	support M mud N nil C casing penetration  water 10-Oct-12 water level on date shown water inflow water outflow	samples & field tests B bulk disturbed sample D disturbed sample E environmental sample SS split spoon sample U## undisturbed sample ##mm diameter HP hand penetrometer (kPa) N standard penetration test (SPT) N* SPT - sample recovered Nc SPT with solid cone VS vane shear; peak/remoulded (kPa) R refusal HB hammer bouncing	classification symbol & soil description based on Unified Classification System moisture D dry M moist W wet Wp plastic limit WL liquid limit	consistency / relative density VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
--	---	--	--	--

Engineering Log - Borehole

client: **GOSFORD CITY DEVELOPMENTS**

principal:

project: **108-118 MANN STREET, GOSFORD**

location: **GOSFORD**

Borehole ID. **BH 3**

sheet: 3 of 4

project no. **GEOTLCOV25137AA**

date started: **12 Jun 2014**

date completed: **12 Jun 2014**

logged by: **AWJ**

checked by:

position: E: 345788; N: 6300220 (MGA94 Zone 56)				surface elevation : 3.50m (AHD)				angle from horizontal: 90°						
drill model: Geoprobe				mounting: Track				hole diameter : 100 mm						
drilling information				material substance										
method & support	1 penetration	2 penetration	3 penetration	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
<div>W</div>					SPT 0, 0, 0 N*=0	-13			CH	Sandy CLAY: high plasticity, pale grey mottled yellow brown, fine grained sand.	>Wp	F - St	X	ALLUVIUM
						17.0	CH		CLAY: high plasticity, pale grey-white mottled yellow brown and orange.	VS			RESIDUAL SOIL	
					SPT 4, 7, 11 N*=18	-14						X		
						18.0								
						-15								
					SPT 12/100mm HB N*=R	-16				SANDSTONE medium grained, pale grey and brown, extremely weathered, estimated very low strength, remoulds to Sandy CLAY. Borehole BH 3 continued as cored hole				WEATHERED ROCK
						-20								
						-17								
						-18								
						-19								
						-20								
						-21								
						-22								
						-23								
						-24								
						-25								
						-26								
						-27								
						-28								
						-29								
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client: **GOSFORD CITY DEVELOPMENTS**
principal:
project: **108-118 MANN STREET, GOSFORD**
location: **GOSFORD**

Borehole ID.	BH 3
sheet:	4 of 4
project no.	GEOTLCOV25137AA
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date started:	12 Jun 2014
date completed:	12 Jun 2014
logged by:	AWJ
checked by:	

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