No 307-311A Bexley Road Bexley North

Planning Proposal

Rockdale Local Environmental Plan 2011

No 88-96 New Illawarra Road & No 307-311A Bexley Road, Bexley North

Proposed Rezoning of land to Residential High Density R4 with associated amendments to building height and FSR

Bayside Council

May 2017

(amended January 2018)

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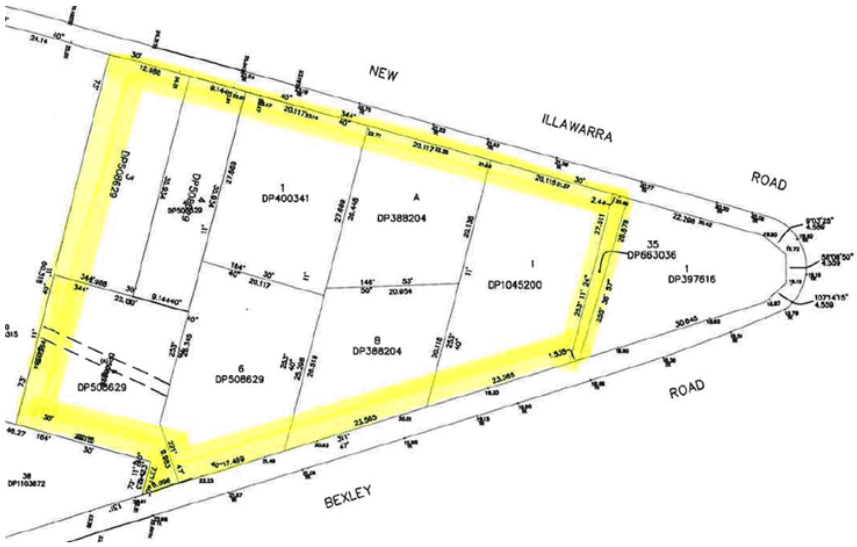
Introduction

This Planning Proposal explains the intended effect of, and justification, for the proposed amendment to *Rockdale Local Environmental Plan 2011 (Rockdale LEP 2011)*. It has been prepared in accordance with Section 55 of the *Environmental Planning and Assessment Act 1979* and the relevant Department of Planning and Environment guides, including 'A Guide to Preparing Local Environment Plans' and 'A Guide to Preparing Planning Proposals'.

Background

This planning proposal has been prepared for land known as No 88-96 New Illawarra Road and No 307-311A Bexley Road, Bexley North. The planning proposal relates to the R2 Low Density zoned land fronting Bexley Road and New Illawarra Road, North Bexley.



The subject land is legally identified as Lot 35 in DP 663036; Lot 1 in DP 1045200; Lot A in DP 388204; Lot B in DP 388204; Lot 1 in DP 400341; Lot 6 in DP 508629; Lots 3 and 4 in DP 508629; and Lot 5 in DP 508629.

Adjoining the subject site to the north is Lot 1 in DP 397616, a triangular shaped parcel of open space at the point or intersection of New Illawarra Road and Bexley Road, which provides an ideal landscaped setting to the subject site. This open space parcel of land is suitable for embellishment works generating a public benefit. Such works will be discussed with Council and can form part of a formal voluntary planning agreement.

Adjoining the subject site to the south is land owned by the Department of Family and Community Services (Dept of Housing). It is understood that the adjoining two lots are subject to a development application to Council in the near future for the erection of a residential flat building for public housing.

The subject land has been identified as being suitable for an up-zoning based on its location characteristics being within walking distance to Bexley North Railway Station, connectivity to the North Bexley town centre, existence of a redundant service station, its unique configuration on the street block being separated by housing lots further to the south by Department of Family and Community Services land. In addition the subject site has potential for the erection of coordinated built form, address of local overland flow issues and public domain improvements.

Accordingly, the applicant proposes to rezone the subject land from R2 Low Density Residential to R4 High Density Residential, so as to facilitate the construction of three (3) residential flat buildings ranging in building height from 5 to 6 storeys.

The subject is ideally situated on the southern fringe of the North Bexley town centre and benefits from having two street frontages to Bexley Road and New Illawarra Road. The subject site has a total area of **4,257m^2**.

The subject site has no heritage significance, nor is it located within a heritage conservation area. There are no heritage items adjoining the property.

Applicable to the subject site currently are the provisions of Rockdale Local Environmental Plan 2011 and associated Development control Plan. Pursuant to which the subject land is zoned R2 Low Density Residential, has a maximum building height limit of 8.5m and a maximum floor space ratio (FSR) of 0.5:1. The current planning controls stifle redevelopment opportunities of what is considered to be a unique and valuable parcel of land within the North Bexley town centre context.

As a matter of background, the applicant has had discussions with Council as to the feasibility of pursuing the up-zoning. Council staff have advised that while there are no immediate plans by Council to rezone the land, the subject land has potentially redevelopment characteristics.

Property owners within the street block have been approached by the applicant inviting support for the proposal inclusive of the Department of Family and Community Services (The ex Department of Housing). The property owners within the subject site have been consulted and agreement obtained to pursue the planning proposal. Contact has also been made with the Department of Family and Community Services. Representatives have advised that there is no need for a rezoning of their land as the Department was seeking to submit a development application for the development of their site pursuant to current legislation.

View of subject site from Bexley Road

View of subject site from New Illawarra Road

Part 1 - Objectives or Intended Outcomes

The objective of the Planning Proposal is to amend *Rockdale LEP 2011* to facilitate the rezoning of the subject site from R2 Low Density Residential to R4 High Density Residential permitting the construction of three (3) residential flat buildings ranging in building height from 5 to 6 storeys.

A detailed site and urban analysis has been prepared by Urban Link Pty Ltd.

The proposed design concept has been developed to promote and reflect the Local and State planning metropolitan initiatives for renewal and consolidation of sites near major transport nodes. The scale and density of the proposed buildings is site specifically designed and meant to reflect the desired future character of development within and near the town centres within the Bayside Local Government Area.

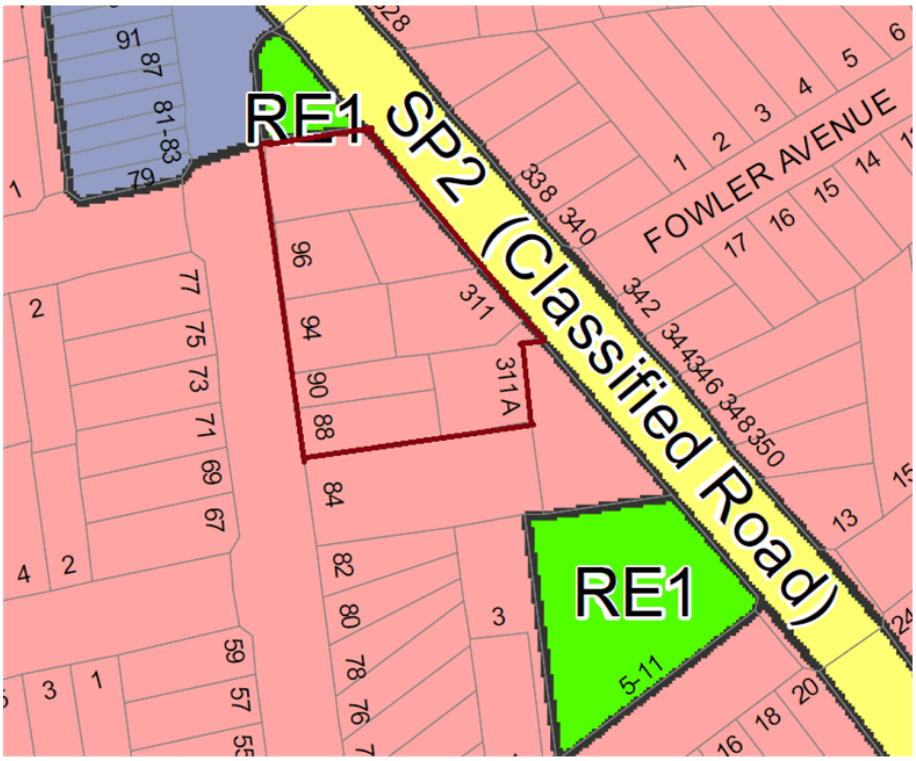
The proposed design and amendments to the planning instrument effectively fast tracks Council initiatives. The proposed development outcome provides for building heights between 5 and 6 storeys - 20.5m and a maximum floor space ratio of 1.9:1; the planning proposal provides for corresponding amendments to the zoning, height and floor space ratio controls under the Rockdale Local Environmental Plan 2011.

The proposed up-zoning of the land to R4 High Density Residential enables the development of the site with residential flat buildings which has the potential of increasing housing supply in the precinct and generating a community benefit as follows:

- providing additional affordable housing opportunities within a well serviced locality close to public transport and the work place.
- Utilising a valuable land parcel which presently contains in part a redundant service station;
- Capitalising on existing service infrastructure and transport services.

Part 2 - Explanation of Provisions

Map LZN_001



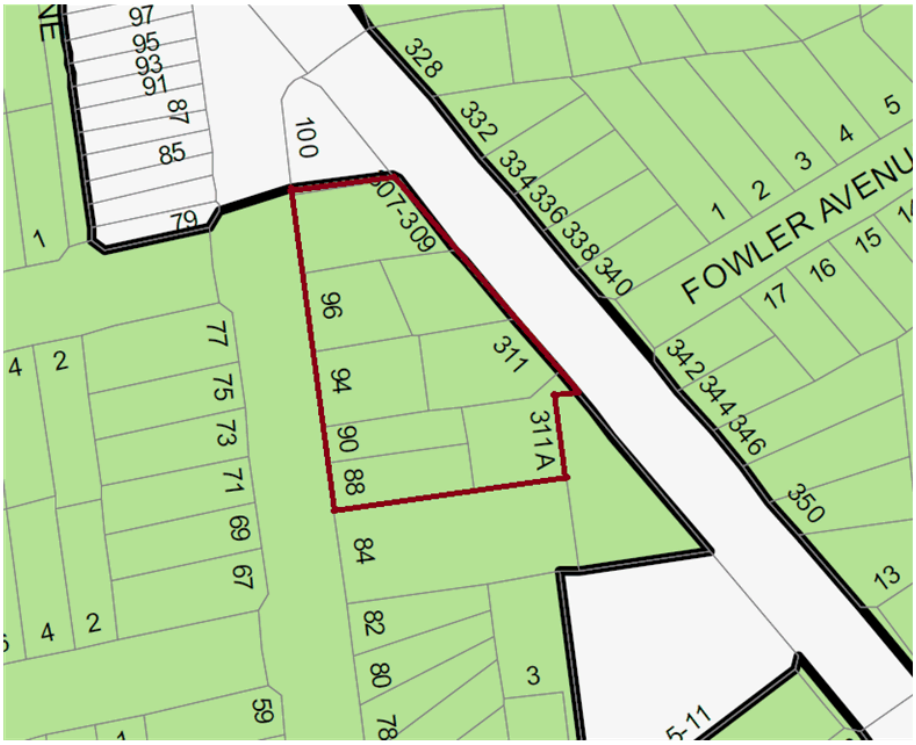
Extract of Current Zoning Map

The *Rockdale Local Environmental Plan 2011* Zoning Map is proposed to be amended as per Table 1 below.

Table 1 – Proposed Map Amendments

Map Tile No.	Amendment	Explanation
Zoning Map	• Up-zone the land from R2 Low density residential to R4 High Density Residential	The proposed R4 zoning enables the construction of residential flat buildings on the site

Map LSZ_001



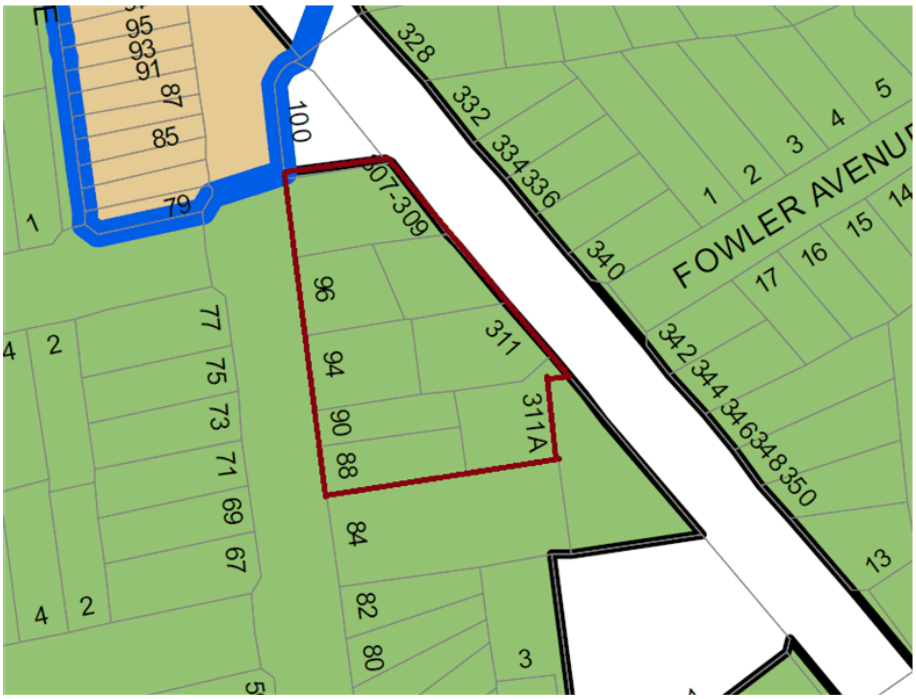
Extract of the Lot Size Map

The *Rockdale Local Environmental Plan 2011* Lot Size Map is proposed to be amended as per Table 1 below.

Table 1 – Proposed Map Amendments

Map Tile No.	Amendment	Explanation
Lot Size Map	• Remove the minimum lot size reference	Maintain consistency across the Local Environmental Plan

Map HOB_001



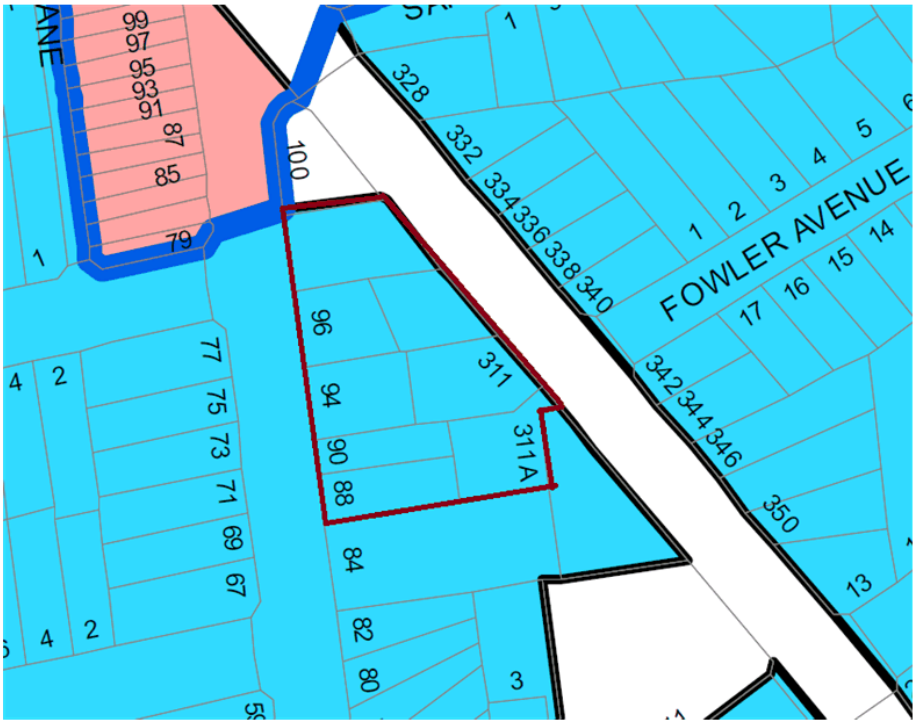
Extract from the Height of Building Map

The *Rockdale Local Environmental Plan 2011* Height of Building Map is proposed to be amended as per Table 1 below.

Table 1 – Proposed Map Amendments

Map Tile No.	Amendment	Explanation
Height of Building Map	• Delete reference to I - 8.5m maximum height and replace with Q2 - 20.5m	The proposed height provides opportunity to provide a 6 storey building catering for overland flow issues and maximising design treatment of the buildings.

Map FSR_001



Extract from the Maximum Floor Space Ratio Map

The *Rockdale Local Environmental Plan 2011* Maximum Floor Space Ratio Map is proposed to be amended as per Table 1 below.

Table 1 – Proposed Map Amendments

Map Tile No.	Amendment	Explanation
Floor Space Ratio Map	• Delete reference to D - 0.5:1 and replace with T1 - 2:1	The proposed Floor Space Ratio provides opportunity to provide a 6 storey building and maximise the quality of apartments.

B There are no other provisions of the Local Environmental Plan requiring amendment to facilitate this planning proposal.

To facilitate the above, it will be necessary to prepare a site specific development control plan detailing the scale of building spread across the site; the proposed setbacks; landscape treatment and the desired driveway locations. The development control plan can be prepared once the preferred design solution for the site is determined through the consultation process.

Part 3 - Justification

Question 1: Is the planning proposal a result of any strategic study or report?

The planning proposal is not a direct result of a specific strategic study or report for the site undertaken by a public authority. The planning proposal has evolved after much consultation with Council staff and undertaking an in-depth investigation into the redevelopment potential of the site. The derived planning outcome for the site is meritorious in generating a planning and built form outcome which is consistent with the broader planning objectives for the Bayside Local Government Area as indentified by 'Draft Greater Sydney Region Plan' planning strategy. This draft plan seek to increase housing densities and employment in and near town centres given their high level of access to public transport (both rail and buses), the availability of local support services and the convenient accessibility of the town centre and other major employment areas.

Bexley North is a town centre portraying such location characteristics however the existing planning controls are in need of review to keep pace with initiatives being undertaken in other town centres and Local Government Areas such as Parramatta, Merrylands, Top Ryde and Burwood and the like.

Accordingly the subject planning proposal warrants consideration.

Question 2: Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The current planning controls and land use table are limiting in terms of promoting orderly redevelopment opportunities consummate with broader planning strategies near town centres.

A rezoning is needed to provide the necessary stimulus to facilitate orderly development, to engage neighbour co-operation in the process, derive pedestrian access improvements to and around the site and embellishment upgrades of open space within the street block.

This planning proposal establishes the appropriate planning mechanism to facilitate the optimum redevelopment opportunities for the site as Council have no plans to undertake the same in the coming years.

The site currently contains a redundant service station use, which operates pursuant to the 'existing use rights' provisions. The current R2 Residential Low Density land use table does not provide the incentives or opportunities to undertake viable redevelopment. The current zoning also under utilises site opportunities and location characteristics.

There is no other way available to redevelop the site and achieve orderly and economic development outcomes.

B Relationship to strategic planning framework

Question 3: Is the planning proposal consistent with the objectives and actions of the applicable regional, sub-regional or district plan or strategy (including any exhibited draft plans or strategies)?

a) Does the proposal have strategic merit? Is it:

• *Consistent with the relevant regional plan outside of the* Draft Greater Sydney Region Plan*, the relevant district plan within the Greater Sydney Region, or corridor/precinct plans applying to the site, including any draft regional, district or corridor/precinct plans released for public comment; or*
• *Consistent with a relevant local council strategy that has been endorsed by the Department; or*
• *Responding to a change in circumstances, such as the investment in new infrastructure or changing demographic trends that have not been recognised by existing planning controls*.

The planning proposal and the subsequent redevelopment of the subject land is considered to derive inherent net community benefit as follows:

- The redevelopment of the site will remove a redundant service station and prohibited use from the land;
- The redevelopment will remove old and redundant dwellings and constraints associated with irregular shaped small allotments;
- The redevelopment will occur in accordance with an endorsed site specific Development Control Plan regulating built form and open space provision;
- Contemporary and alternate housing forms will be generated providing affordable housing opportunities elevated above busy roads;

- Pedestrian access to the site will be reviewed and improved with the potential for a new pedestrian footpaths in New Illawarra Road and/or Bexley Road;
- The open space parcels 'book ending' the subject site can be suitably embellished as part of the proposal given the likely increase in patronage should the application be approved;
- The shape of the site introduces opportunities to generate attractive and contemporary built form within a landscaped setting pronouncing the approach to the Bexley North town centre from a southern approach;
- The planning of the site will rectify current overland flow issues and regularise and storm water drainage across the site; and
- Approval of this application should stimulate a review and upgrade of controls applying to the Bexley North town centre to the benefit of the broader community.

No significant adverse community impacts or significant adverse environmental impacts are likely to arise from the proposal. A review of the development concept plans prepared as part of this submission confirms shadows cast by future buildings can be contained within the site or within the road reservations. Additionally the consolidation of individual driveways and provision of new strategically positioned driveways will reduce the risk of vehicle/pedestrian conflict arising from cars reversing onto the main roads.

Consideration	**Comment**	**Benefit**
Will the Local Environmental Plan be compatible with agreed State and regional strategic direction for development in the area	The proposed scale and type of development is appropriate on a fringe of the town centre. The higher density introduces opportunity for contemporary affordable accommodation within walking distance of the town centre and railway station thus reducing car dependency.	Positive

Is the proposal consistent with the Draft Greater Sydney Region Plan or other regional/sub-regional strategy?	The proposal is compatible with the strategic framework. The proposal facilitates housing which has the potential to accommodate for a growing population within Metropolitan Sydney, which is ideally located near transport nodes and commercial centres.	Positive
Is the planning proposal likely to create a precedent or create or change the expectations of the landowner or other landholders?	Given the sites close proximity to the town centre, the planning proposal would assist in meeting people's expectations for higher density and urban renewal. The planning proposal does not relate to an isolated site but includes several site which achieves a coordinated response. It is envisaged that the planning proposal may provide a stimulus for further consideration within the Bexley North town centre.	Neutral
Have the cumulative effects of other spot rezoning proposals in the locality been considered? What was the outcome of these considerations?	There are no other spot rezoning applications which have occurred in the vicinity of the site.	Neutral
Will the Local Environmental Plan facilitate a permanent employment generating activity or result in a loss of	The proposal relates to an up-zoning of residential land. There will not be loss of employment land. The existing service station at the site	Neutral

employment lands?	operates under 'existing use rights'. A service station is currently a prohibited use in the R2 Low Density Residential zone under the Rockdale Local Environmental Plan 2011. Given this there will be no loss of employment land, as the site is currently zoned for residential purposes.	
Will the planning proposal impact upon the supply of residential land and therefore housing supply and affordability?	The planning proposal provides increased housing densities in a well serviced locality improving supply and thus affordability (having regard to the fundamental economic principle of 'supply and demand').	Positive
Is the existing public infrastructure (roads, rail, utilities) capable of servicing the proposed site? Is there good pedestrian and cycling access? Is public transport currently available or is there infrastructure capacity to support future public transport?	The subject site is within convenient walking distance of public transport including railway and bus services. It is proposed to improve access to the site by creating a pedestrian linkages with the town centre via pedestrian crossings in appropriate locations. All services including electricity, sewer and phone are available to the site.	Positive

Will the proposal result in changes to the car distances travelled by customers, employees and suppliers? If so, what are the likely impacts in terms of greenhouse gas emissions, operating costs and road safety?	The proximity of good public transport services reduces car dependency thereby promoting positive environmental outcomes.	Positive
Are there significant Government investments in infrastructure or services in the area whose patronage will be affected by the proposal? If so, what is the expected impact?	There are no immediate Council or State Government strategies for the up-grade of railway infrastructure or services in the locality. Notwithstanding North Bexley Station appears to have undergone a recent upgrade.	Neutral
Will the proposal impact on land that the Government has identified a need to protect (e.g. land with high biodiversity values) or have other environmental impacts? Is the land constrained by environmental factors such as flooding?	The key characteristics of the site are: • The subject site is not identified as being of heritage significance. • The site is not located within a heritage conservation area. • The subject site does not contain significant vegetation or critical habitat. • The subject site is affected by overland flows during peak periods however is not identified as being significantly flood prone. • The site is not within a bushfire hazard area.	Positive

	• The site falls to the street enabling gravity flow of storm water to existing infrastructure in Bexley Road. • The subject site contains a service station which is subject to contaminants, however investigations reveal that contamination is not a constraint to the development of the site. A decontamination of the service station site can be effectively undertaken. The remaining lots are used for residential purposes.	
Will the planning proposal be compatible/complementary with surrounding land uses? What is the impact on amenity in the location and wider community? Will the public domain improve?	The proposed development represents a higher scale of development which will be effectively contained within a street block. Shadows are contained effectively within the site and road reservations. Storm water from the site can be directed via gravity flow to Council drainage infrastructure. Noise generated by the use is purely domestic and contained by strata by-laws. The proposed transition in built form from north to south is an appropriate response to protecting nearby residential amenity and maintaining a	Positive

	reasonable scale of development relative to the nearby zones.	
Will the planning proposal contribute to improved transport or other services in the locality?	The subject site is within close proximity of regular train and bus services, thus increasing patronage of public transport use, thus justifying its expense and viability.	Positive
Will the planning proposal create any significant demand on public services or facilities?	Apart from increased funding coming from section 94 contributions, a Voluntary Planning Agreement (VPA) can be entered into providing for the upgrade/embellishment of the two parks within the street block and the provision of new pedestrian footpaths in appropriate locations. The Voluntary Planning Agreement will be subject to consultation with Council.	Positive
Will the planning proposal require the expenditure of public money?	The planning proposal does not involve the expenditure of public money.	Neutral

The Planning Proposal is consistent with the objectives and actions contained in the 'Draft Greater Sydney Plan' and the more specific 'Draft Eastern City District Plan'.

Draft Greater Sydney Region Plan

The draft Greater Sydney Region Plan is built on a vision where the people of Greater Sydney live within 30 minutes of their jobs, education and health facilities, services and great places. This is consistent with the 10 Directions in Directions for a Greater Sydney which establish the aspirations for the region over the next 40 years and are a core component of the vision and a measure of the Plan's performance.

The Plan provides an integrated, long–term planning framework that is intended to manage Sydney's growth and strengthen its economic development over the next 40 years. The Plan sets in place objectives and actions for Sydney to become a more compact, networked city with improved accessibility, capable of supporting more jobs, homes and lifestyle opportunities within the existing urban footprint based on the concept of a ***'30-minute City'***.

The Plan establishes key objectives and actions to achieve desired outcomes of:

- *creates a metropolis of three cities, rebalancing growth and opportunities for people across Greater Sydney;*
- *uses the airport as a catalyst to generate a diversity of jobs in the Western City;*
- *improves housing affordability and choice aligned with local infrastructure across the city;*
- *plans and prioritises infrastructure early to support a growing Greater Sydney through growth infrastructure compacts;*
- *protects and enhances the city's unique landscape by recognising its environmental diversity;*
- *creates great local places by protecting heritage and biodiversity, while enhancing the Green Grid and tree canopy cover;*
- *uses quality design to create great places, walkable communities and shared spaces; and*
- *delivers a 30-minute city to provide better access to jobs, schools, and health care within 30 minutes of people's homes.*

The planning proposal is consistent with the objectives and actions of the Draft Greater Sydney Plan which aims to achieve 30 objectives centred around enhancing infrastructure, transportation, employment and social cohesion. The following objectives and actions are particularly relevant to the circumstances of the planning proposal.

The Plan recognises that concentrating a greater range of activities near one another in centres well served by public transport makes it easier for people to go about their daily activities and helps to create lively, functional places in which to live, work, socialise and invest. The benefits of concentrating activities in centres include:

• improved access to retail, office, health, education, leisure and entertainment facilities, and community and personal services;

• increased opportunities for a greater diversity of dwellings and more diverse communities;

• encouraging collaboration, healthy competition and innovation among businesses through clustering;

• making better use of infrastructure, and making public transport improvements more viable;

• promoting sustainable and accessible transport and healthier communities by increasing walking, cycling and public transport options for more people by making more activities available in one location;

• slowing the growth of greenhouse gas emissions by reducing the number of car journeys needed to access services;

• reducing pressure for development to occur in less accessible locations, and

• creating vibrant places which operate as a focus for community activity and events and which help to build social inclusion.

Objective 10 in particular relates to achieving 'greater housing supply'. *Providing ongoing housing supply and a range of housing types in the right locations will create more liveable neighbourhoods and support Greater Sydney's growing population.*

The NSW Government has identified that 725,000 new homes will be needed to meet demand based on current population projections to 2036. By 2056, it is anticipated that significant further housing supply will be required to meet Greater Sydney's continued strong population growth.

Increasing the density of development on the subject site contributes to the fundamental objective of increasing housing densities in well serviced locations.

Creating capacity for new housing in the right locations requires clear criteria for where capacity is to be located. Accommodating homes for the next generation needs to be linked to local infrastructure - both to optimise existing infrastructure use and to maximise investment in new infrastructure. Opportunities for capacity can be realised by urban renewal, local infill developments and land release areas.

The planning proposal promotes the redevelopment of the site with buildings displaying good urban and architectural design on sites, which benefit from excellent access to the town centre and railway station.

Housing Sydney's Population

Housing targets for the Eastern District in which the subject site is contained is provided below:

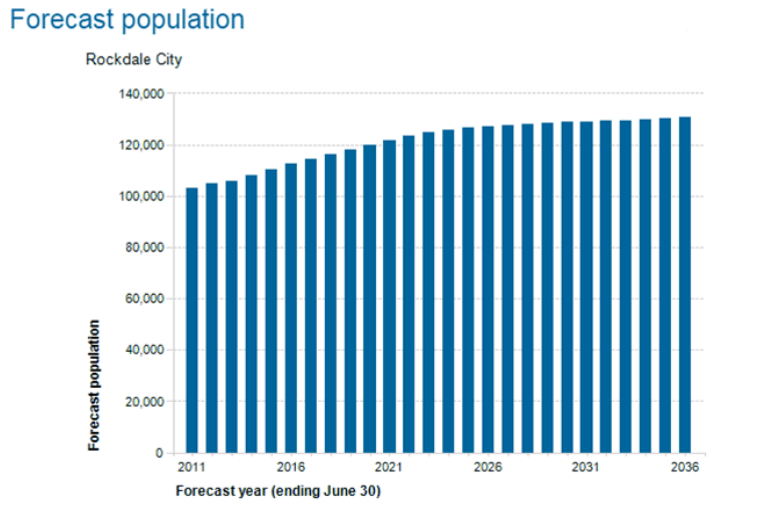
District	0–5 year housing supply target: 2016–2021		20-year strategic housing target: 2016–2036
	46,550	157,500	
Eastern City		46,550	157,500

The Draft Plan aims to focus the bulk of new housing development in or near centres with good public transport. The Draft Plan requires new Local Environmental Plan's and planning proposals to support this principle.

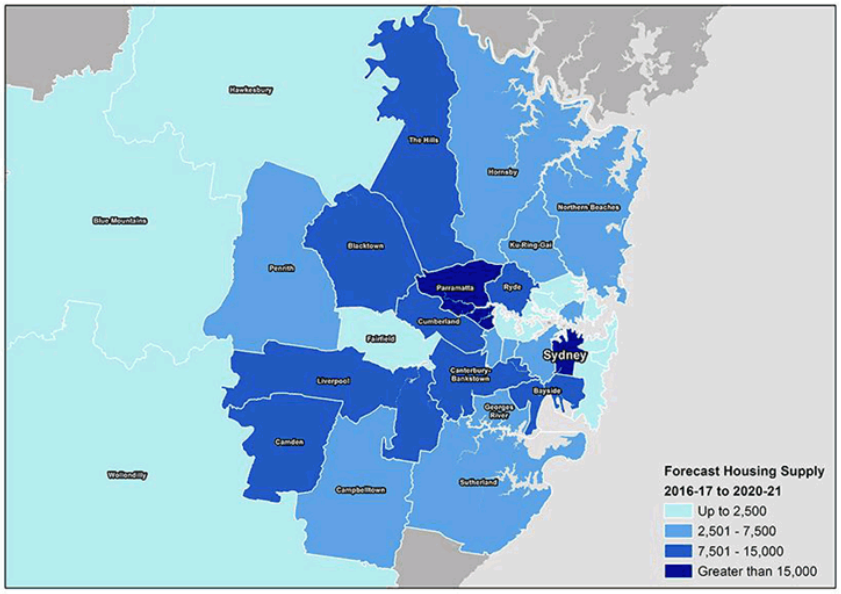
The subject site is located within walking distance to many services and facilities. The site has good public transport access (including train and bus) that provides direct and frequent access to major employment centres including the Bayside and Sydney Central Business District. Increasing the residential density on the subject site also promotes a quality lifestyle benefitting from nearby recreational facilities, employment opportunities, restaurants, schools and churches. Increasing the density of development on the site promotes this key policy objective of the Metropolitan Plan.

As shown in the graph below, Bayside Council is expected to see significant population growth. According to Profile iD (adapted data from ABS), Rockdale anticipates to house 130,497 residents by 2036, resulting in an 18.4% increase from 2015. The proposal meets this objective as the development not only supplies land for residential development near Bexley North town centre with

good public transport, but it also caters for a growing population within Bayside Council.



Population and household forecasts, 2011 to 2036, prepared by .id, November 2013.



Population forecasts for Bayside are for an increase in population by 7,500 people over the next 5 year period.

A further aim is to *"produce housing that suits our expected future needs".*

***Councils** are to investigate opportunities for supply and a diversity of housing particularly around centres to create more walkable neighbourhoods. For councils, the main tool for understanding the need and planning for housing and infrastructure delivery is housing strategies. Councils' housing strategies will need to address the 0–5 and 6–10 year local (when agreed) or district housing targets as well as 20-year strategic district targets outlined in this draft Plan.*

The 0–5-year housing supply targets are a minimum and councils will need to find additional opportunities to exceed their target to address demand.

***Developers** play an important role in supporting housing outcomes. The development industry needs to continually provide new housing and translate the development capacity created by the planning system into approvals and supply.*

Comment:

The development plans that support the planning proposal provide opportunity for a diversity of housing choice including the provision of one bedroom, two bedroom and 3 bedroom apartments contributing to the future housing priorities identified by the Plan.

A primary objective is to *"improve housing affordability"*. The planning proposal provides increased housing densities in a well serviced locality improving supply and thus affordability (having regard to the fundamental economic principle of 'supply and demand').

The proposed development will provide a mix of apartment types within a self contained environment inclusive of communal open space, on-site parking and security, thus placing downward pressure on housing costs and promoting housing affordability.

Affordability is further promoted by not 'over designing' the proposed apartments in terms of floor areas however compliance with State Environmental Planning Policy 65 criteria is readily achieved.

The Plan also promotes high quality design to improve the image and market attractiveness of centres by ensuring the design of new residential development on landmark sites and the urban renewal of centres is of a high quality. The planning proposal is supported by concept architectural massing plans outlining the possible desired development outcome for the site. The development is capable of meeting the principles and controls of State Environmental Planning Policy No 65 and is intended to generate design excellence.

Draft Eastern City District Plan

Bayside Council is sited within the Eastern City District and includes other Council areas of Burwood, City of Sydney, Canada Bay, Inner West, Randwick, Strathfield, Waverley and Woollahra local government areas.

The Department of Planning and Environment identifies the District as being on *the precipice of great change as it solidifies its position as the nation's economic powerhouse*.

The 40-year vision is *to enable a more productive, liveable and sustainable Greater Sydney*.

The Draft Plan seeks to make the best use of public assets such as transport and infrastructure to make Sydney more sustainable and efficient. The Strategy identifies that the focus of housing growth will be in and around the many centres within the Metropolitan Urban Area. The aim is to deliver more and different types of housing across the city in line with employment and infrastructure and market demand to create improved quality of life, increased productivity, better environmental management and heightened accessibility.

The planning proposal provides for the increase in the density of housing on a site that is ideally located near public transport and support service infrastructure. Increasing the density of development assists in achieving housing targets and supports the fundamental principles of increasing densities in well serviced locations.

The planning proposal provides increased housing densities in a well serviced locality contributing to housing supply and thus affordability (having regard to the fundamental economic principle of 'supply and demand').

The redevelopment concept plans have been designed to achieve State Environmental Planning Policy 65 requirements. The apartments will be designed to provide a high level of amenity but have not been 'over designed' as this would lead to increased market prices for the end product. In this respect:

1. The development minimises the provision of on-site car parking so as to encourage the use of public transport services.

2. The proposed apartment floor areas will represent 'comfortable' and not 'excessive' floor space.

The above design characteristics place downward pressure on the end market price of the apartments contributing to housing affordability.

The planning proposal will facilitate the development of the subject site in a manner that is consistent with the desired future character of Bexley North. The planning proposal is supported by architectural concept plans of the desired development outcome for the site. The development has been designed to achieve the principles of State Environmental Planning Policy No 65 (a design verification statement accompanies the planning proposal) and can stimulate consideration for the planning of the North Bexley town centre.

The proposed up-zoning can facilitate the following:

- Greater housing choice and affordability;
- Attractive built form in a landscaped setting;
- Population diversity;
- An upgrade to the public reserve adjoining the site and situated at the intersection of the two main roads;
- Stimulate planning consideration within the Bexley North town centre;

The site has no inherent sensitivity in terms of being on a ridgeline, near the coast or near water courses.

Question 5: Is the planning proposal consistent with a council's local strategy or other local strategic plan?

Rockdale City Community Strategic Plan

Council's Vision is: One Community, Many Cultures, Endless Opportunity. The blueprint for the Rockdale community for 2025 is to be achieved through strategic community outcomes:

- **Outcome 1** – Rockdale is a welcoming and creative City with active, healthy and safe communities.
- **Outcome 2** – Rockdale is a City with a high quality natural and built environment and valued heritage in liveable neighbourhoods. A City that is easy to get around and has good links and connections to other parts of Sydney and beyond.
- **Outcome 3** – Rockdale is a City with a thriving economy that provides jobs for local people and opportunities for lifelong learning.
- **Outcome 4** – Rockdale is a City with engaged communities, effective leadership and access to decision making.

Comment:

The planning proposal is consistent with and promotes the long term objectives established in the Community strategic plan.

In this respect:

- The planning proposal will facilitate the redevelopment of the site with buildings of high urban and architectural merit positively contributing to the image of the City and the streetscapes of North Bexley.
- The proposed redevelopment provides a diversity of residential apartment types promoting the living city concept and contributing to the vibrancy of the town centre.
- The proposed redevelopment will be designed to promote an environmentally efficient living environment.
- The proposed redevelopment promotes good environmental outcomes by encouraging walking and cycling and reducing private vehicle dependency. The proximity of the site to public transport nodes supports and promotes public transport patronage.

- The location of the site promotes a high quality lifestyle for future residents particularly noting the close proximity of major sport and recreation facilities including theatres, restaurants, public open space and the like.
  The planning proposal promotes development that provides housing choice and diversity while retaining affordability

Rockdale Urban Strategy 2010

The Rockdale Urban Strategy identifies the planning priorities which will be the focus of future planning aimed at improving the quality and character of Rockdale. It provides a basis for the future direction and planning of Rockdale's natural and urban environment.

The Strategic Plan identifies eight strategic directions for Rockdale's long term plan:

- *Enhance the City's primary centres of **Rockdale and Brighton Le Sands** to create vibrant centres with improved linkage along Bay Street.*
- *Concentrate future development around the City's existing **villages and local centres**, improving their vibrancy and character through an increase in the local residential population, and reducing the need to travel*
- *Protect and utilise the City's natural resources in the three **open space corridors** which run through the City, to improve recreational opportunities, foster biodiversity, and add to the character of the City.*
- *Ensure that all aspects of development within the City are of a high **design quality**, creating a more attractive and liveable urban environment.*
- *Foster the growth of the emerging town centre at **Wolli Creek** which will accommodate much of the City's future populaton growth, and form a northern gateway to the City*
- *Encourage revitalisation of the **Princes Highway Corridor** to improve employment opportunities and present a more attractive image along this prominent vehicle route through the City.*
- *Improve the City's **sustainable transport** network to encourage alternative transport modes and provide better access to the City's attractions.*

- *Protect and enhance the **residential character** of the City's suburbs and neighbourhoods, to ensure they remain pleasant and amenable.*

The planning proposal is consistent with and promotes the long term objectives established in the Community strategic plan. In this respect:

- The planning proposal will facilitate the redevelopment of the site with buildings of high design quality and architectural merit positively contributing to the attractiveness and liveability of the environment.

- The proposed redevelopment will be designed to enhance the residential character within Bexley North and establishing a standard of development to follow with future urban renewal in the town centre.

- The proposed redevelopment promotes sustainable transport methods by encouraging walking and cycling. The proposal supports and promotes public transport patronage due to its close proximity to key public transport networks.

- The location of the site promotes a high quality lifestyle for future residents particularly noting the close proximity of recreation facilities including restaurants, public open space and the like.

- The planning proposal promotes development that provides housing choice and diversity while retaining affordability.

Residential Strategy 2007

The Residential Strategy contains 6 key strategic directions which aim to protect and improve opportunities for the people who live, work, have a business or who visit the City.

The 6 key recommendations are as follows:

1. *Focus additional residential growth in key town centres by encouraging mixed use development with economic incentives to stimulate redevelopment. The key centres to be targeted for extra growth include centres identified in the Destinations Rockdale and Thriving Town Centres Programs, these being the Rockdale Town Centre, Brighton Le*

*Sands, **Bexley North** and Arncliffe, as well as Kingsgrove, Bexley, Carlton and Kogarah West*

2. *Retain the scale and character of existing suburban areas in the City by introducing urban character statements into the Development Control Plan to guide future development and focussing new growth in town centres which provide transport, shopping and other services*
3. *Continue to provide for a range of housing types and sizes in appropriate locations throughout the City, including dual occupancy development, villas and townhouses, semi's and apartments*
4. *Manage potential land use conflicts involving residential development, by limiting residential development along the Princes Highway and providing transitional areas between industrial and residential uses at Turrella Street, Turrella and Garnet Street, Rockdale*
5. *Expand housing provision to include temporary housing by encouraging serviced apartments and hotels in the tourist zone in Brighton Le Sands*
6. *Improve public and social housing by encouraging the revitalisation of key public housing holdings at The Grand Parade, Brighton Le Sands and Eden Street, Arncliffe and encouraging the retention of boarding houses and caravan parks*
7. *Increase opportunities for seniors housing by encouraging new seniors housing in areas with flat topography and good access to transport, shops and services*
8. *Revitalise existing housing stock by investigating opportunities for the redevelopment of older strata units as they approach the end of their life cycle.*

The planning proposal is consistent with and promotes the recommendations of this Strategy:

- The additional housing stock associated with the proposal focuses on the anticipated residential growth within Bexley North.
- The applicant proposes to provide a range of housing types and sizes.

Transport and Access Strategy

The Transport and Access Strategy focuses on 'Making Rockdale a Better City'. The strategic directions outlined below all have a relationship to transport, accessibility and sustainability.

1. *Promoting a Healthy, Safe and Accessible Lifestyle*

2. *Environmental Quality*
3. *A Liveable City*
4. *Lifestyle Quality*
5. *Developing Reliable Transport and Safe Roads*
6. *Economic Prosperity*

The Strategy identifies Bexley North as one of the City of Rockdale's largest employment locations. Council anticipates additional residential development within Bexley North.

> *"This data shows that the largest employment locations in the City of Rockdale are Kogarah North, the International Terminal, Brighton Le Sands, Turrella, Monterey, Arncliffe and* ***Bexley North****... In terms of broad structure, additional residential development will be focused in key areas with adequate transport and services, these being along the East Hills line (Kingsgrove,* ***Bexley North*** *and Bardwell Park)".*

The proposal is consistent with this Strategy as the applicant proposes to cater for additional residential development within Bexley North providing greater patronage of town centre facilities and services.

Capacity Analysis and Built Form Study 2010

The Study states that the scale of recent redevelopment within the Bexley North Town Centre supports the concept of additional height and floor space ratio to be applied to the centre.

> *"The scale of recent redevelopments supports the concept of additional heights and FSR to be applied to the centre. There is additional capacity on the commuter train network to ensure transport choice for existing and future residents".*

Comment:

It is noted that council recognises the future growth potential of Bexley North town centre. It is anticipated that the proposed up-zoning encourages/stimulates future planning review of the town centre.

Table 3 below identifies how the Planning Proposal is consistent with the community outcomes.

Table 3 – Consistency with Rockdale City Community Strategic Plan

Outcome	Objective	Strategy	Consistency

Rockdale City Community Strategic Plan

Question 5: Is the planning proposal consistent with applicable State Environmental Planning Policies (SEPPs)?

The planning proposal is consistent with the provisions of the following State Environmental Planning Policies that are relevant to the circumstances of the proposal.

Table 4 - Consistency with State Environmental Planning Policies

No.	Title	Consistency with Planning Proposal
1	Development Standards	(Repealed by *RLEP 2011)*
14	Coastal Wetlands	Not Applicable
15	Rural Land sharing Communities	Repealed
19	Bushland in Urban Areas	Not Applicable
21	Caravan Parks	Not Applicable
22	Shops and Commercial	Not Applicable

	Premises	
26	Littoral Rainforests	Not Applicable
29	Western Sydney Recreation Area	Repealed
30	Intensive Aquaculture	Not Applicable
32	Urban Consolidation (Redevelopment of Urban Land)	Repealed
33	Hazardous and Offensive Development	Not Applicable
36	Manufactured Home Estates	Not Applicable
39	Spit Island Bird Habitat	Repealed
44	Koala Habitat Protection	Not Applicable
47	Moore Park Showground	Not Applicable
50	Canal Estate Development	Not Applicable
52	Farm Dams and Other Works in Land and Water Management Plan Areas	Not Applicable
55	Remediation of Land	Clause 6 of the SEPP requires potential site contamination and remediation to be considered by planning

		proposals in circumstances where there is a zoning amendment that would permit a change of use of the land. The applicant seeks to alter the zoning which applies to the site. A contamination report has been provided and identifies that the site is suitable for redevelopment. Will be consistent
59	Central Western Sydney Regional Open Space and Residential	Repealed
60	Exempt and Complying Development	(Repealed by *RLEP 2011*)
62	Sustainable Aquaculture	Not Applicable
64	Advertising and Signage	Not Applicable
65	Design Quality of Residential Flat Development	The primary objective of the SEPP is to improve the design quality of residential flat development in New South Wales. The design concept plans that form part of the planning proposal documentation have been prepared by a

		qualified architect. Will be consistent
70	Affordable Housing (Revised Schemes)	Not Applicable
71	Coastal Protection	Not Applicable
	(Affordable Rental Housing) 2009	Not Applicable
	(Building Sustainability Index: BASIX) 2004	BASIX certification will be required at the development application stage. Will be consistent
	(Exempt and Complying Development Codes) 2008	Not applicable
	(Housing for Seniors or People with a Disability) 2004	Not applicable
	(Infrastructure) 2007	Consistent
	(Kosciuszko National park Alpine Resorts) 2007	Not applicable
	(Kurnell Peninsula) 1989	Not applicable
	(Major Development) 2005	Not Applicable
	(Mining, Petroleum Production and Extractive Industries) 2007	Not Applicable

	(Miscellaneous Consent Provisions) 2007	Not applicable
	(Penrith Lakes Scheme) 1989	Not Applicable
	(Rural Lands) 2008	Not Applicable
	(SEPP 53 Transitional Provisions) 2011	Not applicable
	(State and Regional Development) 2011	Not applicable
	(Sydney Drinking Water Catchment) 2011	Not Applicable
	(Sydney Region Growth Centres) 2006	Not Applicable
	(Three Ports) 2013	Not Applicable
	(Urban Renewal) 2010	Not Applicable
	(Western Sydney Employment Area) 2009	Not Applicable
	(Western Sydney Parklands) 2009	Not Applicable

See Table 5 below which reviews the consistency with the formerly named State Regional Environmental Plans, now identified as deemed SEPPs.

Table 5 - Consistency with deemed State Environmental Planning Policies

No.	Title	Consistency with Planning Proposal
8	(Central Coast Plateau Areas)	Not Applicable
9	Extractive Industry (No.2 – 1995)	Not applicable
16	Walsh Bay	Not applicable
18	Public Transport Corridors	Repealed
19	Rouse Hill Development Area	Repealed
20	Hawkesbury-Nepean River (No.2 – 1997)	Not Applicable
24	Homebush Bay Area	Not Applicable
26	City West	Not Applicable
30	St Marys	Not Applicable
33	Cooks Cove	Not Applicable
	(Sydney Harbour Catchment) 2005	Not applicable

Question 6: Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

See Table 6 below which reviews the consistency with the Ministerial Directions for LEPs under section 117 of the *Environmental Planning and Assessment Act 1979*.

Table 6 - Consistency with applicable Ministerial Directions

1. Employment and Resources

No.	Title	Consistency with Planning Proposal
1.1	Business and Industrial Zones	Not Applicable
1.2	Rural Zones	Not Applicable
1.3	Mining, Petroleum Production & Extractive Industries	Not Applicable
1.4	Oyster Aquaculture	Not Applicable
1.5	Rural Lands	Not Applicable

2. Environment and Heritage

No.	Title	Consistency with Planning Proposal
2.1	Environmental Protection Zones	Not Applicable
2.2	Coastal Protection	Not Applicable
2.3	Heritage Conservation	Not Applicable
2.4	Recreation Vehicle Areas	Not Applicable

3. Housing, Infrastructure and Urban Development

No.	Title	Consistency with Planning Proposal
3.1	Residential Zones	Consistent
3.2	Caravan Parks and Manufactured Home Estates	Not Applicable
3.3	Home Occupations	Not Applicable
3.4	Integrating land use and Transport	Consistent
3.5	Development near Licensed Aerodromes	Not Applicable
3.6	Shooting ranges	Not Applicable

4. Hazard and Risk

No.	Title	Consistency with Planning Proposal
4.1	Acid Sulfate Soils	Consistent
4.2	Mine Subsidence and Unstable Land	Not Applicable
4.3	Flood Prone Land	Consistent
4.4	Planning for Bushfire Protection	Not Applicable

5. Regional Planning

No.	Title	Consistency with Planning Proposal
5.1	Implementation of Regional Strategies	Not Applicable
5.2	Sydney Drinking Water Catchments	Not Applicable
5.3	Farmland of State and Regional Significance on the NSW Far North Coast	Not Applicable
5.4	Commercial and Retail Development along the Pacific Highway, North Coast	Not Applicable
5.5	Development on the vicinity of Ellalong…	Not Applicable
5.6	Sydney to Canberra Corridor	Not Applicable
5.7	Central Coast	
5.8	Second Sydney Airport: Badgerys Creek	Not Applicable

6. Local Plan Making

No.	Title	Consistency with Planning Proposal

6.1	Approval and Referral Requirements	Consistent
6.2	Reserving land for Public Purposes	Not Applicable
6.3	Site Specific Provisions	Not Applicable

7. Metropolitan Planning

No.	Title	Consistency with Planning Proposal
7.1	Implementation of A Plan for Growing Sydney	Consistent

C Environmental, social and economic impact

Question 7: 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?

No impacts arise from the planning proposal as the site does not contain critical habitat, threatened species, populations or ecological communities.

Question 8: Are there any other likely environmental effects as a result of the planning proposal and how they might be managed?

The key characteristics of the site are:

- The subject site is not identified as being of heritage significance.
- The site is not located within a heritage conservation area.
- The subject site does not contain significant vegetation or critical habitat.
- The subject site is not near a natural water course. Some overland flooding is identified across certain lots in the street block however such does not constitute an impediment to redevelopment.
- The site is not within a bushfire hazard area.
- The subject site is not potentially affected by acid sulphate soils.
- The subject site will require the decommissioning of a redundant service station however contamination is not a constraint restricting development of the site.

An expert report addressing contamination has been prepared supporting the planning proposal. The subject site can be suitably developed to provide co-ordinated and safe vehicle access and the development is likely have a reduced traffic generation than the current uses on-site.

An expert report addressing flooding and stormwater management plan has been prepared supporting the planning proposal.

Question 9: Has the planning proposal adequately addressed any social or environmental impacts?

Potential flood and acid sulphate soil impacts have been adequately addressed in previous reporting and Council assessments. The urban design aspects of the proposed redevelopment have been addressed in the architects design statement. The planning proposal promotes the aims and objectives of the strategic framework as detailed in section 3.4 of this report. Section 3.3.3 of this report canvasses the community benefits of the development. There are no additional matters or likely impacts specific to the site.

D State and Commonwealth interests

Question 10: Is there adequate public infrastructure for the planning proposal?

All utility services (telephone, electricity, sewer and water) are available to the site. A Voluntary Planning Agreement is proposed to be prepared addressing local service and facility provision including contributions towards improvements to the open space parcels within the street block and possible provision of new pedestrian footpaths providing better pedestrian connectivity to the site from the town centre.

The road network has the capacity to accommodate the proposed densities.

Question 11: What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

There has been no consultation at this point. The planning proposal does not raise any matters of State and Commonwealth significance beyond the matters addressed in this report. If any additional matters are identified in the gateway determination then they will be addressed at that point.

Part 4 – Mapping

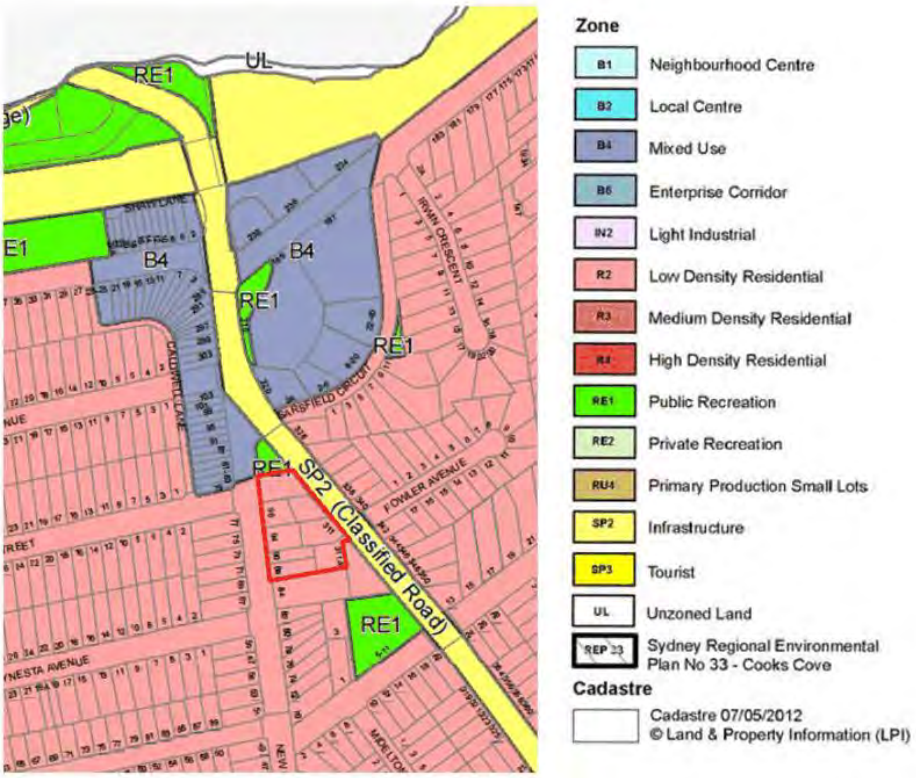
The following mapping documents have been prepared in support of the planning proposal:

- site identification maps including aerial photographs of the site and its context (sections 3.1.1 and 3.1.2 of this report).
- current and proposed development standards relating to the land – zoning, FSR, and building height (section 3.2.2 of this report).
- plans of the proposed redevelopment of the site.

Site Context Map

Maps 1 to 6 illustrate the current control maps as well as proposed controls. Specifically, the zoning, height of building and floor space ratio are proposed to be modified by this planning proposal.

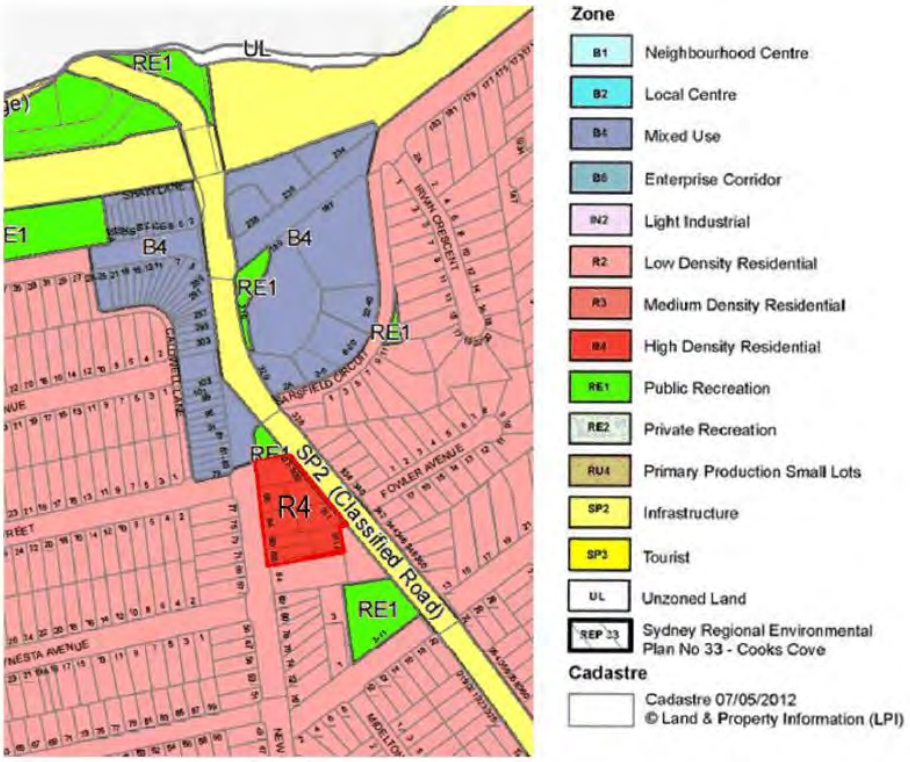
Map 1 below shows the current land zoning control as per **Rockdale LEP 2011.**



Map 1: Current Land Zoning Control (R2 – Low Density Residential)

Planning Proposal – **No 307-311A Bexley Road Bexley North**

Map 2 below shows the proposed land zoning control.



Map 2: Proposed Land Zoning Control (R4 – High Density Residential)

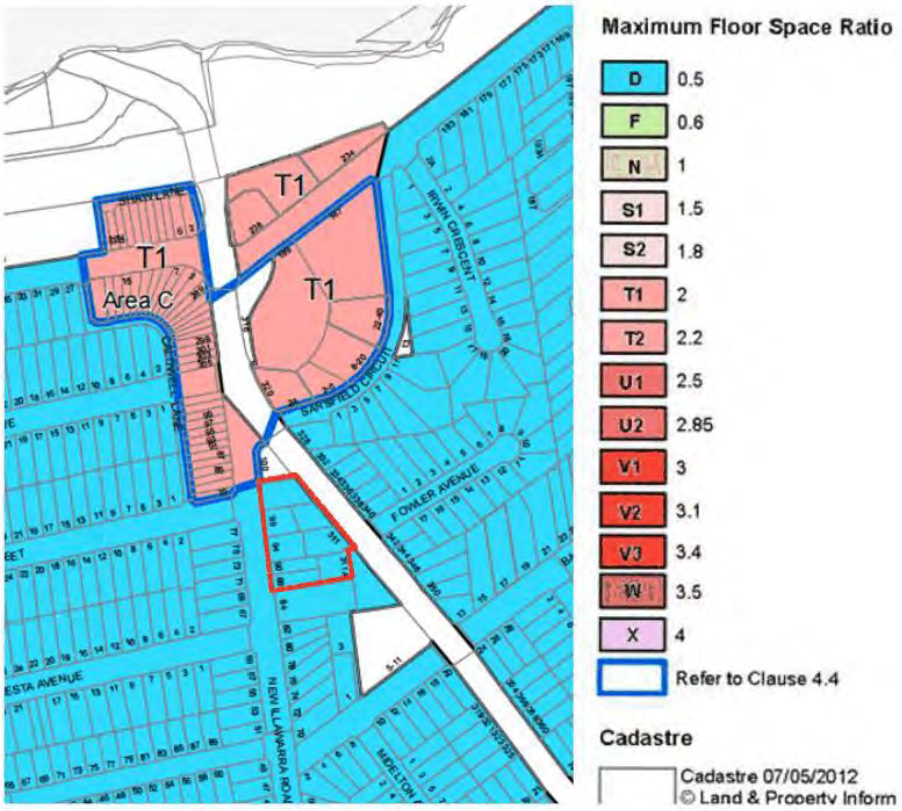
Map 3 below shows the current maximum building height control as per Rockdale LEP 2011.

Map 3: Current Height Control (I – 8.5m)

Map 4 below shows the proposed maximum building height control.

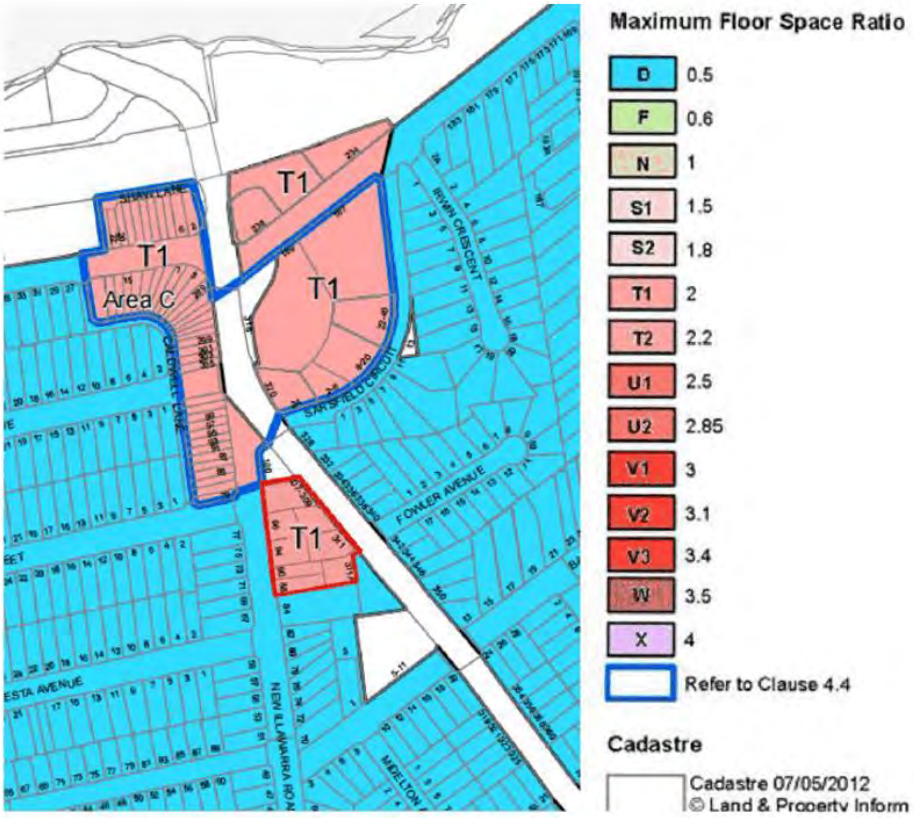
Map 4: Proposed Maximum Height Control (Q2 – 20.5m)

Map 5 below shows the current floor space ratio control as per Rockdale LEP 2011.



Map 5: Current Floor Space Ratio Control (D – 0.5:1)

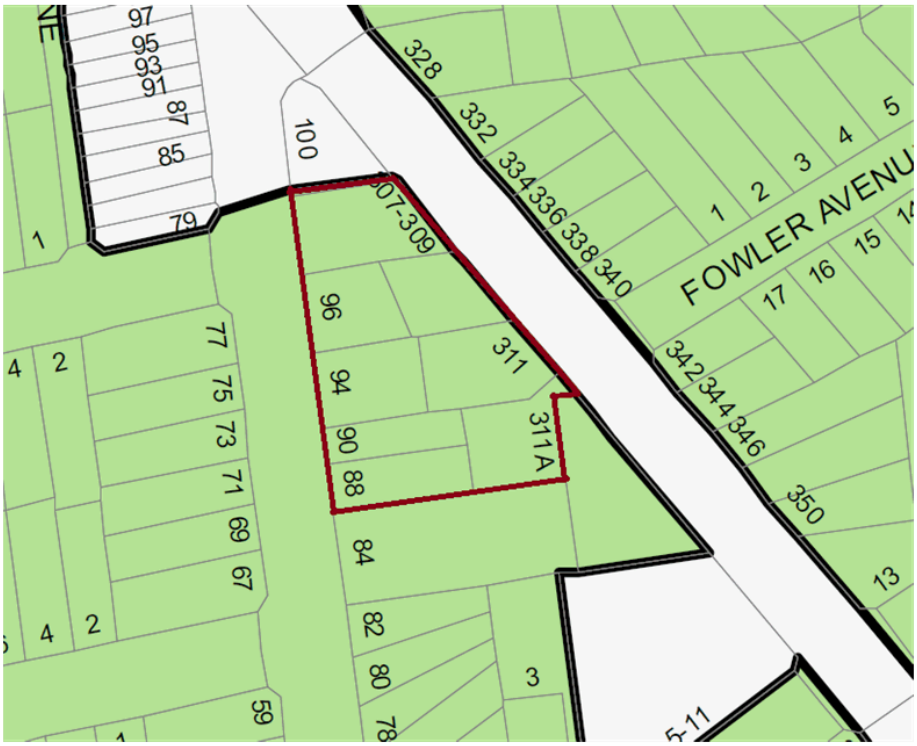
Map 6 below shows the proposed floor space ratio.



Map 6: Proposed Floor Space Ratio Control (T1 – 2:1)

No 307-311A Bexley Road Bexley North

Map 7 below shows the current Lot Size map as per Rockdale LEP 2011.



Map 7: Current Lot Size Map

Planning Proposal – **No 307-311A Bexley Road Bexley North**

Map 8 below shows the removal of a lot size applicable to the site.

Minimum Lot Size (sq m)

B	230
D	340
G	450
S	840

Cadastre

[Insert record number (and Trim file)]

Part 5 - Community Consultation

In preparing the planning proposal the applicant has consulted with senior officers from Rockdale City Council.

The Gateway determination will confirm the extent of public consultation that must be undertaken in respect of the planning proposal. The Gateway will also confirm the scope of additional information that may be required and the range of agencies to be consulted. This part of the proposal will be revised to reflect the consultation requirements specified in the determination.

Part 6 – Project Timeline

Anticipated commencement date (date of Gateway determination)	July 2017
Anticipated timeframe for the completion of required technical information	August 2017
Timeframe for government agency consultation (pre and post exhibition as required by Gateway determination)	August - September 2017
Commencement and completion dates for public exhibition period	September 2017
Dates for public hearing (if required)	October 2017
Timeframe for consideration of submissions	October-November 2017
Timeframe for the consideration of a proposal post exhibition	December 2017
Date of submission to the department to finalise the LEP	January 2018
Anticipated date RPA will make the plan (if delegated)	January 2018
Anticipated date RPA will forward to the department for notification.	January 2018

Summary

Council has received a draft Planning Proposal in relation to land at 88-96 New Illawarra Road & 307-311A Bexley Road, Bexley North (subject site).

The draft Planning Proposal seeks to:

1 Rezone the land from R2 Low Density Residential (R2) to R4 High Density Residential (R4).

2 Increase the maximum height of buildings (HOB) on the land from 8.5 metres to 20.5 metres.

3 Remove the requirement for a minimum lot size on the land.

4 Increase the maximum floor space ratio (FSR) on the land from 0.5:1 to 2:1.

The intended outcome of the draft Planning Proposal is to facilitate the provision of new housing within walking distance of regular public transport and existing shops and services in Bexley North local centre.

Officer Recommendation

That the Bayside Planning Panel recommends to Council:

That pursuant to section 3.34 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) the draft Planning Proposal for land known as 88-96 New Illawarra Road & 307-311A Bexley Road, Bexley North be submitted to the Department of Planning & Environment (DPE) for a Gateway determination.

Background

Applicant: Mr Nigel White - Planning Direction.

Owner: Mr Tony Soueid.

Site Description: Lots subject to the draft Planning Proposal are shown in table 1, below:

Table 1: Lots subject to draft Planning Proposal

Lot	*DP*	Address	Current zoning
35	*663036*	307-309 Bexley Road	R2
1	1045200		
B	388204		
6	508629	311 Bexley Road	R2
5	508629	311A Bexley Road	R2
3	508629	88 New Illawarra Road	R2
4	508629	90 New Illawarra Road	R2
1	400341	94 New Illawarra Road	R2
A	388204	96 New Illawarra Road	R2

The subject site has a total area of approximately 4257 m^2 and is bounded by New Illawarra Road to the west; Bexley Road to the east; Amber Gardens reserve to the north; and by residential development to the south. The site currently contains low density residential development and a petrol station located in the northern portion of the site (refer to aerial photograph at **Figure 1,** below).

Figure 1 – Aerial photograph with subject site outlined in red
(Source: www.maps.six.nsw.gov.au)

Site Context:

The site adjoins the southern extent of the B4 Mixed Use zone of the Bexley North local centre, which contains retail and commercial services in a predominantly single and two storey built form. There are also a number of shop top housing developments up to 5-storeys in height within the centre. It is noted that at the time of preparation of this Planning Proposal assessment, a Development Application lodged by NSW Land & Housing Corporation (LAHC) for a part 3/ part 4-storey residential flat building pursuant to a Site Compatibility Certificate issued by the DPE was under consideration by Council at the adjoining site to the south, No 84 New Illawarra Road, Bexley North.

Bexley North rail station, which is on the Airport & South Line provides regular train services to Sydney Airport and Sydney CBD and is located approximately 250 metres walking distance north of the subject site.

A context map for the site is provided in **Figure 2**, below:

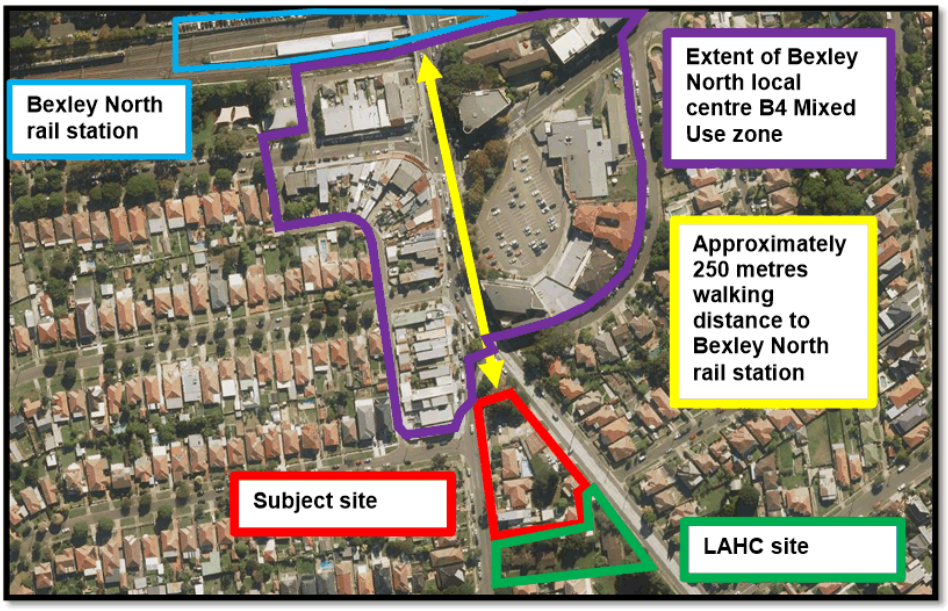


Figure 2: Site context map
(Source: Land & Property Information www.maps.six.nsw.gov.au)

Surrounding land use zones:

Land use zones surrounding the site are predominantly R2 Low Density Residential development to the west, south and east, and B4 Mixed Use associated with the Bexley North local centre, to the north. A pocket park of approximately 475m^2 and zoned RE1 Public Recreation directly adjoins the northern boundary of the site (refer to **Figure 3**, overleaf. Note: subject site outlined in red).

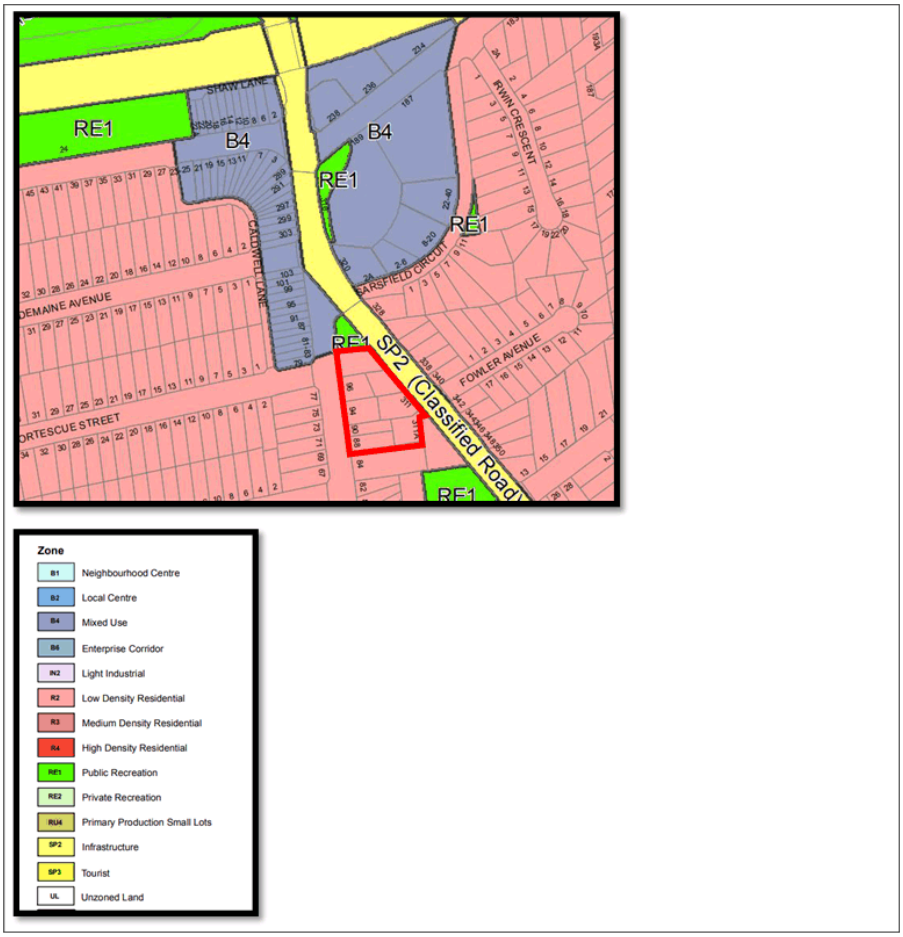


Figure 3 – Rockdale LEP 2011 Land Zoning Map_LZN_001 (Subject site – R2 Low Density Residential)
(Source: www.legislation.nsw.gov.au)

Current Planning controls:

The relevant *Rockdale Local Environmental Plan 2011* (Rockdale LEP 2011) extracts (**refer to Figures 4-6,** below) for the subject site and surrounding land are provided below, describing the current planning controls for height of buildings; floor space ratio and minimum lot size (note: subject site outlined in red).

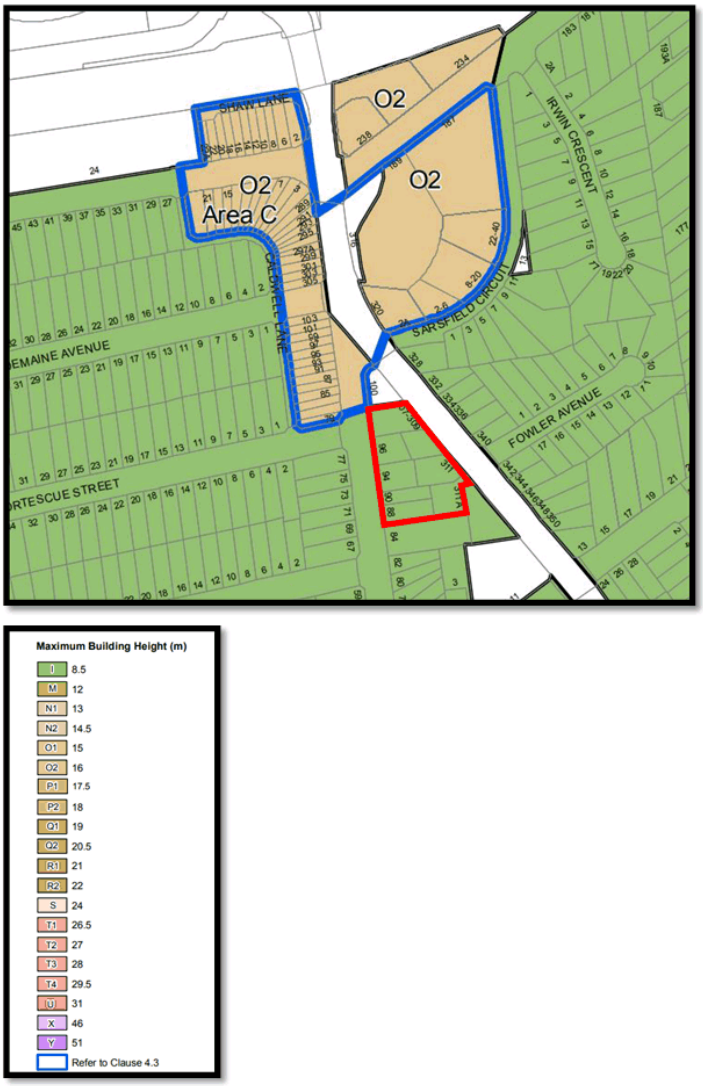


Figure 4 – Rockdale LEP 2011 Height of Buildings Map_HOB_001 (Subject site – 8.5 metres)
(Source: www.legislation.nsw.gov.au)

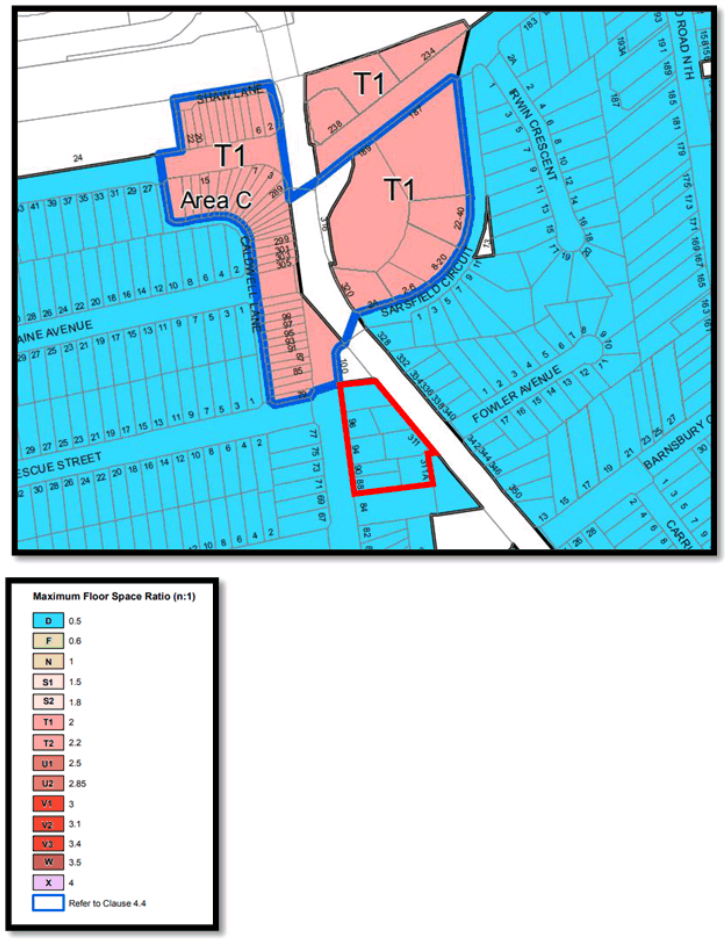


Figure 5 – Rockdale LEP 2011 Floor Space Ratio Map_FSR_001 (Subject site – 0.5:1)
(Source: www.legislation.nsw.gov.au)

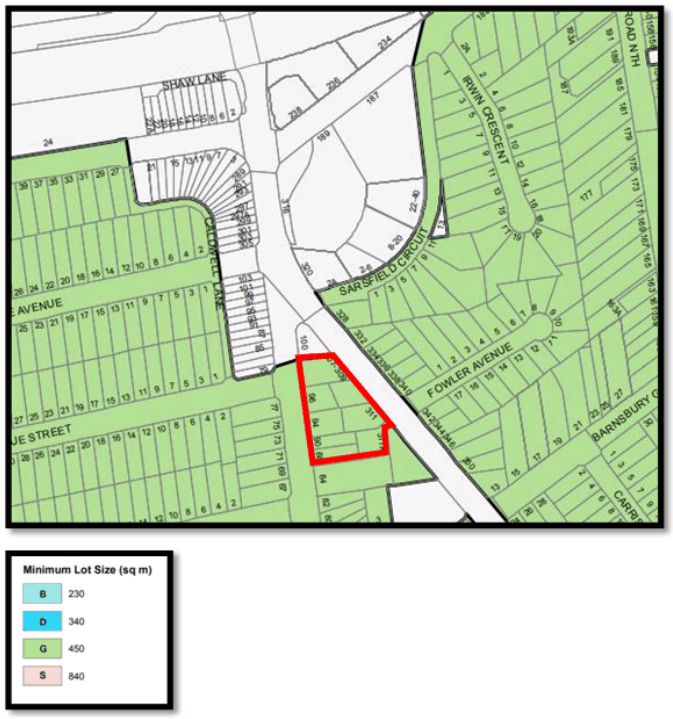


Figure 6 – Rockdale LEP 2011 Lot Size Map_LSZ_001 (Subject site – 450 m²)
(Source: www.legislation.nsw.gov.au)

Draft Planning Proposal Assessment

Summary of Draft Planning Proposal

In summary, the draft Planning Proposal seeks to amend the following provisions in the Rockdale LEP 2011 as follows:

1 Rezone the land from R2 Low Density Residential (R2) to R4 High Density Residential (R4).

2 Increase the maximum height of buildings (HOB) on the land from 8.5 metres to 20.5 metres.

3 Increase the maximum floor space ratio (FSR) on the land from 0.5:1 to 2:1.

4 Remove the requirement for a minimum lot size on the land.

A copy of the draft Planning Proposal is included at ***Attachment 1.***

A comparison of the current and proposed zoning and development standards for the site, based on the provisions of the Rockdale LEP 2011, is provided in **Table 2**, below:

Table 2: Comparison of current and proposed zoning & development standards

Development Standard	Current	Proposed
Zoning	R2 Low Density Residential	R4 High Density Residential
Height of Building	8.5 metres	20.5 metres
Floor Space Ratio	0.5:1	2:1
Minimum Lot Size	450 m^2	nil

Assessment of Draft Provisions

Proposed Zoning

The proposed R4 High Density Residential zoning is intended to facilitate high density residential development within an existing residential context located in close proximity to a local centre and rail station.

Proposed Height of Buildings

The proposed application for a height limit of 20.5 metres is considered to be appropriate given the size of the site, being approximately 4257 sqm. For buildings located on sites within the area marked 'Area C' on the Rockdale LEP 2011 Height of Buildings Map that have an area greater than 1200 sqm, the maximum height is increased to 22 metres. The relationship of the site to Area C is shown in **Figure 4,** above.

The draft Planning Proposal was supported by an Urban Context Report (UCR), which demonstrates that the proposed maximum building height is considered appropriate. Extracts from the UCR are provided in **Figures 7, 8, 9 and 10** below and illustrate the proposed height/ massing in the context of adjoining development. The UCR was submitted to Council's Urban Designer, who raised no objection to the proposed building height.

Figure 7: 3D Views of Planning Proposal
(Source: Proponent's Planning Proposal)

Figure 8: 3D Perspectives of Planning Proposal
(Source: Proponents Urban Context Report)

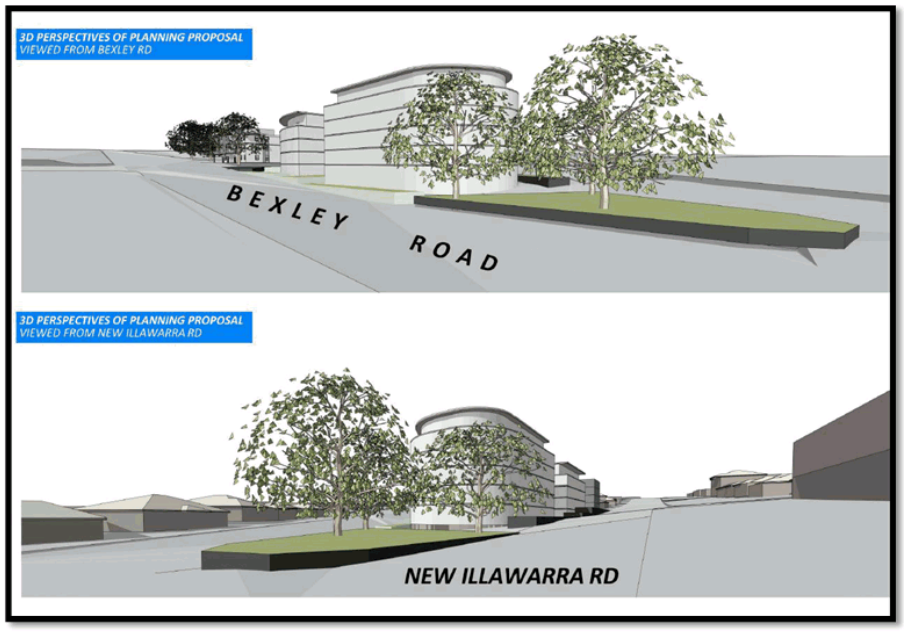


Figure 9: 3D Perspectives from Bexley Road and New Illawarra Road
(Source: Proponents Urban Context Report)

A recent example of 4-5 storey development in the Bexley North local centre can be found at No 502/ 2A Sarsfield Circuit (**Figure 10**, overleaf):

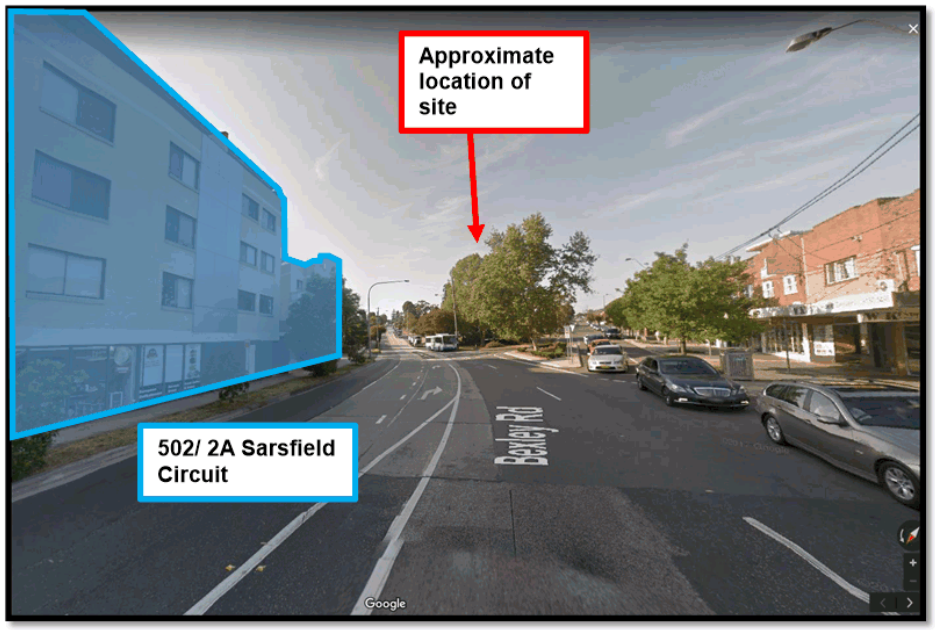


Figure 10: Existing 4-5 storey development at 502/ 2A Sarsfield Circuit, Bexley North (Source: www.google.com.au)

The site to the south at No 84 New Illawarra Road is owned by NSW Land & Housing Corporation (LAHC). LAHC were issued with a Site Compatibility Certificate (SCC) under *State Environmental Planning Policy (Affordable Rental Housing) 2009* (ARH SEPP) by determination issued by the DPE on 29 April 2016. The 'requirements imposed on determination' require that the development satisfy the following requirements:

1. *The height of the proposed building fronting New Illawarra Road should be limited to 2 storeys, and may transition to 3 storeys at the rear, to reflect the predominantly 2 storey streetscape and utilising the natural contours of the site.*

2. *The height of the proposed building fronting Bexley Road should be limited to 3 storeys, and may transition to 4 storeys with appropriate setbacks at the rear, to reflect a predominantly 3 storey streetscape and scale.*

3. *Final dwelling numbers and parking spaces are to the satisfaction of the consent authority in determining the development application.*

4. *The final built form will be subject to the consent authority undertaking a detailed assessment of the proposal's building design and height, and its impact on solar access and overshadowing and the amenity of surrounding residential development as part of the development application process.*

A Development Application (DA-2017/371) was subsequently lodged with Council for the construction of a part-two and part-three storey residential flat building comprising 10 residential units fronting New Illawarra Road; and a part-three and part-four storey residential flat building comprising 14 residential units fronting Bexley Road, including basement carpark. Street elevations submitted as part of the DA are shown in **Figure 11**, below:

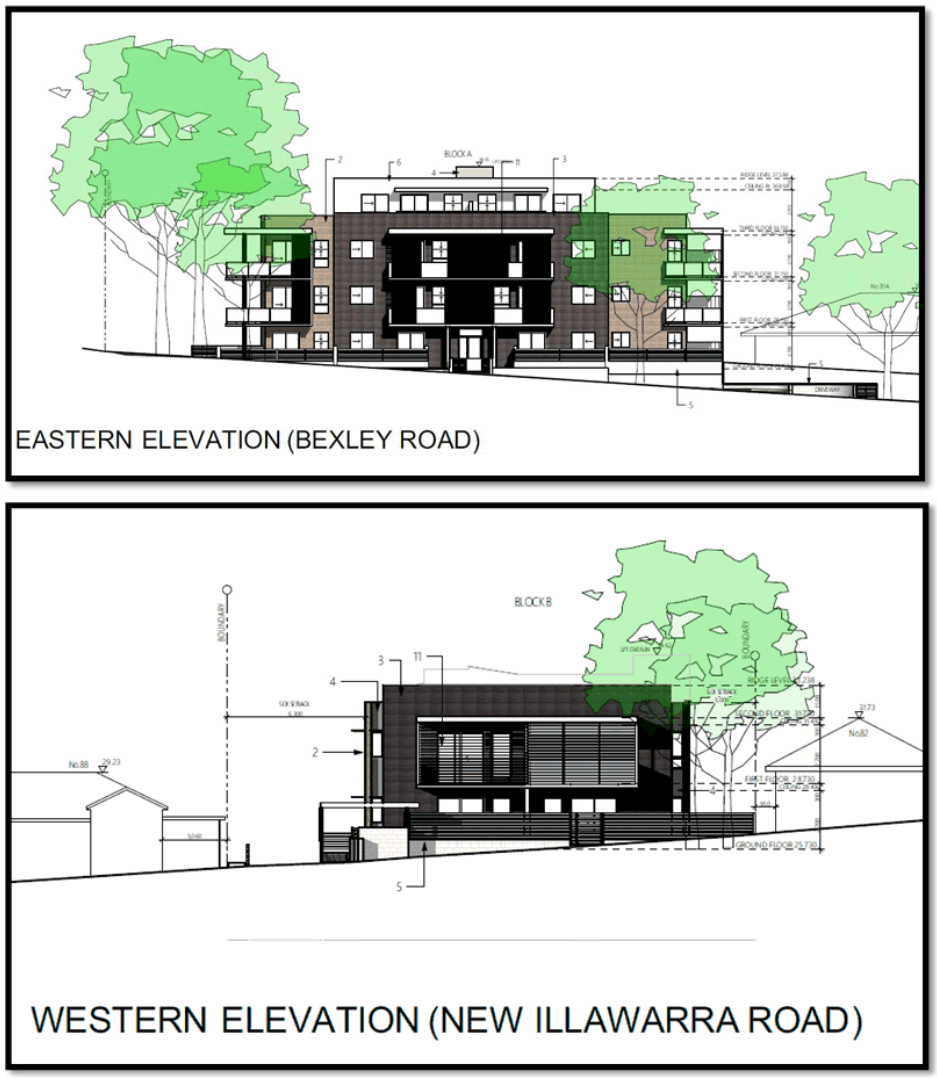


Figure 11: DA-2017/371 – Elevations of 84 New Illawarra Road, Bexley North

The DA is currently under assessment and is yet to be determined at the time of preparation of this assessment. The draft Planning Proposal for 88-96 New Illawarra Road and 307-311A Bexley Road has been considered in the context of the proposed development by LAHC.

Proposed Floor Space Ratio

The proposed application of a FSR of 2:1 for the land is considered appropriate, given the existing FSR of 2:1 (plus an additional 0.5:1 FSR for sites greater than 1200 m^2 in area)

applying to adjoining B4 Mixed Use zoned land to the north of the subject site; and the scale of the development at No 84 New Illawarra Road.

Proposed Minimum Lot Size

The proposed application to delete the minimum lot size provisions is considered appropriate, as the retention of a minimum lot size would have the effect of constraining development potential for the proposed R4 High Density Residential zoned land.

Urban Context & Evaluation

An Urban Context Report (UCR) has been submitted with the draft Planning Proposal (refer to ***Attachment 2***). The UCR provides maximum development envelopes illustrated by mass modelling diagrams for both existing and potential built form on surrounding B4 Mixed Use and R2 Low Density Residential zoned land. The UCR was referred to Council's Urban Designer for assessment.

The proposed building height and FSR controls are considered consistent with the heights achievable on B4 Mixed Use zoned land to the north, and are not considered to result in development of excessive bulk or scale for the sites location, being within 400 metres walking distance of regular public transport and existing shops and services in Bexley North local centre.

Should Council and the DPE support the draft Planning Proposal, any proposed Development Application(s) (DA) would need to be supported by a further detailed urban design analysis, to illustrate the intended built form outcome proposed for the subject land at that time.

Justification

Environmental Planning & Assessment Act 1979 (EP&A Act)

The NSW Department of Planning & Environment's *A Guide to Preparing Planning Proposals* - issued under s3.33 (3) of the EP&A Act - provides guidance and information on the process for preparing Planning Proposals. The assessment of the submitted Planning Proposal by Council staff has been undertaken in accordance with the latest version of this *Guide* (dated August 2016).

Section 9.1 Ministerial Directions (formerly known as 'section 117 directions')

Section 9.1 Ministerial directions (s9.1 directions) set out what a RPA must do if a s9.1 direction applies to a Planning Proposal, and provides details on how inconsistencies with the terms of a direction *may* be justified.

An assessment of the Planning Proposal against the applicable s9.1 directions is provided in **Table 3** below:

Table 3: Planning Proposal consistency with s9.1 directions.

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
2.3 Heritage Conservation	**What a RPA must do:** A RPA must ensure that a Planning Proposal contains provisions that facilitate the conservation of heritage items, places, building works or precincts of environmental heritage significance to an area. Comment: The site is not within a conservation area, does not contain a heritage item and is not in the vicinity of a heritage item. No inconsistencies with the terms of the direction were identified.	**YES**
3.1 Residential Zones	**What a RPA must do:** The RPA must include in the Planning Proposal the following (relevant) provisions: - encourage the provision of housing that will broaden the choice of building types and locations available in the housing market, and; - make more efficient use of existing infrastructure and services, and - be of good design. Comment: The Planning Proposal proposes to increase the supply of housing, in a residential flat building typology; and will make efficient use of existing infrastructure and services given the sites location within 400 metres walking distance of the Bexley North rail station and Bexley North local centre. In relation to design, the Planning Proposal and accompanying Urban Context Report (refer ***Attachment 2***) were referred to Council's Urban Design officer, who did not raise concern in relation to the proposal from an urban design perspective. The built form resulting from the amended height and FSR are not considered to result in unreasonable overshadowing, privacy or streetscape impacts. In addition, should the Planning Proposal proceed, the design of any proposal will need to address the requirements of *State Environmental Planning Policy No 65--Design Quality of Residential Apartment Development* at the Development Application (DA) stage. No inconsistencies with the terms of the direction were identified.	**YES**
3.3 Home Occupations	**What a RPA must do:** A Planning Proposal must permit home occupations to be carried out in dwelling houses without the need for development consent. Comment:	**YES**

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
	The proposed R4 High Density Residential zone in the Rockdale LEP 2011 includes home occupations as development that may be carried out in dwelling houses without consent as a permissible use. The Planning Proposal does not seek to alter this provision. No inconsistencies with the terms of the direction were identified.	
3.4 Integrating Land Use and Transport	**What a RPA must do:** A Planning Proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of *Improving Transport Choice – Guidelines for planning and development (DUAP 2001)* (guidelines). Comment: The Planning Proposal is considered consistent with the guidelines as the Planning Proposal encourages higher density residential and development in close proximity to frequent public transport and a mix of uses including shops and services. No inconsistencies with the terms of the direction were identified.	**YES**
3.5 Development Near Licensed Aerodromes	**What a RPA must do:** In the preparation of a Planning Proposal, a RPA must: - consult with the Department of the Commonwealth responsible for aerodromes and the lessee of the aerodrome. Comment: Consultation with the Commonwealth Department of Infrastructure and Regional Development (DIRD) will be undertaken should the DPE determine to issue a Gateway Determination. - take into consideration the Obstacle Limitation Surface (OLS) and prepare appropriate development standards such as height where the land is affected by the OLS. Comment: The submitted survey indicates that the site has a high point of approximately 26 metres Australian Height Datum (AHD). The amendment to the building height map proposes a maximum building height of 20.5 metres, resulting in a potential maximum building height of approximately 46.5 metres AHD, considerably below the prescribed OLS of 70 to 80 metres AHD in the vicinity of the site. - obtain permission from the Department of the Commonwealth where the height encroaches the OLS prior to undertaking community consultation Comment: The site is located between the 70m and 80m AHD OLS contours as shown on the Prescribed Airspace for Sydney Airport Obstacle Limitation Surface declared by the Commonwealth Department of	**YES**

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
	Infrastructure and Regional Development map dated 20 March 2015. The submitted survey indicates that the site has a high point of approximately 26 metres AHD. The proposed maximum building height is 20.5 metres. Accordingly, the potential built form will not penetrate the OLS and therefore, permission from DIRD prior to community consultation will not be required. No inconsistencies with the terms of the direction were identified.	
4.1 Acid Sulfate Soils	**What a RPA must do:** The direction requires that a RPA must consider an acid sulfate soils study assessing the appropriateness of the change of land use given the presence of acid sulfate soils. Comment: The Rockdale LEP 2011 Acid Sulfate Soils Map identifies the site as having Class 5 acid sulfate soils. **Consistency** *A Planning Proposal may be inconsistent with the terms of the direction if the inconsistency is justified by a study prepared in support of the Planning Proposal.* Comment: Clause 6.1 of the Rockdale LEP 2011 requires an acid sulfate soils management plan at DA stage, before carrying out any development on the land. The inconsistency with this direction is therefore considered minor and justifiable.	**NO - Inconsistency justified.**
4.3 Flood Prone Land	**What a RPA must do:** A Planning Proposal must: (4) Include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005. Comment: The proponent has not submitted a floodplain risk management plan prepared in accordance with the principles and guidelines of the *Flood Plain Development Manual 2005*, or specifically addressed the NSW Flood Prone Land Policy to support the Planning Proposal. However, Council's Strategic Flood Engineer did not raise objection to the proposed method of stormwater modelling, noting that any future DA would require a comprehensive flood assessment. (6) Not contain provisions that apply to the flood planning areas which: (a) permit development in floodway areas, Comment:	**NO - Inconsistency justified.**

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
	Flood certificate FA-2016/132 dated 19 May 2016 issued by the former Rockdale City Council identifies the site as being located in a 'Floodway:High Hazard'. The Stormwater Drainage Flood Assessment Report submitted with the Planning Proposal was referred to Council's Engineer, who raised no objection to the Planning Proposal given the proposed method of stormwater modelling, and that any future DA would need a comprehensive flood assessment. (b) permit development that will result in significant flood impacts to other properties, Comment: Council's Engineer raised no objection to the proposal given the proposed method of stormwater modelling. (c) permit a significant increase in the development of that land, Comment: A significant increase of development is proposed, however, as noted elsewhere, Council's Strategic Stormwater Engineer raised no objection given the proposed method of stormwater modelling. (d) are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services. Comment Works to Council's drainage infrastructure will be required within the site at the proponents cost. **Consistency:** *A Planning Proposal may be inconsistent with the direction if the RPA can satisfy the Director-General that:* *(a) the Planning Proposal is in accordance with a floodplain risk management plan prepared in accordance with the principles and guidelines of the Floodplain Development Manual 2005, or* Comment: No objection was raised to rezoning the land to R4 High Density Residential, however, if Council and the DPE support the draft Planning Proposal, any proposed Development Application(s) would need to be supported by a flood assessment, including: (i) a floodplain risk management plan prepared in accordance with the principles and guidelines of the Floodplain Development Manual 2005; and (ii) a full hydraulic (pipe) capacity assessment to support any future pipe realignment.	

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
	(b) the provisions of the Planning Proposal that are inconsistent are of minor significance. Comment: The inconsistency with the direction is not considered of minor significance given that the Planning Proposal significantly increases residential density on an identified floodway.	
5.10 Implementation of Regional Plans	**What a RPA must do:** Planning proposals must be consistent with a Regional Plan released by the Minister for Planning. Comment: *A Metropolis of Three Cities* is the Region Plan that applies to the five districts that make up the Greater Sydney Region. The Planning Proposal is consistent with the following objectives in the Region Plan: • Objective 10: Greater housing supply The Planning Proposal increases the supply of housing. • Objective 14: integrated land use and transport creates walkable and 30-minute cities. The Planning Proposal increases housing within a walkable catchment of Bexley North rail station.	**YES**
7.1 Implementation of A Plan for Growing Sydney	**What a RPA must do:** A RPA must ensure that a Planning Proposal is consistent with A Plan for Growing Sydney. Comment: The draft Planning Proposal is consistent with the following directions and priorities contained in A Plan for Growing Sydney: • Direction 2.1: Accelerate housing supply across Sydney. The delivery of new housing must be accelerated to meet the need for a bigger population and to satisfy a growing demand of different types of housing. • Direction 2.2: Accelerate urban renewal across Sydney – providing homes closer to jobs. New urban renewal locations will be selected in or near centres on the public transport network. Locating new housing here will make it easier for people to get to jobs and services and take pressure off congested roads. • Direction 2.3: Improve housing choice to suit different needs and lifestyles.	**YES**

Direction	Planning Proposal consistency with terms of direction	Consistent: Yes/ No (If No, is the inconsistency adequately justified?)
	• Direction 3.1: Revitalise existing suburbs. Provision of new housing within Sydney's established suburbs bring real benefits to communities and make good social and economic sense. Directing new housing to the existing urban areas will reduce the impact of development on the environment and protect productive rural land on the urban fringe. No inconsistencies with the terms of the direction were identified.	

- **State Environmental Planning Policies (SEPPs)**

An assessment of the Planning Proposal against the relevant SEPPs is provided in **Table 4**, below.

Table 4: Relevant SEPPs

Name of SEPP	Compliance of Planning Proposal with SEPP	Complies Y/ N
SEPP No 65—Design Quality of Residential Apartment Development (SEPP 65)	The Planning Proposal was referred to Council's Urban Designer, who raised no objection to the proposal in terms of its consistency with SEPP 65, noting that any future DA, if the Planning Proposal be supported, would be required to comply with SEPP 65 and accompanying Apartment Design Guide.	**YES**
SEPP (Infrastructure) 2007	**Clause 101 – Development with frontage to classified road** The submitted Traffic and Parking Assessment Report was referred to a Traffic Consultant for review. The review found that traffic movements would be significantly less than the current situation and raised no objection to the proposal. Should Council and the DPE support the Planning Proposal, any future DA will be referred to Transport for NSW given the location of the bus stop on New Illawarra Road; and Roads & Maritime Services (RMS) given that the site has frontage to a classified road. **Clause 102 – Impact of road noise or vibration on non-road development** The site is located on Bexley Road, a classified road (Class: Main Road) with an Annual Average Daily Traffic Volume (AADT) in 2017 of 34,786 (RMS Traffic Volume Viewer – Station ID 24221 located approximately 600 metres north of the subject site on Bexley Road). Should Council and the Department of Planning & Environment support the Planning Proposal, any future DA will require consideration of the publication *'Development Near Rail Corridors and Busy Roads – Interim Guideline.'* (Department of Planning, 2008).	**YES**
SEPP No 55—Remediation of Land	**Clause 6 - Contamination and remediation to be considered in zoning or rezoning proposal** (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	**YES**

Name of SEPP	Compliance of Planning Proposal with SEPP	Complies Y/ N
	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. Comment: A portion of the site currently contains an operational service station that has existed on the site since the 1960's. In this regard, the Planning Proposal is supported by a Stage 1 Preliminary Environmental Site Assessment; a Stage 1 and 2 Environmental Site Assessment; and a Remedial Action Plan (refer to ***Attachment 3***). The documents were referred to Council's Environmental Scientist, who provided the following comment: *'Following a request to update the report to reflect complete residential use as required in the previous memo dated 25 October 2017, an amended Stage 1 and 2 Environmental Site Assessment was provided:* 1. *'Stage 1 and 2 Environmental Site Assessment – 307-311 Bexley Road and 88-96 New Illawarra Road, Bexley North NSW' (Report ID E16016BN-R03F – Rev 0.2) dated 1 November 2017completed by Geo-Environmental Engineering.* *This reflects the appropriate residential use and states that the site can be made suitable subject to remediation to the site through an RAP. Further review of the site and an RAP can be completed at the DA lodgement stage and reflect the proposed design. Should the site be continued for use as a service station then additional analysis will be required at that time to reflect any changes in site conditions.* *I have no objections to the rezoning of the site to residential use with limited access to soil.'* Based on the above, the site is suitable for rezoning to residential purposes.	

There are no other SEPPs applicable to the Planning Proposal.

- **Sydney Regional Environmental Plans (SREPs)**

There are no SREPs applicable to the Planning Proposal.

- **Strategic Planning Framework**

Regional, sub-regional and district plans and strategies include outcomes and specific actions for a range of different matters including housing and employment targets, and

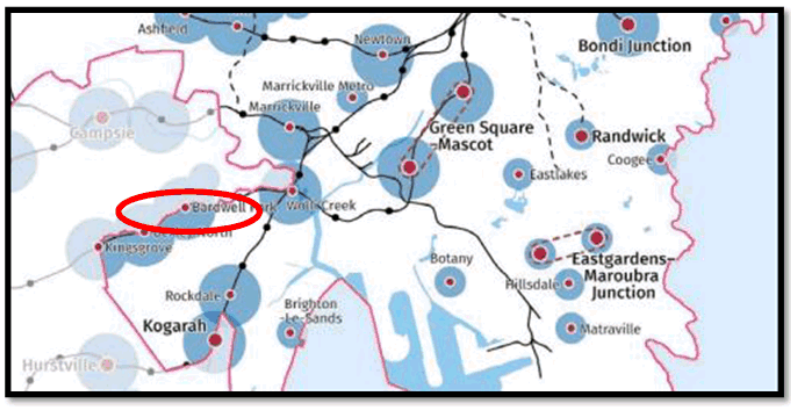
identify regionally important natural resources, transport networks and social infrastructure.

An assessment of the Planning Proposals consistency with the strategic planning framework is provided in **Table 5**, below.

Table 5: Strategic Planning Framework

Name of Strategic Plan	Directions, priorities, objectives and actions	Planning Proposal consistency with Strategic Plan	Consistency Y/ N
Regional Plans			
Greater Sydney Region Plan	Objective 10 – Greater housing supply, which encourages the supply of housing in the right locations with access to shops, services and public transport. Objective 14 – A Metropolis of Three Cities – integrated land use and transport creates walkable and 30-minute cities. *"One of the principal elements in achieving the productivity outcomes is:* *Co-locate activities in metropolitan, strategic and local centres and attract housing in and around centres to create walkable, cycle-friendly neighbourhoods.'*	Comment: The draft Planning Proposal is consistent with objective 10, as additional housing supply is facilitated within walking distance of shops, services and public transport. Comment: The Planning Proposal in located in a local centre and will facilitate additional housing within walking distance of shops and public transport.	**YES**
District Plans			
Eastern City District Plan (ECDP)	• Planning Priority E5: Providing housing supply, choice and affordability, with access to jobs, services and public transport. • Planning Priority E6: Creating and renewing great places and local	Comment: The Planning Proposal supports the role of the Bexley North local centre by increasing housing provisions within a catchment area within walking distance (up to 10 minutes) of a centre with rail services. Comment:	**YES**

Name of Strategic Plan	Directions, priorities, objectives and actions	Planning Proposal consistency with Strategic Plan	Consistency Y/ N
	centres. The Planning Priority establishes 'Principles for local centres' and states that: *"additional residential development within a five-minute walk of a centre focused on local transport, …. will help to create walkable local centres. However, housing should not compromise a centre's primary role to provide goods and services, and the opportunity for the centre's employment function to grow and change over time."*	Bexley North is identified as a local centre in the ECDP (refer to the extract from the ECDP in **figure 12**, below). The Planning Proposal is broadly consistent with the 'Principles for local centres' (p49 of the ECDP) through the provision of increased residential development in, or within walkable distance of, the centre. Further, the Planning Proposal does not encroach on the B4 Mixed Use zone to the north and is therefore considered consistent with the principle to protect employment opportunities and retail/ commercial floor space.	



District Boundary
400m walking catchment
Light Rail
Metropolitan Centre
800m walking catchment
Strategic Centre
Waterways
Local Centre
Railway

The map illustrates the approximate five-minute walking catchment around local centres serviced by local transport and the approximate 10-minute walking catchment around a centre focused on a mass transit stop. Actual walking catchments of 5-10 minutes will depend on local connections and conditions and should be determined using a place-based approach within which housing, retail and commercial growth opportunities need to be balanced and planned for by councils.

Figure 12: Eastern City District – centres

Name of Strategic Plan	Directions, priorities, objectives and actions	Planning Proposal consistency with Strategic Plan	Consistency Y/ N
(Source: Eastern City District Plan)			
	Implementation: *Successful implementation of the district plans requires:* • *councils to prepare and implement local strategic planning statements as part of their strategic planning framework* • *councils to update local environmental plans through the development of their local strategic planning statements and other relevant plans and policies* Role of district and local plans *Region and district plans inform the preparation and endorsement of local strategic planning statements and the preparation and assessment of planning proposals. Councils are to complete the update of their local environmental plan within three years of the district plans being finalised. This involves councils:* *E21. Reviewing their strategic planning framework, including a review of the existing local environmental plans against the relevant District Plan* *E22. Undertaking necessary studies and strategies and preparing a local strategic planning statement which will guide the update of the local environmental plans.*	Comment: Council is currently scoping detailed studies to inform the preparation of a new comprehensive LEP, including the preparation of a 'local strategic planning statement' for the Bexley North local centre.	**NO -** Inconsistency justified. The DPE advises that Metropolitan Councils are not expected to have their local strategic planning statements prepared until mid-2019 at the earliest. However, the above, the Planning Proposal is considered generally consistent with the principles for local centres established in the ECDP.
Local plans			
Rockdale Community Strategic Plan (adopted 15 June 2011)	Villages and Local Centres *Redevelopment within these centres is encouraged as a means of increasing residential densities in close proximity to public transport and services. Redevelopment proposals*	Comment: The Planning Proposal is consistent with the Plan to increase residential densities in close proximity to public transport.	**NO -** Inconsistency justified.

Name of Strategic Plan	Directions, priorities, objectives and actions	Planning Proposal consistency with Strategic Plan	Consistency Y/ N
	would need to recognise the desired local character of the centre. <u>Rockdale Tomorrow:</u> *Future growth is likely to occur in the centres of Rockdale, Wolli Creek, Brighton Le Sands, Bexley and Bexley North, which have the most significant opportunities for redevelopment through the presence of larger sites which are more readily able to be developed. The Rockdale LEP 2011 contains incentives to encourage development in these centres.*	It is noted that the subject site was not included in the Rockdale LEP 2011 for intensification of development at the time.	As noted above, the Planning Proposal is generally consistent with the principles for local centres established in the ECDP.

Any other likely environmental effects as a result of the planning proposal?

Traffic & Vehicular Access

A traffic and parking assessment report has been prepared to inform the draft Planning Proposal, which concluded that there would be no unacceptable impacts on traffic safety and that the road network, including intersections, could accommodate the redevelopment of the land. A copy of the report is included as ***Attachment 4***.

An independent review of the submitted traffic and parking assessment report did not raise any significant concerns in relation to traffic generation or safety that would preclude the site from being rezoned to R4 High Density Residential.

In addition, the subject site is located within 400m walking distance of shops and services within Bexley North local centre; the public entrance to Bexley North rail station; and regular bus services operated by Sydney Buses. This is likely to assist in reducing vehicle movements generated by redevelopment of the subject site.

If Council and the DPE support the draft Planning Proposal, any proposed Development Application(s) would need to be supported by a further detailed traffic impact assessment.

Voluntary Planning Agreement (VPA)

A draft VPA offer has been made to Council and a report will be provided to Council.

Conclusion

The Planning Proposal seeks to achieve a strategic planning outcome that will facilitate higher density living opportunities within 400 metres walking distance of Bexley North rail station and the shops and services in Bexley North local centre. This Planning Proposal is consistent with the directions and planning priorities contained in the Greater Sydney Region Plan and the Eastern City District Plan. The proposed increase in height and FSR is consistent with the surrounding area.

Community Engagement

Should the Planning Proposal proceed through Gateway, community consultation will be undertaken in accordance with section 3.34 of the EP&A Act. The specific requirements for community consultation will be listed in the Gateway determination, including any government agencies that are to be consulted.

Bayside Council
Serving Our Community

Bayside Planning Panel 8/05/2018

Item No	4.2
Subject	**Minutes of Bayside Planning Panel – 1 May 2018**
Report by	Lauren Thomas, Governance Officer
File	SC17/780

Officer Recommendation

That the Minutes of the Bayside Planning Panel held on 1 May 2018 be confirmed as a true record of proceedings.

Present

Jan Murrell, Chairperson and Independent Specialist Member
Robert Montgomery, Independent Specialist Member
Helen Deegan, Independent Specialist Member
Patrick Ryan, Community Representative

Also Present

Michael McCabe, Director City Futures
Clare Harley, Manager Strategic Planning
Bruce Cooke, Acting Manager Governance
Josh Ford, Coordinator Strategic Planning
John McNally, Senior Urban Planner
Howard Taylor, Urban Planner
Ian Vong, IT Technical Support Officer
Lauren Thomas, Governance Officer

The Chairperson opened the meeting in the Botany Town Hall at 6:04 pm.

1 Acknowledgement of Traditional Owners

The Chairperson affirmed that Bayside Council respects the traditional custodians of the land, and elders past and present, on which this meeting takes place, and acknowledged the Gadigal and Bidjigal clans.

2 Apologies

There were no apologies received.]

3 Disclosures of Interest

Helen Deegan declared a potential conflict of interest in Item 5.3. The Chair decided that Ms Deegan should not take part in any discussion, site inspection or deliberation on the matter.

4 Minutes of Previous Meetings

The minutes of the Bayside Planning Panel meeting to be held on 24 April 2018 will be presented to the Bayside Planning Panel on 8 May 2018.

5 Reports – Planning Proposals

5.1 Planning Proposal: 119 Barton Street, Monterey

An on-site inspection took place at the property earlier in the day.

Mr Michael Neustein, City Planning Works, applicant spoke for the officer's recommendation.

Panel Recommendation to Council

The Bayside Planning Panel recommends to Council that pursuant to section 3.34 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) the draft Planning Proposal for land known as 119 Barton Street, Monterey be submitted to the Department of Planning & Environment (DPE) for a Gateway determination.

Name	For	Against
Jan Murrell	☒	☐
Robert Montgomery	☒	☐
Helen Deegan	☒	☐
Patrick Ryan	☒	☐

The reason for this decision is:

- The Panel is of the view that the proposed rezoning will allow for development in character with the adjoining residential area.

5.2 Draft Planning Proposal: 88-96 New Illawarra Road & 307-311A Bexley Road, Bexley North

An on-site inspection took place at the property earlier in the day.

The following people spoke against the officer's recommendation:

Mrs Johanna Cordes, affected neighbour

Mrs Tom Raptis, affected neighbour

Mr Stephen Kelly, affected neighbour

Mr Eddie Curto, affected neighbour

Ms Phoebe Scali, interested resident

Mr Stephen McIntyre, affected neighbour

Ms Stephanie Gatt, affected neighbour

Mr Simon Rabagliati, affected neighbour

Mrs Zinovia Dimitripoulos, affected neighbour

Barry O'Neill, affected neighbour

The following people spoke for the officer's recommendation:

Emmanuel Zoumas, neighbour

Nigel White, applicant

The Panel members adjourned for 10 minutes to consider their recommendation.

Panel Recommendation to Council

The Bayside Planning Panel recommends to Council that pursuant to section 3.34 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) the draft Planning Proposal for land known as 88-96 New Illawarra Road & 307-311A Bexley Road, Bexley North be submitted to the Department of Planning and Environment (DPE) for a Gateway determination.

However, the Panel recommends the following changes:

- A Flood Plain Risk Management Plan be submitted for the Council staff's review in accordance with the *Flood Plain Development Manual 2005.* Exhibition of the Planning Proposal should not proceed until the study is completed to allow it to also be publicly exhibited concurrently.
- Similarly the RMS comments on the Planning Proposal should also be available for concurrent exhibition.
- An additional provision be drafted prior to exhibition to require a minimum lot size area of 1650 square metres for development.
- The Panel recommends that the Council request the Gateway Determination require a minimum of 28-day exhibition for the Planning Proposal to allow for community consultation.

The Panel's reasons for the above changes are to provide for greater certainty and transparency in the process and public consultation. The minimum lot size is to ensure that the site is comprehensively redeveloped to minimise fragmentation and amenity impacts.

Name	For	Against
Jan Murrell	☒	☐
Robert Montgomery	☒	☐
Helen Deegan	☒	☐
Patrick Ryan	☒	☐

5.3 Post Exhibition Report: Planning Proposal: 75-81 Railway Street, Rockdale

Helen Deegan reiterated her conflict of interest in Item 5.3 and left the meeting. She did not participate in the discussion of this item, nor did she vote in respect of this item.

An on-site inspection took place at the property earlier in the day.

Mark Syke from Zoe Holdings (the proponent) and Giovanni Cirillo (Planning Consultant) spoke for the officer's recommendation

Panel Recommendation to Council

The Bayside Planning Panel recommends to Council that it exercises its delegation and makes the Local Environmental Plan amendment, as exhibited, for 75-81 Railway Street, Rockdale in accordance with Section 3.36 of the Environmental Planning and Assessment Act 1979.

Name	For	Against
Jan Murrell	☒	☐
Robert Montgomery	☒	☐
Helen Deegan	☐	☐
Patrick Ryan	☒	☐

The reasons for this decision are:

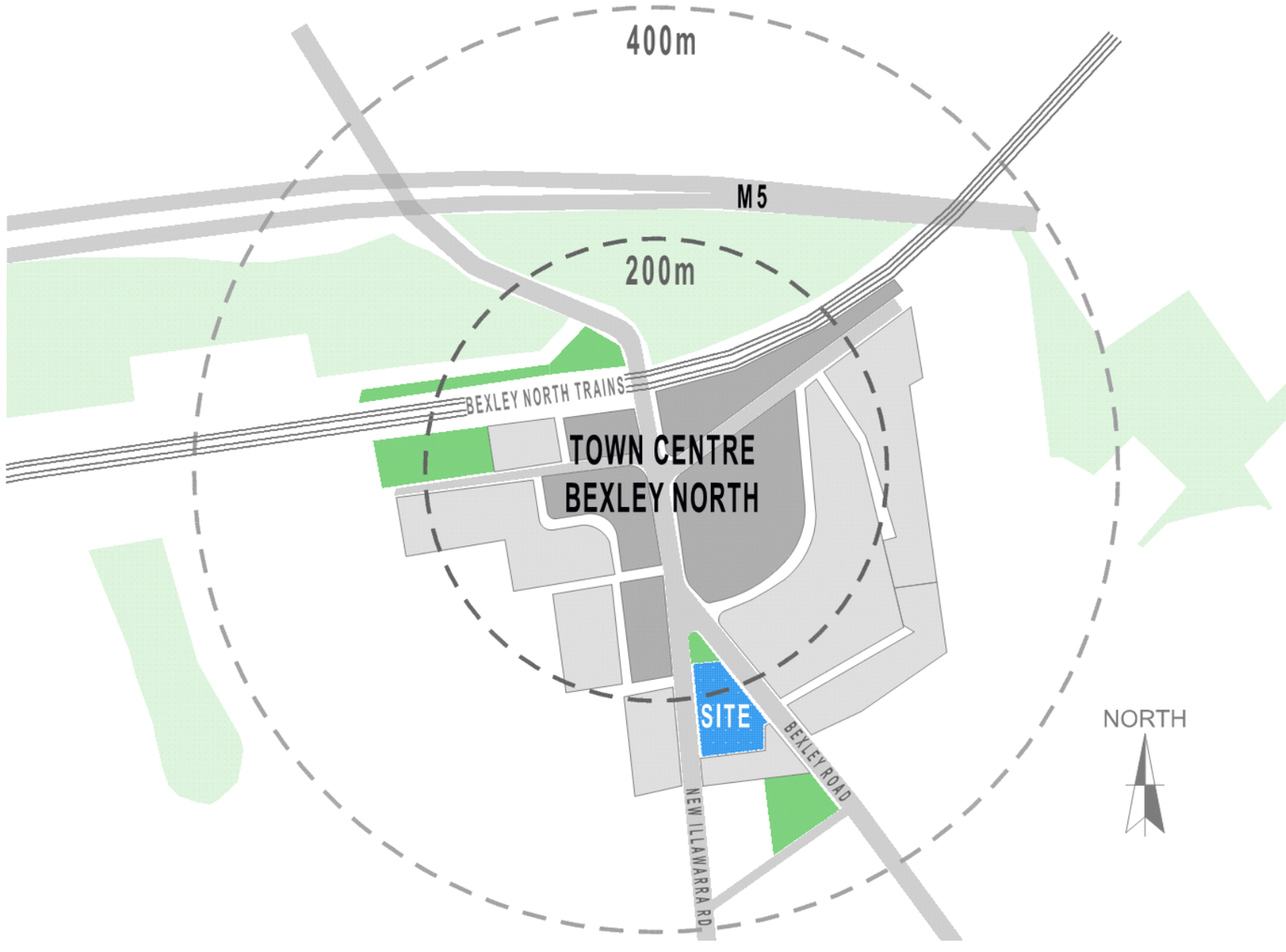
- The Panel considers that the Planning Proposal has merit and public benefit by facilitating a laneway at the rear.

The Chairperson closed the meeting at 7:55 pm.

Jan Murrell
Chairperson
Bayside Planning Panel

PLANNING PROPOSAL DESIGN

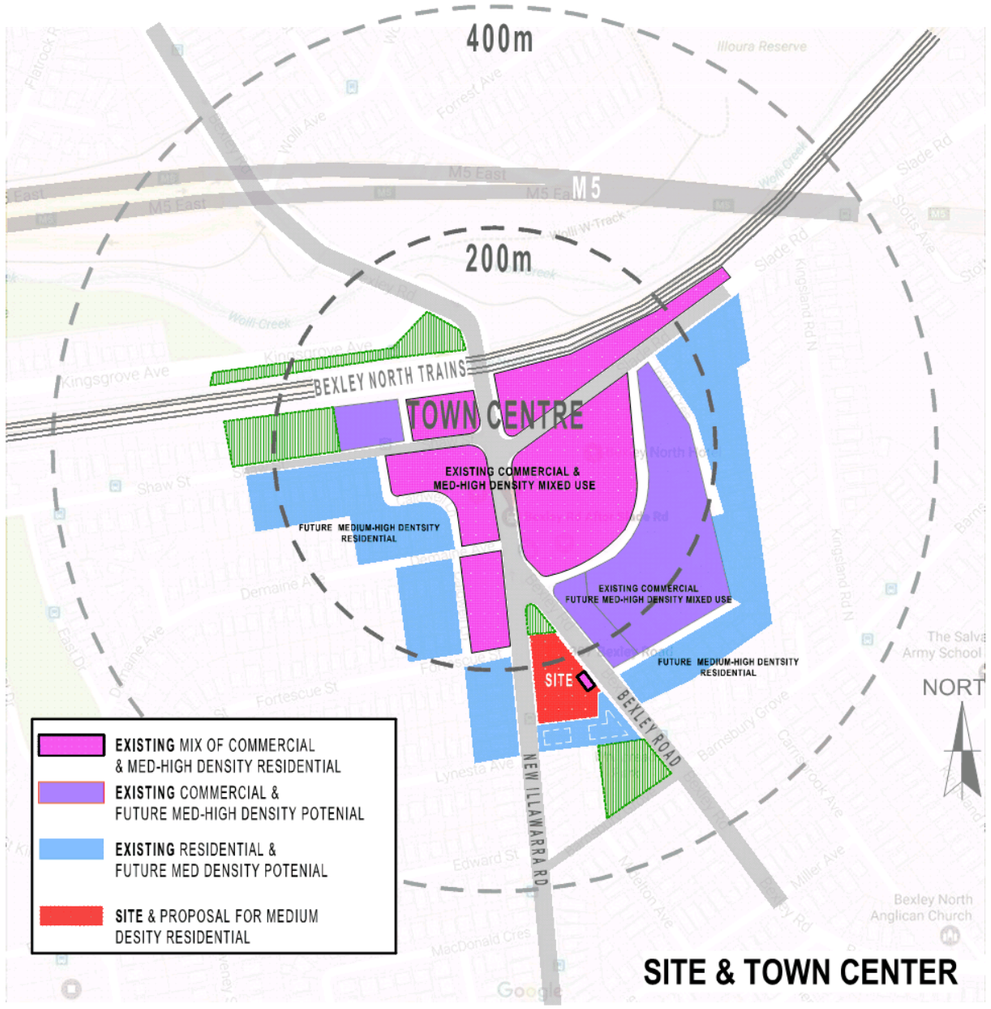
88-96 NEW ILLAWARRA RD & 307-311A BEXLEY ROAD, BEXLEY NORTH



URBAN LINK

21/02/2018

01 COVER PAGE



SITE & TOWN CENTER

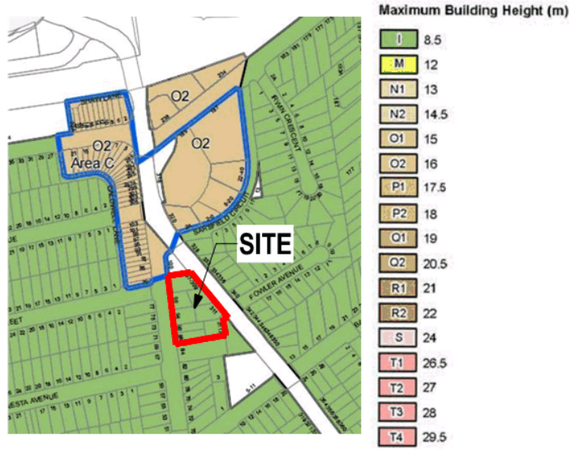
SITE CONTEXT: CURRENT LEP

Under the current LEP the site is excluded from the town center zoning in relation to FSR and building height. A simple overview of these plans shows that the proposed site should be included within the town centre zoning. Shadow studies also show that there is no adverse impact if the site is zoned similar to the rest of the town center.

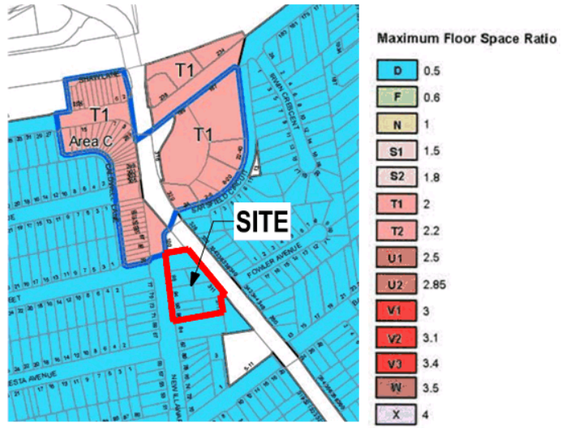
Furthermore the future growth of Bexley North will require these areas be the first to have increased density. There is already an application from the Department of Housing for 3-4 storey residential flat buildings on 84 New Illawarra Rd & 313 Bexley Rd.

EXISTING PLANNING CONTROLS
LEP - LAND USE ZONING

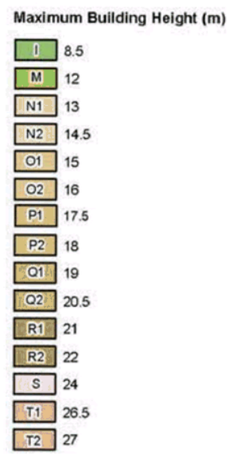
EXISTING PLANNING CONTROLS
LEP - HEIGHT OF BUILDING



EXISTING PLANNING CONTROLS
LEP - FLOOR SPACE RATIO

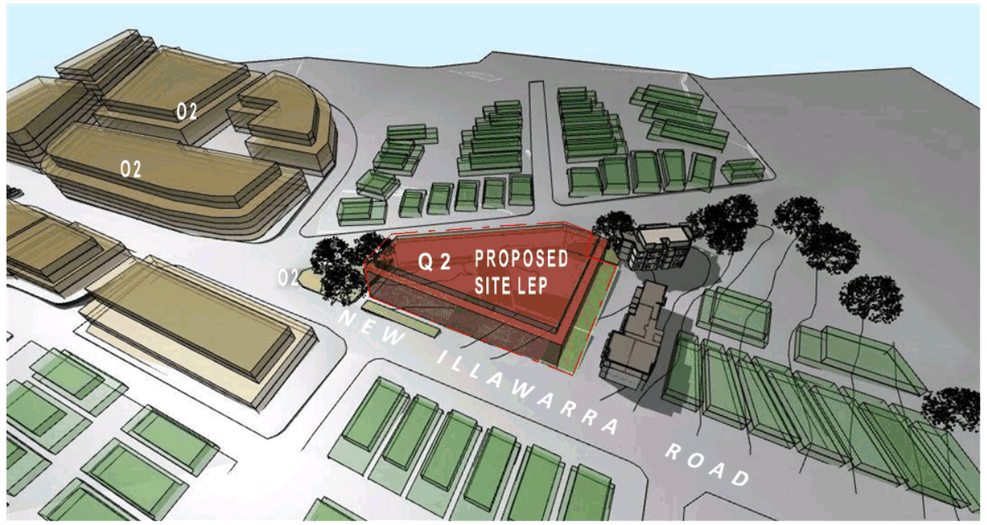


02 CONTEXT: LEP MAPS



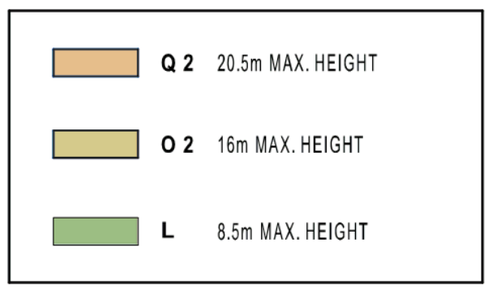
EXISTING LEP

PROPOSED LEP [HOB] - Q2



EXISTING PLANNING CONTROLS
LEP - HEIGHT OF BUILDING ZONES

PROPOSED PLANNING CONTROLS
LEP - HEIGHT OF BUILDING ZONES

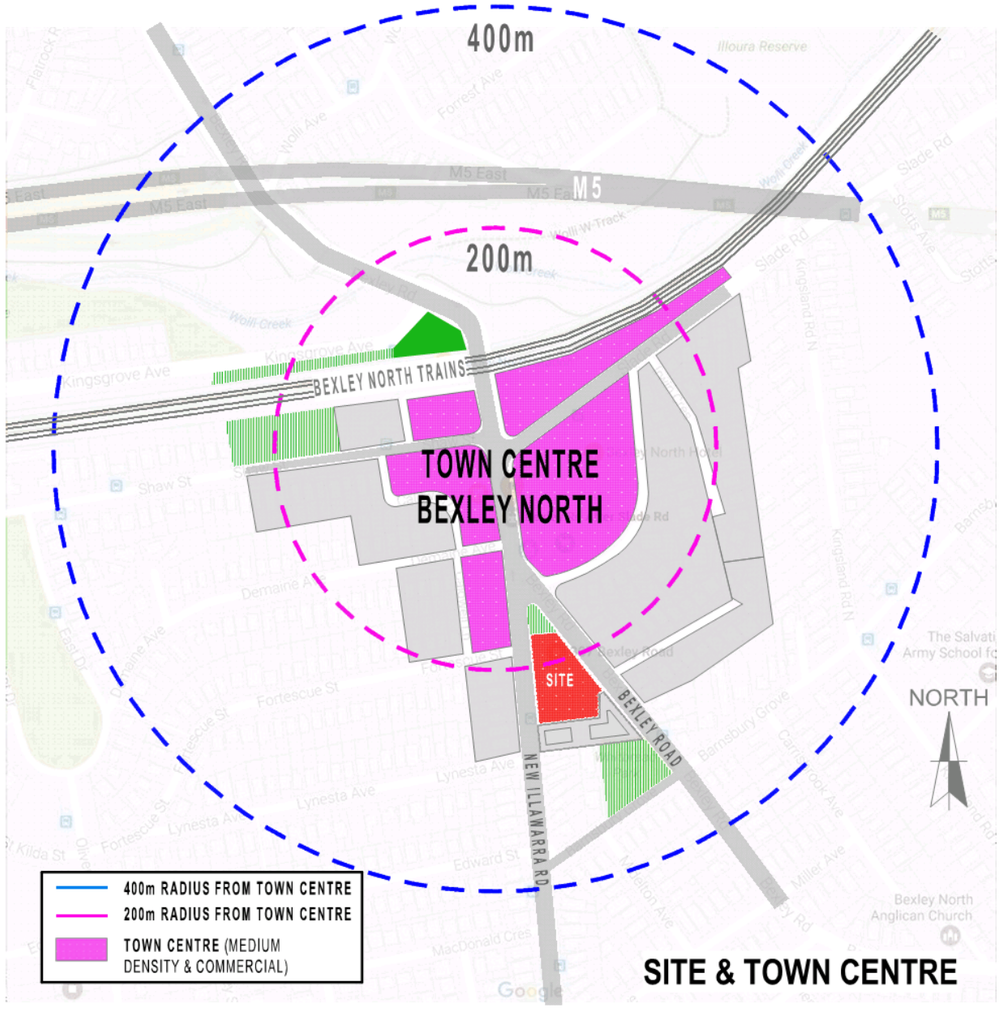


SITE CONTEXT: CURRENT LEP

Under the current LEP the site is excluded from the town center zoning in relation to FSR and building height. A simple overview of these plans shows that the proposed site should be included within the town centre zoning. Shadow studies also show that there is no adverse impact if the site is zoned similar to the rest of the town center.

Furthermore the future growth of Bexley North will require these areas be the first to have increased density. There is already an application from the Department of Housing for 3-4 storey residential flat buildings on 84 New Illawarra Rd & 313 Bexley Rd.

03 CONTEXT: HOB LEP MAP PERSPECTIVE



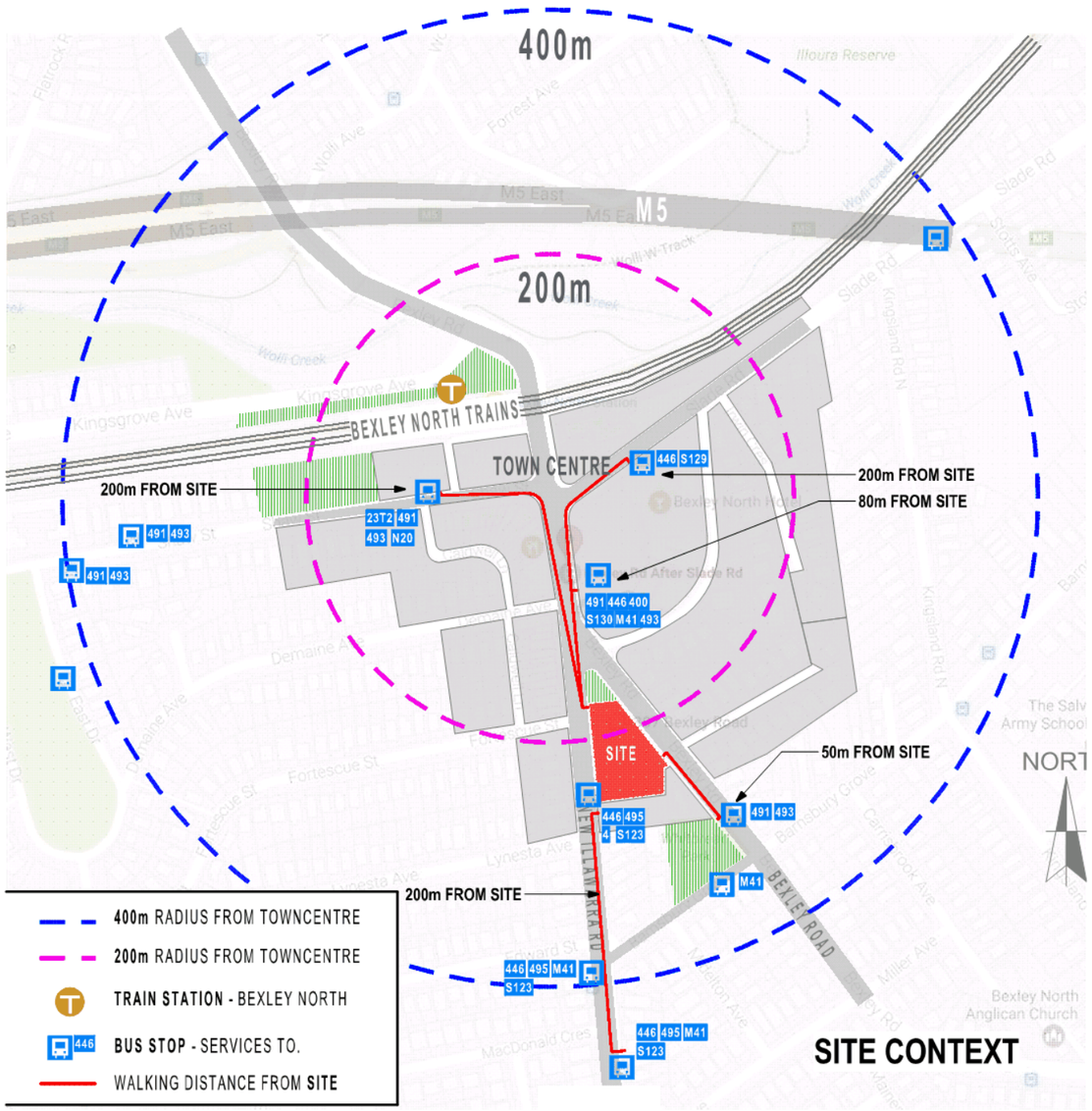
PROPOSED SITE & TOWN CENTER PROXIMITY

The subject site is located withing close proximity of other medium density sites and commcerical centers that are part of the town centre. The site is situated in very critical location and has to potential to complete the towncenter circle.

Like the majority of suburbs in Sydney, Bexley too has seen growth and therefore the need for more residential, retail and commercial developments that meet these needs.

On the next page these areas are clear indicated with photo references to clarify the sites significance as part of the town centre.

04 CONTEXT: TOWN CENTRE



DISTANCE TO PUBLIC TRANSPORT

The Subject Site enjoys exceptional public transport connections to major Office, Commercil, Retail and Educational Centres all within ONLY 200m.

<u>Rail</u>

200m to Bexley North Train station - Which allows direct trains to Central Station & Revesby and all other stations Via the T2 Airport Line.

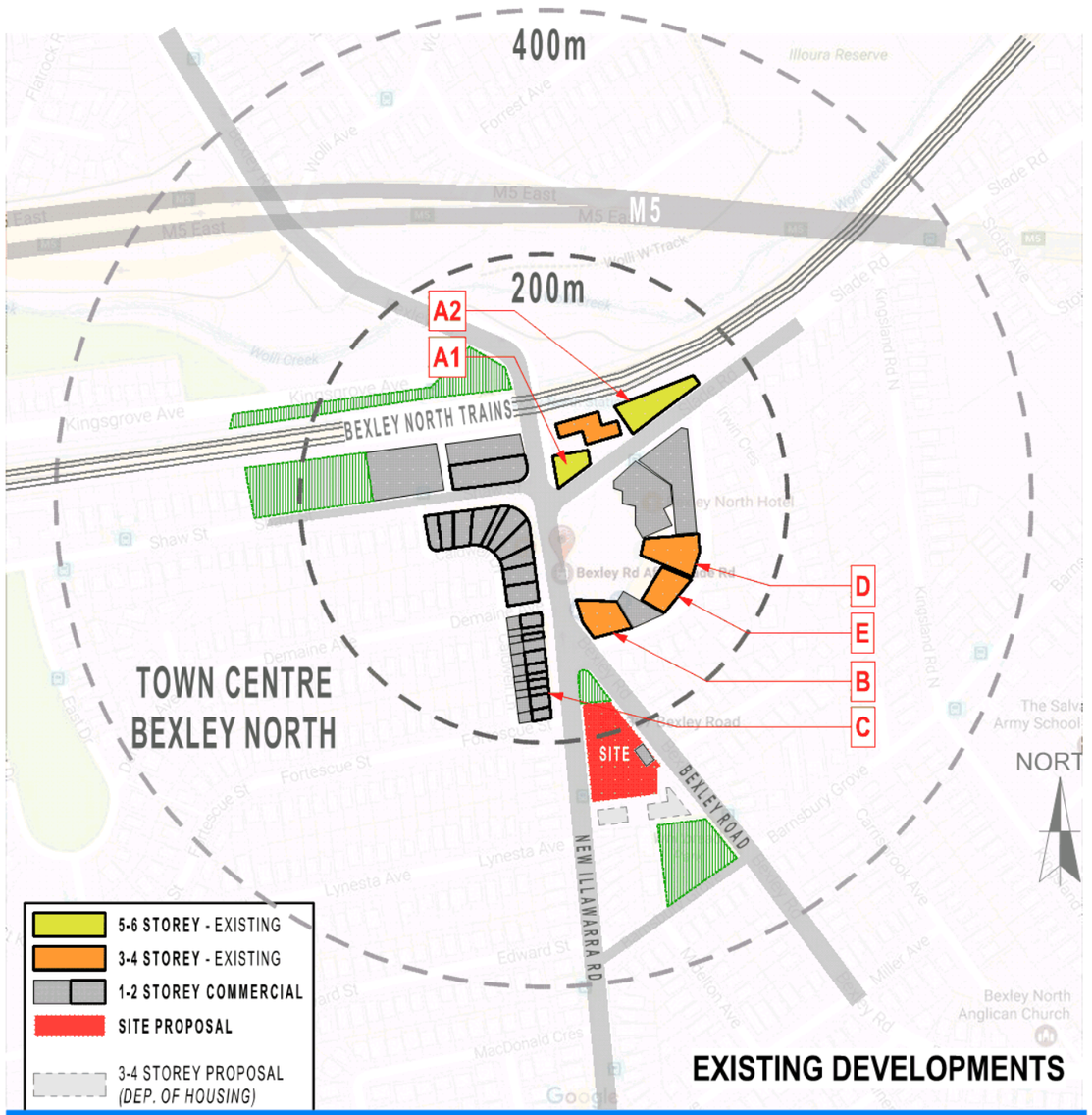
Bus Service on New Illawarra Rd
Husrtvill, Kingsgrove, Kograh, Roselands (Including stops to suburbs in between)

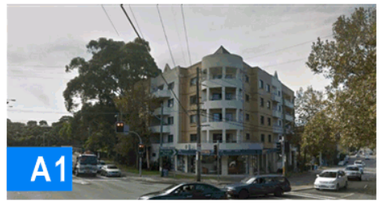
<u>Bus Services on Bexley Rd</u>

200m to Bus Stop for Routes M41, 400, 491, 493.
Connections to Hurstville, Bondi Junction, Five Dock, Earlwood, Burwood, Roselands (Including stops to suburbs in between).

The proposed development will be a Transit Oriented Development.
“Transit Oriented Development is a planning concept that promotes high quality, medium to high density mixed use development within a comfortable ten minute walk of established or planned rail and bus-way stations (a radius of about 800 metres).” (Transport for NSW)

05 CONTEXT: TRANSPORT

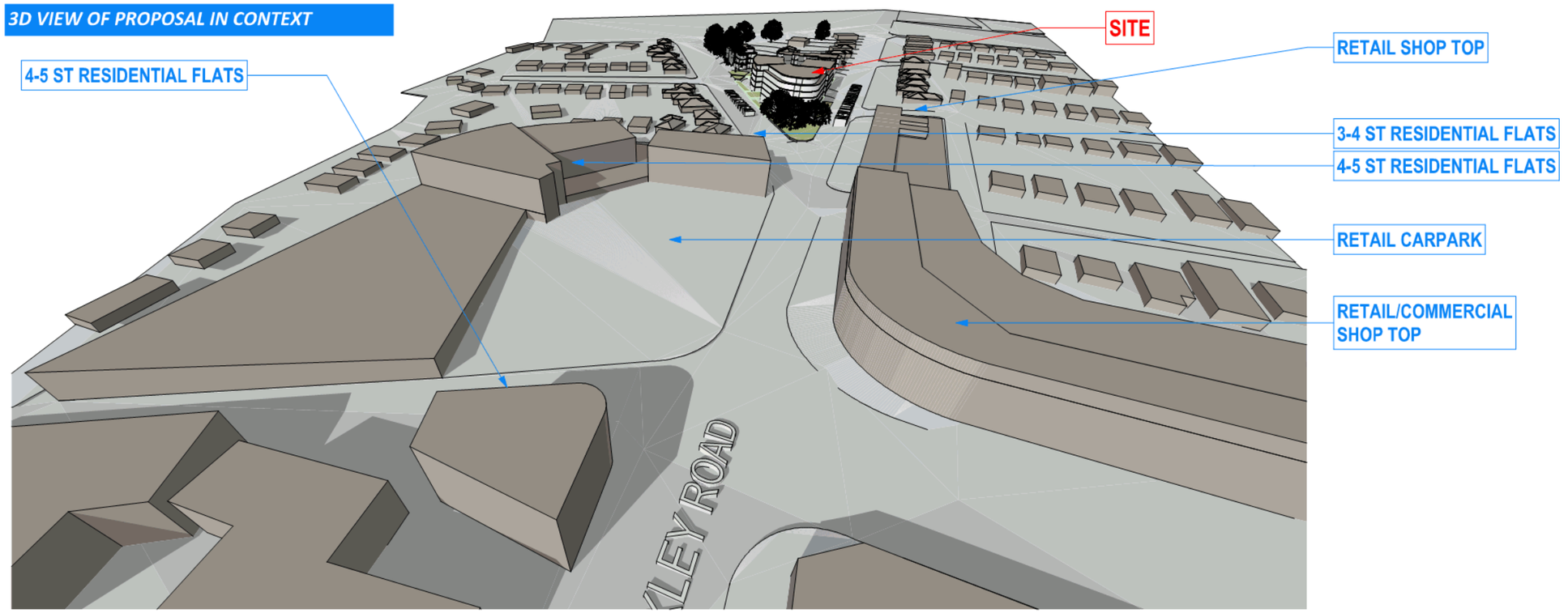


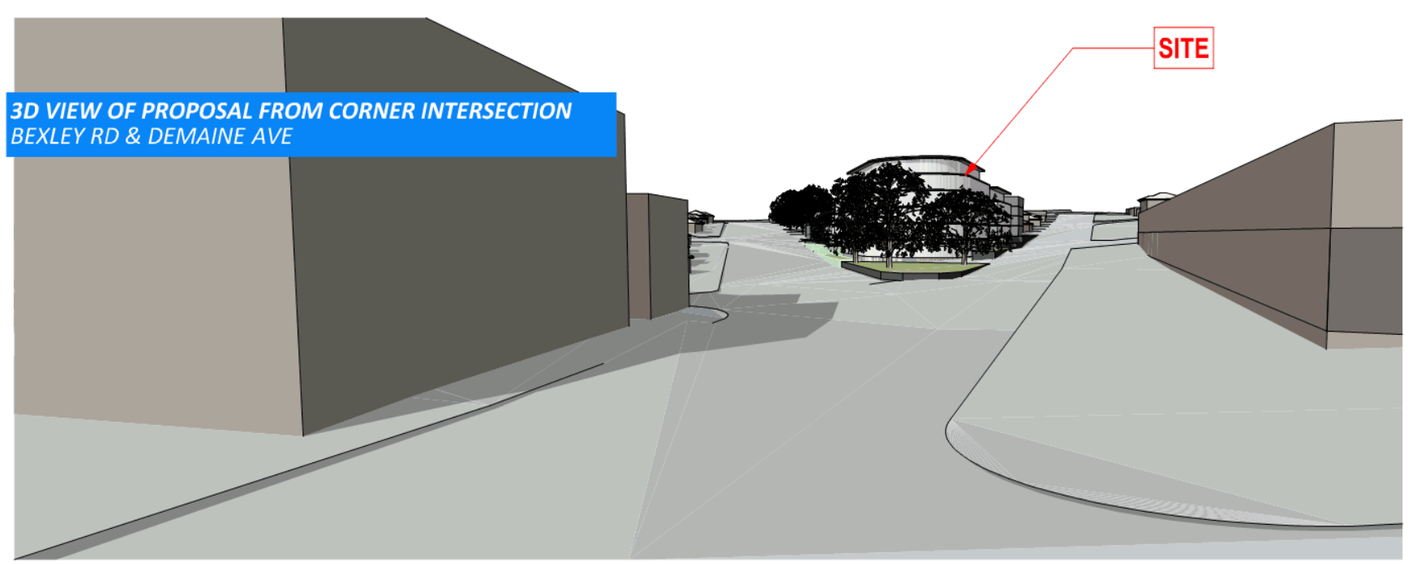


EXISTING CONTEXT & DEVELOPMENTS

As shown in the diagram above the proposed site is surround by by commercial buildings and medium density residential buildings including a service station on the site itself. It is therefore quite reasonable that the site should be part of this "town centre" zoning that would allow a development that is in keeping with the surrounding context and future potential to meet the needs of the Bexley North community.

06 CONTEXT: EXISTING DEVELOPMENTS

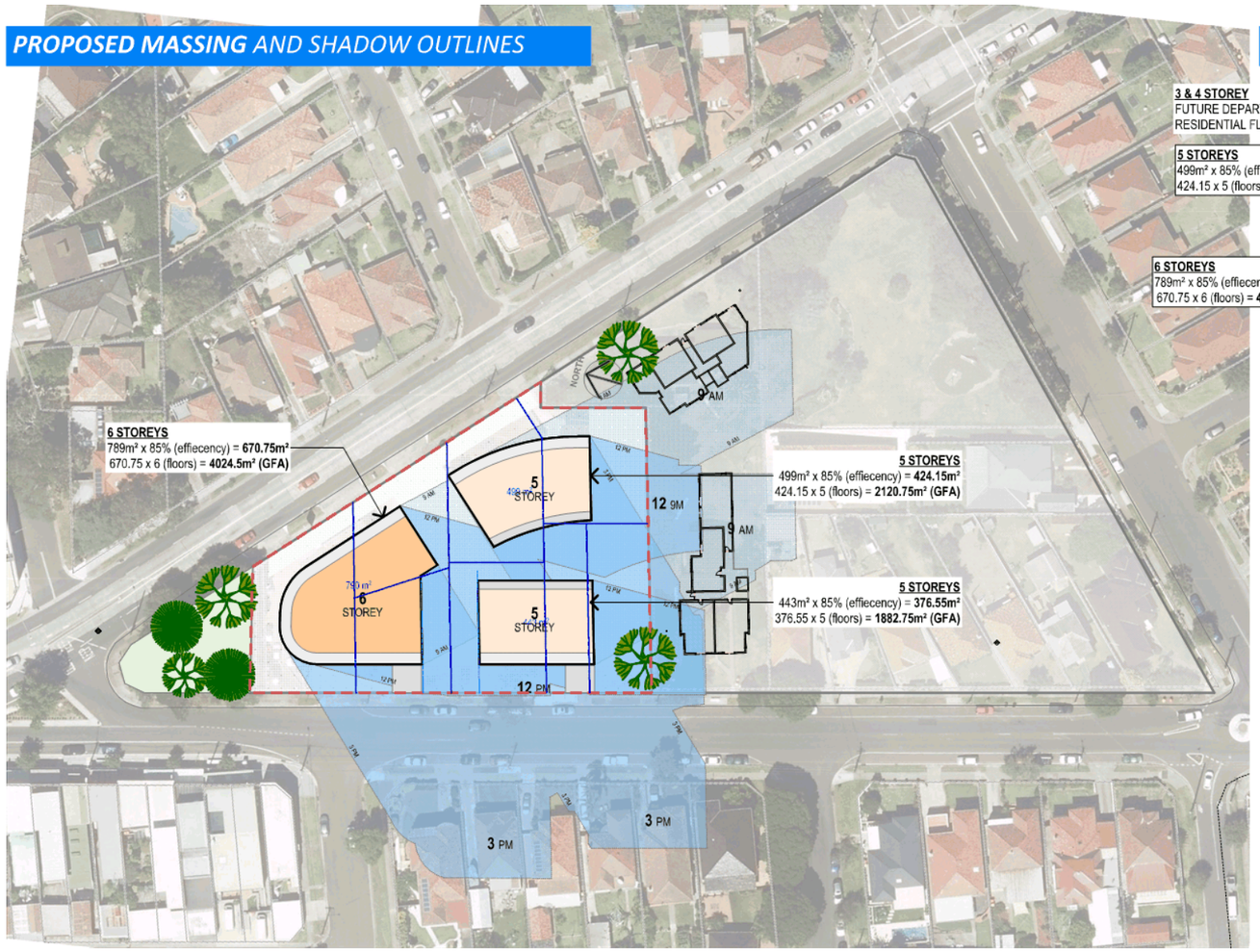




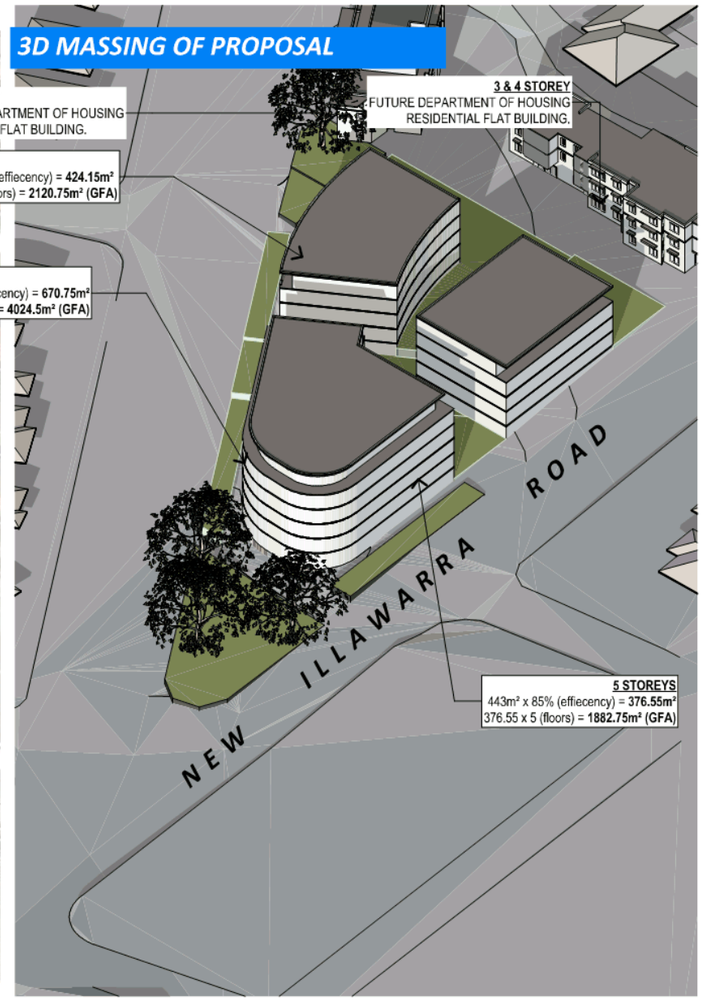
07 PROPOSAL: IN CONTEXT


PROPOSED BUILDING SETBACKS - 1:400
BEXLEY ROAD
NORTH
4 STOREY
PROPOSED DEPARTMENT OF HOUSING
RES. FLAT BUILDING
5 STOREY
499 m²
6 STOREY
789 m²
5 STOREY
443 m²
3 STOREY
PROPOSED DEPARTMENT OF HOUSING
RES. FLAT BUILDING
PARK
6,000
12,000
18,000
15,000
NEW ILLAWARRA ROAD
08 PROPOSAL: SETBACKS

PROPOSED MASSING AND SHADOW OUTLINES



3D MASSING OF PROPOSAL



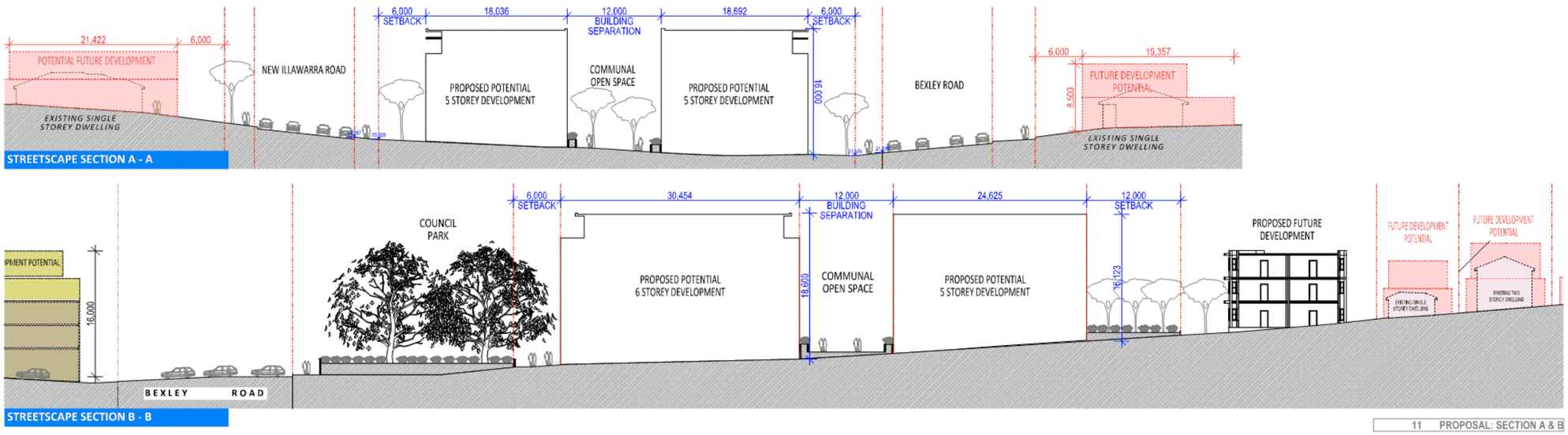
PROPOSED MASSING

The proposed massing on the site is three residential flat buildings that are organised into the shape of the site and with consideration to vehical entry points and amenity to the residents and neighbours.

Our proposal allows generous setbacks to minimise overshadowing and maximise amenity and to provide a transition between the town center and R2 residential zoning.

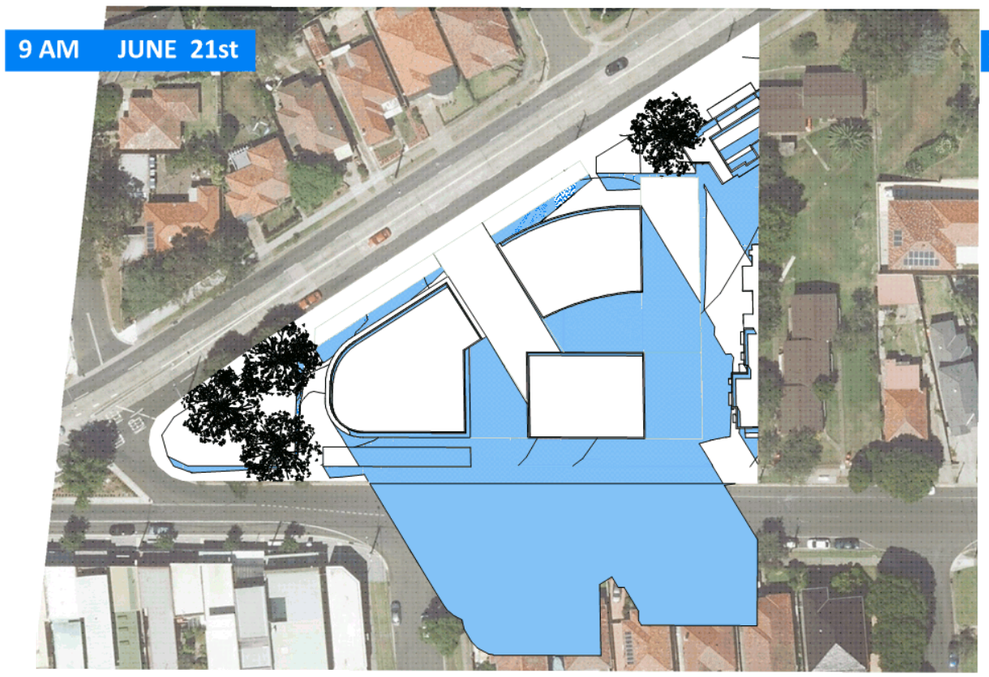
09 PROPOSAL: MASSING

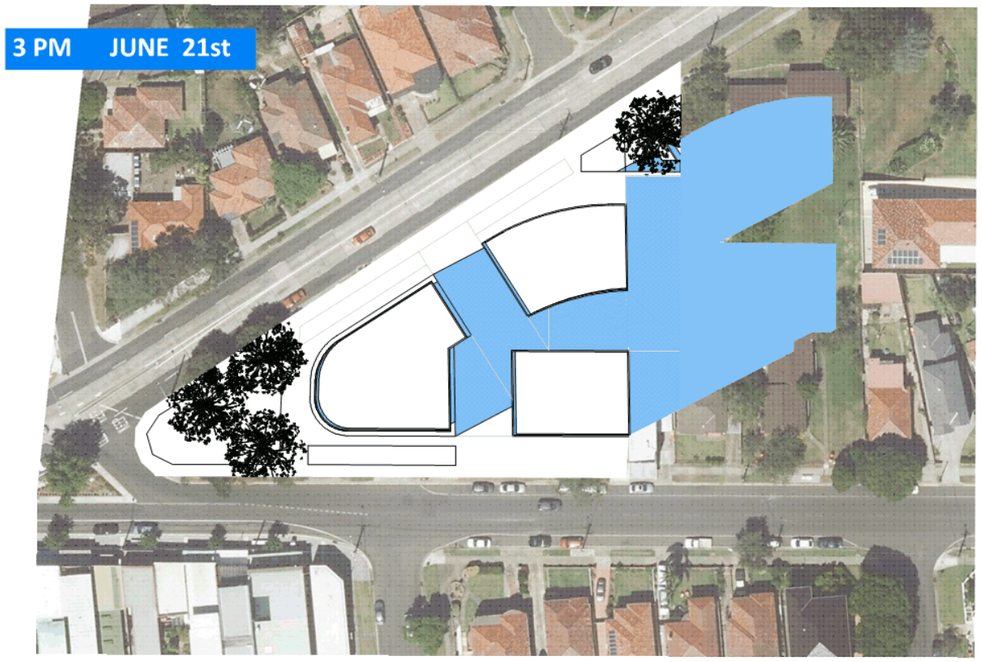
10 PROPOSAL: FSR/GFA CALCS



11 PROPOSAL: SECTION A & B


BASEMENT PLAN & DRIVEWAY ENTRY/EXITS
BEXLEY ROAD
NORTH
SITE A -DEEP SOIL AREA : 762m² OR 45%
SITE B -DEEP SOIL AREA : 1326m² OR 51%
TOTAL DEEP SOIL AREA: 2,088 m²
BASEMENT
SINGLE LEVEL
DEEP SOIL ZONE
1,190 m²
BASEMENT
2 x LEVELS
DEEP SOIL ZONE
762 m²
PARK
01 LANDSCAPE DIAGRAM
6,000
12,000
1,000
15,000
7,264
8,238
6,000
6,000
6,000
6,000
6,000
12,000
DRIVEWAY LOCATIONS AS PER TRAFFIC ENGINEERS RECOMMENDATIONS
NEW ILLAWARRA ROAD
12 PROPOSAL: BASEMENT PLAN



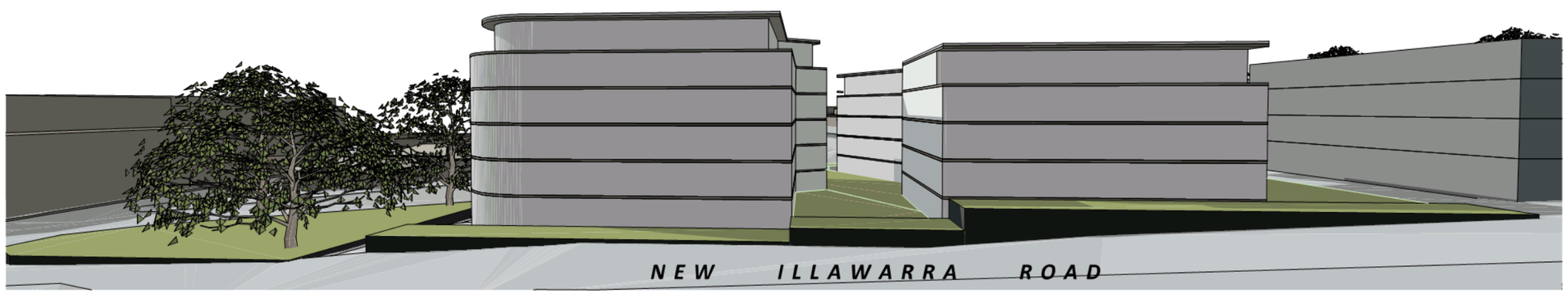


SHADOW DIAGRAMS:
9AM, 12PM & 3PM ON JUNE 21st

13 PROPOSAL: SHADOWS

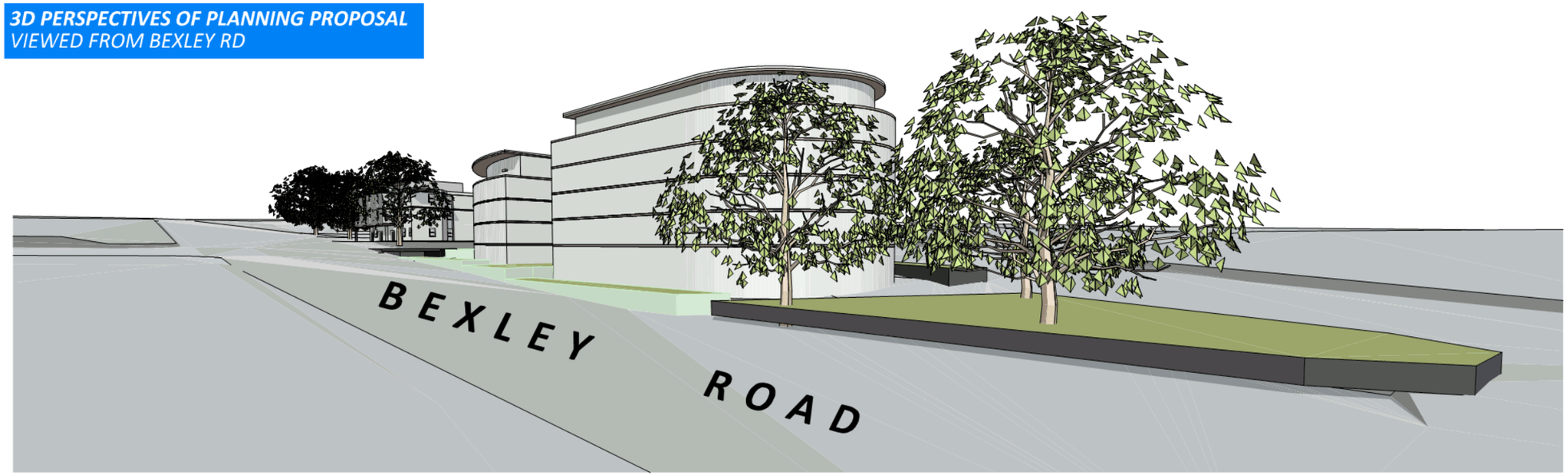
OVERVIEW OF PLANNING PROPOSAL
VIEWED FROM ABOVE BEXLEY ROAD

3D PERSPECTIVES OF PLANNING PROPOSAL
VIEWED FROM NEW ILLAWARRA RD

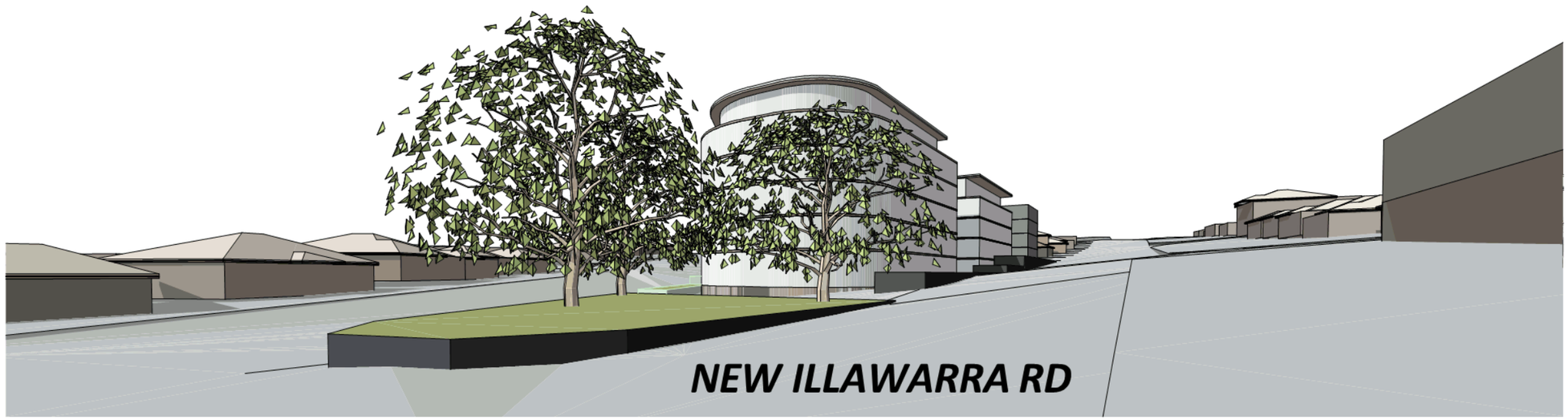


14 PROPOSAL: 3D PERSPECTIVES

3D PERSPECTIVES OF PLANNING PROPOSAL
VIEWED FROM BEXLEY RD



3D PERSPECTIVES OF PLANNING PROPOSAL
VIEWED FROM NEW ILLAWARRA RD



15 PROPOSAL: 3D PERSPECTIVES

JOHN ROMANOUS & ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Flood Risk Management Study

For

Proposed Re-Zoning

At

88-96 New Illawarra Road, & 307-311A Bexley Road

Bexley North NSW 2207

Prepared by John Romanous & Associates P/L
Consulting Civil &Structural Engineers
Suite 2D, 322 Kingsgrove Road
Kingsgrove NSW 2208

Ph: (02) 87 83 68 26

Dated 5th May 2018

Report Reference 1805-R2

Table of Contents

APPENDICES

1. Introduction

It is proposed to apply for a rezoning to allow for future redevelopment of the properties located at 88-96 New Illawarra Road and 307-311A Bexley Road. Bexley North.

The subject properties are impacted by a 900mm diameter pipeline within a stormwater drainage easement. The existing stormwater drainage system crosses the site diagonally and it will be necessary to relocate the drainage line and easement to allow for the future development. The pipeline follows the line of a depression that extends through the site up to Barnsbury Grove. The trapped low point in Barnsbury Grove directs upstream overland flows that cannot enter the piped drainage system into the depression and ultimately through the development site.

A *Stormwater Drainage Assessment Report* No.1805-R1 (the Flood Study) dated 5 April 2017 was prepared by John Romanous and Associates to assess the flood characteristics for the 100 years ARI (Average Recurrence Interval). This report examined the overland flow path and determined the depth of flow, hazard level and ensured that no adverse impacts will occur as a result of the redevelopment.

The proposed flood levels in the 100 year ARI event are shown in Appendix A and the proposed flood extents in the 100 year ARI event are shown in Appendix B. The Probable maximum Flood (PMF) levels prepared for this report are shown in Appendix C.

2. Council Response to the Flood Study

After assessment of the flood study Council's Strategic Floodplain Engineer responded via email on 14 May 2018 seeking:
a) Augmentation of the Council pipe capacity and realigning it.
b) An update to the flood study based on augmenting and realigning the pipeline
c) *A flood risk management study. You will be required to follow the floodplain manual which requires flood risk analysis, emergency response and evacuation plan up to PMF level, cumulative impact of development and address the LEP and DCP flood controls etc. (please refer to Appendix G of Floodplain Development Manual)*.
.
This report seeks to address the requirements of item c) a Flood Risk Management Study.

The Council LEP requirements for flood planning are at Appendix D.

The Council DCP requirements for flood risk management are at Appendix E.

3. Council LEP Requirements

Section 6.6 (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 "***

The *Stormwater Drainage Assessment Report* identified that the existing site is currently affected by the overland flows from Barnsbury Grove. The table on page 2 of the report is reproduced below.

Section Name	100yrs ARI Water Surface Profile									
	Pre-Development					Post Development				
	Surface Level	Water Level	Depth	Velocity (m/s)	Velocity X Depth	Surface Level	Water Level	Depth (m)	Velocity (m/s)	Velocity X Depth
S11	28.40	28.68	0.28	1.38	0.39	28.40	28.68	0.28	1.38	0.39
S10	28.10	28.33	0.23	2.76	0.63	28.10	28.33	0.23	2.76	0.63
S9	25.90	26.25	0.35	2.55	0.89	25.90	26.25	0.35	2.55	0.89
S8	23.50	23.83	0.33	3.15	1.04	23.50	23.83	0.33	3.15	1.04
S7	22.31	22.77	0.46	1.69	0.78	22.30	22.64	0.34	1.37	0.47
S6	21.00	21.36	0.36	2.10	0.76	21.20	21.33	0.13	1.71	0.22
S5	20.10	20.50	0.40	1.56	0.62	20.10	20.34	0.24	1.22	0.29
S4	19.15	19.46	0.31	1.41	0.44	19.15	19.45	0.30	1.31	0.39
S3	18.25	18.71	0.46	0.78	0.36	18.25	18.71	0.46	0.78	0.36
S2	18.15	18.52	0.37	1.51	0.56	18.15	18.52	0.37	1.51	0.56
S1	17.80	18.02	0.22	1.67	0.37	17.80	18.02	0.22	1.67	0.37

This table highlights that the depth of the 100 year flow within the site has been reduced to about 0.3 m or less and provisional hazard of 0.4 or less. These flood and hazard characteristics resulting from the infrequent flooding are compatible for the use of the site where alternate safe access is available. In addition based on the proposed upgrade of the Council drainage system to the 20 year ARI standard as requested by Council this will substantially reduce the flow below the current reduced impacts and reduce the frequency of overflows to an average of once in 20 years. This low level of risk indicates that the development **is** compatible with the flood hazard of the land.

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

In the table above from the *Stormwater Drainage Assessment Report* the depth of the 100 year flow is compared from pre-development to post development flow at the same cross-section locations. The report highlights that the depth of flow at the critical sections of the development S4 to S7 is actually reduced as a result of the development. This will further reduce with pipe augmentation and reduced overland flows. Consequently there is a decrease in flood affectation and certainly NO detrimental increase in the potential flood affection and item (b) is satisfied.

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

The various measures proposed to manage the risk to life are outlined below. A number of these were already highlighted in the *Stormwater Drainage Assessment Report* at section 7 “Conclusion”.

i) The habitable buildings finished ground floor levels must be set a minimum of 500mm above the water surface levels at the 100Yrs. ARI. This provides for the minimum required freeboard. Note that as the water level varies across the site the minimum floor level will also vary. The critical level is the 100 year water immediately upstream of each building.

ii) The buildings will be designed to allow the free flow of floodwaters under and not restrict the flow.

iii) No obstructions will be permitted across the flow path that will divert or raise the flood level. Any fencing will be flow through style either as vertical open bar pool fence style or as horizontal louvers.

iv) To minimise the risk to residents trying to access or drive out of the basement garage during a flood event two protections are proposed.
(1) No openings into the basement will be permitted below 500 mm above the critical 1 in 100 year flood level along the major flowpath. This includes any vehicle or pedestrian entries, or any windows or openings for light and ventilation
(2) Provide a crest in the driveway to protect the basement garage from any local flows in New Illawarra Road.

v) Set all water sensitive instruments such as air conditioning units, gas meters and hot water heaters, etc…, are to be located outside the flow path and above the estimated water level at the 100 years ARI. All electrical power outlets and the meter box are to be at a minimum of 0.5 m above the 100 year flood level. This protects the residents from the potential risks that inundation of these systems may bring but ensures services are maintained throughout the flood.

vi) Appendix C details the PMF flood levels. Even though the PMF flows are typically four times the 100 year flows the flood level increase is typically 0.3 m or less. This PMF increase still sits within the 0.5 m freeboard so flood safety within the building itself is relatively risk free. In the event of a major failure within the drainage system such as pipe blockage there is additional freeboard available or in a worst case scenario as the proposed development has multiple levels then vertical evacuation is always available.

vii) Pedestrian access is proposed via New Illawarra Road which completely avoids the high risk flood area that fronts Bexley Road.

viii) An individual Flood Risk Management Plan will be prepared for each building to promote flood awareness and flood preparedness. This will outline the flood risks, flood preparation, emergencies, no flood warnings being available, evacuation routes or shelter in place and returning after the flood. A sample is provided in Appendix F. This would be better refined once the actual building details are finalised. A copy of the plan would be placed on any noticeboard an in each unit.

ix) Lastly a requirement for structural certification of the building to ensure that the building can withstand the impacts of the flood up to the PMF and is safe to remain in where shelter-in-place is an option. As the building is multi storied this certification should be readily obtainable.

Consequently (c) has been satisfied.

(d) is not likely to 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

The development is proposed within a highly urbanised environment. Much of the site is an existing service station with no vegetation cover. New landscaping of this area will improve the environment Landscaping will be required as part of the development that will stabilise the landscape and avoid erosion. The catchment is highly developed and siltation is not a significant factor. Any silt that may be generated through the catchment would generally be conveyed by the pipe system and not settle on site. There is no riparian vegetation, it is not a river and the watercourse has been piped and significantly modified.

Consequently (d) has been satisfied.

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

As noted above the lowest habitable floor levels garage are all set above the PMF level and the basement garages are all flood proofed above the PMF level. Consequently the cost to the community are low. As the development will proceed with this flood knowledge in place the area within the flood path can be designed to be stable and limit any damage to flooding. The current service station presents a significant potential social and economic cost to the community if any petrol bowsers were damaged during a flood and this allowed the escape of petroleum products to the environment and the associated clean up costs.

The proposed development is a significant improvement to the existing development and (e) is satisfied.

4. Council DCP Requirements

Under Part 4 of the DCP under **General Principles for Development - Section 4.1 Site Planning** the Controls for **Flood Risk Management** are highlighted below.

3. Development must comply with Council's – Flood Management Policy which provides guidelines of controlling developments in different flood risk areas. It should be read in conjunction with the NSW Government's 'Floodplain Development Manual 2005'

The email from Council's Strategic Floodplain Engineer on 14 May also advocated reference to the *Floodplain Development Manual (FDM) 2005* particularly Appendix G. When considering Appendix G of the FDM it highlights the Existing Risk, the Future Risk and the Continuing Risk.

The consideration of G4.1 Existing Risk and works that could be undertaken to protect the existing houses and service station are not relevant for this proposal, though it acknowledged that the existing service station is severely flood affected and may present an environmental risk to the community during a flood.

Under G4.2 Future Risk it states that "Property modification measures, such as land use and development controls, are an effective means of ensuring that future development is compatible with flood risk." The proposed development will apply development controls to set flood planning levels with 0.5 m freeboard above the 100 year ARI. The proposed rezoning will allow redevelopment to proceed in an orderly manner removing a very high risk to occupants of the service station and houses that

accessed only Bexley Road which may have been trapped by floodwaters with limited escape routes in addition to removing the risk of release of contaminants form the service station to the environment during a flood.

Under G4.3 Continuing Risk addresses floods greater than the 100 year design flood. As indicated previously the PMF is only about 0.3 m above the 100 year flood levels and can be incorporated into the 0.5 m freeboard. In addition vertical evacuation is possible due to the multiple levels of the development.

Section G5.2 Hydraulic and Hazard Categorisation refers to Appendix L of the FDM to assess the hazard at the site particularly in the 100 year event.

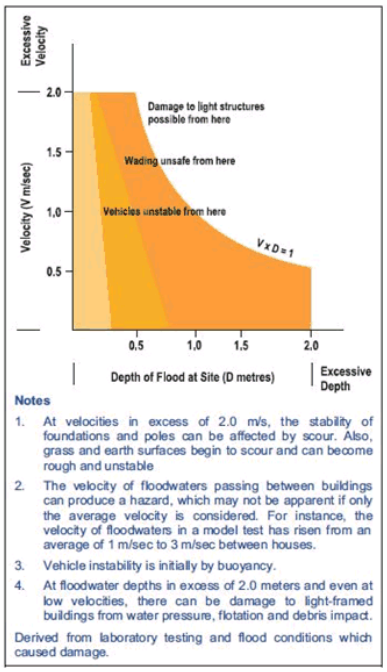


FIGURE L1 - Velocity & Depth Relationships

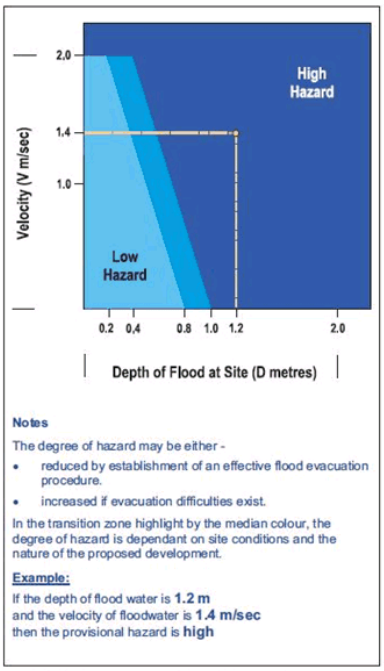


FIGURE L2 - Provisional Hydraulic Hazard

The provisional hazard detailed above will vary over the site from sections 4 to 7 in the flood model. The higher hazard section is section 4 which equates to River Station 72. In the current flood model (without the upgraded pipe lines) the flow depth is 0.3 m and velocity 1.31 m/s. When these values are entered into the diagrams above at Figure L.1 this sets the site in the middle band where vehicles are unstable but evacuation on foot is possible. At Figure L.2 the site is in the lighter blue Low Hazard Area. However these are provisional hazard and the mitigating factor here is evacuation routes. As both vehicular access and pedestrian access in a flood will be via New Illawarra Road then no person or vehicle is exposed to these risk factors and the true hazard is very low.

Section G6.1 Impacts of New Development on Flooding of the FDM are addressed by the new development being designed not to block flowpaths, improving and not reducing flood storage and the use of on-site detention to offset any increase in impervious area.

Section G9.1 Cumulative Impacts in the FDM. Cumulative impacts are where development increase flood levels at one location which is added to by development next door and another close by etc… when considered together these small individual flood rises can result in significant impact overall. As detailed above the new development proposed will lower flood levels and consequently there is no cumulative adverse impact.

Section G9.8 Climate Change. The site is above the localised affects of any sea level rise. Any potential increase in rainfall intensity can be accommodated in the 0.5 m freeboard. As noted previously the consideration of the PMF with flows four times the 100 year ARI only results in a typical 0.3 m increase. Consequently the development is considered robust enough to address any climate change concerns.

4. The filling of land up to the 1:100 Average Recurrence Interval (ARI) flood level (or flood storage area if determined) is not permitted, unless specifically directed by Council in very special and limited locations. Filling of land above the 1:100 ARI up to the Probable Maximum Flood (PMF) (or in flood fringe) is discouraged however it will be considered providing it does not adversely impact upon flood behaviour.

No filling is proposed within the 100 year flood extents. This is an improvement over the existing site where the existing buildings reduce the level of floodplain storage. Openings are proposed under the buildings so as not to restrict flows or remove storage. The volume occupied by the building may be considered to loose floodplain storage for events greater than the 100 year up to the PMF however the small rise is PMF flood levels suggests that this volume would be small and offset by the floodplain storage made available by removal of the existing buildings in the floodplain.

5. Development should not adversely increase the potential flood affectation on other development or properties, either individually or in combination with the cumulative impact of similar developments likely to occur within the same catchment.

By reference to the table from page 2 of the *Stormwater Drainage Assessment Report* the new development proposed will lower not raise flood levels. There is no adverse impact on flooding to adjoining development. As cumulative impacts are where development increase flood levels at one location which is added to by another development and when considered together these small individual flood rises can result in significant impact overall. As there is no increase in flood levels there is no adverse cumulative impact.

6. The impact of flooding and flood liability is to be managed, to ensure the development does not divert the flood waters, nor interfere with flood water storage or the natural functions of waterways. It must not adversely impact upon flood behaviour.

By reference to the table from page 2 of the *Stormwater Drainage Assessment Report* the new development proposed will lower not raise flood levels. There is no

adverse impact on flooding to adjoining development through rising flood levels, nor is any water diverted onto a neighbouring property. The development has been carefully designed to prevent loss of floodplain storage or the natural function of the waterway. i.e. the flowpath is not blocked or redirected. Consequently there is no adverse impact on flood behaviour.

7. A flood refuge may be required to provide an area for occupants to escape to for developments where occupants require a higher standard of care. Flood refuges may also be required where there is a large difference between the PMF and the 1 in 100 year flood level that may place occupants at severe risk if they remain within the building during large flood events.

The minimum habitable floor level is set 0.5 m above the 100 year flood level and about 0.2 m above the PMF. Consequently the whole building could be considered a flood refuge. However should some rare event occur such as pit or pipe blockage that results in significant increases in flow there is opportunity for residents to go up the stirs to a higher level until the flood passes.

5. Conclusion

The requirements of Council's LEP and DCP have been thoroughly evaluated together with a review of the requirements of Appendix G of the *Floodplain Development Manual (FDM) 2005.*

The requirements of Section 3 (c) above to incorporate measures to protect residents should be incorporated into any future building design.

By reviewing the material above it is clear that the building layout for the proposed rezoning has been thoughtfully and carefully considered. The safety of the residents has been of paramount importance and will be incorporated into the ultimate design. No access across the major flowpath is proposed. There is no adverse impact to the neighbours or to the community due to flooding. In fact the removal of the service station from the flowpath could be considered to result in significant improvements to the community by eliminating the potential for spills or discharge of contaminants to the environment during a flood.

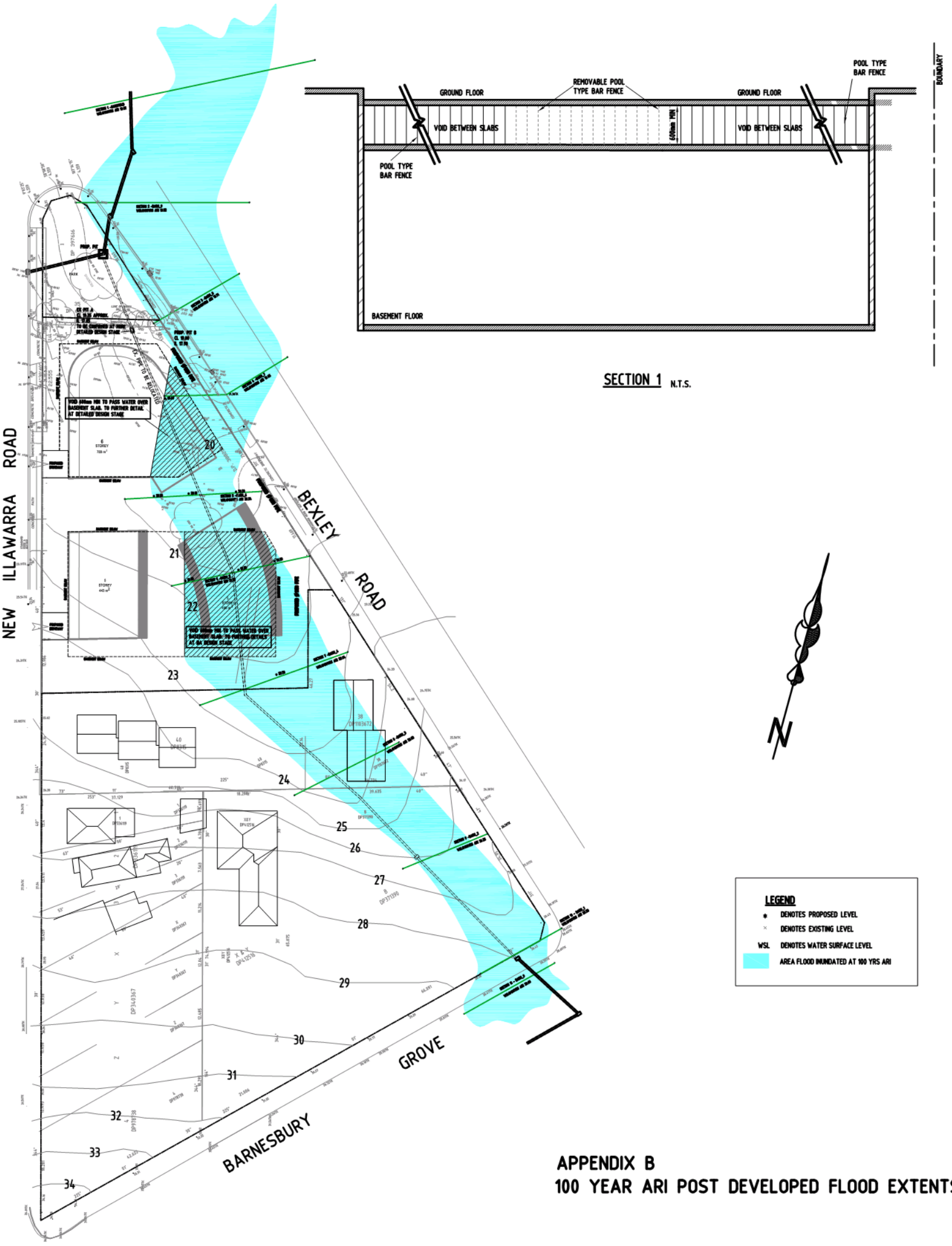
The potential upgrade of the drainage system to a higher standard as part of the development will result in additional improvements as the overland flows will be reduced over that section of the upgrade.

Consequently the rezoning of the lots for the proposed development should be supported as an improvement to the community and reduction of flood impacts not only within the site but also over the adjoining properties.

Appendix A: 100 YEAR ARI POST DEVELOPED FLOOD LEVELS

HEC-RAS Plan: Plan 05 River: Bexley Reach: 1 Profile: 100yr ARI

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	233.0	100yr ARI	4.80	28.40	28.68	28.68	28.77	0.018390	1.38	3.73	21.84	0.95
1	227.0	100yr ARI	4.80	28.10	28.33	28.41	28.57	0.064682	2.76	2.42	18.12	1.82
1	199	100yr ARI	4.80	25.90	26.25	26.34	26.54	0.081392	2.55	2.13	12.15	1.49
1	171.0	100yr ARI	4.80	23.50	23.83	23.98	24.34	0.228253	3.15	1.53	7.84	2.28
1	144.0	100yr ARI	4.80	22.30	22.64	22.64	22.74	0.027060	1.37	3.52	19.85	1.00
1	118.0	100yr ARI	4.80	21.20	21.33	21.37	21.48	0.109322	1.71	2.85	22.56	1.51
1	99.0	100yr ARI	4.80	20.10	20.34	20.33	20.42	0.033758	1.22	3.99	21.96	0.89
1	72	100yr ARI	4.80	19.15	19.45	19.45	19.52	0.032713	1.31	4.18	27.07	0.89
1	50.0	100yr ARI	4.80	18.25	18.71	18.56	18.74	0.001984	0.78	7.17	21.50	0.40
1	26.0	100yr ARI	5.50	18.15	18.52	18.52	18.64	0.010542	1.51	3.64	16.20	1.02
1	0.0	100yr ARI	5.50	17.80	18.02	18.06	18.16	0.041823	1.67	3.30	28.58	1.53



APPENDIX B
100 YEAR ARI POST DEVELOPED FLOOD EXTENTS

Appendix C:PROBABLE MAXIMUM FLOOD POST DEVELOPED FLOOD LEVELS

HEC-RAS Plan: Plan 16 River: Bexley Reach: 1 Profile: 100yr ARI

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	233.0	100yr ARI	22.50	28.40	28.98	28.98	29.22	0.014907	2.24	10.71	23.00	1.00
1	227.0	100yr ARI	22.50	28.10	28.58	28.71	29.05	0.043121	3.65	7.53	21.00	1.68
1	199	100yr ARI	22.50	25.90	26.49	26.71	27.26	0.099488	4.20	6.14	20.62	1.82
1	171.0	100yr ARI	22.50	23.50	24.18	24.57	25.19	0.147965	4.46	5.09	11.59	2.09
1	144.0	100yr ARI	22.50	22.30	22.87	22.98	23.22	0.036832	2.70	9.17	29.57	1.33
1	118.0	100yr ARI	22.50	21.20	21.57	21.67	21.93	0.069806	2.72	8.62	25.93	1.43
1	99.0	100yr ARI	22.50	20.10	20.59	20.64	20.87	0.043667	2.41	9.78	25.33	1.16
1	72	100yr ARI	22.50	19.15	19.68	19.71	19.92	0.035164	2.20	10.79	28.00	1.04
1	50.0	100yr ARI	22.50	18.25	19.18	18.90	19.28	0.002636	1.51	17.66	23.01	0.52
1	26.0	100yr ARI	26.40	18.15	18.95	18.95	19.18	0.005683	2.24	14.47	36.96	0.89
1	0.0	100yr ARI	26.40	17.80	18.16	18.33	18.79	0.072011	3.61	7.81	38.40	2.28

APPENDIX D
COUNCIL LEP FLOOD REQUIREMENTS

Rockdale LEP 2011

6.6 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) is not likely to 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) is not likely to 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 used in this clause has the same meaning as it has in the *Floodplain Development Manual* (ISBN 0 7347 5476 0), published in 2005 by the NSW Government, unless it is otherwise defined in this clause.

(5) In this clause:
flood planning level means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.
Flood Planning Map means the Rockdale Local Environmental Plan 2011 Flood Planning Map.

APPENDIX E
COUNCIL DCP FLOOD REQUIREMENTS

DCP Part 4 General Principles for Development 4.1 Site Planning

Objectives

A. To ensure development has minimal impacts on the natural water cycle and the environment, including natural water systems, water quality and surface/ground water flow regimes

B. To ensure development has minimal impacts on Council's existing drainage network

C. To minimise run-off volumes and discharge rates from new developments to reduce stormwater drainage flows and flood risk in urban area

D. To ensure the safety of people in flood risk areas and limit the potential damage to property and infrastructure

E. To manage continuing flood risk and cumulative impacts of developments

Controls

Flood Risk Management

3. Development must comply with Council's – Flood Management Policy which provides guidelines of controlling developments in different flood risk areas. It should be read in conjunction with the NSW Government's 'Floodplain Development Manual 2005'.

4. The filling of land up to the 1:100 Average Recurrence Interval (ARI) flood level (or flood storage area if determined) is not permitted, unless specifically directed by Council in very special and limited locations. Filling of land above the 1:100 ARI up to the Probable Maximum Flood (PMF) (or in flood fringe) is discouraged however it will be considered providing it does not adversely impact upon flood behaviour.

5. Development should not adversely increase the potential flood affectation on other development or properties, either individually or in combination with the cumulative impact of similar developments likely to occur within the same catchment.

6. The impact of flooding and flood liability is to be managed, to ensure the development does not divert the flood waters, nor interfere with flood water storage or the natural functions of waterways. It must not adversely impact upon flood behaviour.

7. A flood refuge may be required to provide an area for occupants to escape to for developments where occupants require a higher standard of care. Flood refuges may also be required where there is a large difference between the PMF and the 1 in 100 year flood level that may place occupants at severe risk if they remain within the building during large flood events

APPENDIX F
EXAMPLE OF A POSSIBLE FLOOD RISK MANAGEMENT PLAN

SAMPLE FLOOD RISK MANAGEMENT PLAN FOR 307BEXLEY ROAD BEXLEY NORTH NORTHERN BUILDING

Background

Council has advised that this property is identified by the Wolli Creek Drainage and Overland Flow Analysis as an area subject to flooding in a 1% AEP (1 in 100 year ARI) storm event. Council has no information on Tsunamis in the Rockdale area. Relevant levels are:

1% AEP Flood Level = 20.34 m Australian Height Datum (AHD)
Habitable First Floor Level Minimum = 20.84 m AHD
Basement Level = 18.00 m AHD (but floodproofed to 20.84 m AHD)
Low Point near Bexley Road = 20.10 m AHD
Probable maximum Flood Level = 20.59 m AHD

The above levels give an indication of how the various floods will impact this property. These flood flows are traveling from the low point in Barnsbury Grove down through the park and private properties where it enters onto Bexley Road at this site, across to Sarsfield Circuit and then onto the Bardwell Creek. These are flows cannot be contained within the existing pipe network.

Procedure

1. Overland Flooding in this area are considered as "flash floods" and no warning system is available. Storms leading to major flooding can be as short as a ½ hour long or last up to a few hours. Once the storm passes floodwaters usually disappear rapidly.
2. During floods many local and major streets and roads will be cut by floodwaters. Traveling through floodwaters on foot, or in a vehicle can be very dangerous as the water may be polluted, obstructions can be hidden under the floodwaters, or you could be swept away. It is recommended that you stay within the building as much as practical. If you need to leave the building by car, do so early in the storm event travel south along New Illawarra Road and then east along Edward Street to Kingsgrove. At no time travel north along Bexley Road across the rail bridge due to severe flood risks.
3. Develop your own family or business flood plan and be prepared if flooding should occur at different times of the day. Talk to the Council to determine the safer travel routes that are less likely to be cut by floodwaters.
4. If you are within the building remain where you are as a flood is unlikely to reach this level.
5. If you need to leave by foot exit via New Illawarra Road.
6. In the event that floodwaters may enter the building move to the first floor level or above and wait for the storm to end and the flood waters to recede. Do not evacuate the building unless instructed to do so by the SES or the Police. Remember floodwaters are much deeper and flow much faster outside the building than anything inside.
7. In the case of a medical emergency during a flood event ring 000 as normal, but explain about the flooding.
8. Any electrical items that have been inundated with floodwater should be checked by an electrician before using.
9. A laminated copy of this flood plan should be permanently attached (glued) to an inside cupboard door in the laundry and to the noticeboards.
10. This Flood Warning Notice should be reviewed in 2023 and every 5 years after that. This is to account for changes in flood levels identified in future studies, particularly with the potential effects of Climate Change with sea level rise and increased rainfall intensities. Check with Council for the latest information.

geo-environmental ENGINEERING

STAGE 1 AND STAGE 2 ENVIRONMENTAL SITE ASSESSMENT

307 - 311 BEXLEY ROAD & 88 - 96
NEW ILLAWARRA ROAD, BEXLEY NORTH NSW

PREPARED FOR TONY SOUEID
REPORT ID: *E16016BN-R03F*

Date: 31st July 2017
Revision No.: 0.1

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EXECUTIVE SUMMARY

Geo-Environmental Engineering Pty Ltd (GEE) was commissioned by Tony Soueid to undertake a preliminary and detailed Environmental Site Assessment (ESA) at 307 - 311 Bexley Road & 88 - 96 New Illawarra Road, Bexley North, New South Wales (herein referred to as the 'site'). The site covers a combined area of approximately 4,200m^2 and comprises nine allotments which are legally referred to as Lots 3, 4, 5 and 6 in Deposited Plan 508629, Lots A and B in DP388204, Lot 1 in DP1045200, Lot 1 in DP 400341 and Lot 35 in DP663036.

The ESA was required to support a planning proposal which relates to the proposed rezoning of the land to R4 – High Density Residential, with the future development to include a basement (single or multiple levels) and up to six levels above ground.

The objective of the ESA was to address the requirements of Council's Contaminated Land Policy (reference 1) and the provisions of the *State Environmental Planning Policy No. 55 – Remediation of Land* (reference 2) by providing a preliminary assessment of contamination and in turn an assessment of the suitability of the site for the proposed land-use and possible constraints on future site development. In this regard, GEE has completed a *Stage 1 - Preliminary Site Investigation* (Stage 1 - PSI) and a *Stage 2 - Detailed Site Investigation* (Stage 2 DSI) in accordance with the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (reference 3) and NEPM (2013) Schedule B(2) *Guideline on Site Characterisation* (reference 4).

The scope of works comprised a:

- A review of the previous investigation report,
- Review of the environmental and physical setting in which the site lies, including geology, hydrogeology and topography,
- Review of the history of the site using readily available records and historical aerial photographs,
- Detailed site inspection for potential sources of contamination, and
- A detailed soil and groundwater sampling and analysis program to characterise potential contamination in accessible areas across the site.

A summary of the information obtained and results of this assessment is presented below.

Site History and Potential For Contamination

The historical information indicates that the site was originally part of a larger parcel of land (likely rural/residential) before being progressively subdivided between 1914 and 1940 while owned by NSW Realty Co Limited. Initially the southern part of the site (88 and 90 New Illawarra Road and 311A Bexley Road) was subdivided and sold as two allotments in 1918 and has since been owned by various individuals. The allotments were further subdivided in the late 1960s to create the residential allotment known as 311A Bexley Road (Lot 5 DP508629). Historical aerial photographs suggest that this part of the site has predominately been used for residential purposes (low density). However, the dwelling at No. 90 New Illawarra Road is also known to have been partly used for commercial purposes, including a Butchers in the 1970s and 1980s.

The central part of the site (94 New Illawarra Road and 311 Bexley Road) was subdivided by NSW Realty Co Limited and sold off in 1919 as two allotments which currently exist. Historical aerial photographs indicate that this part of the site has been occupied by residential dwellings (low density) and associated garages, sheds and pools.

The northern part of the site (including 307 – 309 Bexley Road and 96 New Illawarra Road) was sold by NSW Realty Co Limited in 1940 and subdivided into the existing allotments by 1954. 96 New Illawarra Road (Lot A in DP388204) was developed into a dwelling circa 1954, while the remaining part of the land was developed into a service station (including mechanical repair workshop) soon after (late 1950s).

Of particular significance to this investigation are the activities associated with the service station at the northern end of the site, specifically the storage and use of fuels and mechanical repair of vehicles.

Soil Conditions

Soil conditions across the site were assessed at seventeen borehole locations positioned in accessible areas across the site and targeting areas of potential contamination. The number of sampling points exceeds the minimum number of sampling points required for adequate site characterisation as defined by the EPA NSW and Australian Standards, and it is the opinion of GEE that the number of sampling points was sufficient to support the planning proposal.

The majority of the boreholes drilled by GEE were dry during drilling and also upon completion. Exceptions included some seepage water encountered below 1.6m in

borehole BH102 and slight seepage noted between a depth of 2.0m and 2.8m depth within borehole BH107.

The subsurface conditions, as observed in the boreholes, typically comprised fill material over sandy clay soil which was underlain by sandstone bedrock. The thickness of the topsoil and/or fill unit ranged from 0.3m to 2.7m depth while the depth to the bedrock formation ranged from 0.75m to 2.7m depth.

During the drilling of boreholes, there were no unusual odours (that could be potentially associated with contamination) noted. Additionally, no potentially Asbestos Containing Materials (ACM) was observed below ground during sampling and logging.

GEE submitted a total of 41 primary soil samples from the 17 boreholes to Envirolab for NATA accredited laboratory analysis of metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury and zinc), TRH, BTEX, PAHs, OCPs, PCBs and asbestos. The analytical results were compared against relevant set of ecological and health-based Site Acceptance Criteria (SAC) appropriate for the proposed land-use (high density residential).

In summary, the fill and natural soil was found to be free of significant contamination which would impact on the proposed development, future users of the site and the environment.

Groundwater Conditions

Groundwater conditions were assessed using three pre-existing monitoring wells (GW01 to GW03) and three recently installed monitoring wells (BH102, BH105, BH107).

The stabilised level of groundwater within the wells installed within BH102, BH107, GW01, GW02 and GW03 was measured on the 14th November 2016 (approximately 13 days after installation of the wells) at depths of 1.28m, 1.78m, 2.21m, 2.13m and 1.34m bgs respectively. The well within borehole BH105 was dry to a depth of 2.4m bgs. Water within the wells was slightly to moderately acidic (4.5<pH<6.5) and low in conductivity.

The water encountered in the wells is considered to be perched water flowing along the soil/bedrock interface and such water is normally significantly influenced by rainfall events and therefore its presence can be intermittent. This is supported by the fact that the well installed within borehole BH105 was dry to a depth of 2.4m.

Taking into account the approximate surface elevation at each of the well locations, it is inferred that the perched water is following the regional topography and flowing in a northerly to north-easterly direction. Although the flow direction is expected to have been significantly altered by the presence of UST tankpit excavations in the northern end of the site.

To assess the presence of contamination within the groundwater, a sample of water was collected and submitted to Envirolab for NATA accredited analysis of dissolved metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury), TRH, BTEX, PAHs and Phenols. The analytical results were then compared against a set of Groundwater Assessment Criteria (GAC) considered appropriate for the environmental setting of the site.

Conclusion and Recommendations

Based on observations made during the field investigations, the sampling and analysis program conducted at the site (including that completed previously by STS), the proposed land-use and with respect to relevant statutory guidelines, GEE conclude that the site can be made suitable for the proposed land-use described in the planning proposal, subject to the excavation, removal and validation of the existing UPSS. In accordance with Council's Contaminated Lands Policy and SEPP 55, a Remedial Action Plan should be prepared which details the methodology for the excavation, removal and validation of the existing UPSS.

1 PROJECT INFORMATION

1.1 INTRODUCTION AND OBJECTIVES

Geo-Environmental Engineering Pty Ltd (GEE) was commissioned by Tony Soueid to undertake a preliminary and details Environmental Site Assessment (ESA) at 307 - 311 Bexley Road & 88 - 96 New Illawarra Road, Bexley North, New South Wales (herein referred to as the 'site'). The site covers a combined area of approximately 4,200m^2 and comprises the following allotments:

- Lots 3, 4, 5 and 6 in Deposited Plan (DP) 508629,
- Lots A and B in DP 388204,
- Lot 1 in DP 1045200,
- Lot 1 in DP 400341, and
- Lot 35 in DP 663036.

A site survey plan is provided for reference in **Appendix A**, while a site location map is provided as **Figure 1**.

The ESA was required to support a planning proposal which relates to the proposed rezoning of the land to 'R4 – High Density' residential with likely development to include a basement (single or multiple levels) and up to six levels above-ground.

The objective of the ESA was to address the requirements of Council's Contaminated Land Policy (reference 1) and the provisions of the *State Environmental Planning Policy No. 55 – Remediation of Land* (reference 2) by providing a preliminary assessment of contamination and in turn an assessment of the suitability of the site for the proposed land-use and possible constraints on future site development.

In this regard, GEE has completed a *Stage 1 - Preliminary Site Investigation* (Stage 1 - PSI) and a Stage *2 – Detailed Site Investigation* (Stage 2 – DSI), in accordance with the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (reference 3) and NEPM (2013) Schedule B(2) *Guideline on Site Characterisation* (reference 4). The investigation was also conducted in accordance with relevant Office of Environment and Heritage (OEH)[1] endorsed guidelines, the SEPP 55 and relevant Australian Standards.

[1] The OEH incorporates the NSW Environment Protection Authority (EPA) and was formerly known as the NSW Department of Environment and Climate Change and Water (DECCW), the NSW Department of Environment and Climate Change (DECC) and NSW Department of Environment and Conservation (DEC).

1.2 PREVIOUS INVESTIGATIONS

GEE understands that a contamination assessment had previously been completed in 2011 for the northern part of the site (i.e. 307 – 309 Bexley Road), which is currently occupied by a Metro Petroleum service station. However, GEE has not been provided with a copy of this report.

More recently (early 2016), STS GeoEnvironmental Pty Ltd (STS) completed a geotechnical investigation at the northern end of the site (reference 5). The geotechnical report included:

- The drilling of five boreholes (BH1 to BH5 – Refer **Figure 2**) across the northern part of the site (i.e. 307-309 Bexley Road) using a mechanical drilling rig equipped with solid flight augers,
- The performance of Dynamic Cone Penetrometer (DCP) tests at each borehole location to assess the consistency and/or relative density of the soil profile,
- Collection of samples from each of the borehole, and
- Analysis of selective samples for pH, sulphate and chloride content to provide a preliminary assessment of the aggressivity of the soil profile.

The subsurface conditions encountered by the STS boreholes comprised concrete and/or asphalt over fill material which was underlain by natural (i.e. previously undisturbed) sandy clays, clayey sands and weathered sandstone bedrock. The fill layer extended to a maximum depth of 1.6m, while the bedrock formation was encountered at depths of between 2.0m and 4.6m.

1.3 SCOPE OF WORKS

The scope of works completed by GEE, to achieve the above objectives, is provided below:

- A review of the previous investigation report,
- A review of the environmental and physical setting in which the site lies, including geology, hydrogeology and topography,
- A review of the history of the site using readily available records and historical aerial photographs,
- A site inspection for potential sources of contamination,
- Field investigations including:

- The drilling of seventeen boreholes (BH101 to BH109 and BH201 to BH208) across accessible areas of the site,
- The installation of a groundwater monitoring well within three of the nine boreholes. These three wells compliment three existing wells at the northern end of the site within the existing Metro Petroleum Service Station. The origin of the existing wells is not known although they are believed to have been installed during the 2011 contamination assessment mentioned above. For the purpose of this assessment the former wells were labelled as Well GW01, GW02 and GW02 (**Figure 2**),
- Sampling of soil from the boreholes, and
- Sampling of groundwater from the groundwater wells.

◊ Laboratory analysis of selected soil samples for a broad suite of potential contaminants,

◊ Laboratory analysis of the groundwater sample for a broad suite of potential contaminants, and

◊ Preparation of this report including the comparison of the laboratory analytical results against relevant NSW OEH endorsed guidelines.

2 SITE IDENTIFICATION

A summary of the site location details is provided below, while a site location map is provided as **Figure 1**:

Street Address:	307 - 311 Bexley Road & 88 - 96 New Illawarra Road, Bexley North (**Figure 1**)
Legal Description:	Lots 3, 4, 5 and 6 in Deposited Plan 508629, Lots A and B in DP388204, Lot 1 in DP1045200, Lot 1 in DP 400341 and Lot 35 in DP663036.
Coordinates (MGA 56):	325760m E, 6242900m N
Local Government Area:	Bayside (formerly Rockdale)
Site Area:	Approximately 4,200m^2
Current Zoning:	Low Density Residential (R2)[2]
Current Use:	Mixture of low density residential and commercial/industrial (Metro Service Station)
Proposed Zoning:	High Density Residential (R4)
Proposed Use:	Commercial-residential mixed use

[2] Bayside (Rockdale) Local Environment Plan (LEP) 2011

3 SITE HISTORY

The history of the site was researched to provide an understanding of past and present site activities, which in turn may indicate sources and areas of potential contamination as well as potential chemicals of concern.

Information obtained and reviewed included:

- Historical aerial photographs dating back to 1943, as supplied by Lotsearch Pty Ltd using sources including the NSW Land and Property Information, or online aerial photography such as Google Earth, and Nearmap Limited (**Appendix B**).
- Historical title information, dating back to 1910, obtained from Hazlett Information Services (**Appendix C**).
- Historical business directory records from 1950, 1970 and 1991 which is provided in the Lotsearch Report (**Appendix B**).
- A search of dangerous good licences held with WorkCover NSW which often includes underground fuel storage tanks (USTs) (**Appendix D**).
- A search of the contaminated land database, which is available on the OEH website and reiterated in the Lotsearch report (**Appendix B**). This search reveals if there has been any past records of written notices issued on the site by OEH under the Contaminated Land Management Act 1997 (CLM Act), including preliminary investigation orders. Additionally, the search can reveal if the site has ever been notified to the OEH under Section 60 duty to report contaminated sites, of the CLM Act.

GEE notes that a search of WorkCover NSW records for licenced dangerous goods was not completed for the residential properties because it was considered highly unlikely that such dangerous goods would be stored or used.

3.1 HISTORICAL AERIAL PHOTOGRAPHS

Historical aerial photographs were examined for the years 1943, 1955, 1961, 1965, 1970, 1982, 1991, 2000, 2007 and 2014. A description of the site from each photograph is provided below while a copy of the aerial photography is provided in **Appendix B**:

1943 The earliest available aerial image reveals that Bexley Road and New Illawarr Roads were both formed. The northern part of the site (currently occupied by Metro Petroleum) was undeveloped land covered by grass with a tree (or two)

present in the north-western corner. Elsewhere, there was a residential dwelling occupying 94 New Illawarra Road (Lot 1 DP400341), 90 New Illawarra Road (Lot 4 DP508629) and 88 New Illawarra Road (Lot 3 DP508629) and each of these properties appeared to extend east to Bexley Road where there were a few sheds and or garages.

Surrounding land was predominately residential (low density) with much vacant grass covered land.

1955 By 1955 a residential dwelling had been constructed on 96 New Illawarra Road (Lot A DP388204) and 311 Bexley Road (Lot 6 DP 508629). No. 311A Bexley Road appeared to be the rear yard of the dwelling at 88 and 90 New Illawarra Road. The northern part of the site remained undeveloped.

On surrounding land there has been increased development, particularly low density residential.

1961 By 1961 the Service Station at the northern end of the site (Lot 1 DP1045200 and Lot B DP 388204) had been constructed. Elsewhere a new and larger residential dwelling had been constructed at 94 New Illawarra Road (Lot 1 DP400341).

On surrounding land there has been increased development for residential and commercial land use, with the most obvious addition being a large residential-commercial development to the north (which is known to be a series of shops with residential apartments above).

1965 There appears to be little change to the site since 1961. The main change on surrounding land is the development of residential apartment buildings on the land immediately to the south of the site.

1970 By 1970 the land at the rear of 88 and 90 New Illawarra Road had been subdivided creating 311A Bexley Road) and a new residential dwelling had been constructed.

On surrounding land there appears to be little change when compared to the 1965 image.

1982 There appears to be little change to the site and surrounding land when compared to the 1970 image.

1991 There appears to be little change to the site and surrounding land when compared to the 1982 image.

2000 There appears to be little change to the site and surrounding land when

compared to the 1991 image.

2007 There appears to be little change to the site and the surrounding land when compared to the 2000 image.

2014 There appears to be little change to the site and the surrounding land when compared to the 2007 image.

Based on review of the aerial photographs, the most significant observation was the presence of the Service Station located at the northern end of the site, which is currently operated by Metro Petroleum. Elsewhere the site has been occupied by residential dwelling and associated sheds/garages since the earliest available photograph from 1943. However, the author of this report can confirm from local knowledge that the building at 90 New Illawarra Road was also partly used for commercial purposes some 20 to 30 years ago, specifically as butcher on the ground floor.

3.2 HISTORICAL TITLE INFORMATION

A copy of the historical title information obtained from circa 1910 to present is provided for reference in **Appendix C,** along with a summary table listing the past proprietors (owners) and leaseholders of the allotments.

The historical information indicates that the site was originally part of a larger parcel of land (likely rural/residential) before being progressively subdivided between 1914 and 1940, while owned by NSW Realty Co Limited. A summary of the title information is provided below and has been separated into the main areas of the site:

- *307-309 Bexley Road (Lot 1 DP1045200 and Lot B DP 388204 and Lot 35 DP 663036)*

From 1910 to 1954 this part of the site was owned by various individuals and when cross referenced with aerial photographs the land was undeveloped. In 1954 the land was sold to HC Sleigh Limited which is known to have operated Golden Fleece Service Stations. Caltex purchased the site from Golden Fleece (HC Sleigh Limited) in 1995 before being transferred to an individual (Daniel Anthony Ishkhanian) in the same year. Since then the site has been owned by other individuals and a company called Oriental Pacific Holdings Pty Limited which a Google search suggests is also related to the petroleum/service station industry.

In summary the title records support the aerial photographs and indicate that this part of the site has been a service station since 1954 to present. The current owners are Mtanios and Nazah Soueid and it is leased to Michael and Raed Hanna.

- 88 – 96 New Illawarra Road (Lot A DP 388204, Lot 1 DP400341 and Lots 3,4 and 6 DP 508629), 311 and 311A Bexley Road (Lots 5 and 6 in DP508629)

These allotments were progressively formed by subdivision between 1918 and 1962 and have all been owned by various individuals. This supports the historical aerial photographs which suggest that this part of the site has predominately been used for residential purposes (low density). However, the dwelling at No. 90 New Illawarra Road is also known to have been partly used for commercial purposes, including a Butchers circa 1980s.

3.3 BUSINESS DIRECTORY LISTINGS

A search of the historical business directory listings from 1950, 1970 and 1991 was completed to assist with determining any past land-use activities, and in particular past land-use activities that may cause contamination. A list of some activities that may cause contamination is provided in Table 1 of SEPP 55 (reference 2) and includes motor garages, dry cleaners and service stations.

The results are provided in the Lotsearch Report (**Appendix B**) and they confirmed the existence of a service station and motor vehicle repair centre in the northern part of the site in 1950, 1970 and 1991. The search also confirmed the presence of a Butchers at 90 New Illawarra Road both in 1950 and 1970 business directory.

Beyond the subject site there is another service station with mechanical workshop listed on the 1970 and 1991 director which is located approximately 60 to 70 m to the north of the site. There is also a dry cleaners located approximately 100m to the north/north-east. This service station and dry cleaners are both expected to be down-hydraulic gradient of the site and therefore unlikely to have any impact on the site.

3.4 WORKCOVER NSW

WorkCover NSW has searched their Stored Chemical Information Database and has provided records of licensed dangerous goods (e.g. fuel) being kept on the premises. The WorkCover documents are provided in **Appendix D** and indicate that there are six Underground fuel Storage Tanks (USTs) located on the site. The earliest record of the USTs was from 1964 when the service station was being operated by Golden Fleece.

According to the plan of the site at this time there were four USTs present (identified herein as Tanks 1 to 4) and these were likely installed at the same time that the service station was developed (i.e. late 1950s). Around 1970 another UST was installed (Tank 5) and by mid 1970s two of the original USTs (Tanks 3 and 4) were abandoned and presumably remain below ground. Circa 1979 another larger UST was installed (Tank 6) and a small kerosene UST was also installed (Tank 7). Most recently (circa 1995) the largest UST (Tank 8) was installed, while recent plans provided by WorkCover NSW suggest that another tank (herein referred to as Tank 9) exists adjacent to the vehicle workshop and is used for waste oil. GEE has not confirmed the size of the waste oil tank or whether it was an Above ground Storage Tank (AST) or a UST.

A table summarising the UST details including estimated installation date, size and contents is provided in **Table 1**. The approximate locations of the USTs are shown on **Figure 3**.

Table 1: UST Details

Tank Number	Location	Installed Date	Contents	Size	Status
Tank 1	Next to main canopy	Approx 1959	Super (now unleaded)	7,500L	In Use
Tank 2	North of Office/Shop	Approx 1959	Super (now diesel)	7,500L	In Use
Tank 3	North of Office/Shop	Approx 1959	Not known	3,700L	Abandoned
Tank 4	North of Office/Shop	Approx 1959	Not known	3,700L	Abandoned
Tank 5	Northern End	Approx 1970	Super (now unleaded)	27,600L	In Use
Tank 6	Northern End	Approx 1979	Super (now unleaded)	27,600L	In Use
Tank 7	West of office/shop	Approx 1979	Kerosene	2,000L	Likely abandoned
Tank 8	South-eastern part of service station	Approx 1995	unleaded	34,000L	In Use
Tank 9	Adjacent to the Workshop	Approx 1995	Waste oil	Not known	In Use

According the dangerous goods licencing information, LPG is also stored on site in above ground tanks.

3.5 CONTAMINATED LAND DATABASE

A search of the contaminated land database, which is available on the Office of Environment and Heritage (OEH) website, was conducted and revealed there has been no past record of written notices issued on the site, by the OEH, under the Contaminated Land Management Act 1997 (CLM Act), including preliminary investigation orders. Additionally, the site has never been notified to the OEH under Section 60 duty to report contaminated sites, of the CLM Act.

Beyond the subject site, there were no properties within a 1km radius that that has been notified to the NSW EPA under Section 60 of the CLM Act or had notices issued on them by the OEH.

3.6 SUMMARY OF SITE HISTORY INFORMATION

The historical information indicates that the site was originally part of a larger parcel of land (likely rural/residential) before being progressively subdivided between 1914 and 1940 while owned by NSW Realty Co Limited. Initially the southern part of the site (88 and 90 New Illawarra Road and 311A Bexley Road) was subdivided and sold as two allotments in 1918 to George and Annie Gibbons and has since been owned by various individuals. The allotments extended between New Illawarra Road to the west and Bexley Road to the east and were further subdivided in the late 1960s to create the residential allotment known as 311A Bexley Road (Lot 5 DP508629). Historical aerial photographs suggest that this part of the site has predominately been used for residential purposes (low density). However, the dwelling at No. 90 New Illawarra Road is also known to have been partly used for commercial purposes, including a Butchers in the 1970s and 1980s.

The central part of the site (94 New Illawarra Road and 311 Bexley Road) was subdivided by NSW Realty Co Limited and sold off in 1919 as two allotments which currently exist. Historical aerial photographs indicate that this part of the site has been occupied by residential dwellings (low density) and associated garages, sheds and pools.

The northern part of the site (including 307 – 309 Bexley Road and 96 New Illawarra Road) was sold by NSW Realty Co Limited in 1940 and subdivided into the existing allotments by 1954. No. 96 New Illawarra Road (Lot A in DP388204) was developed into a dwelling circa 1954, while the remaining part of the land was developed into a service station (including mechanical repair workshop) soon after (late 1950s).

Of particular significance to this investigation are the activities associated with the service station at the northern end of the site, specifically the storage and use of fuels and mechanical repair of vehicles.

4 SITE CONDITION AND SURROUNDING ENVIRONMENT

4.1 SITE DESCRIPTION

The site bounded by New Illawarra Road to the west, Bexley Road to the east a park/recreational space to the north and residential land to the south.

At the time of the field investigation, a Metro service station, with shop and mechanical workshop, occupied the northern end of the site (307-309 Bexley Road). The buildings in this part of the site were constructed of fibro and brick with a corrugated iron roof. Additionally, there was a metal awning extending from the eastern side of the shop over three fuel dispensers. A fourth fuel dispenser was located midway along the northern boundary. There were several underground fuel Storage Tanks (USTs) across the Metro Service station property and the surface predominately comprised concrete or asphalt pavements with some garden beds along the perimeter of the property. The exact number of USTs was not confirmed but based on WorkCover NSW documents it is believed that there are nine tanks present (refer to **Table 1** and **Figure 3**).

Three groundwater monitoring wells were also observed across the Metro Service station forecourt and are likely from the former contamination assessment completed in 2011. As previously mentioned, GEE has not been provided with a copy of this report. Each of these wells were used to sample groundwater as part of this investigation and for the purpose of this investigation they were labelled GW01 to GW03. Their approximate locations are shown on **Figure 2**.

The remainder of the site was occupied by residential dwellings, associated garages, sheds and swimming pools, although the dwelling at 94 New Illawarra Road was being used for commercial purposes (specifically an office for the Mental Health Recovery Institute.

4.2 TOPOGRAPHY

During the site investigation, it was noted that the site was situated on a slope, highest in elevation at the southern end of the site, dipping down towards the north and north-east at approximately 5% to 10%.

4.3 GEOLOGY AND SOILS

4.3.1 *Regional*

A review of the Sydney 1:100,000 regional geological map (reference 6) indicates that the site is situated on the geological contact between the Ashfield Shale and

Hawkesbury Sandstone formations. The Ashfield Shale formation comprises "*...black to dark-grey shale and laminite*" whilst the Hawkesbury Sandstone typically consists "*...medium to coarse-grained quartz sandstone, very minor shale and laminite lenses".*

A review of the regional soils map (reference 7) indicates the site is located within the Gymea Soil Landscape Group, recognised by undulating to rolling rises and low hills on Hawkesbury Sandstone. Local reliefs are between 20-80m while slopes are typically between 10-25% in gradient. Soils of the Gymea Group are typically erosional sands and clays, have very low soil fertility and form a high soil erosion hazard.

4.3.2 *Local*

The subsurface conditions encountered by the STS boreholes (reference 5) comprised concrete and/or asphalt over fill material which was underlain by natural (i.e. previously undisturbed) sandy clays, clayey sands and weathered sandstone bedrock. The fill layer extended to a maximum depth of 1.6m, while the bedrock formation was encountered at depths of between 2.0m and 4.6m.

4.4 HYDROGEOLOGY

Permanent groundwater is likely to be confined or partly confined within discrete, water-bearing zones within the bedrock formation. However, intermittent 'perched' water seepage is likely to occur at the soil-bedrock interface following heavy and prolonged rainfall events.

Groundwater flow is dominated by water movement through fractures or joints, where stress has caused partial loss of cohesion in the rock, with evidence of potential water bearing fractures usually the presence of clay or iron-staining along the face of joints.

4.5 ACID SULFATE SOIL POTENTIAL

Acid Sulfate Soil is naturally occurring sediments and soils containing iron sulfides (principally iron sulfide, iron disulfide or their precursors). Oxidation of these soils through exposure to the atmosphere or through lowering of groundwater levels results in the generation of sulfuric acid.

Land that may contain potential acid sulfate soils was mapped by the NSW Department of Land and Water Conservation (DLWC) and based on these maps local Councils produced their own acid sulfate soil maps to be used for planning purposes.

The Acid Sulfate Soils Map produced by the NSW Department of Planning and Environment, via interactive online mapping, indicates that the site lies within area defined as "*Class 5*". In accordance with Clause 6.1 of Council's Local Environment Plan (LEP) 2011, a preliminary assessment of acid sulfate soil and potentially a management plan is recommended for any "*Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land*".

Firstly, the surface elevation is greater than 5m AHD (approximately between 10-20m AHD). Secondly, the maximum depth of proposed excavation is expected to be 7m below the ground surface (bgs) which equates to a bulk excavation level which is significantly greater 1m AHD. Additionally, there is no need for de-watering which would reduce the water table in adjoining Class 1 to Class 4 land below 1m AHD, which according to the acid sulphate maps produced by Council, is approximately 250m west of the site. In this regard, there is no need for an acid sulphate soil assessment or management plan

5 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) is a representation, or summary, of information obtained regarding potential contamination sources, receptors and exposure pathways between the sources and receptors. The key elements of a CSM include:

- known and potential sources of contamination and contaminants of concern, including the mechanisms of contamination (such as 'top down' spills or sub-surface releases from corroded tanks or pipes),
- potentially affected media (such as soil, sediment, groundwater, surface water, indoor and ambient air),
- human and ecological receptors, and
- potential and complete exposure pathways.

GEE notes that this CSM is based on existing information (i.e. the historical information and the review of the site physical and environmental setting).

5.1 CONTAMINANT SOURCES

Based on GEE's knowledge of the site, including review of the site's history and physical and environmental setting, the main sources of potential contamination include:

- *Past development of the site, specifically the potential for contaminated fill.*

  With any site development works there is a possibility that fill material was used to raise site levels above predicted flood levels, or to create a level building platform. When sourced from an unknown origin, the quality of the fill is also unknown and potentially contaminated. Based on the regional topography, historical aerial photographs and an intrusive investigation completed by STS, filling up to 2.0m depth was encountered at the northern end of the site.

- *Current use of the site as a petrol station and auto-repair workshop.*

  This may have resulted in 'top down' contamination of fuels from the service pumps and the fuels, oils, paints, and solvents during the machinery operations. However, the concrete pavement / floor slab across the site would have minimised any migration of contaminants into the ground.

- *Current storage and use of petrol / diesel in USTs.*

  The USTs and any associated infrastructure has the potential to cause significant soil and groundwater contamination if leakage occurs. There is also the potential

for 'top down' spills or leaks of the fuel/solvents during filling and extraction of the products from the USTs, however, the concrete pavement would have minimised any migration of contaminants into the ground.

5.2 POTENTIAL CONTAMINANTS OF CONCERN

A summary of the potential contaminants of concern attributed to the fill is summarised below in **Table 1**.

Table 1: Summary of Potential Contamination

Potential Contaminating Activity	Area of Environmental Concern (AEC)	Chemical of Potential Concern (COPC)
Past filling	Entire Site	Metals, TRH, Polycyclic Aromatic Hydrocarbons (PAHs), Pesticides (OCPs), PCBs and Asbestos[3]
Current Vehicle Repair Shop	The likely use and storage of fuel products and oil	TRH, BTEX, Lead, PAHs, Phenols.
Current UST	Leakage of current contents and existing petroleum hydrocarbon impacted water	TRH, BTEX, Lead

5.3 POTENTIAL OR KNOWN CONTAMINATED MEDIA

Potential contaminated media is the fill layer across the site and natural soil and/or bedrock in the vicinity of the existing USTs. Groundwater is likely to also be impacted, particularly nearby the existing USTs.

5.4 CONTAMINANT RECEPTORS

Potential receptors to the contamination include workers engaged to construct the proposed development including earthworks contractors. Future users of the site are not expected to be impacted because the majority of the site will be excavated to facilitate the construction of a basement.

5.5 POTENTIAL EXPOSURE PATHWAYS

At this preliminary stage, potential exposure pathways include direct contact for workers on site and future users of the site.

[3] These are common contaminants of concern for developed areas across Sydney.

6 SAMPLING AND ANALYSIS PROGRAM

The sampling and analysis program was designed with reference to the site's history and a recent site inspection. The purpose of the program was to provide a preliminary assessment of the soil and groundwater conditions across the entire site, particularly in areas of environmental concern.

In accordance with the NSW DEC *Contaminated Sites: Guidelines for NSW Site Auditor Scheme* (reference 8), the Data Quality Objectives (DQOs) process was used to define the type, quantity and quality of the data needed to support decisions relating to the environmental condition of a site. Details of the DQO process adopted for the soil sampling and analysis program is provided in **Appendix E**.

6.1 SAMPLING PROGRAM

The sampling program was undertaken in two stages by Stephen McCormack from GEE and comprised:

- The drilling of seventeen boreholes (BH101 to BH109 and BH201 to 208) in accessible areas across the site,
- Installation of a groundwater monitoring well within three of the nine boreholes (BH102, BH105 and BH107),
- The collection of soil samples from each borehole for subsequent selective laboratory analysis, and
- The collection of a groundwater sample from each of the groundwater monitoring wells installed on the site, for subsequent laboratory analysis.

6.1.1 *Borehole Drilling Operations and Logging*

Fieldwork was completed in two stages and prior to the commencement of the bores a scan for potential underground services and utilities was completed by a specialist contractor and cross-checked with the results of a Dial Before you Dig (DBYD) search.

The initial stage of fieldwork was completed in November 2016 and comprised the drilling of nine boreholes (BH101 to BH109) in accessible areas across the site with a particular focus on the service station which represented the most significant risk of contamination. The second stage of fieldwork was completed in July 2017 and comprised the drilling of an additional eight boreholes (BH201 to BH208) to provide increased coverage across the site.

The number of sampling points (boreholes), when combined with the STS boreholes, exceeds the minimum number of sampling points required for adequate site characterisation as defined by the EPA NSW and Australian Standards (reference 10 and 11) and was considered by GEE to be appropriate for the current and past land-use.

The boreholes were positioned to provide broadly even coverage across the site, subject to the constraints of existing buildings and buries infrastructure. The boreholes were drilled using either an 85mm diameter stainless steel hand auger operated by Stephen McCormack from GEE, or with a mechanical Hanjin D&B track rig that was owned and operated by Total Drilling Pty Ltd and equipped with Solid Flight Augers (SFA) and a tungsten-carbide drill bit (TC-bit). The hand auger was used in areas where the mechanical rig could not access.

The majority of boreholes drilled by GEE were dry during drilling and also upon completion. Exceptions included some seepage water encountered below 1.6m in borehole BH102 and slight seepage noted between a depth of 2.0m and 2.8m depth within borehole BH107.

With the exception of borehole BH104, the boreholes were extended through any fill material into the natural soil profile before terminating on, or within, the underlying sandstone bedrock formation at depths of between 0.75m and 3.8m below ground surface (bgs). Borehole BH104 refused on an obstruction within the fill profile (likely concrete) at a depth of 1.2m bgs.

To minimise cross contamination between sampling locations, the hand auger and the lead SFA was washed with Decon90, a laboratory grade cleaning agent and decontaminant, at the start of the fieldwork and after each boreholes. The auger was then rinsed vigorously with water after to ensure the removal of all traces of contamination as well as the cleaning agent.

During drilling, the encountered fill material and any natural soil was geologically logged, taking care to describe the presence and depth of any adverse aesthetics such as discolouration or odours, of which there were none. Detailed descriptions of the subsurface conditions on site are provided in the borehole logs provided in **Appendix F**.

A summary of the borehole information, including total depth, is provided in **Table 2** and their locations are shown on **Figure 2**. Also included in Table 1 and Figure 2 are details and location of the geotechnical bores completed by STS (reference 5).

Table 2: Summary of the Borehole Information

Borehole ID	Date Completed	Drilling Method	Total Depth	Depth of Filling [1]	Depth to Bedrock	Well Screen Interval
			(m BGS)	(m BGS)	(m BGS)	(m BGS)
GEE Boreholes						
BH101	1 Nov 2016	Mechanical	3.8	0.4	2.7	--
BH102	1 Nov 2016	Mechanical	2.4	2.0	2.0	1.0 – 2.2
BH103	1 Nov 2016	Mechanical	1.4	1.1	1.1	--
BH104	1 Nov 2016	Mechanical	1.2	>1.2	--	--
BH105	1 Nov 2016	Mechanical	2.4	1.05	2.3	1.15 – 2.35
BH106	1 Nov 2016	Mechanical	2.2	0.6	1.9	--
BH107	1 Nov 2016	Mechanical	2.8	0.7	1.4	1.6 – 2.8
BH108	1 Nov 2016	Hand Auger	0.75	0.3	0.75	--
BH109	1 Nov 2016	Hand Auger	1.35	0.7	1.35	--
BH201	19 Jul 2017	Hand Auger	1.6	1.0	--	--
BH202	19 Jul 2017	Hand Auger	1.8	1.3	--	--
BH203	19 Jul 2017	Hand Auger	1.2	0.6	--	--
BH204	19 Jul 2017	Hand Auger	0.7	>0.7	--	--
BH205	19 Jul 2017	Hand Auger	1.0	0.5	--	--
BH206	19 Jul 2017	Hand Auger	1.1	0.6	--	--
BH207	19 Jul 2017	Hand Auger	1.0	0.4	--	--
BH208	19 Jul 2017	Hand Auger	1.0	0.5	--	--
STS Boreholes 2015						
BH1	14 Dec 2015	Mechanical	3.2	0.2	3.0	--
BH2	14 Dec 2015	Mechanical	0.6	>0.6	--	--
BH3	14 Dec 2015	Mechanical	5.0	1.6	4.6	--
BH4	14 Dec 2015	Mechanical	2.2	0.6	2.0	--
BH5	14 Dec 2015	Mechanical	0.8	>0.8	--	--

m BGS = metres below ground surface
Note 1: Depth of fill included topsoil, concrete and any soil which had been previously disturbed.

6.1.2 *Soil Sampling*

A total of 54 primary samples were collected from the seventeen GEE boreholes. This included a near-surface sample (approximately 0 – 200mm depth), followed by samples at regular intervals or changes in soils type. Each sample was collected by hand using dedicated, disposable nitrile gloves in general accordance with techniques described in Australian Standard AS4482.2 (reference 9) and NEPM (2013 – reference 4), to maintain the representativeness and integrity of the samples. The soil was then placed in laboratory supplied, acid washed glass jars.

Field screening of samples for the potential presence of volatile contaminants, such as fuel, was not carried out, however, there was no obvious hydrocarbon odour noted during the fieldwork and the majority of near surface soil samples were analysed for volatile component of Total Petroleum Hydrocarbons, which is more conclusive than field screening with a PID.

The samples for laboratory analysis were each labelled with a unique sample identification number, in addition to the date of collection and project number, before being placed on ice within an esky. The sample identification number was repeated on the borehole logs (**Appendix F**)

At the completion of each borehole, including logging and the sampling of soils, each borehole was backfilled with soil cuttings. A summary of the samples collected during this investigation is provided in **Table 4.**

6.1.3 *Groundwater Well Installations and Monitoring*

Groundwater monitoring wells were installed in boreholes BH102, BH105 and BH107 in general accordance with the Land and Water Biodiversity Committee (2012) *Minimum Construction Requirements for Water Bores in Australia* (reference 12), using 50 mm diameter uPVC pipe, with a machine slotted screen section, 2 mm sand pack and a bentonite seal. The depths of the screened section of the well is provided in **Table 2**.

The stabilised level of groundwater within the wells installed within BH102, BH107, GW01, GW02 and GW03 was measured on the 14th November 2016 (approximately 13 days after installation of the wells) at depths of 1.28m, 1.78m, 2.21m, 2.13m and 1.34m bgs respectively. As previously mentioned, the well within borehole BH105 was dry to a depth of 2.4m bgs.

The water encountered in the wells is considered to be perched water flowing along the soil/bedrock interface and such water is normally significantly influenced by rainfall events and therefore its presence can be intermittent. This is supported by the fact that the well installed within borehole BH105 was dry. Taking into account the approximate surface elevation at each of the well locations, it is inferred that the perched water is following the regional topography and flowing in a northerly to north-easterly direction. Although the flow direction is expected to have been significantly altered by the presence of UST tankpit excavations in the northern end of the site.

6.1.4 *Groundwater Sampling*

Groundwater was sampled from three existing monitoring wells (GW01 to GW03), as well as from two monitoring wells installed by GEE (BH102 & BH107). It is noted that a monitoring well was also installed within BH105, however it was dry at the time of sampling.

Sampling was undertaken following purging of the wells to remove stagnant water from the well casing and to ensure that the samples are representative of groundwater in the surrounding geological formation.

Immediately prior to purging and sampling, the well was dipped to determine the depth to stabilised water level and, using a clear disposable bailer, assessed for the presence of a hydrocarbon sheen and Light Non-Aqueous Phase Liquids (LNAPLs) which may be floating on the water. Neither sheen nor LNAPLs was observed on the surface of the water in each well. However, a slight hydrocarbon odour was noted within wells GW01, GW02 and GW03 during purging and sampling.

Purging of the monitoring wells took place on the 11th of November 2016. The well was installed within a low-transmissive formation, therefore, slow to re-charge and thus purging was undertaken using a high volume pump with dedicated tubing until practically dry. Following purging, the wells were allowed to recharge to at least 80% before sampling later the same day, using dedicated Waterra foot valves.

A calibrated water quality meter was used during the sampling to assess pH, redox potential (Eh), electrical conductivity (EC), dissolved oxygen (DO) and temperature.

The groundwater was collected directly into laboratory supplied sample containers in order of volatility, with the most volatile substances collected first. Samples to be analysed for metals were collected last and filtered in the field using a new disposable 0.45micron filter and syringe. Samples to be analysed for volatile substances (*e.g.*

BTEX), were filled to the container brim and capped, making sure that there were no bubbles / headspace.

All sample containers were immediately placed within an esky in which ice had been added. At the end of each sampling day the samples in the esky were transported to the GEE office where more ice was added and the samples delivered to the laboratory (within one working day).

All sample containers were labelled with the sample number, project number and date collected and the information repeated on a Chain-of-Custody (COC) form which accompanied the samples to the laboratory. The chain-of custody form (provided by the laboratory) demonstrates that the samples were properly received, documented, processed and stored.

While on site, the supervising engineer/scientist filled out a copy of the GEE "Groundwater Sampling Field Sheet" which documents, the sample identification, date of sampling, time of sampling, stabilised groundwater level, water quality field screening results, physical description of the water, presence or absence of odour, well condition and volumes purged. A copy of the "Groundwater Sampling Field Sheet" is provided in **Appendix G**.

Finally, it is noted that the purging and sampling equipment did not require decontamination because GEE used dedicated equipment for each well.

A summary of the groundwater samples collected and analysed during this investigation are provided in **Table 5**.

6.2 *ANALYTICAL PROGRAM*

In accordance with Section 5.2, selected soil samples were analysed for a broad suite of potential contaminants, including:

- Metals (Arsenic, Cadmium, Chromium, Copper, Nickel, Lead and Zinc)
- TRH
- BTEX
- PAH
- OCPs
- OPPs

- PCBs
- Asbestos.

Also, the pH and Cation Exchange Capacity (CEC) of some samples was also analysed to assist with determining the most appropriate ecological assessment criteria for some metals.

The groundwater samples collected from existing and recently installed groundwater wells were analysed for dissolved metals, TRH, BTEX, PAH and VOC. The primary soil and groundwater environmental samples were analysed by Envirolab Services Pty Ltd which is National Association of Testing Authorities (NATA) registered for the testing undertaken.

A summary of the soil analytical program, including which samples were selected for analysis and the chemicals analysed, is provided in **Table 4**, while a summary of the groundwater analytical program is provided in **Table 5**.

Table 4: Summary of the Sampling and Analysis Program

Location	Sample Id	Sample Depth	Material Type	Analytical Program				
				Metals	TRH/ BTEX	PAHs	OCPs / PCBs	Asbestos
			Primary Samples					
BH101	SMC011116-01	0.2 – 0.3	FILL	✓	✓	✓	---	---
BH101	SMC011116-02	0.4 – 0.5	SAND	✓	✓	---	---	---
BH101	SMC011116-03	0.9 – 1.0	SAND	---	---	---	---	---
BH101	SMC011116-04	1.3 – 1.5	SAND	---	✓	---	---	---
BH101	SMC011116-05	3.0 – 3.3	SANDSTONE	✓	---	---	---	---
BH102	SMC011116-06	0.2 – 0.3	FILL	✓	✓	✓	✓	✓
BH102	SMC011116-07	0.6 – 0.7	FILL	---	---	---	---	---
BH102	SMC011116-08	0.9 – 1.0	FILL	---	---	---	---	---
BH102	SMC011116-09	1.8 – 2.0	FILL	✓	✓	✓	---	---
BH103	SMC011116-11	0.1 – 0.25	FILL	✓	✓	✓	---	---
BH103	SMC011116-13	0.5 – 0.7	FILL	✓	✓	✓	---	---
BH104	SMC011116-15	0.2 – 0.3	FILL	✓	✓	✓	✓	✓
BH104	SMC011116-16	0.5 – 0.65	FILL	✓	---	---	---	---
BH104	SMC011116-17	0.8 – 0.95	FILL	✓	✓	✓	---	---
BH105	SMC011116-18	0.1 – 0.2	FILL	✓	✓	✓	✓	✓
BH105	SMC011116-19	0.5 – 0.6	FILL	---	---	---	---	---
BH105	SMC011116-20	0.9 – 1.0	FILL	✓	✓	✓	---	---
BH105	SMC011116-21	1.1 – 1.25	Sandy CLAY	✓	✓	---	---	---
BH105	SMC011116-23	1.8 – 2.0	Sandy CLAY	---	---	---	---	---
BH106	SMC011116-24	0.1 – 0.3	FILL	✓	✓	✓	---	---
BH106	SMC011116-25	0.7 – 0.9	Sandy CLAY	✓	✓	---	---	---
BH106	SMC011116-27	1.3 – 1.5	Sandy CLAY	✓	---	---	---	---
BH107	SMC011116-29	0.1 – 0.2	FILL	✓	✓	✓	✓	✓
BH106	SMC011116-30	0.4 - 0.5	FILL	✓	---	---	---	---
BH107	SMC011116-28	0.7 – 0.8	Silty CLAY	---	---	---	---	---
BH107	SMC011116-31	1.5 – 1.6	SANDSTONE	---	---	---	---	---
BH107	SMC011116-35	2.5 – 2.8	SANDSTONE	---	---	---	---	---
BH108	SMC011116-32	0.0 – 0.15	TOPSOIL / FILL	✓	✓	✓	✓	✓
BH108	SMC011116-33	0.3 – 0.5	Sandy CLAY	✓	---	---	---	---
BH109	SMC011116-34	0.0 – 0.15	TOPSOIL / FILL	✓	✓	✓	---	---
BH109	SMC011116-36	0.5 – 0.6	TOPSOIL / FILL	---	---	---	---	---
BH109	SMC011116-37	0.7 – 0.85	Sandy CLAY	✓	---	---	---	---
BH201	JL190717-01	0.05 – 0.15	FILL	✓	✓	✓	---	---
BH201	JL190717-02	0.4 – 0.5	FILL	---	---	---	---	---
BH201	JL190717-03	0.7 – 0.8	FILL	✓	✓	✓	---	---

BH201	JL190717-04	1.0 – 1.1	Clayey SAND	✓	---	---	---	---
BH201	JL190717-05	1.4 – 1.5	Sandy CLAY	---	---	---	---	---
BH202	JL190717-06	0.25 – 0.35	FILL	✓	✓	✓	✓	---
BH202	JL190717-08	0.6 – 0.7	FILL	✓	✓	✓	---	---
BH202	JL190717-09	1.1 – 1.2	FILL	✓	---	---	---	---
BH202	JL190717-10	1.4 – 1.5	Sandy CLAY	✓	✓	✓	---	---
BH203	JL190717-11	0.15 – 0.25	FILL	✓	✓	✓	✓	✓
BH203	JL190717-12	0.7 – 0.8	Clayey SAND	✓	---	---	---	---
BH203	JL190717-13	1.1 – 1.2	Clayey SAND	---	---	---	---	---
BH204	JL190717-14	0.2 – 0.3	FILL	✓	✓	✓	✓	---
BH204	JL190717-15	0.6 – 0.7	FILL	✓	---	---	---	---
BH205	JL190717-16	0.05 – 0.15	FILL	✓	✓	✓	✓	✓
BH205	JL190717-18	0.6 – 0.7	Sandy CLAY	✓	✓	✓	---	---
BH206	JL190717-19	0.05 – 0.15	TOPSOIL / FILL	✓	✓	✓	---	---
BH206	JL190717-20	0.7 – 0.8	SAND	✓	---	---	---	---
BH207	JL190717-21	0.05 – 0.15	TOPSOIL / FILL	✓	✓	✓	---	---
BH207	JL190717-22	0.5 – 0.6	Sandy CLAY	✓	---	---	---	---
BH207	JL190717-23	0.9 – 1.0	Sandy CLAY	---	---	---	---	---
BH208	JL190717-24	0.05 – 0.15	TOPSOIL / FILL	✓	✓	✓	✓	✓
BH208	JL190717-26	0.5 – 0.6	Sandy CLAY	✓	---	---	---	---
Total				41	29	25	10	8
Quality Control Samples								
BH102	SMC011116-10	Blind Replicate of 'SMC011116-09'		✓	✓	✓	---	---
BH103	SMC011116-12	Split Replicate of 'SMC011116-11'		✓	✓	✓	---	---
BH103	SMC011116-14	Blind Replicate of 'SMC011116-13'		---	---	---	---	---
BH105	SMC011116-22	Blind Replicate of 'SMC011116-21'		---	---	---	---	---
BH106	SMC011116-26	Blind Replicate of 'SMC011116-25'		---	---	---	---	---
--	Trip Blank	Sand		---	✓[1]	---	---	---
--	Trip Spike	Sand		---	✓[2]	---	---	---
BH202	JL190717-07	Blind Replicate of 'JL190717-06'		✓	✓	✓	✓	---
BH205	JL190717-17	Blind Replicate of 'JL190717-16'		---	---	---	---	---
BH208	JL190717-25	Blind Replicate of 'JL190717-24'		---	---	---	---	---
--	Trip Blank	Sand		---	✓[1]	---	---	---
--	Trip Spike	Sand		---	✓[2]	---	---	---

Note 1: BTEX and TRH (C6-C9) only
Note 2: BTEX only

Table 5: Summary of the Groundwater Sampling and Analysis Program

Location	Sample Id	Analytical Program			
		Metals	TRH/BTEX	PAHs	Phenols
Primary Groundwater Samples					
BH107	AC111116-01	✓	✓	✓	✓
GW01	AC111116-03	✓	✓	✓	✓
GW02	AC111116-04	✓	✓	✓	✓
GW03	AC111116-05	✓	✓	✓	✓
BH102	AC111116-06	✓	✓	✓	✓
Quality Control Samples					
BH107	AC111116-02 Duplicate of 'AC111116-01'	✓	✓	✓	✓
--	Trip Blank	---	✓[1]	---	---
--	Trip Spike	---	✓[2]	---	---

Note 1: BTEX and TRH (C6-C9) only
Note 2: BTEX only

7 DATA QUALITY ASSESSMENT

A detailed Quality Assurance (QA) assessment, including the analysis of Quality Control (QC) samples, was carried out by GEE to determine the suitability and reliability of field procedures and analytical results. In accordance with NSW DEC (reference 8), the QA assessment used Data Quality Indicators (DQIs) which included:

- precision.
- accuracy (or bias).
- representativeness.
- completeness.
- comparability.

The detailed QA assessment report is provided in **Appendix H**, and concludes that the field procedures and analytical data presented herein are of suitable quality for making conclusions and recommendations regarding the contamination status of the site.

8 ASSESSMENT CRITERIA

8.1 SOIL

For any contamination assessment, it is necessary to evaluate the human health and ecological risks associated with the presence of site contamination. Also, in accordance with Appendix I of DEC, 2006 guidelines (reference 8), residential sites need to address aesthetics such as highly malodorous soils.

8.1.1 *Aesthetics*

Aesthetics was continually assessed in the field during borehole drilling and logging and no significant and adverse observations were noted.

8.1.2 *Ecological Risk*

To address potential ecological risks, GEE has compared the soil analytical results against the Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) appropriate for the land-use as detailed in NEPM (2013), *Schedule B(1) – Guidelines on Investigation Levels for Soil and Groundwater* (reference 13).

Ecological Investigation Levels (EILs)

EILs were derived for common contaminants in soil (specifically Arsenic, Copper, Chromium (III), DDT, naphthalene, Nickel, Lead and Zinc) and are based on a species sensitivity distribution (SSD) model developed for Australian conditions. They consider the physicochemical properties of soil (e.g. Cation Exchange Capacity, pH and clay content), contaminants and the capacity of the local ecosystem to accommodate increases in contaminant levels (referred to as the 'added contaminant limit' or ACL) above ambient background. Also, EILs consider various land use scenarios and generally only apply to the top 2m of soil which corresponds to the root zone and habitation zone of many species.

Finally, different EILs apply for 'fresh' contamination and 'aged' contamination. 'Fresh' contamination is usually associated with current activity and chemical spills, while a contaminant that has been incorporated into a soil for more than 2 years is considered to be 'aged'. For the purpose of this report 'aged' EILs have been adopted because any contamination present at the site is likely to have been present for more than 2 years.

To assist with determining appropriate EILs to screen the soil analytical results, particularly for Copper, Chromium -III, Nickel and Zinc, the Cation Exchange Capacity (CEC) and pH of the soil was analysed for each of the samples. The CEC values for

each sample ranged from <1.0 to 29.0 meq/100g, while the pH values ranged from 3.5 to 9.6. For the purpose of this report, and to screen the analytical results, GEE has adopted the lowest values for both CEC and pH which was a CEC of 1.0 meq/100g and pH of 3.5. Additionally, a value of 1% clay composition has been adopted when determining the EIL for chromium (III).

When determining the EILs for Copper, Nickel, Chromium and Zinc, ambient background concentrations can be used to increase the final EIL, however, for the purpose of this investigation zero ambient background concentrations have been adopted.

The broad land-use scenarios are areas of ecological significance, urban residential/ public space, and commercial/industrial. Each land-use scenario assumes different exposure scenarios and are generally based on the primary land-use activity of the exposed soils (i.e. any deep soil areas). For the proposed development, which includes a basement, commercial land-use on ground floor with residential living areas above, the most appropriate land use scenario is commercial / industrial, however, to be conservative, residential land-use has been adopted.

A summary of the EILs appropriate for the site is provided in **Table 6**.

Ecological Screening Levels (ESLs)

ESLs have been developed for selected petroleum hydrocarbon compounds (specifically TRH[4], BTEX and Benzo(a)pyrene) and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and like EILs the ESLs consider various land use scenarios, only apply to the top 2m of soil and differ for 'fresh' contamination and 'aged' contamination. For the purpose of this report, coarse-grained soil and 'aged' ESLs have been adopted. Coarse grained soil was adopted over fine grained soil because it provides the most conservative criteria and if an exceedance occurs then the criteria will be adjusted to suit the actual soil type.

With respect to land-use, residential ESLs have been adopted and like with EILs, these are considered to be conservative considering the proposed development is expected to include a basement with commercial tenancies on ground floor.

[4] ESLs for the various carbon fractions are based on TRH analysis with F1 (C6-C9) being obtained after subtraction of BTEX.

A summary of the ESLs appropriate for the site is provided in **Table 6.** GEE notes that screening levels are the concentrations of a contaminant above which will require further evaluation and consideration.

8.1.3 *Human Health Risk*

To address potential health impacts at the site, GEE has compared the analytical results against Health Investigation Levels (HILs) and Health Screening Levels (HSLs), provided in NEPM (2013), *Schedule B(1) – Guidelines on Investigation Levels for Soil and Groundwater* (reference 13).

Health Investigation Levels (HILs)

The HILs are scientifically based, generic assessment criteria to be used as a first stage (or tier 1) screening of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on four different and generic land use scenarios (i.e. HIL-A described as residential with accessible soils, HIL-B which includes residential with minimal opportunities for soil access, HIL-C for public space such as parks and HIL-D for commercial/industrial sites). Each land-use scenario assumes different exposure scenarios and when land is used for more than one purpose, the HILs that are relevant to the more sensitive land-use should be adopted. In this regard, the most appropriate land-use scenario is HIL-B.

HILs for soil contaminants are provided in Table 1A(1) of the NEPM guidelines and includes metals, PAHs, Pesticides and PCBs. Petroleum hydrocarbons are not included.

A summary of the HILs appropriate for the site is provided in **Table 6**.

Health Screening Levels (HSLs)

Health Screening Levels (HSLs) were developed for selected petroleum hydrocarbons (specifically TRH C_6 – C_{10} or F1 fraction, TRH $>C_{10}$ – C_{16} or F2 fraction and BTEX) by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) and have been adopted and are referenced in Schedule B(1) of NEPM (2013 – reference 13) and Friebel & Nadebaum (2011 – reference 14).

The assessment of petroleum hydrocarbon contamination is primarily driven by human health concerns relating to volatile components (e.g. TRH C_6 – C_{10}, TRH $>C_{10}$ – C_{16} and Benzene) which have the potential to cause health issues via vapour intrusion. HSLs also apply for direct human contact (Table A4 – reference 14) but only where this is likely.

For vapour intrusion and direct contact, different HSLs apply for different land use scenarios, different soil types (i.e. sand, silt and clay) and different depths. For the purpose of this investigation, criteria relevant for shallow (0m to 1m) sandy soils has been adopted to screen the soil analytical results because they are most conservative. If a sample exceedance occurs at greater depth then the criteria will be adjusted to suit.

With respect to land-use there are four scenarios:

- HSL-A for low density residential sites
- HSL-B for high density residential sites
- HSL-C for recreational/open space areas
- HSL-D for commercial and industrial sites

The land use setting is based on ground floor occupation because if the vapour exposure is acceptable at ground level then it can be assumed to be acceptable on the floors above. As previously mentioned it is proposed to construct a mixed-use development with commercial land-use at ground level and a one or two level basement. In this regard HSL-D is considered to be appropriate.

Where there is a HSL for vapour intrusion as well as direct contact, the lowest criteria has been adopted, which is the vapour intrusion HSLs. Where there are no direct contact or vapour intrusion HSLs available, GEE has adopted management limits (Table 1B(7) – reference 13) which apply for TRH. The management limits are designed to avoid or minimise potential effects of petroleum hydrocarbons including:

- The formation of observable light non-aqueous phase liquids (LNAPL),
- Fire and explosive hazards, and
- The effects on buried infrastructure e.g. penetration of, or damage to, in-ground services by hydrocarbons.

Again, there are different management limits for the various land use scenarios and GEE has adopted the management limits appropriate for high density residential sites have been adopted. Finally, where there are HILs or management limits available for a particular contaminant, GEE has adopted HSLs recommended for direct contact on high density residential sites (Table A4 – reference 17). A summary of the petroleum hydrocarbon HSLs adopted for the site is provided in **Table 6**.

Table 6: Soil Site Assessment Criteria (SAC)

Analyte	Health Investigation/Screening Levels (HILs/HSLs) (mg/kg)		Ecological Investigation/Screening Levels (EILs/ESLs) (mg/kg)	
	HIL-B / HSL-D	Reference	**Residential EIL/ESL**	Reference
Total Metals				
Arsenic	500	Table 1A – Reference 13	100	Table 1B(5) – Reference 13
Cadmium	150	Table 1A – Reference 13	--	--
Chromium (VI)	500	Table 1A – Reference 13	--	--
Chromium (III)	--	--	190	Table 1B(3) – Reference 13
Copper	30,000	Table 1A – Reference 13	35	Table 1B(2) – Reference 13
Lead	1,200	Table 1A – Reference 13	1,100	Table 1B(4) – Reference 13
Mercury (inorganic)	120	Table 1A – Reference 13	--	--
Nickel	1,200	Table 1A – Reference 13	6	Table 1B(3) – Reference 13
Zinc	60,000	Table 1A – Reference 13	95	Table 1B(1) – Reference 13
Total Polychlorinated Biphenyls (PCBs)				
Total PCBs	1	Table 1A – Reference 13	--	--
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	11,000	Table 1A(3) – Reference 13	170	Table 1B(5) – Reference 13
Benzo(a)pyrene	--	--	0.7	Table 1B(6) – Reference 13
Benzo(a)pyrene TEQ	4	Table 1A – Reference 13	--	--
TOTAL PAHs	400	Table 1A – Reference 13	--	--
Organochlorine Pesticides (OCP)				
Heptachlor	10	Table 1A – Reference 13	--	--
Aldrin + Dieldrin	10	Table 1A – Reference 13	--	--
Endrin	20	Table 1A – Reference 13	--	--
Chlordane	90	Table 1A – Reference 13	--	--
Endosulfan	400	Table 1A – Reference 13	--	--
HCB	15	Table 1A – Reference 13	--	--
Methoxychlor	500	Table 1A – Reference 13	--	--
DDE + DDD + DDT	600	Table 1A – Reference 13	--	--
DDT	--	--	180	Table 1B(5) – Reference 13
BTEX				
Benzene	3	Table 1A(3) – Reference 13	50	Table 1B(6) – Reference 13
Toluene	99,000	Table 1A(3) – Reference 13	85	Table 1B(6) – Reference 13
Ethylbenzene	27,000	Table 1A(3) – Reference 13	70	Table 1B(6) – Reference 13
Xylenes	230	Table 1A(3) – Reference 13	45	Table 1B(6) – Reference 13
Total Recoverable Hydrocarbons (TRH)				
(F1) C6 – C10	260	Table 1A(3) – Reference 13	180	Table 1B(6) – Reference 13
(F2) >C10 - C16	1,000	Table 1A(3) – Reference 13	120	Table 1B(6) – Reference 13
(F3) >C16 – C34	3,500	Table 1A(3) – Reference 13	300	Table 1B(6) – Reference 13
(F4) >C34 – C40	10,000	Table 1B(7) – Reference 13	2,800	Table 1B(6) – Reference 13
Asbestos				
Surface Soil	No visible Asbestos	Table 7 – Reference 13	--	--
Buried Bonded	0.04%	Table 7 – Reference 13	--	--
Buried Friable	0.001%	Table 7 – Reference 13	--	--

8.2 WATER SAMPLES

Assessment criteria for groundwater were derived from the NEPM (2013), *Schedule B(1) – Guidelines on Investigation Levels for Soil and Groundwater* (reference 13) which are based on the ANZECC/ARMCANZ (2000) *water quality guidelines (reference 15)*. However, with respect to specific petroleum hydrocarbons the assessment criteria provided in NEPM (2013) are based on Health Screening Levels (HSLs) developed by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) and published by Friebel & Nadebaum (2011 – reference 14).

Typically the assessment of petroleum hydrocarbon contamination is driven by human health concerns relating to volatile components (e.g. TRH $C_6 – C_{10}$ (F1), TRH $>C_{10} – C_{16}$ (F2), BTEX and Naphthalene) which have the potential to cause health issues or explosive risks via vapour intrusion. The HSL criterion depends on the soil type, the depth to groundwater and land-use scenario where the groundwater exists. The HSLs change depending on the soil type and depth to groundwater and for the purpose of this assessment GEE have adopted the most conservative criteria which relates to sand and a depth of less than 2.0 metres. Also, an exposure scenario of residential land use with limited accessible soil (HSL-B) has been adopted, which is considered conservative for the proposed development.

For other analytes not covered by HSLs, GEE has adopted the Groundwater Investigation Levels (GILs) which are derived from the from ANZECC/ARMCANZ (2000) *water quality guidelines (*reference 15). GILs for fresh water were adopted for this study rather than marine water guidelines, on the basis that the receiving system for groundwater at the site is most likely to be either Wolli Creek or Bardwell Creek. Also the electrical conductivity of the water within the groundwater wells was relatively low. A search of registered groundwater bores in the vicinity of the site did not reveal any drinking water extraction wells and therefore drinking water guidelines levels were not appropriate.

ANZECC/ARMCANZ (2000) specifies four sets of trigger values corresponding with different levels of protection for ecosystem conditions. Trigger values, derived using the statistical distribution method, relate to the protection of 99%, 95%, 90% and 80% of species in an aquatic ecosystem. Three "categories of ecosystem conditions" are developed in the guidelines and the level of protection afforded to a particular ecosystem should be determined following consideration of site conditions in consultation with key stakeholders. Additionally, for each chemical, ANZECC/ARMCANZ (2000) provides three grades of guideline trigger values: high, moderate or low

reliability trigger values. The grade depends on the data available and hence the confidence or reliability of the final figures.

The groundwater investigation levels (GILs) in NEPM (2013) relate to "slightly to moderately disturbed" aquatic ecosystems and adopt trigger values based on a 95% level of protection, however, this is increased to 99% for some chemicals that have the potential to bioaccumulate or where the 95% value may not provide sufficient protection for key species. In the absence of high or moderate reliable fresh water criteria, GEE has adopted the high or moderate reliable criteria for marine water. Then, in the absence of high or moderate trigger values, GEE has applied low reliability trigger levels from ANZECC/ ARMCANZ (2000) as 'first pass' criteria. It should be noted that low reliability trigger values were originally derived from insufficient data sets and should not be used as final guidelines but as indicative interim figures, which if exceeded, suggest the need to obtain further data.

Finally, in all cases where the laboratory limit of reporting exceeds the ANZECC/ARMCANZ (2000) trigger value, the detection limit of that analyte is used as a trigger for further investigation.

A summary of the Groundwater Assessment Criteria (GAC) adopted for this site is provided in **Table 7**.

Table 7: Groundwater Assessment Criteria (GAC)

Analyte	Units	GILs [1]	Source
Metals			
Arsenic V	µg/L	13	Table 1C (fresh) - Reference 13
Cadmium	µg/L	0.2	Table 1C (fresh) - Reference 13
Chromium VI	µg/L	1	Table 1C (fresh) - Reference 13
Copper	µg/L	1.4	Table 1C (fresh) - Reference 13
Lead	µg/L	3.4	Table 1C (fresh) - Reference 13
Nickel	µg/L	11	Table 1C (fresh) - Reference 13
Zinc	µg/L	8	Table 1C (fresh) - Reference 13
Mercury (inorganic)	µg/L	0.06	Table 1C (fresh) - Reference 13
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	µg/L	16	Table 1C (fresh) - Reference 13
Anthracene	µg/L	*0.4*	Reference 15
Phenanthrene	µg/L	*2*	Reference 15
Fluoranthene	µg/L	*1.4*	Reference 15
Benzo(a)pyrene	µg/L	*0.2*	Reference 15
Phenols			
Phenol	µg/L	*320*	Table 1C (fresh) - Reference 13
Total Petroleum Hydrocarbons (TPH)			
(F1) C6 – C10	µg/L	1,000 [2]	Table 1A(4) - Reference 13
(F2) >C10 - C16	µg/L	1,000 [2]	Table 1A(4) - Reference 13
(F3) >C16 – C34	µg/L	--	--
(F4) >C34 – C40	µg/L	--	--
BTEX			
Benzene	µg/L	800	Table 1A(4) - Reference 13
Toluene	µg/L	*180*	Reference 15 (fresh)
Ethylbenzene	µg/L	*80*	Reference 15 (fresh)
para-Xylene	µg/L	200	Table 1C (fresh) - Reference 13
ortho-Xylene	µg/L	350	Table 1C (fresh) - Reference 13

Notes:

[1] Criteria shown in italics are low reliability trigger values used as a first pass assessment in the absence of more reliable trigger values.

[2] Criteria depends on the type of soil and depth of sample. Criteria adopted is for sandy soil which is the most conservative and residential land use (HSL-B).

NL – Criteria Not Limiting

9 ANALYTICAL RESULTS

9.1 SOIL SAMPLES

A copy of the laboratory report is provided in **Appendix I**, while a summary of the results compared to the SAC (**Table 8**) is provided in below.

9.1.1 *Metals*

A total of 41 primary samples were analysed by GEE for the presence of metals, specifically, arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury. A summary of the results is provided below:

Metal	Number of Samples Analysed	Minimum Value	Maximum Value	SAC		Exceedances	
				Health	Ecological	Health	Ecological
Arsenic	41	<4	20	500	100	0	0
Cadmium	41	<0.4	0.9	150	--	0	0
Chromium	41	2	95	500	190	0	0
Copper	41	<1	45	30,000	35	0	**4**
Lead	41	1	590	1,200	1,100	0	0
Mercury	41	<0.1	2	120	--	0	0
Nickel	41	<1	87	1,200	15	0	**7**
Zinc	41	2	380	60,000	170	0	**9**

In summary, there were no samples that contained metal concentrations above the health-based SAC, however, sixteen samples contained concentrations of copper, nickel and/or zinc above the ecological based SAC. As previously mentioned, the ecological-based SAC are dependent on the CEC and/or pH of the individual samples. The SAC provided in **Table 6** are based on the lowest values of CEC and pH for all samples (i.e. 3.5 pH and 1.0 meq/100g) and was done as the 'first pass' assessment of the results. The actual CEC and pH results for these samples are as follows:

Sample ID	Actual pH value	Actual CEC (meq/100g)
SM011116-01	9.6	16
SM011116-02	9.1	16
SM011116-11/12	8.2	22
SM011116-16	8.3	12
SM011116-24	7.7	26
SM011116-32	7.0	11
SM011116-34	3.5	<1.0
SM011116-37	6.2	8.5
JL190717-01	6.6	20
JL190717-03	7.3	6.3
JL190717-06/07	8.6	29
JL190717-15	8.0	22
JL190717-16	5.7	6.2
JL190717-19	6.3	6.1
JL190717-21	6.2	6.1
JL190717-24	6.2	6.1

When using the actual CEC and pH values for each sample, the ecological SAC increases as indicated below:

Sample ID	Sample Concentration (mg/kg)	'First Pass' Ecological SAC (mg/kg)	Actual Ecological SAC
Copper			
SM011116-11/12	38	20	230
SM011116-16	42	20	210
SM011116-24	42	20	230
JL190717-24	45	20	130
Nickel			
SM011116-01	48	5	230
SM011116-02	20	5	230
SM011116-11/12	87	5	290
SM011116-24	63	5	320
JL190717-01	14	5	270
JL190717-03	9	5	60

JL190717-06/07	27	5	350
Zinc			
SM011116-32	380	75	510
SM011116-34	**100**	75	95
SM011116-37	110	75	430
JL190717-01	250	75	720
JL190717-15	130	75	830
JL190717-16	180	75	320
JL190717-19	220	75	350
JL190717-21	270	75	350
JL190717-24	**380**	75	350

As shown above, when adopting the individual pH and CEC sample results the sample concentrations were below the ecological SAC except for zinc within sample SM011116-34 and JL190717-24. Based on the analytical results, GEE considers that the elevated zinc concentration at these locations do not pose a significant contamination issue for the proposed development because:

- The concentrations are only slightly above the SAC,
- The site is not located within an area of known ecological significance,
- There will be no ecological exposure pathway available when the basement is constructed, and
- The EIL adopted was for residential land-use which is considered rather conservative considering the ground floor will be commercial land-use and the commercial based criteria would be 100mg/kg and 500mg/kg respectively.

In summary, metals do not pose a significant contamination issue for soils at the site.

9.1.2 *TRH and BTEX*

A total of 29 primary samples were selected for TRH and BTEX analysis. A summary of the results is provided below:

Analyte	Number of Samples Analysed	Minimum Value	Maximum Value	SAC		Number of Exceedances	
				Health	Ecological	Health	Ecological
TRH C6-C10 (F1)	29	<25	<25	260	180	0	0
TRH >C10 – C16 (F2)	29	<50	<50	1,000	120	0	0
TRH >C16 – C34 (F3)	29	<100	790	3,500	300	0	1
TRH >C34 – C40 (F4)	29	<100	480	10,000	2,800	0	0
Benzene	29	<0.2	<0.2	3	50	0	0
Toluene	29	<0.5	<0.5	99,000	85	0	0
Ethylbenzene	29	<1	<1	27,000	70	0	0
Xylenes	29	<2	<2	230	45	0	0

In summary, there were no samples that contained concentrations above the health-based SAC, however, one sample (JL190717-01 from BH201) contained a concentration of TRH C16-C34 (790mg/kg) which was above the ecological based SAC. GEE considers that the elevated TRH concentration at this location does not pose a significant contamination issue for the proposed development because:

- ◊ The site is not located within an area of known ecological significance,
- ◊ There will be no ecological exposure pathway available when the basement is constructed, and
- ◊ The EIL adopted was for residential land-use which is considered rather conservative considering the ground floor will be commercial land-use and the more relevant commercial based criteria is 1,700mg/kg.

In summary, metals do not pose a significant contamination issue for soils at the site.

9.1.3 *PAHs*

A total of 25 primary samples were analysed for PAHs. A summary of the results is provided below:

Analyte	Number of Samples Analysed	Minimum Value	Maximum Value	SAC		Number of Exceedances
				Health	Ecological	
Naphthalene	25	<0.1	<0.1	11,000	170	0
Benzo(a)pyrene	25	<0.05	0.2	--	0.7	0
Benzo(a)pyrene TEQ	25	<0.5	<0.5	4	--	0
Total PAHs	25	NIL(+)VE	2.1	40	--	0

Based on the soil analytical results, GEE considers that PAHs do not pose a contamination issue for the proposed development.

9.1.4 *OCPs and PCBs*

Eight primary samples were analysed for OCPs and PCBs and a summary of the results is provided below:

Analyte	Number of Samples Analysed	Minimum Value	Maximum Value	SAC		Number of Exceedances
				Health	Ecological	
Heptachlor	10	<0.1	<0.1	10	--	0
Aldrin + Dieldrin	10	<0.1	<0.1	10	--	0
Endrin	10	<0.1	<0.1	20	--	0
Chlordane	10	<0.1	<0.1	90	--	0
Endosulfan	10	<0.1	<0.1	400	--	0
HCB	10	<0.1	<0.1	15	--	0
Methoxychlor	10	<0.1	<0.1	200	--	0
DDE + DDD + DDT	10	<0.1	0.3	600	--	0
DDT	10	<0.1	<0.1	--	180	0
Total PCBs	10	<0.1	<0.1	1	--	0

On the basis of the soil analytical results, OCPs and PCBs are not considered to be a contamination issue for the development.

9.1.5 *Asbestos*

Asbestos fibres were not detected in each of the eight near surface soil samples selected for analysis and there were no obvious visible fragments of asbestos containing materials (such as fibro) observed below the surface in the nine boreholes.

TABLE 8 - Summary of Analytical Results (Soil)

Sample ID		SM011116-01	SM011116-02	SM011116-04	SM011116-05	SM011116-06	SM011116-09	SM011116-10	SM011116-11	SM011116-12	SM011116-13	SM011116-15	SM011116-16	SM011116-17	Site Acceptance Criteria	
Analyte	Location	BH101	BH101	BH101	BH101	BH102	BH102	Blind	BH103	Split	BH103	BH104	BH104	BH104	Health	Ecological
	Depth	0.2 - 0.3	0.4 - 0.5	1.3 - 1.5	3.0 - 3.3	0.2 - 0.3	1.8 - 2.0	Replicate	0.1 - 0.25	Duplicate	0.5 - 0.7	0.2 - 0.3	0.5 - 0.65	0.8 - 0.95		
	Type	FILL	SAND	SAND	SANDSTONE	FILL	FILL	of '09'	FILL	of '11'	FILL	FILL	FILL	FILL		
Asbestos																
Asbestos Detected	-	--	--	--	--	No	--	--	--	--	--	No	--	--	**0.04%**	--
Respirable Fibres	-	--	--	--	--	No	--	--	--	--	--	No	--	--	**0.001%**	--
Metals																
Arsenic	mg/kg	<4	<4	--	5	<4	9	12	5	20	12	<4	6	6	**500**	**100**
Cadmium	mg/kg	<0.4	<0.4	--	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	**150**	--
Chromium[1]	mg/kg	59	35	--	11	5	20	20	95	34	7	4	3	7	**500**	**190**
Copper	mg/kg	17	8	--	4	3	10	14	38	17	6	17	42	14	**30,000**	**35**
Lead	mg/kg	11	3	--	20	6	48	33	20	66	15	17	2	11	**1,200**	**1,100**
Mercury	mg/kg	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	**120**	--
Nickel	mg/kg	48	20	--	3	1	3	4	87	15	1	6	<1	2	**1,200**	**6**
Zinc	mg/kg	33	10	--	29	15	87	30	62	64	30	24	3	21	**60,000**	**95**
BTEX																
Benzene	mg/kg	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2	--	<0.2	**3**	**50**
Toluene	mg/kg	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	>0.1	<0.5	<0.5	--	<0.5	**99,000**	**85**
Ethylbenzene	mg/kg	<1	<1	<1	--	<1	<1	<1	<1	<0.1	<1	<1	--	<1	**27,000**	**70**
Total Xylenes	mg/kg	<2	<2	<2	--	<2	<2	<2	<2	<0.3	<2	<2	--	<2	**230**	**45**
TRH																
TRH C_6 - C_{10} (F1)	mg/kg	<25	<25	<25	--	<25	<25	<25	<25	<20	<25	<25	--	<25	**260**	**180**
TRH >C_{10} - C_{16} (F2)	mg/kg	<50	<50	<50	--	<50	<50	<50	<50	<50	<50	<50	--	<50	**1,000**	**120**
TRH >C_{16}-C_{34} (F3)	mg/kg	<100	<100	<100	--	<100	<100	<100	<100	<100	<100	<100	--	<100	**3,500**	**300**
TRH >C_{34}-C_{40} (F4)	mg/kg	<100	<100	<100	--	<100	<100	<100	<100	<100	<100	<100	--	<100	**10,000**	**2,800**
PAHs																
Naphthalene	mg/kg	<0.1	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	--	<0.1	**11,000**	**170**
Benzo(a)pyrene	mg/kg	<0.05	--	--	--	<0.05	<0.05	<0.05	0.2	<0.5	<0.05	0.07	--	<0.05	--	**0.7**
Benzo(a)pyrene TEQ	mg/kg	<0.5	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	**4**	--
Total PAHs	mg/kg	NIL(+)VE	--	--	--	NIL(+)VE	NIL(+)VE	NIL(+)VE	2.1	<0.5	NIL(+)VE	0.81	--	NIL(+)VE	**400**	--
OCPs																
Heptachlor	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**10**	--
Aldrin	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**10**	--
Dieldrin	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--		
Endrin	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**20**	--
gamma-Chlordane	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**90**	--
alpha-chlordane	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--		--
Endosulfan I	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**400**	--
Endosulfan II	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--		--
HCB	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**15**	--
Methoxychlor	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**500**	--
pp-DDE	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--		--
pp-DDD	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**600**	--
pp-DDT	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--		**180**
PCBs																
Total PCBs	mg/kg	--	--	--	--	<0.1	--	--	--	--	--	<0.1	--	--	**1**	--

TABLE NOTES:

Analytical results which exceed any of the Health-based Investigation Levels (HILs) are shown as **bold** text.

Analytical results which exceed any of the Ecological-based Investigation Levels (PILs) are shown as boxed text.

1 – Total Chromium analytical result includes chromium (III) and (VI).

TABLE 8 - Summary of Analytical Results (Soil)

Sample ID		SM011116-18	SM011116-20	SM011116-21	SM011116-24	SM011116-25	SM011116-27	SM011116-29	SM011116-30	SM011116-32	SM011116-33	SM011116-34	SM011116-37	Site Acceptance Criteria	
Analyte	Location	BH105	BH105	BH105	BH106	BH106	BH106	BH107	BH107	BH108	BH108	BH109	BH109	Health	Ecological
	Depth	0.1 - 0.2	0.9 - 1.0	1.1 - 1.25	0.1 - 0.3	0.7 - 0.9	1.3 - 1.5	0.1 - 0.2	0.4 - 0.5	0.0 - 0.15	0.3 - 0.5	0.0 - 0.15	0.7 - 0.85		
	Type	FILL	FILL	Sandy CLAY	FILL	Sandy CLAY	Sandy CLAY	FILL	FILL	FILL	Sandy CLAY	FILL	Sandy CLAY		
Asbestos															
Asbestos Detected	-	No	--	--	--	--	--	No	--	No	--	--	--	**0.04%**	--
Respirable Fibres	-	No	--	--	--	--	--	No	--	No	--	--	--	**0.001%**	--
Metals															
Arsenic	mg/kg	4	4	<4	4	<4	<4	<4	5	6	6	6	8	**500**	**100**
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.7	<0.4	<0.4	<0.4	**150**	--
Chromium[1]	mg/kg	11	12	15	72	12	11	4	9	12	23	13	21	**500**	**190**
Copper	mg/kg	12	9	1	42	3	1	1	7	23	2	24	3	**30,000**	**35**
Lead	mg/kg	34	32	7	30	6	6	8	74	170	9	420	12	**1,200**	**1,100**
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	**120**	--
Nickel	mg/kg	2	2	2	63	2	1	1	2	4	3	2	2	**1,200**	**6**
Zinc	mg/kg	25	28	5	69	4	5	10	74	380	38	100	110	**60,000**	**95**
BTEX															
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	--	<0.2	--	<0.2	--	<0.2	--	**3**	**50**
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	<0.5	--	<0.5	--	**99,000**	**85**
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1	--	<1	--	<1	--	<1	--	**27,000**	**70**
Total Xylenes	mg/kg	<2	<2	<2	<2	<2	--	<2	--	<2	--	<2	--	**230**	**45**
TRH															
TRH C_6 - C_{10} (F1)	mg/kg	<25	<25	<25	<25	<25	--	<25	--	<25	--	<25	--	**260**	**180**
TRH >C_{10} - C_{16} (F2)	mg/kg	<50	<50	<50	<50	<50	--	<50	--	<50	--	<50	--	**1,000**	**120**
TRH >C_{16}-C_{34} (F3)	mg/kg	<100	<100	<100	<100	<100	--	<100	--	<100	--	<100	--	**3,500**	**300**
TRH >C_{34}-C_{40} (F4)	mg/kg	<100	<100	<100	<100	<100	--	<100	--	<100	--	<100	--	**10,000**	**2,800**
PAHs															
Naphthalene	mg/kg	<0.1	<0.1	--	<0.1	--	--	<0.1	--	<0.1	--	<0.1	--	**11,000**	**170**
Benzo(a)pyrene	mg/kg	0.2	0.07	--	<0.05	--	--	<0.05	--	0.08	--	0.08	--	--	**0.7**
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	--	<0.5	--	--	<0.5	--	<0.5	--	<0.5	--	**4**	--
Total PAHs	mg/kg	1.5	0.37	--	NIL(+)VE	--	--	NIL(+)VE	--	0.08	--	0.43	--	**400**	--
OCPs															
Heptachlor	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**10**	--
Aldrin	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**10**	--
Dieldrin	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--		
Endrin	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**20**	--
gamma-Chlordane	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**90**	--
alpha-chlordane	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--		--
Endosulfan I	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**400**	--
Endosulfan II	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--		--
HCB	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**15**	--
Methoxychlor	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**500**	--
pp-DDE	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--		--
pp-DDD	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**600**	--
pp-DDT	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--		**180**
PCBs															
Total PCBs	mg/kg	<0.1	--	--	--	--	--	<0.1	--	<0.1	--	--	--	**1**	--

TABLE NOTES:

Analytical results which exceed any of the Health-based Investigation Levels (HILs) are shown as **bold** text.

Analytical results which exceed any of the Ecological-based Investigation Levels (PILs) are shown as boxed text.

1 – Total Chromium analytical result includes chromium (III) and (VI).

TABLE 8 - Summary of Analytical Results (Soil)

Sample ID		JL190717-01	JL190717-03	JL190717-04	JL190717-06	JL190717-07	JL190717-08	JL190717-09	JL190717-10	JL190717-11	JL190717-12	Site Acceptance Criteria	
Analyte	Location	BH201	BH201	BH201	BH202	Blind	BH202	BH202	BH202	BH203	BH203	Health	Ecological
	Depth	0.05 – 0.15	0.7 – 0.8	1.0 – 1.1	0.25 – 0.35	Replicate	0.6 – 0.7	1.1 – 1.2	1.4 – 1.5	0.15 – 0.25	0.7 – 0.8		
	Type	FILL	FILL	Clayey SAND	FILL	of '06'	FILL	FILL	Sandy CLAY	FILL	Clayey SAND		
Asbestos													
Asbestos Detected	-	--	--	--	--	--	--	--	--	No	--	**0.04%**	--
Respirable Fibres	-	--	--	--	--	--	--	--	--	No	--	**0.001%**	--
Metals													
Arsenic	mg/kg	8	5	<4	4	7	<4	6	4	14	11	**500**	**100**
Cadmium	mg/kg	0.9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	**150**	--
Chromium[1]	mg/kg	16	12	15	22	16	2	9	9	10	12	**500**	**190**
Copper	mg/kg	34	13	1	24	29	<1	9	11	8	2	**30,000**	**35**
Lead	mg/kg	590	74	14	9	12	1	43	29	65	13	**1,200**	**1,100**
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**120**	--
Nickel	mg/kg	14	9	2	27	24	<1	2	2	3	2	**1,200**	**6**
Zinc	mg/kg	250	75	21	30	39	2	40	11	94	51	**60,000**	**95**
BTEX													
Benzene	mg/kg	<0.2	<0.2	--	<0.2	<0.2	<0.2	--	<0.2	<0.2	--	**3**	**50**
Toluene	mg/kg	<0.5	<0.5	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	**99,000**	**85**
Ethylbenzene	mg/kg	<1	<1	--	<1	<1	<1	--	<1	<1	--	**27,000**	**70**
Total Xylenes	mg/kg	<2	<2	--	<2	<2	<2	--	<2	<2	--	**230**	**45**
TRH													
TRH C_6 - C_{10} (F1)	mg/kg	<25	<25	--	<25	<25	<25	--	<25	<25	--	**260**	**180**
TRH >C_{10} - C_{16} (F2)	mg/kg	<50	<50	--	<50	<50	<50	--	<50	<50	--	**1,000**	**120**
TRH >C_{16}-C_{34} (F3)	mg/kg	790	<100	--	<100	<100	<100	--	<100	<100	--	**3,500**	**300**
TRH >C_{34}-C_{40} (F4)	mg/kg	480	<100	--	<100	<100	<100	--	<100	<100	--	**10,000**	**2,800**
PAHs													
Naphthalene	mg/kg	<1	<1	--	<1	<0.1	<1	--	<1	<1	--	**11,000**	**170**
Benzo(a)pyrene	mg/kg	<0.05	0.1	--	<0.05	<0.05	<0.05	--	0.05	<0.05	--	--	**0.7**
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	--	**4**	--
Total PAHs	mg/kg	0.5	1.3	--	<0.05	<0.05	<0.05	--	0.06	<0.05	--	**400**	--
OCPs													
Heptachlor	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**10**	--
Aldrin	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**10**	--
Dieldrin	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--		
Endrin	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**20**	--
gamma-Chlordane	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**90**	--
alpha-chlordane	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--		--
Endosulfan I	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**400**	--
Endosulfan II	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--		--
HCB	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**15**	--
Methoxychlor	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**500**	--
pp-DDE	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--		--
pp-DDD	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**600**	--
pp-DDT	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--		**180**
PCBs													
Total PCBs	mg/kg	--	--	--	<0.1	<0.1	--	--	--	<0.1	--	**1**	--

TABLE NOTES:

Analytical results which exceed any of the Health-based Investigation Levels (HILs) are shown as **bold** text.

Analytical results which exceed any of the Ecological-based Investigation Levels (PILs) are shown as boxed text.

1 – Total Chromium analytical result includes chromium (III) and (VI).

TABLE 8 - Summary of Analytical Results (Soil)

Sample ID		BH204	BH204	BH205	BH205	BH206	BH206	BH207	BH207	BH208	BH208	Site Acceptance Criteria	
Analyte	Location	JL190717-14	JL190717-15	JL190717-16	JL190717-18	JL190717-19	JL190717-20	JL190717-21	JL190717-22	JL190717-24	JL190717-26	Health	Ecological
	Depth	0.2 – 0.3	0.6 – 0.7	0.05 – 0.15	0.6 – 0.7	0.05 – 0.15	0.7 – 0.8	0.05 – 0.15	0.5 – 0.6	0.05 – 0.15	0.5 – 0.6		
	Type	FILL	FILL	FILL	Sandy CLAY	TOPSOIL / FILL	SAND	TOPSOIL / FILL	Sandy CLAY	TOPSOIL / FILL	Sandy CLAY		
Asbestos													
Asbestos Detected	-	--	--	No	--	--	--	--	--	No	--	**0.04%**	--
Respirable Fibres	-	--	--	No	--	--	--	--	--	No	--	**0.001%**	--
Metals													
Arsenic	mg/kg	5	4	5	<4	5	<4	5	<4	6	<4	**500**	**100**
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.5	<0.4	<0.4	<0.4	0.7	<0.4	**150**	--
Chromium[1]	mg/kg	12	9	12	3	11	2	11	5	14	8	**500**	**190**
Copper	mg/kg	11	8	26	4	19	<1	28	<1	45	3	**30,000**	**35**
Lead	mg/kg	42	86	180	3	170	6	280	9	190	8	**1,200**	**1,100**
Mercury	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	2	<0.1	0.1	<0.1	**120**	--
Nickel	mg/kg	2	3	3	<1	3	<1	3	1	6	2	**1,200**	**6**
Zinc	mg/kg	36	130	180	18	220	19	270	6	380	25	**60,000**	**95**
BTEX													
Benzene	mg/kg	<0.2	--	<0.2	<0.2	<0.2	--	<0.2	--	<0.2	--	**3**	**50**
Toluene	mg/kg	<0.5	--	<0.5	<0.5	<0.5	--	<0.5	--	<0.5	--	**99,000**	**85**
Ethylbenzene	mg/kg	<1	--	<1	<1	<1	--	<1	--	<1	--	**27,000**	**70**
Total Xylenes	mg/kg	<2	--	<2	<2	<2	--	<2	--	<2	--	**230**	**45**
TRH													
TRH C_6 - C_{10} (F1)	mg/kg	<25	--	<25	<25	<25	--	<25	--	<25	--	**260**	**180**
TRH >C_{10} - C_{16} (F2)	mg/kg	<50	--	<50	<50	<50	--	<50	--	<50	--	**1,000**	**120**
TRH >C_{16}-C_{34} (F3)	mg/kg	<100	--	<100	<100	<100	--	<100	--	<100	--	**3,500**	**300**
TRH >C_{34}-C_{40} (F4)	mg/kg	<100	--	<100	<100	<100	--	<100	--	<100	--	**10,000**	**2,800**
PAHs													
Naphthalene	mg/kg	<1	--	<1	<1	<1	--	<1	--	<1	--	**11,000**	**170**
Benzo(a)pyrene	mg/kg	<0.05	--	0.1	<0.05	0.06	--	0.1	--	0.1	--	--	**0.7**
Benzo(a)pyrene TEQ	mg/kg	<0.5	--	<0.5	<0.5	<0.5	--	<0.5	--	<0.5	--	**4**	--
Total PAHs	mg/kg	<0.05	--	1	<0.05	0.06	--	0.76	--	0.83	--	**400**	--
OCPs													
Heptachlor	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**10**	--
Aldrin	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**10**	--
Dieldrin	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--		
Endrin	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**20**	--
gamma-Chlordane	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**90**	--
alpha-chlordane	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--		--
Endosulfan I	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**400**	--
Endosulfan II	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--		--
HCB	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**15**	--
Methoxychlor	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**500**	--
pp-DDE	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--		--
pp-DDD	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**600**	--
pp-DDT	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--		**180**
PCBs													
Total PCBs	mg/kg	<0.1	--	<0.1	--	--	--	--	--	<0.1	--	**1**	--

TABLE NOTES:

Analytical results which exceed any of the Health-based Investigation Levels (HILs) are shown as **bold** text.

Analytical results which exceed any of the Ecological-based Investigation Levels (PILs) are shown as boxed text.

1 – Total Chromium analytical result includes chromium (III) and (VI).

9.2 WATER FIELD PARAMETERS

Field parameters (*i*.e. pH, electrical conductivity, dissolved oxygen, redox potential, temperature, odour and other notable observations) were recorded during the sampling of groundwater within the existing and recently installed groundwater wells. A summary of the field parameter information, along with the standing water level readings, is provided in **Table 9**.

Within the monitoring wells, pH was slightly to moderately acidic, while the electrical conductivity was relatively low. The dissolved oxygen results were relatively low, which is common for groundwater.

TABLE 9: Groundwater Field Data Results

Sample Identification			AC111116-01	AC111116-03	AC111116-04	AC111116-05	AC111116-06
Analyte	Units	LOR	BH107	GW01	GW02	GW03	BH102
Standing Water Level	m BGS	0.01	1.78	2.21	2.13	1.34	1.28
pH	pH units	0.01	4.88	6.18	6.09	6.47	5.86
Electrical Conductivity	µS/cm	0.01	1093	685	620	734	1048
Temperature	°C	0.1	22.5	21.7	22.5	25.0	22.0
Redox Potential	mV	1	-91.0	-107.5	-80.3	-69.8	-55.3
Dissolved Oxygen	mg/L	0.01	2.42	0.67	1.06	2.47	1.60

9.3 WATER ANALYTICAL RESULTS

Groundwater from the five monitoring wells were analysed for dissolved metals, TRH, BTEX, PAHs and Phenols. The laboratory results are provided in the laboratory reports in **Appendix I**, while the tabulated results are provided in **Table 10** and summarised below.

9.3.1 *Metals*

The concentration of dissolved metals in all samples was below the GAC with the exception of zinc for samples AC111116-01/02, AC111116-04 & AC111116-06. The concentrations of dissolved zinc was 34mg/L, 10mg/L and 25mg/L respectively. It is noted that the GAC for zinc provided in Table 5, and reiterated in Table 8, relates to soft water (approximately 30 mg/L CaCo3 or less) and the GAC increases with increasing water hardness as seen below.

Sample ID	Sample Concentration (µg/L)	'First Pass' GAC (µg/L)	Hardness ($mg.CaCO_3/L$)	Actual GAC (µg/L)
		Zinc		
AC111116-01	**34**	8	140	29.6
AC111116-04	10	8	150	31.4
AC111116-06	25	8	200	40.1

When taking into consideration hardness, only one sample (AC111116-01) exceeded the GAC. Based on the analytical results, GEE considers that the elevated zinc concentration at this location (BH107) does not pose a significant contamination issue for the proposed development because:

- The groundwater from the site was collected from a stratigraphy comprising sandstone and according to Hem (1989 – reference 16), the concentrations of the zinc is commensurate with naturally occurring background concentrations.
- The GAC is the expected water quality at the 'Point of use' or 'discharge' from groundwater into a surface body of water and the nearest water body is Wolli Creek, approximately 350m north of the site. Additionally, the concentrations were only marginally above the GAC and significant dilution is expected upon entering the nearest surface body of water,
- The concentrations of zinc were higher in the up-gradient well compared to the down-gradient well which suggests that the elevated metals are from off-site,
- No significant source of metal contamination was identified in the fill and natural soils across the site, and
- The concentrations detected are commensurate with metal concentrations within the groundwater across the Sydney region.

In summary the metals are not considered to be a groundwater contamination issue at the site.

9.3.2 *TRH and BTEX*

The concentration of TRH and BTEX in the groundwater was less than the GAC. However, given the concentrations and the hydrocarbon odour noted during sampling, it is likely that groundwater has been slightly impacted by TRH and BTEX, particularly at the north-eastern portion of the site. Nonetheless, given the analytical results, TRH and BTEX are not considered a groundwater contamination issue at the site.

9.3.3 *PAHs*

The concentration of PAHs in the groundwater was less than the GAC. This suggests that PAHs are not a groundwater contamination issue at the site.

9.3.4 *Phenols*

Phenols were water sampled from each well were all less than the GAC. These results suggest that Phenols do not pose a contamination issue for groundwater beneath the site.

TABLE 10 - Summary of Analytical Results (Groundwater)

Sample Date		11/09/2016	11/09/2016	11/09/2016	11/09/2016	11/09/2016	11/09/2016	Groundwater Assessment Criteria (GAC) [1]
Sample Identification		**AC111116-01**	**AC111116-02**	**AC111116-03**	**AC111116-04**	**AC111116-05**	**AC111116-06**	
Analyte	Units	BH107	Blind Replicate of '01'	GW01	GW02	GW03	BH102	
Dissolved Metals								
Arsenic	µg/L	<1	<1	<1	12	1	5	13
Cadmium	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	1
Copper	µg/L	<1	<1	<1	<1	<1	<1	1.4
Lead	µg/L	1	1	1	<1	<1	2	3.4
Mercury	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Nickel	µg/L	10	10	2	2	<1	6	11
Zinc	µg/L	**32**	**34**	3	**10**	3	**25**	8
PAHs								
Naphthalene	µg/L	<1	<1	<1	<1	<1	<1	16
Phenanthrene	µg/L	<1	<1	<1	<1	<1	<1	*2*
Anthracene	µg/L	<1	<1	<1	<1	<1	<1	*0.4*
Fluoranthene	µg/L	<1	<1	<1	<1	<1	<1	*1.4*
Benzo(a)pyrene	µg/L	<1	<1	<1	<1	<1	<1	*0.2*
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5	<5	<5	<1	--
Total (+VE) PAHs	µg/L	NIL(+)VE	NIL(+)VE	NIL(+)VE	NIL(+)VE	NIL(+)VE	NIL(+)VE	--
BTEX								
Benzene	µg/L	<1	<1	1	<1	<1	<1	800
Toluene	µg/L	<1	<1	<1	<1	<1	<1	*180*
Ethylbenzene	µg/L	<1	<1	<1	<1	<1	<1	*80*
m+p-xylene	µg/L	<2	<2	<2	<2	<2	<2	200
o-xylene	µg/L	<1	<1	<1	<1	<1	<1	350
TRH								
vTPH C_6 - C_{10} (F1)	µg/L	<10	<10	130	130	<10	<10	1,000
TRH >C_{10} - C_{16} (F2)	µg/L	<50	<50	290	560	<50	<50	1,000
TRH >C_{16}-C_{34} (F3)	µg/L	<100	<100	<100	<100	<100	<100	--
TRH >C_{34}-C_{40} (F4)	µg/L	<100	<100	<100	<100	<100	<100	--
Phenols								
Total Phenolics	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*0.32*
Other Tests								
Hardness	mg.CaCO3/L	140	140	160	150	330	200	--

Notes:

-- No Criteria Established / Not Analysed

LOR = Limit of Reporting

NL = Not Limiting

10 SITE CHARACTERISATION

A summary of the information obtained and results of this assessment is presented below.

10.1 SITE HISTORY AND POTENTIAL FOR CONTAMINATION

The historical information indicates that the site was originally part of a larger parcel of land (likely rural/residential) before being progressively subdivided between 1914 and 1940 while owned by NSW Realty Co Limited. Initially the southern part of the site (88 and 90 New Illawarra Road and 311A Bexley Road) was subdivided and sold as two allotments in 1918 to George and Annie Gibbons and has since been owned by various individuals. The allotments extended between New Illawarra Road to the west and Bexley Road to the east and were further subdivided in the late 1960s to create the residential allotment known as 311A Bexley Road (Lot 5 DP508629). Historical aerial photographs suggest that this part of the site has predominately been used for residential purposes (low density). However, the dwelling at No. 90 New Illawarra Road is also known to have been partly used for commercial purposes, including a Butchers in the 1970s and 1980s.

The central part of the site (94 New Illawarra Road and 311 Bexley Road) was subdivided by NSW Realty Co Limited and sold off in 1919 as two allotments which currently exist. Historical aerial photographs indicate that this part of the site has been occupied by residential dwellings (low density) and associated garages, sheds and pools.

The northern part of the site (including 307 – 309 Bexley Road and 96 New Illawarra Road) was sold by NSW Realty Co Limited in 1940 and subdivided into the existing allotments by 1954. 96 New Illawarra Road (Lot A in DP388204) was developed into a dwelling circa 1954, while the remaining part of the land was developed into a service station (including mechanical repair workshop) soon after (late 1950s).

Of particular significance to this investigation are the activities associated with the service station at the northern end of the site, specifically the storage and use of fuels and mechanical repair of vehicles.

10.2 SOIL ASSESSMENT

Soil conditions across the site were assessed at seventeen borehole locations positioned in accessible areas across the site and targeting areas of potential contamination. The

number of sampling points exceeds the minimum number of sampling points required for adequate site characterisation as defined by the EPA NSW and Australian Standards, and it is the opinion of GEE that the number of sampling points was sufficient to support the planning proposal.

The majority of the boreholes drilled by GEE were dry during drilling and also upon completion. Exceptions included some seepage water encountered below 1.6m in borehole BH102 and slight seepage noted between a depth of 2.0m and 2.8m depth within borehole BH107.

The subsurface conditions, as observed in the boreholes, typically comprised fill material over sandy clay soil which was underlain by sandstone bedrock. The thickness of the topsoil and/or fill unit ranged from 0.3m to 2.7m depth while the depth to the bedrock formation ranged from 0.75m to 2.7m depth.

During the drilling of boreholes, there were no unusual odours (that could be potentially associated with contamination) noted. Additionally, no potentially Asbestos Containing Materials (ACM) was observed below ground during sampling and logging.

GEE submitted a total of 41 primary soil samples from the 17 boreholes to Envirolab for NATA accredited laboratory analysis of metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury and zinc), TRH, BTEX, PAHs, OCPs, PCBs and asbestos. The analytical results were compared against relevant set of ecological and health-based Site Acceptance Criteria (SAC) appropriate for the proposed land-use (high density residential).

In summary, the fill and natural soil was found to be free of significant contamination which would impact on the proposed development, future users of the site and the environment.

10.3 GROUNDWATER CONDITIONS

Groundwater conditions were assessed using three pre-existing monitoring wells (GW01 to GW03) and three recently installed monitoring wells (BH102, BH105, BH107).

The stabilised level of groundwater within the wells installed within BH102, BH107, GW01, GW02 and GW03 was measured on the 14th November 2016 (approximately 13 days after installation of the wells) at depths of 1.28m, 1.78m, 2.21m, 2.13m and 1.34m bgs respectively. The well within borehole BH105 was dry to a depth of 2.4m

bgs. Water within the wells was slightly to moderately acidic (4.5<pH<6.5) and low in conductivity.

The water encountered in the wells is considered to be perched water flowing along the soil/bedrock interface and such water is normally significantly influenced by rainfall events and therefore its presence can be intermittent. This is supported by the fact that the well installed within borehole BH105 was dry to a depth of 2.4m.

Taking into account the approximate surface elevation at each of the well locations, it is inferred that the perched water is following the regional topography and flowing in a northerly to north-easterly direction. Although the flow direction is expected to have been significantly altered by the presence of UST tankpit excavations in the northern end of the site.

To assess the presence of contamination within the groundwater, a sample of water was collected and submitted to Envirolab for NATA accredited analysis of dissolved metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury), TRH, BTEX, PAHs and Phenols. The analytical results were then compared against a set of Groundwater Assessment Criteria (GAC) considered appropriate for the environmental setting of the site. In summary so significant contamination was found.

11 CONCLUSION AND RECOMMENDATIONS

Geo-Environmental Engineering Pty Ltd (GEE) was commissioned by Mr Tony Soueid to undertake a preliminary and detailed Environmental Site Assessment (ESA) at 307 - 311 Bexley Road & 88 - 96 New Illawarra Road, Bexley North, New South Wales.

The ESA was required to support a planning proposal which relates to the proposed rezoning of the site to R4 – High Density Residential, with the future development to include a basement (single or multiple levels) and up to six levels above ground. The objective of this assessment was to address the requirements of Council's Contaminated Land Policy (reference 1) and the provisions of the *State Environmental Planning Policy No. 55 – Remediation of Land* (reference 2) by providing a preliminary assessment of contamination and in turn an assessment of the suitability of the site for the proposed land-use and possible constraints on future site development.

The scope of works completed for the ESA comprised a:

- A review of the previous investigation report,
- Review of the environmental and physical setting in which the site lies, including geology, hydrogeology and topography,
- Review of the history of the site using readily available records and historical aerial photographs,
- Detailed site inspection for potential sources of contamination, and
- A detailed sampling and analysis program to characterise potential soil and groundwater contamination across the site.

The detailed sampling and analysis program completed by GEE identified no significant soil or groundwater contamination associated with the site. Notwithstanding this, there is an operational petrol station located at the southern end of the site and it was impossible to investigate immediately adjacent and beneath the Underground Petroleum Storage System (UPSS).

Based on observations made during the field investigations, the sampling and analysis program conducted at the site (including that completed previously by STS), the proposed land-use and with respect to relevant statutory guidelines, GEE conclude that the site can be made suitable for the proposed land-use described in the planning proposal, subject to the excavation, removal and validation of the existing UPSS. In accordance with Council's Contaminated Lands Policy (reference 1) and SEPP 55

(reference 2), a Remedial Action Plan (RAP) should be prepared which details the methodology for the excavation, removal and validation of the existing UPSS.

12 GENERAL LIMITATIONS OF THIS REPORT

This report has been prepared in general accordance with guidelines endorsed by the NSW Office of Environment and Heritage, and the conclusions of this report are based on a limited scope of work described herein, which was considered appropriate based on the same regulatory guidelines.

It is the intention of GEE that the report reflect actual subsurface site conditions, and the contamination status, of the entire site (within the depths investigated). However, regardless of the level of investigation undertaken, there will always be uncertainty when dealing with land contamination. For instance, the sampling points (boreholes and/or testpits) represent a relatively small portion of the site, and ground conditions may vary between sampling locations. The cause of such variation may include, but are not limited to, complex geological settings, the fate and transport characteristics of certain chemicals, the distribution of existing contamination, physical limitations imposed by the location of utilities and other man-made structures, and the limitations of assessment technologies.

Furthermore, the laboratory analytical results contained in this report, upon which conclusions are drawn, relate only to a discrete sample submitted for analysis. Also, not all chemicals have been assessed as part of this investigation. The chemical analytes targeted by this investigation are based on either the site's history, or represent a suite of common soil contaminants.

This report is based on site conditions which existed at the time of the field investigation and subsurface conditions may change over time, either through natural processes, or via ongoing activities on the site. Should additional information become available regarding conditions at the site (such as during construction), including evidence of previously unknown sources of contamination, then additional advice should be sought from GEE.

Finally, this report has been prepared for use by the client who has commissioned the works in accordance with the project brief only. Any reliance assumed by third parties on this report shall be at their own risk. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by GEE.

13 REFERENCES

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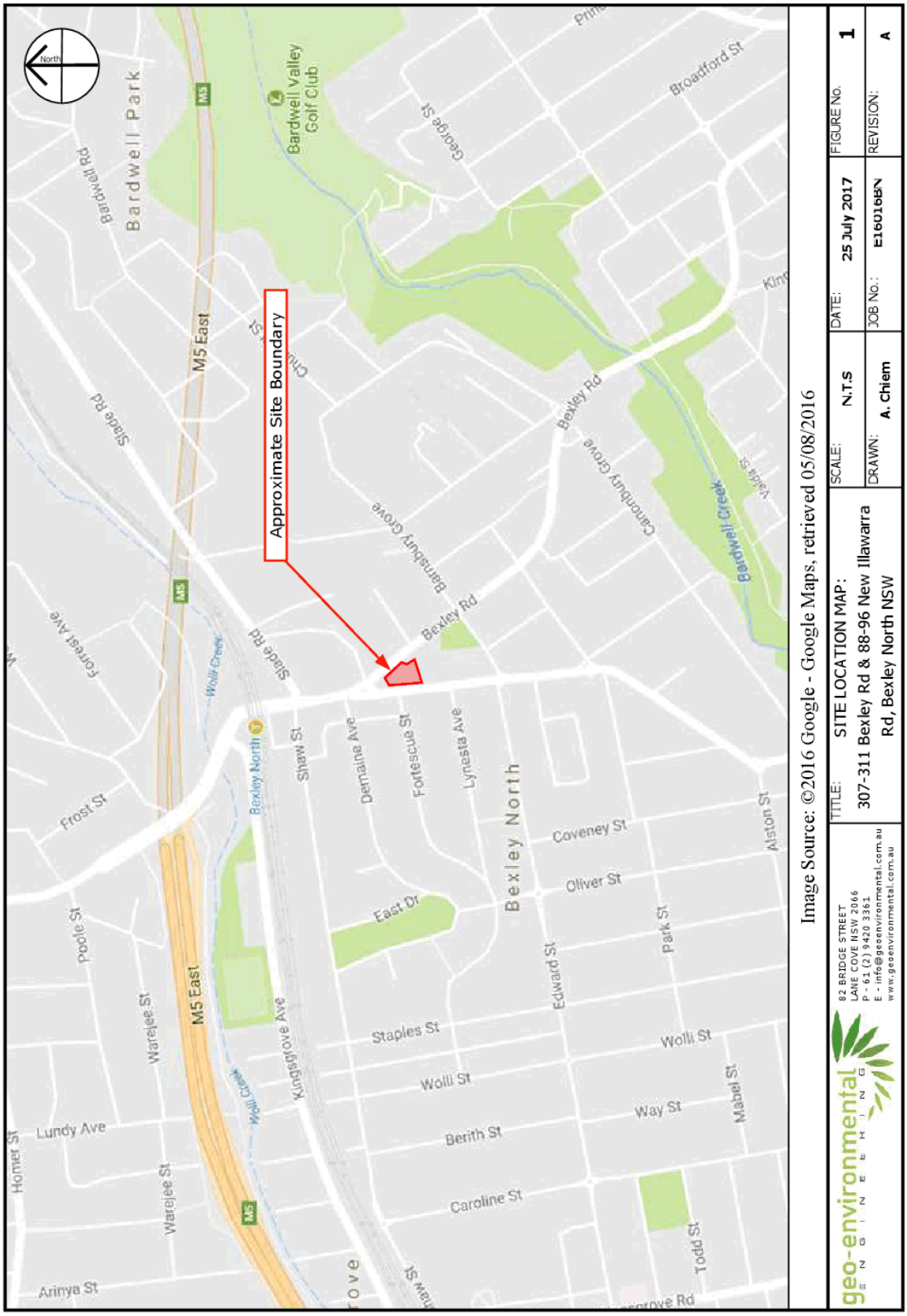
FIGURES


Approximate Site Boundary
Bardwell Park
Bardwell Valley Golf Club
M5 East
Bexley North
Bexley Rd
Broadford St
Stade Rd
Forest Ave
Frost St
Poole St
Warejee St
Lundy Ave
Horner St
Arinya St
Shaw St
Demaine Ave
Fortescue St
Lynesta Ave
Coveney St
Oliver St
East Dr
Staples St
Wolli St
Berith St
Caroline St
Way St
Park St
Edward St
Alston St
Mabel St
Todd St
Kingsgrove Ave
Barnsbury Grove
Canonbury Grove
Bardwell Creek
Wolli Creek
Image Source: ©2016 Google - Google Maps, retrieved 05/08/2016
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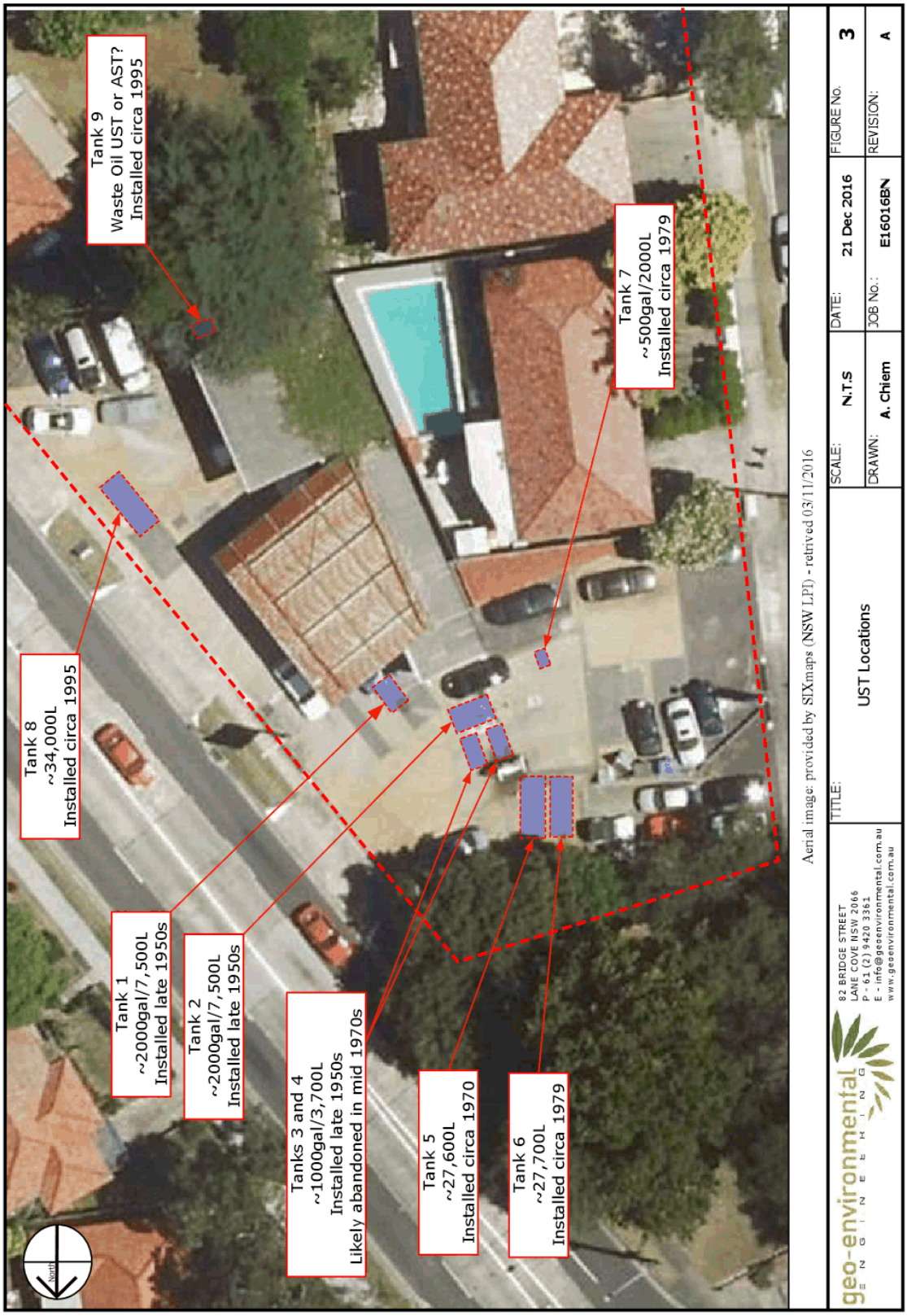
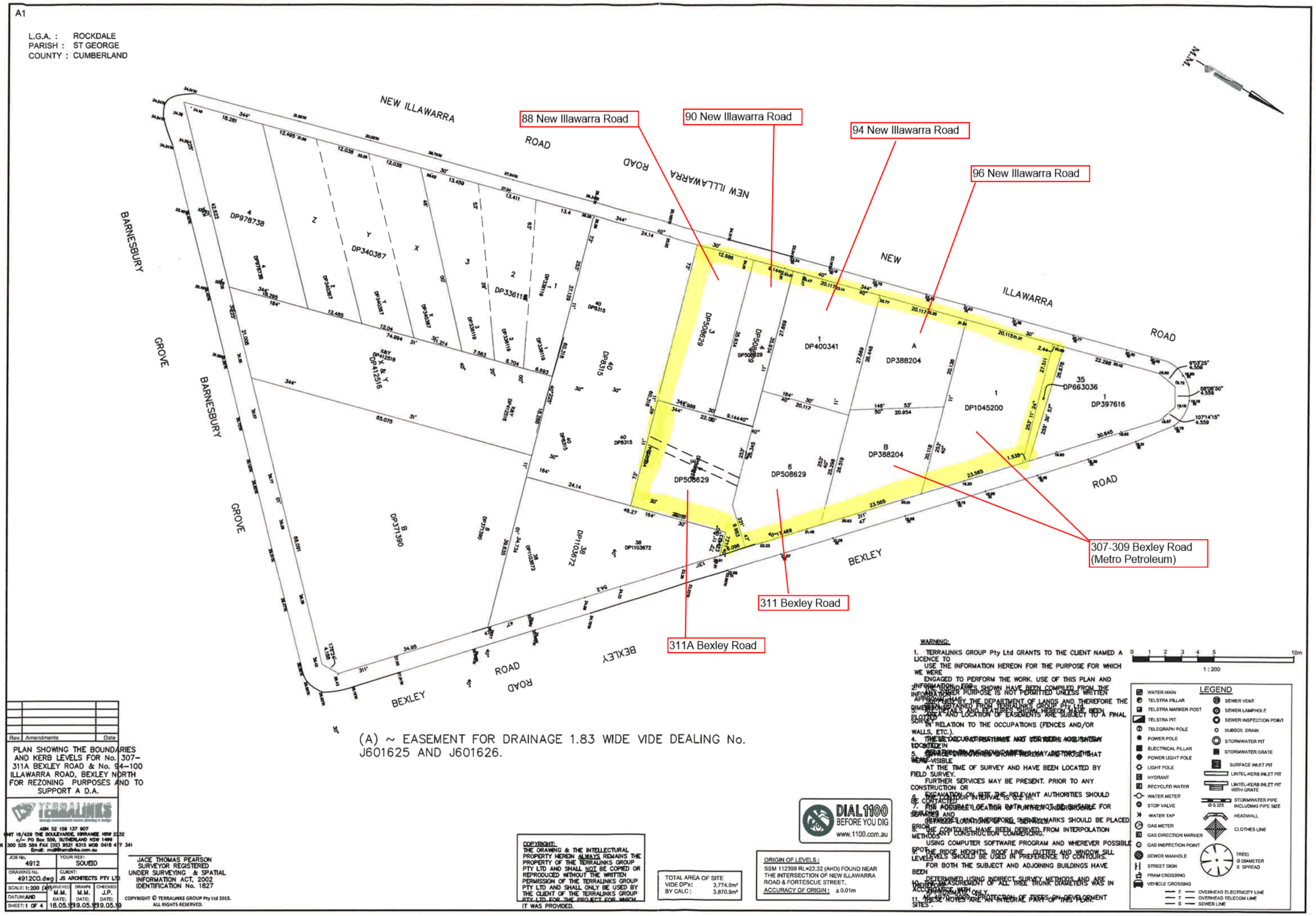
82 BRIDGE STREET
LANE COVE NSW 2066
P - 61 (2) 9420 3361
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au
TITLE: SITE LOCATION MAP:
307-311 Bexley Rd & 88-96 New Illawarra Rd, Bexley North NSW
SCALE: N.T.S
DRAWN: A. Chiem
DATE: 25 July 2017
JOB No.: E16016BN
FIGURE No. 1
REVISION: A


BH203
BH108
BH107
BH109
BH208
BH207
BH205
BH206
BH5
BH102
BH103
BH204
GW03
BH4
BH101
BH201
BH106
BH2
BH202
BH1
BH3
GW01
BH104
GW02
BH105
Approximate Site Boundary
North
LEGEND
GEE Borehole
GEE Borehole & Well
STS Borehole 2016
Pre-existing Well
Aerial image: provided by SIXmaps (NSW LPI) - retrived 03/11/2016
geo-environmental ENGINEERING
82 BRIDGE STREET
LANE COVE NSW 2066
P - 61 (2) 9420 3361
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au
TITLE:
SITE PLAN
307-311 Bexley Rd & 88-96 New Illawarra Rd Bexley North NSW
SCALE: N.T.S
DRAWN: J. Long
DATE: 19 Jul 2017
JOB No.: E16016BN
FIGURE No. 2
REVISION: A


Tank 9
Waste Oil UST or AST?
Installed circa 1995
Tank 8
~34,000L
Installed circa 1995
Tank 1
~2000gal/7,500L
Installed late 1950s
Tank 2
~2000gal/7,500L
Installed late 1950s
Tanks 3 and 4
~1000gal/3,700L
Installed late 1950s
Likely abandoned in mid 1970s
Tank 5
~27,600L
Installed circa 1970
Tank 6
~27,700L
Installed circa 1979
Tank 7
~500gal/2000L
Installed circa 1979
North
Aerial image: provided by SIXmaps (NSW LPI) - retrived 03/11/2016
geo-environmental ENGINEERING
82 BRIDGE STREET
LANE COVE NSW 2066
P - 61 (2) 9420 3361
E - info@geoenvironmental.com.au
www.geoenvironmental.com.au
TITLE:
UST Locations
SCALE: N.T.S
DRAWN: A. Chiem
DATE: 21 Dec 2016
JOB No.: E16016BN
FIGURE No. 3
REVISION: A

APPENDIX A

SITE SURVEY


A1
L.G.A. : ROCKDALE
PARISH : ST GEORGE
COUNTY : CUMBERLAND
NEW ILLAWARRA ROAD
88 New Illawarra Road
90 New Illawarra Road
94 New Illawarra Road
96 New Illawarra Road
BARNESBURY GROVE
307-309 Bexley Road (Metro Petroleum)
311 Bexley Road
311A Bexley Road
BEXLEY ROAD
DP400341
DP388204
DP1045200
DP663036
DP397616
DP508629
DP412516
DP336118
DP340387
DP978738
DP371390
DP1103672
DP6315
(A) ~ EASEMENT FOR DRAINAGE 1.83 WIDE VIDE DEALING No. J601625 AND J601626.
PLAN SHOWING THE BOUNDARIES AND KERB LEVELS FOR No. 307-311A BEXLEY ROAD & No. 94-100 ILLAWARRA ROAD, BEXLEY NORTH FOR REZONING PURPOSES AND TO SUPPORT A D.A.
TERRALINKS
JACE THOMAS PEARSON SURVEYOR REGISTERED UNDER SURVEYING & SPATIAL INFORMATION ACT, 2002 IDENTIFICATION No. 1827
COPYRIGHT © TERRALINKS GROUP Pty Ltd 2015. ALL RIGHTS RESERVED.
TOTAL AREA OF SITE
VIDE DP's: 3,774.9m²
BY CALC : 3,870.9m²
ORIGIN OF LEVELS :
SSM 112399 RL=22.32 (AHD) FOUND NEAR THE INTERSECTION OF NEW ILLAWARRA ROAD & FORTESCUE STREET.
ACCURACY OF ORIGIN : ± 0.01m
DIAL 1100 BEFORE YOU DIG www.1100.com.au
WARNING:
LEGEND
1 : 200

APPENDIX B

LOTSEARCH REPORT

Lotsearch

Environmental Risk and Planning Report

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Report Buffer: 1000m

Report Date: 13 Oct 2016 13:13:08

Disclaimer:
The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features.
You should obtain independent advice before you make any decision based on the information within the report.
The detailed terms applicable to use of this report are set out at the end of this report.

Table of Contents

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading "LC" or "LocConf". These codes lookup to the following location confidences:

LC Code	Location Confidence
1	Georeferenced to the site location / premise or part of site
2	Georeferenced with the confidence of the general/approximate area
3	Georeferenced to the road or rail
4	Georeferenced to the road intersection
5	Feature is a buffered point
6	Land adjacent to Georeferenced Site
7	Georeferenced to a network of features

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	Land and Property Information	13/10/2016	13/10/2016	Daily	-	-	-
Topographic Data	Land and Property Information	10/04/2015	01/04/2015	As required	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	10/10/2016	30/08/2016	Monthly	0	0	0
Contaminated Land: Records of Notice	Environment Protection Authority	10/10/2016	10/10/2016	Monthly	0	0	0
Former Gasworks	Environment Protection Authority	10/10/2016	10/05/2013	Monthly	0	0	0
National Waste Management Site Database	Geoscience Australia	06/07/2016	15/11/2012	Quarterly	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	0	0	2
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	0	0	4
UPSS Environmentally Sensitive Zones	Department of Environment, Climate Change and Water (NSW)	14/04/2015	12/01/2010	As required	1	1	1
UBD Business to Business Directory 1991	Hardie Grant			Not required	1	3	3
UBD Business Directory 1991 Motor Garages/Service Stations	Hardie Grant			Not required	0	1	1
UBD Business Directory 1970	Hardie Grant			Not required	2	29	53
UBD Business Directory 1970 Drycleaners & Motor Garages/Service Stations	Hardie Grant			Not required	1	4	9
UBD Business Directory 1950	Hardie Grant			Not required	1	8	10
UBD Business Directory 1950 Drycleaners & Motor Garages/Service Stations	Hardie Grant			Not required	0	1	5
Points of Interest	Land and Property Information	10/04/2015	01/04/2015	Annually	0	1	45
Tanks (Areas)	Land and Property Information	10/04/2015	01/04/2015	Annually	0	0	0
Tanks (Points)	Land and Property Information	10/04/2015	01/04/2015	Annually	0	0	0
Major Easements	Land and Property Information	11/06/2014	11/06/2014	As required	0	0	8
State Forest	Land and Property Information	11/04/2016	23/01/2015	As required	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment and Heritage	11/04/2016	31/12/2015	Annually	0	0	1
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1	1	1
Groundwater Boreholes	NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation; Commonwealth of Australia (Bureau of Meteorology) 2015	21/03/2016	01/12/2015	Annually	0	0	21
Geological Units 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	2	-	3
Geological Structures 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	0	-	0
Naturally Occurring Asbestos Potential	NSW Department of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	0	0	0
Soil Landscapes	NSW Office of Environment and Heritage	12/08/2014		None planned	1	-	3
Standard Local Environmental Plan Acid Sulfate Soils	NSW Planning and Environment	07/10/2016	07/10/2016	As required	1	-	-
Dryland Salinity Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	0	0	0
Mining Subsidence Districts	Land and Property Information	13/10/2016	13/10/2016	As required	0	0	0
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	0	0	0
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	0	0	0
SEPP Strategic Land Use Areas	NSW Planning and Environment	06/07/2016	28/01/2014	Annually	0	0	0
Local Environmental Plan - Land Zoning	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	8	66
Local Environmental Plan - Minimum Subdivision Lot Size	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	-	-
Local Environmental Plan - Height of Building	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	-	-
Local Environmental Plan - Floor Space Ratio	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	-	-
Local Environmental Plan - Land Application	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	-	-
Local Environmental Plan - Land Reservation Acquisition	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	-	-
State Heritage Items	NSW Planning and Environment	03/10/2016	12/03/2015	Quarterly	0	0	0
Local Heritage Items	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	0	10
Bushfire Prone Land	NSW Rural Fire Service	18/08/2016	12/08/2016	Quarterly	0	0	0
Native Vegetation of the Sydney Metropolitan Area	NSW Office of Environment and Heritage	08/10/2014	11/10/2013	As required	1	1	6
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	0	0	0
ATLAS of NSW Wildlife	NSW Office of Environment and Heritage	13/10/2016	13/10/2016	Daily	-	-	-

Aerial Imagery 2015

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Contaminated Land & Waste Management Facilities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the report buffer:

Map Id	Site	Address	Suburb	Activity	EPA site management class	Status	Dist	Direction	LC
N/A	No records in buffer								

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land & Waste Management Facilities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Contaminated Land: Records of Notice

Record of Notices within the report buffer:

Map Id	Area No	Name	Address	Suburb	Notices	Distance	Direction	LC
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority
Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit
http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the report buffer:

Map Id	Location	Council	Further Info	Distance	Direction	LC
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

National Waste Management Site Database

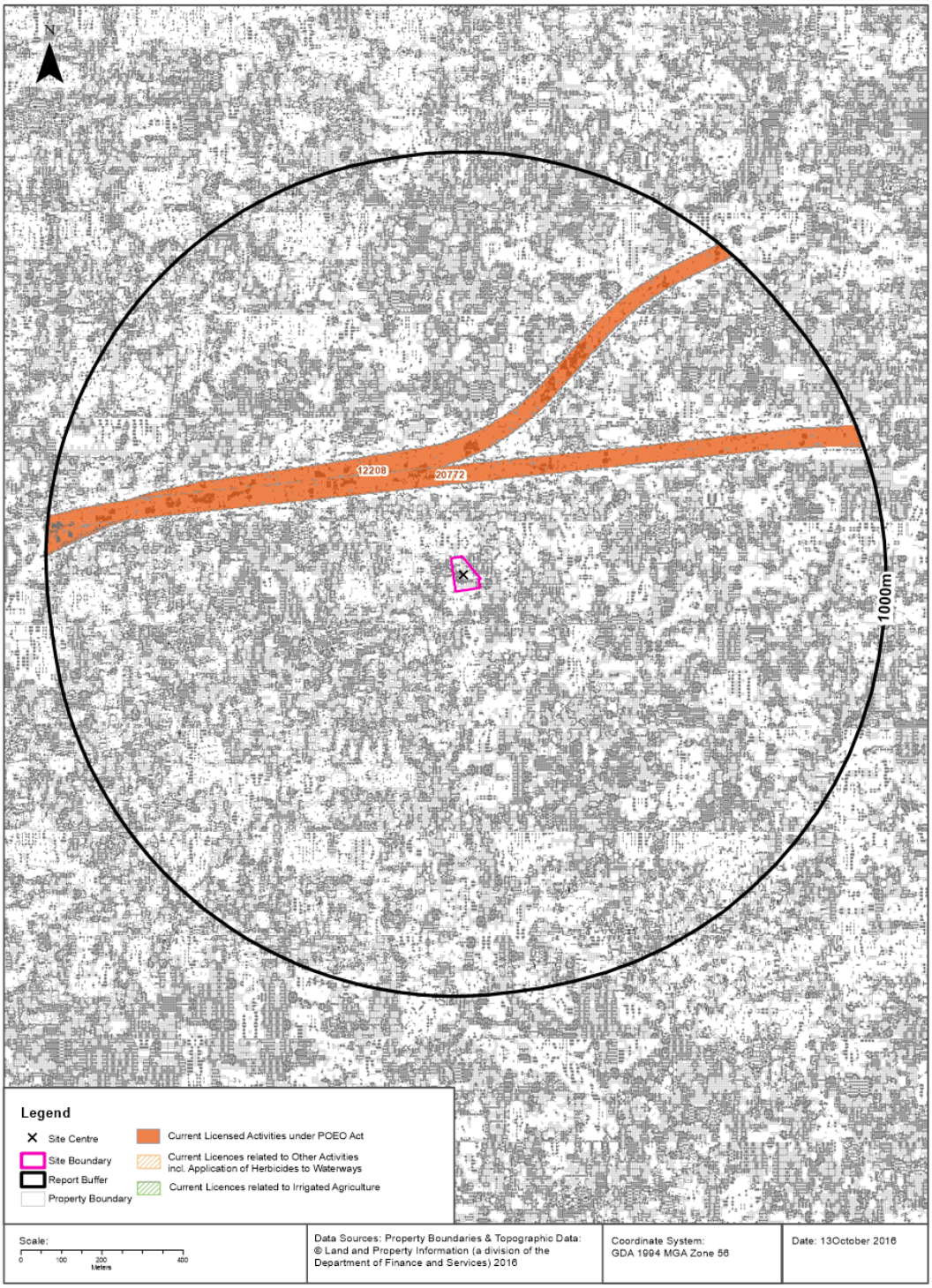
Sites on the National Waste Management Site Database within the report buffer:

Site Id	Owner	Name	Address	Suburb	Postcode	Landfill	Reprocess	Transfer	Distance	Direction	LC
N/A	No records in buffer										

Wate Management Facilities Data Source: Australian Governement Geoscience Australia
Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

Current EPA Licensed Activities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



EPA Activities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Licensed Activities under the POEO Act 1997

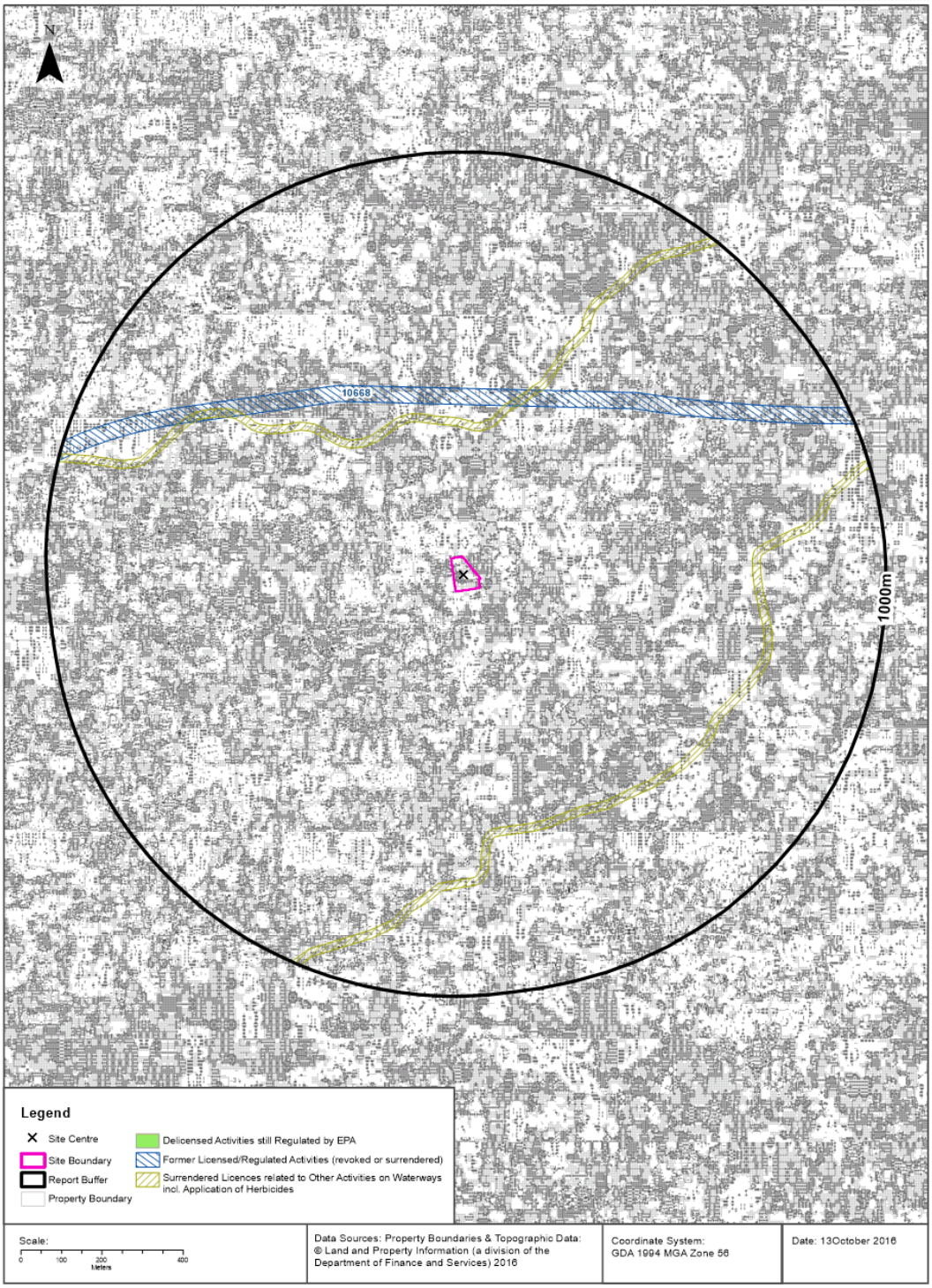
Licensed activities under the Protection of the Environment Operations Act 1997, within the report buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
20772	CPB CONTRACTORS PTY LIMITED		Between Beverly Hills and St Peters, BEVERLY HILLS, NSW 2209		Road construction	3	180m	North East
12208	SYDNEY TRAINS		PO BOX K349, HAYMARKET, NSW 1238		Railway systems activities	3	226m	North West

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



EPA Activities

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the report buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

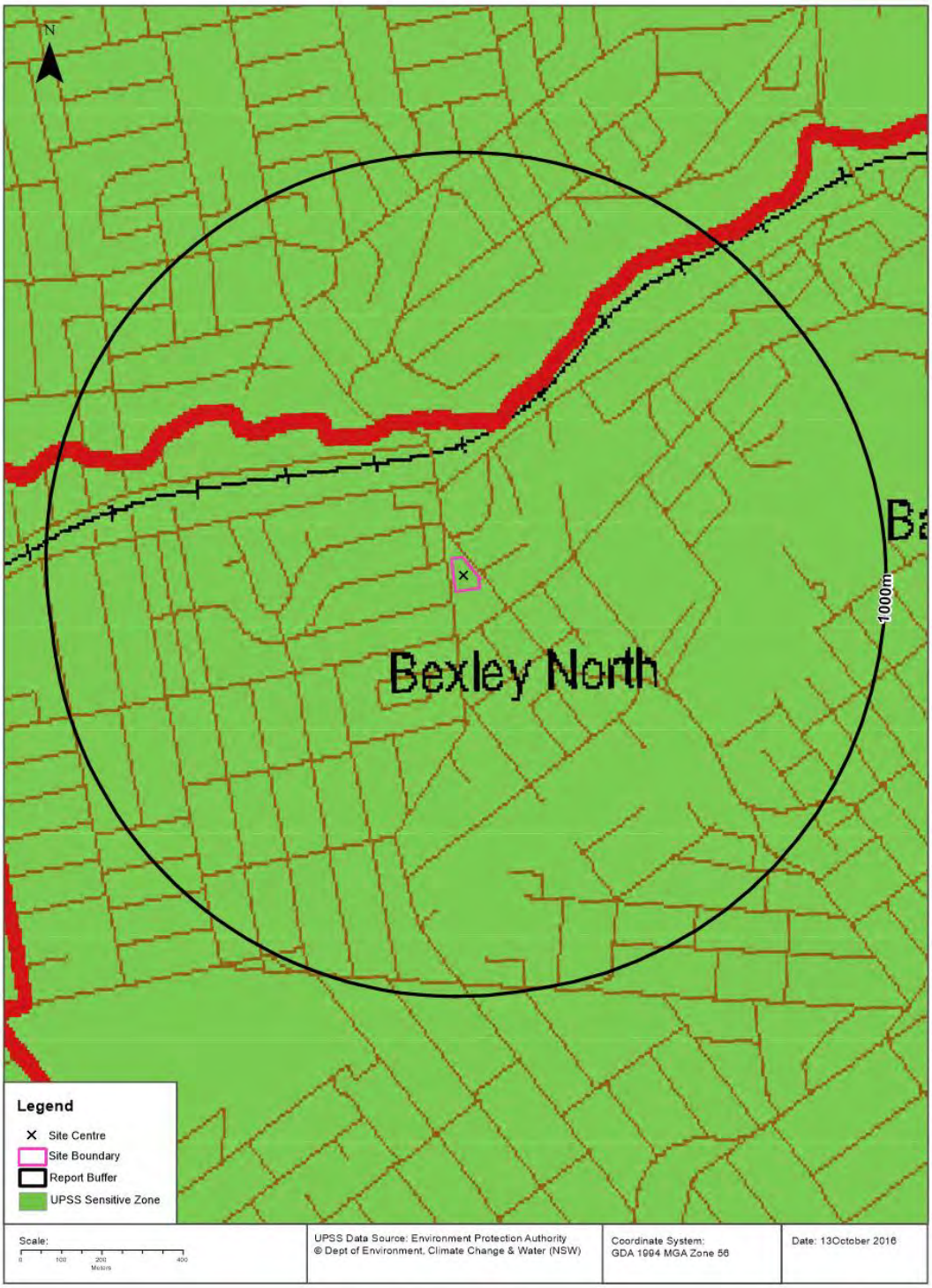
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the report buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	312m	-
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	312m	-
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	312m	-
10668	BILFINGER BERGER PROJECT INVESTMENTS PTY LTD	M5 EAST BETWEEN KINGS GEORGES RD, BEVERLY HILLS & GENERAL HOLMES DRIVE, KYEEMAGH, EARLWOOD, NSW 2206	Surrendered	05/06/2001	Road construction	3	376m	East

Former Licensed Activities Data Source: Environment Protection Authority

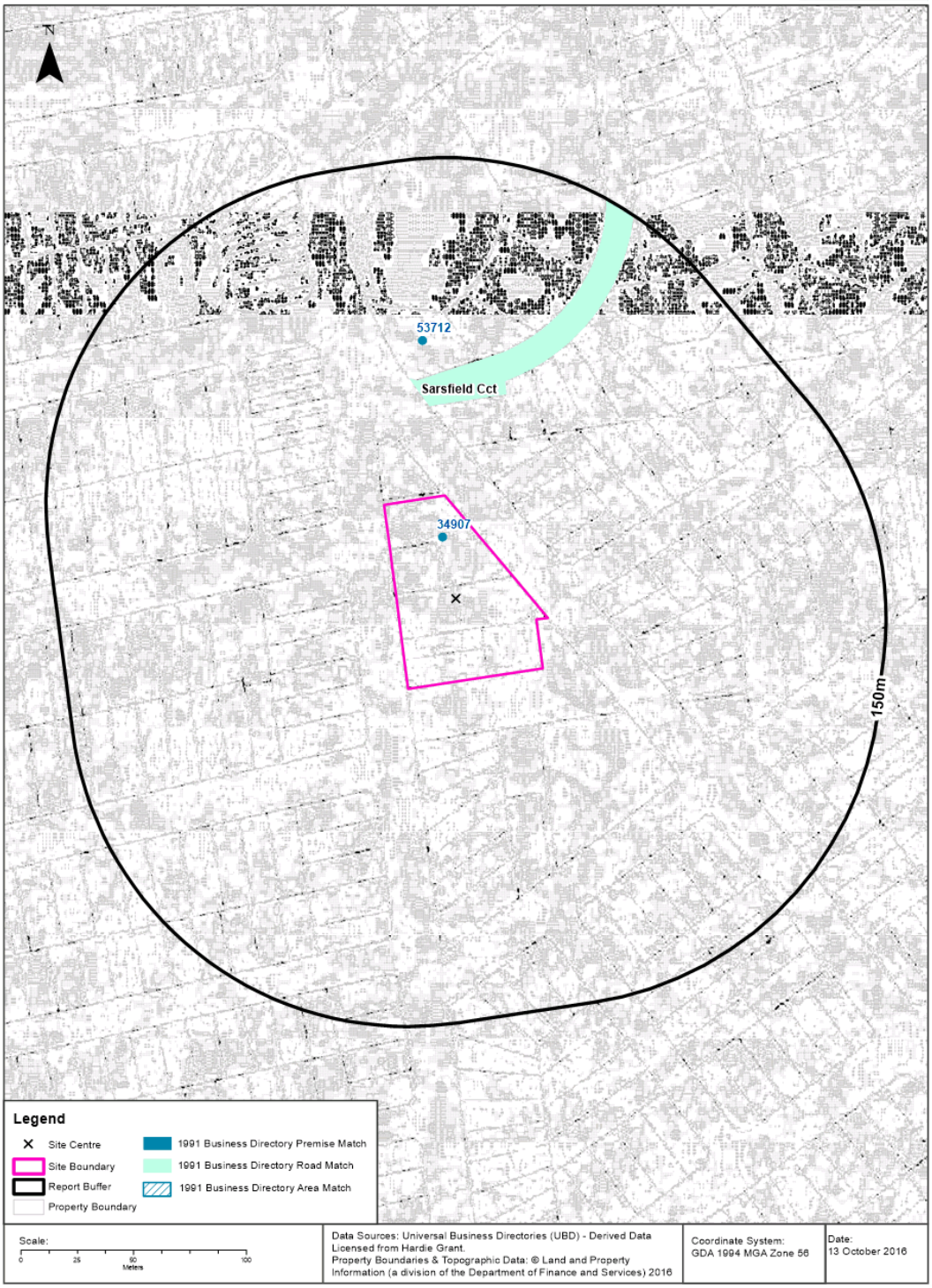
UPSS Sensitive Zones

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



1991 Historical Business Directory Records

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Historical Business Directories

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

1991 Business to Business Directory Records

Records from the 1991 UBD Business to Business Directory within 150m of the site:

Business Activity	Organisation	Address	Ref No.	Location Confidence	Distance	Direction
Auto Electricians	Caltex Bexley North Service Station	309 Bexley Rd, Bexley North 2207	34907	Premise Match	0m	Onsite
Bakers	Wilson's Cake Shoppe	Sarsfield Cr, Bexley North 2207	35381	Road Match	40m	North
Motor Garages & Service Stations	Esso Bexley North Service Station	320 Bexley Rd, Bexley North 2207	53712	Premise Match	67m	North

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1991 Business Directory Motor Garages & Service Stations

Motor Garages & Service Stations from the 1991 UBD Business Directory within 1km of the site:

Business Activity	Organisation	Address	Ref No.	Location Confidence	Distance	Direction
Motor Garages & Service Stations	Esso Bexley North Service Station	320 Bexley Rd, Bexley North 2207	53712	Premise Match	67m	North

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Historical Business Directory Records

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Historical Business Directories

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

1970 Business Directory Records

Records from the 1970 UBD Business Directory within 150m of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
BUTCHERS-RETAIL (B860)	Gibbons, J., 90 New iilawarra Rd., Bexley North	273658	Premise Match	0m	Onsite
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Golden Fleece Service Station,309 Bexley Rd.BEXLEY NORTH	341158	Premise Match	0m	Onsite
BUILDERS & CONTRACTORS-(M.M.B.A.) (B796)	King, H E., 330 Bexley Rd., Bexley North NSW	270694	Premise Match	34m	North
BUTCHERS-RETAIL (B860)	Angus Steaks, Sarsfield Crct(off 336 Bexley Rd.), BexleyNorth	273076	Road Match	40m	North
HAIRDRESSERS (GENT.'S) (H070)	Bexley North Gentlemen's Hairdresser,Sarsfield Circuit,off 336 Bexley Rd.,Bexley North	313633	Road Match	40m	North
RESTAURANTS (R320)	Coffee Break Restaurant,Sarsfield Circuit (off 336 Bexley Rd.),Bexley North	356827	Road Match	40m	North
BEAUTY SALONS &/OR LADIES' HAIRDRESSERS (B260)	Florida Beauty Salon, Sarsfield Crct., off 336 Bexley Rd.,Bexley North	265897	Road Match	40m	North
ANIMAL & BIRD FOOD SUPPLIES (A375)	Pets' Food Fair, Sarsfield Crct, off 336 Bexley Rd, BexleyNorth	261580	Road Match	40m	North
MEDICAL PRACTITIONERS (M216)	Stuart,Kingston,Sarsfield Circuit,off 336 Bexley Rd.,Bexley North	328344	Road Match	40m	North
BEAUTY SALONS &/OR LADIES' HAIRDRESSERS (B260)	Janece Beauty Salon, 91 New Illawarra Rd., Bexley North	266037	Premise Match	48m	North West
FURNITURE-HOUSEHOLD-RETAILERS RETAILERS (F740)	Rigby,N.R.,91 New Illawarra Rd.,Bexley North	309570	Premise Match	48m	North West
WALLPAPER MERCHANTS (W035)	McKee,R.J.& Co.,93 New Illawarra Rd.,Bexley North	372920	Premise Match	52m	North West
GIFT SHOPS (G180)	McKee,R.J.ft Co.,93 New 11 lawarra Rd.,Bexley North	310918	Premise Match	52m	North West
MUSIC-SHEET &/OR RECORDDEALERS (M776)	Carter,P.,95 New Illawarra Rd.,Bexley North	343144	Premise Match	57m	North West
RADIO &/OR TELEVISION SALES & SERVICEMEN (R090)	Carter,P.,95 New Illawarra Rd.BEXLEY NORTH	354215	Premise Match	57m	North West
FRUITERERS/GREENGROCERS (F640)	Spasaro,Sammy,97 New Illawarra Rd.,Bexley North	307965	Premise Match	61m	North West
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Esso Servicenter,320 Bexley Rd.BEXLEY NORTH	341070	Premise Match	67m	North
MOTOR GARAGES & ENGINEERS (M6S6)	Shapiro,W. Sc A.,320 Bexley Rd.BEXLEY NORTH	338594	Premise Match	67m	North
GROCERS-RETAIL (G655)	Taylor,H. J.,99 New tllawarra Rd.,Bexley North	313068	Premise Match	67m	North West
DELICATESSENS (D080)	Andrew's Delicatessen,101 New Itlawarra Rd.,Bexley North	287102	Premise Match	72m	North West
PAINT,VARNISH,OILS/COLOUR MERCHANTS (P074)	Blackwell's Hardware,103 New Hlawarra Rd.,Bexley North	346111	Premise Match	77m	North West
GARDEN SUPPLIES-RETAIL (G060)	Blackwell's Hardware,103 New Illawarra Rd.,Bexley North	310256	Premise Match	77m	North West
LIME/CEMENT MERCHANTS (L490)	Blackwell's Hardware,103 New IMawarra Rd.,Bexley North	323366	Premise Match	77m	North West
HARDWARE DEALERS/IRONMONGERS (H230)	Blackwell's Hardware,103 New Ulawarra Rd.BEXLEY NORTH	314918	Premise Match	77m	North West
TOY DEALERS-RETAIL (T535)	Bexley North Hobby Centre,14 Sarsfield Circuit,BexleyNorth	369979	Premise Match	99m	North
FRUITERERS/GREENGROCERS (F640)	Bourke & Dennis,10 Sarsfield Crct.,Bexley North	306705	Premise Match	99m	North
BEAUTY SALONS &/OR LADIES' HAIRDRESSERS (B260)	Florida Keys Beauty Salon, 16 Sarsfield Crct., Bexley North	265898	Premise Match	99m	North
DRY CLEANERS,PRESSERS/DYERS (D710)	Kleenit Valet Service,18 Sarsfield Crct.,Bexley North	292364	Premise Match	99m	North
BUTCHERS-RETAIL (B860)	Stroud, G., 8 Sarsfield Circuit, Bexley North	274630	Premise Match	99m	North
MERCERS-MEN'S & BOYS' OUTFITTERS(M232)	Johnston,T.,305 Bexley Rd.,Bexley North	328957	Premise Match	101m	North West

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
BUTCHERS-RETAIL (B860)	Ron's Butchery, 303 Bexley Rd., Bexley North	274460	Premise Match	107m	North West
CLUBS & SPORTING BODIES (C487)	Bexley Bowling & Recreation Club, Edward St., Bexley North	284016	Road Match	108m	South West
BUILDERS & CONTRACTORS-(M.M.B.A.) (B796)	Hargreaves, CW., 13 Fowler Ave., Bexley North NSW	270649	Premise Match	112m	East
MEDICAL PRACTITIONERS (M216)	Boden,Betty,301 Bexley Rd.,Bexley North	326231	Premise Match	112m	North West
DENTISTS (D140)	Cotterell,F.H.,301 Bexley Rd.,Bexley North	288479	Premise Match	112m	North West
MEDICAL PRACTITIONERS (M216)	Mathers,P.,301 Bexley Rd.,Bexley North & Branch	327585	Premise Match	112m	North West
MEDICAL PRACTITIONERS (M216)	Stuart,Mary,301 & 446 Bexley Rd.,Bexley North	328345	Premise Match	112m	North West
CHEMISTS-PHARMACEUTICAL (C286)	Bateman's Pharmacy, Neville, 299 Bexley Rd., Bexley North	280038	Premise Match	118m	North West
BUILDERS & CONTRACTORS (B800)	Sadler, B., 24 Bamsberry Gr., Bexley North	270362	Premise Match	122m	South East
DELICATESSENS (D080)	McKenna's Delicacies,297a Bexley Rd.,Bexley North	287684	Premise Match	123m	North West
FRUITERERS/GREENGROCERS (F640)	Barbuto Bros.297 Bexley Rd.,Bexley North	306640	Premise Match	127m	North West
DELICATESSENS (D080)	Notaras,P.,297 Bexley Rd.,Bexley North	287759	Premise Match	127m	North West
OPTOMETRISTS-REGISTERED (O 280)	Andrews,Brian K.,32 Sarsfield Crct.,off 336 Bexley Rd.,Bexley North	345293	Premise Match	130m	North
BUILDERS & CONTRACTORS (B800)	Braeside Building Co. Pty. Ltd., 34 Sarsfield Circuit, BexleyNorth	269965	Premise Match	130m	North
BUILDERS & CONTRACTORS (B800)	Braeside Constructions Co. Pty. Ltd., 34 Sarsfield CircuitBexley North	269966	Premise Match	130m	North
HAIRDRESSERS (GENT.'S) (H070)	Meier,P.,22 Sarsfield Circuit,Bexley North	314187	Premise Match	130m	North
MANAGEMENT CONSULTANTS(M077)	Rosser,R. & Associates,26 Sarsfield Crct.,Bexley North	324475	Premise Match	130m	North
VENDING MACHINE MFR.&/OR DISTS. (V115)	Vendo (Aust.) Pty.Ltd.,38 Sarsfield Crct.,Bexley North	372477	Premise Match	130m	North
CAKE SHOPS & PASTRYCOOKS (C045)	Breit, AJ., 295 Bexley Rd., Bexley North	276375	Premise Match	131m	North West
DRAPERS-RETAIL (D540)	Shaw's Drapery & Mercery,293 Bexley Rd.,Bexley North	290601	Premise Match	136m	North West
MERCERS-MEN'S & BOYS' OUTFITTERS(M232)	Shaw's Drapery and Mercery,293 Bexley Rd.,Bexley North	329137	Premise Match	136m	North West
DELICATESSENS (D080)	Stone,L.A.,291 Bexley Rd.,Bexley North	287997	Premise Match	141m	North West
CHEMISTS-PHARMACEUTICAL (C286)	iderson, W., 289 Bexley Rd., Bexley North	280566	Premise Match	147m	North West

1970 Business Directory Drycleaners & Service Stations

Drycleaners, Motor Garages & Service Stations from the 1970 UBD Business Directory within 1km of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Golden Fleece Service Station,309 Bexley Rd.BEXLEY NORTH	341158	Building Match	0m	Onsite
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Esso Servicenter,320 Bexley Rd.BEXLEY NORTH	341070	Building Match	67m	North
MOTOR GARAGES & ENGINEERS (M6S6)	Shapiro,W. Sc A.,320 Bexley Rd.BEXLEY NORTH	338594	Building Match	67m	North
DRY CLEANERS,PRESSERS/DYERS (D710)	Kleenit Valet Service,18 Sarsfield Crct.,Bexley North	292364	Building Match	99m	North
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Bexley North Service Station,Stade Rd.BEXLEY NORTH	340843	Road Match	268m	North
MOTOR GARAGES & ENGINEERS (M6S6)	BP Bexley North Service Station,Slade Rd.BEXLEY NORTH	337359	Road Match	268m	North
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Kingsland Auto Port,Bexley Rd.BEXLEY	341255	Road Match	900m	South East
MOTOR GARAGES & ENGINEERS (M6S6)	Ampol Bexley North Service Station,272 Bexley Rd.BEXLEY NORTH	337197	Building Match	918m	South East
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Bexley Park Service Station,91-95 Stoney Creek Rd.,Bexley,2207BEXLEY	340844	Building Match	987m	South

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Historical Business Directory Records

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Historical Business Directories

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

1950 Business Directory Records

Records from the 1950 UBD Business Directory within 150m of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
BUTCHERS-RETAIL	Gibbon, J. S., 90 New Illawarra Rd., Bexley North	13538	Premise Match	0m	Onsite
MOTOR SERVICE STATIONS-PETROL, Etc.	Bexley North Filling Station, Bexley Rd., Bexley North	85794	Road Match	0m	East
BEAUTY SALONS &/OR LADIES' HAIRDRESSERS	Race, Mrs. A. I., Bexley Rd., Bexley North	7701	Road Match	0m	East
FRUITERERS & GREENGROCERS	Kavanagh, K. B., 97 New Illawarra Rd., Bexley North	50413	Premise Match	61m	North West
MILK BARS & CONFECTIONERS	Kavanagh, K. B., 97 New Illawarra Rd., Bexley North	76861	Premise Match	61m	North West
GROCERS-RETAIL	Taylor, H. J., 99 New Illawarra Rd., Bexley North	55839	Premise Match	67m	North West
HARDWARE DEALERS &/OR IRONMONGERS	Taylor, H. J., 99 New Illawarra Rd., Bexley North	61431	Premise Match	67m	North West
CARRIERS & CARTAGE CONTRACTORS	Roddan, J., 8 Fortescue St., Bexley	19679	Premise Match	100m	West
BAG & SACK MERCHANTS	Bates, W., 17 Barnesby Rd., Bexley North	4990	Premise Match	109m	East
CARRIERS & CARTAGE CONTRACTORS	Carroll, M. A., 1 Middleton Ave., North Bexley	18554	Premise Match	141m	South East

1950 Business Directory Drycleaners & Service Stations

Drycleaners, Motor Garages & Service Stations from the 1950 UBD Business Directory within 1km of the site:

Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
MOTOR SERVICE STATIONS-PETROL, Etc.	Bexley North Filling Station, Bexley Rd., Bexley North	85794	Road Match	0m	East
DRY CLEANERS, PRESSERS & DYERS	Murray, G. E. (Agent), 538 Homer St., Earlwood	35545	Premise Match	781m	North
DRY CLEANERS, PRESSERS & DYERS	Pigott, A. H. (Agent), 176 Stoney Creek Rd., Bexley	35592	Premise Match	968m	South
MOTOR GARAGES &/OR ENGINEERS	Skyway Motor (B. James), 107 Stoney Creek Rd., Bexley	84375	Premise Match	991m	South
MOTOR GARAGES &/OR ENGINEERS	Skyway Motors, 107 Stoney Creek Rd., Bexley	84376	Premise Match	991m	South

Aerial Imagery 2014

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 2007

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 2000

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1991

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1982

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1970

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Lotsearch Pty Ltd ABN 89 600 168 018 26

Aerial Imagery 1965

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1961

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1955

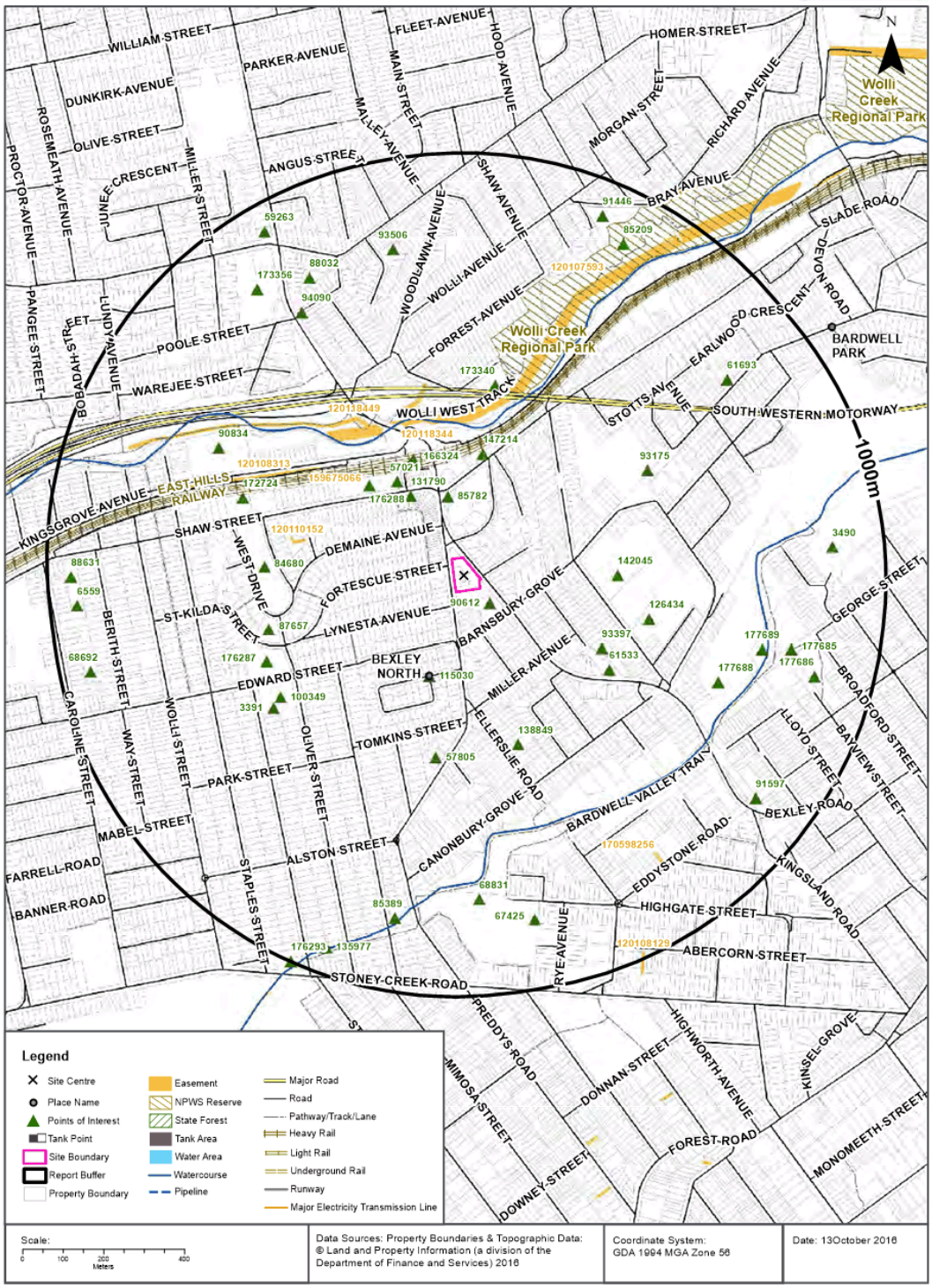
Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Aerial Imagery 1943

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Topographic Features

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Topographic Features

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Points of Interest

What Points of Interest exist within the report buffer?

Map Id	Feature Type	Label	Distance	Direction
90612	Park	WHITBREAD PARK	43m	South East
85782	Park	NAIRN GARDENS	155m	North
131790	Post Office	BEXLEY NORTH POST OFFICE	186m	North West
115030	Suburb	BEXLEY NORTH	217m	South
57021	Library	BEXLEY NORTH LIBRARY	234m	North West
147214	Embassy	CONSULATE-GENERAL OF PANAMA	262m	North
166324	Railway Station	BEXLEY NORTH RAILWAY STATION	265m	North West
176288	Park	SHAW STREET RESERVE	273m	North West
93397	Park	Park	336m	South East
142045	Education Facility	THE SALVATION ARMY BOOTH COLLEGE	339m	East
61533	Place Of Worship	ANGLICAN CHURCH	377m	South East
138849	Retirement Village	BEXLEY GARDENS VILLAGE	396m	South
57805	Place Of Worship	CHURCH OF CHRIST	411m	South
126434	Primary School	BEXLEY NORTH PUBLIC SCHOOL	425m	East
173340	Park	ILLOURA RESERVE	434m	North
84680	Park	GILCHRIST PARK	462m	West
87657	Park	Park	470m	West
93175	Park	STOTTS RESERVE	493m	North East
176287	Park	GILCHRIST PARK	497m	South West
100349	Sports Field	BOWLING GREENS	504m	South West
3391	Club	BEXLEY BOWLING CLUB	533m	South West
172724	Community Facility	KINGSGROVE BEXLEY NORTH COMMUNITY CENTRE	537m	West
177688	Park	BARDWELL VALLEY PARKLANDS	633m	South East
90834	Park	KINGSGROVE AVENUE RESERVE	637m	North West
177689	Park	BARDWELL CREEK RESERVE	713m	East
94090	Park	Park	714m	North West
68831	Swimming Pool	BEXLEY SWIMMING CENTRE	761m	South
88032	Park	Park	780m	North West
93506	Park	Park	780m	North
177685	Lookout	VIEWING AREA	784m	East
61693	Place Of Worship	UNITING CHURCH	785m	North East
85389	Park	OSWALD SCHOLES RESERVE	818m	South
173356	Park	BEAUMONT PARK	822m	North West

Map Id	Feature Type	Label	Distance	Direction
67425	SES Facility	ROCKDALE SES	828m	South
177686	Park	BROADFORD STREET RESERVE	855m	East
91597	Park	BINNAMITTALONG NATIVE GARDENS	856m	South East
85209	Park	Park	872m	North East
3490	Club	BARDWELL VALLEY GOLF CLUB	873m	East
91446	Park	S J HARRISON PARK	913m	North
68692	Sports Centre	KINGSGROVE TENNIS CENTRE	922m	West
6559	Community Facility	SCOUT HALL	931m	West
59263	Place Of Worship	ANGLICAN CHURCH	933m	North West
135977	Retirement Village	JACINTA VILLA	933m	South
88631	Park	KOOKABURRA RESERVE	940m	West
176293	Park	HANNAH LAYCOCK RESERVE	998m	South West

Topographic Features

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Tanks (Areas)

What are the Tank Areas located within the report buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Capture Method	Feature Currency	Distance	Direction
N/A	No records in buffer						

Tanks (Points)

What are the Tank Points located within the report buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Capture Method	Feature Currency	Distance	Direction
N/A	No records in buffer						

Major Easements

What Major Easements exist within the report buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120107593	Primary	Undefined		335m	North East
120118344	Primary	Undefined		348m	North
120110152	Primary	Undefined		365m	West
120118449	Primary	Undefined		369m	North West
159675066	Primary	Easement for Access		396m	West
120108313	Primary	Undefined	Variable	396m	West
170598256	Primary	Right of way	3m & Variable	785m	South East
120108129	Primary	Undefined		984m	South East

Topographic Features

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

State Forest

What State Forest exist within the report buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

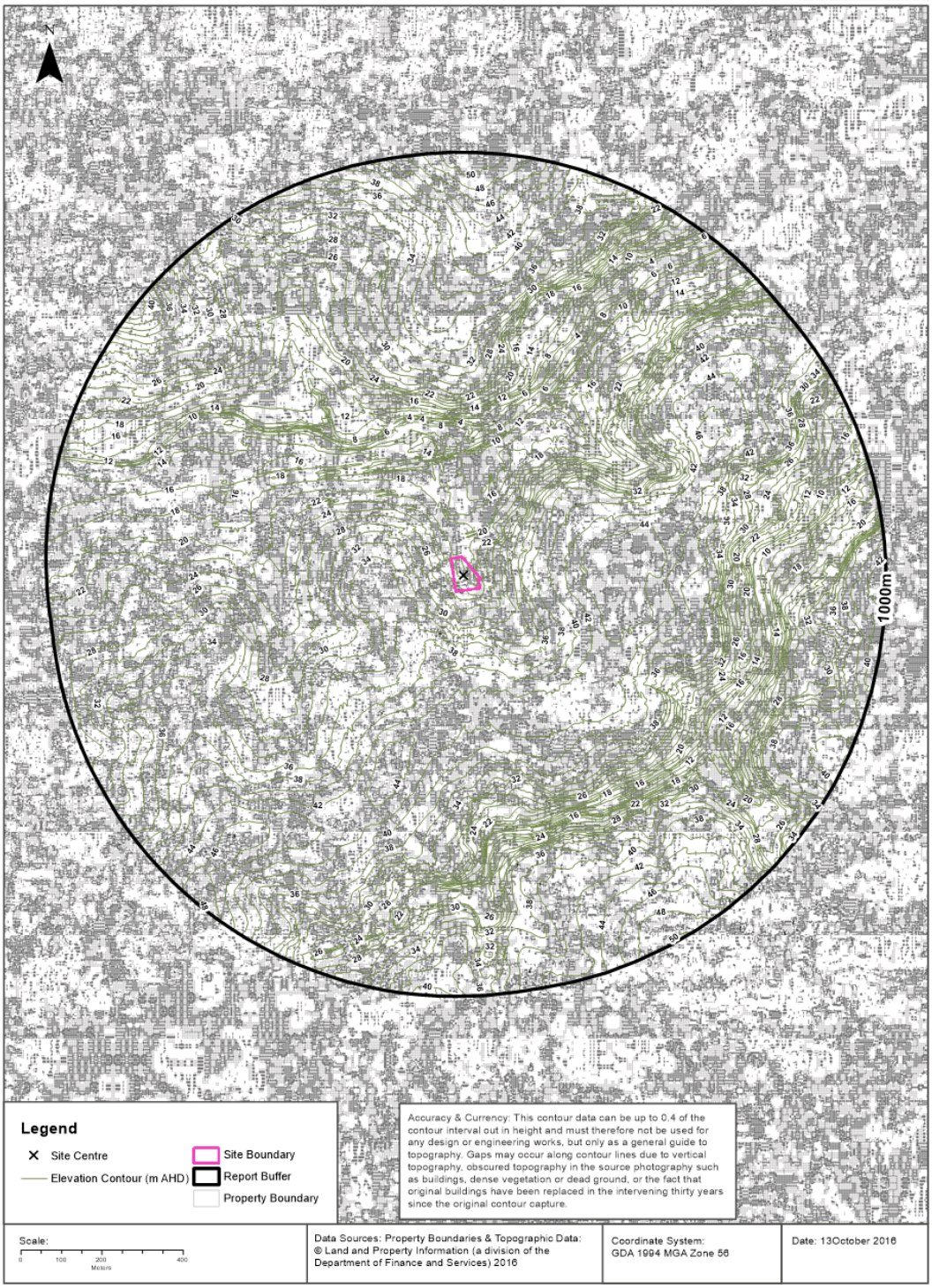
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the report buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N0644	REGIONAL PARK	Wolli Creek Regional Park	25/01/2001	420m	North East

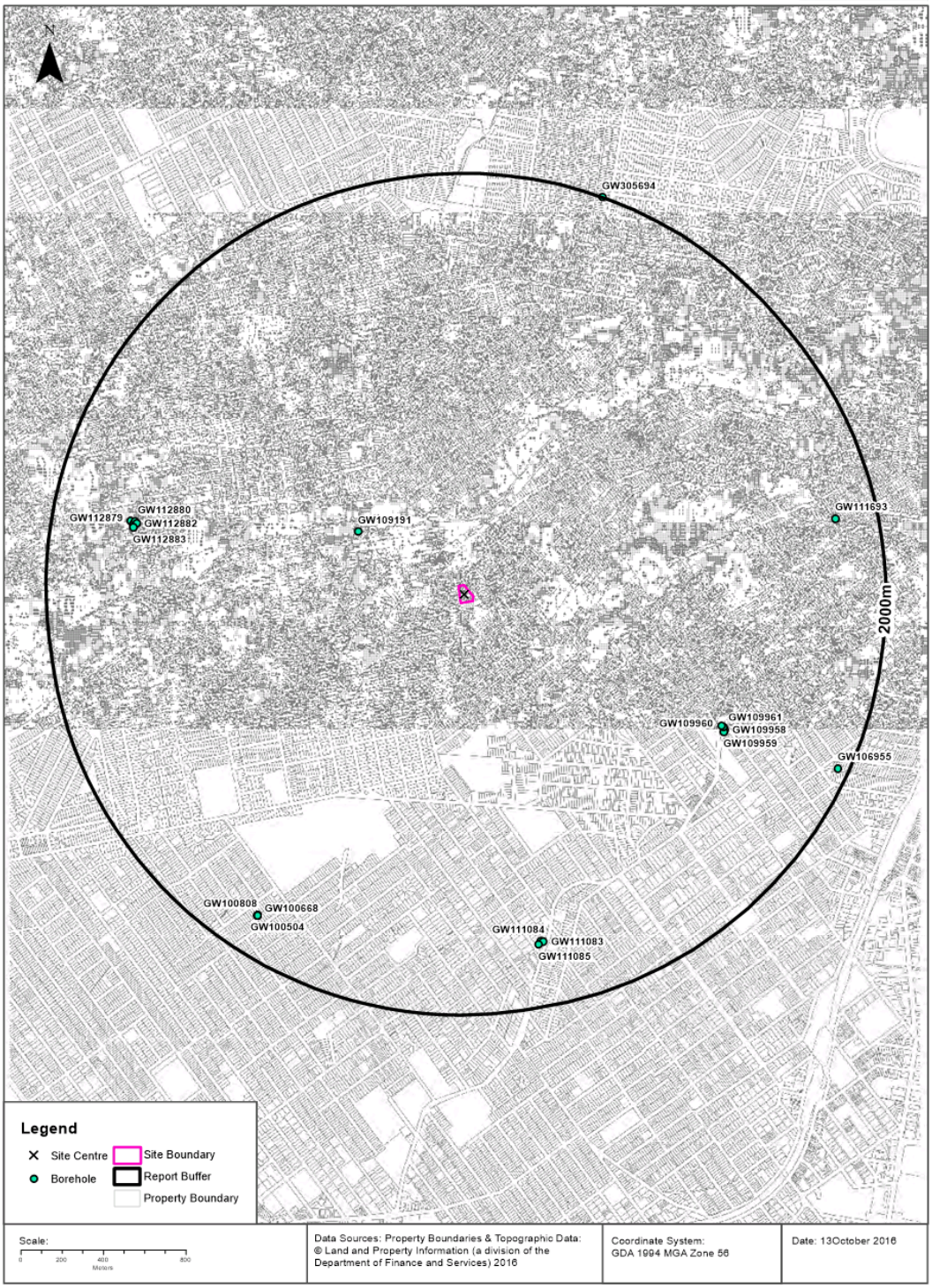
Elevation Contours (m AHD)

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Groundwater Boreholes

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Hydrogeology & Groundwater

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Hydrogeology

Description of aquifers on-site:

Description
Porous, extensive aquifers of low to moderate productivity

Description of aquifers within the report buffer:

Description
Porous, extensive aquifers of low to moderate productivity

Groundwater Boreholes

Boreholes within 2km of the site:

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW109191	10BL601292, 10BL602310, 10WA114753	Bore	Other Govt	Recreation	Intertec Drilling Services	08/08/2008	186.00	186.00	3950	93.00	0.050		552m	North West
GW109960	10BL601848	Well	Private	Monitoring	HLA Enviroscience s	13/04/2007	8.00	8.00					1351m	South East
GW109961	10BL601848	Well	Private	Monitoring	HLA Enviroscience s	12/04/2007	5.80	5.80					1360m	South East
GW109958	10BL601848	Well	Private	Monitoring	HLA Enviroscience s	12/04/2007	5.20	5.20					1373m	South East
GW109959	10BL601848	Well	Private	Monitoring	HLA Enviroscience s	13/04/2007	5.90	5.90					1373m	South East
GW112882	10BL604145	Bore	Other Govt	Monitoring	SOILCHECK PTY LTD	12/07/2010	6.00	6.00					1589m	West
GW112880	10BL604145	Bore	Other Govt	Monitoring	SOILCHECK PTY LTD	12/07/2010	6.00	6.00					1598m	West
GW112883	10BL604145	Bore	Other Govt	Monitoring	SOILCHECK PTY LTD	12/07/2010	6.20	6.20					1601m	West
GW112881	10BL604145	Bore	Other Govt	Monitoring	SOILCHECK PTY LTD	12/07/2010	6.00	6.00					1603m	West
GW112879	10BL604145	Bore	Other Govt	Monitoring	SOILCHECK PTY LTD	12/07/2010	6.20	6.20					1618m	West
GW111084	10BL604064	Bore	Private	Monitoring	Numac Drilling Services Pty Ltd	19/04/2010	9.00	9.00					1685m	South
GW111083	10BL604064	Bore	Private	Monitoring	Numac Drilling Services Pty Ltd	19/04/2010	9.00	9.00					1688m	South
GW111085	10BL604064	Bore	Private	Monitoring	Numac Drilling Services Pty Ltd	19/04/2010	5.00	5.00					1698m	South
GW111693	10BL602861, 10WA109273	Spear	Private	Domestic		20/02/2009	8.85	8.85	good	5.49	1.000		1797m	East
GW100668	10BL157758, 10WA108384	Spear	Private	Domestic		09/10/1996	7.95	7.95	Good	5.45	1.000		1808m	South West

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW100580	10BL157928, 10WA108399	Spear	Private	Domestic	A Korkadis	11/03/1997	9.15	9.15	Good		1.000		1808m	South West
GW100068	10BL156735, 10WA108351	Spear	Private	Domestic	A Korkadis	20/06/1995	7.30	7.30	Good	4.27	1.000		1808m	South West
GW100504	10BL157928, 10WA108399	Bore			A Korkadis	11/03/1997	9.15						1808m	South West
GW100808	10BL156230, 10WA108335	Spear	Private	Domestic		01/01/1991	3.66	6.10	Other	1.52			1808m	South West
GW106955	10BL164738, 10WA108920	Spear	Private	Domestic		15/04/2005	4.20	4.20			1.000		1949m	South East
GW305694	30BL181476	Spear	Private	Domestic	Self Drilled	20/02/2003	5.00				0.300		1998m	North

Hydrogeology & Groundwater

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Driller's Logs

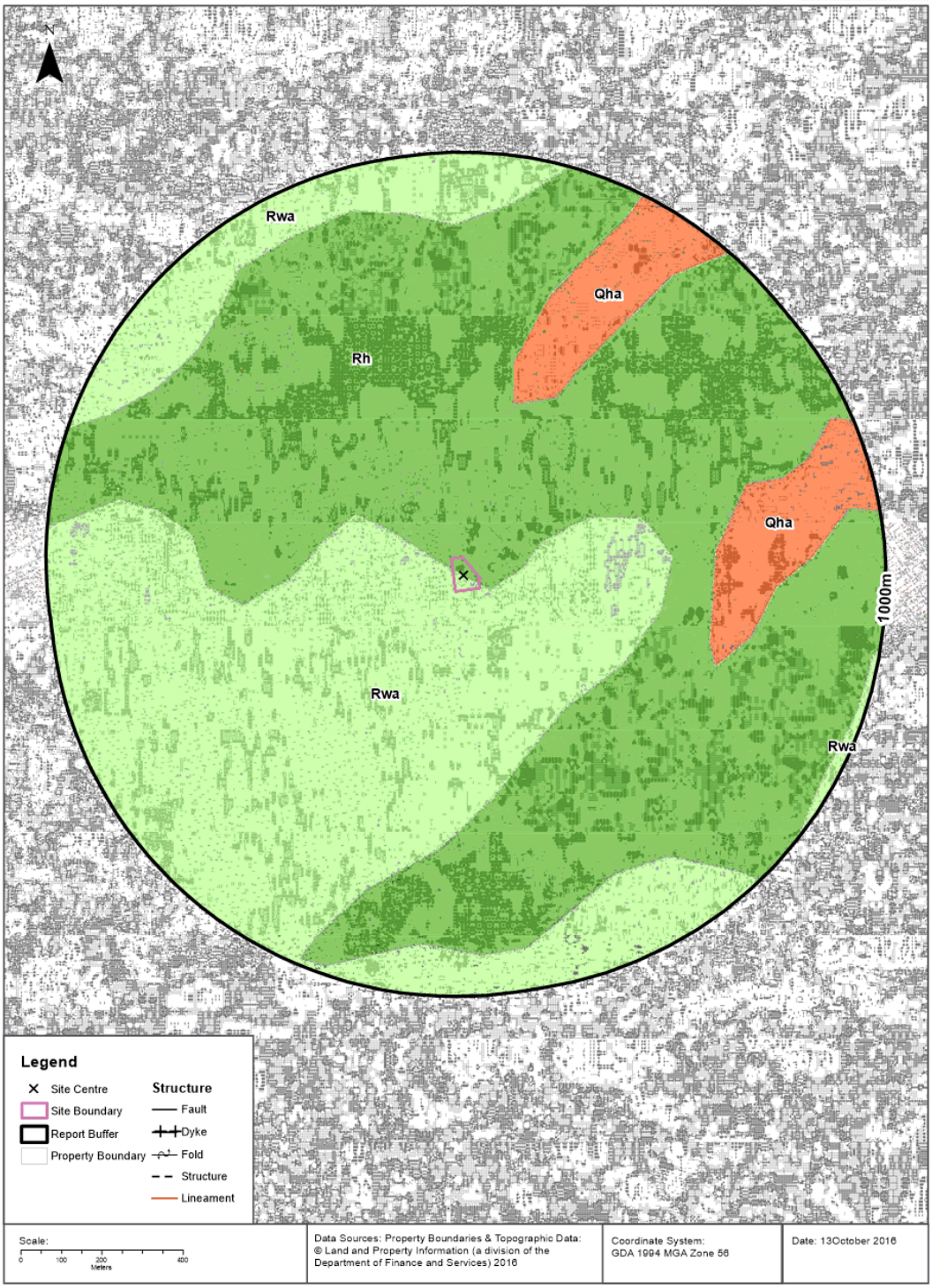
Drill log data relevant to the boreholes within 2km of the site:

Groundwater No	Drillers Log	Distance	Direction
GW109191	0.00m-1.00m SANDY CLAY 1.00m-4.00m CLAY 4.00m-7.00m SANDSTONE SOFT 7.00m-9.00m SANDSTONE L/BROWN 9.00m-9.50m SANDSTONE AND FINE QUARTZ 9.50m-31.00m SANDSTONE GREY 31.00m-40.00m SANDSTONE AND SHALE BEDDING 40.00m-41.00m SANDSTONE AND FINE QUARTZ 41.00m-131.00m SANDSTONE GREY 131.00m-135.50m SANDSTONE AND FINE QUARTZ 135.50m-148.00m SANDSTONE GREY 148.00m-159.00m SANDSTONE AND SHALE BEDDING 159.00m-186.00m SANDSTONE GREY	552m	North West
GW109960	0.00m-0.20m CONCRETE 0.20m-0.50m CONCRETE AND CLAYEY GRAVEL,SAND LOOSE,DARK BROWN 0.50m-1.00m CLAY,SOFT SIGHTLY MOIST,HIGH PLASTICITY,ORANGE BROWN 1.00m-2.50m CLAYEY SHALE,WEATHERED,STIFF,DRY,M/L/PLASTICITY,BROWN GREY 2.50m-4.00m SHALE,STIFF,WEATHERED,DRY,M/L/PLASTICITY,BROWN GREY 4.00m-6.00m CLAYEY SHALE,STIFF,WEATHERED,SOME IRONSTONE AND GRAVEL 6.00m-7.80m SANDY SHALE,VERY LOOSE,MOIST,M/L/ PLASTICITY,GREY 7.80m-8.00m CLAYEY SHALE VERY SOFT CLAY,SOME SHALE,DARK GREY BROWN	1351m	South East
GW109961	0.00m-0.20m CONCRETE 0.20m-0.40m GRAVELLY SAND,LOOSE,LOW PLASTICIY,DARK GREY 0.40m-1.70m CLAY.,EDOI, STOFF.SJA;E.DRU.M/L/PLASTICITY,ORANGE,BROWN,GREY 1.70m-2.50m CLAYEY SHALE,VERY STIFF,DRY,M/L/PLASTICITY,BROWN GREY 2.50m-4.00m SHALE, MEDIUM STIFF,WEATHERED,DRY, BROWN GREY 4.00m-5.60m CLAY,VERY SOFT,WEATHERED SHALE,DRY,GREY BROWN 5.60m-5.80m SHALE HARD DRY LOW PLASTICITY,GREY	1360m	South East
GW109958	0.00m-0.20m CONCRETE 0.20m-0.50m CLAYEY GRAVEL (FILL),MOIST, L/PLASTICITY,D/GREY, CLAY 0.50m-0.70m CLAYEY GRAVEL,STIFF,LOOSE SAND,MOIST,L/PLASTICITY 0.70m-1.50m CLAY,MEDIUM STIFF,LOOSE SAND,MOIST,HIGH PLASTICITY,ORANGE BROWN 1.50m-2.50m CLAYEY SHALE. WEATHERED,STIFF,MEDIUM LOW PLASTICITY,BROWN GREY 2.50m-4.00m SHALE.WEATHERED.STIFF,DRY,MEDIUM LOW PLASTICITY,BROWN GREY 4.00m-4.50m CLAY,SOFT,DRY,LOW PLASTICITY,BROWN,GREY 4.50m-5.20m CLAY,MEDIUM STIFF,SHALE MOIST,M/L/PLASTICITY,RED BROWN	1373m	South East
GW109959	0.00m-0.30m CONCRETE 0.30m-0.50m CONCRETE, GRAVEL,LOOSE SAND MOIST,L/PLASTICITY,DARK BROWN 0.50m-1.00m CLAYEY GRAVEL,LOOSE SAND,MOIST L/PLASTICITY,DARK BROWN 1.00m-3.00m CLAYEY SHALE,STIFF,WEATHERED SHALE,DRY,M/L/PLASTICITY 3.00m-3.50m SHALE,SOFT,WEATHERED SHALE,DRY,MEDIUM LOW PLASTICITY 3.50m-5.80m CLAYEY SHALE,STIFF,SOFT,WEATHERED,DRY,CLAY BECOMES SOFT 5.80m-5.90m CLAY VERY SOFT,SATURATED,MEDIUM LOW PLASTICITY,BROWN	1373m	South East
GW111084	0.00m-1.50m FILL 1.50m-6.00m CLAY L/BROWN STIFF 6.00m-8.00m SHALE L/GREY WEATHERED 8.00m-9.00m SHALE GREY WEATHERED,CLAY LENSES	1685m	South
GW111083	0.00m-1.50m FILL 1.50m-6.00m CLAY L/BROWN STIFF 6.00m-8.00m SHALE L/GREY WEATHERED 8.00m-9.00m CLAY LENSES	1688m	South
GW111085	0.00m-0.50m FILL 0.50m-3.00m CLAY L/BROWN STIFF 3.00m-4.00m SHALE GREY WEATHERED 4.00m-5.00m SHALE GREY WEATHERED WITH CLAY LENSES	1698m	South
GW111693	0.00m-8.85m UNCONSOLIDATED ALL SANDS	1797m	East
GW100068	0.00m-7.30m ALL SAND UNCONSOLIDATED SAND WITH SMALL SEASHELLS	1808m	South West
GW100580	0.00m-9.15m UNCONSOLIDATED ALL SAND WITH SMALL SEA SHELLS	1808m	South West
GW100668	0.00m-7.95m Unconsolidated all Sand with Small Seashells	1808m	South West

Groundwater No	Drillers Log	Distance	Direction
GW100808	0.00m-1.52m CLEAN YELLOW SAND 1.52m-1.72m SEA SHELL 1.72m-6.10m CLEAN YELLOW SAND, THEN GREYISH SMELLY MUD AT 6.10 metres	1808m	South West
GW106955	0.00m-2.60m Clay 2.60m-4.20m Sandy Clay	1949m	South East

Geology 1:100,000

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Geology

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rh	Medium to coarse grained quartz sandstone, very minor shale and laminate lenses				Triassic		Sydney	1:100,000
Rwa	Black to dark grey shale and laminate	Ashfield Shale	Wianamatta Group		Triassic		Sydney	1:100,000

What are the Geological Units within the report buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Qha	Silty to peaty quartz sand, silt, and clay. Ferruginous and humic cementation in places. Common shell layers				Quaternary		Sydney	1:100,000
Rh	Medium to coarse grained quartz sandstone, very minor shale and laminate lenses				Triassic		Sydney	1:100,000
Rwa	Black to dark grey shale and laminate	Ashfield Shale	Wianamatta Group		Triassic		Sydney	1:100,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

What are the Geological Structures within the report buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Naturally Occurring Asbestos Potential

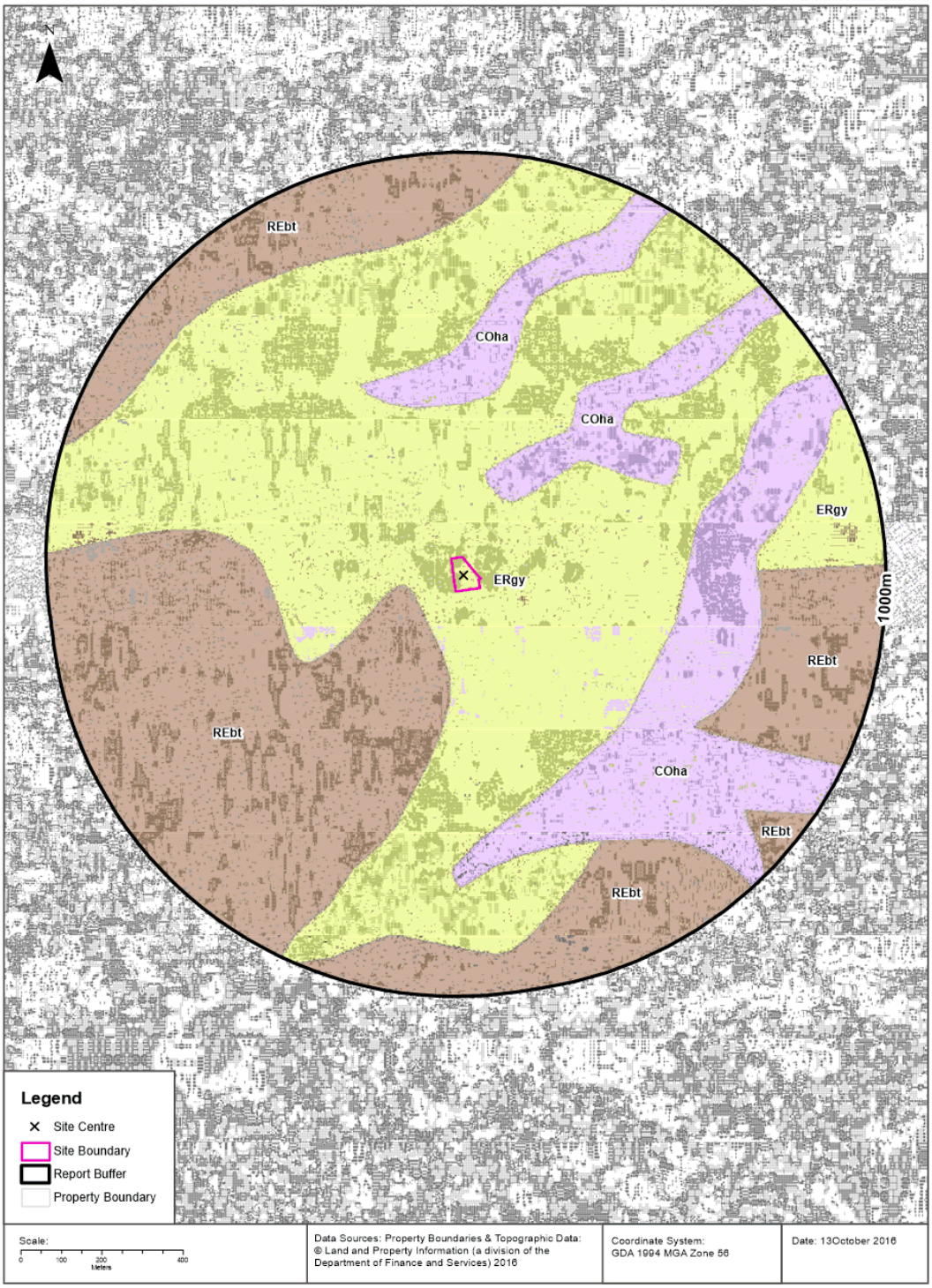
Naturally Occurring Asbestos Potential within the report buffer?

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Mining Subsidence District Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Soil Landscapes

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Soils

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Soil Landscapes

What are the onsite Soil Landscapes?

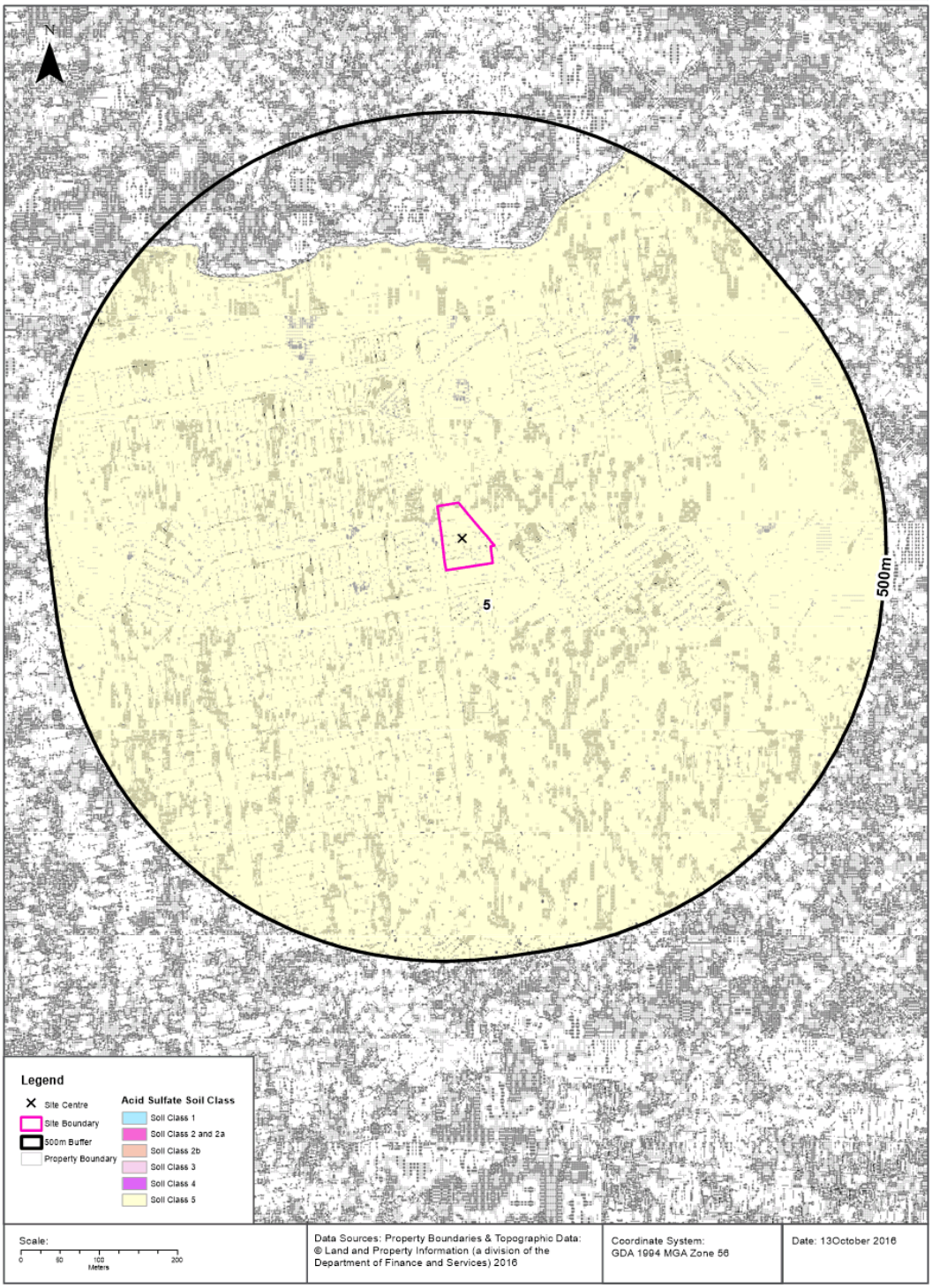
Soil Code	Name	Group	Process	Map Sheet	Scale
ERgy	GYMEA		EROSIONAL	Sydney	1:100,000

What are the Soil Landscapes within the report buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
COha	HAWKESBURY		COLLUVIAL	Sydney	1:100,000
ERgy	GYMEA		EROSIONAL	Sydney	1:100,000
REbt	BLACKTOWN		RESIDUAL	Sydney	1:100,000

Acid Sulfate Soils

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Standard Local Environmental Plan Acid Sulfate Soils

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Standard Local Environmental Plan Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

Soil Class	Description	LEP
5	Works within 500 metres of adjacent Class 1, 2, 3, or 4 land that is below 5 metres AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land, present an environmental risk	Rockdale Local Environmental Plan 2011

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	LEP	Distance	Direction
None				

Dryland Salinity

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Dryland Salinity

Is there Dryland Salinity data onsite?

No

Is there Dryland Salinity data within the report buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Mining Subsidence Districts

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Mining Subsidence Districts

Mining Subsidence Districts within the report buffer?

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

Environmental Zoning

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the report buffer?

Dataset	Onsite	Within Site Buffer	Distance
SEPP14 - Coastal Wetlands	No	No	N/A
SEPP26 - Littoral Rainforests	No	No	N/A
SEPP71 - Coastal Protection Zone	No	No	N/A

SEPP Protected Areas Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the report buffer?

Map Id	Feature	Effective Date	Distance	Direction
N/A	No records within buffer			

SEPP Major Development Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Strategic Land Use Areas

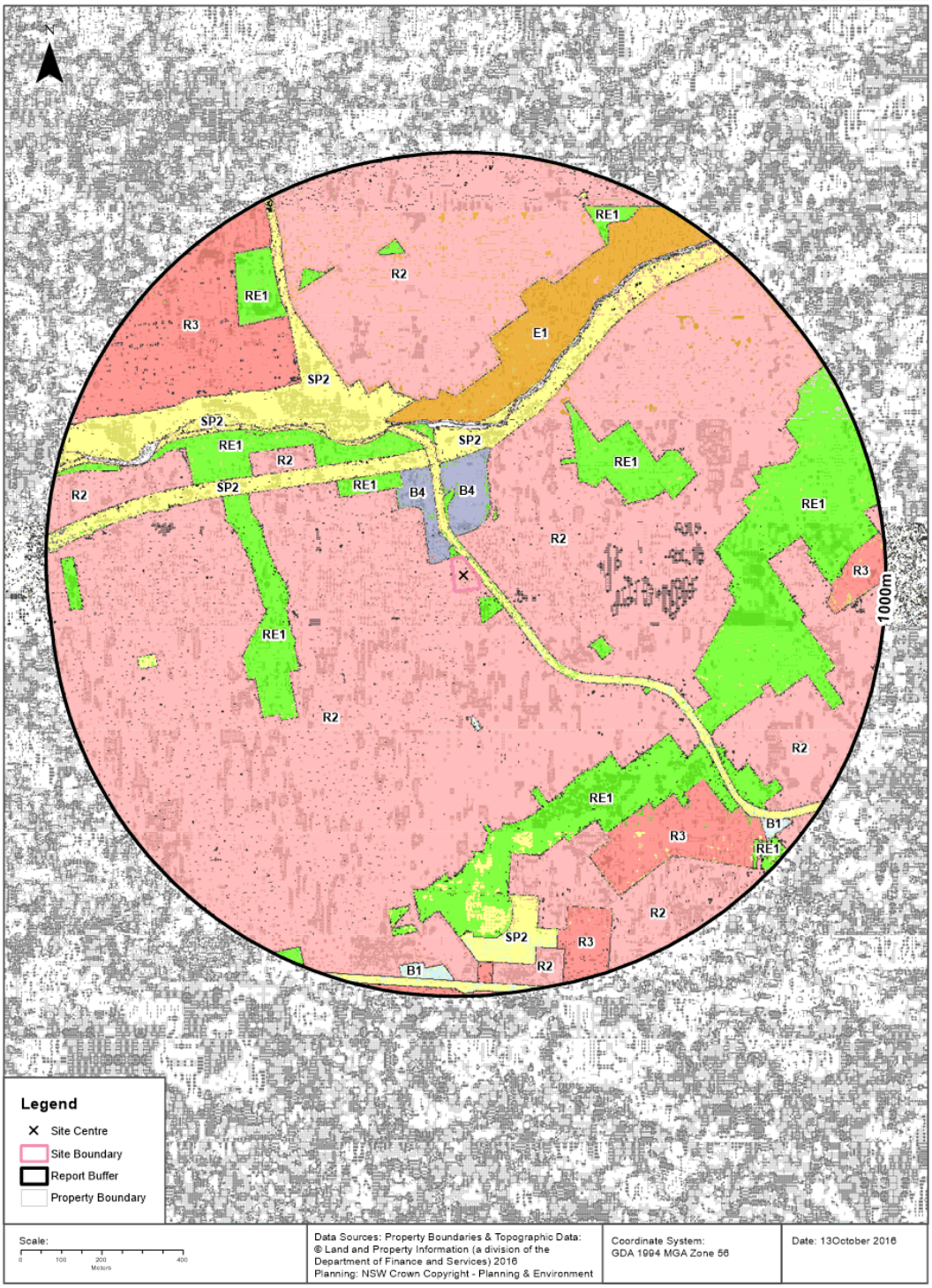
State Environmental Planning Policy Strategic Land Use Areas onsite or within the report buffer?

Strategic Land Use	SEPPNo	Effective Date	Amendment	Amendment Year	Distance	Direction
No records within buffer						

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment

LEP Planning Zones

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Local Environmental Plan

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Land Zoning

What Local Environmental Plan Land Zones exist within the report buffer?

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		0m	Onsite
SP2	Infrastructure	Classified Road	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		0m	East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		1m	North West
B4	Mixed Use		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		2m	North West
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		20m	North East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		24m	South East
B4	Mixed Use		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		52m	North
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		91m	North
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		119m	North East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		214m	North West
SP2	Infrastructure	Railway	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		234m	West
SP2	Infrastructure	Railway	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		237m	North East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		279m	North
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		305m	South East
B1	Neighbourhood Centre		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		309m	South
UL	Unzoned Land		Rockdale Local Environmental Plan 2011	11/07/2014	11/07/2014	15/04/2016	Amendment No 1	313m	North
UL	Unzoned Land		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		325m	North
SP2	Infrastructure	Railways	Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		329m	North
E1	National Parks and Nature Reserves		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		332m	North East
E1	National Parks and Nature Reserves		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		335m	North
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		336m	North East
SP2	Infrastructure	Drainage	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		348m	North West
SP2	Infrastructure	Classified Road	Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		353m	West
SP2	Infrastructure	Classified Road	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		356m	North West
UL	Unzoned Land		Rockdale Local Environmental Plan 2011	11/07/2014	11/07/2014	15/04/2016	Amendment No 1	368m	North East
R2	Low Density Residential		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		394m	North East
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		399m	North West
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		405m	West
UL	Unzoned Land		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		406m	North East
SP2	Infrastructure	Classified Road	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		434m	North West

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		477m	South East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		511m	South
SP2	Infrastructure	Drainage	Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		543m	North West
RE1	Public Recreation		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		549m	North West
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		569m	East
R3	Medium Density Residential		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		571m	North West
SP2	Infrastructure	Drainage	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		600m	West
SP2	Infrastructure	Classified Road	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		612m	North West
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		641m	South East
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		660m	West
R3	Medium Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		674m	South East
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		678m	East
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		680m	South East
RE1	Public Recreation		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		722m	North West
SP2	Infrastructure	Telecommunications	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		755m	West
SP2	Infrastructure	Depot	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		759m	South
RE1	Public Recreation		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		761m	North West
RE1	Public Recreation		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		763m	North
UL	Unzoned Land		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		769m	West
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		784m	South
R3	Medium Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		816m	South
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		827m	South
RE1	Public Recreation		Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		849m	North
R3	Medium Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		856m	East
B1	Neighbourhood Centre		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		897m	South East
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		899m	South
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		913m	West
R3	Medium Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		915m	South
B1	Neighbourhood Centre		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		918m	South
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		920m	South East
SP2	Infrastructure	Drainage	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		931m	West
SP2	Infrastructure	Water Supply System	Canterbury Local Environmental Plan 2012	01/01/2013	01/01/2013	11/12/2015		934m	North
RE1	Public Recreation		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		957m	South West
SP2	Infrastructure	Classified Road	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		959m	South
R3	Medium Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		979m	South
R2	Low Density Residential		Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		986m	South

Local Environmental Plan

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Minimum Subdivision Lot Size

What are the onsite Local Environmental Plan Minimum Subdivision Lot Sizes?

Symbol	Minimum Lot Size	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
G	450 m2	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	15/04/2016		100

Maximum Height of Building

What are the onsite Local Environmental Plan Maximum Height of Buildings?

Symbol	Maximum Height of Building	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
I	8.50 m	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	10/06/2016		100

Floor Space Ratio

What are the onsite Local Environmental Plan Floor Space Ratios?

Symbol	Floor Space Ratio	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
D	0.50	LEP	05/12/2011	05/12/2011	15/04/2016		100

Land Application

What are the onsite Local Environmental Plan Land Applications?

Application Type	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
Included	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011		100

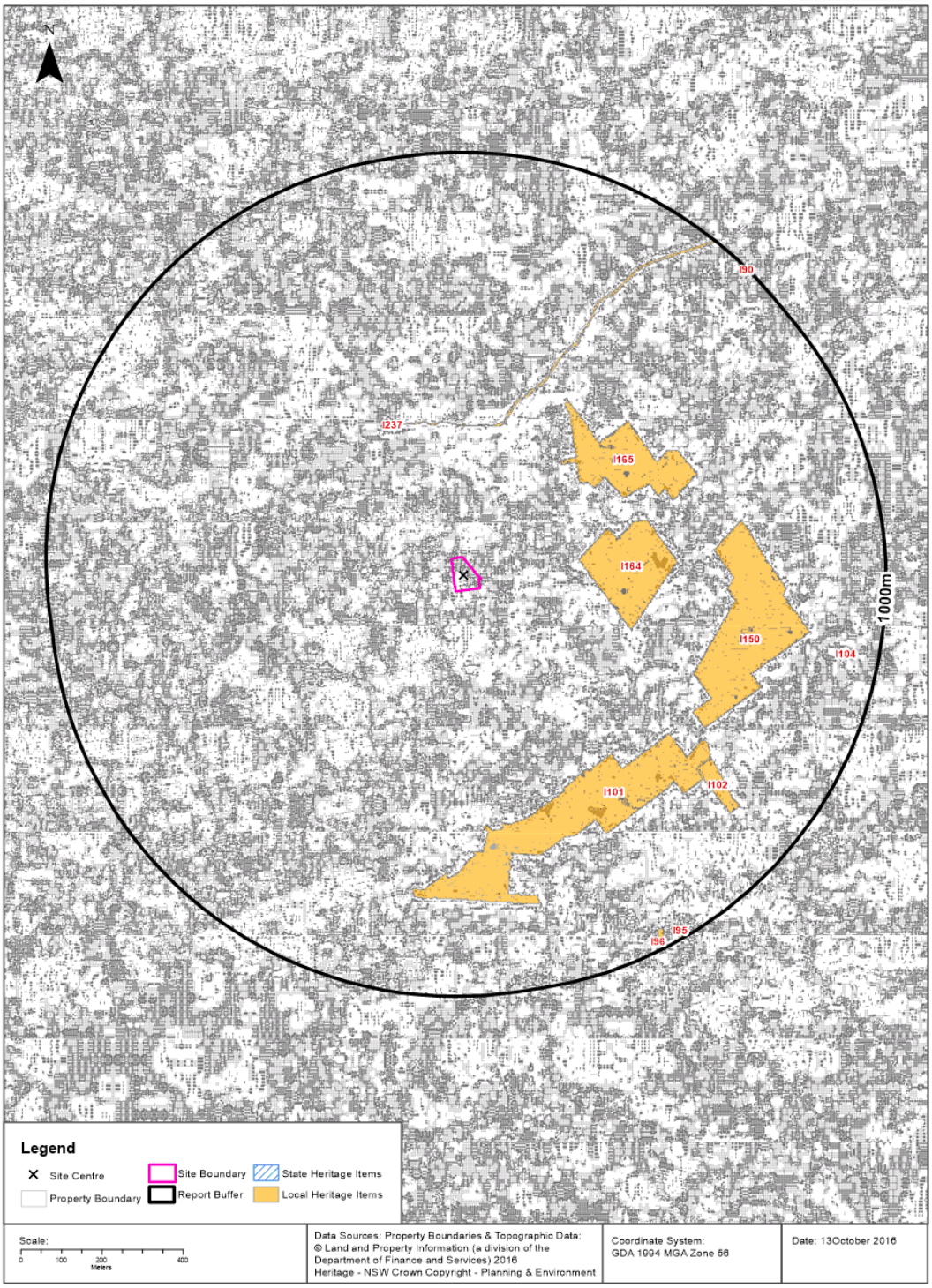
Land Reservation Acquisition

What are the onsite Local Environmental Plan Land Reservation Acquisitions?

Reservation	LEP	Published Date	Commenced Date	Currency Date	Amendment	Comments	Percentage of Site Area
No Data							

Heritage Items

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Heritage

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

State Heritage Items

What are the State Heritage Items located within the report buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

Local Heritage Items

What are the Local Heritage Items located within the report buffer?

Map Id	Name	Classification	Significance	LEP or Act	Published Date	Commenced Date	Currency Date	Distance	Direction
I164	Glendalough McIlveen Museum and Research Centre	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	248m	East
I237	Wolli Creek Valley	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	323m	North East
I165	Stotts Reserve	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	336m	North East
I101	Bardwell Creek Flora Reserve (south of Bexley Road)	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	520m	South East
I150	Bardwell Creek Flora Reserve (north of Bexley Road)	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	569m	East
I102	Former quarry	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	697m	South East
I104	Montrose (main house only)	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	902m	East
I96	Federation house	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	949m	South East
I95	Federation house	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	978m	South East
I90	Hillsdon's Nursery Cottage	Item - General	Local	Rockdale Local Environmental Plan 2011	05/12/2011	05/12/2011	05/12/2011	997m	North East

Natural Hazards

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Bushfire Prone Land

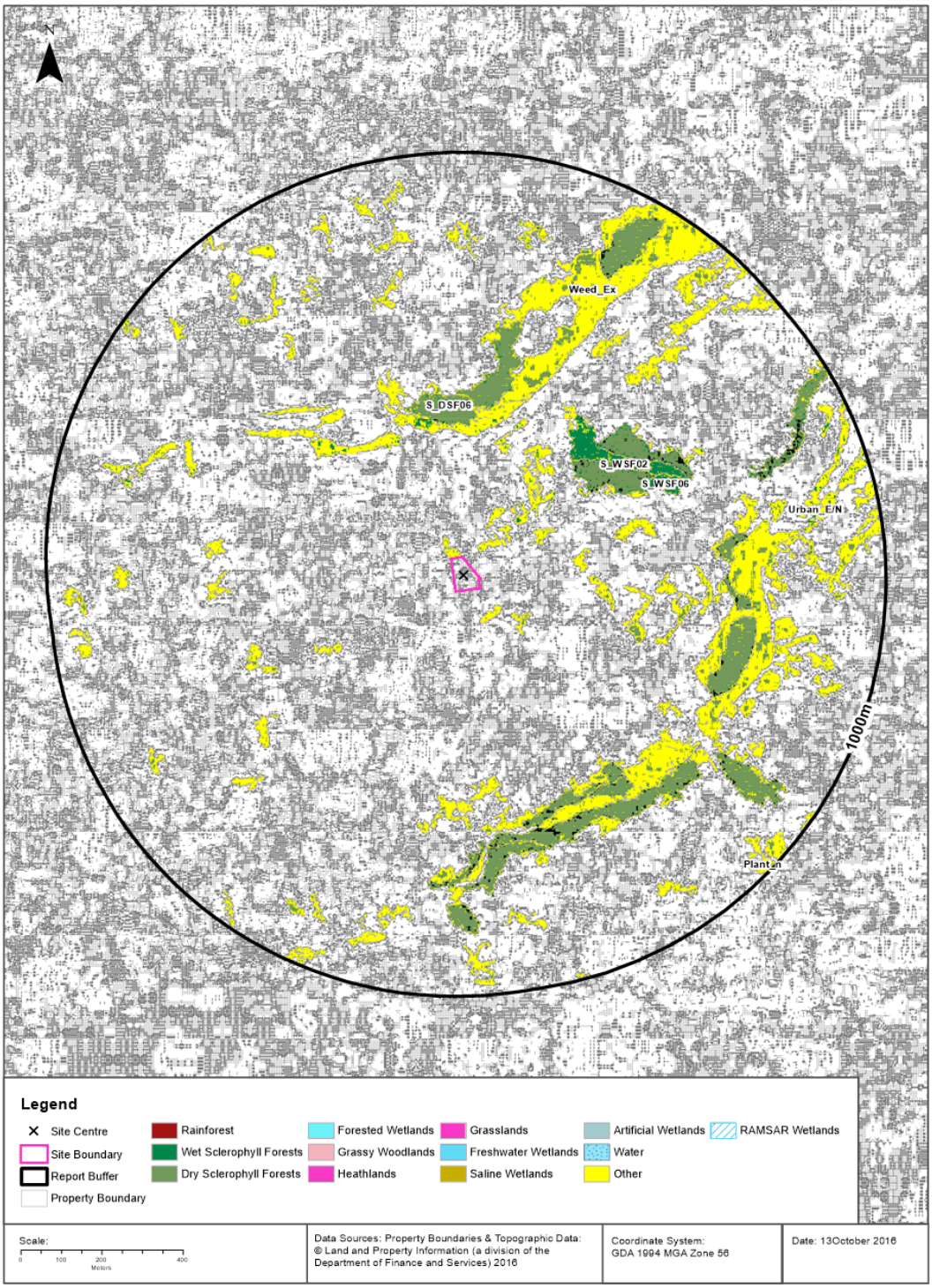
What are the nearest Bushfire Prone Land Categories that exist within the report buffer?

Bushfire Prone Land Category	Distance	Direction
No records within buffer		

Bushfire Prone Land Data Reference - NSW RFS GIS Data Set

Ecological Constraints - Native Vegetation & RAMSAR Wetlands

Bexley Road & New Illawarra Road, Bexley North, NSW 2207



Ecological Constraints

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

Native Vegetation

What native vegetation exists within the report buffer?

Map ID	Map Unit Name	Threatened Ecological Community NSW	Threatened Ecological Community EPBC Act	Understorey	Disturbance	Disturbance Index	Dominant Species	Dist	Direction
Urban_E/N	Urban_E/N: Urban Exotic/Native			00: Not assessed	00: Not assessed	0: Not assessed	Urban Exotic/ Native	0m	Onsite
Weed_Ex	Weed_Ex: Weeds and Exotics			00: Not assessed	00: Not assessed	0: Not assessed	Exotic Species >90%cover	296m	North
S_DSF06	S_DSF06: Coastal Sandstone Foreshores Forest			17: Pittosporum dominant	13: Weeds	3: High	A.costata/ E.piperita/ +/ - C.gummifera/ S.glomulifera/ E.resinifera	322m	North
S_WSF02	S_WSF02: Coastal Enriched Sandstone Moist Forest			10: Mesic/rainforest	20: Previously cleared 1943	3: High	E.saligna/ S.glomulifera	361m	North East
S_WSF06	S_WSF06: Coastal Shale-Sandstone Forest			11: Semi sheltered dry/mesic	13: Weeds	2: Moderate	E.resinifera/ S.glomulifera/ C.gummifera	457m	North East
Plant_n	Plant_n: Plantation (native and/or exotic)			00: Not assessed	00: Not assessed	0: Not assessed	Native or Exotic Plantations	636m	South East

Native Vegetation of the Sydney Metropolitan Area : NSW Office of Environment and Heritage

RAMSAR Wetlands

What RAMSAR Wetland areas exist within the report buffer?

Map Id	RAMSAR Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints

Bexley Road & New Illawarra Road, Bexley North, NSW 2207

ATLAS of NSW Wildlife

Endangered &Vulnerable Species on the ATLAS of NSW Wildlife database, within 10km of the site?

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Amphibia	Hylidae	Litoria aurea	Green and Golden Bell Frog	No	Endangered, Protected	Vulnerable
Amphibia	Myobatrachidae	Crinia tinnula	Wallum Froglet	No	Vulnerable, Protected	
Amphibia	Myobatrachidae	Pseudophryne australis	Red-crowned Toadlet	No	Vulnerable, Protected	
Aves	Acanthizidae	Calamanthus fuliginosus	Striated Fieldwren	No	Endangered, Protected	
Aves	Accipitridae	Hieraaetus morphnoides	Little Eagle	No	Vulnerable, Protected	
Aves	Accipitridae	Lophoictinia isura	Square-tailed Kite	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Accipitridae	Pandion cristatus	Eastern Osprey	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Anatidae	Stictonetta naevosa	Freckled Duck	No	Vulnerable, Protected	
Aves	Ardeidae	Botaurus poiciloptilus	Australasian Bittern	No	Endangered, Protected	Endangered
Aves	Artamidae	Artamus cyanopterus cyanopterus	Dusky Woodswallow	No	Vulnerable, Protected	
Aves	Burhinidae	Burhinus grallarius	Bush Stone-curlew	No	Endangered, Protected	
Aves	Burhinidae	Esacus magnirostris	Beach Stone-curlew	No	Critically Endangered Species, Protected	
Aves	Cacatuidae	Callocephalon fimbriatum	Gang-gang Cockatoo	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Cacatuidae	Calyptorhynchus lathami	Glossy Black-Cockatoo	No	Vulnerable, Protected, Category 2 Sensitive Species	
Aves	Cacatuidae	Lophochroa leadbeateri	Major Mitchell's Cockatoo	No	Vulnerable, Protected, Category 2 Sensitive Species	
Aves	Charadriidae	Charadrius leschenaultii	Greater Sand-plover	No	Vulnerable, Protected	V,C,J,K
Aves	Charadriidae	Charadrius mongolus	Lesser Sand-plover	No	Vulnerable, Protected	E,C,J,K
Aves	Ciconiidae	Ephippiorhynchus asiaticus	Black-necked Stork	No	Endangered, Protected	
Aves	Columbidae	Ptilinopus superbus	Superb Fruit-Dove	No	Vulnerable, Protected	
Aves	Diomedeidae	Diomedea exulans	Wandering Albatross	No	Endangered, Protected	E,J
Aves	Estrildidae	Stagonopleura guttata	Diamond Firetail	No	Vulnerable, Protected	
Aves	Falconidae	Falco subniger	Black Falcon	No	Vulnerable, Protected	
Aves	Haematopodidae	Haematopus fuliginosus	Sooty Oystercatcher	No	Vulnerable, Protected	
Aves	Haematopodidae	Haematopus longirostris	Pied Oystercatcher	No	Endangered, Protected	
Aves	Laridae	Onychoprion fuscata	Sooty Tern	No	Vulnerable, Protected	
Aves	Laridae	Sternula albifrons	Little Tern	No	Endangered, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Meliphagidae	Anthochaera phrygia	Regent Honeyeater	No	Critically Endangered Species, Protected	Critically Endangered
Aves	Meliphagidae	Epthianura albifrons	White-fronted Chat	No	Vulnerable, Protected	
Aves	Meliphagidae	Epthianura albifrons	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	No	Endangered Population, Vulnerable, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Aves	Petroicidae	Petroica boodang	Scarlet Robin	No	Vulnerable, Protected	
Aves	Petroicidae	Petroica phoenicea	Flame Robin	No	Vulnerable, Protected	
Aves	Psittacidae	Glossopsitta pusilla	Little Lorikeet	No	Vulnerable, Protected	
Aves	Psittacidae	Lathamus discolor	Swift Parrot	No	Endangered, Protected, Category 3 Sensitive Species	Critically Endangered
Aves	Psittacidae	Neophema pulchella	Turquoise Parrot	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Rostratulidae	Rostratula australis	Australian Painted Snipe	No	Endangered, Protected	Endangered
Aves	Scolopacidae	Calidris alba	Sanderling	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	Calidris ferruginea	Curlew Sandpiper	No	Endangered, Protected	CE,C,J,K
Aves	Scolopacidae	Calidris tenuirostris	Great Knot	No	Vulnerable, Protected	CE,C,J,K
Aves	Scolopacidae	Limicola falcinellus	Broad-billed Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	Limosa limosa	Black-tailed Godwit	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	Xenus cinereus	Terek Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Strigidae	Ninox strenua	Powerful Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Tytonidae	Tyto novaehollandiae	Masked Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Mammalia	Balaenidae	Eubalaena australis	Southern Right Whale	No	Endangered, Protected	Endangered
Mammalia	Dasyuridae	Dasyurus viverrinus	Eastern Quoll	No	Endangered, Protected	Critically Endangered
Mammalia	Dugongidae	Dugong dugon	Dugong	No	Endangered, Protected	
Mammalia	Molossidae	Mormopterus norfolkensis	Eastern Freetail-bat	No	Vulnerable, Protected	
Mammalia	Otariidae	Arctocephalus pusillus doriferus	Australian Fur-seal	No	Vulnerable, Protected	
Mammalia	Peramelidae	Perameles nasuta	Long-nosed Bandicoot population in inner western Sydney	No	Endangered Population, Protected	
Mammalia	Phascolarctidae	Phascolarctos cinereus	Koala	No	Vulnerable, Protected	Vulnerable
Mammalia	Pteropodidae	Pteropus poliocephalus	Grey-headed Flying-fox	No	Vulnerable, Protected	Vulnerable
Mammalia	Vespertilionidae	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Myotis macropus	Southern Myotis	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Scoteanax rueppellii	Greater Broad-nosed Bat	No	Vulnerable, Protected	
Reptilia	Cheloniidae	Chelonia mydas	Green Turtle	No	Vulnerable, Protected	Vulnerable
Flora	Asteraceae	Senecio spathulatus	Coast Groundsel	No	Endangered, Protected	
Flora	Campanulaceae	Wahlenbergia multicaulis	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	No	Endangered Population	
Flora	Casuarinaceae	Allocasuarina diminuta subsp. mimica	Allocasuarina diminuta subsp. mimica L.A.S.Johnson population in the Sutherland and Liverpool local government areas	No	Endangered Population	
Flora	Convolvulaceae	Wilsonia backhousei	Narrow-leafed Wilsonia	No	Vulnerable, Protected	
Flora	Dilleniaceae	Hibbertia stricta subsp. furcatula		No	Endangered, Protected	
Flora	Elaeocarpaceae	Tetratheca juncea	Black-eyed Susan	No	Vulnerable, Protected	Vulnerable
Flora	Ericaceae	Epacris purpurascens var. purpurascens		No	Vulnerable, Protected	
Flora	Ericaceae	Leucopogon exolasius	Woronora Beard-heath	No	Vulnerable, Protected	Vulnerable

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Flora	Fabaceae (Faboideae)	Pultenaea pedunculata	Matted Bush-pea	No	Endangered, Protected	
Flora	Fabaceae (Mimosoideae)	Acacia bynoeana	Bynoe's Wattle	No	Endangered, Protected	Vulnerable
Flora	Fabaceae (Mimosoideae)	Acacia prominens	Gosford Wattle, Hurstville and Kogarah Local Government Areas	No	Endangered Population	
Flora	Fabaceae (Mimosoideae)	Acacia pubescens	Downy Wattle	No	Vulnerable, Protected	Vulnerable
Flora	Fabaceae (Mimosoideae)	Acacia terminalis subsp. terminalis	Sunshine Wattle	No	Endangered, Protected	Endangered
Flora	Juncaginaceae	Maundia triglochinoides		No	Vulnerable, Protected	
Flora	Lobeliaceae	Hypsela sessiliflora		No	Endangered, Protected, Category 3 Sensitive Species	Extinct
Flora	Myrtaceae	Callistemon linearifolius	Netted Bottle Brush	No	Vulnerable, Protected, Category 3 Sensitive Species	
Flora	Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Eucalyptus scoparia	Wallangarra White Gum	No	Endangered, Protected	Vulnerable
Flora	Myrtaceae	Melaleuca deanei	Deane's Paperbark	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	No	Endangered, Protected	Vulnerable
Flora	Orchidaceae	Caladenia tessellata	Thick Lip Spider Orchid	No	Endangered, Protected, Category 2 Sensitive Species	Vulnerable
Flora	Poaceae	Deyeuxia appressa		No	Endangered, Protected	Endangered
Flora	Proteaceae	Grevillea beadleana	Beadle's Grevillea	No	Endangered, Protected, Category 3 Sensitive Species	Endangered
Flora	Proteaceae	Persoonia hirsuta	Hairy Geebung	No	Endangered, Protected, Category 3 Sensitive Species	Endangered
Flora	Proteaceae	Persoonia nutans	Nodding Geebung	No	Endangered, Protected	Endangered
Flora	Rhamnaceae	Pomaderris prunifolia	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	No	Endangered Population	
Flora	Thymelaeaceae	Pimelea curviflora var. curviflora		No	Vulnerable, Protected	Vulnerable

Data does not include records not defined as either endangered or vulnerable, and category 1 sensitive species are also excluded. NSW Office of Environment and Heritage's Atlas of NSW Wildlife, which holds data from a number of custodians. Data obtained 13/10/2016

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APPENDIX C

HISTORICAL TITLE SEARCH RESULTS

Summary of Owners Report

LPI **Sydney**

Address: - 88, 90, 94, 96 New Illawarra Road & 311 Bexley Road, Bexley North

Description: - Lot A D.P. 388204, Lot 1 D.P. 400341 & Lots 3, 4, 6 D.P. 508629

As regards Lot A D.P. 388204

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1940)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
5.3.1940 (1940 to 1948)	Francis Baines (Married Woman)	Vol 2055 Fol 231 Now Vol 5248 Fol 180
19.8.1948 (1948 to 1953)	Thomas Baines (Carpenter) (Application by Transmission not investigated)	Vol 5248 Fol 180
15.12.1953 (1953 to 1954)	Ann Josh (Married Woman) (Application by Transmission not investigated)	Vol 5248 Fol 180 Now Vol 6755 Fol 208
12.1.1954 (1954 to 1954)	Victor Charles Hood (Building Contractor) Fred Ward (Building Contractor)	Vol 6755 Fol 208
8.12.1954 (1954 to 1960)	John Lionel Lavender (Motor Mechanic) Greta Eileen Lavender (Married Woman)	Vol 6755 Fol 208 Now Vol 6935 Fol 113
23.9.1960 (1960 to 1984)	Edward Lewis Andrew Anderson (Civil Engineer)	Vol 6935 Fol 113
10.9.1984 (1984 to 1986)	John Joseph Quinn Gloria Muriel Quinn	Vol 6935 Fol 113
22.8.1986 (1986 to Date)	# Samih Ali Ghoniem # Mariam Mahmoud Ghoniem Now # Samih Ali Ghunaim # Mariam Mahmoud Ghunaim	Vol 6935 Fol 113 Now A/388204

# Denotes current registered proprietor

Easement & Leases: -NIL

As regards Lot 1 D.P. 400341

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1919)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
3.9.1919 (1919 to 1953)	Thomas Baines (Poultry Farmer)	Vol 2055 Fol 231 Now Vol 5248 Fol 201
15.12.1953 (1953 to 1954)	Ella Moon (Married Woman) (Application by Transmission not investigated)	Vol 5248 Fol 201 Now Vol 6755 Fol 206
12.2.1954 (1954 to 1956)	Frank Hennah (Taxi Proprietor) Mary Ann Hennah (Married Woman)	Vol 6755 Fol 206
1.5.1956 (1956 to 1993)	John Albert Monahan (Builder) Ida Laura Monahan (Married Woman)	Vol 6755 Fol 206 Now 1/400341
30.3.1993 (1993 to 2008)	Ida Laura Monahan (Widow)	1/400341
13.5.2008 (2008 to 2013)	Ali Fadel Ibrahim Mustapha Fadel	1/400341
28.10.2013 (2013 to Date)	# Abdellatif Ibrahim Mahmoud Meqdadi	1/400341

# Denotes current registered proprietor

Easement & Leases: -NIL

Search Lot 3 D.P. 508629

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1918)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
12.4.1918 (1918 to 1977)	George Gibbons (Sugar Boiler) Annie Elizabeth Gibbons (Married Woman)	Vol 2055 Fol 231 Now Vol 9792 Fol 73
12.7.1977 (1977 to 1977)	Annie Elizabeth Gibbons (Widow)	Vol 9792 Fol 73
29.9.1977 (1977 to 1990)	John Angelo Popovich (Railway Employee) Anica Popovich	Vol 9792 Fol 73 Now 3/508629
24.12.1990 (1990 to 1998)	Yuet Kwong	3/508629
1.7.1998 (1998 to 2004)	Joseph Awada Nariman Awada	3/508629
3.3.2004 (2004 to Date)	# Nariman Awada	3/508629

# Denotes current registered proprietor

Easement & Leases: -NIL

Search Lot 4 D.P. 508629

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1918)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
12.4.1918 (1918 to 1938)	George Gibbons (Sugar Boiler) Annie Elizabeth Gibbons (Married Woman)	Vol 2055 Fol 231 Now Vol 2847 Fol 78
5.10.1938 (1938 to 1981)	John Spencer Gibbons (Butcher)	Vol 2847 Fol 78 Now Vol 9792 Fol 74
10.3.1981 (1981 to 1987)	Michael Paul Sergis (Butcher)	Vol 9792 Fol 74
4.6.1987 (1987 to 1998)	Chris Stavropoulos Maria Stavropoulos	Vol 9792 Fol 74 Now 4/508629
25.2.1998 (1998 to Date)	# Emmanuel Zoumas # Patty Zoumas	4/508629

# Denotes current registered proprietor

Easement: -NIL

Leases:

- 25.9.1991 Z945041 – expired or surrendered not investigated

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Search Lot 6 D.P. 508629

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1919)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
3.9.1919 (1919 to 1953)	Thomas Baines (Poultry Farmer)	Vol 2055 Fol 231 Now Vol 5248 Fol 201
15.12.1953 (1953 to 1954)	Ella Moon (Married Woman) (Application by Transmission not investigated)	Vol 5248 Fol 201 Now Vol 6755 Fol 206
12.2.1954 (1954 to 1957)	Frank Hennah (Taxi Proprietor) Mary Ann Hennah (Married Woman)	Vol 6755 Fol 206 Now Vol 7339 Fol 235
12.9.1957 (1957 to 1962)	John Inman Bale (Pilot) Joy Elaine Bale (Married Woman)	Vol 7339 Fol 235
16.10.1962 (1962 to 1964)	Peter William Davis (Service Station Manager)	Vol 7339 Fol 235 Now Vol 9792 Fol 76
20.8.1964 (1964 to 1967)	Robert Raymond Giddins (Printer) Patricia June Giddins (Married Woman)	Vol 9792 Fol 76
9.5.1967 (1967 to 1970)	Geoffrey Evans Mulcahy (Clerk) Helen Margaret Mulcahy (Married Woman)	Vol 9792 Fol 76
5.8.1970 (1970 to 1985)	Ivan Pavlakovic (Butcher) Wanda Dragan (Married Woman)	Vol 9792 Fol 76
15.3.1985 (1985 to 2007)	Enrique Cavanna Guadalupe Cavanna	Vol 9792 Fol 76 Now 6/508629
8.2.2007 (2007 to Date)	# Andrew Marshall Hunter # Allyn Hector George Marshall	6/5086259

# Denotes current registered proprietor

Search continued as regard Lot 6 D.P. 508629

Easement & Leases: -NIL

Yours Sincerely
James McDonnell
12 October 2016


Land & Property Information
Cadastral Records Enquiry Report
Locality : BEXLEY NORTH
Requested Parcel : Lot 1 DP 400341
Identified Parcel : Lot 1 DP 400341
LGA : BAYSIDE
Parish : ST GEORGE
County : CUMBERLAND
DP 18233
DP 18232
DP 17340
DP 17340
DP 18232
DP 17340
DP 35137
DP 400341
DP 388204
DP 508629
DP 8315
DP 371390 B
DP 1103672
DP 336119
DP 340367
DP 412516
DP 1078738
DP 19534
DP 231608
DP 430806
DP 231948
DP 561696
DP 344788 A
DP 438987
SP 87740
DP 397616
DP 663036
DP 1045200
DP 587405
DP 339095 B
DP 181455 B
DP 369190 C
DP 18322
DP 18322
DP 18887
DP 1108902
DP 402246
DP 199868
DP 349188
SP 7141
DP 19634
DP 506443
DEMAINE AVE
FORTESCUE ST
LYNESTA AVE
NEW ILLAWARRA RD
SARSFIELD CCT
BEXLEY RD
FOWLER AVE
BARNSBURY GR
BAYSIDE COUNCIL
Copyright (c) Land and Property Information. Map Projection: MGA Zone 56
0 8.5 17 25.5 34 Metres
Report Generated 3:22:54 PM, 11 October, 2016
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For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.
Page 1 of 3

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:05AM

FOLIO: A/388204

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 6935 FOL 113

Recorded	Number	Type of Instrument	C.T. Issue
2/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
12/12/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED

*** END OF SEARCH ***

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FOLIO: A/388204

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:17 AM	-	-

VOL 6935 FOL 113 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT A IN DEPOSITED PLAN 388204
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP388204

FIRST SCHEDULE

SAMIH ALI GHUNAIM
MARIAM MAHMOUD GHUNAIM
AS JOINT TENANTS (CN Y414549)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:08AM

FOLIO: 1/400341

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 7339 FOL 219

Recorded	Number	Type of Instrument	C.T. Issue
26/11/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
19/4/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
30/3/1993	I223060	REQUEST	
30/3/1993	I223061	NOTICE OF DEATH	EDITION 1
13/5/2008	AD949119	TRANSFER	
13/5/2008	AD949120	MORTGAGE	EDITION 2
27/8/2013	AH974939	CAVEAT	
28/10/2013	AI116829	WITHDRAWAL OF CAVEAT	
28/10/2013	AI116830	DISCHARGE OF MORTGAGE	
28/10/2013	AI116831	TRANSFER	
28/10/2013	AI116832	MORTGAGE	EDITION 3

*** END OF SEARCH ***

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Req:R561890 /Doc:DL AD949119 /Rev:13-May-2008 /Sts:NO.OK /Pgs:ALL /Prt:12-Oct-2016 09:44 /Seq:1 of 1
Ref:PSH-GROLLY-Bexley_North /Src:H

Form: 01T
Release: 3.3
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TRANSFER

New South Wales
Real Property Act 1900

AD949119D

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the R(by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY — Office of State Revenue use only

Office of State Revenue
NSW Treasury
Client No: 92046394 1529
Duty: [redacted] Trans No: 1948914
Asst details:

(A) FOLIO OF THE REGISTER: 1/400341

(B) LODGED BY

Document Collection Box	Name, Address or DX, Telephone, and LLPN if any	CODES
23L	LLPN:123835G CSB Reference: 82178406	T TW (Sheriff)

(C) TRANSFEROR: Ida Laura MONAHAN

(D) CONSIDERATION: The transferor acknowledges receipt of the consideration of $ 600,000.00 and as regards

(E) ESTATE: the above folio of the Register transfers to the transferee an estate in fee simple

(F) SHARE TRANSFERRED:

(G) Encumbrances (if applicable):

(H) TRANSFEREE: Ali FADEL and Ibrahim Mustapha FADEL

(I) TENANCY: Joint Tenants

DATE 24.4.08

(J) I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness:

Name of witness: Alan A. JOHN A. MONAHAN
Address of witness: 41 WABASH AVE CROMER NSW 2099

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of transferor: I. L. Monahan

Certified correct for the purposes of the Real Property Act 1900 by the person whose signature appears below.

Signature:

Signatory's name: Nancy Wahlquist
Signatory's capacity: transferee's licensed conveyancer

ALL HANDWRITING MUST BE IN BLOCK CAPITALS.
0706

Page 1 of 1

DEPARTMENT OF LANDS
LAND AND PROPERTY INFORMATION DIVISION

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/400341

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:17 AM	3	28/10/2013

LAND

LOT 1 IN DEPOSITED PLAN 400341
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP400341

FIRST SCHEDULE

ABDELLATIF IBRAHIM MAHMOUD MEQDADI (T AI116831)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AI116832 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Req:R560818 /Doc:CT 09792-073 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:22 /Seq:1 of 2
Ref:PSH-GROLLY-Bexley North /Src:H

[redacted]IFICATE OF TITLE
ERTY ACT, 1900, as amended.

09792073

NEW SOUTH WALES
Application No. 3427
Prior Title Volume 2847 Folio 78

Vol. 9792 Fol. 73

ID 1st Edition issued 28-8-1964

Fol. 73
Vol. 9792
(Page 1)

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the [redacted] Schedule.

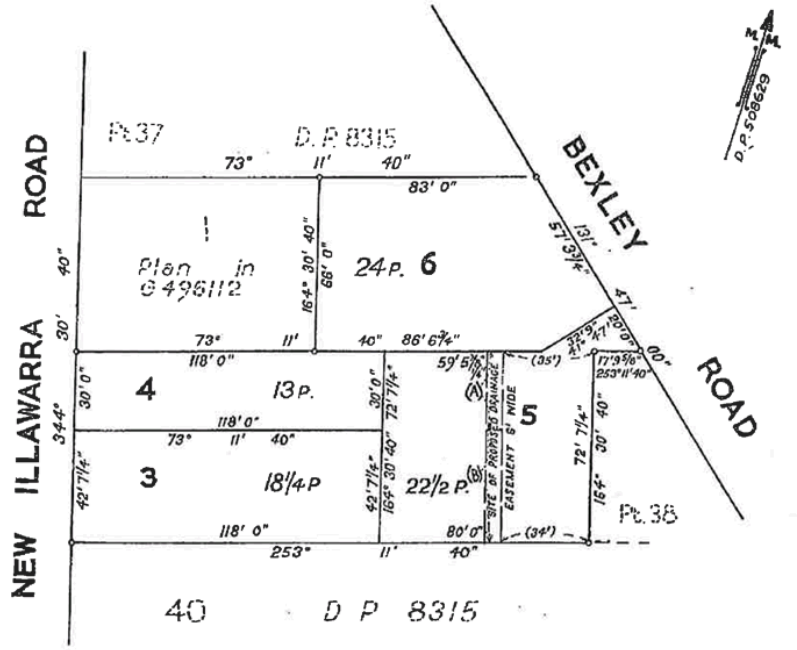
CANCELLED

Witness R B Latta

Registrar General

SEE AUTO FOLIO

PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 3 in Deposited Plan 508629 at Bexley North in the Municipality of Rockdale Parish of St.George and County of Cumberland being part of Portion 142 granted to James Chandler on 19-10-1831.

FIRST SCHEDULE (continued overleaf)

~~GEORGE GIBBONS, of Bexley, Sugar Boiler, and~~ ANNIE ELIZABETH GIBBONS, his wife, as Joint Tenants.

Registrar General

SECOND SCHEDULE (continued overleaf)

1. Reservations and conditions, if any, contained in the Crown Grant(s) above referred to.
2. Covenant created by Transfer No.A375153.

Registrar General

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

Vol. 9792 Fol. 73

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar General
Annie Elizabeth Gibbons of Bexley North, Widow	Notice of Death	927451		12-7-1977.	
John Angelo Popovich of Bexley North, Railway Employee and Anica Popovich, his wife, as joint tenants.	Transfer	936858	------	29-9-1977.	

CANCELLED

SEE AUTO FOLIO

SECOND SCHEDULE (continued)

NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION
Mortgage	936859 P	------	to N.S.W. Permanent Building Society Limited.	29-9-1977.		

(Page 2 of 2 pages)

FORM No. 62

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:09AM

FOLIO: 3/508629

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 9792 FOL 73

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
22/6/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
20/9/1988	X787012	MORTGAGE	EDITION 1
3/2/1989	Y140914	DISCHARGE OF MORTGAGE	EDITION 2
24/12/1990	Z416227	DISCHARGE OF MORTGAGE	
24/12/1990	Z416228	TRANSFER	EDITION 3
1/7/1998	5095443	TRANSFER	
1/7/1998	5095444	MORTGAGE	EDITION 4
18/9/2001	7949894	DISCHARGE OF MORTGAGE	
18/9/2001	7949895	MORTGAGE	EDITION 5
3/7/2003	9757197	DISCHARGE OF MORTGAGE	
3/7/2003	9757198	MORTGAGE	EDITION 6
3/3/2004	AA465966	TRANSFER	EDITION 7
26/8/2004	AA908893	DISCHARGE OF MORTGAGE	
26/8/2004	AA908894	MORTGAGE	EDITION 8
26/8/2005	AB723682	DISCHARGE OF MORTGAGE	
26/8/2005	AB723683	MORTGAGE	EDITION 9
6/6/2014	AI640087	DISCHARGE OF MORTGAGE	
6/6/2014	AI640088	MORTGAGE	EDITION 10

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Req:R562124 /Doc:DL 5095443 /Rev:03-Jul-1998 /Sts:NO.OK /Pgs:ALL /Prt:12-Oct-2016 10:01 /Seq:1 of 1
Ref:PSH-GROLLY-Bexley_North /Src:H
Licence: AUS/0634/96

TRANSFER

New South Wales
Real Property Act 19(

5095443 B

Instructions for filling out this form are available from the Land Titles Office

Office of State Revenue use only

(A) **LAND TRANSFERRED**
If appropriate, specify the share or part transferred.

FOLIO IDENTIFIER 3/508629

(B) **LODGED BY**

LTO Box	Name, Address or DX and Telephone
20	Reference (15 character maximum): AWADA / SR6G.

(C) **TRANSFEROR** YUET KWONG

(D) acknowledges receipt of the consideration of $215,000.00
and as regards the land specified above transfers to the transferee an estate in fee simple.

(E) Encumbrances (if applicable): 1. ..... 2. ..... 3. .....

(F) **TRANSFEREE**

T TS (s713 LGA) TW (Sheriff)	JOSEPH AWADA and NARIMAN AWADA
(G)	TENANCY: JOINT TENANTS

N.S.W. STAMP DUTY
050598 8304 04 00226703/03
$2.00

(H) We certify this dealing correct for the purposes of the Real Property Act 1900. **DATE** 25/6/98

Signed in my presence by the transferor who is personally known to me.

Signature of Witness

Jeannie Thanadakis
Name of Witness (BLOCK LETTERS)

3709 Forest Rd Bexley 2207
Address of Witness

BY HER ATTORNEY KITTY YUEN LING TSANG PURSUANT TO POWER OF ATTORNEY BOOK 4060 NO. 423

Signature of Transferor

Signed in my presence by the transferee who is personally known to me.

Signature of Witness

Name of Witness (BLOCK LETTERS)

Address of Witness

Signature of Transferee

If signed on the transferee's behalf by a solicitor or licensed conveyancer, show the signatory's full name in block letters.
Joseph Alphonse, Solicitor for Transferee

Page 1 of .....

Checked by (LTO use) .....

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 3/508629

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:18 AM	10	6/6/2014

LAND

LOT 3 IN DEPOSITED PLAN 508629
AT BEXLEY NORTH
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP508629

FIRST SCHEDULE

NARIMAN AWADA (T AA465966)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 A375153 COVENANT
3 AI640088 MORTGAGE TO ARAB BANK AUSTRALIA LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Req:R560819 /Doc:CT 09792-074 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:22 /Seq:1 of 2
Ref:PSH-GROLLY-Bexley North /Src:H

[redacted]IFICATE OF TITLE
[redacted]ERTY ACT, 1900, as amended.

NEW SOUTH WALES

Application No. 3427
Prior Title Volume 5005 Folio 46

Vol. 9792 Fol. 74

ID

1st Edition issued 28-8-1964

Vol. 9792 Fol. 74 (Page 1)

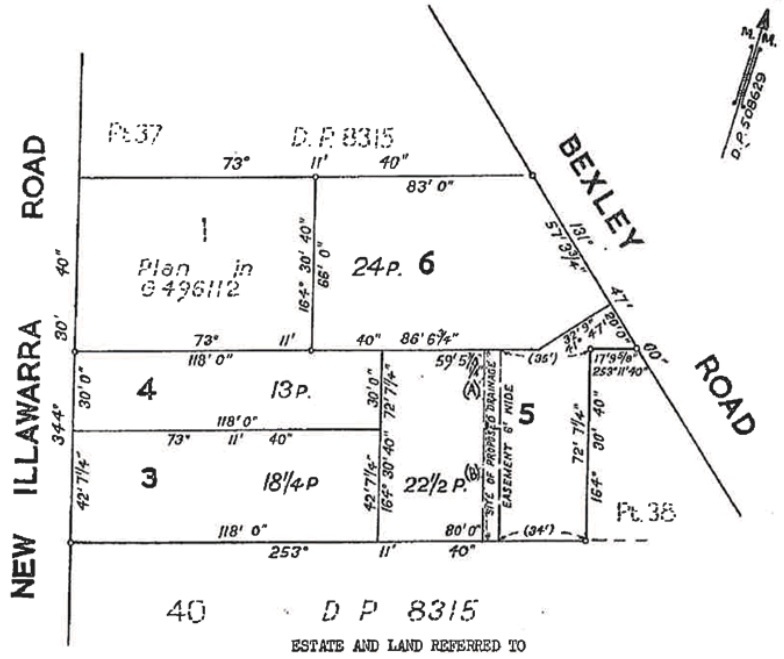
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness R B Latta

CANCELLED Jawatson
Registrar General.

PLAN SHOWING LOCATION OF LAND

SEE AUTO FOLIO



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 4 in Deposited Plan 508629 at Bexley North in the Municipality of Rockdale Parish of St.George and County of Cumberland being part of Portion 142 granted to James Chandler on 19-10-1831.

FIRST SCHEDULE (continued overleaf)

~~JOHN SPENCER GIBBONS, of Bexley, Gentleman.~~

Jawatson
Registrar General

SECOND SCHEDULE (continued overleaf)

GRY 1. Reservations and conditions, if any, contained in the Crown Grant(s) above referred to.
CV 2. Covenant created by Transfer No.A375153.

Jawatson
RegistrarGeneral

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

Req:R560819 /Doc:CT 09792-074 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:22 /Seq:2 of 2
Ref:PSH-GROLLY-Bexley North /Src:H

Vol. 9792 Fol 74

(Page 2 of 2 pages)

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	NATURE	INSTRUMENT NUMBER	DATE	ENTERED	Signature of Registrar General
Michael Paul Sergeoff of Parramatta, Butcher, ... Chris Stavropoulos and Maria Stavropoulos as joint tenants by Transfer M907583. Registered 4-6-1987.	Transfer	M907583	4-6-1987		

CANCELLED

SEE AUTO FOLIO

SECOND SCHEDULE (continued)

NATURE	INSTRUMENT NUMBER	DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION
M907584 Mortgage to St. George Building Society Ltd. Registered 4-6-1987.						
X499338 Mortgage to Westpac Savings Bank Limited. Registered 29-4-1988.						Discharged X499337

MW

FORM No. 62

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:11AM

FOLIO: 4/508629

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 9792 FOL 74

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
22/6/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
25/9/1991	Z945041	LEASE	EDITION 1
18/12/1995	O776720	DISCHARGE OF MORTGAGE	EDITION 2
4/2/1998	3772590	REQUEST	EDITION 3
25/2/1998	3819466	TRANSFER	
25/2/1998	3819467	MORTGAGE	EDITION 4
2/2/2005	AB260653	DISCHARGE OF MORTGAGE	
2/2/2005	AB260654	MORTGAGE	EDITION 5

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 4/508629

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:19 AM	5	2/2/2005

LAND

LOT 4 IN DEPOSITED PLAN 508629
AT BEXLEY NORTH
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP508629

FIRST SCHEDULE

EMMANUEL ZOUMAS
PATTY ZOUMAS
AS JOINT TENANTS (T 3819466)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 A375153 COVENANT
3 AB260654 MORTGAGE TO BANK OF CYPRUS AUSTRALIA PTY LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Req:R560828 /Doc:CT 09792-076 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:23 /Seq:1 of 2
Ref:PSH-GROLLY-Bexley_North /Src:H

[redacted]IFICATE OF TITLE
[redacted]ERTY ACT, 1900, as amended.

0979E076

NEW SOUTH WALES

Application No. 3427
Prior Title Volume 7339 Folio 235

Vol. 9792 Fol. 76

ID 1st Edition issued 28-8-1964

Vol. 9792 Fol. 76 (Page 1)

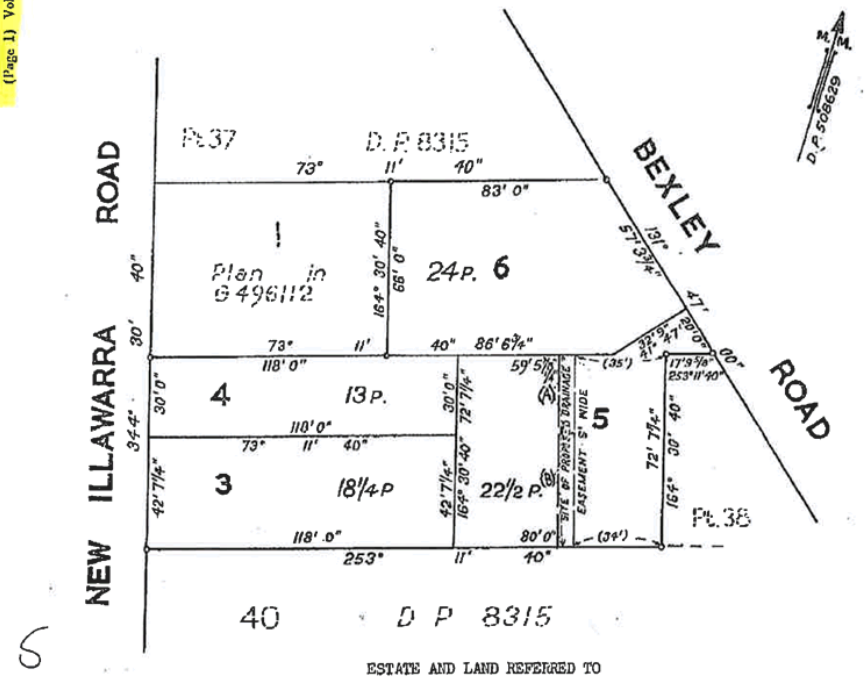
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness R B Latta

CANCELLED
Registrar General.

SEE AUTO FOLIO

PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 6 in Deposited Plan 508629 at Bexley North in the Municipality of Rockdale Parish of St.George and County of Cumberland being part of Portion 142 granted to James Chandler on 19-10-1831.

FIRST SCHEDULE (continued overleaf)

~~PETER WILLIAM DAVIS, of Bexley North, Service Station Manager.~~

Registrar General

SECOND SCHEDULE (continued overleaf)

GR 1. Reservations and conditions, if any, contained in the Crown Grant(s) above referred to.
AP 2. Conditions created by Transfer No.A489100.
~~3. Mortgage No. J184262 to St.George & Cronulla Permanent Co-operative Building and Investment Society Limited~~ Entered 8-11-1962. ~~Discharged J749114~~

Registrar General

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

Vol. 9792 Fol 76

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

Enrique Cavanna and Guadalupe Cavanna as joint tenants by Transfer V605643. Registered 15-3-1985

CANCELLED

SEE AUTO FOLIO

(Page 2 of 2 pages)

SECOND SCHEDULE (continued)

V605644 Mortgage to Commonwealth Savings Bank of Australia. Registered 15-3-1985

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

FORM No. 62

Ref:PSH-GROLLY-Bexley North /Src:H

Req:R560828 /Doc:CT 09792-076 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:23 /Seq:2 of 2

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:12AM

FOLIO: 6/508629

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 9792 FOL 76

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
22/6/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
15/2/2001	7414145	DISCHARGE OF MORTGAGE	
15/2/2001	7414146	MORTGAGE	EDITION 1
23/8/2002	8893262	DISCHARGE OF MORTGAGE	
23/8/2002	8893263	MORTGAGE	EDITION 2
8/2/2007	AC923918	DISCHARGE OF MORTGAGE	
8/2/2007	AC923919	TRANSFER	
8/2/2007	AC923920	MORTGAGE	EDITION 3
29/10/2012	AH327660	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 6/508629

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:20 AM	3	8/2/2007

LAND

LOT 6 IN DEPOSITED PLAN 508629
AT BEXLEY NORTH
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP508629

FIRST SCHEDULE

ANDREW MARSHALL HUNTER
ALLYN HECTOR GEORGE MARSHALL
AS JOINT TENANTS (T AC923919)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
* 2 CONDITION(S) CREATED BY A489100
3 AC923920 MORTGAGE TO WESTPAC BANKING CORPORATION

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Summary of Owners Report

LPI **Sydney**

Address: - 307-309 Bexley Road, Bexley North

Description: - Lot B D.P. 388204, Lot 1 D.P. 1045200 & Lot 35 D.P. 663036

As regards Lot B D.P. 388204

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1940)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
5.3.1940 (1940 to 1948)	Francis Baines (Married Woman)	Vol 2055 Fol 231 Now Vol 5248 Fol 181
19.8.1948 (1948 to 1953)	Thomas Baines (Carpenter) (Application by Transmission not investigated)	Vol 5248 Fol 181
15.12.1953 (1953 to 1954)	Ann Josh (Married Woman) (Application by Transmission not investigated)	Vol 5248 Fol 181 Now Vol 6755 Fol 208
12.1.1954 (1954 to 1954)	Victor Charles Hood (Building Contractor) Fred Ward (Building Contractor)	Vol 6755 Fol 208
12.5.1954 (1954 to 1995)	H.C. Sleigh Limited	Vol 6755 Fol 208 Now B/388204
25.8.1995 (1995 to 1995)	Caltex Oil (Australia) Pty Limited	B/388204
15.12.1995 (1995 to 1996)	Daniel Anthony Ishkhanian	B/388204
18.3.1996 (1996 to 2002)	Michael Lambrou Gina Lambrou	B/388204
6.3.2002 (2002 to 2007)	Oriental Pacific Holdings Pty Limited	B/388204
13.2.2007 (2007 to Date)	# Mtanios Soueid # Nazah Soueid	B/388204

# Denotes current registered proprietor

Easement: -NIL

Leases: -

- 24.10.2002 8909096 – Michael Hanna & Raed Hanna – expired not investigated

As regards Lot 1 D.P. 1045200

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1940)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
5.3.1940 (1940 to 1948)	Francis Baines (Married Woman)	Vol 2055 Fol 231 Now Vol 5248 Fol 181
19.8.1948 (1948 to 1953)	Thomas Baines (Carpenter) (Application by Transmission not investigated)	Vol 5248 Fol 181
15.12.1953 (1953 to 1955)	Thomas Richard Baines	Vol 5248 Fol 181 Now Vol 6755 Fol 207
7.4.1955 (1955 to 1995)	H.C. Sleigh Limited	Vol 6755 Fol 207
25.8.1995 (1995 to 1995)	Caltex Oil (Australia) Pty Limited	Vol 6755 Fol 207
15.12.1995 (1995 to 1996)	Daniel Anthony Ishkhanian	Vol 6755 Fol 207
18.3.1996 (1996 to 2002)	Michael Lambrou Gina Lambrou	Vol 6755 Fol 207
6.3.2002 (2002 to 2007)	Oriental Pacific Holdings Pty Limited	Vol 6755 Fol 207 Now 1/1045200
13.2.2007 (2007 to Date)	# Mtanios Soueid # Nazah Soueid	1/1045200

# Denotes current registered proprietor

Easement: -NIL

Leases: -

- 24.10.2002 8909096 – Michael Hanna & Raed Hanna – expired not investigated

As regards Lot 35 D.P. 663036

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1919)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
3.9.1919 (1919 to 1953)	Thomas Baines (Poultry Farmer)	Vol 2055 Fol 231 Now Vol 5214 Fol 43
24.9.1953 (1953 to 1955)	Thomas Richard Baines (Application by Transmission not investigated)	Vol 5214 Fol 43
7.4.1955 (1955 to 1995)	H.C. Sleigh Limited	Vol 5214 Fol 43 Now Vol 7516 Fol 93
25.8.1995 (1995 to 1995)	Caltex Oil (Australia) Pty Limited	Vol 7516 Fol 93
15.12.1995 (1995 to 1996)	Daniel Anthony Ishkhanian	Vol 7516 Fol 93 Now 35/663036
18.3.1996 (1996 to 2002)	Michael Lambrou Gina Lambrou	35/663036
6.3.2002 (2002 to 2007)	Oriental Pacific Holdings Pty Limited	35/663036
13.2.2007 (2007 to Date)	# Mtanios Soueid # Nazah Soueid	35/663036

# Denotes current registered proprietor

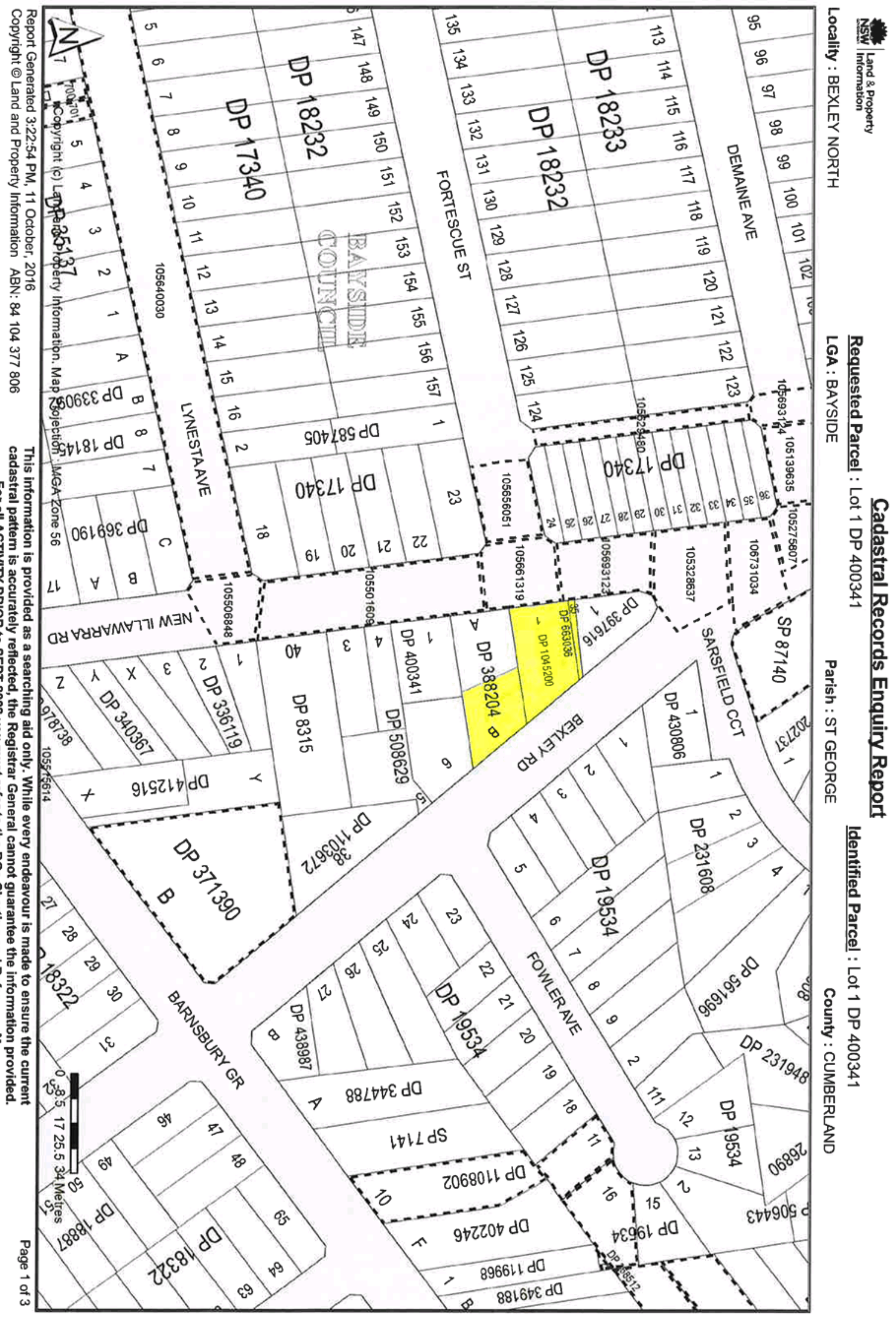
Easement: -NIL

Leases: -

- 24.10.2002 8909096 – Michael Hanna & Raed Hanna – expired not investigated

Yours Sincerely
James McDonnell
12 October 2016

3


Land & Property Information
Cadastral Records Enquiry Report
Requested Parcel : Lot 1 DP 400341
Identified Parcel : Lot 1 DP 400341
Locality : BEXLEY NORTH
LGA : BAYSIDE
Parish : ST GEORGE
County : CUMBERLAND
DEMAINE AVE
FORTESCUE ST
LYNESTA AVE
NEW ILLAWARRA RD
BEXLEY RD
SARSFIELD CCT
FOWLER AVE
BARNSBURY GR
BAYSIDE COUNCIL
DP 400341
DP 388204
Report Generated 3:22:54 PM, 11 October, 2016
Copyright © Land and Property Information ABN: 84 104 377 806
This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided.
For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.
Page 1 of 3

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:06AM

FOLIO: B/388204

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 6883 FOL 200

Recorded	Number	Type of Instrument	C.T. Issue
2/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
11/12/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
25/8/1995	O303685	TRANSFER	EDITION 1
15/12/1995	O759266	TRANSFER	
15/12/1995	O759267	MORTGAGE	EDITION 2
18/3/1996	2002531	DISCHARGE OF MORTGAGE	
18/3/1996	2002532	TRANSFER	EDITION 3
11/8/1999	6078476	MORTGAGE	EDITION 4
6/3/2002	8371897	DISCHARGE OF MORTGAGE	
6/3/2002	8371898	TRANSFER	EDITION 5
24/10/2002	8909096	LEASE	EDITION 6
22/8/2003	9686994	SURRENDER OF LEASE	EDITION 7
22/8/2003	9686995	CAVEAT	
13/2/2007	AC931082	WITHDRAWAL OF CAVEAT	
13/2/2007	AC931083	TRANSFER	
13/2/2007	AC931084	MORTGAGE	EDITION 8
28/1/2011	AG26267	WRIT	
3/2/2011	AG39059	CAVEAT	
4/2/2011	AG36189	WRIT	
5/8/2011	AG411526	APPLICATION TO CANCEL RECORDING OF WRIT	
5/8/2011	AG411531	APPLICATION TO CANCEL RECORDING OF WRIT	
10/8/2011	AG423258	WITHDRAWAL OF CAVEAT	

END OF PAGE 1 - CONTINUED OVER

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:06AM

FOLIO: B/388204 PAGE 2

Recorded	Number	Type of Instrument	C.T. Issue
13/6/2012	AG840133	REJECTED - LEASE	
14/9/2015	AJ810379	DISCHARGE OF MORTGAGE	
14/9/2015	AJ810380	MORTGAGE	EDITION 9

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: B/388204

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:17 AM	9	14/9/2015

LAND

LOT B IN DEPOSITED PLAN 388204
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP388204

FIRST SCHEDULE

MTANIOS SOUEID
NAZAH SOUEID
AS JOINT TENANTS (T AC931083)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AJ810380 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:04AM

FOLIO: 1/1045200

First Title(s): OLD SYSTEM
Prior Title(s): VOL 6755 FOL 207

Recorded	Number	Type of Instrument	C.T. Issue
11/9/2002	DP1045200	DEPOSITED PLAN	LOT RECORDED FOLIO NOT CREATED
24/10/2002	9068724	DEPARTMENTAL DEALING	FOLIO CREATED EDITION 1
22/8/2003	9686994	SURRENDER OF LEASE	EDITION 2
22/8/2003	9686995	CAVEAT	
13/2/2007	AC931082	WITHDRAWAL OF CAVEAT	
13/2/2007	AC931083	TRANSFER	
13/2/2007	AC931084	MORTGAGE	EDITION 3
28/1/2011	AG26267	WRIT	
3/2/2011	AG39059	CAVEAT	
4/2/2011	AG36189	WRIT	
5/8/2011	AG411526	APPLICATION TO CANCEL RECORDING OF WRIT	
5/8/2011	AG411531	APPLICATION TO CANCEL RECORDING OF WRIT	
10/8/2011	AG423258	WITHDRAWAL OF CAVEAT	
13/6/2012	AG840133	REJECTED - LEASE	
14/9/2015	AJ810379	DISCHARGE OF MORTGAGE	
14/9/2015	AJ810380	MORTGAGE	EDITION 4

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/1045200

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:16 AM	4	14/9/2015

LAND

LOT 1 IN DEPOSITED PLAN 1045200
AT BEXLEY NORTH
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP1045200

FIRST SCHEDULE

MTANIOS SOUEID
NAZAH SOUEID
AS JOINT TENANTS (T AC931083)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AJ810380 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:02AM

FOLIO: 35/663036

First Title(s): OLD SYSTEM
Prior Title(s): VOL 7516 FOL 93

Recorded	Number	Type of Instrument	C.T. Issue
15/3/1996		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
18/3/1996	2002531	DISCHARGE OF MORTGAGE	
18/3/1996	2002532	TRANSFER	EDITION 1
11/8/1999	6078476	MORTGAGE	EDITION 2
6/3/2002	8371897	DISCHARGE OF MORTGAGE	
6/3/2002	8371898	TRANSFER	EDITION 3
24/10/2002	8909096	LEASE	EDITION 4
22/8/2003	9686994	SURRENDER OF LEASE	EDITION 5
22/8/2003	9686995	CAVEAT	
13/2/2007	AC931082	WITHDRAWAL OF CAVEAT	
13/2/2007	AC931083	TRANSFER	
13/2/2007	AC931084	MORTGAGE	EDITION 6
28/1/2011	AG26267	WRIT	
3/2/2011	AG39059	CAVEAT	
4/2/2011	AG36189	WRIT	
5/8/2011	AG411526	APPLICATION TO CANCEL RECORDING OF WRIT	
5/8/2011	AG411531	APPLICATION TO CANCEL RECORDING OF WRIT	
10/8/2011	AG423258	WITHDRAWAL OF CAVEAT	
13/6/2012	AG840133	REJECTED - LEASE	
14/9/2015	AJ810379	DISCHARGE OF MORTGAGE	
14/9/2015	AJ810380	MORTGAGE	EDITION 7

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 35/663036

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:16 AM	7	14/9/2015

LAND

LOT 35 IN DEPOSITED PLAN 663036
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP663036

FIRST SCHEDULE

MTANIOS SOUEID
NAZAH SOUEID
AS JOINT TENANTS (T AC931083)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 A489100 COVENANT
3 AJ810380 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Summary of Owners Report

LPI **Sydney**

Address: - 311A Bexley Road, Bexley North

Description: - Lot 5 D.P. 508629

As regards the part tinted yellow on attached cadastral

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1919)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
3.9.1919 (1919 to 1953)	Thomas Baines (Poultry Farmer)	Vol 2055 Fol 231 Now Vol 5248 Fol 201
15.12.1953 (1953 to 1954)	Ella Moon (Married Woman) (Application by Transmission not investigated)	Vol 5248 Fol 201 Now Vol 6755 Fol 206
12.2.1954 (1954 to 1956)	Frank Hennah (Taxi Proprietor) Mary Ann Hennah (Married Woman)	Vol 6755 Fol 206 Now Vol 7339 Fol 235
12.9.1957 (1957 to 1962)	John Inman Bale (Pilot) Joy Elaine Bale (Married Woman)	Vol 7339 Fol 235
16.10.1962 (1962 to 1963)	Peter William Davis (Service Station Manager)	Vol 7339 Fol 235
22.5.1963 (1963 to 1981)	James George Gibbons (Master Butcher) Lurline Jeanette Gibbons (Married Woman)	Vol 7339 Fol 235 Now Vol 9792 Fol 75

As regards the part tinted pink on attached cadastral

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1918)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
12.4.1918 (1918 to 1938)	George Gibbons (Sugar Boiler) Annie Elizabeth Gibbons (Married Woman)	Vol 2055 Fol 231 Now Vol 2847 Fol 78
5.10.1938 (1938 to 1963)	John Spencer Gibbons (Butcher)	Vol 2847 Fol 78
17.10.1963 (1963 to 1981)	James George Gibbons (Master Butcher) Lurline Jeanette Gibbons (Married Woman)	Vol 2847 Fol 78 Now Vol 9792 Fol 75

As regards the part tinted purple on attached cadastral

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
11.5.1910 (1910 to 1913)	Edgar Lucas (Solicitor)	Vol 2055 Fol 231
20.2.1913 (1913 to 1914)	Heinrich George Menkens (Commercial Broker)	Vol 2055 Fol 231
31.1.1914 (1914 to 1918)	N.S.W. Realty Co Limited	Vol 2055 Fol 231
12.4.1918 (1918 to 1963)	George Gibbons (Sugar Boiler) Annie Elizabeth Gibbons (Married Woman)	Vol 2055 Fol 231 Now Vol 2847 Fol 78
17.10.1963 (1963 to 1981)	James George Gibbons (Master Butcher) Lurline Jeanette Gibbons (Married Woman)	Vol 2847 Fol 78 Now Vol 9792 Fol 75

Search continued as regards the whole of the subject land

Date of Acquisition and Term held	Registered Proprietor(s) & occupations where available	Reference to title at acquisition and sale
15.7.1981 (1981 to 1986)	Frank Xavior Camilleri Eleonora Camilleri	Vol 9792 Fol 75
13.8.1986 (1986 to 2002)	Fat Tsang Yuet Kwong Tsang	Vol 9792 Fol 75 Now 5/508629
1.10.2002 (2002 to 20.10)	Wo Tsang Yuet Kwong Tsang	5/508629
21.4.2010 (2010 to 2012)	Yuet Kwong Tsang	5/508629
28.8.2012 (2012 to Date)	# Harrijanto Rusli # Sui Jun Han	5/508629

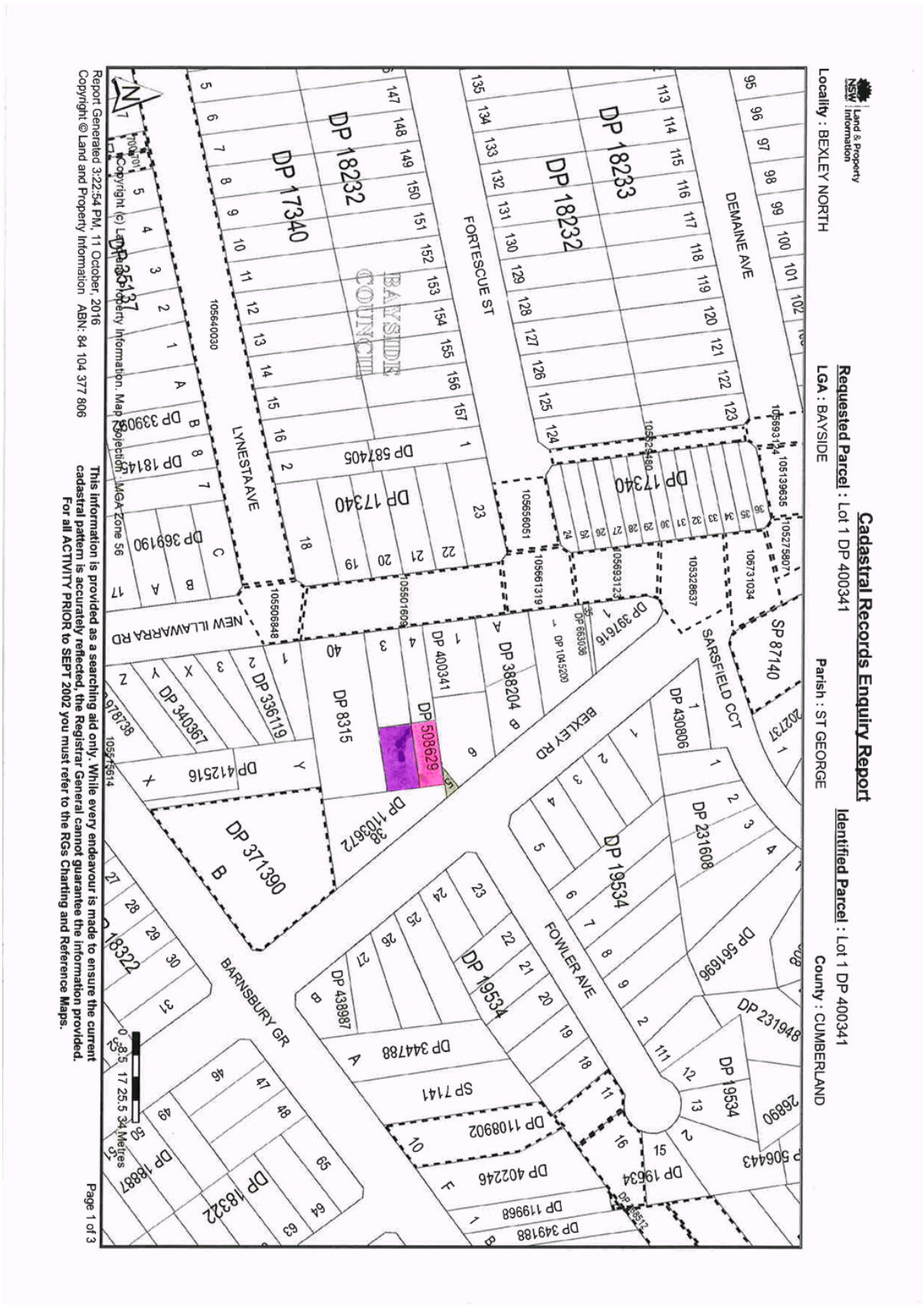
# Denotes current registered proprietor

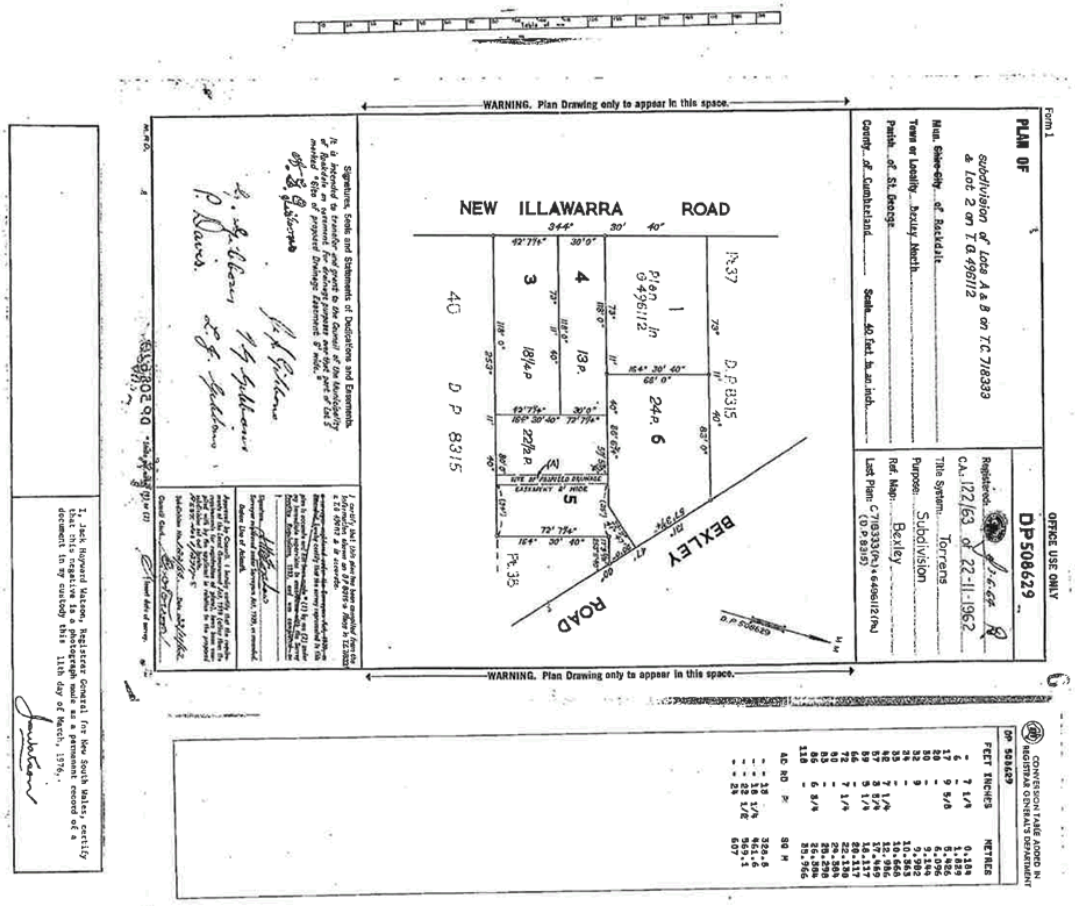
Easement:

- 16.7.1963 J601625 – Easement for Drainage
- 27.5.19363 J601626 – Easement for Drainage

Leases: -NIL

Yours Sincerely
James McDonnell
12 October 2016


Land & Property Information
Cadastral Records Enquiry Report
Locality : BEXLEY NORTH
Requested Parcel : Lot 1 DP 400341
Identified Parcel : Lot 1 DP 400341
LGA : BAYSIDE
Parish : ST GEORGE
County : CUMBERLAND
DEMAINE AVE
FORTESCUE ST
LYNESTA AVE
NEW ILLAWARRA RD
SARSFIELD CCT
BEXLEY RD
FOWLER AVE
BARNSBURY GR
DP 18233
DP 18232
DP 17340
DP 17340
DP 18232
DP 17340
DP 587405
DP 8315
DP 508629
DP 400341
DP 388204
DP 397616
DP 863038
DP 1045200
DP 110367
DP 371390
DP 336119
DP 340367
DP 412516
DP 430806
DP 231608
DP 19534
DP 19534
DP 56169
DP 231948
DP 19534
DP 438987
DP 344788
SP 7141
DP 1108902
DP 402246
DP 19634
DP 119968
DP 349188
SP 87140
DP 35137
DP 369190
DP 181451
DP 339051
DP 18322
DP 18322
DP 18887
BAYSIDE COUNCIL
Copyright (c) Land and Property Information. Map Projection: MGA Zone 56
0 8.5 17 25.5 34 Metres
Report Generated 3:22:54 PM, 11 October, 2016
Copyright © Land and Property Information ABN: 84 104 377 806
This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided.
For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.
Page 1 of 3



[redacted] IFICATE OF TITLE
[redacted] ERTY ACT, 1900, as amended.

09793075

NEW SOUTH WALES

Application No. 3427
Prior Titles Volume 2847 Folio 78
Volume 5005 Folio 46
Volume 7339 Folio 235

Vol. 9792 Fol. 75

ID 1st Edition issued 28-8-1964

(Page 1) Vol. 9792 Fol. 75

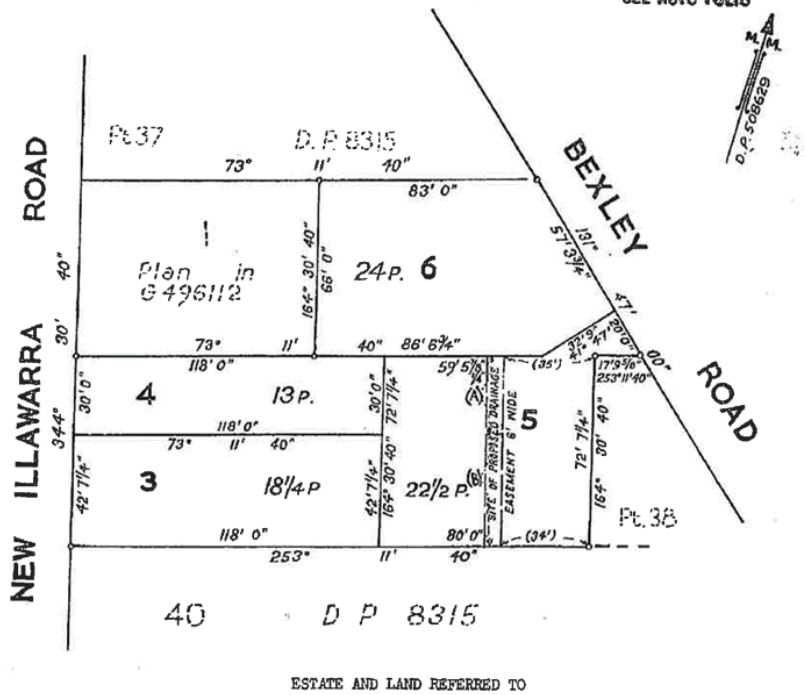
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness R B Latta

CANCELLED
Registrar General.

PLAN SHOWING LOCATION OF LAND

SEE AUTO FOLIO



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 5 in Deposited Plan 508629 at Bexley North in the Municipality of Rockdale Parish of St.George and County of Cumberland being part of Portion 142 granted to James Chandler on 19-10-1831.

FIRST SCHEDULE (continued overleaf)

~~JAMES GEORGE GIBBONS, of Bexley North, Master Butcher, and LURLINE JEANETTE GIBBONS, his wife, as Joint Tenants~~

Registrar General

SECOND SCHEDULE (continued overleaf)

GR 1. Reservations and conditions, if any, contained in the Crown Grant(s) above referred to.
CV 2. Covenant created by Transfer No.A375153P affecting part.
AA 3. Conditions created by Transfer No.A489100 affecting part.
ED(A) 4. Easement for Drainage created by Transfer No. J601625P affecting the piece of land 6 feet wide designated (A) shown in the plan hereon.
ED(B) 5. Easement for Drainage created by Transfer No. J601626P affecting the piece of land 6 feet wide designated(B) shown in the plan hereon.

Registrar General

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

Vol. 9792 Fol 75

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR

Frank Xavier Camilleri and Eleonora Camilleri as joint tenants by Transfer S573912. Registered 15-7-1981.

Fat Tsang and Yuet Kwong Tsang as joint tenants by Transfer W451774. Registered 13-8-1986

CANCELLED

SEE AUTO FOLIO

INSTRUMENT NATURE / NUMBER / DATE | ENTERED | Signature of Registrar General

(Page 2 of 2 pages)

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	NUMBER	DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION
Mortgage	4244092	30-1-1980	to Commercial Banking Company of Sydney Limited	31-1-1980		Discharged S218622
Mortgage	S584594		to Australia and New Zealand Banking Group Limited	31-3-1984		Discharged S573911
Mortgage	T216683		to Bank of New South Wales Savings Bank Limited. Registered 15-7-1981.			Discharged T216682
Mortgage	T460686		to Westpac Banking Corporation. Registered 21-3-1983.			Discharged M451773
Mortgage	W45295		to Westpac Banking Corporation. Registered 13-6-1986.			Discharged M451772
Caveat	W673396		by F.C.J. Finance Pty. Limited. Registered 19-6-1985.			Discharged M451771
						Withdrawn W276370

FORM No. 62

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Ref:PSH-GROLLY-Bexley_North /Src:H

Req:R508025 /Doc:CT 09792-075 CT /Rev:08-Feb-2011 /Sts:OK.SC /Pgs:ALL /Prt:12-Oct-2016 08:22 /Seq:2 of 2

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
12/10/2016 8:12AM

FOLIO: 5/508629

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 9792 FOL 75

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
22/6/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
1/10/2002	8816233	TRANSFER	EDITION 1
21/4/2010	AF445124	NOTICE OF DEATH	EDITION 2
28/8/2012	AH201497	TRANSFER	
28/8/2012	AH201498	MORTGAGE	EDITION 3
29/10/2012	AH327660	DEPARTMENTAL DEALING	
31/10/2012	AH332938	DISCHARGE OF MORTGAGE	
31/10/2012	AH332939	MORTGAGE	EDITION 4

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

Req:R563435 /Doc:DL 8816233 /Rev:03-Oct-2002 /Sts:NO.OK /Pgs:ALL /Prt:12-Oct-2016 11:18 /Seq:1 of 6
Ref:PSH-GROLLY-Bexley_North /Src:H
Licence: 98M111
Edition: 0011

RELODGED
STAMP DUTY
23 SEP 2002
TIME: 11:00

TRANSFER

New South Wales
Real Property Act 1900

8816233Y

PRIVACY NOTE: this information is legally required and will be

Office of State Revenue use only

NEW SOUTH WALES DUTY
29-07-2002 0001060373-002
SECTION 18(2)
DUTY $ **********2.00

(A) TORRENS TITLE

If appropriate, specify the part transferred
~~One undivided half share~~ in 5/508629

(B) LODGED BY

Delivery Box: W

Name, Address or DX and Telephone
WILLIAM CHAN & CO
Suite 207, 661 George Street, Sydney

Reference (optional):

CODES
T
TW
(Sheriff)

(C) TRANSFEROR

FAT TSANG YUET KWONG TSANG

(D) CONSIDERATION The transferor acknowledges receipt of the consideration of $ 1.00 and as regards

(E) ESTATE the land specified above transfers to the transferee an estate in fee simple.

(F) SHARE TRANSFERRED

(G) Encumbrances (if applicable): 1. 2. 3.

(H) TRANSFEREE

WO TSANG AND YUET KWONG TSANG

TENANCY: JOINT TENANTS

(I)

DATE ...../...../.....
dd mm yyyy

(J) I certify that the transferor, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this transfer in my presence.

Signature of witness: X

Name of witness: JENNY LIU FUNG YING TSANG

Address of witness: 10A. EDWARD STREET, WILLOUGHBY N.S.W. 2068

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of transferor: X 鄭月

I certify that the transferee, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this transfer in my presence.

RELODGED
30 SEP 2002
TIME: 12.30

Signature of witness:

Name of witness: JENNY LIU FUNG YING TSANG

Address of witness: 10A, EDWARD STREET, WILLOUGHBY N.S.W. 2068

Certified correct for the purposes of the Real Property Act 1900 by the transferee.

Signature of transferee: Wo Kong X 鄭月

If signed on the transferee's behalf by a solicitor, licensed conveyancer or barrister, insert the signatory's full name and capacity below:

NOS lodged

ALL HANDWRITING MUST BE IN BLOCK CAPITALS.

Page 1 of ..... number additional pages sequentially

A set of notes on this form (01T-2) is available from Land and Property Information NSW.

Filed No. DL 8816233

Our Ref: 8816233

B

Land and Property Information
www.lpi.nsw.gov.au
1 Prince Albert Road
Queens Square
SYDNEY NSW 2000
GPO Box 15
SYDNEY NSW 2001
DX 17 SYDNEY
T (61 2) 9228 6666
F (61 2) 9233 4357

YUET KWONG TSANG
10 EDWARD STREET
WILLOUGHBY 2068

11 SEP 2002

NOTICE OF SEVERANCE OF JOINT TENANCY

Section 12A and Section 97 (5)
Real Property Act, 1900

I am writing to you concerning your land at BEXLEY NORTH
Register Folio 5/508629
which you own with FAT TSANG as joint tenants.

Dealing No. 8816233 (copy enclosed) has been lodged in this Office and will be registered in thirty (30) days from the date of this letter.

The effect of registration of this dealing will be that the joint tenancy will be severed and you will then own the land as tenant in common with WO TSANG

The register folio for your land will then show that you hold a **half share** and WO TSANG holds a **half share** in the land as tenants in common.

What the change means:

The difference between owning the land as joint tenants instead of tenants in common is what happens to one of the owner's share in the land after he or she dies. When land is held as joint tenants and an owner dies, that person's interest in the land automatically passes to the other owner(s). When land is held by tenants in common, and an owner dies, his or her share in the land passes to the people named in his or her will as beneficiaries or, if there is no will, it goes to their next of kin.

You will need to think about what will happen to your share in the land after you die. You will need to make a will so that you can say who will get your share. If you already have a will, you will need to check that it says who will get your share in the land.

over.....

Land and Property Information
New South Wales
is part of the
New South Wales
Department of Information
Technology and Management

Right to change ownership from joint tenants to tenants in common.

Under the law in New South Wales, a joint tenant can register a document at the Land Titles Office which changes the ownership from joint tenants to tenants in common . In most cases a joint tenant can make this change with or without the agreement of the other joint tenant(s). In other cases, a joint tenant cannot make this change without agreement of the other joint tenant(s). Instances where a joint tenant cannot make this change are where he or she:

* is a trustee: or

* has made an agreement not to change the tenancy

Should you consult a Solicitor?0

If any of the following circumstances apply, you should see a Solicitor:

* You and the other owner(s) own the land as trustees: or

* You and the other owner(s) had an agreement not to change the ownership from joint tenants to tenants in common, or you had an agreement that said that it would be changed in a different way to how it was done; or

* You contributed a bigger share to the purchase of the land or its improvements than the other owner(s); or

* You have any doubts about what is in this notice.

If you have not lodged a court order stopping me from registering the dealing severing the joint tenancy within 30 days from the date of this letter, I will register it and the joint tenancy will then be severed as set out in this letter.

If you have any general questions about this notice, please telephone the Client Services at the Land and Property Information New South Wales on (02) 9228-6713.

Yours faithfully,

WARWICK WATKINS
Registrar General.
Per: O_

F.1m (2)
8816233

DAMMHOLZ & CO. (HAYMARKET OFFICE)
SOLICITORS
ABN 70 200 622 953

HUGO AHWEE
2nd FLOOR
661 GEORGE STREET
SYDNEY NSW 2000
AUSTRALIA

TEL : (02) 9211 2032
FAX : (02) 92110750

Your Ref: 8816230-33

Our Ref: HA

5 September 2002

New South Wales
Land Title Office
Queens Square
Sydney

Dear Sirs

Re: Transfer severing tenancy
Your ref: 8816230-33

F.1

We refer to your enclosed requisition.

We submit the following replies:

a. The address of Yuet Kwong Tsang Fat Tsang is 10 Edward Street, Willoughby.

b. Statement of n legal imediment to transfer.

Yours faithfully
DAMMHOLZ & CO

Film.
8816233

I, Fat Tsang of 10 Edward Street Willoughby
DO SOLEMNLY AND SINCERELY DECLARE AS FOLLOWS:

1. That I am living at the above address.
2. That I did transfer my one half share in 10 Edward Street, Willoughby to Kevin Tim Yung Tsang.
3. That I did transfer my one half share in 311A Bexley Road, Bexley to Wo Tsang.
4. That the folio identifier in 2 above is 102/857628.
5. That the folio identifier in 3 above is 5/508629.
6. That I am of sound mind and I have no legal impediment to the above transfers.

AND I MAKE THIS SOLEMN DECLARATION conscientiously believing the contents to be true and by virtue of the Oaths Act 1900.

MADE AND SUBSCRIBED BY
Fat Tsang, the said Declarant
at Sydney this 2nd day
of September 2002.

曾發

.....

Before me:

.....J.P.
MICHAEL JOSEPH WARREN
a Justice of the Peace

Film
8816233

DAMMHOLZ & CO. (HAYMARKET OFFICE)
SOLICITORS
ABN 70 200 622 953
(PREVIOUSLY WILLIAM CHAN & CO)

HUGO AHWEE
2nd FLOOR
661 GEORGE STREET
SYDNEY NSW 2000
AUSTRALIA

TEL : (02) 9211 2032
FAX : (02) 9211 0750

Your Ref:

Our Ref:

17 September 2002

Land Title Office
Sydney

Dear Sirs

Re: Your File Ref No 8816230-33
(A) 102/857628
Fat TSang transfer of ½share to Kevin Tsang
(B) 5/508629
Fat Tsang transfer of ½ share to Wo Tsang

We have been instructed by both transferors and transferees that they do not wish to sever the Joint Tenancy.

We would be pleased if we could uplift both Transfers for amendment and to be marked by the Office of State Revenue.

Yours faithfully
DAMMHOLZ & CO
per:

Req:R563442 /Doc:DL AF445124 /Rev:27-Apr-2010 /Sts:NO.OK /Pgs:ALL /Prt:12-Oct-2016 11:19 /Seq:1 of 1
Ref:PSH-GROLLY-Bexley_North /Src:H

Form: 02ND
Release: 4.0
www.lands.nsw.gov.au

NOTICE OF DEATH

New South Wales
Section 101 Real Property Act 1900

AF445124V

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

(A) **TORRENS TITLE** 5/508629

(B) **REGISTERED DEALING**

Number	Torrens Title

(C) **LODGED BY**

Document Collection Box	Name, Address or DX, Telephone, and Customer Account Number if any	CODE
IW	~~Yuet Kwong TSANG~~ MELISSA TSANG ~~10 Edward Street, Willoughby NSW 2068~~ POB N136 (mobile) 0412 686 086 BEXLEY NORTH NSW 2207 Reference:	ND

(D) **DECEASED JOINT TENANT** See Instructions for Completion: Instruction (D) regarding discrepancies in the name
Wo TSANG

(E) **SURVIVING JOINT TENANT** Yuet Kwong TSANG

(F) I, the abovementioned surviving joint tenant, apply to be registered as proprietor of the interest of the deceased joint tenant (who died on 18 January 2007 as stated in the copy of death certificate No. 104340/2007 accompanying this application) in the above land.

DATE 21 April 2010

(G) I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Signature of witness: M.Tsang

Name of witness: Melissa TSANG
Address of witness: 311a Bexley Road
Bexley North NSW 2207

Certified correct for the purposes of the Real Property Act 1900 by the surviving joint tenant.

Signature of surviving joint tenant: 鄭月

(H) *This section is to be completed where a notice of sale is required and the relevant data has been forwarded to LPI through eNOS.*

The applicant certifies that the eNOS data relevant to this dealing has been submitted and stored under eNOS ID No. _____ Full name: Signature:

1003 ALL HANDWRITING MUSTBE IN BLOCK CAPITALS.
LAND AND PROPERTY MANAGEMENT AUTHORITY

Office use only—
Evidence sighted and returned: CA

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 5/508629

SEARCH DATE	TIME	EDITION NO	DATE
12/10/2016	8:19 AM	4	31/10/2012

LAND

LOT 5 IN DEPOSITED PLAN 508629
AT BEXLEY NORTH
LOCAL GOVERNMENT AREA ROCKDALE
PARISH OF ST GEORGE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP508629

FIRST SCHEDULE

HARRIJANTO RUSLI
SUI JUN HAN
AS JOINT TENANTS (T AH201497)

SECOND SCHEDULE (6 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 A375153 COVENANT AFFECTING PART
3 CONDITION(S) CREATED BY A489100
4 J601625 EASEMENT FOR DRAINAGE AFFECTING THE SITE DESIGNATED (A) IN THE TITLE DIAGRAM
5 J601626 EASEMENT FOR DRAINAGE AFFECTING THE SITE DESIGNATED (B) IN THE TITLE DIAGRAM
6 AH332939 MORTGAGE TO WESTPAC BANKING CORPORATION

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PSH-GROLLY-Bexley North PRINTED ON 12/10/2016

APPENDIX D

WORKCOVER NSW INFORMATION

NOTIFICATION OF DANGEROUS GOODS ON PREMISES FORM FDG01

CONTACT FOR NOTIFICATION INQUIRIES

Title: (Mr) Miss / Ms / Mrs / Other (please specify) _____ Family name AHMED

Given name FUAD Other names _____

Business phone (02) 91500892 Business fax number (02) 91500892

Business email address sanbib@optusnet.com.au

Previous Licence Number or Acknowledgement Number (if known)

35/007066 15/12/07

Previous Occupier (if known)

N/A

Site on which dangerous goods are to be kept

Number 307-309 Street BEXLEY ROAD

Suburb/Town/Locality BEXLEY NORTH Postcode 2207

Nearest cross Street NEW ILLWARA ROAD

Lot and DP if no street number

Is the site staffed? If yes state number of employees 4

Site staffing: Hours per day 15 Days per week 7

Site Emergency Contact

Phone number (04)02 408 623 Name FUAD AHMED

Nature of site (eg petrol station, warehouse etc) PETROL STATION

Nature of primary business activity

ABN Number (if any) 47856421234 Website details (if any)

What is the ANSZIC code most applicable to your business? (see guide for list of codes and further information)

Code 5321 Description AUTOMOTIVE FUEL RETAILING

Attach a site sketch(s) of the premises. Refer to the Guide GDG01 for information on the requirements for the site sketch.

Attach a legible photocopy page from a local Street Directory or other map showing the locality of the premises. Mark the location of the premises with an X.

NOTIFICATION OF DANGEROUS GOODS ON PREMISES FORM **FDG01**

List the dangerous goods that will be stored and/or processed on these premises (refer to Guide GDG01). Copy this page and attach additional sheets if there is insufficient space.

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
1	Underground tank	3	34,200L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1203	PETROL	3	III	UNLEADED	3YE	8000	L

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
2	Underground tank	1	9500L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
00 C1	Combustible liquid	1	III	Diesel		6000	L

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
3	Underground tank	3	27,600L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1203	Petrol	3	III	UNLEADED	3YE	18,000	L

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
4	Underground tank	3	27,600 L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1203	Petrol	3	III	UNLEADED	3YE	18,000	L

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
5	Underground tank	3	10,000 L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1203	Petrol	3	III	UNLEADED	3YE	[illegible]	

lo	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
	Underground tank	3	2000 L

mber	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
		3	III	UNLEADED	3YE	2000	L

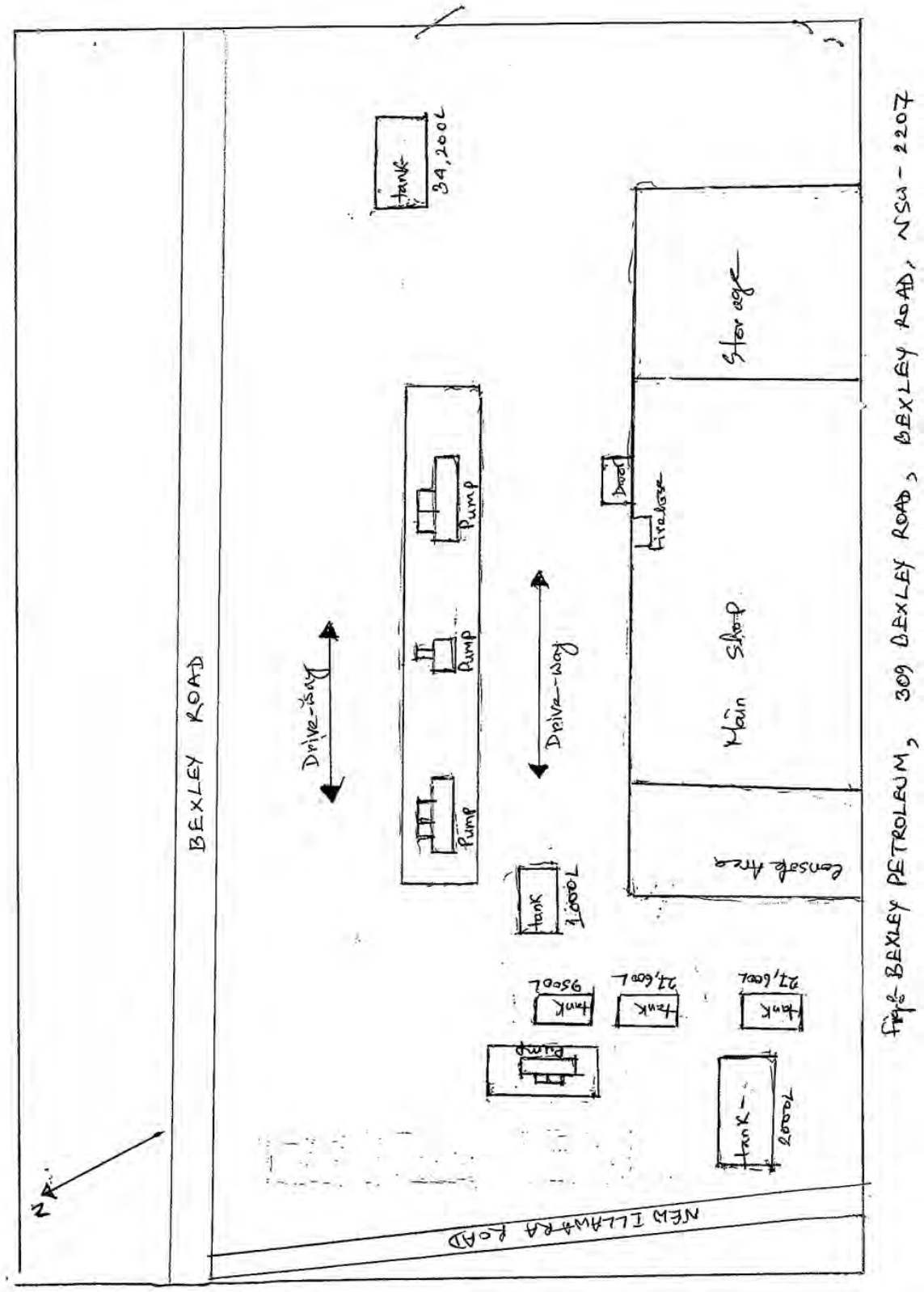


Fig 2 BEXLEY PETROLEUM, 309 BEXLEY ROAD, BEXLEY ROAD, NSW - 2207

168 - 517-B

Licence No. 35/007066

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 35/007066 to 18/12/2005 . I confirm that all the licence details shown below are correct (amend if necessary).

Ahmed Fuad — *(Signature)* for: AHMED F & RAHMAN M

FUAD AHMED — *(Please print name)*

10/11/04 — *(Date signed)*

*THIS **SIGNED** DECLARATION SHOULD BE **RETURNED TO:***

WorkCover New South Wales
Dangerous Goods Licensing Section
LOCKED BAG 2906
LISAROW NSW 2252

Enquiries:ph (02) 43215500
fax (02) 92875500

Details of licence on 5 November 2004

Licence Number 35/007066 **Expiry Date** 18/12/2004

Licensee AHMED F & RAHMAN M BEXLEY PETROLEUM

Postal Address: BEXLEY PETROLEUM 307-309 BEXLEY RD BEXLEY NORTH NSW 2207

Licensee Contact FUAD AHMED Ph. 02 9150 0892 Fax. 02 9150 0892

Premises Licensed to Keep Dangerous Goods
AHMED F & RAHMAN M BEXLEY PETROLEUM
307-309 BEXLEY RD BEXLEY NORTH 2207

Nature of Site AUTOMOTIVE FUEL RETAILING

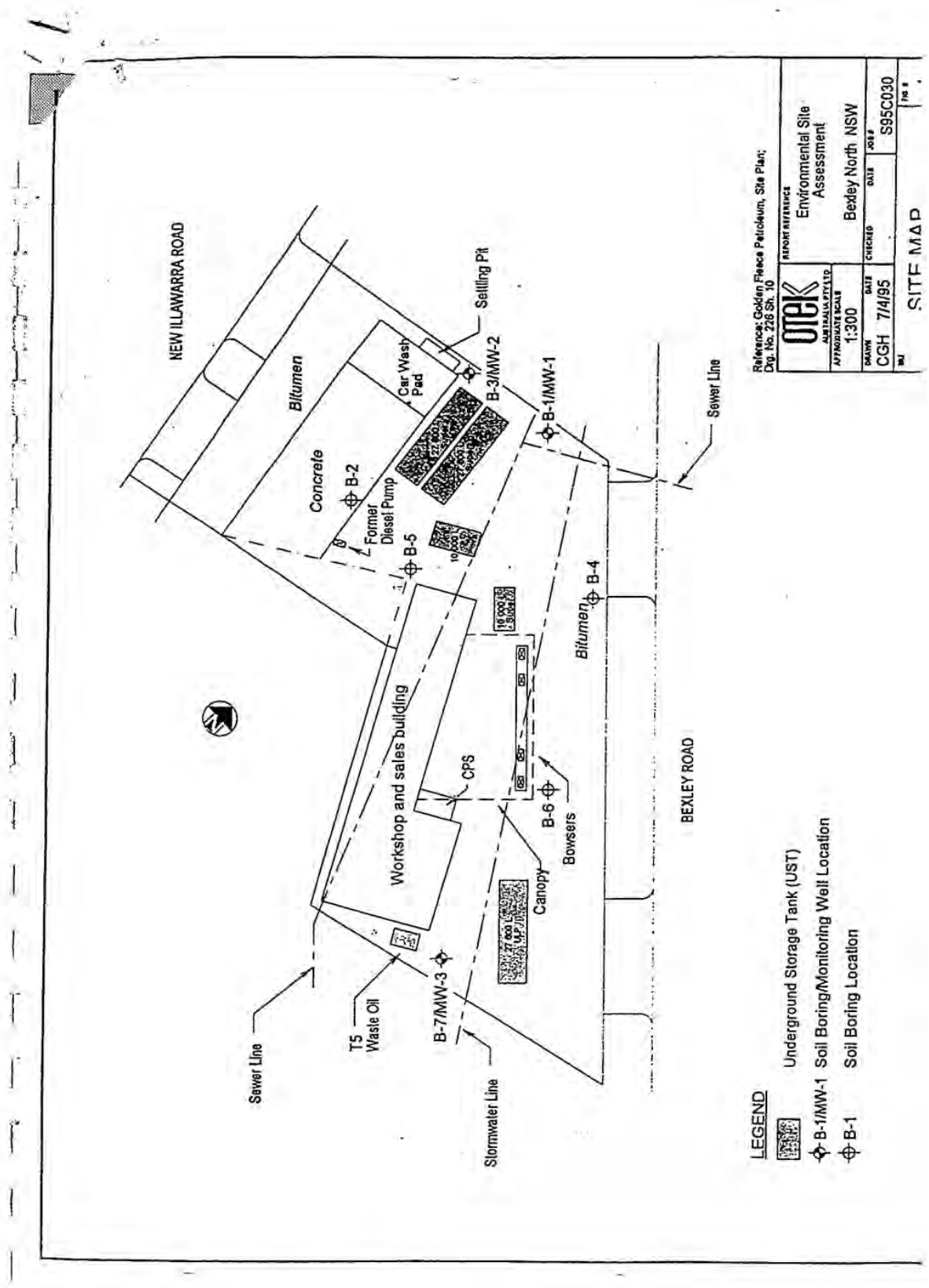
Major Supplier of Dangerous Goods AUSTRALIAN (CALTEX)

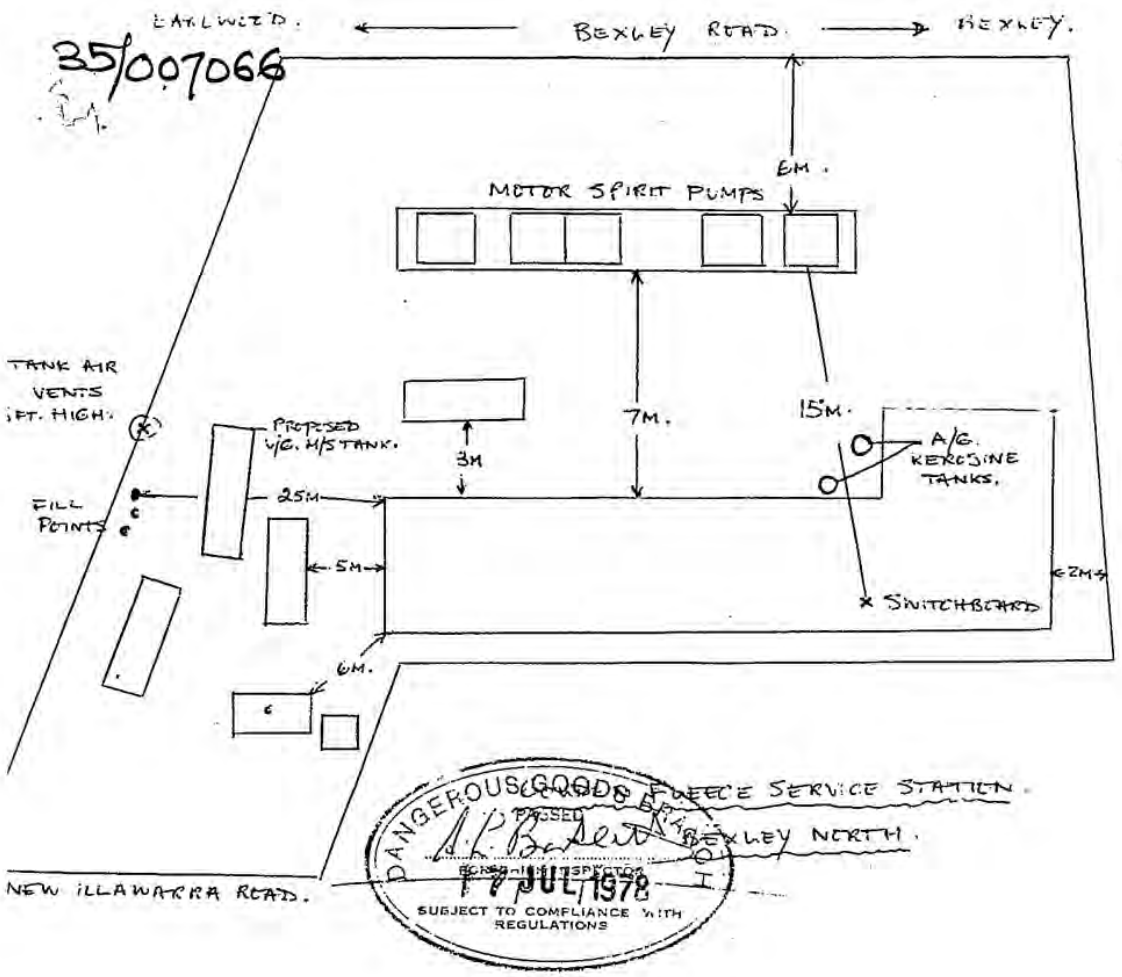
Emergency Contact for this Site FUAD AHMED Ph. 0408 408623

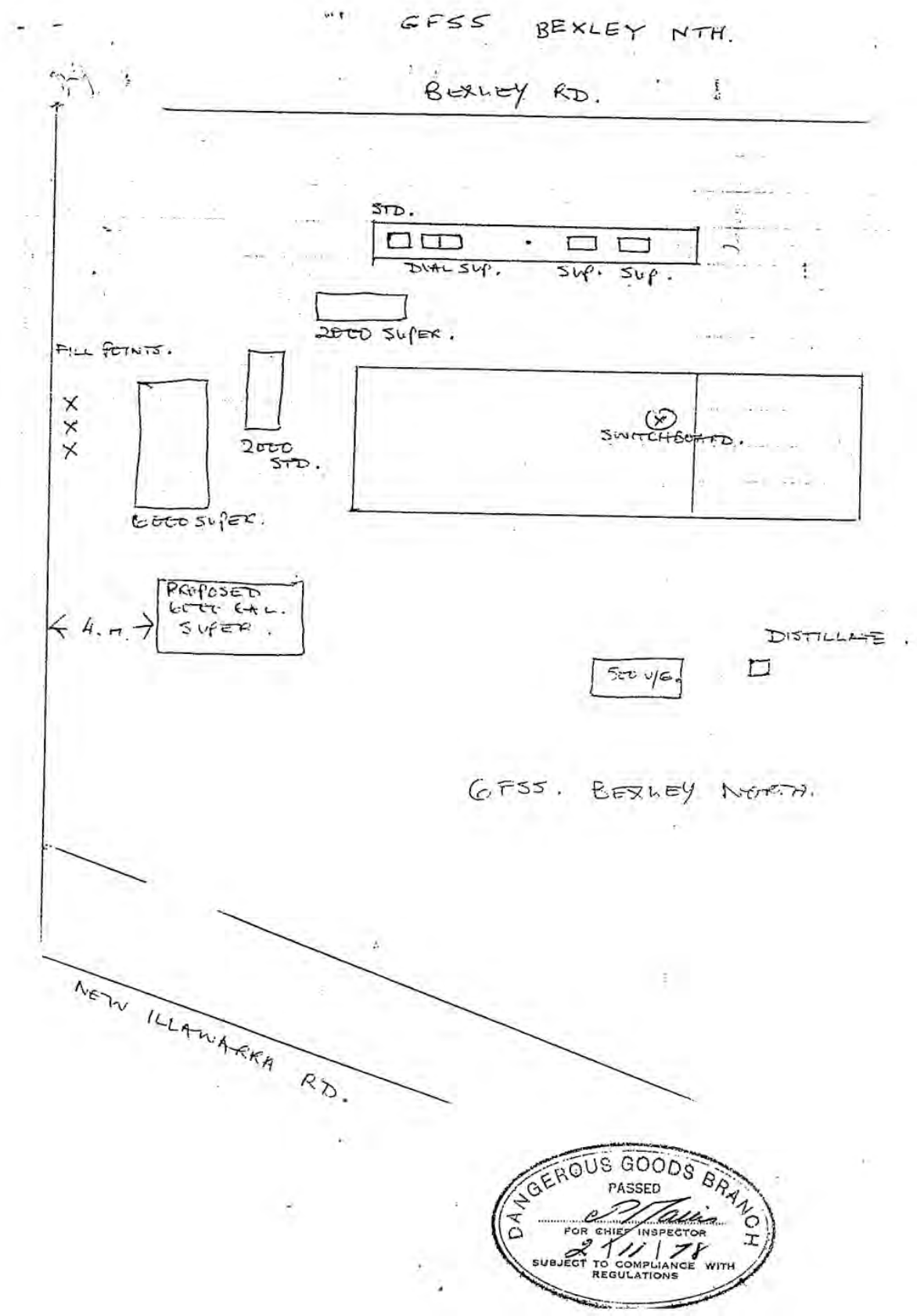
Site staffing 16HRS 7DAYS

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
1	**UNDERGROUND TANK**	**Class 3**	**34200 L**
	UN 1203 PETROL		30000 L
2	**UNDERGROUND TANK**	**Class 3**	**9500 L**
	UN 1203 PETROL		9000 L
3	**UNDERGROUND TANK**	**Class 3**	**27600 L**
	UN 1203 PETROL		25000 L
4	**UNDERGROUND TANK**	**Class 3**	**10000 L**
	UN 1203 PETROL		9000 L
5	**UNDERGROUND TANK**	**Class 3**	**26600 L**
	UN 1203 PETROL		25000 L
6	**EXEMPT - U/G TANK**	**Class C1**	**2000 L**
	UN 00C1 DIESEL		2000 L
LPG1	**CYLINDER STORE**	**Class 2.1**	**180 KG**
	UN 1075 PETROLEUM GASES, LIQUEFIED		180 KG
LPG2	**DECANTING CYLINDER(S)**	**Class 2.1**	**420 KG**
	UN 1075 PETROLEUM GASES, LIQUEFIED		420 KG


NEW ILLAWARRA ROAD
Bitumen
Concrete
Car Wash Pad
Settling Pit
B-3/MW-2
B-1/MW-1
B-2
Former Diesel Pump
B-5
B-4
Sewer Line
Workshop and sales building
CPS
B-6
Bowsers
Canopy
Bitumen
BEXLEY ROAD
B-7/MW-3
T5 Waste Oil
Sewer Line
Stormwater Line
LEGEND
Underground Storage Tank (UST)
B-1/MW-1 Soil Boring/Monitoring Well Location
B-1 Soil Boring Location
Reference: Golden Fleece Petroleum, Site Plan; Dg. No. 226 Sh. 10
Environmental Site Assessment
Bexley North NSW
1:300
CGH 7/4/95
S95C030
SITE MAP


EARLWOOD.
BEXLEY ROAD.
BEXLEY.
35/007066
6M.
MOTOR SPIRIT PUMPS
TANK AIR VENTS 12FT. HIGH.
PROPOSED U/G. M/S TANK.
3M
7M.
15M.
A/G. KEROSINE TANKS.
FILL POINTS
25M
5M
2M
SWITCHBOARD
6M.
DANGEROUS GOODS BRANCH
PASSED
BEXLEY NORTH.
17 JUL 1978
SUBJECT TO COMPLIANCE WITH REGULATIONS
NEW ILLAWARRA ROAD.


GFSS BEXLEY NTH.
BEXLEY RD.
STD.
DUAL SUP.
SUP. SUP.
2000 SUPER.
FILL POINTS.
2000 STD.
SWITCHBOARD.
6000 SUPER.
PROPOSED 6000 GAL. SUPER.
4.M.
DISTILLATE.
SEC V/G.
GFSS. BEXLEY NORTH.
NEW ILLAWARRA RD.
DANGEROUS GOODS BRANCH
PASSED
FOR CHIEF INSPECTOR
21/11/78
SUBJECT TO COMPLIANCE WITH REGULATIONS

FOR THE KEEPING OF DANGEROUS GOODS 3

Application is hereby made for— *a licence (or amendment of the licence) *the transfer of the licence for the keeping of dangerous goods in or on the premises described below.

(*delete whichever is not required)

FEE: $10.00 per Depot for new licence. $10.00 for amendment or transfer.

Name of Applicant in full (see over)	NF NOMENI P/L
Trading name or occupier's name (if any)	Golden Fleece Service Station
Postal address	Postcode
Address of the premises including street number (if any)	cnr. 309 Bexley & New Illawarra Rds BEXLEY NORTH Postcode 2207
Nature of premises (see over)	SERVICE STATION
Telephone number of applicant	STD Code Number 502.2223

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 LITRES	Dangerous goods: Product being stored	C & C Office use only 2006 120 6
1	Underg. Tank	27800	Petrol 3.1	202034
2	✓ ✓	27800	✓ 3.1	202034
3	✓ ✓	29000	✓ 3.1	202093
4	✓ ✓	29000	✓ 3.1	202093
5	✓ ✓	2500	Kero 3.2	202023
6	cylinder store	420	LPGas 2.1	7100 42
7				
8				
9				
10				
11				
12				

Has site plan been approved? Yes ✓ No — If yes, no plans required. If no, please attach site plan.

Have premises previously been licensed? Yes ✓ No — If yes, state name of previous occupier. DACRA Investment P/L

Name of company supplying flammable liquid (if any) Golden Fleece

Signature of applicant ..... Date 1.10.82

For external explosives magazine(s), please fill in side 2. ERIC FLAMMIA

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, ANDY NOUR 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 15.11.82

Licence No. 3500 7066.2 (F3)

Application is hereby made for *the transfer of the licence for the keeping of dangerous goods on the premises described below.

(*delete whichever is not required)

FEE: $10.00 per Depot

$20

8859 6/03/79 038

Name of Applicant in full (see over)	Surname HARDY Given Names LESLIE THOMAS
Trading name or occupier's name (if any)	LES HARDY'S PERFORMANCE CENTRE.
Postal address	309 Bexley & New Illawarra Rds Bexley Postcode 2207
Telephone number of applicant	STD Code 02 Number 506659
Address of the premises in or on which the depot or depots are situated (including street number, if any)	309 Bexley & New Illawarra Rds Bexley Postcode 2207
Nature of premises (see over)	Service Station

~~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: Product being stored	Dangerous goods: C & C Office use only
1	Underground	27850	3.1 (PETROL)	~~2~~ 2020
2	"	27850	3.1 PETROL	2020
3	"	10,000	3.1 PETROL	2020
4	"	10,000	3.1 PETROL	2020
5	"	2,000	3.2 KEROSENE	2.020
6	Cylinder	420	2.1 (L.P.G.)	7.100.4
7				
8				
9				
10				
11				
12				

Name of company supplying flammable liquid (if any) H.C.P

Have premises previously been licensed? Yes

If known, state name of previous occupier Mobil Licence No. 07066

Signature of applicant [signature] Date 21/2/79

For external explosives magazine(s), please fill in side 2. N

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, George E. Brooks 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 [signature]

Date

Application is hereby made for—~~*a licence (or amendment of the licence)~~ *the transfer of the licence for the keeping of dangerous goods in or on the premises described below.

(*delete whichever is not required)

FEE: ~~$10.00~~ $50 per Depot

Name of Applicant in full (see over)	Surname SLOANE Given Names BARRY COLIN ~~2415 21/08/80 03A~~
Trading name or occupier's name (if any)	~~BP Oil Shell~~ Golden Mile Service Station Bentley
Postal address	309 Berkley Rd, Berkley Nortth Postcode 2207.
Telephone number of applicant	STD Code 502 2223 Number 506659.
Address of the premises in or on which the depot or depots are situated (including street number, if any) 1950	309 Berkley Rd Berkley North Postcode 2207.
Nature of premises (see over)	Service Station.

~~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 ~~DD 00~~ 8 120 C	
			Product being stored	C & C Office use only
1	underground tank	27.800	Class 3.1	2020 34
2	✓ ✓	27 800	✓ ✓	2020 34
3	✓ ✓	10.000	✓ ✓	2020 14
4	✓ ✓	10 000	✓ ✓	2020 14
5	✓ ✓		✓ ✓	2020 33
6	✓ ✓	2500	Class 3.2. Kero	
~~0~~	~~Cylinder Store~~	~~200 LT~~	~~Class 2.1~~ EXEMPT	
8				
9				
10				
11				
12				

Name of company supplying flammable liquid (if any) H.C.S.

Have premises previously been licensed? yes

If known, state name of previous occupier L.T. Hardy Licence No. ~~33~~ 3500706 62

Signature of applicant X B Sloane Date 1.8.80

For external explosives magazine(s), please fill in side 2.

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, George E Brooks 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 G E Brooks

Name of Occupier MOUBARAK (Surname) Peter (First Names)

Trading Name (if any) Golden Fleece Service Station

Postal Address Postcode

Address of the premises in which the depot or depots are situated Cnr Rexley & Nth Illawarra Rds North Rexley Postcode 2207

Occupation Service Station Prop.

Nature of Premises S/Stn

Particulars of construction of depots and maximum quantities of inflammable liquid and/or dangerous goods to be kej at any one time.

PLEASE SKETCH SITE ON BACK OR ATTACH PLAN

Depot No.	Construction of depots *			Inflammable Liquid		Dangerous Goods						
	Walls	Roof	Floor	Mineral spirit litres	Mineral oil litres	Class 1 litres	Class 2 litres	Class 3 kg	Class 4 m^3	Class 5A# litres	Class 5B# litres	Class 9 litres
1	Underground Tank		"	30000								
2	"		"	10000								
3	"		"	10000								
4												
5												
6												
7												
8												
9												
10												
TOTAL												

PUBLIC REVENUE A/c

cheque / $25.00

* If kept in tanks describe depots as underground or aboveground tanks.

Insert water capacity of tanks or cylinders.

Name of Company supplying inflammable liquid H. C. Sleigh (Date) 30·3·76 Receipt No. 5614

Have premises previously been licensed? Yes

If known, state name of previous occupier Caltex

Signature of applicant Peter Moubarak Date

CERTIFICATE OF INSPECTION

I, Leslie Edward Brooks being an Inspector under t Inflammable Liquid Act, 1915, do hereby certify that the premises or store described above does comply with t requirements of that Act and regulations with regard to its situation and construction for the keeping of inflammal liquid and/or dangerous goods in quantity and nature specified.

Signature of Inspector L E Brooks

Date 24-3-76

SEE PAGE 4 FOR DETAILS OF FEES PAYABLE AND DISTANCES FROM PROTECTED WORKS

Hex

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.

Registration of Premises – 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 Licence, Div. 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 Licence, 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.

1. Name of occupier including full christian names. R/le 9939 $400 chq cash	GRIVAINAS PETROS
2. Trading Name (if any)	Golden Fleece Service Station
3. Locality of the premises in which the depot or depots are situated 3.	No. or Name on Street Bexley & New Illawarra Rd Town Nth Bexley
4. Postal address	as above Postcode 2207
5. Occupation	S/Stn Prop
6. Nature of premises (dwelling, garage etc.)	S/Stn

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*			Inflammable liquid		Dangerous goods						
	Walls	Roof	Floor	Mineral spirit gallons	Mineral oil gallons	Class 1 gallons	Class 2 gallons	Class 3 lb	Class 4 cu ft	Class 5A water gal	Class 5B water gal	Class 9 gallons
1	Underground tk			6000								
2				2000								
3				2000								
4	2x1000 gls		2PC								40	
5												
6												
7							PLEASE GIVE A/C					
8							Chq $450					
9							8/6/73 $425					
10							(Date) Receipt No.					

*If product is kept in tanks describe depots as underground or aboveground tanks.

Signature of applicant X P. Gouvas

Date of application _____, 19__

CERTIFICATE OF INSPECTION

I, GAVIN R GILLIS 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.

Place Sydney Signature of Inspector

premises described below. (*delete whichever is not required)

1592 3/07/79 038

FEE: $10.00 per Depot

Amended Renewal

Name of Applicant in full (see over)	Surname HARDY Given Names LESLIE
Trading name or occupier's name (if any)	GOLDEN FLEECE S/Stn. BEXLEY TF
Postal address	Postcode
Telephone number of applicant	STD Code 02 Number
Address of the premises in or on which the depot or depots are situated (including street number, if any)	cnr. BEXLEY Rd. & NEW ILLAWARRA Rd. BEXLEY Postcode 2207
Nature of premises (see over)	SERVICE STATION

~~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 LITRES	Dangerous goods: Product being stored	Dangerous goods: C & C Office use only
1	Underground Tank	27850 ✓	3.1	2 020 34
2	✓ ✓	27850 ✓	3.1	2 020 34
3	✓ ✓	10000 ✓	3.1	2 020 14
4	✓ ✓	10000 ✓	3.1	2 020 14
5	✓ ✓	2500	3.2	2 020 23
6	Cylinder Store	420	2.1	7 100 42
7				
8				
9				
10				
11				
12				

INSPECTORS FIELD COLLECTION
RECEIPT No. 11002
DATE 4.6.79
AMOUNT $60.00 cheq

Name of company supplying flammable liquid (if any) HES

Have premises previously been licensed? YES

If known, state name of previous occupier AS ABOVE Licence No. 7066-3

Signature of applicant [signature] Date 4/6/79

For external explosives magazine(s), please fill in side 2.

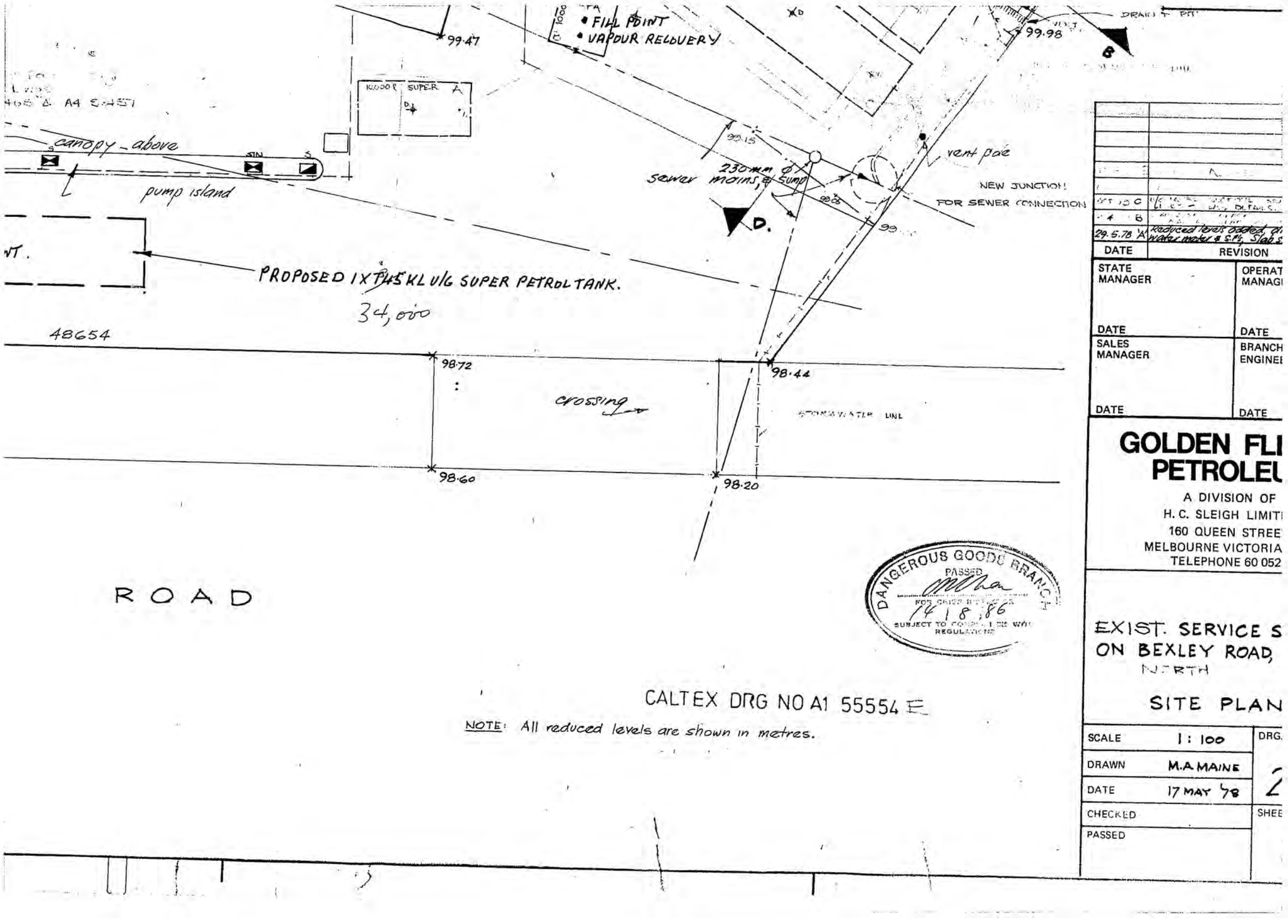
FOR OFFICE USE ONLY

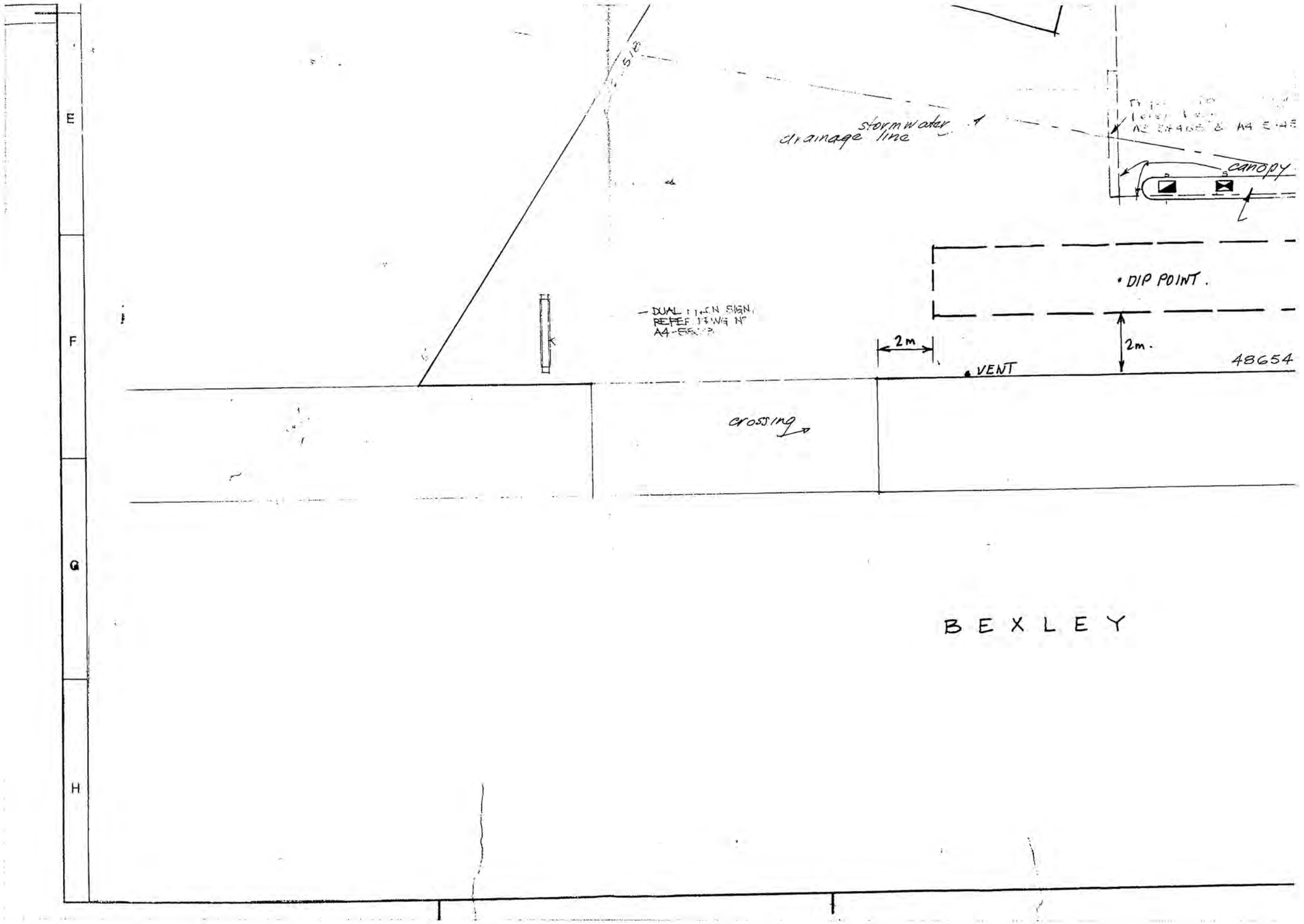
CERTIFICATE OF INSPECTION

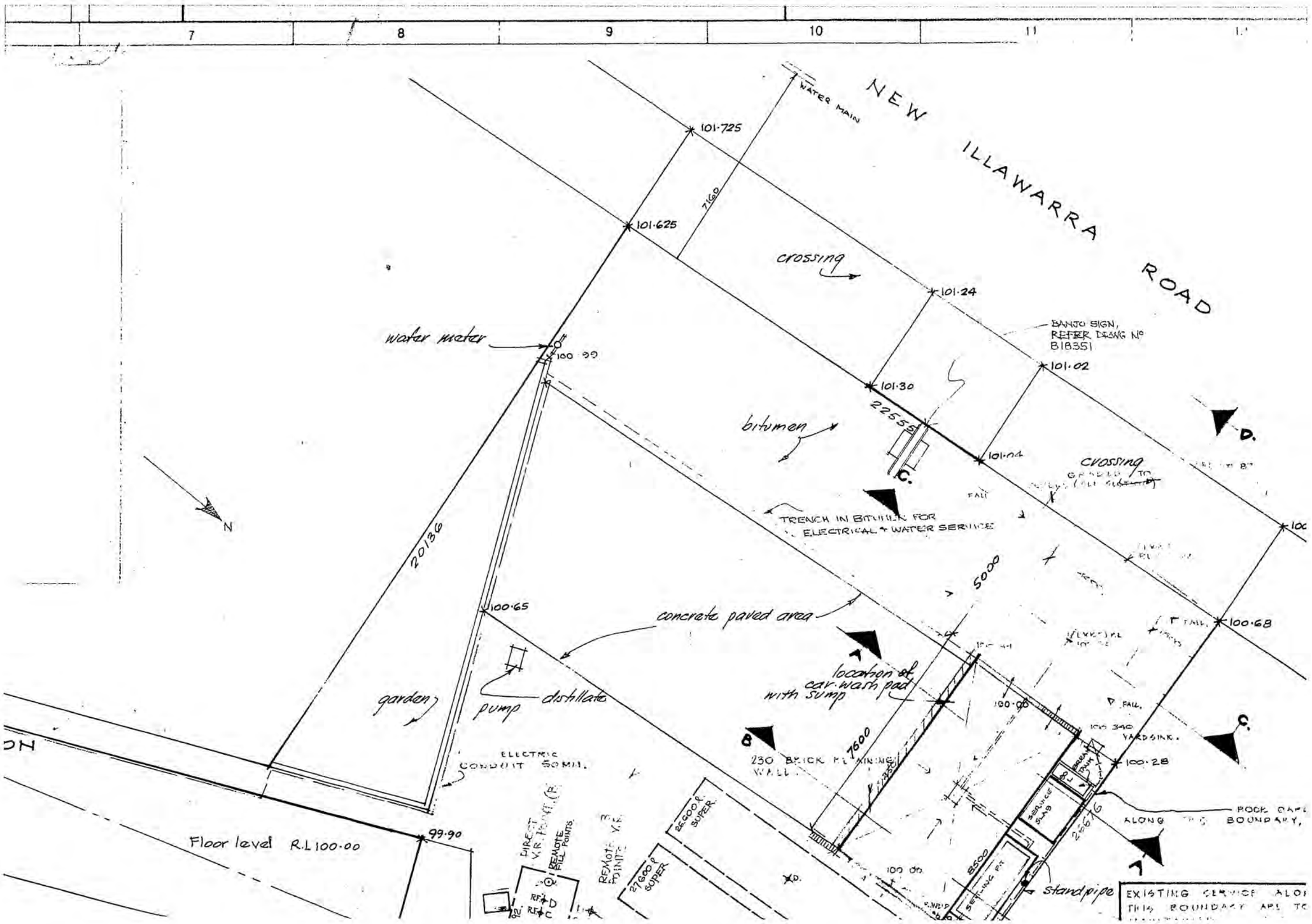
I, ADLY NOUR being an Inspector under the Dangerous Goods Act, 1975, do hereby certify that the premises described above do comply with the requirements of the Dangerous Goods Act, 1975, and the Dangerous Goods Regulation with regard to their situation and construction for the keeping of dangerous goods of the nature and in the quantity specified.

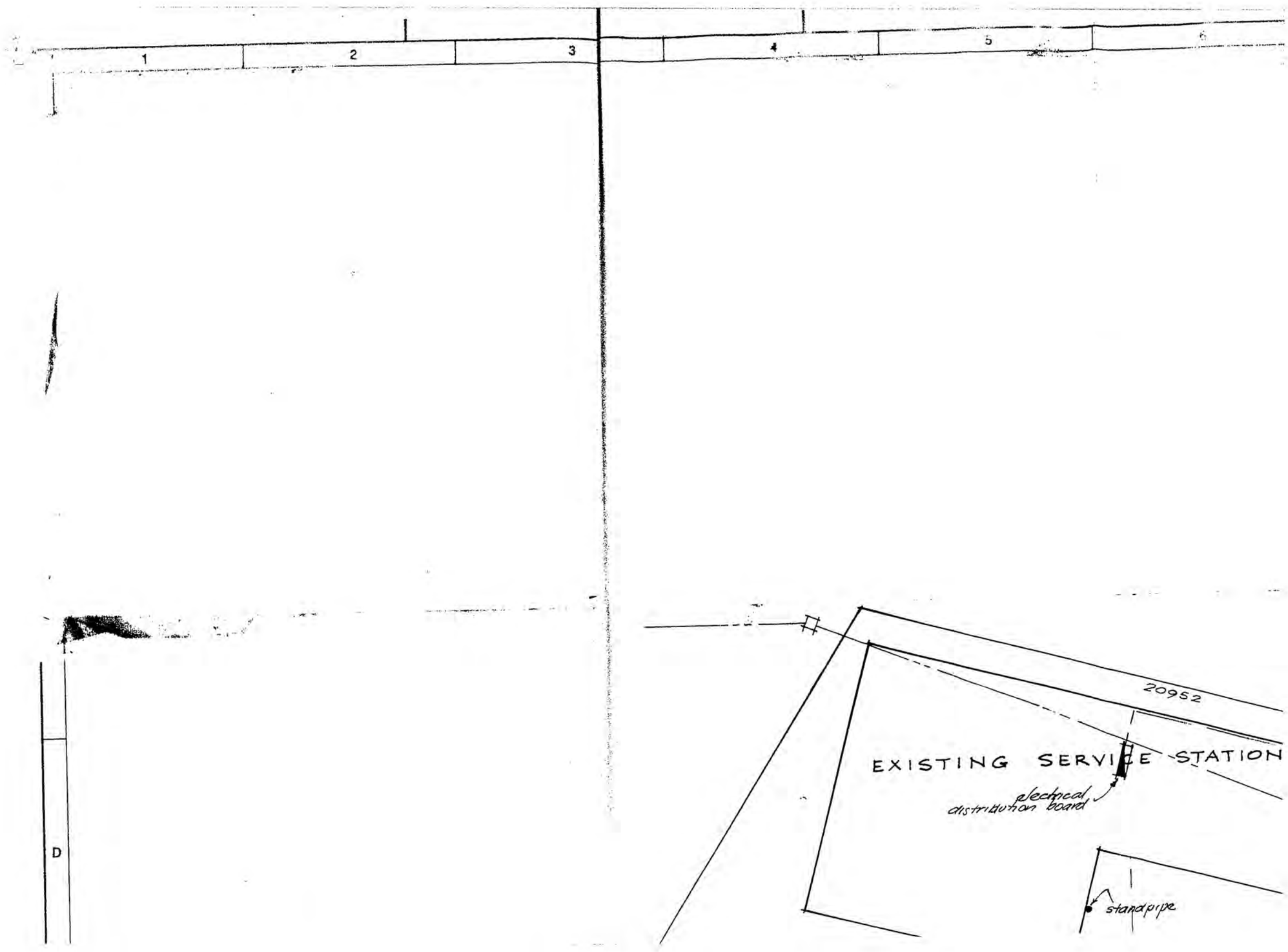
Signature of Inspector [signature]

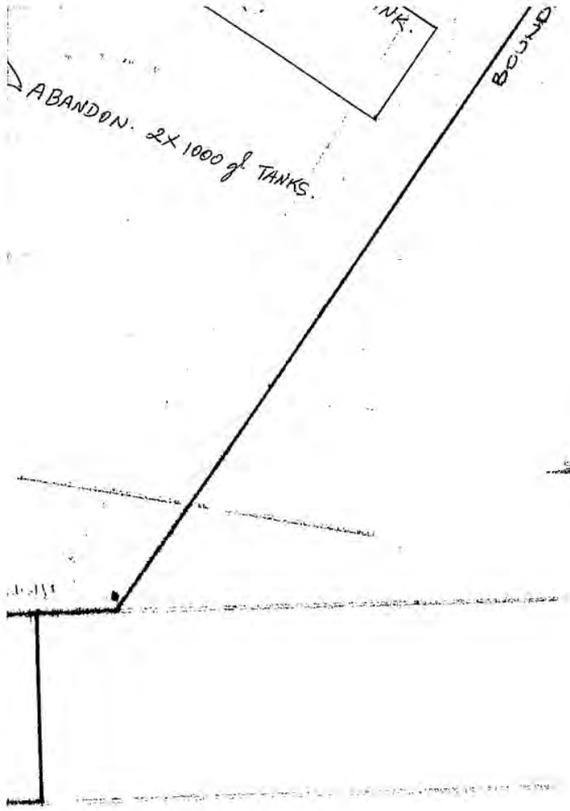
Date 4.6.79

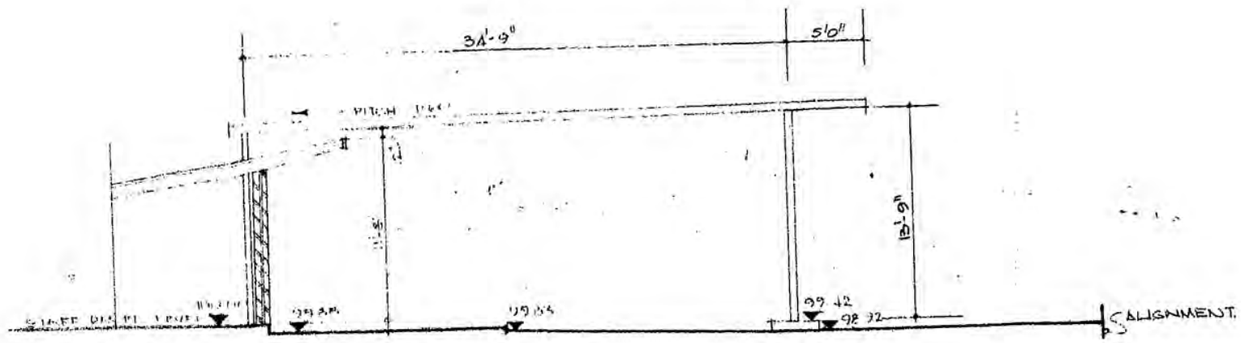

99.47
FILL POINT
VAPOUR RECOVERY
10000 L SUPER A
99.98
DRAIN P PIT
canopy above
pump island
99.15
230mm Ø sewer mains & sump
vent pole
NEW JUNCTION FOR SEWER CONNECTION
D.
PROPOSED 1 X 34 KL U/G SUPER PETROL TANK.
34,000
48654
98.72
98.44
crossing
STORMWATER LINE
98.60
98.20
ROAD
DANGEROUS GOODS BRANCH PASSED 14.8.86
CALTEX DRG NO A1 55554 E
NOTE: All reduced levels are shown in metres.
29.5.78 A Reduced levels added, ... water meter & S.P's, Slab ...
DATE REVISION
STATE MANAGER
OPERAT MANAG
DATE
DATE
SALES MANAGER
BRANCH ENGINE
DATE
DATE
GOLDEN FLI
PETROLEU
A DIVISION OF
H. C. SLEIGH LIMIT
160 QUEEN STREE
MELBOURNE VICTORIA
TELEPHONE 60 052
EXIST. SERVICE S
ON BEXLEY ROAD,
NORTH
SITE PLAN
SCALE 1 : 100
DRAWN M.A MAINE
DATE 17 MAY 78
CHECKED
PASSED
DRG.
SHEE


E
F
G
H
SIP
drainage
stormwater
line
canopy
DIP POINT.
2m
2m.
VENT
48654
crossing
BEXLEY


7
8
9
10
11
NEW ILLAWARRA ROAD
WATER MAIN
101·725
101·625
7660
crossing
101·24
water meter
100·99
BANJO SIGN, REFER DRWG Nº B18351
101·02
101·30
2255
bitumen
101·04
crossing
GRADED TO
FALL
TRENCH IN BITUMEN FOR ELECTRICAL + WATER SERVICE
20136
N
100·65
concrete paved area
5000
100·68
location of car wash pad with sump
garden
pump
distillate
100·00
230 BRICK RETAINING WALL
7600
100·28
YARD SINK
ELECTRIC CONDUIT 50MM.
DIRECT V.R. POINTS
REMOTE FILL POINTS
REMOTE V.R. POINTS
25000 P SUPER
27600 P SUPER
99·90
Floor level R.L 100·00
ROCK GAR
ALONG
BOUNDARY,
2557G
8500
SETTLING PIT
standpipe
EXISTING SERVICE ALO
THIS BOUNDARY ARE TO


1
2
3
4
5
6
D
20952
EXISTING SERVICE STATION
electrical distribution board
standpipe





ELEVATION

NOTE :
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR BEFORE COMMENCEMENT OF FABRICATION OF STEELWORK

Engineering Dept
PASSED

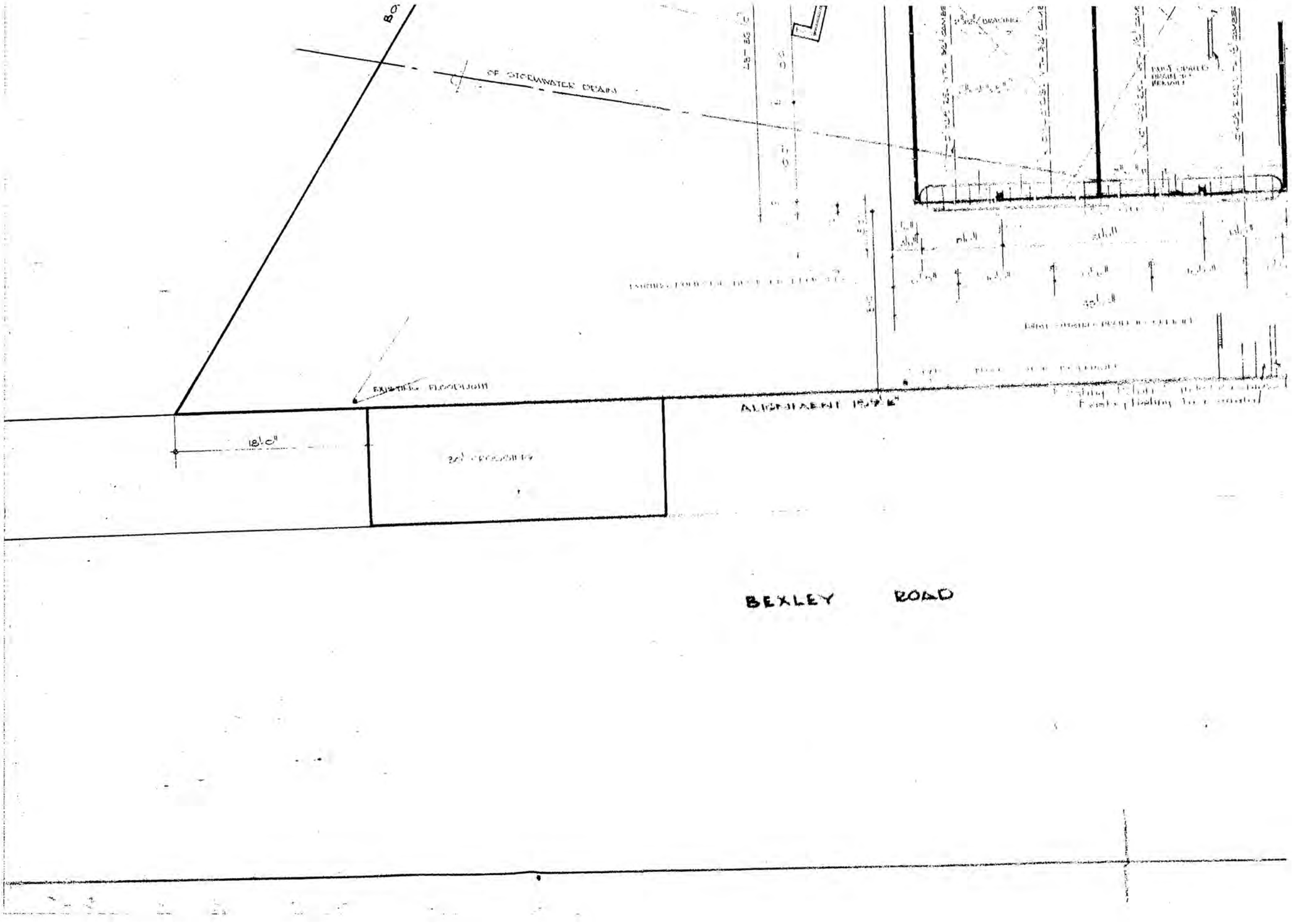
Exp. Dept

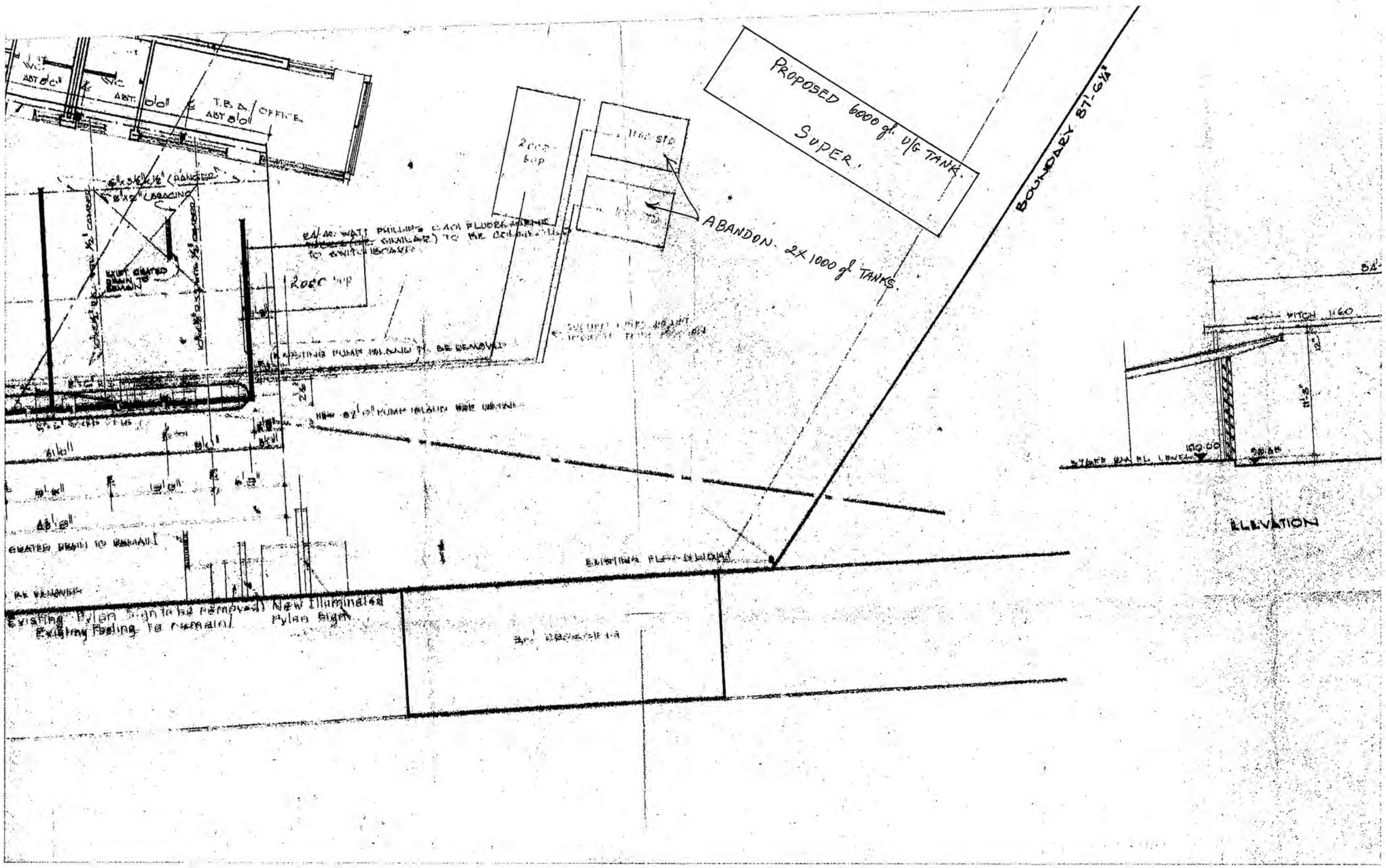
C	13-4-64	Sky Sign removed. New illuminated Pylon Sign added. R.A.S.
B	4-3-65	SIGNAGE ON CANOPY & EXTRA SUPER PUMP IN PLACE OF STANDARD PUMP
A	5-1-66	PUMP ISLAND DETAIL ADDED - CANOPY STRUCTURE & SIGNS REVISED NOTES ADDED
No	DATE	REVISIONS

GOLDEN FLEECE SERVICE STATION
BEXLEY RD & NEW ILLAWARRA RD BEXLEY NTH

CANOPY ADDITIONS	SCALE: 1/4"=1'-0"	CHECKED	DWG. No. 2260 A
	DATE: 4-2-64	APPROVED	
	DRAWN:		

H. C. SLEIGH LIMITED SYDNEY TELEPHONE 2453


OF STORMWATER DRAIN
EXISTING FLOODLIGHT
ALIGNMENT
18.6"
BEXLEY ROAD


PROPOSED 6000 gl. U/G TANK.
SUPER.
BOUNDARY 87-6¼"
ABANDON. 2× 1000 gl TANKS.
T.B.A./OFFICE.
EXISTING PUMP ISLAND TO BE REMOVED
ELEVATION
PITCH
Existing Pylon Sign to be removed. New Illuminated Pylon Sign
Existing Fencing to remain.

APPENDIX E

DATA QUALITY OBJECTIVES

INTRODUCTION

The Data Quality Objectives (DQOs) process was used to define the type, quantity and quality of the data needed to support decisions relating to the environmental condition of a site (reference D1). The process consists of seven steps, with the output from each step influencing the choices that will be made later in the process.

According to USEPA (reference D2), DQOs are qualitative and quantitative statements, derived from the first six steps of the process, that:

- Clarify the study objective;
- Define the most appropriate type of data to collect;
- Determine the most appropriate conditions from which to collect the data; and
- Specify tolerable limits on decision errors which will be used as the basis for establishing the quantity and quality of data needed to support the decision.

The DQOs are then used to develop a scientific and resource-effective data collection design.

STEP 1 - STATE THE PROBLEM

The problem is the potential for the site to be impacted by contamination caused by past activities undertaken on or adjacent to the site, at levels in excess of those permissible for the proposed residential land-use with minimal access to soil, and which could impact upon anticipated receiving environments and the intended development.

STEP 2 - IDENTIFY THE DECISION STATEMENT

The following decision were required to be made:

- Does the concentrations of soil (fill and natural soil) and groundwater exceed acceptable levels for the proposed land-use?

◊ Are there any aesthetic issues relating to the fill, natural soils and groundwater at the site?

STEP 3 - IDENTIFY INPUTS TO THE DECISION

The following information inputs are required to resolve the decision statement:

◊ Collection of environmental soil and groundwater samples using appropriate methods;

◊ Analysis of selected samples for the contaminants of concern;

◊ Comparison of the results with relevant Site Assessment Criteria (SAC) as defined in the main body of the report; and

◊ Accurate measurements of sample locations to allow for accurate mapping and contouring of contamination (if identified).

STEP 4 - DEFINE THE BOUNDARIES OF THE STUDY

The site covers a combined area of 4,200m^2 and the following legal allotments:

◊ Lots 3, 4, 5 and 6 in Deposited Plan (DP) 508629,

◊ Lots A and B in DP 388204,

◊ Lot 1 in DP 1045200,

◊ Lot 1 in DP 400341, and

◊ Lot 38 in DP 663036.

The lateral extent of the study is the boundaries of the site (as depicted on **Figure 2**). The vertical extent of the study is approximately 1m below ground surface (bgs), 0.5m into natural soils or drilling / excavation method refusal or 0.5m below adjoining tankpits (where present).

STEP 5 - DEVELOP A DECISION RULE

The purpose of this step is to define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single "if...then..." statement that describes a logical basis for choosing among alternative actions.

The parameters of interest (or contaminants of concern) are a broad group of common contaminant compounds known to occur within the Sydney area.

The action level or Site Assessment Criteria (SAC) will be used to decide if the parameter represents an unacceptable risk for residential land-use and/or the receiving environment. If the measured concentration of a parameter or compound exceeds the action levels (SAC) in soils, then this is deemed to present an unacceptable risk if the site is developed for residential land-use or to environmental receptors.

If the concentrations of a parameter or compound, whichever is representative for of the site, are above the nominated action levels, then further sampling may be proposed to determine the extent of contamination.

STEP 6 - SPECIFY ACCEPTABLE LIMITS ON DECISION ERRORS

There are two types of errors:

1) Deciding that the site is acceptable for residential land-use and that there is a low risk to receiving environments when it actually is not. The consequence of this error may be unacceptable health risk for current and future users of the sites.

2) Deciding that the site is unacceptable for residential land-use and that there is a risk to receiving environments when it is acceptable. The consequence of this error is that the client will pay for further investigation / remediation that are not necessary.

The more severe consequences are with decision error (1) since the risk of jeopardising human health outweighs the consequences of paying more for remediation. It will not be possible to conduct statistical hypothesis tests as the proposed sampling programme consists of the collection of one round of samples only.

STEP 7 - OPTIMISING THE DESIGN FOR OBTAINING DATA

The purpose of this step is to identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 7 of the report. To ensure the design satisfies the DQOs a comprehensive Quality Assurance and Quality Control Plan will be implemented.

References

D1. NSW DEC (2006) *Contaminated Sites: Guidelines for NSW Site Auditor Scheme, 2nd Edition.*

D2. USEPA, 2000: *Guidance for Data Quality Objectives Process.* EPA QA/G-4.

D3. NEPC, 2013: National Environment Protection Council (1999*).* National Environment Protection (Assessment of Site Contamination) Measure. *Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater.*

D4. Friebel & Nadebaum (2011): *Technical Report No. 10 - Health screening levels for petroleum hydrocarbons in soil and groundwater Part 1: Technical development document.* CRC for Contamination Assessment and Remediation of the Environment.

D5. ANZECC/ARMCANZ, 2000: Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000: *Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy.* October 2000.

APPENDIX F

BOREHOLE LOGS

E16016BN-R03F

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH101**
Hole Depth: **3.80 m**
Sheet: **1 of 1**

Project Name: **Geotechnical and Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **Total Drilling** Date Started: **1/11/2016** Ground Level: ----------
Drill Method: **CC to 0.19m, SFA (TC-Bit) to EOH** Date Completed: **1/11/2016** Easting: ----------
Equipment: **Hanjin D&B** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
CC		0.2					CONCRETE SLAB.				
Solid Flight Auger		0.4				Fill	FILL- Gravelly Sand / Sandy Gravel, brown, fine to coarse grained sand, fine to coarse gravel.	loose		SMC011116-1 0.2-0.3m	
		0.6					SAND- grey brown, fine to coarse grained sand.	loose	moist	SMC011116-2 0.4-0.5m	Possible Fill.
		1.0								SMC011116-3 0.9-1.0m	
		1.4							very moist	SMC011116-4 1.3-1.5m	
		2.8				Natural	Weathered SANDSTONE- orange brown & pale grey, medium to coarse.			SMC011116-5 3.0-3.3m	
		4.0					Hole Terminated at 3.80m Target depth.				Bore dry upon completion.

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016** Checked By: **Stephen McCormack** Date: **10/12/2016**

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:29 PM

Monitoring Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH102**
Hole Depth: **2.40 m**
Sheet: **1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**Total Drilling**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**CC to 0.15m, SFA (TC-Bit) to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Hanjin D&B**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments	Well Details	Well Construction
CC							**CONCRETE SLAB.**						
Solid Flight Auger		0.2				Fill	FILL- Silty Clay, dark grey to black, low to medium plasticity, pockets of sand and gravel (shale and slag).	soft to firm	moist	SMC011116-6 0.2-0.3m			Gatic
		0.4										0.30	
		0.6								SMC011116-7 0.6-0.7m			Bentonite
		0.8										0.80	
		1.0								SMC011116-8 0.9-1.0m		1.00	
		1.2											
		1.4											
		1.6									Water seepage noted below 1.6m.		
		1.8											
		2.0								SMC011116-9/10 1.8-2.0m			Coarse Sand
		2.2				Natural	**SANDSTONE**- orange brown & pale grey, medium to coarse.					2.20	50mm ϕ Screen
		2.4					**Hole Terminated at 2.40m** Practical refusal.						
		2.6											
		2.8											
		3.0											

Moisture		Additional Comments
D	Dry	No adverse odour or staining and no obvious ACM.
Dp	Damp	
SM	Slightly Moist	
M	Moist	
VM	Very Moist	
W	Wet	
Sd	Saturated	

Logged By: **Stephen McCormack** Date: **1/11/2016** Checked By: **Stephen McCormack** Date: **10/12/2016**

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:30 PM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH103**
Hole Depth: **1.40 m**
Sheet: **1 of 1**

Project Name: **Geotechnical and Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **Total Drilling** Date Started: **1/11/2016** Ground Level: ----------
Drill Method: **SFA (TC-Bit) to EOH** Date Completed: **1/11/2016** Easting: ----------
Equipment: **Hanjin D&B** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
Solid Flight Auger		0.2					ASPHALT.				
							FILL- Gravelly Clayey Sand, dark grey and brown.	loose	moist	SMC011116-11/12 0.1-0.25m	
		0.4				Fill					
		0.6					FILL- Silty Sand, dark brown / dark grey, fine to coarse grained sand, trace clay.	loose	moist	SMC011116-13/14 0.5-0.7m	
		0.8									
		1.0									
		1.2				Natural	SANDSTONE- grey & orange brown, medium to coarse.				Insufficient quality sandstone for sampling.
		1.4					**Hole Terminated at 1.40m** Practical refusal.				Bore dry upon completion.
		1.6									
		1.8									
		2.0									
		2.2									
		2.4									
		2.6									
		2.8									
		3.0									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016** Checked By: **Stephen McCormack** Date: **10/12/2016**

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:30 PM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID.	**BH104**
Hole Depth:	**1.20 m**
Sheet:	**1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**Total Drilling**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**CC to 0.15m, SFA (TC-Bit) to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Hanjin D&B**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
CC							CONCRETE SLAB.				
Solid Flight Auger		0.2				Fill	FILL- Sandy Gravel, dark grey / black, fine to coarse grained sand, fine to coarse gravel.	loose	moist	SMC011116-15 0.2-0.3m	Coal-like fragments.
		0.4									
		0.6					FILL- Sand, yellow brown, fine to coarse grained sand.	loose	moist	SMC011116-16 0.5-0.65m	
		0.8					FILL- Sand, dark brown, fine to coarse grained sand, trace gravel.	loose	moist	SMC011116-17 0.8-0.95m	
		1.0									
		1.2					**Hole Terminated at 1.20m** Refusal on concrete.				Bore dry upon completion.
		1.4									
		1.6									
		1.8									
		2.0									
		2.2									
		2.4									
		2.6									
		2.8									
		3.0									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016**

Checked By: **Stephen McCormack** Date: **10/12/2016**

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Monitoring Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID.	**BH105**
Hole Depth:	**2.40 m**
Sheet:	**1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**Total Drilling**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**CC to 0.1m, SFA (TC-Bit) to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Hanjin D&B**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments	Well Details	Well Construction
CC							CONCRETE SLAB.						
Solid Flight Auger		0.2				Fill	FILL- Gravelly Clay, dark brown, fine to coarse gravel, some sand.	firm	moist	SMC011116-18 0.1-0.2m			Gelic
		0.4											
		0.6								SMC011116-19 0.5-0.6m		0.50	
		0.8					FILL- Sandy Clay, dark brown & brown, trace sand.	firm to stiff	moist				Bentonite
		1.0								SMC011116-20 0.9-1.0m		1.00	
		1.2				Natural	**Sandy CLAY**- orange brown, fine to medium gravel.	stiff to very stiff	moist	SMC011116-21/22 1.1-1.25m		1.15	
		1.4											
		1.6					Becoming red brown & orange brown from 1.6m, medium to coarse grained sand.						Coarse Sand
		1.8											
		2.0								SMC011116-23 1.8-2.0m			50mm Ø Screen
		2.2											
		2.4					**SANDSTONE**- grey & orange brown, medium to coarse.					2.35	
							Hole Terminated at 2.40m Practical refusal.				Bore dry upon completion.		
		2.6											
		2.8											
		3.0											

Moisture		Additional Comments
D	Dry	No adverse odour or staining and no obvious ACM.
Dp	Damp	
SM	Slightly Moist	
M	Moist	
VM	Very Moist	
W	Wet	
Sd	Saturated	

Logged By: **Stephen McCormack** Date: **1/11/2016** Checked By: **Stephen McCormack** Date: **10/12/2016**

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:32 PM

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID. **BH106**
Hole Depth: **2.20 m**
Sheet: **1 of 1**

Project Name: **Geotechnical and Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **Total Drilling** Date Started: **1/11/2016** Ground Level: ----------
Drill Method: **SFA (TC-Bit) to EOH** Date Completed: **1/11/2016** Easting: ----------
Equipment: **Hanjin D&B** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
Solid Flight Auger		0.2				Fill	ASPHALT.				
		0.4					FILL- Clayey Sandy Gravel, dark grey & brown, fine to coarse grained sand, fine to coarse gravel.	firm to stiff	moist	SMC011116-24 0.1-0.3m	
		0.6					**Sandy CLAY**- orange brown, fine to medium grained sand.	stiff	moist	SMC011116-25/26 0.7-0.9m	
		0.8									
		1.0									
		1.2									
		1.4				Natural				SMC011116-27 1.3-1.5m	
		1.6									
		1.8									
		2.0					**SANDSTONE**- grey & orange brown, medium to coarse.				
		2.2					**Hole Terminated at 2.20m** Practical refusal.				Bore dry upon completion.
		2.4									
		2.6									
		2.8									
		3.0									

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:33 PM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016** Checked By: **Stephen McCormack** Date: **10/12/2016**

Monitoring Well Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID.	**BH107**
Hole Depth:	**2.80 m**
Sheet:	**1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**Total Drilling**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**SFA (TC-Bit) to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Hanjin D&B**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments	Well Details	Well Construction
							Surface: Grass						
Solid Flight Auger		0.2				Fill	**TOPSOIL / FILL**- Sandy Silt, dark brown, fine to medium gravel, becoming pale brown with depth.	loose to medium dense	moist	SMC011116-29 0.1-0.2m			Gelic
		0.4											
		0.6								SMC011116-30 0.5-0.6m			
		0.8					**Silty CLAY**- red brown & orange brown, some fine to medium grained sand.	firm to stiff	moist	SMC011116-28 0.7-0.8m			
		1.0					**Sandy CLAY**- red brown & orange brown, medium to coarse grained sand, medium to coarse gravel.	stiff	moist			1.00	
		1.2											
		1.4										1.45	Bentonite
		1.6				Natural	**SANDSTONE**- grey & orange brown, medium to coarse.			SMC011116-31 1.5-1.6m		1.60	
		1.8											
		2.0					**SANDSTONE**- pale grey, medium to coarse, weak zone, increased moisture.				Likely water bearing zone between 2.0 and 2.8m.		Coarse Sand
		2.2											
		2.4											50mm Ø Screen
		2.6								SMC011116-35 2.5-2.8m			
		2.8											
		3.0					**Hole Terminated at 2.80m** Practical refusal.						

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:34 PM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016**

Checked By: **Stephen McCormack** Date: **10/12/2016**

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
Lane Cove NSW 2066
T 02 9420 3361

geo-environmental ENGINEERING

Hole ID.	**BH108**
Hole Depth:	**0.75 m**
Sheet:	**1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**GEE**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**Hand Auger to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Manual**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: Grass				
Hand Auger		0.2				Fill	**TOPSOIL / FILL**- Sandy Gravelly Silt, dark grey, fine to medium grained sand, fine to coarse gravel.	loose to medium dense	slightly moist	SMC011116-32 0.0-0.15m	
		0.4				Natural	**Sandy CLAY / Clayey SAND**- red brown & orange brown, medium to coarse grained sand, with sandstone gravel.	stiff	moist	SMC011116-33 0.3-0.5m	
		0.6									
		0.8					**Hole Terminated at 0.75m** Practical refusal on weathered sandstone.				Bore dry upon completion.
		1.0									
		1.2									
		1.4									
		1.6									
		1.8									
		2.0									
		2.2									
		2.4									
		2.6									
		2.8									
		3.0									

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:34 PM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016**

Checked By: **Stephen McCormack** Date: **10/12/2016**

Borehole Log Report

Geo Environmental Engineering Pty Ltd
82 Bridge Street
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Hole ID.	**BH109**
Hole Depth:	**1.35 m**
Sheet:	**1 of 1**

Project Name:	**Geotechnical and Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**GEE**	Date Started:	**1/11/2016**	Ground Level:	----------
Drill Method:	**Hand Auger to EOH**	Date Completed:	**1/11/2016**	Easting:	----------
Equipment:	**Manual**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
Hand Auger		0.2				Fill	**TOPSOIL/FILL**- Clayey Silt, dark brown, trace fine to coarse sandstone and coal gravel, roots.	firm	moist	SMC011116-34 0.0-0.15m	Coal gravel.
		0.4									
		0.6								SMC011116-36 0.5-0.6m	Geofabric at 0.65m.
		0.8				Natural	**Sandy CLAY**- orange brown & red brown.	firm to stiff	moist	SMC011116-37 0.7-0.85m	
		1.0									
		1.2									
		1.4					**Hole Terminated at 1.35m** Practical refusal on weathered sandstone.				Bore dry upon completion.
		1.6									
		1.8									
		2.0									
		2.2									
		2.4									
		2.6									
		2.8									
		3.0									

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By: **Stephen McCormack** Date: **1/11/2016**

Checked By: **Stephen McCormack** Date: **10/12/2016**

GEE DAVIES BH LOG BEXLEY NORTH.GPJ GEE.GDT 20/12/16 1:50:35 PM

Borehole Log Report

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82 Bridge Street
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Hole ID.	**BH201**
Hole Depth:	**1.60 m**
Sheet:	**1 of 1**

Project Name:	**Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**GEE**	Date Started:	**19-JUL-17**	Ground Level:	----------
Drill Method:	**Hand Auger**	Date Completed:	**19-JUL-17**	Easting:	----------
Equipment:	**Manual**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: bark mulch				
Hand Auger		1.0			SP	Fill	FILL- Gravelly Sand, brown, fine to coarse grained, with fine to coarse gravel present.	loose	moist	JL190717-01 0.05-0.15m	
					SC		FILL- Clayey Sand, brown, fine to coarse grained, with fine to coarse gravel (including fragments of metal).	loose	moist	JL190717-02 0.40-0.50m	
										JL190717-03 0.70-0.80m	
					SC	Natural	**Clayey SAND**- orange-brown, fine to coarse grained.	loose to medium dense	moist	JL190717-04 1.00-1.10m	
					CL		**Sandy CLAY**- grey, low plasticity, fine to coarse grained.	firm to stiff	moist		
							becoming yellow-brown from 1.4m.		very moist	JL190717-05 1.40-1.50m	
		2.0					**Hole Terminated at 1.60m** Target Depth Reached				Borehole dry upon completion

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:04 AM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By:	**Joshua Long**	Date:	**19-Jul-17**	Checked By:	**Stephen McCormack** Date: **19-JUL-17**

Monitoring Well Log Report

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Hole ID. **BH202**
Hole Depth: **1.80 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: concrete				
CC							FILL- Concrete, 150mm.				
Hand Auger					SP	Fill	FILL- Gravelly Sand, brown, fine to coarse grained, with fine to coarse gravel (including concrete fragments and plastic).	loose	moist	JL190717-06 / 07 0.25-0.35m	
		1.0			SP	Fill	FILL- Sand, pale brown, fine to coarse grained, with clumps of brown silty clay present.	loose	moist	JL190717-08 0.60-0.70m	
					CL	Fill	FILL- Silty Clay, dark brown, low to medium plasticity, with fine to coarse sand and fine to coarse gravel.	firm to stiff	moist	JL190717-09 1.10-1.20m	
					CL	Natural	**Sandy CLAY**- dark grey, low plasticity, fine to coarse grained. becoming pale brown from 1.5m.	firm to stiff	moist	JL190717-10 1.40-1.50m	
		2.0					**Hole Terminated at 1.80m** Target Depth Reached				Borehole dry upon completion

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:05 AM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

Borehole Log Report

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Hole ID.	**BH203**
Hole Depth:	**1.20 m**
Sheet:	**1 of 1**

Project Name:	**Contamination Assessment**	Project Number:	**E16016BN**
Location / Site:	**307-311 Bexley Rd & 88-96 New Illawarra Rd**	Client:	**Tony Soueid**

Drilling Company:	**GEE**	Date Started:	**19-JUL-17**	Ground Level:	----------
Drill Method:	**Hand Auger**	Date Completed:	**19-JUL-17**	Easting:	----------
Equipment:	**Manual**			Northing:	----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: concrete				
CC							FILL- Concrete, 90mm.				
Hand Auger					SM	Fill	FILL- Silty Sand, dark brown, fine to medium grained.	loose	moist	JL190717-11 0.15-0.25m	
		1.0			SC	Natural	**Clayey SAND**- brown / yellow-brown, fine to coarse grained.	loose to medium dense	moist	JL190717-12 0.70-0.80m JL190717-13 1.10-1.20m	
		2.0					**Hole Terminated at 1.20m** Target Depth Reached				Borehole dry upon completion

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments

No adverse odour or staining and no obvious ACM.

Logged By:	**Joshua Long**	Date:	**19-Jul-17**	Checked By:	**Stephen McCormack** Date: **19-JUL-17**

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:06 AM

Borehole Log Report

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Hole ID. **BH204**
Hole Depth: **0.70 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: concrete				
CC							FILL- Concrete, 150mm.				
Solid Flight Auger					CL	Fill	FILL- Silty Clay, dark grey / dark brown, low plasticity, with fine to coarse sand and fine to coarse gravel (including large concrete and brick fragments).	firm to stiff	moist	JL190717-14 0.20-0.30m JL190717-15 0.60-0.70m	
		1.0 2.0					**Practical Hand Auger Refusal at 0.70m** Caused by large large obstructions within fill layer				Borehole dry upon completion.

Moisture		Additional Comments
D	Dry	No adverse odour or staining and no obvious ACM.
Dp	Damp	
SM	Slightly Moist	
M	Moist	
VM	Very Moist	
W	Wet	
Sd	Saturated	

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:07 AM

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Hole ID. **BH205**
Hole Depth: **1.00 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: grass				
Hand Auger					SM	Fill	**TOPSOIL/FILL**- Silty Sand, dark brown, fine to coarse grained, with fine to coarse gravel (including crushed sandstone).	loose	moist	JL190717-16 / 17 0.05-0.15m	
		1.0			CL	Natural	**Sandy CLAY**- light grey, low plasticity, fine to coarse grained. becoming orange-brown from 0.8m.	firm to stiff	moist	JL190717-18 0.60-0.70m	
		2.0					**Hole Terminated at 1.00m** Target Depth Reached				Borehole dry upon completion.

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:08 AM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

Borehole Log Report

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Lane Cove NSW 2066
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Hole ID. **BH206**
Hole Depth: **1.10 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: grass				
Hand Auger					SM	Fill	**TOPSOIL/FILL**- Silty Sand, dark brown, fine to coarse grained, with fine to coarse gravel.	loose	moist	JL190717-19 0.05-0.15m	
					SP	Natural	**SAND**- pale grey, fine to coarse grained, with clay.	loose to medium dense	moist	JL190717-20 0.70-0.80m	
		1.0			CL		**Sandy CLAY**- pale orange-brown, fine to coarse grained.	firm to stiff	moist		
							Hole Terminated at 1.10m Target Depth Reached				Borehole dry upon completion.
		2.0									

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:09 AM

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

Monitoring Well Log Report

Geo Environmental Engineering Pty Ltd
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Hole ID. **BH207**
Hole Depth: **1.00 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: grass				
Hand Auger					ML	Fill	**TOPSOIL**- Clayey Silt, dark brown, low plasticity, with fine to medium grained sand and a trace of fine to coarse gravel.	firm	moist	JL190717-21 0.05-0.15m	
					CL	Natural	**Sandy CLAY**- pale grey-brown, low plasticity, fine to coarse grained.	firm to stiff	moist	JL190717-22 0.50-0.60m	
							becoming pale orange-brown from 0.7m.				
		1.0					becoming pale grey / orange-brown / red-brown with fine to coarse ironstone gravel from 0.9m.			JL190717-23 0.90-1.00m	
							Hole Terminated at 1.00m Target Depth Reached				Borehole dry upon completion
		2.0									

Moisture		Additional Comments
D	Dry	No adverse odour or staining and no obvious ACM.
Dp	Damp	
SM	Slightly Moist	
M	Moist	
VM	Very Moist	
W	Wet	
Sd	Saturated	

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:10 AM

Borehole Log Report

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Hole ID. **BH208**
Hole Depth: **1.00 m**
Sheet: **1 of 1**

Project Name: **Contamination Assessment** Project Number: **E16016BN**
Location / Site: **307-311 Bexley Rd & 88-96 New Illawarra Rd** Client: **Tony Soueid**

Drilling Company: **GEE** Date Started: **19-JUL-17** Ground Level: ----------
Drill Method: **Hand Auger** Date Completed: **19-JUL-17** Easting: ----------
Equipment: **Manual** Northing: ----------

Method	Water Level	Depth (m)	RL (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Consistency / Density	Moisture	Samples / Tests ID No.	Observations / Comments
							Surface: grass				
Hand Auger					ML	Fill	**TOPSOIL**- Clayey Silt, dark brown, low plasticity, with fine to medium grained sand and a trace of fine to coarse gravel.	firm	moist	JL190717-24 / 25 0.05-0.15m	
		1.0			CL	Natural	**Sandy CLAY**- brown / orange-brown, low plasticity, fine to coarse grained. becoming grey / red-brown / orange-brown with fine to coarse ironstone gravel from 1.0m.	firm to stiff	moist	JL190717-26 0.50-0.60m	
		2.0					**Hole Terminated at 1.00m** Target Depth Reached				Borehole dry upon completion

Moisture	
D	Dry
Dp	Damp
SM	Slightly Moist
M	Moist
VM	Very Moist
W	Wet
Sd	Saturated

Additional Comments
No adverse odour or staining and no obvious ACM.

Logged By: **Joshua Long** Date: **19-Jul-17** Checked By: **Stephen McCormack** Date: **19-JUL-17**

GEE DAVIES BH LOG BEXLEY NORTH STAGE 2 EXTRA.GPJ GEE.GDT 28-7-17 8:11:10 AM

Geo Environmental Engineering
82 Bridge Street
Lane Cove NSW 2066
E info@geoenvironmental.com.au

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Log Report Legend

MATERIAL SYMBOL

FILL
CONCRETE
ASPHALT
TOPSOIL
ORGANICS
ESTUARINE MUD

CLAY	SAND	SILT	GRAVEL
Sandy CLAY	Clayey SAND	Clayey SILT	Clayey GRAVEL
Silty CLAY	Silty SAND	Sandy SILT	Sandy GRAVEL
Gravelly CLAY	Gravelly SAND	Gravelly SILT	Silty GRAVEL
CLAY & SAND	SAND & CLAY	SILT & CLAY	GRAVEL & CLAY
CLAY & SILT	SAND & SILT	SILT & SAND	GRAVEL & SAND
CLAY & GRAVEL	SAND & GRAVEL	SILT & GRAVEL	GRAVEL & SILT
Sandy Silty CLAY	Clayey Silty SAND	Sandy Clayey SILT	Sandy Clayey GRAVEL
Silty Sandy CLAY	Silty Clayey SAND	Clayey Sandy SILT	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Clayey Gravelly SAND	Sandy Gravelly SILT	Silty Clayey GRAVEL
Silty Gravelly CLAY	Silty Gravelly SAND	Clayey Gravelly SILT	Clayey Silty GRAVEL
Gravelly Silty CLAY	Gravelly Silty SAND	Gravelly Clayey SILT	Sandy Silty GRAVEL
Gravelly Sandy CLAY	Gravelly Clayey SAND	Gravelly Sandy SILT	Silty Sandy GRAVEL

SANDSTONE	SHALE	GRANITE	BASALT	SHALE / SANDSTONE
PORCELLANITE	GNEISS	SHALE / CLAYSTONE	MUDSTONE	
CLAYSTONE	MUDSTONE / CLAYSTONE	SHALE / SILTSTONE	IRONSTONE	

WATER LEVELS

Encountered Water
Standing Water

ABBREVIATIONS

PT	Pushtube
SFA	Solid Flight Auger
PWS	Percussion Window Sampler
HA	Hand Auger
HFA	Hollow Flight Auger

WELL GRAPHICS

Cuttings
Bentonite
Screen
Gravel Pack
Grout
Cave-in

GEE LEGEND * * 29/10/09 5:04:07 PM

APPENDIX G

FIELD DATA SHEETS

E16016BN-R03F

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GROUNDWATER SAMPLING FIELD DATA

WELL ID: GW01

PROJECT INFORMATION

PROJECT NAME: Stage 2 ESA PROJECT NUMBER: E16016BN

LOCATION / SITE: Bexley North Metro Petrol CLIENT:

WELL DETAILS

WELL DIAMETER (mm): 50 | WELL SCREEN INTERVAL (m): | CASING STICK UP (+) / DOWN (-) m:

CONDITION (Comments Below): Damage: YES (NO) Well Locked: (YES) NO Water Around Well: YES (NO)
Well ID Visible: YES (NO) Cap on PVC: (YES) NO Water Between PVC and Gatic/ Monument: YES (NO)

WELL MEASUREMENTS

STATIC WATER LEVEL (SWL): 2.21 m BTOC or (m BGL) or m BTOM

FREE PRODUCT: Yes or (No) Thickness (m):

TOTAL DEPTH OF WELL (TD): 2.69 m BTOC or (m BGL) or m BTOM

PURGING DETAILS / OBSERVATIONS

METHOD: Bladder Pump Peristaltic High Volume Pump (Foot Valve) Bailer Other:

DATE: 11/11/16 WATER LEVEL AFTER PURGE: Dry mBTOC / mBGL / mBTOM

MAX. DRAWDOWN (m) INTAKE DEPTH: mBTOC / mBGL / mBTOM

TIME	CUMUL. VOLUME PURGED (Litres)	PURGE RATE	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
Equilibrium Requirements			± 10 %	± 3 %	± 0.05	± 10	± 0.2	—
10:10	5L							

RECHARGE OBSERVATIONS

Slow (80% recharge > 2 Hours) | Fast (80% recharge < 2 Hours)

SAMPLING DETAILS

METHOD: Bladder Pump Peristaltic High Volume Pump (Foot Valve) Bailer Other:

DATE & TIME: 11/11/16 15:15 WATER LEVEL (m) 2.29 mBTOC / mBGL / mBTOM

SAMPLE ID: ACM1116-03 Blind Replicate ID: Split Duplicate ID:

FINAL WATER QUALITY READINGS:	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
	0.67	685	6.18	-107.5	21.7	

DESCRIPTION: Colour red brown Turbidity: high Odour: hydrocarbon Other slight

PURGE VOLUME CALCULATOR: Length of Water Column (m) = TD (m) – SWL (m) = _____
One Well Volumes (L) = Length of Water Column x 2 (50mm Dia.) or 7.8 (100mm Dia.) = _____
Three Well Volumes (L) = _____

NOTES: m BTOC = metres Below Top of Casing / m BGS = metres Below Ground Surface / m BTOM = metres Below Top of Monument
hydrocarbon odour noted during purge

GEE PERSONNEL: ~~S. McCormack~~ A. Owen SIGNATURE:

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GROUNDWATER SAMPLING FIELD DATA

WELL ID: GW02

PROJECT INFORMATION

PROJECT NAME: Stage 2 ESA PROJECT NUMBER: E160/6BN

LOCATION / SITE: Bexley North Metro Petrol CLIENT:

WELL DETAILS

WELL DIAMETER (mm): 50 | WELL SCREEN INTERVAL (m): | CASING STICK UP (+) / DOWN (-) m:

CONDITION (Comments Below): Damage: YES / (NO) Well Locked: (YES) / NO Water Around Well: YES / (NO)

Well ID Visible: YES / (NO) Cap on PVC: (YES) / NO Water Between PVC and Gatic/ Monument: YES / (NO)

WELL MEASUREMENTS

STATIC WATER LEVEL (SWL): 2.13 m BTOC or (m BGL) or m BTOM

FREE PRODUCT: Yes or (No) Thickness (m):

TOTAL DEPTH OF WELL (TD): 2.94 m BTOC or (m BGL) or m BTOM

PURGING DETAILS / OBSERVATIONS

METHOD: Bladder Pump Penstaltic High Volume Pump (Foot Valve) Bailer Other:

DATE: WATER LEVEL AFTER PURGE: DRY mBTOC / mBGL / mBTOM

MAX. DRAWDOWN (m): INTAKE DEPTH: mBTOC / mBGL / mBTOM

TIME	CUMUL. VOLUME PURGED (Litres)	PURGE RATE	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
Equilibrium Requirements			± 10 %	± 3 %	± 0.05	± 10	± 0.2	–
10:20	2L							

RECHARGE OBSERVATIONS

Slow (80% recharge > 2 Hours) | Fast (80% recharge < 2 Hours)

SAMPLING DETAILS

METHOD: Bladder Pump Penstaltic High Volume Pump (Foot Valve) Bailer Other:

DATE & TIME: 11/11/16 15:30 WATER LEVEL (m) 2.15 mBTOC / (mBGL) / mBTOM

SAMPLE ID: AC111116-04 Blind Replicate ID: Split Duplicate ID:

FINAL WATER QUALITY READINGS:	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
	1.06	620	6.09	-80.3	22.5	

DESCRIPTION: Colour: green-grey Turbidity: moderate Odour: hydrocarb (slight) Other:

PURGE VOLUME CALCULATOR: Length of Water Column (m) = TD (m) – SWL (m) = _____

One Well Volumes (L) = Length of Water Column x 2 (50mm Dia.) or 7.8 (100mm Dia.) = _____

Three Well Volumes (L) = _____

NOTES: m BTOC = metres Below Top of Casing / m BGS = metres Below Ground Surface / m BTOM = metres Below Top of Monument

GEE PERSONNEL: S. McCormack A. Chiem SIGNATURE:

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GROUNDWATER SAMPLING FIELD DATA

WELL ID: BH102

PROJECT INFORMATION

PROJECT NAME: Stage 2 ESA PROJECT NUMBER: E16016BN

LOCATION / SITE: Bexley North Metro Petrol CLIENT:

WELL DETAILS

WELL DIAMETER (mm): 50 | WELL SCREEN INTERVAL (m): | CASING STICK UP (+) / DOWN (-) m:

CONDITION (Comments Below): Damage: YES / (NO) | Well Locked: (YES) / NO | Water Around Well: YES / (NO)

Well ID Visible: YES / (NO) | Cap on PVC: (YES) / NO | Water Between PVC and Gatic/ Monument: (YES) / NO

WELL MEASUREMENTS

STATIC WATER LEVEL (SWL): 1.28 m BTOC or (m BGL) or m BTOM

FREE PRODUCT: Yes or (No) Thickness (m):

TOTAL DEPTH OF WELL (TD): 2.20 m BTOC or (m BGL) or m BTOM

PURGING DETAILS / OBSERVATIONS

METHOD: Bladder Pump Peristaltic High Volume Pump (Foot Valve) Bailer Other:

DATE: 11/11/16 WATER LEVEL AFTER PURGE: DRY mBTOC / mBGL / mBTOM

MAX. DRAWDOWN (m) INTAKE DEPTH: mBTOC / mBGL / mBTOM

TIME	CUMUL. VOLUME PURGED (Litres)	PURGE RATE	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
Equilibrium Requirements			± 10 %	± 3 %	± 0.05	± 10	± 0.2	–
10:45	5L							

RECHARGE OBSERVATIONS

Slow (80% recharge > 2 Hours) | Fast (80% recharge < 2 Hours)

SAMPLING DETAILS

METHOD: Bladder Pump Peristaltic High Volume Pump (Foot Valve) Bailer Other:

DATE & TIME: 11/11/16 15:50 WATER LEVEL (m): 1.29 mBTOC / (mBGL) / mBTOM

SAMPLE ID: AC111116-06 Blind Replicate ID: Split Duplicate ID:

FINAL WATER QUALITY READINGS:	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP. (°C)	TURB. (NTUs)
	1.60	1048	5.86	-55.3	22.0	

DESCRIPTION: Colour: Grey-brown Turbidity: Slight Odour: None Other:

PURGE VOLUME CALCULATOR: Length of Water Column (m) = TD (m) – SWL (m) = _____

One Well Volumes (L) = Length of Water Column x 2 (50mm Dia.) or 7.8 (100mm Dia.) = _____

Three Well Volumes (L) = _____

NOTES: m BTOC = metres Below Top of Casing / m BGS = metres Below Ground Surface / m BTOM = metres Below Top of Monument

GEE PERSONNEL: ~~S. McCormack~~ A Chiem SIGNATURE:

GROUNDWATER SAMPLING FIELD DATA

WELL ID: BH105

PROJECT INFORMATION

PROJECT NAME: Stage 2 ESA | PROJECT NUMBER: E16016BN

LOCATION / SITE: Bexley North | CLIENT: ~~Bexley~~ Metro Petrol.

WELL DETAILS

WELL DIAMETER (mm): 50 | WELL SCREEN INTERVAL (m): | CASING STICK UP (+) / DOWN (-) m:

CONDITION (Comments Below): Damage: YES / (NO) | Well Locked: (YES) / NO | Water Around Well: YES / (NO)

Well ID Visible: YES / (NO) | Cap on PVC: (YES) / NO | Water Between PVC and Gatic/ Monument: YES / (NO)

WELL MEASUREMENTS

STATIC WATER LEVEL (SWL): DRY | m BTOC or m BGL or m BTOM

FREE PRODUCT: Yes or (No) | Thickness (m):

TOTAL DEPTH OF WELL (TD): 2.21 | m BTOC (or) m BGL or m BTOM

PURGING DETAILS / OBSERVATIONS

METHOD: Bladder Pump Peristaltic High Volume Pump Foot Valve Bailer Other:

DATE: | WATER LEVEL AFTER PURGE: | mBTOC / mBGL / ~~mBTOM~~

MAX. DRAWDOWN (m) | INTAKE DEPTH: | ~~mBTOC~~ / mBGL / mBTOM

TIME	CUMUL. VOLUME PURGED (Litres)	PURGE RATE	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP (°C)	TURB. (NTUs)
Equilibrium Requirements			± 10 %	± 3 %	± 0.05	± 10	± 0.2	–

RECHARGE OBSERVATIONS

Slow (80% recharge > 2 Hours) | Fast (80% recharge < 2 Hours)

SAMPLING DETAILS

METHOD: Bladder Pump Peristaltic High Volume Pump Foot Valve Bailer Other:

DATE & TIME: | WATER LEVEL (m) | mBTOC / mBGL / mBTOM

SAMPLE ID: | Blind Replicate ID: | Split Duplicate ID:

FINAL WATER QUALITY READINGS:	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP (°C)	TURB. (NTUs)

DESCRIPTION: Colour Turbidity Odour Other

PURGE VOLUME CALCULATOR: Length of Water Column (m) = TD (m) – SWL (m) = _____

One Well Volumes (L) = Length of Water Column x 2 (50mm Dia.) or 7.8 (100mm Dia.) = _____

Three Well Volumes (L) = _____

NOTES: m BTOC = metres Below Top of Casing / m BGS = metres Below Ground Surface / m BTOM = metres Below Top of Monument

GEE PERSONNEL: ~~S. McCormack~~ A-Cheim | SIGNATURE:

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GROUNDWATER SAMPLING FIELD DATA

WELL ID: BH107

PROJECT INFORMATION

PROJECT NAME: Stage 2 ESA PROJECT NUMBER: E16016BN

LOCATION / SITE: Bexley North CLIENT: Metro Petrol

WELL DETAILS

WELL DIAMETER (mm): 50 | WELL SCREEN INTERVAL (m): | CASING STICK UP (+) / DOWN (-) m:

CONDITION (Comments Below): Damage: YES (NO) | Well Locked: YES (NO) | Water Around Well: YES / NO

Well ID Visible: YES / NO | Cap on PVC: (YES) / NO | Water Between PVC and Gatic/ Monument: YES (NO)

WELL MEASUREMENTS

STATIC WATER LEVEL (SWL): 1.78 m BTOC or (m BGL) or m BTOM

FREE PRODUCT: Yes or (No) Thickness (m):

TOTAL DEPTH OF WELL (TD): 2.78 m BTOC or (m BGL) or m BTOM

PURGING DETAILS / OBSERVATIONS

METHOD: Bladder Pump Penstaltic High Volume Pump (Foot Valve) Bailer Other:

DATE: 11/11/16 WATER LEVEL AFTER PURGE: DRY mBTOC / mBGL / mBTOM

MAX. DRAWDOWN (m) INTAKE DEPTH: mBTOC / mBGL / mBTOM

TIME	CUMUL VOLUME PURGED (Litres)	PURGE RATE	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP (°C)	TURB. (NTUs)
Equilibrium Requirements			± 10 %	± 3 %	± 0.05	± 10	± 0.2	–
10:00	3L							

RECHARGE OBSERVATIONS

Slow (80% recharge > 2 Hours) | Fast (80% recharge < 2 Hours)

SAMPLING DETAILS

METHOD: Bladder Pump Peristaltic High Volume Pump Foot Valve Bailer Other:

DATE & TIME: 11/11/16 15:00 WATER LEVEL (m): 1.75 mBTOC / mBGL / mBTOM

SAMPLE ID: AC111116-01 Blind Replicate ID: ~~AC01~~ AC111116-02

Split Duplicate ID:

FINAL WATER QUALITY READINGS:	DO (mg/L)	E.C. mS/cm or µS/cm	pH (standard units)	Redox (mV)	TEMP (°C)	TURB. (NTUs)
	2.42	1093	4.88	-91.0	22.5	

DESCRIPTION: Colour: brown Turbidity: moderate Odour: none Other

PURGE VOLUME CALCULATOR: Length of Water Column (m) = TD (m) – SWL (m) = _____

One Well Volumes (L) = Length of Water Column x 2 (50mm Dia.) or 7.8 (100mm Dia.) = _____

Three Well Volumes (L) = _____

NOTES: m BTOC = metres Below Top of Casing / m BGS = metres Below Ground Surface / m BTOM = metres Below Top of Monument

GEE PERSONNEL: ~~C. McCormack~~ A. Clwem SIGNATURE:

APPENDIX H

QUALITY ASSURANCE ASSESSMENT REPORT

E16016BN-R03F

H1. INTRODUCTION

A detailed Quality Assurance (QA) assessment, including the analysis of Quality Control (QC) samples, was carried out by GEE to determine the reliability of field procedures and analytical results.

H2. QUALITY ASSURANCE

Quality Assurance (QA) involves all of the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples and accuracy and reliability of analysis results (reference 1).

In accordance with AS4482.1 (reference 2) and AS5667.1 (reference 3), a series of QA procedures were integrated within the sampling and analysis plan and included:

- The collection of Quality Control (QC) samples.
- The use of standardised field sampling forms developed by GEE.
- Documentation of calibration and use of field instruments.

To ensure QA in the field, samples were collected by experienced and trained personnel using appropriate methods detailed herein, including appropriate sample handling, containment and transport, and calibrated equipment. Additionally QC samples were collected and analysed as discussed in Section H3.

To ensure QA in the laboratory, GEE used laboratories that are NATA accredited for the analytical tests carried out, therefore it is reasonable for GEE to rely on the laboratories to be proficient in all tests conducted. This encompasses all actions, procedures, checks and decisions undertaken, to ensure the accuracy and reliability of the analysis results. As part of the laboratory QA, QC samples were analysed with each batch of samples as part of this investigation as required by NATA. A discussion of the laboratory QC samples analysed as part of this investigation is provided in Section H3.3.2.

H3. QUALITY CONTROL

QC involves those parts of QA which serve to monitor and measure the effectiveness of QA procedures. QC samples assess sample integrity, accuracy and precision and can be separated into field and laboratory QC.

H3.1 DEFINITIONS

Table H1 provides a description and objective of each of the field and laboratory QC samples used during this investigation.

Table H1: QC Sample Types, Descriptions and Recommended Frequency of Analysis

Type	Description	Purpose	Recommended Frequency
	FIELD QC SAMPLES		
Blind Replicate	A sample collected at the same time and from the same sampling point as the corresponding primary sample[1], and analysed at the same laboratory. Blind replicates are collected, preserved, stored, transported and analysed in the same manner as the primary sample, with the laboratory having no knowledge of the source of the replicate sample. The assessment of blind replicates samples is undertaken by calculating the Relative Percent Difference (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1 – Result No. 2}}{\text{Mean Result}}$	Used to evaluate total sampling and analysis precision and, in the case of soil samples, sample variability.	In accordance with AS4482.1 (reference 2) and NEPM (reference 4) it is recommended that 1 blind replicate sample is collected for every 20 primary samples.
Split Duplicate	A sample collected at the same time and from the same sampling point as the corresponding primary sample, and analysed at a separate laboratory. Split duplicates are collected, preserved, stored, transported and analysed in the same manner as the primary sample, with the laboratories having no knowledge of the purpose of the sample. The assessment of split duplicates samples is undertaken by calculating the Relative Percent Difference (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1 – Result No. 2}}{\text{Mean Result}}$	Used to provide a check on the analytical proficiency of the laboratories and hence precision and comparability.	In accordance with AS4482.1 (reference 2) and NEPM (reference 4) it is recommended that 1 split duplicate sample is collected for every 20 primary samples.
Trip Blank	Trip blanks are laboratory supplied test samples of analyte-free media (either washed sand or de-ionised water) which remain in the sample storage eskies during sampling activities and returned to the laboratory unopened. For soil sampling programmes, the trip blank consists of acid-washed quartz sand that has been heated to 400ºC. For water sampling programs trip blanks comprise pre-washed glass vials containing distilled or de-ionised water with appropriate preservatives. The USEPA has shown that cross-contamination only occurs with volatile organics (reference 5), therefore, trip blanks are only analysed for volatile organics.	Used to measure cross-contamination during sampling, transport, sample preparation and analysis.	Industry standard is 1 trip blank per batch of primary samples.

[1] Primary samples are the original representative samples of soil or groundwater collected for analysis to determine aspects of their chemical composition. Primary samples are the original sample taken from a particular location and other samples from the same location are duplicates, replicates or splits.

Trip Spike	Trip spikes, like trip blanks, are supplied by the primary laboratory using analyte-free media (either washed sand or de-ionised water) and remain in the sample storage eskies during sampling activities and returned to the laboratory unopened. The sample media, however, is spiked with BTEX. For water sampling programmes the BTEX concentration is known and standardised by each laboratory, while for soil sampling programmes the exact spike concentration is not known, rather two identical jars of sand are spiked the same concentration with one sample becoming the trip-spike and the other becoming a control sample, which remains in a refrigerator at the laboratory. The trip spike is analysed after returning from the field and the % recovery of the known spike (for water sampling programs), or of the control sample (for soil sampling programs), is calculated.	Used to monitor VOC losses during transit.	Industry standard is 1 trip spike per batch of primary samples where volatile concentrations are being measured.

Table H1 Continued

Type	Description	Purpose	Recommended Frequency
	LABORATORY QC SAMPLES		
Laboratory Duplicate	Laboratory duplicates are field samples which are prepared and analysed in the same manner twice. The assessment of laboratory duplicates is undertaken by calculating the (RPD) which is defined as: $RPD\ (\%) = 100 \times \frac{\text{Result No. 1 – Result No. 2}}{\text{Mean Result}}$	Determines analytical precision for a sample batch	NATA specifies 1 per 10 samples for trace element and inorganic analysis
Laboratory Control Sample (LCS)	Laboratory Control Samples (LCS) are analyte-free matrices (de-ionised water or clean sand) spiked with a known concentration of target analytes and carried through the entire preparation and analysis. Assessment of LCS is undertaken by calculating the percent recovery (%R) of the spike which is defined as: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spikes Sample Result (SSR) – Sample Result (SR)}}{\text{Concentration of Spike Added (SA)}}$	Determines analytical accuracy and precision for a batch of samples	NATA specifies 1 per batch of up to 20 samples
Surrogates	Surrogates are organic compounds added to field samples and laboratory QC samples prior to preparation. They are similar in chemical behaviour to the target analytes and are not expected to be present in samples (reference 6). They form part of the laboratory QC for organic analyses, and are used to indicate the presence of sample specific interferences. The surrogate is added at the extraction stage then analysed with the batch of samples. Like LCSs, surrogates are assessed by calculating the percent recovery (%R), although the definition is slightly different as shown below: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spiked Sample Result (SSR)}}{\text{Concentration of Spike Added (SA)}}$	Used to demonstrate that the surrogate does not interfere with the target analytes, therefore determines analytical accuracy for each sample	Added to every blank, field and laboratory QC sample

Matrix Spikes	Field samples spiked with a known concentration of a target analytes and carried through the entire preparation and analysis. Matrix spike samples are assessed by calculating the percent recovery (%R) of the spike which is defined as: $\text{Percent Recovery (\%R)} = 100 \times \frac{\text{Spikes Sample Result (SSR)} - \text{Sample Result (SR)}}{\text{Concentration of Spike Added (SA)}}$	Determine the effects of matrix interferences on analytical accuracy of a sample.	Performed at least 1 per batch of up to 20 samples.
Method Blank	Method blanks are an analyte-free matrices (reagent water or clean sand) that is carried through the entire preparation and analysis.	Establishes that laboratory contamination does not cause false positives.	Prepared with every batch of up to 20 samples for all organic and inorganic analyses.

H3.2 CRITERIA / ACCEPTABLE RANGE

The QC Acceptance Criteria adopted for this investigation is provided in Table H2 and is in general accordance with the Table 4 of AS4482.1 (reference 2) and NEPM (reference 4).

Table H2: QC Sample Acceptance Criteria

QC Sample	Criteria / Acceptable Range
FIELD QC SAMPLES	
Blind Replicate & Split Duplicate	RPD < 50 % When average concentration is > 10 x LOR/PQL[2] RPD < 75 % When average concentration is 5 to 10 x LOR/PQL RPD < 100 % When average concentration is< 5 x LOR/PQL
Trip Blank	Analytical Result < LOR/PQL
Trip Spike	± 30%
LABORATORY QC SAMPLES	
Laboratory Duplicates	RPD < 30 % When average concentration is > 10 x LOR/PQL RPD < 50 % When average concentration is 4 to 10 x LOR/PQL RPD < 100 % When average concentration is< 4 x LOR/PQL
Laboratory Control Samples	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs) %R of 62 – 130% (Chromium)
Surrogates	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs)
Matrix Spikes	%R of 70 – 130% (General analytes) %R of 50 – 130% (Phenols) %R of 60 – 130% (OCP/OPPs) %R of 62 – 130% (Chromium)
Method Blanks	Analytical Results < LOR/PQL

If data do not meet the QC Acceptance Criteria then a judgement is made as to whether the exceedance is critical in relation to the suitability of the data set. Otherwise the following steps will be taken:

- ◊ Request that the laboratory re-check or even re-analyse the sample.
- ◊ Inspect the sample for anomalies which may be causing the failure.
- ◊ If necessary, undertake additional sampling and analyses.

[2] Both the LOR and PQL are interchangeable terms used by laboratories and is defined as the lowest concentration that can be reliably achieved within specific limits of precision and accuracy during routine laboratory operating conditions (reference 6).

H3.3 RESULTS

H3.3.1 Field QC Samples

Field QC samples collected and analysed as part of this investigation comprised:

Soil Sampling

- Two blind replicates (SM011116-10 and JL190717-07)
- One split duplicate (SM011116-12)
- One trip blank (labelled 'trip blank')
- One trip spike (labelled 'trip spike')

Water Sampling

- One duplicate (AC111116-02)
- One trip blank (labelled 'trip blank')
- One trip spike (labelled 'trip spike')

A split duplicate sample was not collected during the groundwater sampling event due to the small number of samples analysed.

Tabulated results are presented at the conclusion of this Appendix. Table H3 and H4 provides a summary of the frequency of QC samples and lists results which do not meet the criteria established in Table H2.

Table H3: QC Sample Acceptance Criteria - Soil

Type	Frequency Conducted	Results Not Meeting the Criteria
Blind Replicates	Metals - 1 per 22 primary samples (4.5%)	Zinc (SM011116-10)
	TRH/BTEX - 1 per 17 primary samples (6.7%)	--
	PAHs - 1 per 13 primary samples (7.7%)	--
	OCPs / PCBs – 1 per 10 primary samples (10%)	--
Split Duplicate	Metals - 1 per 21 primary samples (4.5%)	Arsenic, Chromium, Copper, Lead, Nickel
	TRH/BTEX - 1 per 17 primary samples (6.67%)	--
	PAHs - 1 per 16 primary samples (6.2%)	--
Trip Blank	1 per sample batch	--
Trip Spike	1 per sample batch	--

Table H4: QC Sample Acceptance Criteria - Water

Type	Frequency Conducted	Results Not Meeting the Criteria
Blind replicate	Metals - 1 per 5 primary samples (20%)	--
	TRH/BTEX - 1 per 5 primary samples (20%)	--
	PAHs - 1 per 5 primary samples (20%)	--
	Phenols - 1 per 5 primary samples (20%)	--
	Hardness - 1 per 5 primary samples (20%)	--
Trip Blank	1 per sample batch	--
Trip Spike	1 per sample batch	--

The quality control results all conformed to the sample acceptance criteria except for some metals in the blind replicate and split duplicates. The elevated RPD for these metals is attributed to the heterogeneous fill at this location and is not considered to be a reflection of laboratory inaccuracy. Notwithstanding this, GEE has adopted the highest least concentration when making decisions about the suitability of the site.

H3.3.2 Laboratory QC

Laboratory QC results are provided in the laboratory reports while a summary of the results which exceeded the acceptance criteria is provided in Table H5.

Table H5: QC Sample Acceptance Criteria

Type	Results Exceeding Criteria
Laboratory Duplicates	--
Laboratory Control Samples	--
Surrogates	--
Matrix Spikes	--
Method Blanks	--

The laboratory RPD acceptance criteria were considered acceptable.

H4. DATA QUALITY ASSESSMENT

In accordance with reference 7, Data Quality Indicators (DQIs), specifically, precision, accuracy, representativeness, completeness and comparability, were used to assess the reliability of field procedures and analytical results.

H4.1 PRECISION

This is the measure of the variability (or reproducibility) of the data. In the field precision is achieved by using standard operating procedures which were adopted by GEE during this investigation. For laboratory analysis precision is assessed using blind replicates and trip spikes. The measured RPDs for the blind replicate samples and split samples were considered acceptable as were the analytical results for the trip spike.

H4.2 ACCURACY

Accuracy is a measure of the closeness of a measurement to the true parameter value. In the field, accuracy is achieved by using standard operating procedures which were adopted by GEE. For laboratory analysis, accuracy is assessed using tip blanks, rinsate blanks, method blanks, matrix spikes, surrogates and laboratory control samples. Considering that these QC samples were of an acceptable standard, GEE considers the laboratory data set to be accurate.

H4.3 REPRESENTATIVENESS

This is the confidence (expressed qualitatively) that the data are representative of each media present on the site. This is achieved in the field and laboratory by using an adequate number of sampling points to characterise the site and ensuring that the samples collected were representative of the media from which they were collected. Additionally, samples should be analysed within necessary holding times depending on the analyte.

Environmental soil samples were collected from each borehole in general accordance with techniques described in Australian Standards AS4482.1 (reference 2), AS4482.2 (reference 8) and NEPM (reference 1), to maintain the representativeness and integrity of the samples. The number of sampling points exceeded the minimum required sampling density as defined by NSW EPA (reference 9), however, were considered sufficient for the purpose of this investigation.

The groundwater samples were collected in a manner consistent with the collection, handling and preservation principles enunciated in AS/NZS 5667.1:1998 (reference 3) and more specifically the procedures outlined AS/NZS 5667.11:1998 (reference 10) and USEPA's (1991) *Handbook: Groundwater – Volume II: Methodology* (reference 11), to maintain the representativeness and integrity of the samples.

Finally all samples were analysed within holding times.

H4.4 COMPLETENESS

This is a measure of whether all the data necessary to meet the project objectives, were collected. In the field and laboratory, this is achieved by sampling all critical locations and depths using acceptable methods and ensuring samples are analysed for appropriate chemicals.

GEE selected sufficient a sufficient number of sample points for the purpose of the investigation as defined by the NSW EPA (reference 9) and collected groundwater samples from all available monitoring wells on the site. Additionally, samples were analysed for chemicals of concern based on appropriate field screening measures and logging of unusual aesthetics which may indicate contamination. Combined with the fact that standard operating procedures were adopted by GEE, the investigation is assessed as being complete.

H4.5 COMPARABILITY

This is a measure of confidence that data may be considered to be equivalent for each sampling and analysis event. Soil samples were collected by experienced GEE personnel using standard operating procedures and analysed in accordance with NATA accredited laboratory methods. The comparability of the data should be consistent as sampling protocols were employed throughout the duration of the fieldwork and analysis was undertaken by NATA registered laboratories using accredited analytical methods.

H5. CONCLUSION

A review of the DQIs indicates that the field procedures and analytical results adopted for this investigation are able to be relied upon for making conclusions and recommendations regarding the contamination status of the site.

References

1. *NEPC, 1999: National Environment Protection Council (1999). National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(2) Data Collection, Sample Design and Reporting.*
2. *Australian Standard AS4482.1 – 2005: Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds.*
3. *Australian / New Zealand Standard AS/NZS5667.1 – 1998: Water Quality – Sampling. Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*
4. *NEPC, 1999: National Environment Protection Council (1999). National Environment Protection (Assessment of Site Contamination) Measure. Schedule B(3) Guideline of Laboratory Analysis of Potentially contaminated Soils.*
5. *Keith, 1991: Environmental sampling and Analysis, A practical guide. Lewis Publishers.*
6. *Popek (2003). Sampling and Analysis of Environmental Chemical Pollutants. Academic Press.*
7. *NSW DEC (2006) Contaminated Sites: Guidelines for NSW Site Auditor Scheme, 2nd Edition.*
8. *Australian Standard AS4482.2 – 1999: Guide to the sampling and investigation of potentially contaminated soil Part 2: Volatile substances.*
9. *NSW EPA, 1995: Environment Protection Authority NSW, 1995: Contaminated Sites: Sampling Design Guidelines, EPA NSW.*
10. *Australian / New Zealand Standard AS/NZS5667.11 – 1998: Water Quality – Sampling. Part 1: Guidance on sampling of groundwaters.*
11. *US Environmental Protection Agency (USEPA), 1991: Handbook Groundwater Volume II: Groundwater.*

SOIL - Blind Replicate Results

Sample Date		01-11-16	01-11-16	RPD	19-07-17	19-07-17	RPD
Sample Identification		**SM011116-09**	**SM011116-10**		**JL190717-06**	**JL190717-17**	
Analyte	Units						
Total Metals							
Arsenic	mg/kg	9	12	29%	4	7	55%
Cadmium	mg/kg	<0.4	<0.4	--	<0.4	<0.4	--
Chromium	mg/kg	20	20	0%	22	16	32%
Copper	mg/kg	10	14	33%	24	29	19%
Lead	mg/kg	48	33	37%	9	12	29%
Mercury	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Nickel	mg/kg	3	4	29%	27	24	12%
Zinc	mg/kg	87	30	**97%**	30	39	26%
PCBs							--
Total PCBs	mg/kg	--	--	--	<0.1	<0.1	--
Organochlorine Pesticides (OCP)							--
HCB	mg/kg	--	--	--	<0.1	<0.1	--
alpha-BHC	mg/kg	--	--	--	<0.1	<0.1	--
gamma-BHC	mg/kg	--	--	--	<0.1	<0.1	--
beta-BHC	mg/kg	--	--	--	<0.1	<0.1	--
Heptachlor	mg/kg	--	--	--	<0.1	<0.1	--
delta-BHC	mg/kg	--	--	--	<0.1	<0.1	--
Aldrin	mg/kg	--	--	--	<0.1	<0.1	--
Heptachlor Epoxide	mg/kg	--	--	--	<0.1	<0.1	--
gamma-Chlordane	mg/kg	--	--	--	<0.1	<0.1	--
alpha-chlordane	mg/kg	--	--	--	<0.1	<0.1	--
Endosulfan I	mg/kg	--	--	--	<0.1	<0.1	--
pp-DDE	mg/kg	--	--	--	<0.1	<0.1	--
Dieldrin	mg/kg	--	--	--	<0.1	<0.1	--
Endrin	mg/kg	--	--	--	<0.1	<0.1	--
pp-DDD	mg/kg	--	--	--	<0.1	<0.1	--
Endosulfan II	mg/kg	--	--	--	<0.1	<0.1	--
pp-DDT	mg/kg	--	--	--	<0.1	<0.1	--
Endrin Aldehyde	mg/kg	--	--	--	<0.1	<0.1	--
Endosulfan Sulphate	mg/kg	--	--	--	<0.1	<0.1	--
Methoxychlor	mg/kg	--	--	--	<0.1	<0.1	--
Polycyclic Aromatic Hydrocarbons							
Naphthalene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Acenaphthylene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Acenaphthene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Fluorene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Phenanthrene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Anthracene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Fluoranthene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Pyrene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Benz(a)anthracene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Chrysene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Benzo(b&k)fluoranthene	mg/kg	<0.2	<0.2	--	<0.2	<0.2	--
Benzo(a)pyrene	mg/kg	<0.05	<0.05	--	<0.05	<0.05	--
Indeno(1.2.3.cd)pyrene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Dibenz(a.h)anthracene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
Benzo(g.h.i)perylene	mg/kg	<0.1	<0.1	--	<0.1	<0.1	--
TOTAL PAHs	mg/kg	NIL(+)VE	NIL(+)VE	--	NIL(+)VE	NIL(+)VE	--
BTEX							
Benzene	mg/kg	<0.2	<0.2	--	<0.2	<0.2	--
Toluene	mg/kg	<0.5	<0.5	--	<0.5	<0.5	--
Ethylbenzene	mg/kg	<1	<1	--	<1	<1	--
meta- & para-Xylene	mg/kg	<2	<2	--	<2	<2	--
ortho-Xylene	mg/kg	<1	<1	--	<1	<1	--
Total Petroleum Hydrocarbons							
F1 (C6-C10)	mg/kg	<25	<25	--	<25	<25	--
F2 (>C10-C16)	mg/kg	<50	<50	--	<50	<50	--
F3 (>C16-C34)	mg/kg	<100	<100	--	<100	<100	--
F4 (>C34-C40)	mg/kg	<100	<100	--	<100	<100	--

Values in Bold Indicate: RPD > 50 % When average concentration is > 10 x LOR
RPD > 75 % When average concentration is 5 to 10 x LOR
RPD > 100 % When average concentration is< 5 x LOR

SOIL - Split Replicate Results

	Sample Date	01-11-16	01-11-16	RPD
	Sample Identification	**SM011116-11**	**SM011116-12**	
Analyte	Units	Envirolab Services	Eurofins MGT	
Total Metals				
Arsenic	mg/kg	5	20	**120%**
Cadmium	mg/kg	<0.4	<0.4	--
Chromium	mg/kg	95	34	**95%**
Copper	mg/kg	38	17	**76%**
Lead	mg/kg	20	66	**107%**
Mercury	mg/kg	<0.1	<0.05	--
Nickel	mg/kg	87	15	**141%**
Zinc	mg/kg	62	64	3%
Polycyclic Aromatic Hydrocarbons				
Naphthalene	mg/kg	<0.1	<0.5	--
Acenaphthylene	mg/kg	<0.1	<0.5	--
Acenaphthene	mg/kg	<0.1	<0.5	--
Fluorene	mg/kg	<0.1	<0.5	--
Phenanthrene	mg/kg	0.1	<0.5	--
Anthracene	mg/kg	<0.1	<0.5	--
Fluoranthene	mg/kg	0.3	<0.5	--
Pyrene	mg/kg	0.3	<0.5	--
Benz(a)anthracene	mg/kg	0.2	<0.5	--
Chrysene	mg/kg	0.2	<0.5	--
Benzo(b&k)fluoranthene	mg/kg	0.4	<0.5	--
Benzo(a)pyrene	mg/kg	0.2	<0.5	--
Indeno(1.2.3.cd)pyrene	mg/kg	0.1	<0.5	--
Dibenz(a.h)anthracene	mg/kg	<0.1	<0.5	--
Benzo(g.h.i)perylene	mg/kg	0.2	<0.5	--
TOTAL PAHs	mg/kg	2.1	<0.5	--
BTEX				
Benzene	mg/kg	<0.2	<0.1	--
Toluene	mg/kg	<0.5	<0.1	--
Ethylbenzene	mg/kg	<1	<0.1	--
meta- & para-Xylene	mg/kg	<2	<0.2	--
ortho-Xylene	mg/kg	<1	<0.1	--
Total Petroleum Hydrocarbons				
F1 (C6-C10)	mg/kg	<25	<20	--
F2 (>C10-C16)	mg/kg	<50	<50	--
F3 (>C16-C34)	mg/kg	<100	<100	--
F4 (>C34-C40)	mg/kg	<100	<100	--

Values in Bold Indicate: RPD > 50 % When average concentration is > 10 x LOR
RPD > 75 % When average concentration is 5 to 10 x LOR
RPD > 100 % When average concentration is< 5 x LOR

SOIL - Trip Blank Results

Laboratory:		Envirolab	Envirolab
Laboratory Report Number:		156541	171789
Sample ID		**Trip Blank**	**Trip Blank**
Analyte	Units		
BTEX			
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
meta- & para-Xylene	mg/kg	<2	<2
ortho-Xylene	mg/kg	<1	<1
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	mg/kg	<25	<25
C10 - C14 Fraction	mg/kg	<50	<50
C15 - C28 Fraction	mg/kg	<100	<100
C29 - C36 Fraction	mg/kg	<100	<100

Notes:
--- Not Analysed

SOIL - Trip Spike Results

Laboratory:		Envirolab	Envirolab
Laboratory Report Number:		156541	171789
Sample ID		**Trip Spike**	**Trip Spike**
Analyte	Units		
BTEX			
Benzene	mg/kg	95%	103%
Toluene	mg/kg	96%	95%
Ethylbenzene	mg/kg	97%	118%
meta- & para-Xylene	mg/kg	97%	96%
ortho-Xylene	mg/kg	93%	106%

Notes:
--- Not Analysed

WATER - Blind Replicate

Sample Date		11-09-16	11-09-16	RPD
Sample Identification		**AC111116-01**	**AC111116-02**	
Analyte	Units	BH107	BH107	
Dissolved Metals				
Arsenic	µg/L	<1	<1	--
Cadmium	µg/L	<0.1	<0.1	--
Chromium	µg/L	<1	<1	--
Copper	µg/L	<1	<1	--
Lead	µg/L	1	1	0%
Mercury	µg/L	<0.05	<0.05	--
Nickel	µg/L	10	11	10%
Zinc	µg/L	32	34	6%
PAHs				
Naphthalene	µg/L	<1	<1	--
Acenaphythlene		<1	<1	--
Phenanthrene	µg/L	<1	<1	--
Anthracene	µg/L	<1	<1	--
Fluoranthene	µg/L	<1	<1	--
Benzo(a)pyrene	µg/L	<1	<1	--
Benzo(a)pyrene TEQ	µg/L	<5	<5	--
Total (+VE) PAHs	µg/L	NIL(+)VE	NIL(+)VE	--
BTEX				
Benzene	µg/L	<1	<1	--
Toluene	µg/L	<1	<1	--
Ethylbenzene	µg/L	<1	<1	--
m+p-xylene	µg/L	<2	<2	--
o-xylene	µg/L	<1	<1	--
TRH				
vTPH C_6 - C_{10} (F1)	µg/L	<10	<10	--
TRH >C_{10} - C_{16} (F2)	µg/L	<50	<50	--
TRH >C_{16}-C_{34} (F3)	µg/L	<100	<100	--
TRH >C_{34}-C_{40} (F4)	µg/L	<100	<100	--
Phenols				
Total Phenolics	mg/L	<0.05	<0.05	--
Hardness	mg/L	140	140	0.00%

Values in Bold Indicate:

RPD > 50 % When average concentration is > 10 x LOR
RPD > 75 % When average concentration is 5 to 10 x LOR
RPD > 100 % When average concentration is< 5 x LOR

WATER - Trip Blank Results

Laboratory:		Envirolab
Laboratory Report Number:		157226
Sample ID		**Trip Blank**
Analyte	Units	
BTEX		
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
meta- & para-Xylene	µg/L	<2
ortho-Xylene	µg/L	<1
Total Petroleum Hydrocarbons		
C6 - C9 Fraction	µg/L	<10

Notes:
--- Not Analysed

WATER - Trip Spike Results

Laboratory:		Envirolab
Laboratory Report Number:		157226
Sample ID		**Trip Spike**
Analyte	Units	
BTEX		
Benzene	µg/L	119%
Toluene	µg/L	120%
Ethylbenzene	µg/L	115%
meta- & para-Xylene	µg/L	119%
ortho-Xylene	µg/L	121%

Notes:
--- Not Analysed

APPENDIX I

LABORATORY REPORTS AND CERTIFICATES

12 Ashley Street, Chatswood, NSW 2067
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email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS **156541**

Client:
Geo-Environmental Engineering
82 Bridge St
Lane Cove
NSW 2066

Attention: Stephen McCormack

Sample log in details:

Your Reference:	**E16016BN**		
No. of samples:	38 Soils		
Date samples received / completed instructions received	02/11/16	/	02/11/16

This report replaces the R00 due to changes in project's ID as client's request.

This report replaces the R01 due to changes in samples ID.

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:	9/11/16	/	29/11/16
Date of Preliminary Report:	Not Issued		

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Results Approved By:

David Springer
General Manager

Client Reference: E16016BN

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156541-1	156541-2	156541-4	156541-6	156541-9
Your Reference	---------- -	SM011116-01	SM011116-02	SM011116-04	SM011116-06	SM011116-09
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	95	89	101	93

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156541-10	156541-11	156541-12	156541-14	156541-16
Your Reference	---------- -	SM011116-10	SM011116-11	SM011116-13	SM011116-15	SM011116-17
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	92	92	85	103

Client Reference: E16016BN

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156541-17	156541-19	156541-20	156541-23	156541-24
Your Reference	---------- -	SM011116-18	SM011116-20	SM011116-21	SM011116-24	SM011116-25
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC8 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	95	103	104	106	101

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156541-28	156541-32	156541-34	156541-37	156541-38
Your Reference	---------- -	SM011116-29	SM011116-32	SM011116-34	Trip Blank	Trip spike
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	[NA]
TRHC6 - C10	mg/kg	<25	<25	<25	<25	[NA]
vTPHC8 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	95%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	96%
Ethylbenzene	mg/kg	<1	<1	<1	<1	97%
m+p-xylene	mg/kg	<2	<2	<2	<2	97%
o-Xylene	mg/kg	<1	<1	<1	<1	93%
naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	101	101	95	110	97

Client Reference: E16016BN

svTRH (C10-C40) in Soil Our Reference: Your Reference	UNITS ----------	156541-1 SM011116-01	156541-2 SM011116-02	156541-4 SM011116-04	156541-6 SM011116-06	156541-9 SM011116-09
Date Sampled Type of sample	----------	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	82	77	79	80	80

svTRH (C10-C40) in Soil Our Reference: Your Reference	UNITS ----------	156541-10 SM011116-10	156541-11 SM011116-11	156541-12 SM011116-13	156541-14 SM011116-15	156541-16 SM011116-17
Date Sampled Type of sample	----------	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	04/11/2016
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	81	80	79	88	80

Client Reference: E16016BN

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	156541-17	156541-19	156541-20	156541-23	156541-24
Your Reference	----------	SM011116-18	SM011116-20	SM011116-21	SM011116-24	SM011116-25
	-					
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH>C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH>C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH>C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	80	77	77	78	80

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	156541-28	156541-32	156541-34
Your Reference	----------	SM011116-29	SM011116-32	SM011116-34
	-			
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH>C_{10}-C_{16}	mg/kg	<50	<50	<50
TRH>C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH>C_{16}-C_{34}	mg/kg	<100	<100	<100
TRH>C_{34}-C_{40}	mg/kg	<100	<100	<100
Surrogate o-Terphenyl	%	80	80	81

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	156541-1 SM011116-01 1/11/2016 Soil	156541-6 SM011116-06 1/11/2016 Soil	156541-9 SM011116-09 1/11/2016 Soil	156541-10 SM011116-10 1/11/2016 Soil	156541-11 SM011116-11 1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.4
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	2.1
Surrogate p-Terphenyl-d14	%	124	87	81	91	88

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference	UNITS ----------	156541-12 SM011116-13	156541-14 SM011116-15	156541-16 SM011116-17	156541-17 SM011116-18	156541-19 SM011116-20
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.2	0.1
Pyrene	mg/kg	<0.1	0.1	<0.1	0.3	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Chrysene	mg/kg	<0.1	0.2	<0.1	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.3	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.07	<0.05	0.2	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	0.81	NIL (+)VE	1.5	0.37
Surrogate p-Terphenyl-d14	%	89	87	86	85	88

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	156541-23 SM011116-24 1/11/2016 Soil	156541-28 SM011116-29 1/11/2016 Soil	156541-32 SM011116-32 1/11/2016 Soil	156541-34 SM011116-34 1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.2
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.08	0.08
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	0.080	0.43
Surrogate p-Terphenyl-d14	%	85	90	86	88

Client Reference: E16016BN

Acid Extractable metals in soil						
Our Reference:	UNITS	156541-1	156541-2	156541-5	156541-6	156541-9
Your Reference	---------- -	SM011116-01	SM011116-02	SM011116-05	SM011116-06	SM011116-09
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Arsenic	mg/kg	<4	<4	5	<4	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	59	35	11	5	20
Copper	mg/kg	17	8	4	3	10
Lead	mg/kg	11	3	20	6	48
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	48	20	3	1	3
Zinc	mg/kg	33	10	29	15	87

Acid Extractable metals in soil						
Our Reference:	UNITS	156541-10	156541-11	156541-12	156541-14	156541-15
Your Reference	---------- -	SM011116-10	SM011116-11	SM011116-13	SM011116-15	SM011116-16
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Arsenic	mg/kg	12	5	12	<4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	95	7	4	3
Copper	mg/kg	14	38	6	17	42
Lead	mg/kg	33	20	15	17	2
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	87	1	6	<1
Zinc	mg/kg	30	62	30	24	3

Acid Extractable metals in soil						
Our Reference:	UNITS	156541-16	156541-17	156541-19	156541-20	156541-23
Your Reference	---------- -	SM011116-17	SM011116-18	SM011116-20	SM011116-21	SM011116-24
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Arsenic	mg/kg	6	4	4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	11	12	15	72
Copper	mg/kg	14	12	9	1	42
Lead	mg/kg	11	34	32	7	30
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	2	2	63
Zinc	mg/kg	21	25	28	5	69

Client Reference: E16016BN

Acid Extractable metals in soil						
Our Reference:	UNITS	156541-24	156541-26	156541-28	156541-29	156541-32
Your Reference	---------- -	SM011116-25	SM011116-27	SM011116-29	SM011116-30	SM011116-32
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Arsenic	mg/kg	<4	<4	<4	5	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.7
Chromium	mg/kg	12	11	4	9	12
Copper	mg/kg	3	1	1	7	23
Lead	mg/kg	6	6	8	74	170
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	1	1	2	4
Zinc	mg/kg	4	5	10	74	380

Acid Extractable metals in soil				
Our Reference:	UNITS	156541-33	156541-34	156541-36
Your Reference	---------- -	SM011116-33	SM011116-34	SM011116-37
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil
Date prepared	-	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	03/11/2016	03/11/2016	03/11/2016
Arsenic	mg/kg	6	6	8
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	23	13	21
Copper	mg/kg	2	24	3
Lead	mg/kg	9	420	12
Mercury	mg/kg	<0.1	0.1	<0.1
Nickel	mg/kg	3	2	2
Zinc	mg/kg	38	100	110

Client Reference: E16016BN

Moisture						
Our Reference:	UNITS	156541-1	156541-2	156541-4	156541-5	156541-6
Your Reference	---------- -	SM011116-01	SM011116-02	SM011116-04	SM011116-05	SM011116-06
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Date analysed	-	4/11/2016	4/11/2016	4/11/2016	4/11/2016	4/11/2016
Moisture	%	6.4	17	19	20	15

Moisture						
Our Reference:	UNITS	156541-9	156541-10	156541-11	156541-12	156541-14
Your Reference	---------- -	SM011116-09	SM011116-10	SM011116-11	SM011116-13	SM011116-15
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Date analysed	-	4/11/2016	4/11/2016	4/11/2016	4/11/2016	4/11/2016
Moisture	%	20	24	17	11	26

Moisture						
Our Reference:	UNITS	156541-15	156541-16	156541-17	156541-19	156541-20
Your Reference	---------- -	SM011116-16	SM011116-17	SM011116-18	SM011116-20	SM011116-21
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Date analysed	-	4/11/2016	4/11/2016	4/11/2016	4/11/2016	4/11/2016
Moisture	%	7.5	7.3	16	11	16

Moisture						
Our Reference:	UNITS	156541-23	156541-24	156541-26	156541-28	156541-29
Your Reference	---------- -	SM011116-24	SM011116-25	SM011116-27	SM011116-29	SM011116-30
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Date analysed	-	4/11/2016	4/11/2016	4/11/2016	4/11/2016	4/11/2016
Moisture	%	11	10	14	9.5	11

Moisture					
Our Reference:	UNITS	156541-32	156541-33	156541-34	156541-36
Your Reference	---------- -	SM011116-32	SM011116-33	SM011116-34	SM011116-37
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Date analysed	-	4/11/2016	4/11/2016	4/11/2016	4/11/2016
Moisture	%	8.3	17	17	21

Client Reference: E16016BN

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	156541-6 SM011116-06 1/11/2016 Soil	156541-14 SM011116-15 1/11/2016 Soil	156541-17 SM011116-18 1/11/2016 Soil	156541-28 SM011116-29 1/11/2016 Soil	156541-32 SM011116-32 1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	82	99	84	86	88

Client Reference: E16016BN

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	156541-6 SM011116-06 1/11/2016 Soil	156541-14 SM011116-15 1/11/2016 Soil	156541-17 SM011116-18 1/11/2016 Soil	156541-28 SM011116-29 1/11/2016 Soil	156541-32 SM011116-32 1/11/2016 Soil
Date extracted	-	03/11/2016	03/11/2016	03/11/2016	03/11/2016	03/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	82	99	84	86	88

Client Reference: E16016BN

Asbestos ID - soils						
Our Reference:	UNITS	156541-6	156541-14	156541-17	156541-28	156541-32
Your Reference	---------- -	SM011116-06	SM011116-15	SM011116-18	SM011116-29	SM011116-32
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	8/11/2016	8/11/2016	8/11/2016	8/11/2016	8/11/2016
Sample mass tested	g	Approx. 35g	Approx. 30g	Approx. 35g	Approx. 35g	Approx. 35g
Sample Description	-	Tan sandy soil	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Client Reference: E16016BN

Misc Inorg - Soil						
Our Reference:	UNITS	156541-1	156541-2	156541-5	156541-9	156541-11
Your Reference	---------- -	SM011116-01	SM011116-02	SM011116-05	SM011116-09	SM011116-11
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
Date analysed	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
pH 1:5 soil:water	pH Units	9.6	9.1	8.2	7.7	8.2

Misc Inorg - Soil						
Our Reference:	UNITS	156541-12	156541-14	156541-15	156541-16	156541-17
Your Reference	---------- -	SM011116-13	SM011116-15	SM011116-16	SM011116-17	SM011116-18
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
Date analysed	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
pH 1:5 soil:water	pH Units	7.1	6.9	8.7	8.3	7.8

Misc Inorg - Soil						
Our Reference:	UNITS	156541-19	156541-20	156541-23	156541-24	156541-26
Your Reference	---------- -	SM011116-20	SM011116-21	SM011116-24	SM011116-25	SM011116-27
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
Date analysed	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
pH 1:5 soil:water	pH Units	5.8	5.5	7.7	6.9	5.6

Misc Inorg - Soil						
Our Reference:	UNITS	156541-28	156541-29	156541-32	156541-33	156541-34
Your Reference	---------- -	SM011116-29	SM011116-30	SM011116-32	SM011116-33	SM011116-34
Date Sampled	----------	1/11/2016	1/11/2016	1/11/2016	1/11/2016	1/11/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
Date analysed	-	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
pH 1:5 soil:water	pH Units	5.9	6.0	7.0	6.3	3.5

Misc Inorg - Soil		
Our Reference:	UNITS	156541-36
Your Reference	---------- -	SM011116-37
Date Sampled	----------	1/11/2016
Type of sample		Soil
Date prepared	-	07/11/2016
Date analysed	-	07/11/2016
pH 1:5 soil:water	pH Units	6.2

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CEC Our Reference: Your Reference	UNITS ---------- -	156541-1 SM011116-01	156541-2 SM011116-02	156541-5 SM011116-05	156541-9 SM011116-09	156541-11 SM011116-11
Date Sampled Type of sample	----------	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil
Date prepared	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	12	15	6.3	27	20
Exchangeable K	meq/100g	0.2	<0.1	<0.1	0.6	0.2
Exchangeable Mg	meq/100g	2.5	1.0	0.21	1.4	2.7
Exchangeable Na	meq/100g	0.70	0.40	<0.1	0.13	<0.1
Cation Exchange Capacity	meq/100g	16	16	6.6	29	22

CEC Our Reference: Your Reference	UNITS ---------- -	156541-12 SM011116-13	156541-14 SM011116-15	156541-15 SM011116-16	156541-16 SM011116-17	156541-17 SM011116-18
Date Sampled Type of sample	----------	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil
Date prepared	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	4.1	10	12	14	11
Exchangeable K	meq/100g	<0.1	<0.1	<0.1	<0.1	0.4
Exchangeable Mg	meq/100g	0.49	0.36	0.76	0.81	1.7
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	4.7	10	12	15	13

CEC Our Reference: Your Reference	UNITS ---------- -	156541-19 SM011116-20	156541-20 SM011116-21	156541-23 SM011116-24	156541-24 SM011116-25	156541-26 SM011116-27
Date Sampled Type of sample	----------	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil	1/11/2016 Soil
Date prepared	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	5.1	1.6	22	1.1	0.5
Exchangeable K	meq/100g	0.2	0.1	0.3	0.1	0.2
Exchangeable Mg	meq/100g	1.3	1.2	3.8	0.72	2.6
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	6.6	2.9	26	1.9	3.3

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CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	156541-28 SM011116-29 1/11/2016 Soil	156541-29 SM011116-30 1/11/2016 Soil	156541-32 SM011116-32 1/11/2016 Soil	156541-33 SM011116-33 1/11/2016 Soil	156541-34 SM011116-34 1/11/2016 Soil
Date prepared	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	2.0	2.2	9.8	3.0	0.5
Exchangeable K	meq/100g	0.2	0.1	0.2	<0.1	0.2
Exchangeable Mg	meq/100g	0.59	0.50	0.88	2.1	<0.1
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	2.7	2.9	11	5.2	<1.0

CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	156541-36 SM011116-37 1/11/2016 Soil
Date prepared	-	04/11/2016
Date analysed	-	04/11/2016
Exchangeable Ca	meq/100g	7.3
Exchangeable K	meq/100g	0.2
Exchangeable Mg	meq/100g	1.0
Exchangeable Na	meq/100g	<0.1
Cation Exchange Capacity	meq/100g	8.5

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Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

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QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
$TRHC_{6}$ - C_{9}	mg/kg	25	Org-016	<25	156541-6	<25 || <25	LCS-4	103%
$TRHC_{6}$ - C_{10}	mg/kg	25	Org-016	<25	156541-6	<25 || <25	LCS-4	103%
Benzene	mg/kg	0.2	Org-016	<0.2	156541-6	<0.2 || <0.2	LCS-4	98%
Toluene	mg/kg	0.5	Org-016	<0.5	156541-6	<0.5 || <0.5	LCS-4	97%
Ethylbenzene	mg/kg	1	Org-016	<1	156541-6	<1 || <1	LCS-4	103%
m+p-xylene	mg/kg	2	Org-016	<2	156541-6	<2 || <2	LCS-4	109%
o-Xylene	mg/kg	1	Org-016	<1	156541-6	<1 || <1	LCS-4	116%
naphthalene	mg/kg	1	Org-014	<1	156541-6	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	94	156541-6	101 || 90 || RPD: 12	LCS-4	102%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			06/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
$TRHC_{10}$ - C_{14}	mg/kg	50	Org-003	<50	156541-6	<50 || <50	LCS-4	100%
$TRHC_{15}$ - C_{28}	mg/kg	100	Org-003	<100	156541-6	<100 || <100	LCS-4	94%
$TRHC_{29}$ - C_{36}	mg/kg	100	Org-003	<100	156541-6	<100 || <100	LCS-4	96%
$TRH>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	156541-6	<50 || <50	LCS-4	100%
$TRH>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	156541-6	<100 || <100	LCS-4	94%
$TRH>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	156541-6	<100 || <100	LCS-4	96%
Surrogate o-Terphenyl	%		Org-003	90	156541-6	80 || 79 || RPD: 1	LCS-4	94%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			04/11/2016	156541-6	04/11/2016 || 04/11/2016	LCS-4	04/11/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	LCS-4	106%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	LCS-4	107%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	LCS-4	99%
Anthracene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	LCS-4	107%
Pyrene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	LCS-4	116%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	156541-6	<0.2 || <0.2	[NR]	[NR]

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QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	156541-6	<0.05 || <0.05	LCS-4	112%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	93	156541-6	87 || 84 || RPD: 4	LCS-4	137%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Arsenic	mg/kg	4	Metals-020	<4	156541-6	<4 || <4	LCS-4	111%
Cadmium	mg/kg	0.4	Metals-020	<0.4	156541-6	<0.4 || <0.4	LCS-4	107%
Chromium	mg/kg	1	Metals-020	<1	156541-6	5 || 5 || RPD: 0	LCS-4	111%
Copper	mg/kg	1	Metals-020	<1	156541-6	3 || 3 || RPD: 0	LCS-4	110%
Lead	mg/kg	1	Metals-020	<1	156541-6	6 || 5 || RPD: 18	LCS-4	103%
Mercury	mg/kg	0.1	Metals-021	<0.1	156541-6	<0.1 || <0.1	LCS-4	84%
Nickel	mg/kg	1	Metals-020	<1	156541-6	1 || 1 || RPD: 0	LCS-4	102%
Zinc	mg/kg	1	Metals-020	<1	156541-6	15 || 23 || RPD: 42	LCS-4	103%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			04/11/2016	156541-6	04/11/2016 || 04/11/2016	LCS-4	04/11/2016
HCB	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	111%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	97%
Heptachlor	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	103%
delta-BHC	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	100%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	96%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	101%
Dieldrin	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	102%
Endrin	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	108%
pp-DDD	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	103%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]

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QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	LCS-4	110%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	97	156541-6	82 || 87 || RPD: 6	LCS-4	122%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/11/2016	156541-6	03/11/2016 || 03/11/2016	LCS-4	03/11/2016
Date analysed	-			04/11/2016	156541-6	04/11/2016 || 04/11/2016	LCS-4	04/11/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	LCS-4	107%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	156541-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	97	156541-6	82 || 87 || RPD: 6	LCS-4	94%
QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			07/11/2016	[NT]	[NT]	LCS-4	07/11/2016
Date analysed	-			07/11/2016	[NT]	[NT]	LCS-4	07/11/2016
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-4	101%
QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			04/11/2016	[NT]	[NT]	LCS-4	04/11/2016
Date analysed	-			04/11/2016	[NT]	[NT]	LCS-4	04/11/2016
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-4	106%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-4	88%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-4	102%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-4	83%

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QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
$TRHC_6 - C_9$	mg/kg	156541-17	<25 || <25	156541-14	83%
$TRHC_6 - C_{10}$	mg/kg	156541-17	<25 || <25	156541-14	83%
Benzene	mg/kg	156541-17	<0.2 || <0.2	156541-14	83%
Toluene	mg/kg	156541-17	<0.5 || <0.5	156541-14	78%
Ethylbenzene	mg/kg	156541-17	<1 || <1	156541-14	82%
m+p-xylene	mg/kg	156541-17	<2 || <2	156541-14	86%
o-Xylene	mg/kg	156541-17	<1 || <1	156541-14	93%
naphthalene	mg/kg	156541-17	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	156541-17	95 || 97 || RPD: 2	156541-14	85%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	04/11/2016 || 04/11/2016	156541-14	06/11/2016
$TRHC_{10} - C_{14}$	mg/kg	156541-17	<50 || <50	156541-14	116%
$TRHC_{15} - C_{28}$	mg/kg	156541-17	<100 || <100	156541-14	118%
$TRHC_{29} - C_{36}$	mg/kg	156541-17	<100 || <100	156541-14	79%
$TRH>C_{10}-C_{16}$	mg/kg	156541-17	<50 || <50	156541-14	116%
$TRH>C_{16}-C_{34}$	mg/kg	156541-17	<100 || <100	156541-14	118%
$TRH>C_{34}-C_{40}$	mg/kg	156541-17	<100 || <100	156541-14	79%
Surrogate o-Terphenyl	%	156541-17	80 || 80 || RPD: 0	156541-14	84%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	04/11/2016 || 04/11/2016	156541-14	04/11/2016
Naphthalene	mg/kg	156541-17	<0.1 || <0.1	156541-14	96%
Acenaphthylene	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	156541-17	<0.1 || <0.1	156541-14	91%
Phenanthrene	mg/kg	156541-17	<0.1 || <0.1	156541-14	74%
Anthracene	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	156541-17	0.2 || 0.1 || RPD: 67	156541-14	75%
Pyrene	mg/kg	156541-17	0.3 || 0.1 || RPD: 100	156541-14	80%
Benzo(a)anthracene	mg/kg	156541-17	0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	156541-17	0.2 || <0.1	[NR]	[NR]
Benzo(b,j+k)fluoranthene	mg/kg	156541-17	0.3 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	156541-17	0.2 || 0.07 || RPD: 96	156541-14	60%
Indeno(1,2,3-c,d)pyrene	mg/kg	156541-17	0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]

Client Reference: E16016BN

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	156541-17	0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	156541-17	85 || 85 || RPD: 0	156541-14	116%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Arsenic	mg/kg	156541-17	4 || 6 || RPD: 40	156541-14	100%
Cadmium	mg/kg	156541-17	<0.4 || <0.4	156541-14	107%
Chromium	mg/kg	156541-17	11 || 13 || RPD: 17	156541-14	110%
Copper	mg/kg	156541-17	12 || 8 || RPD: 40	156541-14	106%
Lead	mg/kg	156541-17	34 || 30 || RPD: 12	156541-14	94%
Mercury	mg/kg	156541-17	<0.1 || <0.1	156541-14	82%
Nickel	mg/kg	156541-17	2 || 2 || RPD: 0	156541-14	104%
Zinc	mg/kg	156541-17	25 || 24 || RPD: 4	156541-14	90%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	04/11/2016 || 04/11/2016	156541-14	04/11/2016
HCB	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	156541-17	<0.1 || <0.1	156541-14	89%
gamma-BHC	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	156541-17	<0.1 || <0.1	156541-14	85%
Heptachlor	mg/kg	156541-17	<0.1 || <0.1	156541-14	89%
delta-BHC	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	156541-17	<0.1 || <0.1	156541-14	86%
Heptachlor Epoxide	mg/kg	156541-17	<0.1 || <0.1	156541-14	83%
gamma-Chlordane	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	156541-17	<0.1 || <0.1	156541-14	89%
Dieldrin	mg/kg	156541-17	<0.1 || <0.1	156541-14	90%
Endrin	mg/kg	156541-17	<0.1 || <0.1	156541-14	95%
pp-DDD	mg/kg	156541-17	<0.1 || <0.1	156541-14	92%
Endosulfan II	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	156541-17	<0.1 || <0.1	156541-14	99%
Methoxychlor	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	156541-17	84 || 87 || RPD: 4	156541-14	114%

Client Reference: E16016BN

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	156541-17	03/11/2016 || 03/11/2016	156541-14	03/11/2016
Date analysed	-	156541-17	04/11/2016 || 04/11/2016	156541-14	04/11/2016
Aroclor 1016	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	156541-17	<0.1 || <0.1	156541-14	101%
Aroclor 1260	mg/kg	156541-17	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	156541-17	84 || 87 || RPD: 4	156541-14	89%
QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	156541-14	07/11/2016
Date analysed	-	[NT]	[NT]	156541-14	07/11/2016
pH 1:5 soil:water	pH Units	[NT]	[NT]	156541-14	101%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date extracted	-	156541-34	03/11/2016 || 03/11/2016		
Date analysed	-	156541-34	03/11/2016 || 03/11/2016		
TRHC$_6$ - C$_9$	mg/kg	156541-34	<25 || <25		
TRHC$_6$ - C$_{10}$	mg/kg	156541-34	<25 || <25		
Benzene	mg/kg	156541-34	<0.2 || <0.2		
Toluene	mg/kg	156541-34	<0.5 || <0.5		
Ethylbenzene	mg/kg	156541-34	<1 || <1		
m+p-xylene	mg/kg	156541-34	<2 || <2		
o-Xylene	mg/kg	156541-34	<1 || <1		
naphthalene	mg/kg	156541-34	<1 || <1		
Surrogate aaa-Trifluorotoluene	%	156541-34	95 || 96 || RPD: 1		

Client Reference: E16016BN

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	156541-34	03/11/2016 || 03/11/2016
Date analysed	-	156541-34	04/11/2016 || 04/11/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	156541-34	<50 || <50
TRHC$_{15}$ - C$_{28}$	mg/kg	156541-34	<100 || <100
TRHC$_{29}$ - C$_{36}$	mg/kg	156541-34	<100 || <100
TRH>C$_{10}$-C$_{16}$	mg/kg	156541-34	<50 || <50
TRH>C$_{16}$-C$_{34}$	mg/kg	156541-34	<100 || <100
TRH>C$_{34}$-C$_{40}$	mg/kg	156541-34	<100 || <100
Surrogate o-Terphenyl	%	156541-34	81 || 82 || RPD: 1
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	156541-34	03/11/2016 || 03/11/2016
Date analysed	-	156541-34	04/11/2016 || 04/11/2016
Naphthalene	mg/kg	156541-34	<0.1 || <0.1
Acenaphthylene	mg/kg	156541-34	<0.1 || <0.1
Acenaphthene	mg/kg	156541-34	<0.1 || <0.1
Fluorene	mg/kg	156541-34	<0.1 || <0.1
Phenanthrene	mg/kg	156541-34	<0.1 || 0.2
Anthracene	mg/kg	156541-34	<0.1 || <0.1
Fluoranthene	mg/kg	156541-34	0.2 || 0.4 || RPD: 67
Pyrene	mg/kg	156541-34	0.2 || 0.5 || RPD: 86
Benzo(a)anthracene	mg/kg	156541-34	<0.1 || 0.2
Chrysene	mg/kg	156541-34	<0.1 || 0.2
Benzo(b,j+k)fluoranthene	mg/kg	156541-34	<0.2 || 0.4
Benzo(a)pyrene	mg/kg	156541-34	0.08 || 0.2 || RPD: 86
Indeno(1,2,3-c,d)pyrene	mg/kg	156541-34	<0.1 || 0.1
Dibenzo(a,h)anthracene	mg/kg	156541-34	<0.1 || <0.1
Benzo(g,h,i)perylene	mg/kg	156541-34	<0.1 || 0.1
Surrogate p-Terphenyl-d14	%	156541-34	88 || 86 || RPD: 2

Client Reference: E16016BN

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	156541-34	03/11/2016 || 03/11/2016	LCS-5	03/11/2016
Date analysed	-	156541-34	03/11/2016 || 03/11/2016	LCS-5	03/11/2016
Arsenic	mg/kg	156541-34	6 || 6 || RPD: 0	LCS-5	110%
Cadmium	mg/kg	156541-34	<0.4 || <0.4	LCS-5	106%
Chromium	mg/kg	156541-34	13 || 12 || RPD: 8	LCS-5	110%
Copper	mg/kg	156541-34	24 || 24 || RPD: 0	LCS-5	106%
Lead	mg/kg	156541-34	420 || 420 || RPD: 0	LCS-5	102%
Mercury	mg/kg	156541-34	0.1 || 0.1 || RPD: 0	LCS-5	88%
Nickel	mg/kg	156541-34	2 || 2 || RPD: 0	LCS-5	101%
Zinc	mg/kg	156541-34	100 || 100 || RPD: 0	LCS-5	102%
QUALITY CONTROL CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	156541-34	04/11/2016 || 04/11/2016	LCS-5	04/11/2016
Date analysed	-	156541-34	04/11/2016 || 04/11/2016	LCS-5	04/11/2016
Exchangeable Ca	meq/100 g	156541-34	0.5 || 0.4 || RPD: 22	LCS-5	107%
Exchangeable K	meq/100 g	156541-34	0.2 || 0.2 || RPD: 0	LCS-5	102%
Exchangeable Mg	meq/100 g	156541-34	<0.1 || <0.1	LCS-5	105%
Exchangeable Na	meq/100 g	156541-34	<0.1 || <0.1	LCS-5	90%
QUALITY CONTROL CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD		
Date prepared	-	156541-2	04/11/2016 || 04/11/2016		
Date analysed	-	156541-2	04/11/2016 || 04/11/2016		
Exchangeable Ca	meq/100 g	156541-2	15 || 15 || RPD: 0		
Exchangeable K	meq/100 g	156541-2	<0.1 || <0.1		
Exchangeable Mg	meq/100 g	156541-2	1.0 || 1.0 || RPD: 0		
Exchangeable Na	meq/100 g	156541-2	0.40 || 0.39 || RPD: 3		

Client Reference: E16016BN

QUALITY CONTROL CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	156541-20	04/11/2016 || 04/11/2016
Date analysed	-	156541-20	04/11/2016 || 04/11/2016
Exchangeable Ca	meq/100 g	156541-20	1.6 || 1.3 || RPD: 21
Exchangeable K	meq/100 g	156541-20	0.1 || 0.1 || RPD: 0
Exchangeable Mg	meq/100 g	156541-20	1.2 || 0.95 || RPD: 23
Exchangeable Na	meq/100 g	156541-20	<0.1 || <0.1
QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	156541-1	07/11/2016 || 07/11/2016
Date analysed	-	156541-1	07/11/2016 || 07/11/2016
pH 1:5 soil:water	pH Units	156541-1	9.6 || 9.6 || RPD: 0
QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	156541-19	07/11/2016 || 07/11/2016
Date analysed	-	156541-19	07/11/2016 || 07/11/2016
pH 1:5 soil:water	pH Units	156541-19	5.8 || 5.8 || RPD: 0
QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	156541-36	07/11/2016 || 07/11/2016
Date analysed	-	156541-36	07/11/2016 || 07/11/2016
pH 1:5 soil:water	pH Units	156541-36	6.2 || 6.2 || RPD: 0

Client Reference: E16016BN

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 156541-6, 14, 17, 28 & 32 were sub-sampled from jars provided by the client.

Asbestos ID was analysed by Approved Identifier:	Paul Ching
Asbestos ID was authorised by Approved Signatory:	Paul Ching

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Client Reference: E16016BN

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 batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16014BLA	**Envirolab Services** **12 Ashley St, Chatswood, NSW, 2067**
Project Mgr	S. McCormack		
Sampler:	S. McCormack	**PO No.:**	**Phone: 02 9910 6200**
Address:	82 Bridge Street Lane Cove NSW 2066	**Envirolab Services Quote No. :** **Date results required:**	**Fax: 02 9910 6201**
Email:	stephen@geoenvironmental.com.au	**Or choose: standard / 1 day / 2 day / 3 day** 5 days *Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**E-mail: ahie@envirolabservices.com.au**
Phone:	0431 480 980		**Contact: Aileen Hie**

	Sample information			Tests Required														Comments
Envirolab Sample ID	**Client Sample ID**	**Date sampled**	**Type of sample**	**Combination 3**	**Combination 3a**	**Combination 4**	**Combination 5b**	**Combination 5**	**Combination 5a**	**OCP/OPPs**	**Metals (Std8)**	**pH**	**EC**	**Asbestos**	**BTEX / Volatile TRH**	**BTEX**	**CEC/pH**	**TRH/BTEX**	**Provide as much information about the sample as you can**
1	SM011116-01	1/11/2016	soil jar	1													1		
2	SM011116-02	1/11/2016	soil jar								1						1	1	
3	SM011116-03	1/11/2016	soil jar																
4	SM011116-04	1/11/2016	soil jar															1	
5	SM011116-05	1/11/2016	soil jar								1						1		
6	SM011116-06	1/11/2016	soil jar						1										
7	SM011116-07	1/11/2016	soil jar																
8	SM011116-08	1/11/2016	soil jar																
9	SM011116-09	1/11/2016	soil jar	1													1		
10	SM011116-10	1/11/2016	soil jar	1															
11	SM011116-11	1/11/2016	soil jar	1													1		
12	SM011116-13	1/11/2016	soil jar	1													1		

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ELS	**Samples Received: Cool or Ambient (circle one)**
Print Name:	S. McCormack	**Print Name:** Steph	**Temperature Recieved at:** (if applicable)
Date & Time:	02-Nov-16	**Date & Time:** 2/11/16 (11:30am)	**Transported by: Hand delivered / courier**
Signature:		**Signature:** SK	**Page No: 1 of 3**

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No:
156541
Date Received: 2/11/16
Time Received: 11:30am
Received by: SKoN
Temp: Cool/Ambient
Cooling: Ice/icepack
Security: Intact/Broken/None

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CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16016BN	**Envirolab Services** 12 Ashley St, Chatswood, NSW, 2067
Project Mgr:	S. McCormack		
Sampler:	S. McCormack	**PO No.:**	Phone: 02 9910 6200
Address:	82 Bridge Street Lane Cove NSW 2066	**Envirolab Services Quote No. :** **Date results required:**	Fax: 02 9910 6201
Email:	stephen@geoenvironmental.com.au	**Or choose: standard / 1 day / 2 day / 3 day** 5 days *Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	E-mail: ahie@envirolabservices.com.au
Phone:	0431 480 980		Contact: Aileen Hie

Sample information				Tests Required															Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 4	Combination 5b	Combination 5	Combination 5a	OCP/OPPs	Metals (Std8)	pH	EC	Asbestos	BTEX / Volatile TRH	BTEX	CEC/pH	TRH/BTEX	Provide as much information about the sample as you can
13	SM011116-14	1/11/2016	Soil jar																
14	SM011116-15	1/11/2016	Soil jar						1								1		
15	SM011116-16	1/11/2016	Soil jar								1						1		
16	SM011116-17	1/11/2016	Soil jar	1													1		
17	SM011116-18	1/11/2016	Soil jar						1								1		
18	SM011116-19	1/11/2016	Soil jar																
19	SM011116-20	1/11/2016	Soil jar	1													1		
20	SM011116-21	1/11/2016	Soil jar								1						1	1	
21	SM011116-22	1/11/2016	Soil jar																
22	SM011116-23	1/11/2016	Soil jar																
23	SM011116-24	1/11/2016	Soil jar	1													1	1	
24	SM011116-25	1/11/2016	Soil jar								1						1	1	
25	SM011116-26	1/11/2016	Soil jar																

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ELS	Samples Received: Cool or Ambient (circle one)
Print Name:	S. McCormack	**Print Name:** STEPH	Temperature Recieved at: (if applicable)
Date & Time:	23-Aug-16	**Date & Time:** 23/11/16 1130	Transported by: Hand delivered / courier
Signature:		**Signature:** SK	Page No: 2 of 3

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CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16014BLA	**Envirolab Services** 12 Ashley St, Chatswood, NSW, 2067
Project Mgr	S. McCormack	**PO No.:**	
Sampler:	S. McCormack	**Envirolab Services Quote No. :**	**Phone:** 02 9910 6200
Address:	82 Bridge Street Lane Cove NSW 2066	**Date results required:**	**Fax:** 02 9910 6201
Email:	stephen@geoenvironmental.com.au	**Or choose:** standard / 1 day / 2 day / 3 day — 5 days	**E-mail:** ahie@envirolabservices.com.au
Phone:	0431 480 980	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**Contact:** Aileen Hie

Sample information				Tests Required														Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 4	Combination 5b	Combination 5	Combination 5a	OCP/OPPs	Metals (Std8)	pH	EC	Asbestos	BTEX / Volatile TRH	BTEX	CEC/pH	TRH/BTEX	Provide as much information about the sample as you can
26	SM011116-27	1/11/2016	Soil jar								1						1		
27	SM011116-28	1/11/2016	Soil jar																
28	SM011116-29	1/11/2016	Soil jar						1								1		
29	SM011116-30	1/11/2016	Soil jar								1						1		
30	SM011116-31	1/11/2016	Soil jar																
31	SM011116-35	1/11/2016	Soil jar																
32	SM011116-32	1/11/2016	Soil jar						1								1		
33	SM011116-33	1/11/2016	Soil jar								1						1		
34	SM011116-34	1/11/2016	Soil jar	1													1		
35	SM011116-36	1/11/2016	Soil jar																
36	SM011116-37	1/11/2016	Soil jar								1						1		
37	Trip Blank	1/11/2016	Soil jar												1				
38	Trip Spike	1/11/2016	Soil jar													1			

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ELS	**Samples Received:** Cool or Ambient (circle one)
Print Name:	S. McCormack	**Print Name:** STEPH	**Temperature Recieved at:** (if applicable)
Date & Time:	23-Aug-16	**Date & Time:** 2/11 1130	**Transported by:** Hand delivered / courier
Signature:		**Signature:**	**Page No:** 3 of 3

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.

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CERTIFICATE OF ANALYSIS **157226**

Client:
Geo-Environmental Engineering
82 Bridge St
Lane Cove
NSW 2066

Attention: Stephen McCormack

Sample log in details:

Your Reference:	**E16016BN**		
No. of samples:	8 Waters		
Date samples received / completed instructions received	14/11/16	/	14/11/16

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:	21/11/16	/	17/11/16
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Client Reference: E16016BN

vTRH(C6-C10)/BTEXN in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	157226-1 AC111116-01 11/11/2016 water	157226-2 AC111116-02 11/11/2016 water	157226-3 AC111116-03 11/11/2016 water	157226-4 AC111116-04 11/11/2016 water	157226-5 AC111116-05 11/11/2016 water
Date extracted	-	14/11/2016	14/11/2016	14/11/2016	14/11/2016	14/11/2016
Date analysed	-	15/11/2016	15/11/2016	15/11/2016	15/11/2016	15/11/2016
TRHC6 - C9	µg/L	<10	<10	100	68	<10
TRHC6 - C10	µg/L	<10	<10	130	130	<10
TRHC6 - C10 less BTEX (F1)	µg/L	<10	<10	130	130	<10
Benzene	µg/L	<1	<1	1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	103	105	110	101	96
Surrogate toluene-d8	%	108	107	103	103	105
Surrogate 4-BFB	%	101	103	100	103	103

vTRH(C6-C10)/BTEXN in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	157226-6 AC111116-06 11/11/2016 water	157226-7 Trip Blank 11/11/2016 water	157226-8 Trip Spike 11/11/2016 water
Date extracted	-	14/11/2016	14/11/2016	14/11/2016
Date analysed	-	15/11/2016	15/11/2016	15/11/2016
TRHC6 - C9	µg/L	<10	<10	[NA]
TRHC6 - C10	µg/L	<10	<10	[NA]
TRHC6 - C10 less BTEX (F1)	µg/L	<10	<10	[NA]
Benzene	µg/L	<1	<1	119%
Toluene	µg/L	<1	<1	120%
Ethylbenzene	µg/L	<1	<1	115%
m+p-xylene	µg/L	<2	<2	119%
o-xylene	µg/L	<1	<1	121%
Naphthalene	µg/L	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	106	99	93
Surrogate toluene-d8	%	106	105	104
Surrogate 4-BFB	%	101	102	102

Client Reference: E16016BN

svTRH (C10-C40) in Water Our Reference: Your Reference	UNITS ----------	157226-1 AC111116-01	157226-2 AC111116-02	157226-3 AC111116-03	157226-4 AC111116-04	157226-5 AC111116-05
Date Sampled Type of sample	----------	11/11/2016 water	11/11/2016 water	11/11/2016 water	11/11/2016 water	11/11/2016 water
Date extracted	-	16/11/2016	16/11/2016	16/11/2016	16/11/2016	16/11/2016
Date analysed	-	16/11/2016	16/11/2016	16/11/2016	16/11/2016	16/11/2016
TRHC10 - C14	µg/L	<50	<50	260	480	<50
TRHC15 - C28	µg/L	<100	<100	<100	120	<100
TRHC29 - C36	µg/L	<100	<100	<100	<100	<100
TRH>C10 - C16	µg/L	<50	<50	290	560	<50
TRH>C10 - C16 less Naphthalene (F2)	µg/L	<50	<50	290	560	<50
TRH>C16 - C34	µg/L	<100	<100	<100	<100	<100
TRH>C34 - C40	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	80	85	81	80	83

svTRH (C10-C40) in Water Our Reference: Your Reference	UNITS ----------	157226-6 AC111116-06
Date Sampled Type of sample	----------	11/11/2016 water
Date extracted	-	16/11/2016
Date analysed	-	16/11/2016
TRHC10 - C14	µg/L	<50
TRHC15 - C28	µg/L	<100
TRHC29 - C36	µg/L	<100
TRH>C10 - C16	µg/L	<50
TRH>C10 - C16 less Naphthalene (F2)	µg/L	<50
TRH>C16 - C34	µg/L	<100
TRH>C34 - C40	µg/L	<100
Surrogate o-Terphenyl	%	91

Client Reference: E16016BN

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	157226-1 AC111116-01 11/11/2016 water	157226-2 AC111116-02 11/11/2016 water	157226-3 AC111116-03 11/11/2016 water	157226-4 AC111116-04 11/11/2016 water	157226-5 AC111116-05 11/11/2016 water
Date extracted	-	16/11/2016	16/11/2016	16/11/2016	16/11/2016	16/11/2016
Date analysed	-	16/11/2016	16/11/2016	16/11/2016	16/11/2016	16/11/2016
Naphthalene	µg/L	<1	<1	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1	<1	<1
Fluorene	µg/L	<1	<1	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1	<1	<1
Anthracene	µg/L	<1	<1	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1	<1	<1
Pyrene	µg/L	<1	<1	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1	<1	<1
Chrysene	µg/L	<1	<1	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	81	103	89	91	94

Client Reference: E16016BN

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	 157226-6 AC111116-06 11/11/2016 water
Date extracted	-	16/11/2016
Date analysed	-	16/11/2016
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	99

Client Reference: E16016BN

Total Phenolics in Water						
Our Reference:	UNITS	157226-1	157226-2	157226-3	157226-4	157226-5
Your Reference	---------- -	AC111116-01	AC111116-02	AC111116-03	AC111116-04	AC111116-05
Date Sampled	----------	11/11/2016	11/11/2016	11/11/2016	11/11/2016	11/11/2016
Type of sample		water	water	water	water	water
Date extracted	-	15/11/2016	15/11/2016	15/11/2016	15/11/2016	15/11/2016
Date analysed	-	15/11/2016	15/11/2016	15/11/2016	15/11/2016	15/11/2016
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Total Phenolics in Water		
Our Reference:	UNITS	157226-6
Your Reference	---------- -	AC111116-06
Date Sampled	----------	11/11/2016
Type of sample		water
Date extracted	-	15/11/2016
Date analysed	-	15/11/2016
Total Phenolics (as Phenol)	mg/L	<0.05

Client Reference: E16016BN

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	157226-1 AC111116-01 11/11/2016 water	157226-2 AC111116-02 11/11/2016 water	157226-3 AC111116-03 11/11/2016 water	157226-4 AC111116-04 11/11/2016 water	157226-5 AC111116-05 11/11/2016 water
Date prepared	-	15/11/2016	15/11/2016	15/11/2016	15/11/2016	15/11/2016
Date analysed	-	15/11/2016	15/11/2016	15/11/2016	15/11/2016	15/11/2016
Arsenic-Dissolved	µg/L	<1	<1	<1	12	1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Lead-Dissolved	µg/L	1	1	1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	10	11	2	2	<1
Zinc-Dissolved	µg/L	32	34	3	10	3

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	157226-6 AC111116-06 11/11/2016 water
Date prepared	-	15/11/2016
Date analysed	-	15/11/2016
Arsenic-Dissolved	µg/L	5
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	2
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	6
Zinc-Dissolved	µg/L	25

Client Reference: E16016BN

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021	Determination of Mercury by Cold Vapour AAS.

Client Reference: E16016BN

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/11/2016	157226-3	14/11/2016 || 14/11/2016	LCS-W1	14/11/2016
Date analysed	-			15/11/2016	157226-3	15/11/2016 || 15/11/2016	LCS-W1	15/11/2016
TRHC6 - C9	µg/L	10	Org-016	<10	157226-3	100 || 110 || RPD: 10	LCS-W1	115%
TRHC6 - C10	µg/L	10	Org-016	<10	157226-3	130 || 140 || RPD: 7	LCS-W1	115%
Benzene	µg/L	1	Org-016	<1	157226-3	1 || 1 || RPD: 0	LCS-W1	122%
Toluene	µg/L	1	Org-016	<1	157226-3	<1 || <1	LCS-W1	123%
Ethylbenzene	µg/L	1	Org-016	<1	157226-3	<1 || <1	LCS-W1	108%
m+p-xylene	µg/L	2	Org-016	<2	157226-3	<2 || <2	LCS-W1	111%
o-xylene	µg/L	1	Org-016	<1	157226-3	<1 || <1	LCS-W1	113%
Naphthalene	µg/L	1	Org-013	<1	157226-3	<1 || <1	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	100	157226-3	110 || 114 || RPD: 4	LCS-W1	95%
Surrogate toluene-d8	%		Org-016	110	157226-3	103 || 102 || RPD: 1	LCS-W1	111%
Surrogate 4-BFB	%		Org-016	102	157226-3	100 || 102 || RPD: 2	LCS-W1	101%
QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/11/2016	[NT]	[NT]	LCS-W1	16/11/2016
Date analysed	-			16/11/2016	[NT]	[NT]	LCS-W1	16/11/2016
TRHC10 - C14	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	100%
TRHC15 - C28	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	96%
TRHC29 - C36	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	119%
TRH>C10 - C16	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	100%
TRH>C16 - C34	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	96%
TRH>C34 - C40	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	119%
Surrogate o-Terphenyl	%		Org-003	75	[NT]	[NT]	LCS-W1	93%
QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/11/2016	[NT]	[NT]	LCS-W1	16/11/2016
Date analysed	-			16/11/2016	[NT]	[NT]	LCS-W1	16/11/2016
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	84%
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	80%
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	92%
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	77%
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	77%
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]

Client Reference: E16016BN

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Benzo(b,j+k) fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W1	102%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	90	[NT]	[NT]	LCS-W1	82%
QUALITY CONTROL Total Phenolics in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			15/11/2016	[NT]	[NT]	LCS-W1	15/11/2016
Date analysed	-			15/11/2016	[NT]	[NT]	LCS-W1	15/11/2016
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	LCS-W1	108%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			15/11/2016	[NT]	[NT]	LCS-W2	15/11/2016
Date analysed	-			15/11/2016	[NT]	[NT]	LCS-W2	15/11/2016
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	98%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W2	99%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	93%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	88%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	103%
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	LCS-W2	106%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	92%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	95%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	157226-1	16/11/2016 || 16/11/2016	157226-2	16/11/2016
Date analysed	-	157226-1	16/11/2016 || 16/11/2016	157226-2	16/11/2016
$TRHC_{10}$ - C_{14}	µg/L	157226-1	<50 || <50	157226-2	117%
$TRHC_{15}$ - C_{28}	µg/L	157226-1	<100 || <100	157226-2	110%
$TRHC_{29}$ - C_{36}	µg/L	157226-1	<100 || <100	157226-2	123%
$TRH>C_{10}$ - C_{16}	µg/L	157226-1	<50 || <50	157226-2	117%

Client Reference: E16016BN

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
TRH>C_{16} - C_{34}	µg/L	157226-1	<100 || <100	157226-2	110%
TRH>C_{34} - C_{40}	µg/L	157226-1	<100 || <100	157226-2	123%
Surrogate o-Terphenyl	%	157226-1	80 || 86 || RPD: 7	157226-2	85%
QUALITY CONTROL PAHs in Water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	157226-1	16/11/2016 || 16/11/2016	157226-2	16/11/2016
Date analysed	-	157226-1	16/11/2016 || 16/11/2016	157226-2	16/11/2016
Naphthalene	µg/L	157226-1	<1 || <1	157226-2	81%
Acenaphthylene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Acenaphthene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Fluorene	µg/L	157226-1	<1 || <1	157226-2	71%
Phenanthrene	µg/L	157226-1	<1 || <1	157226-2	76%
Anthracene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Fluoranthene	µg/L	157226-1	<1 || <1	157226-2	64%
Pyrene	µg/L	157226-1	<1 || <1	157226-2	68%
Benzo(a)anthracene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Chrysene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Benzo(b,j+k)fluoranthene	µg/L	157226-1	<2 || <2	[NR]	[NR]
Benzo(a)pyrene	µg/L	157226-1	<1 || <1	157226-2	93%
Indeno(1,2,3-c,d)pyrene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	157226-1	<1 || <1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	157226-1	81 || 98 || RPD: 19	157226-2	81%

Client Reference: E16016BN

QUALITY CONTROL Total Phenolics in Water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	157226-1	15/11/2016 || 15/11/2016
Date analysed	-	157226-1	15/11/2016 || 15/11/2016
Total Phenolics (as Phenol)	mg/L	157226-1	<0.05 || <0.05

QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	157226-1	15/11/2016 || 15/11/2016	157226-2	15/11/2016
Date analysed	-	157226-1	15/11/2016 || 15/11/2016	157226-2	15/11/2016
Arsenic-Dissolved	µg/L	157226-1	<1 || <1	157226-2	95%
Cadmium-Dissolved	µg/L	157226-1	<0.1 || <0.1	157226-2	98%
Chromium-Dissolved	µg/L	157226-1	<1 || <1	157226-2	88%
Copper-Dissolved	µg/L	157226-1	<1 || <1	157226-2	83%
Lead-Dissolved	µg/L	157226-1	1 || <1	157226-2	96%
Mercury-Dissolved	µg/L	157226-1	<0.05 || <0.05	157226-2	107%
Nickel-Dissolved	µg/L	157226-1	10 || 11 || RPD: 10	157226-2	87%
Zinc-Dissolved	µg/L	157226-1	32 || 32 || RPD: 0	157226-2	92%

Client Reference: **E16016BN**

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
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Client Reference: E16016BN

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 batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16016BN	**Envirolab Services** 12 Ashley St, Chatswood, NSW, 2067
Project Mgr:	McCormack	**PO No.:**	Phone: 02 9910 6200
Sampler:	A. Chiem	**Envirolab Services Quote No. :**	Fax: 02 9910 6201
Address:	82 Bridge Street Lane Cove NSW 2066	**Date results required:** **Or choose: standard / 1 day / 2 day / 3 day** 5 days	E-mail: ahie@envirolabservices.com.au
Email:	stephen@geoenvironmental.com.au andy@geoenvironmental.com.au	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**Contact: Aileen Hie**
Phone:	0431 480 980		

Sample information				Tests Required														Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 5	Combination 5a	Combination 4	TRH/BTEX	Metals (Std8)	Asbestos	VOCs	PAH	BTEX	TRH(C6-C9)/BTEX	EC	hardness	CEC/pH	Provide as much information about the sample as you can
1	AC111116-01	11/11/2016	water					1											
2	AC111116-02	11/11/2016	water					1											
3	AC111116-03	11/11/2016	water					1											
4	AC111116-04	11/11/2016	water					1											
5	AC111116-05	11/11/2016	water					1											
6	AC111116-06	11/11/2016	water					1											
7	Trip Blank	--	water												1				
8	Trip Spike	--	water											1					

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 157226
Date Received: 14/11/2016
Time Received: 10 45
Received by: PR
Temp: Cool/Ambient 12.5
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ECS	**Samples Received:** Cool or Ambient (circle one)
Print Name:	A. Chiem	**Print Name:** P. Raj	**Temperature Recieved at:** 12.5 (if applicable)
Date & Time:	14/11/16	**Date & Time:** 14/11/2016 10:45	**Transported by:** Hand delivered / courier
Signature:		**Signature:** PR	**Page No:** 1 of 1

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS **157226-A**

Client:
Geo-Environmental Engineering
82 Bridge St
Lane Cove
NSW 2066

Attention: Stephen McCormack

Sample log in details:

Your Reference:	**E16016BN**		
No. of samples:	Additional testing		
Date samples received / completed instructions received	14/11/16	/	28/11/16

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:	30/11/16	/	30/11/16
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 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Envirolab Reference: 157226-A
Revision No: R 00

ACCREDITED FOR TECHNICAL COMPETENCE

Client Reference: E16016BN

Cations in water Dissolved						
Our Reference:	UNITS	157226-A-1	157226-A-2	157226-A-3	157226-A-4	157226-A-5
Your Reference	---------- -	AC111116-01	AC111116-02	AC111116-03	AC111116-04	AC111116-05
Date Sampled	----------	11/11/2016	11/11/2016	11/11/2016	11/11/2016	11/11/2016
Type of sample		water	water	water	water	water
Date digested	-	29/11/2016	29/11/2016	29/11/2016	29/11/2016	29/11/2016
Date analysed	-	29/11/2016	29/11/2016	29/11/2016	29/11/2016	29/11/2016
Calcium - Dissolved	mg/L	12	12	26	38	110
Magnesium - Dissolved	mg/L	26	26	23	13	15
Hardness	mgCaCO3/L	140	140	160	150	330

Cations in water Dissolved		
Our Reference:	UNITS	157226-A-6
Your Reference	---------- -	AC111116-06
Date Sampled	----------	11/11/2016
Type of sample		water
Date digested	-	29/11/2016
Date analysed	-	29/11/2016
Calcium - Dissolved	mg/L	30
Magnesium - Dissolved	mg/L	30
Hardness	mgCaCO3/L	200

Client Reference: E16016BN

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.

Client Reference: E16016BN

QUALITY CONTROL Cations in water Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			29/11/2016	157226-A-4	29/11/2016 || 29/11/2016	LCS-W1	29/11/2016
Date analysed	-			29/11/2016	157226-A-4	29/11/2016 || 29/11/2016	LCS-W1	29/11/2016
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	157226-A-4	38 || 39 || RPD: 3	LCS-W1	104%
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	157226-A-4	13 || 14 || RPD: 7	LCS-W1	104%
Hardness	mgCaCO3/L	3		[NT]	157226-A-4	150 || 150 || RPD: 0	[NR]	[NR]

Client Reference: **E16016BN**

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
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<: Less than	>: Greater than	LCS: Laboratory Control Sample

Client Reference: E16016BN

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Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Geo-Environmental Engineering Pty Ltd
82 Bridge St
Lane Cove
NSW 2066

Attention: **Stephen McCormack**

Report **521920-S**
Project name E16016BN
Received Date Nov 01, 2016

Client Sample ID			**SM011116-12**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**S16-No00764**
Date Sampled			**Nov 01, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-36 (Total)	50	mg/kg	< 50
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	66
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5

Client Sample ID			SM011116-12
Sample Matrix			Soil
Eurofins | mgt Sample No.			S16-No00764
Date Sampled			Nov 01, 2016
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	108
p-Terphenyl-d14 (surr.)	1	%	81
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
Heavy Metals			
Arsenic	2	mg/kg	20
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	34
Copper	5	mg/kg	17
Lead	5	mg/kg	66
Mercury	0.05	mg/kg	< 0.05
Nickel	5	mg/kg	15
Zinc	5	mg/kg	64
% Moisture	1	%	16

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Nov 08, 2016	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
BTEX	Sydney	Nov 07, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Nov 07, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Sydney	Nov 08, 2016	14 Day
- Method: E007 Polyaromatic Hydrocarbons (PAH)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Nov 07, 2016	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Metals M8	Sydney	Nov 07, 2016	28 Day
- Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS			
% Moisture	Sydney	Nov 01, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Geo-Environmental Engineering P/L	**Order No.:**		**Received:**	Nov 1, 2016 6:00 PM
Address:	82 Bridge St Lane Cove NSW 2066	**Report #:**	521920	**Due:**	Nov 9, 2016
		Phone:	02 9592 0218	**Priority:**	5 Day
		Fax:	02 9519 9140	**Contact Name:**	Stephen McCormack
Project Name:	E16016BN				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217						X	X
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	SM011116-12	Nov 01, 2016		Soil	S16-No00764	X	X
Test Counts						1	1

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE**: pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.05			0.05	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	105			70-130	Pass	
TRH C10-C14	%	107			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	113			70-130	Pass	
Toluene	%	113			70-130	Pass	
Ethylbenzene	%	113			70-130	Pass	
m&p-Xylenes	%	112			70-130	Pass	
o-Xylene	%	113			70-130	Pass	
Xylenes - Total	%	112			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	106			70-130	Pass	
TRH C6-C10	%	98			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	105			70-130	Pass	
Acenaphthylene	%	107			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	108			70-130	Pass	
Benzo(a)pyrene	%	93			70-130	Pass	
Benzo(b&j)fluoranthene	%	84			70-130	Pass	
Benzo(k)fluoranthene	%	81			70-130	Pass	
Chrysene	%	110			70-130	Pass	
Fluoranthene	%	114			70-130	Pass	
Fluorene	%	104			70-130	Pass	
Naphthalene	%	110			70-130	Pass	
Phenanthrene	%	123			70-130	Pass	
Pyrene	%	125			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	104			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	94			70-130	Pass	
Cadmium	%	106			70-130	Pass	
Chromium	%	93			70-130	Pass	
Copper	%	94			70-130	Pass	
Lead	%	103			70-130	Pass	
Mercury	%	94			70-130	Pass	
Nickel	%	90			70-130	Pass	
Zinc	%	98			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S16-No02620	NCP	%	86			70-130	Pass	
TRH C10-C14	S16-No03259	NCP	%	108			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S16-No02620	NCP	%	103			70-130	Pass	
Toluene	S16-No02620	NCP	%	103			70-130	Pass	
Ethylbenzene	S16-No02620	NCP	%	102			70-130	Pass	
m&p-Xylenes	S16-No02620	NCP	%	102			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
o-Xylene	S16-No02620	NCP	%	102			70-130	Pass	
Xylenes - Total	S16-No02620	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-No02620	NCP	%	88			70-130	Pass	
TRH C6-C10	S16-No02620	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S16-No04669	NCP	%	87			70-130	Pass	
Acenaphthylene	S16-No04669	NCP	%	95			70-130	Pass	
Anthracene	S16-No04669	NCP	%	85			70-130	Pass	
Benz(a)anthracene	S16-No02486	NCP	%	109			70-130	Pass	
Benzo(a)pyrene	S16-No02486	NCP	%	111			70-130	Pass	
Benzo(b&j)fluoranthene	S16-No02486	NCP	%	108			70-130	Pass	
Benzo(k)fluoranthene	S16-No02486	NCP	%	118			70-130	Pass	
Chrysene	S16-No02486	NCP	%	118			70-130	Pass	
Fluoranthene	S16-No02486	NCP	%	123			70-130	Pass	
Fluorene	S16-No04669	NCP	%	88			70-130	Pass	
Naphthalene	S16-No04669	NCP	%	95			70-130	Pass	
Phenanthrene	S16-No02486	NCP	%	121			70-130	Pass	
Pyrene	S16-No02486	NCP	%	124			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S16-No03259	NCP	%	119			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S16-No01842	NCP	%	89			70-130	Pass	
Cadmium	S16-No07198	NCP	%	107			70-130	Pass	
Chromium	S16-No07198	NCP	%	86			70-130	Pass	
Copper	S16-No07198	NCP	%	72			70-130	Pass	
Lead	S16-No07198	NCP	%	86			70-130	Pass	
Mercury	S16-No07198	NCP	%	93			70-130	Pass	
Nickel	S16-No01842	NCP	%	95			70-130	Pass	
Zinc	S16-No07198	NCP	%	90			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-No00764	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S16-No03258	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S16-No03258	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S16-No03258	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S16-No00764	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S16-No00764	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S16-No00764	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S16-No00764	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S16-No00764	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S16-No00764	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-No00764	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S16-No00764	CP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S16-No02496	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-No03258	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S16-No03258	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S16-No03258	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S16-No01992	NCP	mg/kg	6.7	6.5	4.0	30%	Pass	
Cadmium	S16-No07197	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S16-No01992	NCP	mg/kg	18	18	1.0	30%	Pass	
Copper	S16-No01992	NCP	mg/kg	12	12	2.0	30%	Pass	
Lead	S16-No01992	NCP	mg/kg	15	16	11	30%	Pass	
Mercury	S16-No01992	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Nickel	S16-No01992	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S16-No01992	NCP	mg/kg	11	9.5	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S16-No04537	NCP	%	20	19	7.0	30%	Pass	

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Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
BTEX	1	1	1	1	1
Total Recoverable Hydrocarbons - 1999 NEPM	1	1	1	1	1
Total Recoverable Hydrocarbons - 2013 NEPM	1	1	1	1	1
Polycyclic Aromatic Hydrocarbons	1	1	1	1	1
Heavy Metals	1	1	1	1	1
% Moisture	1	1	NA	NA	NA

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

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Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Andrew Black	Analytical Services Manager
Ryan Hamilton	Senior Analyst-Inorganic (NSW)
Ryan Hamilton	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Sample Receipt Advice

Company name:	**Geo-Environmental Engineering P/L**
Contact name:	Stephen McCormack
Project name:	E16016BN
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 1, 2016 6:00 PM
Eurofins | mgt reference:	**521920**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Stephen McCormack - stephen@geoenvironmental.com.au.

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CERTIFICATE OF ANALYSIS **171789**

Client:
Geo-Environmental Engineering
82 Bridge St
Lane Cove
NSW 2066

Attention: S McCormack

Sample log in details:

Your Reference:	**E16016BN**	
No. of samples:	28 Soils	
Date samples received / completed instructions received	19/07/17	/ 20/07/17

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:	27/07/17	/ 27/07/17
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 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Envirolab Reference: 171789
Revision No: R 00

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Client Reference: E16016BN

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	171789-1	171789-3	171789-6	171789-7	171789-8
Your Reference	---------- -	JL190717-01	JL190717-03	JL190717-06	JL190717-07	JL190717-08
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	76	72	75	81	81

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	171789-10	171789-11	171789-14	171789-16	171789-18
Your Reference	---------- -	JL190717-10	JL190717-11	JL190717-14	JL190717-16	JL190717-18
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	79	82	78	84	83

Client Reference: E16016BN

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	171789-19	171789-21	171789-24	171789-27	171789-28
Your Reference	----------	JL190717-19	JL190717-21	JL190717-24	Trip Blank	Trip Spike
	-					
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	[NA]
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	[NA]
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	103%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	95%
Ethylbenzene	mg/kg	<1	<1	<1	<1	118%
m+p-xylene	mg/kg	<2	<2	<2	<2	96%
o-Xylene	mg/kg	<1	<1	<1	<1	106%
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	[NA]
naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	85	81	75	83	101

Client Reference: E16016BN

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	171789-1	171789-3	171789-6	171789-7	171789-8
Your Reference	---------- -	JL190717-01	JL190717-03	JL190717-06	JL190717-07	JL190717-08
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	240	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	750	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	790	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	480	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	1,300	<50	<50	<50	<50
Surrogate o-Terphenyl	%	106	97	95	94	94

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	171789-10	171789-11	171789-14	171789-16	171789-18
Your Reference	---------- -	JL190717-10	JL190717-11	JL190717-14	JL190717-16	JL190717-18
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	93	94	92	93	92

Client Reference: E16016BN

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	171789-19	171789-21	171789-24
Your Reference	---------- -	JL190717-19	JL190717-21	JL190717-24
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH>C_{10}-C_{16}	mg/kg	<50	<50	<50
TRH>C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH>C_{16}-C_{34}	mg/kg	<100	<100	<100
TRH>C_{34}-C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	93	93	94

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	171789-1 JL190717-01 19/07/2017 Soil	171789-3 JL190717-03 19/07/2017 Soil	171789-6 JL190717-06 19/07/2017 Soil	171789-7 JL190717-07 19/07/2017 Soil	171789-8 JL190717-08 19/07/2017 Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.1	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.5	0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.50	1.3	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	90	100	92	94	93

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	171789-10 JL190717-10 19/07/2017 Soil	171789-11 JL190717-11 19/07/2017 Soil	171789-14 JL190717-14 19/07/2017 Soil	171789-16 JL190717-16 19/07/2017 Soil	171789-18 JL190717-18 19/07/2017 Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.05	<0.05	<0.05	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.06	<0.05	<0.05	1.0	<0.05
Surrogate p-Terphenyl-d14	%	94	97	99	90	95

Client Reference: E16016BN

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-19 JL190717-19 19/07/2017 Soil	171789-21 JL190717-21 19/07/2017 Soil	171789-24 JL190717-24 19/07/2017 Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	0.2
Pyrene	mg/kg	<0.1	0.2	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.06	0.1	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.1	0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.06	0.76	0.83
Surrogate p-Terphenyl-d14	%	99	96	103

Client Reference: E16016BN

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ----------	171789-6 JL190717-06 19/07/2017 Soil	171789-7 JL190717-07 19/07/2017 Soil	171789-11 JL190717-11 19/07/2017 Soil	171789-14 JL190717-14 19/07/2017 Soil	171789-16 JL190717-16 19/07/2017 Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	0.6	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total+veDDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	95	93	95	94

Client Reference: E16016BN

Organochlorine Pesticides in soil		
Our Reference:	UNITS	171789-24
Your Reference	----------	JL190717-24
	-	
Date Sampled	----------	19/07/2017
Type of sample		Soil
Date extracted	-	21/07/2017
Date analysed	-	21/07/2017
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total+veDDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	93

Client Reference: E16016BN

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-6 JL190717-06 19/07/2017 Soil	171789-7 JL190717-07 19/07/2017 Soil	171789-11 JL190717-11 19/07/2017 Soil	171789-14 JL190717-14 19/07/2017 Soil	171789-16 JL190717-16 19/07/2017 Soil
Date extracted	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	95	95	93	95	94

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-24 JL190717-24 19/07/2017 Soil
Date extracted	-	21/07/2017
Date analysed	-	21/07/2017
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	93

Client Reference: E16016BN

Acid Extractable metals in soil						
Our Reference:	UNITS	171789-1	171789-3	171789-4	171789-6	171789-7
Your Reference	---------- -	JL190717-01	JL190717-03	JL190717-04	JL190717-06	JL190717-07
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Arsenic	mg/kg	8	5	<4	4	7
Cadmium	mg/kg	0.9	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	12	15	22	16
Copper	mg/kg	34	13	1	24	29
Lead	mg/kg	590	74	14	9	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	9	2	27	24
Zinc	mg/kg	250	75	21	30	39

Acid Extractable metals in soil						
Our Reference:	UNITS	171789-8	171789-9	171789-10	171789-11	171789-12
Your Reference	---------- -	JL190717-08	JL190717-09	JL190717-10	JL190717-11	JL190717-12
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Arsenic	mg/kg	<4	6	4	14	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	9	9	10	12
Copper	mg/kg	<1	9	11	8	2
Lead	mg/kg	1	43	29	65	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	2	2	3	2
Zinc	mg/kg	2	40	11	94	51

Acid Extractable metals in soil						
Our Reference:	UNITS	171789-14	171789-15	171789-16	171789-18	171789-19
Your Reference	---------- -	JL190717-14	JL190717-15	JL190717-16	JL190717-18	JL190717-19
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Arsenic	mg/kg	5	4	5	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.5
Chromium	mg/kg	12	9	12	3	11
Copper	mg/kg	11	8	26	4	19
Lead	mg/kg	42	86	180	3	170
Mercury	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	2	3	3	<1	3
Zinc	mg/kg	36	130	180	18	220

Envirolab Reference: 171789
Revision No: R 00

Client Reference: E16016BN

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-20 JL190717-20 19/07/2017 Soil	171789-21 JL190717-21 19/07/2017 Soil	171789-22 JL190717-22 19/07/2017 Soil	171789-24 JL190717-24 19/07/2017 Soil	171789-26 JL190717-26 19/07/2017 Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Arsenic	mg/kg	<4	5	<4	6	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	0.7	<0.4
Chromium	mg/kg	2	11	5	14	8
Copper	mg/kg	<1	28	<1	45	3
Lead	mg/kg	6	280	9	190	8
Mercury	mg/kg	<0.1	2.0	<0.1	0.1	<0.1
Nickel	mg/kg	<1	3	1	6	2
Zinc	mg/kg	19	270	6	380	25

Client Reference: E16016BN

Moisture						
Our Reference:	UNITS	171789-1	171789-3	171789-4	171789-6	171789-7
Your Reference	---------- -	JL190717-01	JL190717-03	JL190717-04	JL190717-06	JL190717-07
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Moisture	%	7.8	21	15	2.6	6.1

Moisture						
Our Reference:	UNITS	171789-8	171789-9	171789-10	171789-11	171789-12
Your Reference	---------- -	JL190717-08	JL190717-09	JL190717-10	JL190717-11	JL190717-12
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Moisture	%	4.4	22	17	7.8	9.3

Moisture						
Our Reference:	UNITS	171789-14	171789-15	171789-16	171789-18	171789-19
Your Reference	---------- -	JL190717-14	JL190717-15	JL190717-16	JL190717-18	JL190717-19
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Moisture	%	22	20	15	12	7.9

Moisture						
Our Reference:	UNITS	171789-20	171789-21	171789-22	171789-24	171789-26
Your Reference	---------- -	JL190717-20	JL190717-21	JL190717-22	JL190717-24	JL190717-26
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Moisture	%	9.8	18	12	17	13

Client Reference: E16016BN

Asbestos ID - soils				
Our Reference:	UNITS	171789-11	171789-16	171789-24
Your Reference	---------- -	JL190717-11	JL190717-16	JL190717-24
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil
Date analysed	-	27/07/2017	27/07/2017	27/07/2017
Sample mass tested	g	Approx. 35g	Approx. 30g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Client Reference: E16016BN

Misc Inorg - Soil						
Our Reference:	UNITS	171789-1	171789-3	171789-4	171789-6	171789-8
Your Reference	---------- -	JL190717-01	JL190717-03	JL190717-04	JL190717-06	JL190717-08
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
pH 1:5 soil:water	pH Units	6.6	7.3	7.4	8.6	8.5

Misc Inorg - Soil						
Our Reference:	UNITS	171789-9	171789-10	171789-11	171789-12	171789-14
Your Reference	---------- -	JL190717-09	JL190717-10	JL190717-11	JL190717-12	JL190717-14
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
pH 1:5 soil:water	pH Units	7.7	7.2	6.8	6.5	6.9

Misc Inorg - Soil						
Our Reference:	UNITS	171789-15	171789-16	171789-18	171789-19	171789-20
Your Reference	---------- -	JL190717-15	JL190717-16	JL190717-18	JL190717-19	JL190717-20
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
pH 1:5 soil:water	pH Units	8.0	5.7	6.4	6.3	6.4

Misc Inorg - Soil					
Our Reference:	UNITS	171789-21	171789-22	171789-24	171789-26
Your Reference	---------- -	JL190717-21	JL190717-22	JL190717-24	JL190717-26
Date Sampled	----------	19/07/2017	19/07/2017	19/07/2017	19/07/2017
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017
pH 1:5 soil:water	pH Units	6.2	6.7	6.2	6.2

Client Reference: E16016BN

CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-1 JL190717-01 19/07/2017 Soil	171789-3 JL190717-03 19/07/2017 Soil	171789-4 JL190717-04 19/07/2017 Soil	171789-6 JL190717-06 19/07/2017 Soil	171789-8 JL190717-08 19/07/2017 Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Exchangeable Ca	meq/100g	19	5.8	5.2	25	0.3
Exchangeable K	meq/100g	0.2	<0.1	0.2	0.3	<0.1
Exchangeable Mg	meq/100g	1.0	0.40	0.57	4.3	<0.1
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	0.15	<0.1
Cation Exchange Capacity	meq/100g	20	6.3	6.0	29	<1.0

CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-9 JL190717-09 19/07/2017 Soil	171789-10 JL190717-10 19/07/2017 Soil	171789-11 JL190717-11 19/07/2017 Soil	171789-12 JL190717-12 19/07/2017 Soil	171789-14 JL190717-14 19/07/2017 Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Exchangeable Ca	meq/100g	18	5.0	5.5	3.5	11
Exchangeable K	meq/100g	0.5	0.2	0.1	<0.1	0.6
Exchangeable Mg	meq/100g	2.2	1.3	0.74	0.60	0.75
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	0.14
Cation Exchange Capacity	meq/100g	20	6.6	6.4	4.2	12

CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-15 JL190717-15 19/07/2017 Soil	171789-16 JL190717-16 19/07/2017 Soil	171789-18 JL190717-18 19/07/2017 Soil	171789-19 JL190717-19 19/07/2017 Soil	171789-20 JL190717-20 19/07/2017 Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Exchangeable Ca	meq/100g	20	5.4	1.4	4.9	1.4
Exchangeable K	meq/100g	0.5	0.2	<0.1	0.2	<0.1
Exchangeable Mg	meq/100g	1.3	0.57	0.19	0.95	0.24
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	22	6.2	1.7	6.1	1.7

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CEC Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	171789-21 JL190717-21 19/07/2017 Soil	171789-22 JL190717-22 19/07/2017 Soil	171789-24 JL190717-24 19/07/2017 Soil	171789-26 JL190717-26 19/07/2017 Soil
Date prepared	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Date analysed	-	24/07/2017	24/07/2017	24/07/2017	24/07/2017
Exchangeable Ca	meq/100g	4.6	1.5	4.9	2.9
Exchangeable K	meq/100g	0.3	<0.1	0.2	<0.1
Exchangeable Mg	meq/100g	1.2	0.11	0.89	0.53
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	6.1	1.7	6.1	3.5

Client Reference: E16016BN

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Metals-020	Determination of various metals by ICP-AES.

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Method ID	Methodology Summary
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

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QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Date analysed	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
TRHC6 - C9	mg/kg	25	Org-016	<25	171789-6	<25 || <25	LCS-7	100%
TRHC6 - C10	mg/kg	25	Org-016	<25	171789-6	<25 || <25	LCS-7	100%
Benzene	mg/kg	0.2	Org-016	<0.2	171789-6	<0.2 || <0.2	LCS-7	86%
Toluene	mg/kg	0.5	Org-016	<0.5	171789-6	<0.5 || <0.5	LCS-7	78%
Ethylbenzene	mg/kg	1	Org-016	<1	171789-6	<1 || <1	LCS-7	110%
m+p-xylene	mg/kg	2	Org-016	<2	171789-6	<2 || <2	LCS-7	114%
o-Xylene	mg/kg	1	Org-016	<1	171789-6	<1 || <1	LCS-7	113%
naphthalene	mg/kg	1	Org-014	<1	171789-6	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	94	171789-6	75 || 80 || RPD: 6	LCS-7	90%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Date analysed	-			24/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
TRHC10 - C14	mg/kg	50	Org-003	<50	171789-6	<50 || <50	LCS-7	107%
TRHC15 - C28	mg/kg	100	Org-003	<100	171789-6	<100 || <100	LCS-7	106%
TRHC29 - C36	mg/kg	100	Org-003	<100	171789-6	<100 || <100	LCS-7	106%
TRH>C10-C16	mg/kg	50	Org-003	<50	171789-6	<50 || <50	LCS-7	107%
TRH>C16-C34	mg/kg	100	Org-003	<100	171789-6	<100 || <100	LCS-7	106%
TRH>C34-C40	mg/kg	100	Org-003	<100	171789-6	<100 || <100	LCS-7	106%
Surrogate o-Terphenyl	%		Org-003	89	171789-6	95 || 95 || RPD: 0	LCS-7	101%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Date analysed	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	104%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	105%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	107%
Anthracene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	102%
Pyrene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	101%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	LCS-7	118%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	171789-6	<0.2 || <0.2	[NR]	[NR]

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QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	171789-6	<0.05 || <0.05	LCS-7	114%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	100	171789-6	92 || 92 || RPD: 0	LCS-7	120%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-10	21/07/2017
Date analysed	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-10	21/07/2017
HCB	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	84%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	102%
Heptachlor	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	106%
delta-BHC	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	99%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	102%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	98%
Dieldrin	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	108%
Endrin	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	97%
pp-DDD	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	102%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	LCS-10	87%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	99	171789-6	95 || 97 || RPD: 2	LCS-10	117%

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QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-10	21/07/2017
Date analysed	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-10	21/07/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	LCS-10	97%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	171789-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	99	171789-6	95 || 97 || RPD: 2	LCS-10	97%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Date analysed	-			21/07/2017	171789-6	21/07/2017 || 21/07/2017	LCS-7	21/07/2017
Arsenic	mg/kg	4	Metals-020	<4	171789-6	4 || 6 || RPD: 40	LCS-7	109%
Cadmium	mg/kg	0.4	Metals-020	<0.4	171789-6	<0.4 || <0.4	LCS-7	100%
Chromium	mg/kg	1	Metals-020	<1	171789-6	22 || 23 || RPD: 4	LCS-7	104%
Copper	mg/kg	1	Metals-020	<1	171789-6	24 || 27 || RPD: 12	LCS-7	106%
Lead	mg/kg	1	Metals-020	<1	171789-6	9 || 11 || RPD: 20	LCS-7	104%
Mercury	mg/kg	0.1	Metals-021	<0.1	171789-6	<0.1 || <0.1	LCS-7	105%
Nickel	mg/kg	1	Metals-020	<1	171789-6	27 || 31 || RPD: 14	LCS-7	99%
Zinc	mg/kg	1	Metals-020	<1	171789-6	30 || 38 || RPD: 24	LCS-7	101%
QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/07/2017	[NT]	[NT]	LCS-7	24/07/2017
Date analysed	-			24/07/2017	[NT]	[NT]	LCS-7	24/07/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-7	101%
QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/07/2017	[NT]	[NT]	LCS-1	24/07/2017
Date analysed	-			24/07/2017	[NT]	[NT]	LCS-1	24/07/2017
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	99%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	105%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	96%

Client Reference: E16016BN

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Exchangeable Na	meq/100 g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Date analysed	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
$TRHC_6$ - C_9	mg/kg	171789-18	<25 || <25	171789-7	90%
$TRHC_6$ - C_{10}	mg/kg	171789-18	<25 || <25	171789-7	90%
Benzene	mg/kg	171789-18	<0.2 || <0.2	171789-7	77%
Toluene	mg/kg	171789-18	<0.5 || <0.5	171789-7	69%
Ethylbenzene	mg/kg	171789-18	<1 || <1	171789-7	99%
m+p-xylene	mg/kg	171789-18	<2 || <2	171789-7	103%
o-Xylene	mg/kg	171789-18	<1 || <1	171789-7	102%
naphthalene	mg/kg	171789-18	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	171789-18	83 || 79 || RPD: 5	171789-7	81%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Date analysed	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
$TRHC_{10}$ - C_{14}	mg/kg	171789-18	<50 || <50	171789-7	101%
$TRHC_{15}$ - C_{28}	mg/kg	171789-18	<100 || <100	171789-7	102%
$TRHC_{29}$ - C_{36}	mg/kg	171789-18	<100 || <100	171789-7	103%
$TRH>C_{10}$-C_{16}	mg/kg	171789-18	<50 || <50	171789-7	101%
$TRH>C_{16}$-C_{34}	mg/kg	171789-18	<100 || <100	171789-7	102%
$TRH>C_{34}$-C_{40}	mg/kg	171789-18	<100 || <100	171789-7	103%
Surrogate o-Terphenyl	%	171789-18	92 || 91 || RPD: 1	171789-7	94%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Date analysed	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Naphthalene	mg/kg	171789-18	<0.1 || <0.1	171789-7	105%
Acenaphthylene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	171789-18	<0.1 || <0.1	171789-7	102%
Phenanthrene	mg/kg	171789-18	<0.1 || <0.1	171789-7	106%
Anthracene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	171789-18	<0.1 || <0.1	171789-7	99%
Pyrene	mg/kg	171789-18	<0.1 || <0.1	171789-7	98%
Benzo(a)anthracene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	171789-18	<0.1 || <0.1	171789-7	117%

Client Reference: E16016BN

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(b,j+k)fluoranthene	mg/kg	171789-18	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	171789-18	<0.05 || <0.05	171789-7	122%
Indeno(1,2,3-c,d)pyrene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	171789-18	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	171789-18	95 || 96 || RPD: 1	171789-7	114%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	[NT]	[NT]
Date analysed	-	[NT]	[NT]
HCB	mg/kg	[NT]	[NT]
alpha-BHC	mg/kg	[NT]	[NT]
gamma-BHC	mg/kg	[NT]	[NT]
beta-BHC	mg/kg	[NT]	[NT]
Heptachlor	mg/kg	[NT]	[NT]
delta-BHC	mg/kg	[NT]	[NT]
Aldrin	mg/kg	[NT]	[NT]
Heptachlor Epoxide	mg/kg	[NT]	[NT]
gamma-Chlordane	mg/kg	[NT]	[NT]
alpha-chlordane	mg/kg	[NT]	[NT]
Endosulfan I	mg/kg	[NT]	[NT]
pp-DDE	mg/kg	[NT]	[NT]
Dieldrin	mg/kg	[NT]	[NT]
Endrin	mg/kg	[NT]	[NT]
pp-DDD	mg/kg	[NT]	[NT]
Endosulfan II	mg/kg	[NT]	[NT]
pp-DDT	mg/kg	[NT]	[NT]
Endrin Aldehyde	mg/kg	[NT]	[NT]
Endosulfan Sulphate	mg/kg	[NT]	[NT]
Methoxychlor	mg/kg	[NT]	[NT]
Surrogate TCMX	%	[NT]	[NT]

Client Reference: E16016BN

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	[NT]	[NT]
Date analysed	-	[NT]	[NT]
Aroclor 1016	mg/kg	[NT]	[NT]
Aroclor 1221	mg/kg	[NT]	[NT]
Aroclor 1232	mg/kg	[NT]	[NT]
Aroclor 1242	mg/kg	[NT]	[NT]
Aroclor 1248	mg/kg	[NT]	[NT]
Aroclor 1254	mg/kg	[NT]	[NT]
Aroclor 1260	mg/kg	[NT]	[NT]
Surrogate TCLMX	%	[NT]	[NT]

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Date analysed	-	171789-18	21/07/2017 || 21/07/2017	171789-7	21/07/2017
Arsenic	mg/kg	171789-18	<4 || <4	171789-7	97%
Cadmium	mg/kg	171789-18	<0.4 || <0.4	171789-7	87%
Chromium	mg/kg	171789-18	3 || 3 || RPD: 0	171789-7	119%
Copper	mg/kg	171789-18	4 || 4 || RPD: 0	171789-7	104%
Lead	mg/kg	171789-18	3 || 4 || RPD: 29	171789-7	78%
Mercury	mg/kg	171789-18	<0.1 || <0.1	171789-7	109%
Nickel	mg/kg	171789-18	<1 || <1	171789-7	123%
Zinc	mg/kg	171789-18	18 || 18 || RPD: 0	171789-7	81%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	171789-1	21/07/2017 || 21/07/2017
Date analysed	-	171789-1	21/07/2017 || 21/07/2017
Arsenic	mg/kg	171789-1	8 || 6 || RPD: 29
Cadmium	mg/kg	171789-1	0.9 || 0.7 || RPD: 25
Chromium	mg/kg	171789-1	16 || 13 || RPD: 21
Copper	mg/kg	171789-1	34 || 43 || RPD: 23
Lead	mg/kg	171789-1	590 || 470 || RPD: 23
Mercury	mg/kg	171789-1	<0.1 || <0.1
Nickel	mg/kg	171789-1	14 || 13 || RPD: 7
Zinc	mg/kg	171789-1	250 || 220 || RPD: 13

Client Reference: E16016BN

QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	171789-1	24/07/2017 || 24/07/2017
Date analysed	-	171789-1	24/07/2017 || 24/07/2017
pH 1:5 soil:water	pH Units	171789-1	6.6 || 6.9 || RPD: 4
QUALITY CONTROL CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	171789-1	24/07/2017 || 24/07/2017
Date analysed	-	171789-1	24/07/2017 || 24/07/2017
Exchangeable Ca	meq/100 g	171789-1	19 || 20 || RPD: 5
Exchangeable K	meq/100 g	171789-1	0.2 || 0.2 || RPD: 0
Exchangeable Mg	meq/100 g	171789-1	1.0 || 1.0 || RPD: 0
Exchangeable Na	meq/100 g	171789-1	<0.1 || <0.1
QUALITY CONTROL CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	171789-15	24/07/2017 || 24/07/2017
Date analysed	-	171789-15	24/07/2017 || 24/07/2017
Exchangeable Ca	meq/100 g	171789-15	20 || 20 || RPD: 0
Exchangeable K	meq/100 g	171789-15	0.5 || 0.5 || RPD: 0
Exchangeable Mg	meq/100 g	171789-15	1.3 || 1.5 || RPD: 14
Exchangeable Na	meq/100 g	171789-15	<0.1 || <0.1
QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	171789-16	24/07/2017 || 24/07/2017
Date analysed	-	171789-16	24/07/2017 || 24/07/2017
pH 1:5 soil:water	pH Units	171789-16	5.7 || 5.9 || RPD: 3

Client Reference: E16016BN

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 171789- 11, 16 & 24 were sub-sampled from jars provided by the client.

Asbestos ID was analysed by Approved Identifier:	Matt Tang
Asbestos ID was authorised by Approved Signatory:	Lulu Scott

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Client Reference: E16016BN

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 batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16016BN	**Envirolab Services** 12 Ashley St, Chatswood, NSW, 2067
Project Mgr:	S. McCormack	**PO No.:**	
Sampler:	J. Long	**Envirolab Services Quote No. :**	**Phone: 02 9910 6200**
Address:	82 Bridge Street Lane Cove NSW 2066	**Date results required:**	**Fax: 02 9910 6201**
Email:	stephen@geoenvironmental.com.au josh@geoenvironmental.com.au	**Or choose: standard / 1 day / 2 day / 3 day** Std *Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**E-mail: ahie@envirolabservices.com.au**
Phone:	0431 480 980		**Contact: Aileen Hie**

Sample information				Tests Required															Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 4	Combination 5b	Combination 5	Combination 5a	OCP/OPPs	Metals (Std8)	pH	VOCs	PAHs	BTEX / Volatile TRH	BTEX	CEC/pH	TRH/BTEX	Provide as much information about the sample as you can
1	JL190717-01	19-07-17	soil jar	1													1		
2	JL190717-02	19-07-17	soil jar																
3	JL190717-03	19-07-17	soil jar	1													1		
4	JL190717-04	19-07-17	soil jar								1						1		
5	JL190717-05	19-07-17	soil jar																
6	JL190717-06	19-07-17	soil jar					1									1		
7	JL190717-07	19-07-17	soil jar					1											
8	JL190717-08	19-07-17	soil jar	1													1		
9	JL190717-09	19-07-17	soil jar								1						1		
10	JL190717-10	19-07-17	soil jar	1													1		
11	JL190717-11	19-07-17	soil jar						1								1		
12	JL190717-12	19-07-17	soil jar								1						1		
13	JL190717-13	19-07-17	soil jar																

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 177589
Date Received: ~~19~~ 19/7/17
Time Received: 15:30
Received by: MT
Temp: Cool/Ambient 16.3
Cooling: Ice/icepack
Security: Intact/Broken/None

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ELS	**Samples Received: Cool or Ambient (circle one)**
Print Name:	S. McCormack	**Print Name:** MT	**Temperature Recieved at:** 16.3 **(if applicable)**
Date & Time:	19-Jul-17	**Date & Time:** 19/7/17 15:30 COC rec'd 20/7/17 14:00	**Transported by: Hand delivered / courier**
Signature:		**Signature:**	**Page No: 1 of 3**

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:** E16016BN	**Envirolab Services** 12 Ashley St, Chatswood, NSW, 2067
Project Mgr:	S. McCormack	**PO No.:**	**Phone: 02 9910 6200**
Sampler:	J. Long	**Envirolab Services Quote No. :**	**Fax: 02 9910 6201**
Address:	82 Bridge Street Lane Cove NSW 2066	**Date results required:**	**E-mail: ahie@envirolabservices.com.au**
Email:	stephen@geoenvironmental.com.au josh@geoenvironmental.com.au	**Or choose: standard / 1 day / 2 day / 3 day** Std	**Contact: Aileen Hie**
Phone:	0431 480 980	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	

Sample information				Tests Required															Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 4	Combination 5b	Combination 5	Combination 5a	OCP/OPPs	Metals (Std8)	pH	VOCs	PAHs	BTEX / Volatile TRH	BTEX	CEC/pH	TRH/BTEX	Provide as much information about the sample as you can
14	JL190717-14	19-07-17	soil jar					1									1		
15	JL190717-15	19-07-17	soil jar								1						1		
16	JL190717-16	19-07-17	soil jar						1								1		
17	JL190717-17	19-07-17	soil jar																
18	JL190717-18	19-07-17	soil jar	1													1		
19	JL190717-19	19-07-17	soil jar	1													1		
20	JL190717-20	19-07-17	soil jar								1						1		
21	JL190717-21	19-07-17	soil jar	1													1		
22	JL190717-22	19-07-17	soil jar								1						1		
23	JL190717-23	19-07-17	soil jar																
24	JL190717-24	19-07-17	soil jar						1								1		
25	JL190717-25	19-07-17	soil jar																
26	JL190717-26	19-07-17	soil jar								1						1		

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):** ELS	**Samples Received: Cool or Ambient (circle one)**
Print Name:	S. McCormack	**Print Name:** MT	**Temperature Recieved at:** (if applicable)
Date & Time:	19-Jul-17	**Date & Time:** 19/7/17 15:30 COC recd 20/7/17 14:00	**Transported by: Hand delivered / courier**
Signature:		**Signature:**	**Page No: 1 of 3**

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Geo-Environmental Engineering Pty Ltd	**Client Project Name and Number:**	**Envirolab Services**
Project Mgr:	S. McCormack	E16016BN	**12 Ashley St, Chatswood, NSW, 2067**
Sampler:	J. Long	**PO No.:**	**Phone: 02 9910 6200**
Address:	82 Bridge Street	**Envirolab Services Quote No. :**	**Fax: 02 9910 6201**
	Lane Cove NSW 2066	**Date results required:**	**E-mail: ahie@envirolabservices.com.au**
Email:	stephen@geoenvironmental.com.au	**Or choose: standard / 1 day / 2 day / 3 day** Std	
	josh@geoenvironmental.com.au	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**Contact: Aileen Hie**
Phone:	0431 480 980		

Sample information				Tests Required														Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combination 3	Combination 3a	Combination 4	Combination 5b	Combination 5	Combination 5a	OCP/OPPs	Metals (Std8)	pH	VOCs	PAHs	BTEX / Volatile TRH	BTEX	CEC/pH	TRH/BTEX	Provide as much information about the sample as you can
27	Trip Blank	19-07-17	Soil Jar												1				
28	Trip Spike	19-07-17	Soil Jar													1			

Relinquished by (company):	Geo-Environmental Engineering	**Received by (company):**	**Samples Received: Cool or Ambient (circle one)**
Print Name:	S. McCormack	**Print Name:**	**Temperature Recieved at: (if applicable)**
Date & Time:	19-Jul-17	**Date & Time:**	**Transported by: Hand delivered / courier**
Signature:		**Signature:**	**Page No: 1 of 3**

Form: 302 - Chain of Custody-Client, Issued 14/02/08, Version 3, Page 1 of 1.

Planning Proposal for a
Proposed Residential Development

88-96 New Illawarra Road & 307-311A Bexley Road, Bexley North

TRAFFIC AND PARKING ASSESSMENT REPORT

5 April 2017

Ref 17160

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants

Suite 6, 20 Young Street, Neutral Bay NSW 2089 - PO Box 1868, Neutral Bay NSW 2089 - Ph: 9904 3224

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Document Verification

Location:	88-96 New Illawarra Rd & 307-311A Bexley Rd, Bexley North	**Job Number**		17160	
Revision	**Details**	**Prepared**		**Approved**	
		By	**Date**	**By**	**Date**
Final	Final for Submission	RV	5/04/17	RV	5/04/17

1. INTRODUCTION

This report has been prepared to accompany a Planning Proposal to Rockdale City Council for a residential development to be located at 88-96 New Illawarra Road and 307-311A Bexley Road, Bexley North (Figures 1 and 2).

The Planning Proposal involves the rezoning of the land from *R2 – Low Density Residential* to *R4 – High Density Residential*. The site is situated approximately 250m walking distance to the entrance of Bexley North Railway Station and is also accessible by several bus services.

The site is also located in close proximity to a variety of shops and services within the Bexley North town centre. The shops and services are located between the railway station and the subject site, and are therefore readily accessible to residents who may be walking on their way home from the station.

To improve the pedestrian accessibility of the site to the nearby shops, services and railway station, consideration could be given to the installation of a pedestrian refuge island in New Illawarra Road in the vicinity of the Fortescue Street intersection.

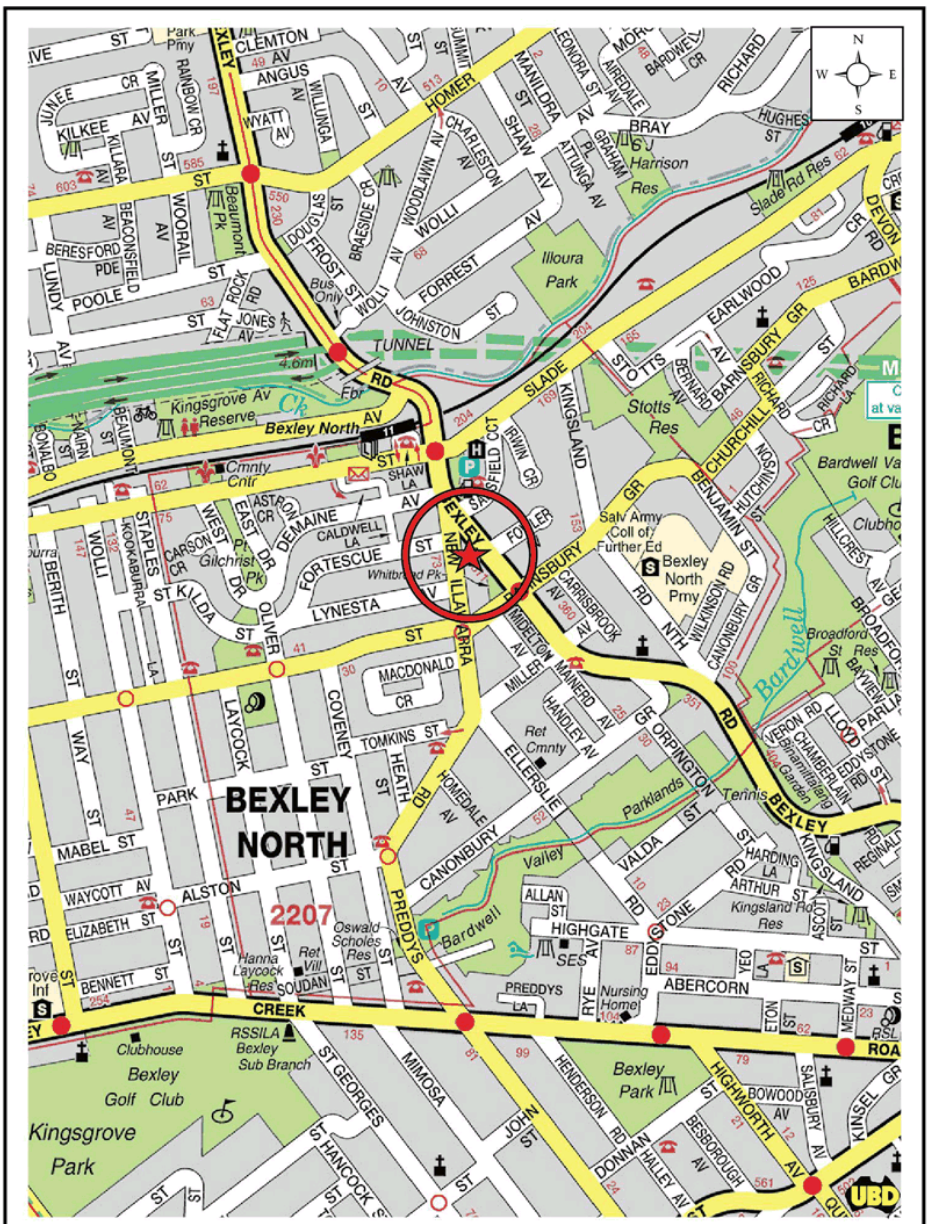
In essence, the site is *ideally located* to encourage increased use of public transport and/or walking to the nearby shops and services.

The Planning Proposal envisages the construction of three new five to six-storey residential apartment buildings resulting in a yield of approximately 100 new dwellings.

Off-street parking is to be provided in two separate new basement car parking areas, with the number of spaces to be provided in accordance with Council's requirements. Vehicular access to the site is to be provided via two separate two-way driveways located off New Illawarra Road.

The purpose of this report is to assess the traffic and parking implications of the Planning Proposal and to that end this report:

- describes the site and provides details of the Planning Proposal
- reviews the road network in the vicinity of the site, and the traffic conditions on that road network
- reviews the public transport services available in the vicinity of the site
- estimates the traffic generation potential of the Planning Proposal, and assigns that traffic generation to the road network serving the site
- assesses the traffic implications of the Planning Proposal in terms of road network capacity
- reviews the off-street car parking requirements applicable to the Planning Proposal.


BEXLEY NORTH
2207
Bexley North
Bexley
Kingsgrove Park
Bexley Golf Club
Clubhouse
RSSILA Bexley Sub Branch
Bexley Park
Illoura Park
Stotts Res
Harrison Res
Parklands
Tennis
Valley
Bardwell
Broadford St Res
Kingsland Rd Res
Oswald Scholes Res
Hanna Laycock Res
Kingsgrove Reserve
Beaumont Pk
Gilchrist Pk
Whitbread Pks
Bexley North Pmy
Salv Army Coll of Further Ed
Nursing Home
Cmnty Cntr
Ret Cmnty
Ret Vill
SES
TUNNEL
4.6m
Bus Only
CREEK
Kingsgrove Av
Slade Rd Res
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
LOCATION
FIGURE 1


KINGSGROVE
AVE
BEXLEY NORTH STATION
BEXLEY
RD
SLADE
CT
IRWIN
CRS
KINGSLAND ROAD NORTH
N
W
E
S
SHAW
ST
CALDWELL
RD
DEMAINE AVE
SARSFIELD
FOWLER AVE
BEXLEY
GR
RD
FORTESCUE ST
NEW ILLAWARRA
LYNESTA AVE
BARNSBURY
CARRSBROOK
AVE
EDWARD ST
MIDELTON AVE
BEXLEY
AVE
RD
McDONAL CRS
RD
MILLER
McDONAL CRS
MAINERD AVE
HANDLEY AVE
TOMKINS ST
ELLERSLIE RD
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
SITE
FIGURE 2

2. PROPOSED DEVELOPMENT

Site

The subject site extends between New Illawarra Road and Bexley Road, opposite Fortescue Street and Fowler Avenue. The site has street frontages approximately 85m in length to New Illawarra Road, approximately 72m in length to Bexley Road and occupies an area of approximately 4,257m^2.

The subject site is currently occupied by six residential dwelling houses as well as a service station with mechanical workshop, all with off-street parking. Vehicular access to the site is currently provided via a number of driveways fronting both New Illawarra Road as well as Bexley Road. A recent aerial image of the site and its surroundings is reproduced below.

Source: Nearmap

Proposed Development

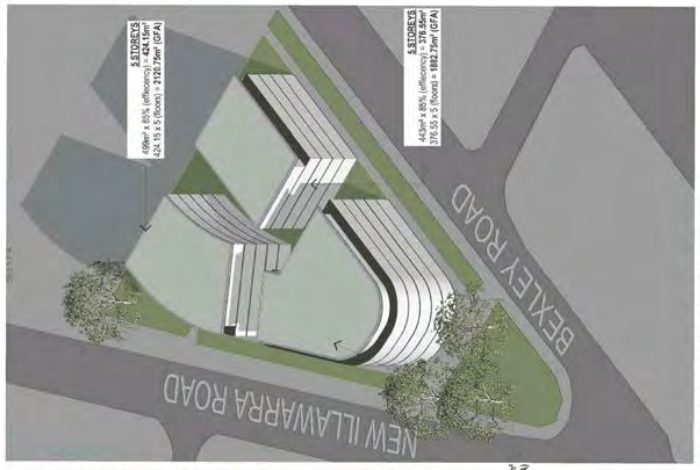
The Planning Proposal involves the rezoning of the land from *R2 – Low Density Residential* to *R4 – High Density Residential.* The Planning Proposal envisages the construction of three new five to six-storey residential apartment buildings resulting in a yield of approximately 100 new dwellings.

Off-street parking is to be provided in two separate new basement car parking areas, with the number of spaces to be provided in accordance with Council's requirements. Vehicular access to the site is to be provided via two separate two-way driveways located off New Illawarra Road.

Concept plans of the Planning Proposal have been prepared by *Urbanlink* and are reproduced on the following pages.

LOCATION PLAN OF PLANNING PROPOSAL SITE

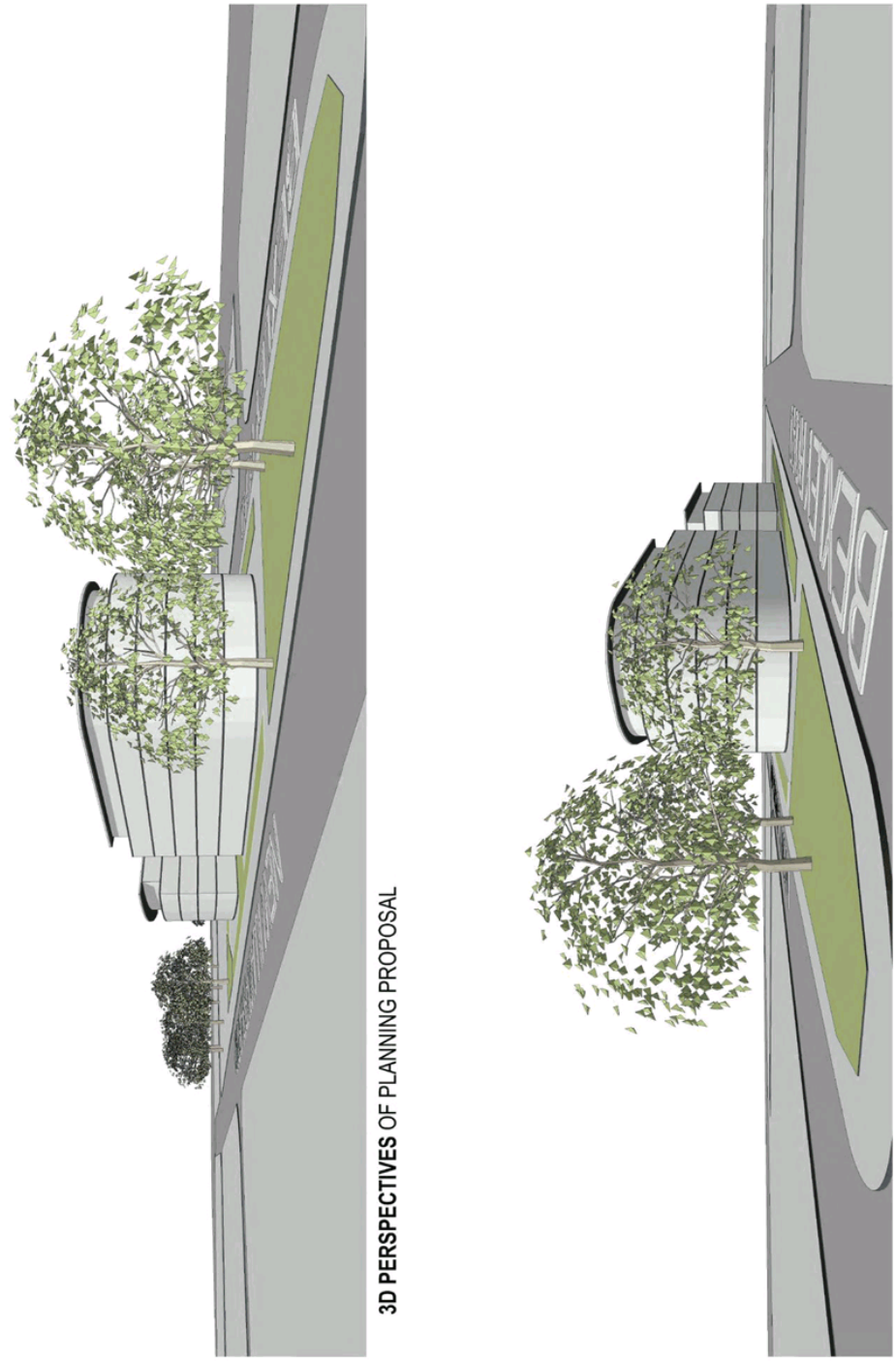

PROPOSED BUILDING SETBACKS
BEXLEY ROAD
NEW ILLAWARRA ROAD
5 STOREY 499 m²
5 STOREY 443 m²
6 STOREY 789 m²
PARK
LEVEL 01
12,000
12,000
12,000
6,000
6,000
18,000
18,000
6,000
6,000
12,000
12,000
15,000
6,000
6,000
6,000



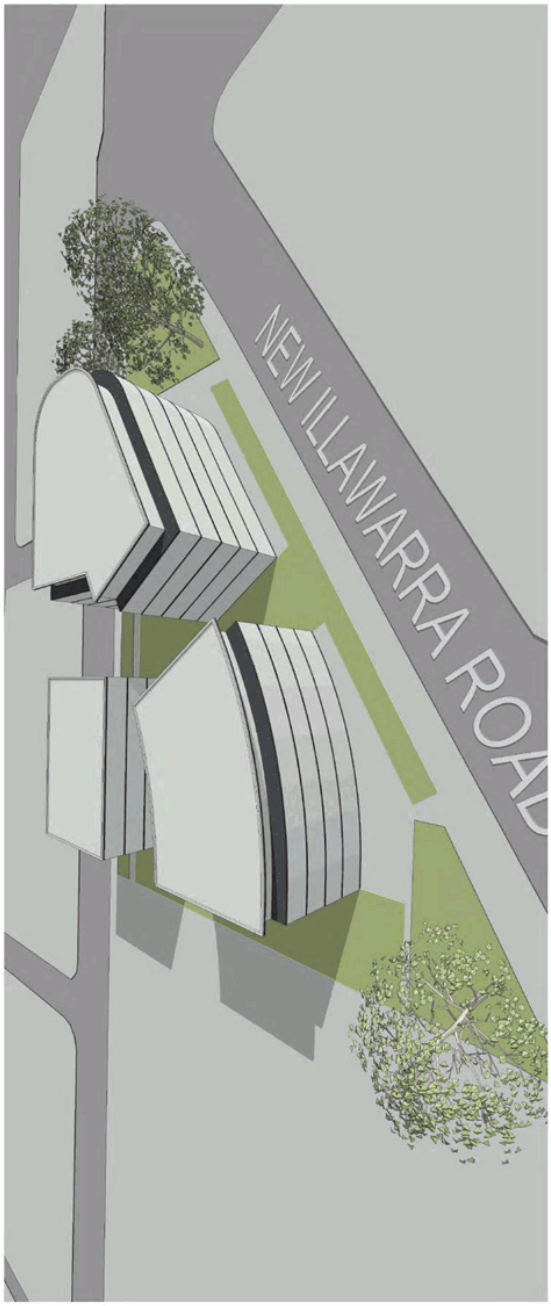
3D MASSING OF PROPOSAL

PROPOSED MASSING AND **SHADOW** OUTLINES

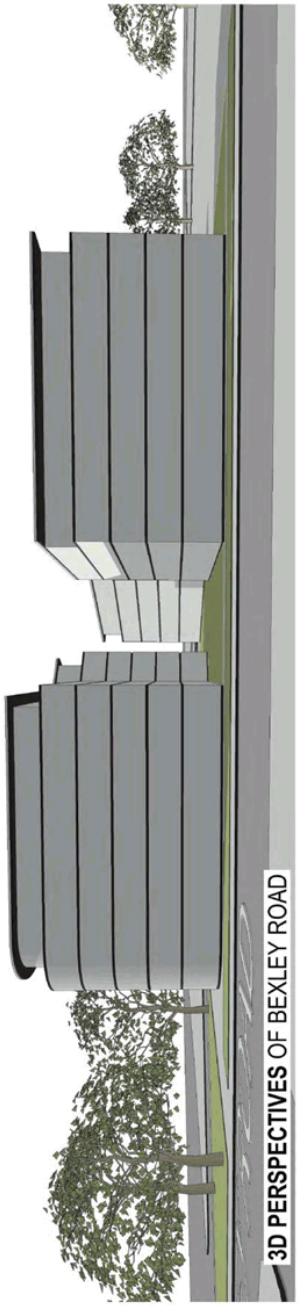

SITE A: 1,693m²
GFA : = 4023.9m²
FSR : 4023.9 / 1693
= 2.3 : 1
SITE B: 2,564m²
GFA : 1882.75+2120.75
= 4003.5m²
FSR : 4003.5 / 2564
=1.56 : 1
5 STOREY 489 m²
5 STOREY 1,475 m²
6 STOREY 780 m²
BEXLEY ROAD
NEW ILLAWARRA ROAD
PARK
FSR & GFA DIAGRAM
SITE A -DEEP SOIL AREA : 762m² OR 45%
SITE B -DEEP SOIL AREA : 1326m² OR 51%
TOTAL DEEP SOIL AREA= 2,088 m²
BASEMENT SINGLE LEVEL
DEEP SOIL ZONE
1,326 m²
BASEMENT 2 x LEVELS
DEEP SOIL ZONE 762 m²
BEXLEY ROAD
NEW ILLAWARRA ROAD
PARK
LANDSCAPE & DEEP SOIL DIAGRAM



3D PERSPECTIVES OF PLANNING PROPOSAL



3D PERSPECTIVES OF PLANNING PROPOSAL



3D PERSPECTIVES OF BEXLEY ROAD

3. TRAFFIC ASSESSMENT

Road Hierarchy

The road hierarchy allocated to the road network in the vicinity of the site by the Roads and Maritime Services is illustrated on Figure 3.

Bexley Road is classified by the RMS as a *State Road* and provides the key north-south road link in the area, linking Campsie to Bexley. It typically carries two traffic lanes in each direction in the vicinity of the site, with kerbside parking generally permitted outside of commuter peak periods.

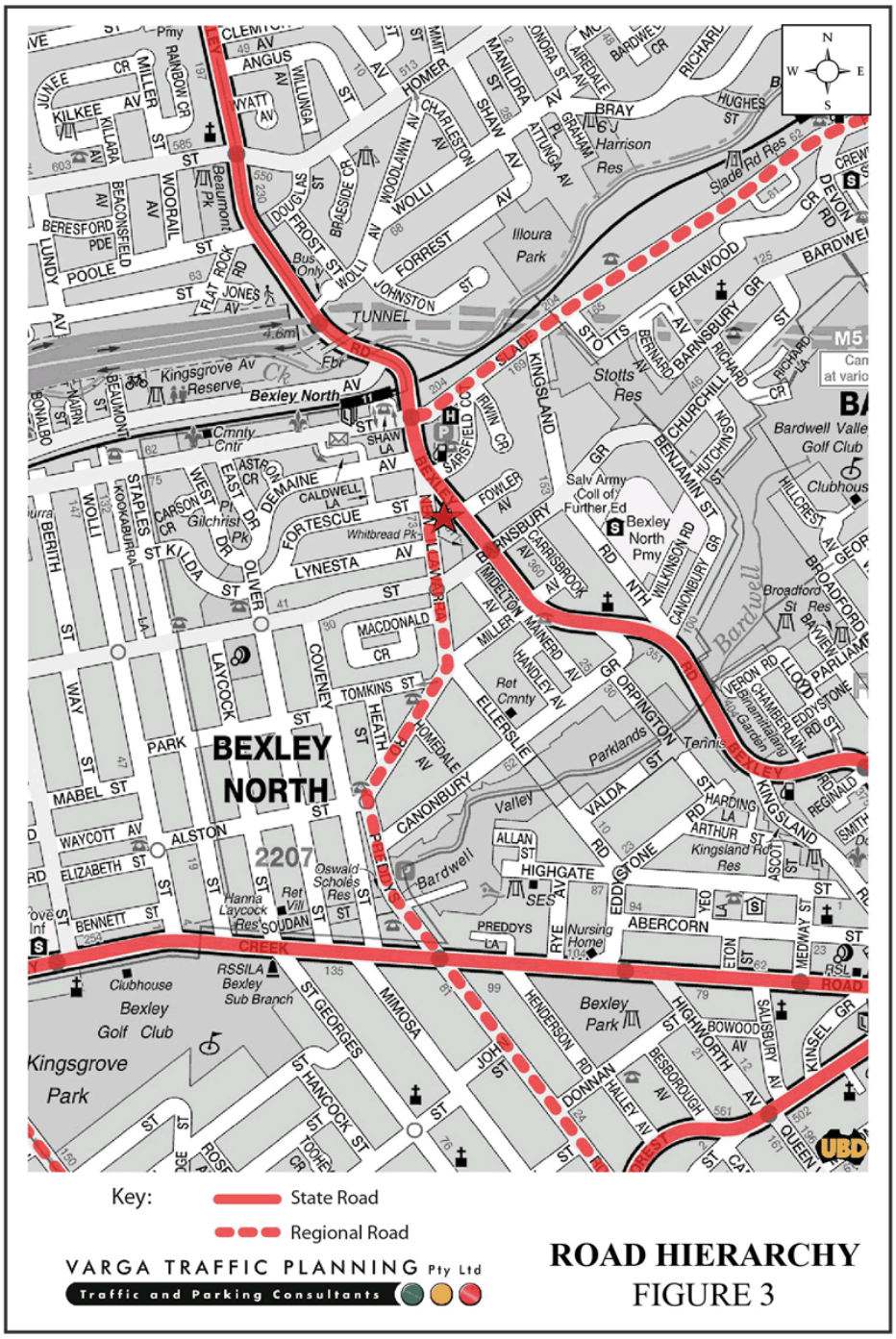
Stoney Creek Road is also classified by the RMS as a *State Road* and provides the key east-west road link in the area, linking Peakhurst to Bexley. It also typically carries two traffic lanes in each direction in the vicinity of the site, with Clearway restrictions applying during commuter peak periods.

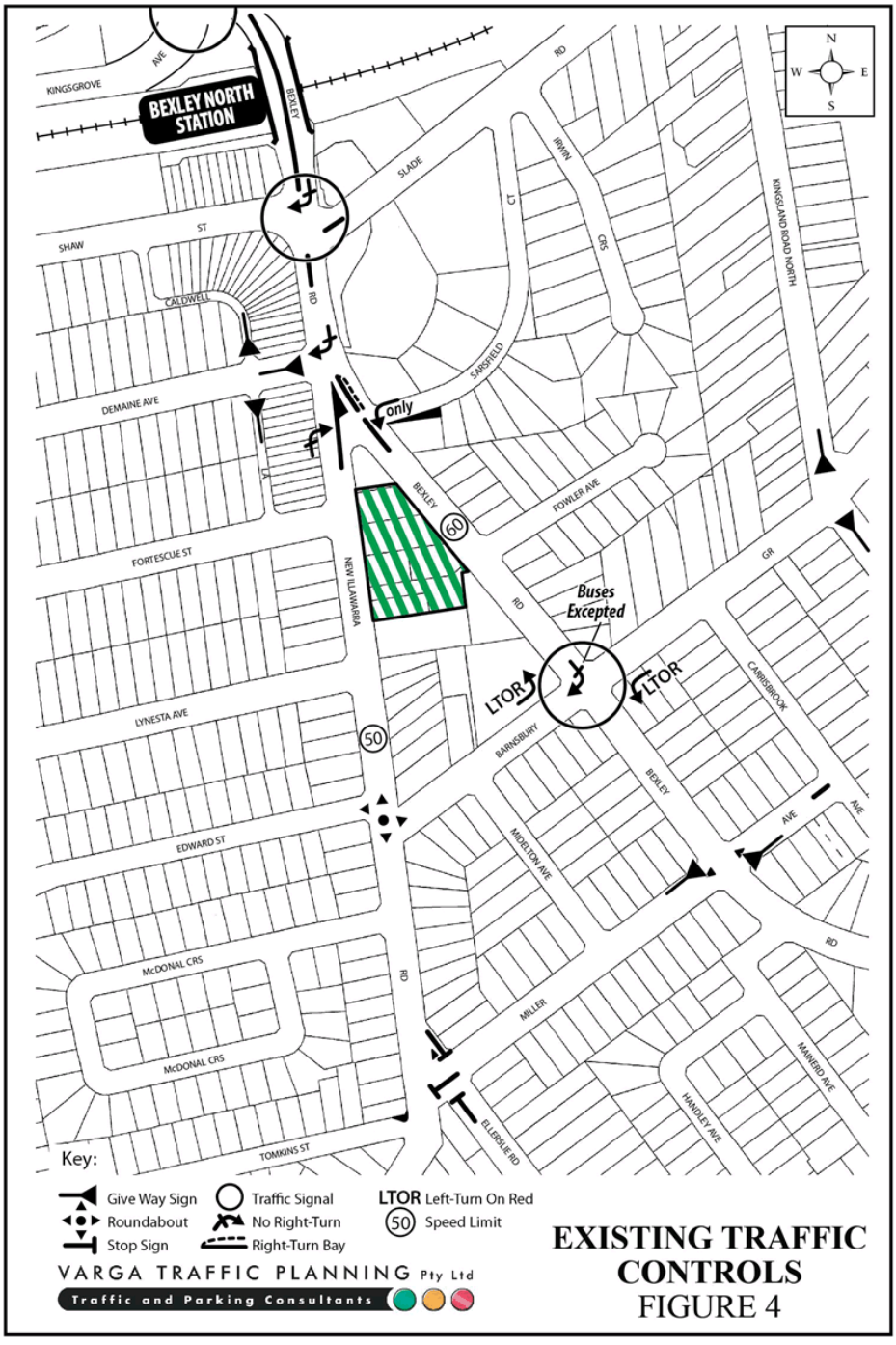
New Illawarra Road is classified by the RMS as a *Regional Road* and provides the key north-south road link in the area. It typically carries one traffic lane with some kerbside parking permitted in selected locations only.

Existing Traffic Controls

The existing traffic controls which apply to the road network in the vicinity of the site are illustrated on Figure 4. Key features of those traffic controls are:

- a 60 km/h SPEED LIMIT which applies to Bexley Road
- a 50 km/h SPEED LIMIT which applies to New Illawarra Road and all other local roads in the area
- a ROUNDABOUT in New Illawarra Road where it intersects with Edward Street/Barnsbury Grove


BEXLEY NORTH
2207
Kingsgrove Park
Bexley Park
Bexley Golf Club
Clubhouse
Bardwell Valley Golf Club
Illoura Park
Stotts Res
Harrison Res
Bexley North Pmy
Kingsland Rd Res
Broadford St Res
Oswald Scholes Res
Hanna Laycock Res
Kingsland Rd Res
Key:
State Road
Regional Road
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
ROAD HIERARCHY
FIGURE 3


BEXLEY NORTH STATION
KINGSGROVE
AVE
BEXLEY
RD
SLADE
IRWIN
CRS
KINGSLAND ROAD NORTH
SHAW
ST
CALDWELL
DEMAINE AVE
SARSFIELD
only
FOWLER AVE
FORTESCUE ST
NEW ILLAWARRA
60
50
Buses Excepted
LTOR
LTOR
LYNESTA AVE
BARNSBURY
CARRISBROOK
EDWARD ST
MIDDLETON AVE
McDONAL CRS
MILLER
MANNERS AVE
HANDLEY AVE
ELLERSLIE RD
TOMKINS ST
N
W
E
S
Key:
Give Way Sign
Roundabout
Stop Sign
Traffic Signal
No Right-Turn
Right-Turn Bay
LTOR Left-Turn On Red
50 Speed Limit
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING TRAFFIC CONTROLS
FIGURE 4

- TRAFFIC SIGNALS in Bexley Road where it intersects with Shaw Street/Slade Road and also Barnsbury Grove

- a RIGHT TURN HOLDING BAY in Bexley Road for southbound traffic turning into New Illawarra Road

- a NO RIGHT TURN restriction for southbound traffic in Bexley Road turning into Barnsbury Grove (Buses Excepted)

- a NO RIGHT TURN restriction for southbound traffic in Bexley Road turning into Shaw Street.

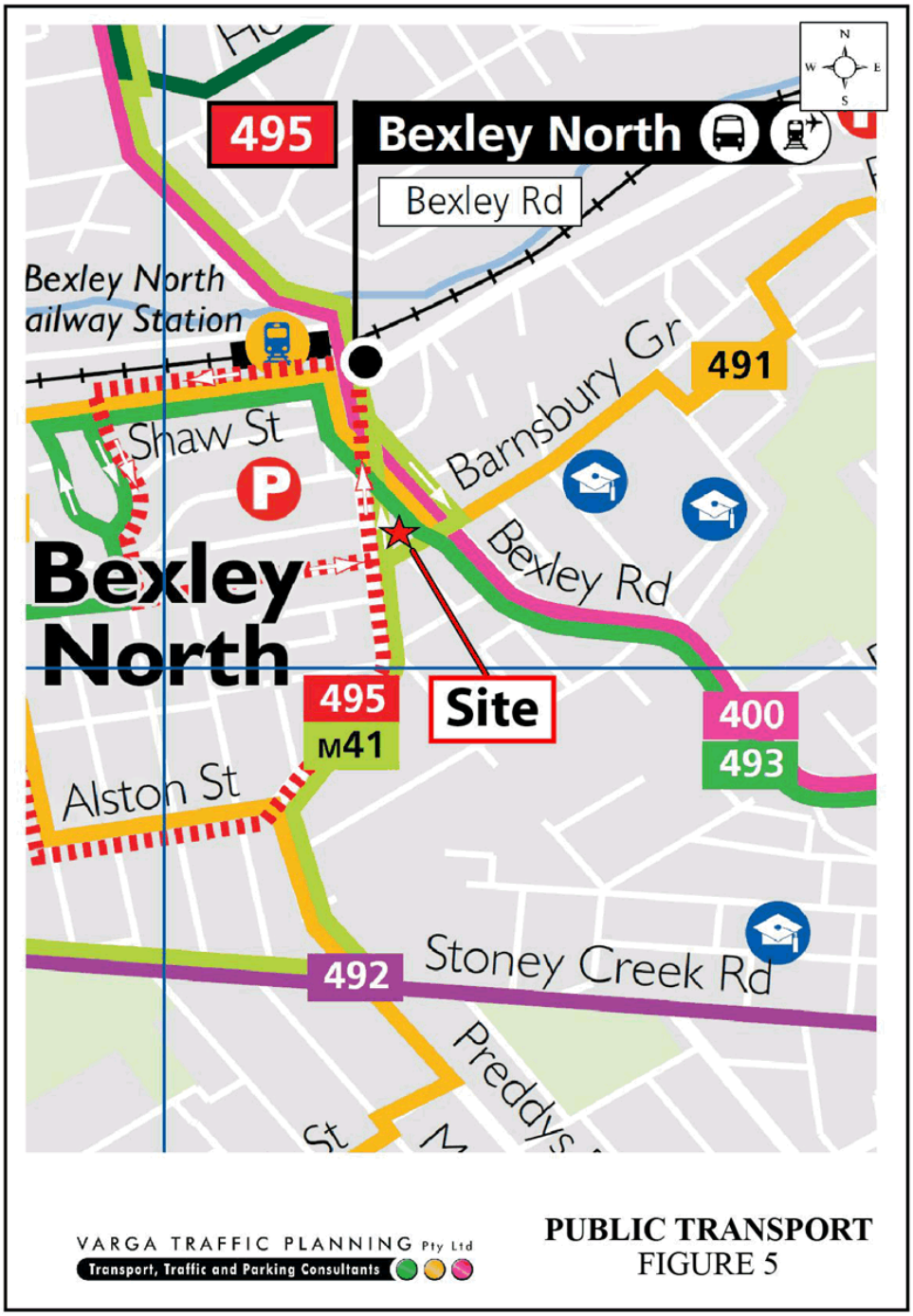
Existing Public Transport Services

The existing public transport services available to the site are illustrated on Figure 5.

The site is located within an easy 250m walking distance of Bexley North Railway Station which provides regular suburban rail services between Sydney CBD and Campbelltown.

There are currently 5 bus routes travelling along either New Illawarra Road or Bexley Road as set out in the table below. These include the intra-regional *Metrobus* M41 and Route 400 bus services which travel between Hurstville/Ryde and Bondi Junction/Burwood respectively. The *M41* service operates seven days per week with weekday services every 15 minutes (every 10 minutes during the morning and afternoon peak) and weekend services every 20 minutes.

Bus Routes and Frequencies							
Route No.	Route	Weekdays		Saturday		Sunday	
		IN	OUT	IN	OUT	IN	OUT
M41	Hurstville Westfield to Waterloo Park	~62	~65	~33	~40	~34	~40
400	Bondi Junction to Burwood	126	127	86	84	86	82
491	Hurstville to Five Dock	36	36	32	30	17	15
493	Roselands to Rockdale	7	7	-	-	-	-
495	Kingsgrove to Bexley North	1	1	-	-	-	-
TOTAL		**232**	**236**	**151**	**154**	**137**	**137**


495
Bexley North
Bexley Rd
Bexley North
ailway Station
Shaw St
Barnsbury Gr
491
Bexley
North
Bexley Rd
495
M41
Site
400
493
Alston St
492
Stoney Creek Rd
Preddys
St
N
W
E
S
VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants
PUBLIC TRANSPORT
FIGURE 5

In summary there are more than 460 bus services travelling past the site on weekdays, decreasing to approximately 300 bus services on Saturdays and approximately 260 bus services on Sundays, as set out in the table below:

All of the abovementioned bus services provide access to suburban railway stations such as Hurstville, Bexley North, Campsie, Burwood, Rhodes, Banksia, Bondi Junction, Rockdale and Macquarie Park Railway Stations.

The site is also located just south of the Bexley North town centre where there is a wide range of essential shops and services such as a Woolworths supermarket, fruit market, butchery, bakery, seafood shop, restaurants, cafés, bottle shop, post office, pharmacy, optometrist, newsagency, hair dresser and beautician.

The site is therefore considered to be highly accessible by public transport and within easy walking distance of a broad range of shops and services which are located between the site and the railway station.

The site is therefore ideally suited to reduce levels of car ownership, and to encourage increased use of public transport and active forms of transport such as walking.

Existing Traffic Conditions

An indication of the existing traffic conditions on the road network in the vicinity of the site is provided by peak period traffic surveys undertaken as part of this traffic study. The traffic surveys were undertaken at the surrounding intersections listed below:

- Bexley Road, Shaw Street & Slade Road (traffic signals)
- Bexley Road & Demaine Avenue (give way)
- Bexley Road, New Illawarra Road & Sarsfield Circuit (give way)
- Bexley Road & Barnsbury Grove (traffic signals)
- New Illawarra Road, Barnsbury Grove & Edward Street (roundabout)

The results of the traffic surveys are reproduced in full in Appendix A and reveal that:

- two-way traffic flows in Bexley Road past the site frontage are typically in the order of 1,800 vehicles per hour (vph) during the morning and afternoon network peak periods

- two-way traffic flows in New Illawarra Road past the site frontage are much lower, typically in the order of 600 vph during the morning and afternoon network peak periods.

Projected Traffic Generation

An indication of the traffic generation potential of the residential component of the Planning Proposal is provided by reference to the Roads and Maritime Services publication *Technical Direction TDT 2013/04a (August 2013).*

The RMS's *Technical Direction* is based on extensive surveys of a wide range of land uses and nominates the following traffic generation rates which are applicable to the Planning Proposal:

High Density Residential Flat Buildings

AM: 0.19 peak hour vehicle trips per dwelling

PM: 0.15 peak hour vehicle trips per dwelling

Application of the above traffic generation rates to the potential yield of 100 residential apartments as outlined in the Planning Proposal yields the following traffic generation potential during commuter peak periods:

Projected Future Traffic Generation Potential

AM Peak Period:	19 vph
PM Peak Period:	15 vph

That projected future level of traffic generation potential should however, be offset or *discounted* by the volume of traffic which could reasonably be expected to be generated by the existing uses of the site, in order to determine the *nett increase (or decrease)* in traffic generation potential expected to occur as a consequence of the Planning Proposal.

The RMS *Guidelines* and *Technical Direction* nominate the following traffic generation rates which are applicable to the existing development on the site:

Low Density Residential Dwellings

AM: 0.95 peak hour vehicle trips per dwelling

PM: 0.99 peak hour vehicle trips per dwelling

Service Stations and Convenience Stores

Evening Peak Hour Vehicle Trips = 0.04A(S) + 0.3A(F)

Where: A(S) = area of site (m^2)

A(F) = convenience store GFA (m^2)

The existing service station also includes a mechanical workshop with two work bays. Reference to the RMS *Guidelines* indicates that, as a guide, 6 parking spaces should be provided per work bay – i.e. 12 parking spaces. If it is assumed that there are two mechanics on site and all customers drop off their car during the morning peak period and collect them during the afternoon peak period, then the workshop has a traffic generation potential of 14 peak hour vehicle trips.

Application of the above traffic generation rates to the existing development on the site yields a traffic generation potential of approximately 91 vehicle trips per hour during commuter peak periods as set out below:

Existing Traffic Generation Potential

	AM	**PM**
Dwelling houses (6 dwellings):	6 vph	6 vph
Service Station (1170m^2 site area, 80m^2 shop & workshop):	85 vph	85 vph
TOTAL TRAFFIC GENERATION POTENTIAL:	**91 vph**	**91 vph**

Accordingly, it is likely that the Planning Proposal will result in a ***substantial reduction*** in the traffic generation potential of the site of approximately 72 vph during the AM commuter peak period and approximately 76 vph during the PM commuter peak period, as set out below:

Projected Nett Reduction in Peak Hour Traffic Generation Potential of the site as a consequence of the Planning Proposal

	AM	PM
Projected Future Traffic Generation Potential:	19 vph	15 vph
Less Existing Traffic Generation Potential:	-91 vph	-91 vph
NETT DECREASE IN TRAFFIC GENERATION POTENTIAL:	**-72 vph**	**-76 vph**

For the purposes of this assessment however, it has been assumed that *all* of the projected future traffic flows of 19 vph during the AM commuter peak period and 15 vph during the PM commuter peak period will be new or *additional* to the existing traffic flows currently using the adjacent road network. Those additional traffic volumes and distributions are illustrated on Figure 6.

That projected level of future traffic generation potential of the site as a consequence of the Planning Proposal is *minimal* and will clearly not have any unacceptable traffic implications in terms of road network capacity, as is demonstrated by the following section of this report.

Traffic Implications - Road Network Capacity

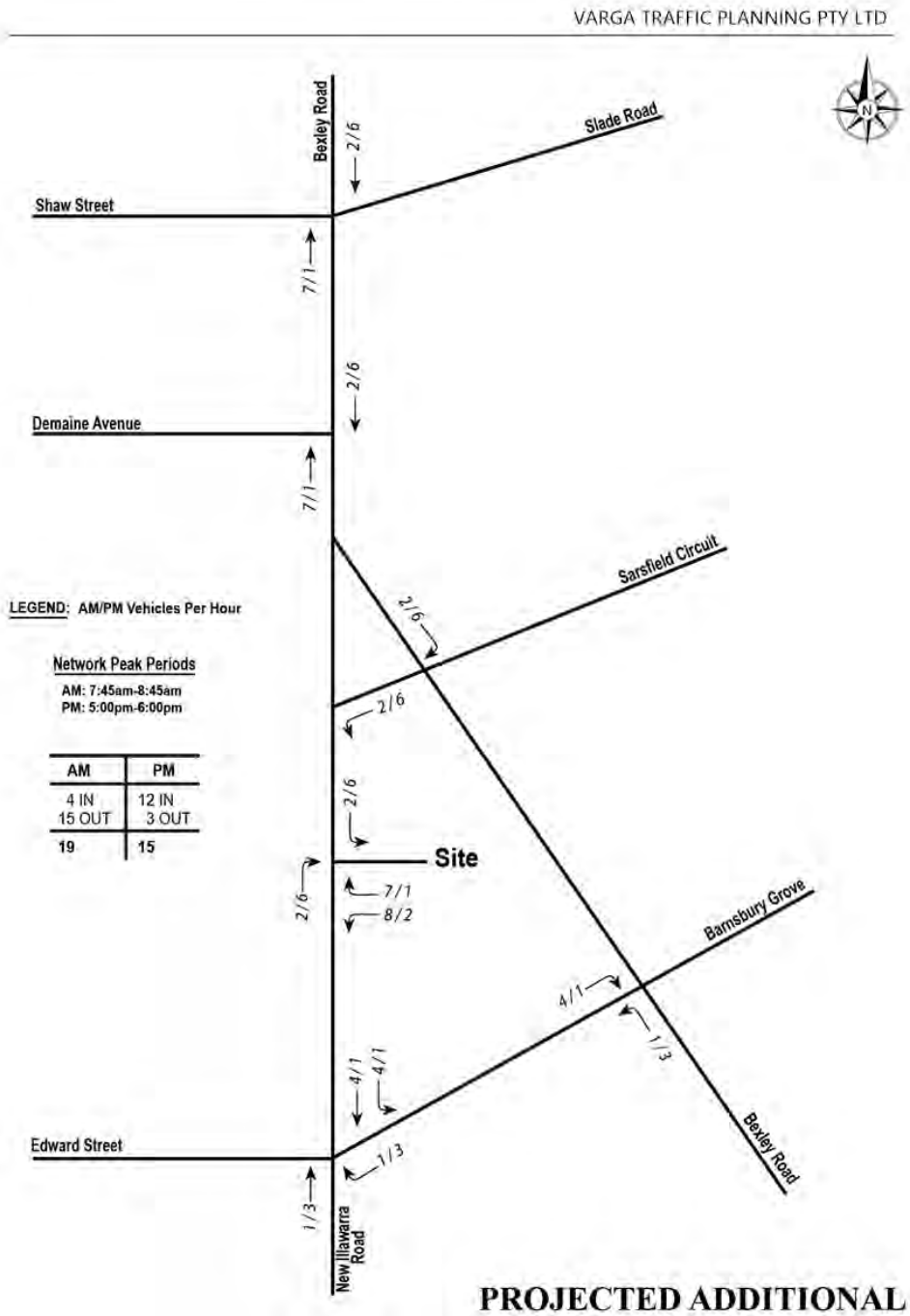
The traffic implications of development proposals primarily concern the effects that any *additional* traffic flows may have on the operational performance of the nearby road network. Those effects can be assessed using the SIDRA INTERSECTION 7 NETWORK program which is widely used by the RMS and many LGA's for this purpose. Criteria for evaluating the results of SIDRA analysis are reproduced in the following pages.

The results of the SIDRA analysis are summarised in the tables below, revealing that:

- the volume of traffic generated by the existing houses and service station on the site is in the order of 85 vph

- the volume of traffic expected to be generated by the Planning Proposal is in the order of 19 vph

- the Planning Proposal would result in a ***substantial reduction*** in the traffic flows generated by the site



PROJECTED ADDITIONAL TRAFFIC VOLUMES
FIGURE 6

22

- all of the intersections would continue to operate at current Levels of Service under the Planning Proposal traffic demands, and

- the Planning Proposal traffic flows would have no appreciable effect whatsoever on the performance of the nearby intersections.

In the circumstances, it is clear that the Planning Proposal will not have any unacceptable traffic implications in terms of road network capacity, and that no improvements works or intersection upgrades will be required on the adjacent road network as a consequence of the Planning Proposal.

TABLE 3.1 - RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & SHAW STREET & SLADE ROAD

Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand	
	AM	PM	AM	PM
Level of Service	E	D	E	D
Degree of Saturation	0.920	0.880	0.925	0.880
Average Vehicle Delay (secs/veh)	**64.2**	**52.0**	**66.8**	**52.3**

TABLE 3.2 - RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & DERMAINE AVENUE

Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand	
	AM	PM	AM	PM
Level of Service	A	A	A	A
Degree of Saturation	0.518	0.382	0.528	0.383
Average Vehicle Delay (secs/veh)	**0.7**	**0.2**	**0.7**	**0.2**

TABLE 3.3 - RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD, NEW ILLAWARRA ROAD & SARSFIELD CIRCUIT				
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand	
	AM	PM	AM	PM
Level of Service	A	A	A	A
Degree of Saturation	0.718	0.871	0.722	0.883
Average Vehicle Delay (secs/veh)	3.4	5.5	3.4	5.8

TABLE 3.4 - RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & BARNSBURY GROVE				
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand	
	AM	PM	AM	PM
Level of Service	B	A	B	A
Degree of Saturation	0.739	0.594	0.757	0.594
Average Vehicle Delay (secs/veh)	16.3	12.6	17.4	12.6

TABLE 3.5 - RESULTS OF SIDRA ANALYSIS OF NEW ILLAWARRA ROAD, BARNSBURY ROAD & EDWARD STREET				
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand	
	AM	PM	AM	PM
Level of Service	A	A	A	A
Degree of Saturation	0.436	0.478	0.437	0.482
Average Vehicle Delay (secs/veh)	7.2	7.5	7.2	7.5

Criteria for Interpreting Results of Sidra Analysis

1. *Level of Service (LOS)*

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. *Average Vehicle Delay (AVD)*

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. *Degree of Saturation (DS)*

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[1] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

1 *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

4. PARKING IMPLICATIONS

Existing Kerbside Parking Restrictions

The existing kerbside parking restrictions which apply to the road network in the vicinity of the site are illustrated on Figure 7 and comprise:

- NO PARKING restrictions along the Bexley Road site frontage during the morning and afternoon commuter peak periods, with UNRESTRICTED parking permitted at all other times
- NO PARKING restrictions along the northern portion of the New Illawarra Road site frontage
- generally UNRESTRICTED PARKING elsewhere along New Illawarra Road in the vicinity of the site including the southern portion of the site frontage
- BUS ZONES located at regular intervals along both sides of New Illawarra Road and Bexley Road.

Off-Street Parking Provisions

The off-street parking requirements applicable to the Planning Proposal are specified in Council's *Development Control Plan 2011, Part 4.6: Car parking, Access and Movement* document in the following terms:

Residential Flat Buildings

- 1 space/studio, 1 and 2 bedrooms apartments
- 2 spaces/3 bedrooms apartments or more
- Visitor parking: 1 space/5 dwellings (including a carwash bay)


N
W
E
S
1P
BZ
(AM/PM Peak)
BEXLEY
FOWLER AVENUE
(AM/PM Peak)
NEW ILLAWARRA
ROAD
BZ
BZ
BZ
LYNESTA AVENUE
(AM Peak)
BZ
BZ
ROAD
GROVE
EDWARD STREET
BARNSBURY
MIDELTON AVENUE
Key:
No Stopping
No Parking
Restricted Parking
BZ Bus Zone
VARGA TRAFFIC PLANNING Pty Ltd
Traffic and Parking Consultants
EXISTING PARKING RESTRICTIONS
FIGURE 7

It is anticipated that the above parking requirements will be satisfied by the proposed provision of basement car parking areas, with vehicular access to be provided off the New Illawarra Road frontage of the site.

In addition, the geometric design layout of the future car parking facilities will also ultimately be designed to comply with Standards Australia publication *Parking Facilities Part 1 - Off-Street Car Parking AS2890.1* and *Parking Facilities Part 6 - Off-Street Parking for People with Disabilities AS2890.6*.

It should also be noted that the 11 existing vehicular access driveways which service the site in both Bexley Road and New Illawarra Road will be replaced with just two new entry/exit driveways in New Illawarra Road, thereby improving the road network efficiency and providing additional kerbside parking as the redundant driveways will be restored to kerb and gutter.

Conclusion

The Planning Proposal seeks to amend the existing planning controls on the subject site to permit a high density residential uses, resulting in a potential yield of 100 residential apartments. Based on the analysis and discussions presented within this report, the following conclusions are made:

- the Planning Proposal is expected to have a traffic generation potential of approximately 19 vph during the AM commuter peak period and 15 vph during the PM commuter peak period, resulting in a significant *reduction* in the traffic generation potential of the site when compared to the existing low density residential and service station uses

- the capacity analysis of nearby intersections using the SIDRA capacity analysis program indicates that:

    - the projected additional traffic flows will not have any adverse effects on the operational performance on the surrounding intersections, and

- no road improvements or intersection upgrades will be required as a consequence of the Planning Proposal

- the future design will accommodate all of the required off-street parking within two new basement car parking areas and will comply with all relevant standards and guidelines.

In summary, the future parking facilities are capable of satisfying the relevant requirements specified in both Council's *DCP 2011* as well as the Australian Standards (with detailed analysis to be undertaken at DA stage), and it is therefore concluded that the Planning Proposal will not have any unacceptable parking implications.

APPENDIX A

TRAFFIC SURVEY DATA

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	6	156	0	26	13	6	3	199	21	0	4	9	**443**
0715 - 0730	2	155	0	20	31	16	1	222	16	0	12	7	**482**
0730 - 0745	7	176	0	36	36	11	1	251	22	0	13	6	**559**
0745 - 0800	4	160	0	31	52	9	6	239	27	1	27	7	**563**
0800 - 0815	9	183	0	23	40	11	4	241	21	1	26	9	**568**
0815 - 0830	1	196	0	34	55	22	13	249	15	5	35	9	**634**
0830 - 0845	13	185	0	23	73	27	6	209	45	1	33	10	**625**
0845 - 0900	15	172	0	24	78	19	2	194	37	2	44	9	**596**
Period End	**57**	**1383**	**0**	**217**	**378**	**121**	**36**	**1804**	**204**	**10**	**194**	**66**	**4470**

Heavies	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	1	2	1	0	0	0	0	6	0	0	0	0	**10**
0715 - 0730	0	1	3	1	0	0	0	1	0	0	0	1	**7**
0730 - 0745	1	3	1	0	0	0	0	8	0	0	0	1	**14**
0745 - 0800	0	1	1	0	0	0	0	3	0	0	0	1	**6**
0800 - 0815	1	2	2	0	0	0	0	3	0	0	0	0	**8**
0815 - 0830	0	3	0	0	0	0	0	1	0	0	0	1	**5**
0830 - 0845	1	2	2	0	0	0	0	5	0	0	0	0	**10**
0845 - 0900	0	4	1	0	0	0	0	4	0	0	0	1	**10**
Period End	**4**	**18**	**11**	**1**	**0**	**0**	**0**	**31**	**0**	**0**	**0**	**5**	**70**

Lights	NORTH			WEST			SOUTH			EAST			
	New Illawarra Rd			*Barnsbury Gr*			*New Illawarra Rd*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	19	647	0	113	132	42	11	911	86	1	56	29	**2047**
0715 - 0815	22	674	0	110	159	47	12	953	86	2	78	29	**2172**
0730 - 0830	21	715	0	124	183	53	24	980	85	7	101	31	**2324**
0745 - 0845	27	724	0	111	220	69	29	938	108	8	121	35	**2390**
0800 - 0900	38	736	0	104	246	79	25	893	118	9	138	37	**2423**
PEAK HOUR	**38**	**736**	**0**	**104**	**246**	**79**	**25**	**893**	**118**	**9**	**138**	**37**	**2423**

Heavies	NORTH			WEST			SOUTH			EAST			
	New Illawarra Rd			*Barnsbury Gr*			*New Illawarra Rd*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	2	7	6	1	0	0	0	18	0	0	0	3	**37**
0715 - 0815	2	7	7	1	0	0	0	15	0	0	0	3	**35**
0730 - 0830	2	9	4	0	0	0	0	15	0	0	0	3	**33**
0745 - 0845	2	8	5	0	0	0	0	12	0	0	0	2	**29**
0800 - 0900	2	11	5	0	0	0	0	13	0	0	0	2	**33**
PEAK HOUR	**2**	**11**	**5**	**0**	**0**	**0**	**0**	**13**	**0**	**0**	**0**	**2**	**33**

Combined	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	7	158	1	26	13	6	3	205	21	0	4	9	**453**
0715 - 0730	2	156	3	21	31	16	1	223	16	0	12	8	**489**
0730 - 0745	8	179	1	36	36	11	1	259	22	0	13	7	**573**
0745 - 0800	4	161	1	31	52	9	6	242	27	1	27	8	**569**
0800 - 0815	10	185	2	23	40	11	4	244	21	1	26	9	**576**
0815 - 0830	1	199	0	34	55	22	13	250	15	5	35	10	**639**
0830 - 0845	14	187	2	23	73	27	6	214	45	1	33	10	**635**
0845 - 0900	15	176	1	24	78	19	2	198	37	2	44	10	**606**
Period End	**61**	**1401**	**11**	**218**	**378**	**121**	**36**	**1835**	**204**	**10**	**194**	**71**	**4540**

Peds	NORTH	WEST	SOUTH	EAST
	New Illawarra	*Barnsbury Gr*	*New Illawarra*	*Barnsbury Gr*
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0715	0	0	0	1	**1**
0715 - 0730	0	3	0	3	**6**
0730 - 0745	0	6	3	1	**10**
0745 - 0800	1	4	0	0	**5**
0800 - 0815	0	7	1	2	**10**
0815 - 0830	0	2	0	0	**2**
0830 - 0845	0	6	1	1	**8**
0845 - 0900	0	0	0	1	**1**
Period End	**1**	**28**	**5**	**9**	**43**

Combined	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Barnsbury Gr*			*Bexley Rd*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	21	654	6	114	132	42	11	929	86	1	56	32	**2084**
0715 - 0815	24	681	7	111	159	47	12	968	86	2	78	32	**2207**
0730 - 0830	23	724	4	124	183	53	24	995	85	7	101	34	**2357**
0745 - 0845	29	732	5	111	220	69	29	950	108	8	121	37	**2419**
0800 - 0900	40	747	5	104	246	79	25	906	118	9	138	39	**2456**
PEAK HOUR	**40**	**747**	**5**	**104**	**246**	**79**	**25**	**906**	**118**	**9**	**138**	**39**	**2456**

Peds	NORTH	WEST	SOUTH	EAST
	New Illawarra	*Barnsbury Gr*	*New Illawarra*	*Barnsbury Gr*
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0800	1	13	3	5	**22**
0715 - 0815	1	20	4	6	**31**
0730 - 0830	1	19	4	3	**27**
0745 - 0845	1	19	2	3	**25**
0800 - 0900	0	15	2	4	**21**
PEAK HR	**0**	**15**	**2**	**4**	**21**

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	12	175	0	14	15	8	7	246	15	1	62	2	557
1615 - 1630	9	172	0	10	28	10	13	231	17	3	44	5	542
1630 - 1645	4	200	0	6	21	5	12	243	9	3	45	7	555
1645 - 1700	5	181	0	15	29	11	7	216	8	2	46	5	525
1700 - 1715	11	202	0	5	24	7	12	249	16	3	35	2	566
1715 - 1730	10	185	0	11	34	10	21	254	12	1	42	5	585
1730 - 1745	6	183	0	9	27	11	21	256	14	2	56	2	587
1745 - 1800	8	212	0	10	17	8	12	247	16	2	41	2	575
Period End	**65**	**1510**	**0**	**80**	**195**	**70**	**105**	**1942**	**107**	**17**	**371**	**30**	**4492**

Heavies

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	1	2	0	0	0	0	0	5	0	0	1	1	10
1615 - 1630	0	2	5	0	0	0	0	1	0	0	0	1	9
1630 - 1645	1	2	0	0	0	0	0	2	0	0	0	0	5
1645 - 1700	0	2	2	0	0	0	0	1	0	0	0	1	6
1700 - 1715	1	0	0	0	0	0	0	4	0	0	0	0	5
1715 - 1730	0	4	2	0	0	0	0	2	0	0	0	1	9
1730 - 1745	1	2	0	0	0	0	0	4	0	0	0	0	7
1745 - 1800	0	2	2	0	0	0	0	4	0	0	0	1	9
Period End	**4**	**16**	**11**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**1**	**5**	**60**

Lights

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	30	728	0	45	93	34	39	936	49	9	197	19	2179
1615 - 1715	29	755	0	36	102	33	44	939	50	11	170	19	2188
1630 - 1730	30	768	0	37	108	33	52	962	45	9	168	19	2231
1645 - 1745	32	751	0	40	114	39	61	975	50	8	179	14	2263
1700 - 1800	35	782	0	35	102	36	66	1006	58	8	174	11	2313
PEAK HOUR	35	782	0	35	102	36	66	1006	58	8	174	11	2313

Heavies

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Barnsbury Gr*			*New Illawarra*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	2	8	7	0	0	0	0	9	0	0	1	3	30
1615 - 1715	2	6	7	0	0	0	0	8	0	0	0	2	25
1630 - 1730	2	8	4	0	0	0	0	9	0	0	0	2	25
1645 - 1745	2	8	4	0	0	0	0	11	0	0	0	2	27
1700 - 1800	2	8	4	0	0	0	0	14	0	0	0	2	30
PEAK HOUR	2	8	4	0	0	0	0	14	0	0	0	2	30

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Barnsbury Gr*			*Bexley Rd*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	13	177	0	14	15	8	7	251	15	1	63	3	567
1615 - 1630	9	174	5	10	28	10	13	232	17	3	44	6	551
1630 - 1645	5	202	0	6	21	5	12	245	9	3	45	7	560
1645 - 1700	5	183	2	15	29	11	7	217	8	2	46	6	531
1700 - 1715	12	202	0	5	24	7	12	253	16	3	35	2	571
1715 - 1730	10	189	2	11	34	10	21	256	12	1	42	6	594
1730 - 1745	7	185	0	9	27	11	21	260	14	2	56	2	594
1745 - 1800	8	214	2	10	17	8	12	251	16	2	41	3	584
Period End	**69**	**1526**	**11**	**80**	**195**	**70**	**105**	**1965**	**107**	**17**	**372**	**35**	**4552**

Peds

	NORTH	WEST	SOUTH	EAST	
	New Illawarra	*Barnsbury Gr*	*New Illawarra*	*Barnsbury Gr*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1615	0	3	4	2	9
1615 - 1630	0	2	0	0	2
1630 - 1645	2	3	0	0	5
1645 - 1700	0	0	0	1	1
1700 - 1715	0	3	0	0	3
1715 - 1730	0	3	2	0	5
1730 - 1745	0	1	2	0	3
1745 - 1800	0	2	2	1	5
Period End	**2**	**17**	**10**	**4**	**33**

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Barnsbury Gr*			*Bexley Rd*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	32	736	7	45	93	34	39	945	49	9	198	22	2209
1615 - 1715	31	761	7	36	102	33	44	947	50	11	170	21	2213
1630 - 1730	32	776	4	37	108	33	52	971	45	9	168	21	2256
1645 - 1745	34	759	4	40	114	39	61	986	50	8	179	16	2290
1700 - 1800	37	790	4	35	102	36	66	1020	58	8	174	13	2343
PEAK HOUR	37	790	4	35	102	36	66	1020	58	8	174	13	2343

Peds

	NORTH	WEST	SOUTH	EAST	
	New Illawarra	*Barnsbury Gr*	*New Illawarra*	*Barnsbury Gr*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1700	2	8	4	3	17
1615 - 1715	2	8	0	1	11
1630 - 1730	2	9	2	1	14
1645 - 1745	0	7	4	1	12
1700 - 1800	0	9	6	1	16
PEAK HR	0	9	6	1	16

R.O.A.R. DATA

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Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

Time Per	NORTH New Illawarra L	NORTH New Illawarra T	NORTH New Illawarra R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra L	SOUTH New Illawarra T	SOUTH New Illawarra R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0715	4	45	2	8	10	1	2	81	27	3	4	1	188
0715 - 0730	3	38	4	4	25	0	3	89	40	6	7	1	220
0730 - 0745	3	44	1	2	28	2	3	58	60	9	4	0	214
0745 - 0800	4	62	8	3	24	1	6	67	69	22	10	3	279
0800 - 0815	4	60	11	1	32	1	11	76	45	21	10	3	275
0815 - 0830	9	64	3	0	41	3	5	67	58	22	21	4	297
0830 - 0845	10	77	7	3	51	2	8	59	64	15	21	3	320
0845 - 0900	7	64	5	2	56	3	2	65	52	20	16	5	297
Period End	**44**	**454**	**41**	**23**	**267**	**13**	**40**	**562**	**415**	**118**	**93**	**20**	**2090**

Heavies

Time Per	NORTH New Illawarra L	NORTH New Illawarra T	NORTH New Illawarra R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra L	SOUTH New Illawarra T	SOUTH New Illawarra R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0715	0	0	0	0	0	0	0	1	0	1	0	0	2
0715 - 0730	0	1	0	1	0	0	0	3	1	3	0	0	9
0730 - 0745	0	1	0	0	0	0	0	6	0	1	0	0	8
0745 - 0800	0	1	0	0	0	0	0	4	0	1	0	0	6
0800 - 0815	0	1	0	0	0	0	0	1	0	2	0	0	4
0815 - 0830	0	1	0	0	0	0	0	3	0	0	0	0	4
0830 - 0845	0	2	0	0	0	0	0	1	0	2	0	0	5
0845 - 0900	0	2	0	0	0	0	0	3	0	1	0	0	6
Period End	**0**	**9**	**0**	**1**	**0**	**0**	**0**	**22**	**1**	**11**	**0**	**0**	**44**

Lights

Peak Time	NORTH New Illawarra Rd L	NORTH New Illawarra Rd T	NORTH New Illawarra Rd R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra Rd L	SOUTH New Illawarra Rd T	SOUTH New Illawarra Rd R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0800	14	189	15	17	87	4	14	295	196	40	25	5	901
0715 - 0815	14	204	24	10	109	4	23	290	214	58	31	7	988
0730 - 0830	20	230	23	6	125	7	25	268	232	74	45	10	1065
0745 - 0845	27	263	29	7	148	7	30	269	236	80	62	13	1171
0800 - 0900	30	265	26	6	180	9	26	267	219	78	68	15	1189
PEAK HOUR	**30**	**265**	**26**	**6**	**180**	**9**	**26**	**267**	**219**	**78**	**68**	**15**	**1189**

Heavies

Peak Time	NORTH New Illawarra Rd L	NORTH New Illawarra Rd T	NORTH New Illawarra Rd R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra Rd L	SOUTH New Illawarra Rd T	SOUTH New Illawarra Rd R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0800	0	3	0	1	0	0	0	14	1	6	0	0	25
0715 - 0815	0	4	0	1	0	0	0	14	1	7	0	0	27
0730 - 0830	0	4	0	0	0	0	0	14	0	4	0	0	22
0745 - 0845	0	5	0	0	0	0	0	9	0	5	0	0	19
0800 - 0900	0	6	0	0	0	0	0	8	0	5	0	0	19
PEAK HOUR	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**5**	**0**	**0**	**19**

Combined

Time Per	NORTH New Illawarra L	NORTH New Illawarra T	NORTH New Illawarra R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra L	SOUTH New Illawarra T	SOUTH New Illawarra R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0715	4	45	2	8	10	1	2	82	27	4	4	1	190
0715 - 0730	3	39	4	5	25	0	3	92	41	9	7	1	229
0730 - 0745	3	45	1	2	28	2	3	64	60	10	4	0	222
0745 - 0800	4	63	8	3	24	1	6	71	69	23	10	3	285
0800 - 0815	4	61	11	1	32	1	11	77	45	23	10	3	279
0815 - 0830	9	65	3	0	41	3	5	70	58	22	21	4	301
0830 - 0845	10	79	7	3	51	2	8	60	64	17	21	3	325
0845 - 0900	7	66	5	2	56	3	2	68	52	21	16	5	303
Period End	**44**	**463**	**41**	**24**	**267**	**13**	**40**	**584**	**416**	**129**	**93**	**20**	**2134**

Peds

Time Per	NORTH New Illawarra UNCLASSIFIED	WEST Edward St UNCLASSIFIED	SOUTH New Illawarra UNCLASSIFIED	EAST Barnsbury Gr UNCLASSIFIED	TOT
0700 - 0715	0	2	0	0	2
0715 - 0730	0	4	0	1	5
0730 - 0745	1	13	0	0	14
0745 - 0800	1	6	0	0	7
0800 - 0815	0	6	0	3	9
0815 - 0830	0	2	2	4	8
0830 - 0845	0	4	0	1	5
0845 - 0900	0	4	3	1	8
Period End	**2**	**41**	**5**	**10**	**58**

Combined

Peak Time	NORTH New Illawarra L	NORTH New Illawarra T	NORTH New Illawarra R	WEST Edward St L	WEST Edward St T	WEST Edward St R	SOUTH New Illawarra L	SOUTH New Illawarra T	SOUTH New Illawarra R	EAST Barnsbury Gr L	EAST Barnsbury Gr T	EAST Barnsbury Gr R	TOT
0700 - 0800	14	192	15	18	87	4	14	309	197	46	25	5	926
0715 - 0815	14	208	24	11	109	4	23	304	215	65	31	7	1015
0730 - 0830	20	234	23	6	125	7	25	282	232	78	45	10	1087
0745 - 0845	27	268	29	7	148	7	30	278	236	85	62	13	1190
0800 - 0900	30	271	26	6	180	9	26	275	219	83	68	15	1208
PEAK HOUR	**30**	**271**	**26**	**6**	**180**	**9**	**26**	**275**	**219**	**83**	**68**	**15**	**1208**

Peds

Peak Per	NORTH New Illawarra UNCLASSIFIED	WEST Edward St UNCLASSIFIED	SOUTH New Illawarra UNCLASSIFIED	EAST Barnsbury Gr UNCLASSIFIED	TOT
0700 - 0800	2	25	0	1	28
0715 - 0815	2	29	0	4	35
0730 - 0830	2	27	2	7	38
0745 - 0845	1	18	2	8	29
0800 - 0900	0	16	5	9	30
PEAK HR	**0**	**16**	**5**	**9**	**30**

R.O.A.R. DATA

Reliable, Original & Authentic Results

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Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	3	103	8	10	9	1	15	50	21	36	28	3	**287**
1615 - 1630	3	89	5	3	17	1	11	34	32	26	34	4	**259**
1630 - 1645	0	98	4	3	3	1	4	44	24	27	31	2	**241**
1645 - 1700	2	96	1	2	10	2	6	61	36	24	19	1	**260**
1700 - 1715	2	92	6	2	9	1	7	43	32	29	29	2	**254**
1715 - 1730	2	99	6	2	17	3	4	51	29	18	41	6	**278**
1730 - 1745	3	97	6	2	13	0	5	51	25	32	37	5	**276**
1745 - 1800	4	89	4	1	9	1	7	38	24	25	32	1	**235**
Period End	**19**	**763**	**40**	**25**	**87**	**10**	**59**	**372**	**223**	**217**	**251**	**24**	**2090**

Heavies

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	0	1	0	0	0	0	0	2	0	1	0	0	**4**
1615 - 1630	0	2	0	0	0	0	0	2	0	5	0	0	**9**
1630 - 1645	0	0	0	0	0	0	0	2	0	0	0	0	**2**
1645 - 1700	0	2	0	0	0	0	0	1	0	2	0	0	**5**
1700 - 1715	0	0	0	0	0	0	0	1	0	0	0	0	**1**
1715 - 1730	0	1	0	0	0	0	0	2	0	2	0	0	**5**
1730 - 1745	0	0	0	0	0	0	0	1	0	0	0	0	**1**
1745 - 1800	0	1	0	0	0	0	0	2	0	2	0	0	**5**
Period End	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**12**	**0**	**0**	**32**

Lights

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	8	386	18	18	39	5	36	189	113	113	112	10	**1047**
1615 - 1715	7	375	16	10	39	5	28	182	124	106	113	9	**1014**
1630 - 1730	6	385	17	9	39	7	21	199	121	98	120	11	**1033**
1645 - 1745	9	384	19	8	49	6	22	206	122	103	126	14	**1068**
1700 - 1800	11	377	22	7	48	5	23	183	110	104	139	14	**1043**
PEAK HOUR	**9**	**384**	**19**	**8**	**49**	**6**	**22**	**206**	**122**	**103**	**126**	**14**	**1068**

Heavies

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	0	5	0	0	0	0	0	7	0	8	0	0	**20**
1615 - 1715	0	4	0	0	0	0	0	6	0	7	0	0	**17**
1630 - 1730	0	3	0	0	0	0	0	6	0	4	0	0	**13**
1645 - 1745	0	3	0	0	0	0	0	5	0	4	0	0	**12**
1700 - 1800	0	2	0	0	0	0	0	6	0	4	0	0	**12**
PEAK HOUR	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**4**	**0**	**0**	**12**

Combined

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	3	104	8	10	9	1	15	52	21	37	28	3	**291**
1615 - 1630	3	91	5	3	17	1	11	36	32	31	34	4	**268**
1630 - 1645	0	98	4	3	3	1	4	46	24	27	31	2	**243**
1645 - 1700	2	98	1	2	10	2	6	62	36	26	19	1	**265**
1700 - 1715	2	92	6	2	9	1	7	44	32	29	29	2	**255**
1715 - 1730	2	100	6	2	17	3	4	53	29	20	41	6	**283**
1730 - 1745	3	97	6	2	13	0	5	52	25	32	37	5	**277**
1745 - 1800	4	90	4	1	9	1	7	40	24	27	32	1	**240**
Period End	**19**	**770**	**40**	**25**	**87**	**10**	**59**	**385**	**223**	**229**	**251**	**24**	**2122**

Peds

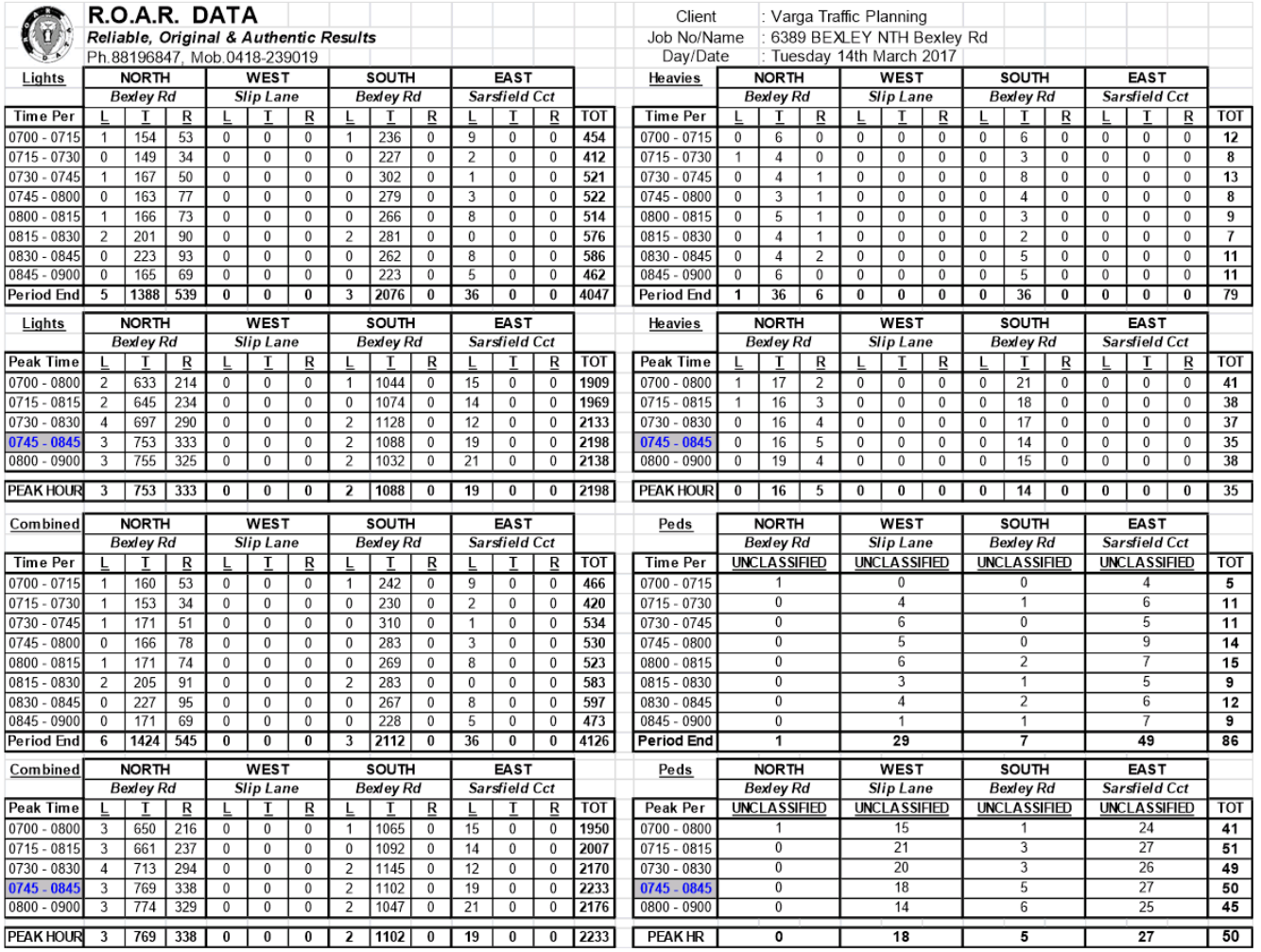
	NORTH	WEST	SOUTH	EAST	
	New Illawarra	*Edward St*	*New Illawarra*	*Barnsbury Gr*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1615	0	5	2	0	**7**
1615 - 1630	0	4	0	0	**4**
1630 - 1645	0	4	0	0	**4**
1645 - 1700	0	11	0	0	**11**
1700 - 1715	0	4	1	1	**6**
1715 - 1730	0	4	0	2	**6**
1730 - 1745	0	2	1	0	**3**
1745 - 1800	0	5	0	0	**5**
Period End	**0**	**39**	**4**	**3**	**46**

Combined

	NORTH			WEST			SOUTH			EAST			
	New Illawarra			*Edward St*			*New Illawarra*			*Barnsbury Gr*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	8	391	18	18	39	5	36	196	113	121	112	10	**1067**
1615 - 1715	7	379	16	10	39	5	28	188	124	113	113	9	**1031**
1630 - 1730	6	388	17	9	39	7	21	205	121	102	120	11	**1046**
1645 - 1745	9	387	19	8	49	6	22	211	122	107	126	14	**1080**
1700 - 1800	11	379	22	7	48	5	23	189	110	108	139	14	**1055**
PEAK HOUR	**9**	**387**	**19**	**8**	**49**	**6**	**22**	**211**	**122**	**107**	**126**	**14**	**1080**

Peds

	NORTH	WEST	SOUTH	EAST	
	New Illawarra	*Edward St*	*New Illawarra*	*Barnsbury Gr*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1700	0	24	2	0	**26**
1615 - 1715	0	23	1	1	**25**
1630 - 1730	0	23	1	3	**27**
1645 - 1745	0	21	2	3	**26**
1700 - 1800	0	15	2	3	**20**
PEAK HR	**0**	**21**	**2**	**3**	**26**



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	1	154	53	0	0	0	1	236	0	9	0	0	454
0715 - 0730	0	149	34	0	0	0	0	227	0	2	0	0	412
0730 - 0745	1	167	50	0	0	0	0	302	0	1	0	0	521
0745 - 0800	0	163	77	0	0	0	0	279	0	3	0	0	522
0800 - 0815	1	166	73	0	0	0	0	266	0	8	0	0	514
0815 - 0830	2	201	90	0	0	0	2	281	0	0	0	0	576
0830 - 0845	0	223	93	0	0	0	0	262	0	8	0	0	586
0845 - 0900	0	165	69	0	0	0	0	223	0	5	0	0	462
Period End	**5**	**1388**	**539**	**0**	**0**	**0**	**3**	**2076**	**0**	**36**	**0**	**0**	**4047**

Heavies

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	0	6	0	0	0	0	0	6	0	0	0	0	12
0715 - 0730	1	4	0	0	0	0	0	3	0	0	0	0	8
0730 - 0745	0	4	1	0	0	0	0	8	0	0	0	0	13
0745 - 0800	0	3	1	0	0	0	0	4	0	0	0	0	8
0800 - 0815	0	5	1	0	0	0	0	3	0	0	0	0	9
0815 - 0830	0	4	1	0	0	0	0	2	0	0	0	0	7
0830 - 0845	0	4	2	0	0	0	0	5	0	0	0	0	11
0845 - 0900	0	6	0	0	0	0	0	5	0	0	0	0	11
Period End	**1**	**36**	**6**	**0**	**0**	**0**	**0**	**36**	**0**	**0**	**0**	**0**	**79**

Lights

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	2	633	214	0	0	0	1	1044	0	15	0	0	1909
0715 - 0815	2	645	234	0	0	0	0	1074	0	14	0	0	1969
0730 - 0830	4	697	290	0	0	0	2	1128	0	12	0	0	2133
0745 - 0845	3	753	333	0	0	0	2	1088	0	19	0	0	2198
0800 - 0900	3	755	325	0	0	0	2	1032	0	21	0	0	2138
PEAK HOUR	3	753	333	0	0	0	2	1088	0	19	0	0	2198

Heavies

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	1	17	2	0	0	0	0	21	0	0	0	0	41
0715 - 0815	1	16	3	0	0	0	0	18	0	0	0	0	38
0730 - 0830	0	16	4	0	0	0	0	17	0	0	0	0	37
0745 - 0845	0	16	5	0	0	0	0	14	0	0	0	0	35
0800 - 0900	0	19	4	0	0	0	0	15	0	0	0	0	38
PEAK HOUR	0	16	5	0	0	0	0	14	0	0	0	0	35

Combined

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	1	160	53	0	0	0	1	242	0	9	0	0	466
0715 - 0730	1	153	34	0	0	0	0	230	0	2	0	0	420
0730 - 0745	1	171	51	0	0	0	0	310	0	1	0	0	534
0745 - 0800	0	166	78	0	0	0	0	283	0	3	0	0	530
0800 - 0815	1	171	74	0	0	0	0	269	0	8	0	0	523
0815 - 0830	2	205	91	0	0	0	2	283	0	0	0	0	583
0830 - 0845	0	227	95	0	0	0	0	267	0	8	0	0	597
0845 - 0900	0	171	69	0	0	0	0	228	0	5	0	0	473
Period End	**6**	**1424**	**545**	**0**	**0**	**0**	**3**	**2112**	**0**	**36**	**0**	**0**	**4126**

Peds

	NORTH Bexley Rd	WEST Slip Lane	SOUTH Bexley Rd	EAST Sarsfield Cct	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0715	1	0	0	4	5
0715 - 0730	0	4	1	6	11
0730 - 0745	0	6	0	5	11
0745 - 0800	0	5	0	9	14
0800 - 0815	0	6	2	7	15
0815 - 0830	0	3	1	5	9
0830 - 0845	0	4	2	6	12
0845 - 0900	0	1	1	7	9
Period End	**1**	**29**	**7**	**49**	**86**

Combined

	NORTH Bexley Rd			WEST Slip Lane			SOUTH Bexley Rd			EAST Sarsfield Cct			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	3	650	216	0	0	0	1	1065	0	15	0	0	1950
0715 - 0815	3	661	237	0	0	0	0	1092	0	14	0	0	2007
0730 - 0830	4	713	294	0	0	0	2	1145	0	12	0	0	2170
0745 - 0845	3	769	338	0	0	0	2	1102	0	19	0	0	2233
0800 - 0900	3	774	329	0	0	0	2	1047	0	21	0	0	2176
PEAK HOUR	3	769	338	0	0	0	2	1102	0	19	0	0	2233

Peds

	NORTH Bexley Rd	WEST Slip Lane	SOUTH Bexley Rd	EAST Sarsfield Cct	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0800	1	15	1	24	41
0715 - 0815	0	21	3	27	51
0730 - 0830	0	20	3	26	49
0745 - 0845	0	18	5	27	50
0800 - 0900	0	14	6	25	45
PEAK HR	0	18	5	27	50

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 6389 BEXLEY NTH Bexley Rd
Day/Date	: Tuesday 14th March 2017

Lights

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	2	186	103	0	0	0	1	296	0	4	0	0	**592**
1615 - 1630	2	176	98	0	0	0	0	262	0	11	0	0	**549**
1630 - 1645	0	219	100	0	0	0	2	272	0	4	0	0	**597**
1645 - 1700	3	197	107	0	0	0	2	235	0	6	0	0	**550**
1700 - 1715	1	187	109	0	0	0	0	241	0	6	0	0	**544**
1715 - 1730	0	165	103	0	0	0	0	246	0	8	0	0	**522**
1730 - 1745	1	193	111	0	0	0	0	276	0	11	0	0	**592**
1745 - 1800	1	190	115	0	0	0	0	270	0	10	0	0	**586**
Period End	**10**	**1513**	**846**	**0**	**0**	**0**	**5**	**2098**	**0**	**60**	**0**	**0**	**4532**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	0	4	1	0	0	0	0	5	0	0	0	0	**10**
1615 - 1630	0	6	2	0	0	0	0	3	0	0	0	0	**11**
1630 - 1645	0	3	1	0	0	0	0	1	0	0	0	0	**5**
1645 - 1700	0	4	1	0	0	0	0	3	0	0	0	0	**8**
1700 - 1715	0	1	0	0	0	0	0	4	0	0	0	0	**5**
1715 - 1730	0	6	1	0	0	0	0	2	0	0	0	0	**9**
1730 - 1745	0	5	1	0	0	0	0	4	0	0	0	0	**10**
1745 - 1800	0	3	0	0	0	0	0	5	0	0	0	0	**8**
Period End	**0**	**32**	**7**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**0**	**0**	**66**

Lights

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	7	778	408	0	0	0	5	1065	0	25	0	0	**2288**
1615 - 1715	6	779	414	0	0	0	4	1010	0	27	0	0	**2240**
1630 - 1730	4	768	419	0	0	0	4	994	0	24	0	0	**2213**
1645 - 1745	5	742	430	0	0	0	2	998	0	31	0	0	**2208**
1700 - 1800	3	735	438	0	0	0	0	1033	0	35	0	0	**2244**
PEAK HOUR	3	735	438	0	0	0	0	1033	0	35	0	0	**2244**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	0	17	5	0	0	0	0	12	0	0	0	0	**34**
1615 - 1715	0	14	4	0	0	0	0	11	0	0	0	0	**29**
1630 - 1730	0	14	3	0	0	0	0	10	0	0	0	0	**27**
1645 - 1745	0	16	3	0	0	0	0	13	0	0	0	0	**32**
1700 - 1800	0	15	2	0	0	0	0	15	0	0	0	0	**32**
PEAK HOUR	0	15	2	0	0	0	0	15	0	0	0	0	**32**

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	2	190	104	0	0	0	1	301	0	4	0	0	**602**
1615 - 1630	2	182	100	0	0	0	0	265	0	11	0	0	**560**
1630 - 1645	0	222	101	0	0	0	2	273	0	4	0	0	**602**
1645 - 1700	3	201	108	0	0	0	2	238	0	6	0	0	**558**
1700 - 1715	1	188	109	0	0	0	0	245	0	6	0	0	**549**
1715 - 1730	0	171	104	0	0	0	0	248	0	8	0	0	**531**
1730 - 1745	1	198	112	0	0	0	0	280	0	11	0	0	**602**
1745 - 1800	1	193	115	0	0	0	0	275	0	10	0	0	**594**
Period End	**10**	**1545**	**853**	**0**	**0**	**0**	**5**	**2125**	**0**	**60**	**0**	**0**	**4598**

Peds

	NORTH	WEST	SOUTH	EAST	
	Bexley Rd	*Slip Lane*	*Bexley Rd*	*Sarsfield Cct*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1615	0	3	0	5	**8**
1615 - 1630	0	2	1	3	**6**
1630 - 1645	0	1	1	9	**11**
1645 - 1700	0	0	0	6	**6**
1700 - 1715	0	4	2	8	**14**
1715 - 1730	0	3	3	3	**9**
1730 - 1745	0	1	2	8	**11**
1745 - 1800	0	1	1	3	**5**
Period End	**0**	**15**	**10**	**45**	**70**

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Slip Lane*			*Bexley Rd*			*Sarsfield Cct*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	7	795	413	0	0	0	5	1077	0	25	0	0	**2322**
1615 - 1715	6	793	418	0	0	0	4	1021	0	27	0	0	**2269**
1630 - 1730	4	782	422	0	0	0	4	1004	0	24	0	0	**2240**
1645 - 1745	5	758	433	0	0	0	2	1011	0	31	0	0	**2240**
1700 - 1800	3	750	440	0	0	0	0	1048	0	35	0	0	**2276**
PEAK HOUR	3	750	440	0	0	0	0	1048	0	35	0	0	**2276**

Peds

	NORTH	WEST	SOUTH	EAST	
	Bexley Rd	*Slip Lane*	*Bexley Rd*	*Sarsfield Cct*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1700	0	6	2	23	**31**
1615 - 1715	0	7	4	26	**37**
1630 - 1730	0	8	6	26	**40**
1645 - 1745	0	8	7	25	**40**
1700 - 1800	0	9	8	22	**39**
PEAK HR	**0**	**9**	**8**	**22**	**39**

R.O.A.R. DATA
Reliable, Original & Authentic Results
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Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	185	0	2	0	0	317	504
0715 - 0730	171	0	17	0	1	348	537
0730 - 0745	272	0	14	0	1	371	658
0745 - 0800	245	0	44	0	0	387	676
0800 - 0815	268	0	38	0	1	409	716
0815 - 0830	292	0	29	0	1	353	675
0830 - 0845	285	2	21	1	0	346	655
0845 - 0900	251	0	16	0	2	316	585
Per End	1969	2	181	1	6	2847	5006

Heavies

	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	6	0	0	0	0	8	14
0715 - 0730	5	0	0	0	0	5	10
0730 - 0745	6	0	0	0	0	14	20
0745 - 0800	3	0	0	0	0	8	11
0800 - 0815	7	0	0	0	0	5	12
0815 - 0830	4	0	0	0	0	6	10
0830 - 0845	6	0	0	0	0	6	12
0845 - 0900	5	0	0	0	0	7	12
Per End	42	0	0	0	0	59	101

Combined

	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Time Per	T	R	L	R	L	T	TOT
0700 - 0715	191	0	2	0	0	325	518
0715 - 0730	176	0	17	0	1	353	547
0730 - 0745	278	0	14	0	1	385	678
0745 - 0800	248	0	44	0	0	395	687
0800 - 0815	275	0	38	0	1	414	728
0815 - 0830	296	0	29	0	1	359	685
0830 - 0845	291	2	21	1	0	352	667
0845 - 0900	256	0	16	0	2	323	597
Per End	2011	2	181	1	6	2906	5107

Lights

	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	873	0	77	0	2	1423	2375
0715 - 0815	956	0	113	0	3	1515	2587
0730 - 0830	1077	0	125	0	3	1520	2725
0745 - 0845	1090	2	132	1	2	1495	2722
0800 - 0900	1096	2	104	1	4	1424	2631
PEAK HR	1077	0	125	0	3	1520	2725

Heavies

	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	20	0	0	0	0	35	55
0715 - 0815	21	0	0	0	0	32	53
0730 - 0830	20	0	0	0	0	33	53
0745 - 0845	20	0	0	0	0	25	45
0800 - 0900	22	0	0	0	0	24	46
PEAK HR	20	0	0	0	0	33	53

Combined

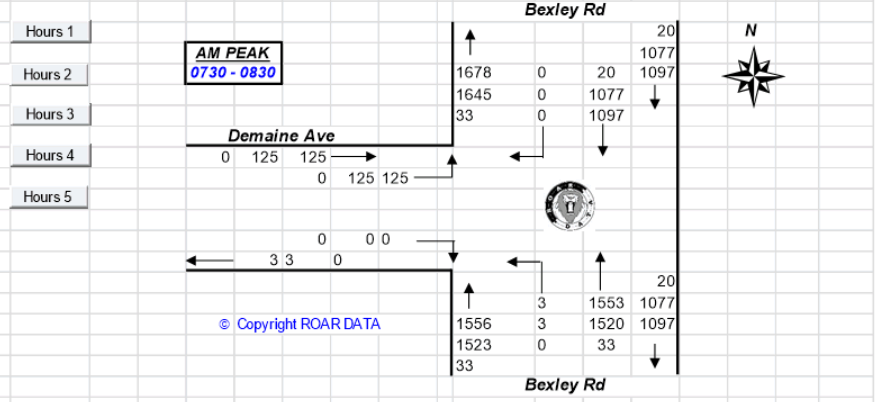
	NORTH		WEST		SOUTH		
	Bexley Rd		Demaine		Bexley Rd		
Peak Per	T	R	L	R	L	T	TOT
0700 - 0800	893	0	77	0	2	1458	2430
0715 - 0815	977	0	113	0	3	1547	2640
0730 - 0830	1097	0	125	0	3	1553	2778
0745 - 0845	1110	2	132	1	2	1520	2767
0800 - 0900	1118	2	104	1	4	1448	2677
PEAK HR	1097	0	125	0	3	1553	2778

Peds

	NORTH	WEST	SOUTH	
Time Per	Bexley Rd	Demaine	Bexley Rd	TOT
0700 - 0715	1	3	0	4
0715 - 0730	0	10	0	10
0730 - 0745	0	25	0	25
0745 - 0800	0	26	0	26
0800 - 0815	0	41	0	41
0815 - 0830	0	21	0	21
0830 - 0845	0	16	0	16
0845 - 0900	3	17	0	20
Per End	4	159	0	163

	NORTH	WEST	SOUTH	
Peak Per	Bexley Rd	Demaine	Bexley Rd	TOT
0700 - 0800	1	64	0	65
0715 - 0815	0	102	0	102
0730 - 0830	0	113	0	113
0745 - 0845	0	104	0	104
0800 - 0900	3	95	0	98
PEAK HR	0	113	0	113

Hours 1
Hours 2
Hours 3
Hours 4
Hours 5



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights

Time Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1615	290	0	3	0	3	360	656
1615 - 1630	269	0	2	0	3	318	592
1630 - 1645	305	0	4	0	1	308	618
1645 - 1700	303	0	3	0	2	345	653
1700 - 1715	295	0	5	0	2	282	584
1715 - 1730	297	0	2	0	0	334	633
1730 - 1745	285	0	2	0	2	382	671
1745 - 1800	309	0	3	0	4	306	622
Per End	2353	0	24	0	17	2635	5029

Heavies

Time Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1615	4	0	0	0	0	7	11
1615 - 1630	9	0	0	0	0	5	14
1630 - 1645	4	0	0	0	0	3	7
1645 - 1700	5	0	0	0	0	4	9
1700 - 1715	1	0	0	0	0	6	7
1715 - 1730	7	0	0	0	0	4	11
1730 - 1745	3	0	0	0	0	6	9
1745 - 1800	7	0	0	0	0	5	12
Per End	40	0	0	0	0	40	80

Combined

Time Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1615	294	0	3	0	3	367	667
1615 - 1630	278	0	2	0	3	323	606
1630 - 1645	309	0	4	0	1	311	625
1645 - 1700	308	0	3	0	2	349	662
1700 - 1715	296	0	5	0	2	288	591
1715 - 1730	304	0	2	0	0	338	644
1730 - 1745	288	0	2	0	2	388	680
1745 - 1800	316	0	3	0	4	311	634
Per End	2393	0	24	0	17	2675	5109

Lights

Peak Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1700	1167	0	12	0	9	1331	2519
1615 - 1715	1172	0	14	0	8	1253	2447
1630 - 1730	1200	0	14	0	5	1269	2488
1645 - 1745	1180	0	12	0	6	1343	2541
1700 - 1800	1186	0	12	0	8	1304	2510
PEAK HR	1180	0	12	0	6	1343	

Heavies

Peak Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1700	22	0	0	0	0	19	41
1615 - 1715	19	0	0	0	0	18	37
1630 - 1730	17	0	0	0	0	17	34
1645 - 1745	16	0	0	0	0	20	36
1700 - 1800	18	0	0	0	0	21	39
PEAK HR	16	0	0	0	0	20	36

Combined

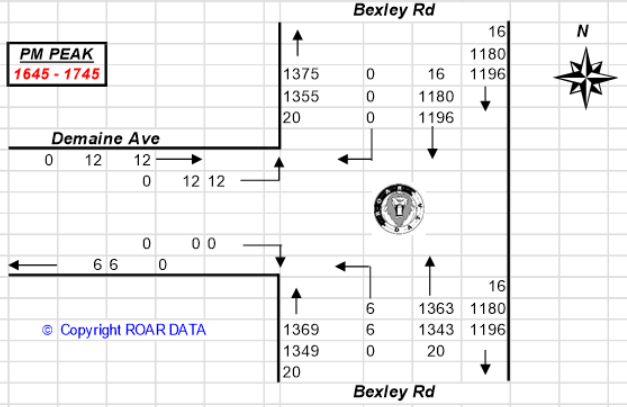
Peak Per	NORTH Bexley Rd T	NORTH Bexley Rd R	WEST Demaine L	WEST Demaine R	SOUTH Bexley Rd L	SOUTH Bexley Rd T	TOT
1600 - 1700	1189	0	12	0	9	1350	2560
1615 - 1715	1191	0	14	0	8	1271	2484
1630 - 1730	1217	0	14	0	5	1286	2522
1645 - 1745	1196	0	12	0	6	1363	2577
1700 - 1800	1204	0	12	0	8	1325	2549
PEAK HR	1196	0	12	0	6	1363	2577

Peds

Time Per	NORTH Bexley Rd	WEST Demaine	SOUTH Bexley Rd	TOT
1600 - 1615	0	8	0	8
1615 - 1630	0	9	1	10
1630 - 1645	0	11	0	11
1645 - 1700	0	21	0	21
1700 - 1715	0	14	0	14
1715 - 1730	0	13	0	13
1730 - 1745	0	26	0	26
1745 - 1800	0	27	0	27
Per End	0	129	1	130

Peak Per	NORTH Bexley Rd	WEST Demaine	SOUTH Bexley Rd	TOT
1600 - 1700	0	49	1	50
1615 - 1715	0	55	1	56
1630 - 1730	0	59	0	59
1645 - 1745	0	74	0	74
1700 - 1800	0	80	0	80
PEAK HR	0	74	0	74

Hours 1
Hours 2
Hours 3
Hours 4
Hours 5



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	0	0	0	46	0	98	144
0715 - 0730	0	0	0	37	0	102	139
0730 - 0745	0	0	0	45	0	63	108
0745 - 0800	0	0	0	80	0	78	158
0800 - 0815	0	0	0	68	0	75	143
0815 - 0830	0	0	0	88	0	78	166
0830 - 0845	0	0	0	75	0	67	142
0845 - 0900	0	0	0	72	0	74	146
Per End	0	0	0	511	0	635	1146

Heavies	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	0	0	0	2	0	2	4
0715 - 0730	0	0	0	0	0	2	2
0730 - 0745	0	0	0	2	0	6	8
0745 - 0800	0	0	0	1	0	4	5
0800 - 0815	0	0	0	2	0	1	3
0815 - 0830	0	0	0	1	0	3	4
0830 - 0845	0	0	0	2	0	1	3
0845 - 0900	0	0	0	1	0	3	4
Per End	0	0	0	11	0	22	33

Combined	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	0	0	0	48	0	100	148
0715 - 0730	0	0	0	37	0	104	141
0730 - 0745	0	0	0	47	0	69	116
0745 - 0800	0	0	0	81	0	82	163
0800 - 0815	0	0	0	70	0	76	146
0815 - 0830	0	0	0	89	0	81	170
0830 - 0845	0	0	0	77	0	68	145
0845 - 0900	0	0	0	73	0	77	150
Per End	0	0	0	522	0	657	1179

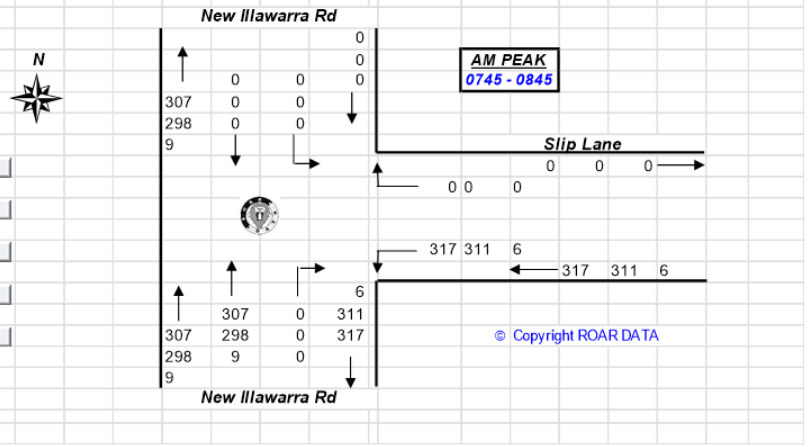
Lights	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	0	0	0	208	0	341	549
0715 - 0815	0	0	0	230	0	318	548
0730 - 0830	0	0	0	281	0	294	575
0745 - 0845	0	0	0	311	0	298	609
0800 - 0900	0	0	0	303	0	294	597
PEAK HR	0	0	0	311	0	298	609

Heavies	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	0	0	0	5	0	14	19
0715 - 0815	0	0	0	5	0	13	18
0730 - 0830	0	0	0	6	0	14	20
0745 - 0845	0	0	0	6	0	9	15
0800 - 0900	0	0	0	6	0	8	14
PEAK HR	0	0	0	6	0	9	15

Combined	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	0	0	0	213	0	355	568
0715 - 0815	0	0	0	235	0	331	566
0730 - 0830	0	0	0	287	0	308	595
0745 - 0845	0	0	0	317	0	307	624
0800 - 0900	0	0	0	309	0	302	611
PEAK HR	0	0	0	317	0	307	624

Peds	NORTH	EAST	SOUTH	
Time Per	New	Slip Lane	New	TOT
0700 - 0715	0	1	1	2
0715 - 0730	1	0	0	1
0730 - 0745	0	0	1	1
0745 - 0800	1	1	0	2
0800 - 0815	0	1	0	1
0815 - 0830	0	0	0	0
0830 - 0845	1	0	1	2
0845 - 0900	0	0	1	1
Per End	3	3		10

	NORTH	EAST	SOUTH	
Peak Per	New	Slip Lane	New	TOT
0700 - 0800	2	2	2	6
0715 - 0815	2	2	1	5
0730 - 0830	1	2	1	4
0745 - 0845	2	2	1	5
0800 - 0900	1	1	2	4
PEAK HR	2	2	1	5



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
1600 - 1615	0	0	0	105	0	54	159
1615 - 1630	0	0	0	97	0	39	136
1630 - 1645	0	0	0	107	0	41	148
1645 - 1700	0	0	0	110	0	60	170
1700 - 1715	0	0	0	115	0	47	162
1715 - 1730	0	0	0	111	0	48	159
1730 - 1745	0	0	0	112	0	51	163
1745 - 1800	0	0	0	106	0	42	148
Per End	0	0	0	863	0	382	1245

Heavies	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
1600 - 1615	0	0	0	1	0	2	3
1615 - 1630	0	0	0	2	0	2	4
1630 - 1645	0	0	0	2	0	2	4
1645 - 1700	0	0	0	0	0	1	1
1700 - 1715	0	0	0	0	0	2	2
1715 - 1730	0	0	0	1	0	2	3
1730 - 1745	0	0	0	0	0	1	1
1745 - 1800	0	0	0	1	0	2	3
Per End	0	0	0	7	0	14	21

Combined	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Time Per	T	L	R	L	R	T	TOT
1600 - 1615	0	0	0	106	0	56	162
1615 - 1630	0	0	0	99	0	41	140
1630 - 1645	0	0	0	109	0	43	152
1645 - 1700	0	0	0	110	0	61	171
1700 - 1715	0	0	0	115	0	49	164
1715 - 1730	0	0	0	112	0	50	162
1730 - 1745	0	0	0	112	0	52	164
1745 - 1800	0	0	0	107	0	44	151
Per End	0	0	0	870	0	396	1266

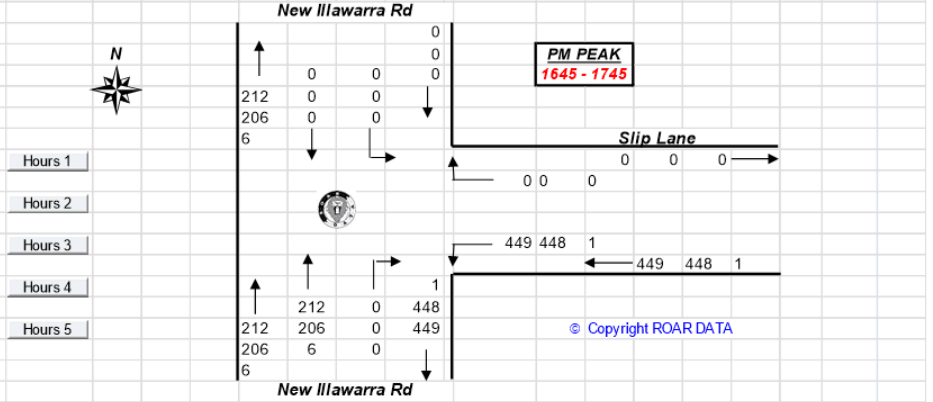
Lights	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
1600 - 1700	0	0	0	419	0	194	613
1615 - 1715	0	0	0	429	0	187	616
1630 - 1730	0	0	0	443	0	196	639
1645 - 1745	0	0	0	448	0	206	654
1700 - 1800	0	0	0	444	0	188	632
PEAK HR	0	0	0	448	0	206	654

Heavies	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
1600 - 1700	0	0	0	5	0	7	12
1615 - 1715	0	0	0	4	0	7	11
1630 - 1730	0	0	0	3	0	7	10
1645 - 1745	0	0	0	1	0	6	7
1700 - 1800	0	0	0	2	0	7	9
PEAK HR	0	0	0	1	0	6	7

Combined	NORTH		EAST		SOUTH		
	New		Slip Lane		New		
Peak Per	T	L	R	L	R	T	TOT
1600 - 1700	0	0	0	424	0	201	625
1615 - 1715	0	0	0	433	0	194	627
1630 - 1730	0	0	0	446	0	203	649
1645 - 1745	0	0	0	449	0	212	661
1700 - 1800	0	0	0	446	0	195	641
PEAK HR	0	0	0	449	0	212	661

Peds	NORTH	EAST	SOUTH	
Time Per	New	Slip Lane	New	TOT
1600 - 1615	0	0	0	0
1615 - 1630	0	0	1	1
1630 - 1645	0	1	1	2
1645 - 1700	0	0	0	0
1700 - 1715	1	0	0	1
1715 - 1730	0	0	0	0
1730 - 1745	0	1	0	1
1745 - 1800	0	0	0	0
Per End	1	2	2	5

	NORTH	EAST	SOUTH	
Peak Per	New	Slip Lane	New	TOT
1600 - 1700	0	1	2	3
1615 - 1715	1	1	2	4
1630 - 1730	1	1	1	3
1645 - 1745	1	1	0	2
1700 - 1800	1	1	0	2
PEAK HR	1	1	0	2



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client : Varga Traffic Planning
Job No/Name : 6389 BEXLEY NTH Bexley Rd
Day/Date : Tuesday 14th March 2017

Lights	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	26	187	0	17	75	13	14	258	64	14	15	38	721
0715 - 0730	36	182	0	22	77	8	28	291	63	8	11	28	754
0730 - 0745	23	226	0	24	90	12	12	329	57	26	19	39	857
0745 - 0800	25	198	0	26	50	12	10	309	41	20	16	36	743
0800 - 0815	16	189	0	28	56	11	8	353	50	32	28	55	826
0815 - 0830	38	265	0	23	56	9	3	265	36	23	35	41	794
0830 - 0845	23	240	0	27	54	11	7	324	45	32	41	59	863
0845 - 0900	21	220	0	23	46	4	14	294	42	35	19	64	782
Period End	208	1707	0	190	504	80	96	2423	398	190	184	360	6340

Heavies	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	0	4	0	1	0	1	1	6	0	1	1	0	15
0715 - 0730	1	4	0	0	0	0	2	4	2	1	0	1	15
0730 - 0745	1	5	0	0	1	1	0	11	0	0	0	0	19
0745 - 0800	2	4	0	0	0	0	1	3	2	1	1	1	15
0800 - 0815	1	6	0	0	0	1	0	5	0	0	0	1	14
0815 - 0830	1	2	0	0	0	0	1	3	1	1	0	0	9
0830 - 0845	0	5	0	0	0	1	0	8	0	0	0	0	14
0845 - 0900	2	4	0	0	0	0	1	5	1	1	0	0	14
Period End	8	34	0	1	1	4	6	45	6	5	2	3	115

Lights	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	110	793	0	89	292	45	64	1187	225	68	61	141	3075
0715 - 0815	100	795	0	100	273	43	58	1282	211	86	74	158	3180
0730 - 0830	102	878	0	101	252	44	33	1256	184	101	98	171	3220
0745 - 0845	102	892	0	104	216	43	28	1251	172	107	120	191	3226
0800 - 0900	98	914	0	101	212	35	32	1236	173	122	123	219	3265
PEAK HOUR	98	914	0	101	212	35	32	1236	173	122	123	219	3265

Heavies	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	4	17	0	1	1	2	4	24	4	3	2	2	64
0715 - 0815	5	19	0	0	1	2	3	23	4	2	1	3	63
0730 - 0830	5	17	0	0	1	2	2	22	3	2	1	2	57
0745 - 0845	4	17	0	0	0	2	2	19	3	2	1	2	52
0800 - 0900	4	17	0	0	0	2	2	21	2	2	0	1	51
PEAK HOUR	4	17	0	0	0	2	2	21	2	2	0	1	51

Combined	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	26	191	0	18	75	14	15	264	64	15	16	38	736
0715 - 0730	37	186	0	22	77	8	30	295	65	9	11	29	769
0730 - 0745	24	231	0	24	91	13	12	340	57	26	19	39	876
0745 - 0800	27	202	0	26	50	12	11	312	43	21	17	37	758
0800 - 0815	17	195	0	28	56	12	8	358	50	32	28	56	840
0815 - 0830	39	267	0	23	56	9	4	268	37	24	35	41	803
0830 - 0845	23	245	0	27	54	12	7	332	45	32	41	59	877
0845 - 0900	23	224	0	23	46	4	15	299	43	36	19	64	796
Period End	216	1741	0	191	505	84	102	2468	404	195	186	363	6455

Peds	NORTH Bexley Rd	WEST Shaw St	SOUTH Bexley Rd	EAST Slade Rd	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0715	4	16	14	5	39
0715 - 0730	1	32	14	7	54
0730 - 0745	9	42	14	2	67
0745 - 0800	11	35	12	2	60
0800 - 0815	4	26	14	1	45
0815 - 0830	15	31	9	2	57
0830 - 0845	14	33	16	5	68
0845 - 0900	13	24	23	2	62
Period End	71	239	116	26	452

Combined	NORTH Bexley Rd			WEST Shaw St			SOUTH Bexley Rd			EAST Slade Rd			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	114	810	0	90	293	47	68	1211	229	71	63	143	3139
0715 - 0815	105	814	0	100	274	45	61	1305	215	88	75	161	3243
0730 - 0830	107	895	0	101	253	46	35	1278	187	103	99	173	3277
0745 - 0845	106	909	0	104	216	45	30	1270	175	109	121	193	3278
0800 - 0900	102	931	0	101	212	37	34	1257	175	124	123	220	3316
PEAK HOUR	102	931	0	101	212	37	34	1257	175	124	123	220	3316

Peds	NORTH Bexley Rd	WEST Shaw St	SOUTH Bexley Rd	EAST Slade Rd	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0800	25	125	54	16	220
0715 - 0815	25	135	54	12	226
0730 - 0830	39	134	49	7	229
0745 - 0845	44	125	51	10	230
0800 - 0900	46	114	62	10	232
PEAK HR	46	114	62	10	232

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob.0418-239019

Client	: Varga Traffic Planning
Job No/Name	: 6389 BEXLEY NTH Bexley Rd
Day/Date	: Tuesday 14th March 2017

Lights

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	44	174	0	14	24	5	12	307	26	36	34	52	**728**
1615 - 1630	38	211	0	10	27	10	7	275	31	34	38	45	**726**
1630 - 1645	30	257	0	12	22	8	7	279	31	33	47	49	**775**
1645 - 1700	47	264	0	8	22	8	10	267	30	26	45	56	**783**
1700 - 1715	31	212	0	8	23	12	8	240	23	48	57	49	**711**
1715 - 1730	36	227	0	12	37	9	8	285	30	32	49	62	**787**
1730 - 1745	40	241	0	15	45	7	5	316	47	28	51	58	**853**
1745 - 1800	44	273	0	14	30	9	2	259	35	29	37	42	**774**
Period End	**310**	**1859**	**0**	**93**	**230**	**68**	**59**	**2228**	**253**	**266**	**358**	**413**	6137

Heavies

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	0	4	0	0	0	1	1	5	1	0	0	1	**13**
1615 - 1630	0	7	0	0	0	0	1	3	1	1	1	0	**14**
1630 - 1645	0	3	0	0	0	1	0	4	0	1	0	0	**9**
1645 - 1700	1	4	0	0	0	0	1	1	1	0	0	0	**8**
1700 - 1715	0	0	0	0	0	1	0	2	0	0	0	0	**3**
1715 - 1730	0	6	0	0	0	0	1	5	2	1	0	0	**15**
1730 - 1745	1	2	0	0	0	1	0	4	0	0	0	0	**8**
1745 - 1800	0	5	0	0	0	0	1	3	2	1	0	0	**12**
Period End	**2**	**31**	**0**	**0**	**0**	**4**	**5**	**27**	**7**	**4**	**1**	**1**	82

Lights

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	159	906	0	44	95	31	36	1128	118	129	164	202	**3012**
1615 - 1715	146	944	0	38	94	38	32	1061	115	141	187	199	**2995**
1630 - 1730	144	960	0	40	104	37	33	1071	114	139	198	216	**3056**
1645 - 1745	154	944	0	43	127	36	31	1108	130	134	202	225	**3134**
1700 - 1800	151	953	0	49	135	37	23	1100	135	137	194	211	**3125**
PEAK HOUR	**154**	**944**	**0**	**43**	**127**	**36**	**31**	**1108**	**130**	**134**	**202**	**225**	3134

Heavies

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	1	18	0	0	0	2	3	13	3	2	1	1	**44**
1615 - 1715	1	14	0	0	0	2	2	10	2	2	1	0	**34**
1630 - 1730	1	13	0	0	0	2	2	12	3	2	0	0	**35**
1645 - 1745	2	12	0	0	0	2	2	12	3	1	0	0	**34**
1700 - 1800	1	13	0	0	0	2	2	14	4	2	0	0	**38**
PEAK HOUR	**2**	**12**	**0**	**0**	**0**	**2**	**2**	**12**	**3**	**1**	**0**	**0**	34

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	44	178	0	14	24	6	13	312	27	36	34	53	**741**
1615 - 1630	38	218	0	10	27	10	8	278	32	35	39	45	**740**
1630 - 1645	30	260	0	12	22	9	7	283	31	34	47	49	**784**
1645 - 1700	48	268	0	8	22	8	11	268	31	26	45	56	**791**
1700 - 1715	31	212	0	8	23	13	8	242	23	48	57	49	**714**
1715 - 1730	36	233	0	12	37	9	9	290	32	33	49	62	**802**
1730 - 1745	41	243	0	15	45	8	5	320	47	28	51	58	**861**
1745 - 1800	44	278	0	14	30	9	3	262	37	30	37	42	**786**
Period End	**312**	**1890**	**0**	**93**	**230**	**72**	**64**	**2255**	**260**	**270**	**359**	**414**	6219

Peds

	NORTH	WEST	SOUTH	EAST	
	Bexley Rd	*Shaw St*	*Bexley Rd*	*Slade Rd*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1615	11	17	8	3	**39**
1615 - 1630	11	15	4	6	**36**
1630 - 1645	8	12	18	4	**42**
1645 - 1700	5	10	6	5	**26**
1700 - 1715	8	9	19	8	**44**
1715 - 1730	8	10	9	6	**33**
1730 - 1745	16	12	13	21	**62**
1745 - 1800	15	21	20	21	**77**
Period End	**82**	**106**	**97**	**74**	359

Combined

	NORTH			WEST			SOUTH			EAST			
	Bexley Rd			*Shaw St*			*Bexley Rd*			*Slade Rd*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	160	924	0	44	95	33	39	1141	121	131	165	203	**3056**
1615 - 1715	147	958	0	38	94	40	34	1071	117	143	188	199	**3029**
1630 - 1730	145	973	0	40	104	39	35	1083	117	141	198	216	**3091**
1645 - 1745	156	956	0	43	127	38	33	1120	133	135	202	225	**3168**
1700 - 1800	152	966	0	49	135	39	25	1114	139	139	194	211	**3163**
PEAK HOUR	**156**	**956**	**0**	**43**	**127**	**38**	**33**	**1120**	**133**	**135**	**202**	**225**	3168

Peds

	NORTH	WEST	SOUTH	EAST	
	Bexley Rd	*Shaw St*	*Bexley Rd*	*Slade Rd*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
1600 - 1700	35	54	36	18	**143**
1615 - 1715	32	46	47	23	**148**
1630 - 1730	29	41	52	23	**145**
1645 - 1745	37	41	47	40	**165**
1700 - 1800	47	52	61	56	**216**
PEAK HR	**37**	**41**	**47**	**40**	165

Transport Roads & Maritime Services

2 July 2018

Roads and Maritime Ref: SYD18/00752 (A22692424)
Council Ref: F17/333

General Manager
Bayside Council
PO Box 21
Rockdale NSW 2216

Attention: Howard Taylor

Dear Sir/Madam,

PLANNING PROPOSAL 88-96 NEW ILLAWARRA ROAD AND 307-311A BEXLEY ROAD, BEXLEY NORTH

Reference is made to your letter dated 8 May 2018 regarding the abovementioned proposal which was referred to Roads and Maritime Services (Roads and Maritime) for comment prior to the Planning Proposal being forwarded to the Department of Planning Environment for Gateway Determination. Roads and Maritime appreciates the opportunity to provide early comment on the proposal.

Roads and Maritime notes that the planning proposal seeks to amend the Rockdale Local Environmental Plan 2011 as follows:

- rezoning the land from R2 Low Density Residential to R4 High Density Residential;
- increasing the maximum height of buildings from 8.5 metres to 20.5 metres; and
- the maximum floor space ratio from 0.5:1 to 2:1.

Roads and Maritime has reviewed the information provided and raises no objection in principle to the planning proposal. However, Roads and Maritime notes that the subject planning proposal may set a precedent for other similar proposals to increase residential densities in the subject locality. Council may wish to give consideration to the preparation of a Master Plan for the subject locality and a cumulative traffic and transport study to consider the impacts and to identify any regional transport infrastructure improvements required to support future growth in the area, should there be other forthcoming planning proposals for this locality.

Notwithstanding the above, Roads and Maritime recommends the preparation of a site specific Development Control Plan (DCP) to support the planning proposal, to set out the future access strategy and identify appropriate maximum parking rates for the subject site, given its close proximity to public transport and the need to encourage the use of public and active transport infrastructure. Improvements to pedestrian links to Bexley North Station should also be investigated and identified to support the planning proposal. Detailed comments in this regard are provided at **Attachment A** for Council's consideration.

Roads and Maritime Services

27-31 Argyle Street, Parramatta NSW 2150 |
PO Box 973 Parramatta NSW 2150 |

www.rms.nsw.gov.au | 13 22 13

Thank you for the opportunity to provide advice on the subject planning proposal. Should you have any questions or further enquiries in relation to this matter, Rachel Nicholson would be pleased to take your call on 8849 2702 or email development.sydney@rms.nsw.gov.au.

Yours sincerely,

Greg Flynn
Senior Manager Strategic Land Use
Sydney Planning, Sydney Division

Attachment A: Detailed Comments

Roads and Maritime has reviewed the traffic report dated 5 April 2017 and provides the following comments for Council's consideration. These matters should be addressed in any traffic study submitted with the future development application(s) for the site where relevant:

Traffic Generation:

1. The traffic impact assessment for the subject planning proposal should consider traffic generation potential of the maximum likely developable yield of the site under current and proposed planning controls (low density residential with FSR of 0.5:1 compared to high density residential with FSR of 2:1).
2. The traffic generation rate applied for the high density residential component reflects Sydney average rates in Roads and Maritime's TDT 2013/04a Updated Traffic Surveys document, which included surveys of sites (eg St Leonards and Chatswood) with greater public transport mode share than might be expected for the subject site. The rate applied for the assessment of the subject proposal should reflect a comparable site with consideration to accessibility and mode share characteristics of the subject locality. For example, RMS TDT 2013/04a provides a traffic generation rate of 0.32 and 0.18 vehicle trips per hour per dwelling for AM and PM peaks respectively for a site surveyed situated in Rockdale. It is acknowledged that this would have a moderate impact on the overall traffic generation estimate given the likely maximum yield of approximately 100-120 apartments that could feasibly be developed with the proposed planning controls.
3. It is noted that the planning proposal may result in the future removal of an existing service station (currently operating under existing use rights) on the site which is understood to be a prohibited use in the R2 Low Density Residential zone under the Rockdale Local Environmental Plan 2011 and proposed R4 High Density Residential zone. Under these circumstances, the planning proposal and subsequent redevelopment of the site may result in a reduction of trips generated by that portion of the site in the PM peak hours.

Traffic Distribution:

4. Assignment of projected traffic to the surrounding road network should be justified with reference to Journey to Work data for the subject locality.

Infrastructure improvements:

5. The proponent should identify suitable road transport infrastructure to ameliorate traffic and safety impacts resulting from the future development with consideration to all road users. This should include improvements to pedestrian facilities to improve links to Bexley North Station. An improved pedestrian crossing on New Illawarra Road should be investigated and identified as part of the planning proposal and should be identified in any funding mechanism (ie Section 94 Plan) or planning agreement to support the planning proposal. Roads and Maritime would be willing to provide advice on any proposed treatments prior to exhibition of the planning proposal. Roads and Maritime supports the suggested improvements to pedestrian footpaths on the site's frontages.

Development Control Plan:

6. A site/precinct specific Development Control Plan (DCP) to set out the future access arrangements for the site to guide future development should be developed prior to public exhibition of the planning proposal.

   Conflict points (and therefore access points) on Bexley Road should be removed where possible, as this is a key arterial road which carries high volumes of traffic where the safe and efficient movement of people and goods is of critical importance. Vehicular access on Bexley Road would be required to be removed as part of any future development application(s), in accordance with the access strategy set out in Infrastructure SEPP 2007.

Roads and Maritime supports proposed vehicular access being obtained from New Illawarra Road, to be designed in accordance with Council's requirements. Access should be located as far as practical away from the intersection with Bexley Road.

Roads and Maritime advises that the weaving and manoeuvring associated with two proposed vehicle access points, in conjunction with turning / manoeuvring of vehicles to and from Fortescue Street and Lynesta Avenue may create vehicle conflict points on New Illawarra Road at the site frontage. The provision of two vehicle access points at this location will also reduce available on-street parking at this location. Roads and Maritime recommends that only one consolidated vehicle access point to New Illawarra Road is provided.

7. It is recommended that the site/precinct specific DCP should identify appropriate maximum parking rates for future development(s) to encourage the use of the available public and active transport.

VARGA TRAFFIC PLANNING Pty Ltd
Transport, Traffic and Parking Consultants
ACN 071 762 537 ABN 88 071 762 537

25 September 2018
Ref 17160

Roads and Maritime Services
PO Box 973
PARRAMATTA NSW 2150

Attn: Mr Greg Flynn

Dear Greg,

PLANNING PROPOSAL
88-96 NEW ILLAWARRA ROAD & 307-311A BEXLEY ROAD, BEXLEY NORTH
ADDENDUM TRAFFIC REPORT

I refer to your letter dated 2 July 2018 [your reference SYD18/00752 (A22692424)] requesting additional information in respect of the traffic matters associated with the abovementioned planning proposal.

1. The maximum development potential of the subject site under the *R4 – High Density Residential* zoning envisaged by the planning proposal is approximately 100 dwellings in 3 new 5 to 6-storey residential apartment buildings.

2. Your advice that the *average* traffic generation rates nominated in Roads and Maritime's *Technical Direction TDT 2013/04A Updated Traffic Surveys* included survey sites at St Leonards and Chatswood "with greater public transport mode share than might be expected at the site" is noted. However, the *average* rates also include other sites such as Liberty Grove and Rockdale with lower public transport mode shares than might be expected at the site. The use of the *average* rates derived from all survey sites was therefore considered to be the most appropriate.

   In particular, it is noted that whilst the Chatswood and St Leonards site are located 160m and 350m respectively from the railway station, the Liberty Grove and Rockdale sites were located 1km and 900m respectively from the railway station.

   The subject site at Bexley North is located just 250m from Bexley North Railway Station, and it is therefore envisaged that this site would achieve public transport mode shares similar to Chatswood and St Leonards rather than Liberty Grove or Rockdale.

   Notwithstanding the above, for the purposes of this addendum traffic assessment, the *"Rockdale"* rates have been adopted as suggested in your letter.

   The projected traffic generation potential of the planning proposal based on the *average* and the *Rockdale* rates is set out in the table below. I note that the difference in the traffic generation potential of the site is minimal in any event.

Planning Proposal Traffic Generation Potential
Comparison of *Average* & *Rockdale* Traffic Generation Rates

	"Average" Rates		"Rockdale" Rates	
	AM	**PM**	**AM**	**PM**
Planning Proposal (100 Apartments):	19 vph	15 vph	32 vph	18 vph

Suite 6, 20 Young Street, Neutral Bay NSW 2089 - PO Box 1868, Neutral Bay NSW 2089 - Ph: 9904 3224

3. The proposed removal of the existing service station on the site will result in a very substantial reduction in the traffic generation potential of the site, as noted in your letter.

4. The projected traffic generation potential has been assigned to the surrounding road network in accordance with the trends identified by the "Journey To Work" data for the subject locality. The traffic assignments using the *average* and the *Rockdale* traffic generation rates are illustrated in the diagrams below. Those traffic assignments are largely consistent with the traffic assignment provided in the original traffic report.

   Consistent with the methodology adopted in the original traffic report, it has been assumed that the site is currently *vacant*, and that no discounting has been applied to reflect the proposed closure of the existing service station on the site as shown on the attached plan

   The results of the updated SIDRA analysis are summarised in the tables below and the Updated Movement Summaries are attached, revealing that *all* of the intersection will continue to operate at current *Levels of Service* and not road improvements or intersection upgrades are required as a consequence of the planning proposal.

5. It is agreed that the planning proposal should include improvements to pedestrian facilities to improve links to Bexley North Railway Station. An improved pedestrian crossing facility on New Illawarra Road is suggested, most likely to the north of the Fortescue Street intersection to provide the shortest, most direct walking route to the station for future residents.

6. A site specific DCP could be prepared as part of the planning proposal to set out the access arrangements for the site to guide future development. The DCP could require all vehicular access to the site to be provided via the New Illawarra Road frontage of the site only.

   The two sites which are the subject of this planning proposal will each be accessed via a single driveway, to be located near the southern boundary of each site.

   As the two sites are in separate ownership and may be developed at different times, the provision of a single, consolidated access driveway serving both sites is not feasible. Each site will generate minimal traffic activity in any event, given the close proximity of Bexley North Railway Station.

   By way of comparison, the attached plan shows the 12 existing driveways currently serving the site, as well as the 10 driveways which would be required if the site was redeveloped in accordance with the current zoning controls.

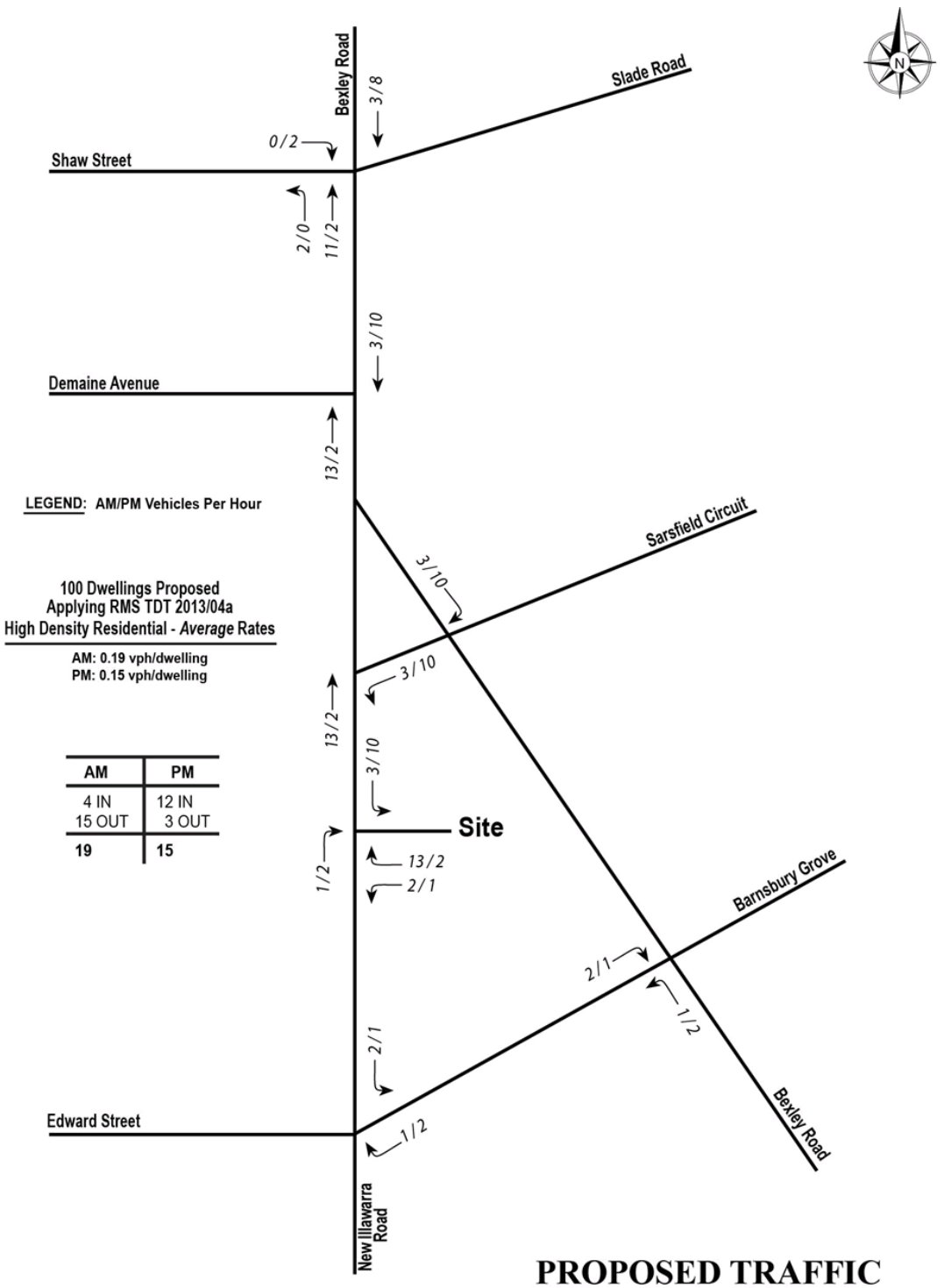
   It is clear that the planning proposal represents the best outcome in terms of driveway numbers and location, with zero driveways proposed in Bexley Road and only two driveways proposed in New Illawarra Road.

7. The amount of car parking to be provided on the site is not yet known, however it is likely to be consistent with requirements of SEPP 65 which nominates the parking rates specified in the RMS *Guidelines* for high density residential flat buildings.

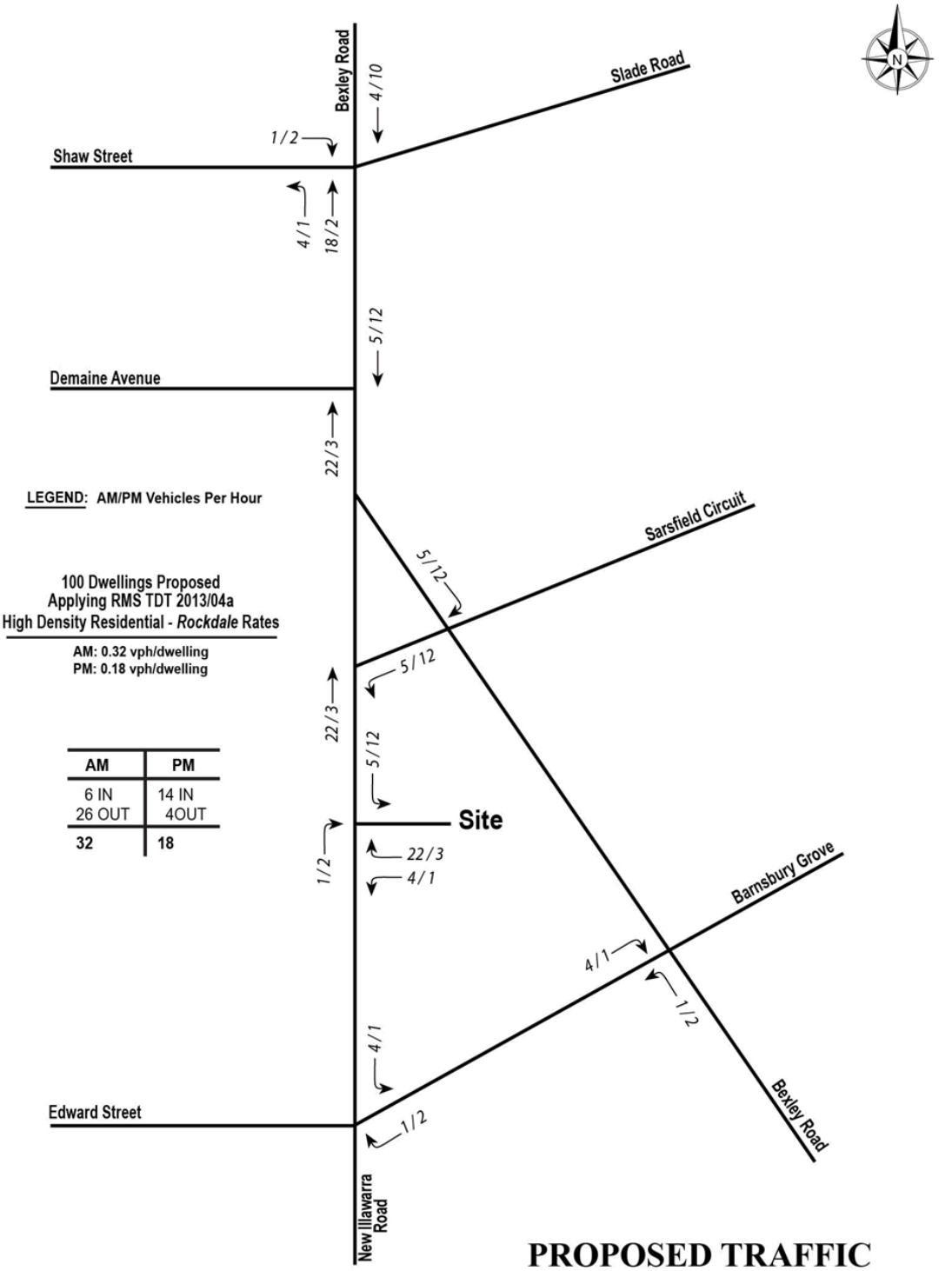
Please do not hesitate to contact me on telephone 9904 3224 should you have any enquiries.

Yours sincerely

Robert Varga
Director
Varga Traffic Planning Pty Ltd



PROPOSED TRAFFIC DISTRIBUTION ASSIGNMENT TDT 2013/04a "Average" Rates



PROPOSED TRAFFIC DISTRIBUTION ASSIGNMENT TDT 2013/04a "Rockdale" Rates

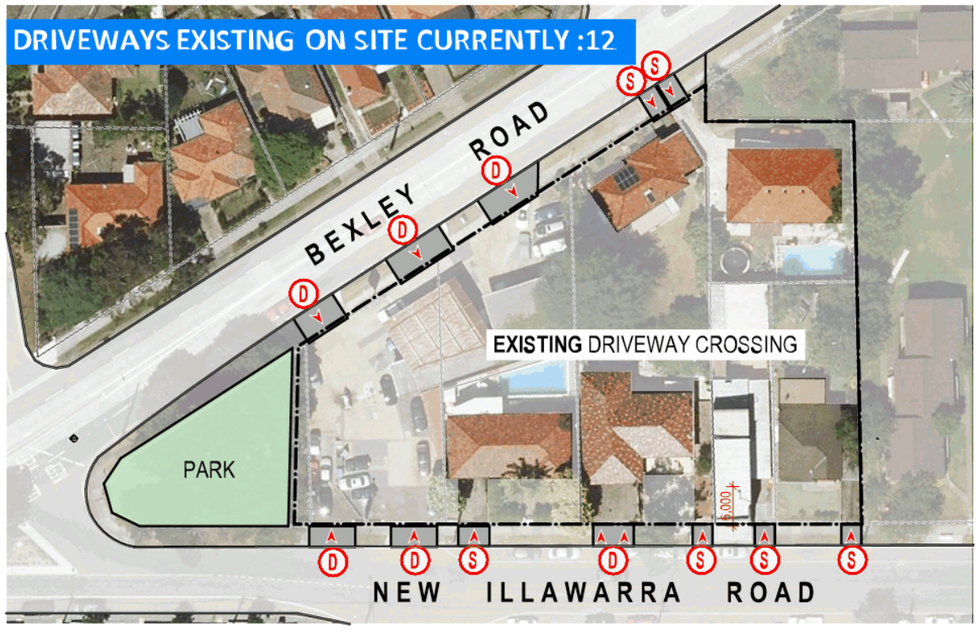
TABLE 3.1 – RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD, SHAW STREET & SLADE ROAD						
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand			
			"Average" Rates		"Rockdale" Rates	
	AM	PM	AM	PM	AM	PM
Level of Service	E	D	E	D	E	D
Degree of Saturation	0.936	0.880	0.929	0.880	0.934	0.880
Average Vehicle Delay (secs/veh)	**67.9**	**52.0**	**67.1**	**52.7**	**67.8**	**52.8**

TABLE 3.2 – RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & DERMAINE AVENUE						
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand			
			"Average" Rates		"Rockdale" Rates	
	AM	PM	AM	PM	AM	PM
Level of Service	A	A	A	A	A	A
Degree of Saturation	0.394	0.382	0.394	0.386	0.394	0.387
Average Vehicle Delay (secs/veh)	**0.8**	**0.2**	**0.8**	**0.2**	**0.8**	**0.2**

TABLE 3.3 – RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD, NEW ILLAWARRA ROAD & SARSFIELD CIRCUIT						
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand			
			"Average" Rates		"Rockdale" Rates	
	AM	PM	AM	PM	AM	PM
Level of Service	A	A	A	A	A	A
Degree of Saturation	0.718	0.871	0.724	0.891	0.728	0.895
Average Vehicle Delay (secs/veh)	**3.4**	**5.5**	**3.4**	**6.1**	**3.5**	**6.2**

TABLE 3.4 – RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & BARNSBURY GROVE						
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand			
			"Average" Rates		"Rockdale" Rates	
	AM	PM	AM	PM	AM	PM
Level of Service	B	A	B	A	B	B
Degree of Saturation	0.739	0.855	0.739	0.855	0.754	0.855
Average Vehicle Delay (secs/veh)	**16.3**	**15.0**	**16.3**	**15.0**	**16.4**	**15.0**

TABLE 3.5 – RESULTS OF SIDRA ANALYSIS OF BEXLEY ROAD & SHAW STREET & SLADE ROAD						
Key Indicators	Existing Traffic Demand		Projected Additional Traffic Demand			
			"Average" Rates		"Rockdale" Rates	
	AM	PM	AM	PM	AM	PM
Level of Service	A	A	A	A	A	A
Degree of Saturation	0.436	0.478	0.436	0.481	0.436	0.481
Average Vehicle Delay (secs/veh)	**7.2**	**7.5**	**7.2**	**7.5**	**7.2**	**7.5**



KEY

- (S) ➤ SINGLE 3m WIDE
- (D) ➤ DOUBLE >5.5m WIDE

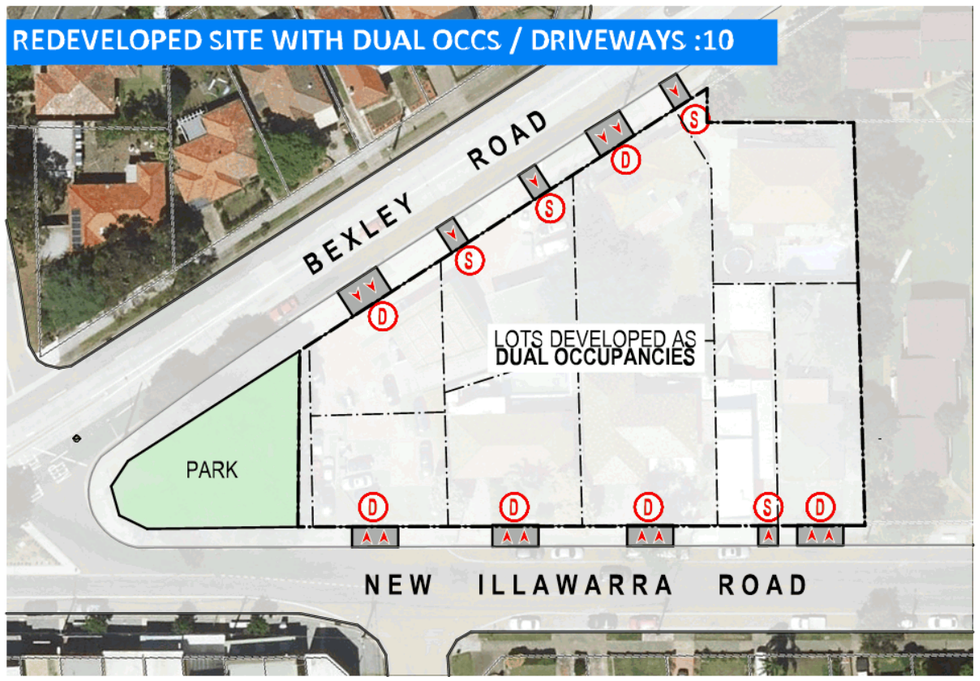
DRIVEWAY CROSSING ANALYSIS

The diagrams show the number of existing driveway crossings in use within the site. What the likely outcomes are if all the sites are re-developed to their highest potential withing the existing DCP/LEP controls and finally the outcome undert the planning proposal.

EXISTING: There are 12 driveway crossings and several driveways wider than 5.5 accessing the petrol station.

RE-DEVELOPED TO EXISTING DCP/LEP: If the site is develope under the existing site controls there would be 10 driveways under a best case senario. These like the existing are on Bexley Rd & New Illawarra Rd.

PLANNING PROPOSAL: Under our proposal for the site as residental flats there would only be 2 driveways proposed, both of which would be on New Illawarra Rd.

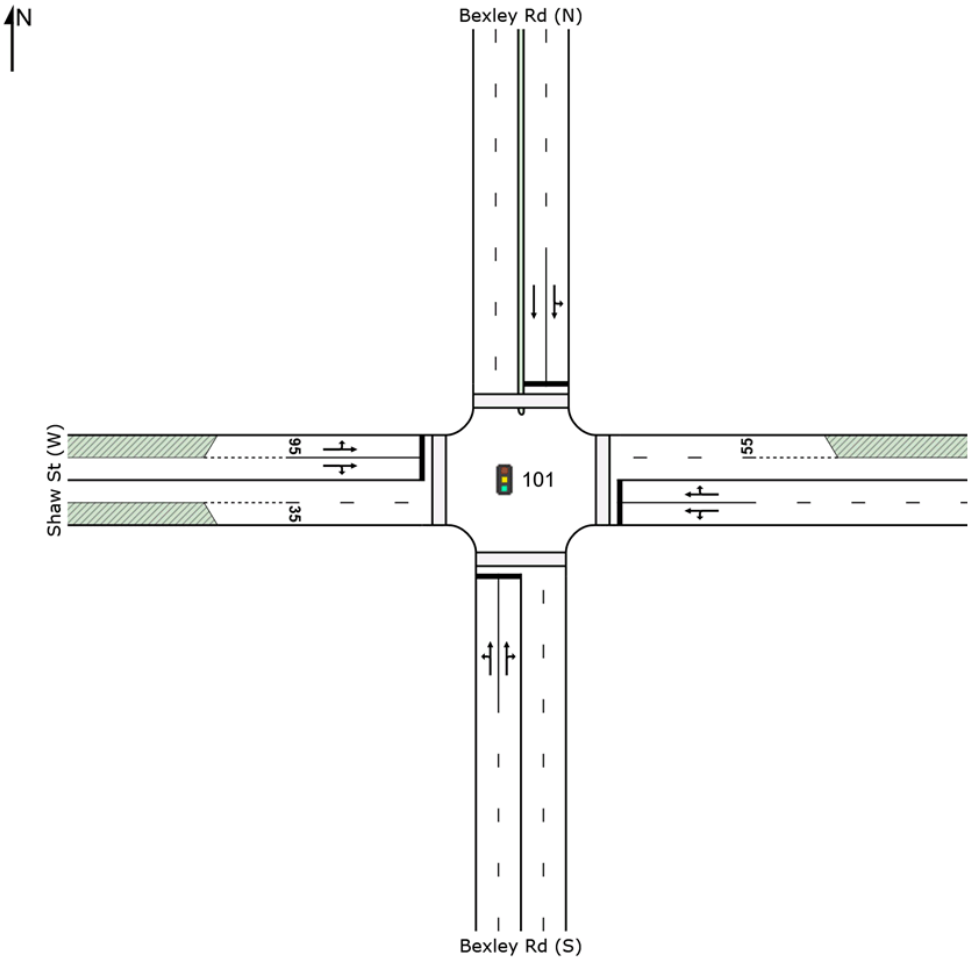


06 (B) CONTEXT - DRIVEWAY ANALYSIS

SITE LAYOUT

Site: 101 [BEX_SHA_SLAX AM]

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated



Organisation: VARGA TRAFFIC PLANNING | Created: Tuesday, 18 September 2018 5:12:24 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAX AM] — **Net ork:N101 [E istin Net ork AM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 150 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	(	0.0	(	0.0	0.9 (	56.0	LOS D	7 .(	522.2	1.00	1.0	28.0
2	T1	1270	1.7	1270	1.7	0.9 (	58.6	LOS E	7 .(	522.2	1.00	1.09	19.8
	R2	175	0.0	175	0.0	0.9 (	87.8	LOS F	7.'	266.2	1.00	1.27	21.
Approach		1475	1.4	1475	1.4	0.9 (	62.0	LOS E	7 .(	522.2	1.00	1.11	20.
East: Slade Rd E													
4	L2	109	0.0	109	0.0	0.192	57.	LOS E	9.9	69.0	0.89	0.78	20.0
5	T1	121	0.0	121	0.0	0.720	58.2	LOS E	18.4	128.5	0.95	0.82	27.2
6	R2	19	0.0	19	0.0	0.720	66.7	LOS E	18.4	128.5	1.00	0.85	21.2
Approach		42	0.0	42	0.0	0.720	61.8	LOS E	18.4	128.5	0.96	0.8	22.9
North: Bexley Rd N													
7	L2	106	0.0	106	0.0	0.917	81.2	LOS F	41.6	295.1	1.00	1.07	19.4
8	T1	909	1.9	909	1.9	0.917	7 .(	LOS F	41.9	297.7	1.00	1.06	7.1
Approach		1015	1.7	1015	1.7	0.917	74.4	LOS F	41.9	297.7	1.00	1.06	8.9
est: Shaw St													
10	L2	104	0.0	104	0.0	0. 8	67.6	LOS E	7.0	48.7	0.95	0.78	20.8
11	T1	216	0.0	216	0.0	0.920	85.5	LOS F	22.0	154.2	1.00	1.08	2 .0
12	R2	45	0.0	45	0.0	0.920	90.0	LOS F	22.0	154.2	1.00	1.08	15.1
Approach		6	0.0	6	0.0	0.920	80.9	LOS F	22.0	154.2	0.99	1.00	21.6
All Vehicles		27	1.2	27	1.2	0.9 (	67.9	LOS E	7 .(	522.2	0.99	1.05	17.8

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	57.	LOS E	0.2	0.2	0.88	0.88
P2	East Full Crossing	5	45.7	LOS E	0.2	0.2	0.78	0.78
P	North Full Crossing	5	64.5	LOS F	0.2	0.2	0.9	0.9
P4	est Full Crossing	5	20.8	LOS C	0.1	0.1	0.5	0.5
All Pedestrians		211	47.1	LOS E			0.78	0.78

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:18:49 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAX PM] **Net ork:N101 [E istin Net ork PM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 140 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o ueu Vehicles e	Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	25	0.0	25	0.0	0.86	8.	LOS C	5 .:	75.·	0.94	0.89	.5
2	T1	1114	1.1	1114	1.1	0.86	40.2	LOS C	5 .:	75.·	0.95	0.95	25.0
	R2	1 5	0.0	1 5	0.0	0.86	70.4	LOS E	26.1	184.1	1.00	1.17	24.
Approach		1278	0.9	1278	0.9	0.86	4 ·	LOS D	5 .:	75.·	0.96	0.97	25.1
East: Slade Rd E													
4	L2	1 5	0.0	1 5	0.0	0.251	0.(	LOS C	5.7	9.(	0.65	0.72	27.7
5	T1	194	0.0	194	0.0	0.880	65.	LOS E	29.9	209.2	1.00	0.98	26.0
6	R2	211	0.0	211	0.0	0.880	69.9	LOS E	29.9	209.2	1.00	0.98	20.7
Approach		544	0.0	544	0.0	0.880	58.1	LOS E	29.9	209.2	0.91	0.92	24.1
North: Bexley Rd N													
7	L2	152	0.0	152	0.0	0.859	59.2	LOS E	7.5	267.2	1.00	0.99	2 .5
8	T1	966	1.2	966	1.2	0.859	5 .:	LOS D	8.·	271.5	1.00	0.98	9.4
Approach		1118	1.1	1118	1.1	0.859	54.1	LOS D	8.·	271.5	1.00	0.98	12.2
est: Shaw St													
10	L2	49	0.0	49	0.0	0. 0'	69.1	LOS E	.'	25.6	0.97	0.75	20.6
11	T1	1 5	0.0	1 5	0.0	0.866	76.1	LOS F	12.5	87.5	1.00	0.98	24.
12	R2	5	0.0	5	0.0	0.866	81.	LOS F	12.5	87.5	1.00	0.99	16.2
Approach		22	0.0	22	0.0	0.866	75.4	LOS F	12.5	87.5	0.99	0.9	22.4
All Vehicles		16	0.8	16	0.8	0.880	52.0	LOS D	5 .:	75.·	0.97	0.96	20.8

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 0.9
Number o Iterations: 8 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	48.2	LOS E	0.2	0.2	0.8	0.8
P2	East Full Crossing	5	8.(	LOS D	0.2	0.2	0.74	0.74
P	North Full Crossing	5	64.	LOS F	0.2	0.2	0.96	0.96
P4	est Full Crossing	5	20.7	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	42.8	LOS E			0.77	0.77

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:19:48 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAP AM] **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 150 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Demand Flows V	Arri al Flow Total eh	Arri al Flow V	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o ueu Vehicles e	95 Back o ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2		0.0		0.0	0.929	52.7	LOS D	7 .	522.2	0.99	1.01	28.9
2	T1	1281	1.6	1281	1.6	0.929	55.5	LOS D	7 .	522.2	0.99	1.07	20.5
	R2	175	0.0	175	0.0	0.929	84.7	LOS F	7.5	264.9	1.00	1.26	21.8
Approach		1489	1.4	1489	1.4	0.929	58.9	LOS E	7 .	522.2	0.99	1.09	21.0
East: Slade Rd E													
4	L2	109	0.0	109	0.0	0.197	59.4	LOS E	10.	72.1	0.91	0.79	19.6
5	T1	121	0.0	121	0.0	0.7 (	59.7	LOS E	18.4	128.5	0.96	0.8	26.9
6	R2	19	0.0	19	0.0	0.7 (	68.1	LOS E	18.4	128.5	1.00	0.86	20.9
Approach		42	0.0	42	0.0	0.7 (	6 .	LOS E	18.4	128.5	0.97	0.84	22.6
North: Bexley Rd N													
7	L2	106	0.0	106	0.0	0.920	82.1	LOS F	42.0	297.7	1.00	1.07	19.
8	T1	912	1.9	912	1.9	0.920	74.4	LOS F	42.2	00.:	1.00	1.06	7.1
Approach		1018	1.7	1018	1.7	0.920	75.2	LOS F	42.2	00.:	1.00	1.07	8.8
est: Shaw St													
10	L2	104	0.0	104	0.0	0. 8:	67.6	LOS E	7.0	48.7	0.95	0.78	20.8
11	T1	216	0.0	216	0.0	0.928	87.2	LOS F	22.4	157.1	1.00	1.10	22.7
12	R2	47	0.0	47	0.0	0.928	91.7	LOS F	22.4	157.1	1.00	1.10	14.9
Approach		6	0.0	6	0.0	0.928	82.2	LOS F	22.4	157.1	0.99	1.01	21.4
All Vehicles		29	1.2	29	1.2	0.929	67.1	LOS E	7 .	522.2	0.99	1.04	17.9

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o Ser ice	A erage Back o ue Pedestrian ped	A erage Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	58.2	LOS E	0.2	0.2	0.88	0.88
P2	East Full Crossing	5	45.7	LOS E	0.2	0.2	0.78	0.78
P	North Full Crossing	5	64.5	LOS F	0.2	0.2	0.9	0.9
P4	est Full Crossing	5	20.	LOS C	0.1	0.1	0.52	0.52
All Pedestrians		211	47.2	LOS E			0.78	0.78

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:44:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network
ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAP PM] — **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 140 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	25	0.0	25	0.0	0.868	9.:	LOS C	54.	8	0.94	0.90	.:
2	T1	1116	1.1	1116	1.1	0.868	41.0	LOS C	54.	8	0.95	0.96	24.7
	R2	1 !	0.0	1 !	0.0	0.868	71.7	LOS F	26.1	18 .!	1.00	1.18	24.1
Approach		1280	0.9	1280	0.9	0.868	44.	LOS D	54.	8	0.96	0.98	24.8
East: Slade Rd E													
4	L2	1 !	0.0	1 !	0.0	0.251	0.(	LOS C	5.7	9.(	0.65	0.72	27.7
5	T1	194	0.0	194	0.0	0.880	65.	LOS E	29.9	209.2	1.00	0.98	26.0
6	R2	211	0.0	211	0.0	0.880	69.9	LOS E	29.9	209.2	1.00	0.98	20.7
Approach		544	0.0	544	0.0	0.880	58.1	LOS E	29.9	209.2	0.91	0.92	24.1
North: Bexley Rd N													
7	L2	152	0.0	152	0.0	0.865	60.1	LOS E	8.(	272.1	1.00	0.99	2 .
8	T1	974	1.2	974	1.2	0.865	54.1	LOS D	9.'	276.	1.00	0.98	9.
Approach		1126	1.1	1126	1.1	0.865	54.9	LOS D	9.'	276.	1.00	0.98	12.0
est: Shaw St													
10	L2	49	0.0	49	0.0	0. 0	69.2	LOS E	.'	25.8	0.97	0.75	20.6
11	T1	1 !	0.0	1 !	0.0	0.874	76.8	LOS F	12.7	88.8	1.00	0.99	24.2
12	R2	41	0.0	41	0.0	0.874	82.1	LOS F	12.7	88.8	1.00	1.00	16.1
Approach		225	0.0	225	0.0	0.874	76.1	LOS F	12.7	88.8	0.99	0.94	22.
All Vehicles		17!	0.8	17!	0.8	0.880	52.7	LOS D	54.	8	0.97	0.97	20.6

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 1.0
Number o Iterations: 8 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	48.2	LOS E	0.2	0.2	0.8	0.8
P2	East Full Crossing	5	8.(	LOS D	0.2	0.2	0.74	0.74
P	North Full Crossing	5	64.	LOS F	0.2	0.2	0.96	0.96
P4	est Full Crossing	5	20.7	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	42.8	LOS E			0.77	0.77

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:45:22 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network
ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAP AM] — **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 150 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Demand Flows V	Arri al Flow Total eh	Arri al Flow V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o ueu Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2		0.0		0.0	0.9	54.	LOS D	7	522.2	1.00	1.02	28.4
2	T1	1288	1.6	1288	1.6	0.9	57.1	LOS E	7	522.2	1.00	1.09	20.1
	R2	175	0.0	175	0.0	0.9	86.1	LOS F	8.	269.2	1.00	1.27	21.6
Approach		1497	1.4	1497	1.4	0.9	60.5	LOS E	7	522.2	1.00	1.11	20.6
East: Slade Rd E													
4	L2	109	0.0	109	0.0	0.197	59.4	LOS E	10.	72.1	0.91	0.79	19.6
5	T1	121	0.0	121	0.0	0.7	59.7	LOS E	18.4	128.5	0.96	0.8	26.9
6	R2	19	0.0	19	0.0	0.7	68.1	LOS E	18.4	128.5	1.00	0.86	20.9
Approach		42	0.0	42	0.0	0.7	6	LOS E	18.4	128.5	0.97	0.84	22.6
North: Bexley Rd N													
7	L2	106	0.0	106	0.0	0.921	82.4	LOS F	42.1	298.6	1.00	1.08	19.2
8	T1	91	1.9	91	1.9	0.921	74.7	LOS F	42.	01.	1.00	1.07	7.0
Approach		1019	1.7	1019	1.7	0.921	75.5	LOS F	42.	01.	1.00	1.07	8.8
est: Shaw St													
10	L2	104	0.0	104	0.0	0. 8	67.6	LOS E	7.0	48.7	0.95	0.78	20.8
11	T1	216	0.0	216	0.0	0.924	86.	LOS F	22.2	155.6	1.00	1.09	22.8
12	R2	46	0.0	46	0.0	0.924	90.8	LOS F	22.2	155.6	1.00	1.09	15.0
Approach		6	0.0	6	0.0	0.924	81.5	LOS F	22.2	155.6	0.99	1.00	21.5
All Vehicles			1.1		1.1	0.9	67.8	LOS E	7	522.2	0.99	1.05	17.8

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o Ser ic	A erage Back o Pedestrian ped	ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	58.2	LOS E	0.2	0.2	0.88	0.88
P2	East Full Crossing	5	45.7	LOS E	0.2	0.2	0.78	0.78
P	North Full Crossing	5	64.5	LOS F	0.2	0.2	0.9	0.9
P4	est Full Crossing	5	20.	LOS C	0.1	0.1	0.52	0.52
All Pedestrians		211	47.2	LOS E			0.78	0.78

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:58:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

MO EMENT SUMMARY

Site: 101 [BEX_SHA_SLAP PM] — **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd, Shaw St & Slade Rd, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 140 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	26	0.0	26	0.0	0.869	9.	LOS C	54.5	84.'	0.94	0.90	.'
2	T1	1116	1.1	1116	1.1	0.869	41.2	LOS C	54.5	84.'	0.95	0.96	24.7
	R2	1 !	0.0	1 !	0.0	0.869	71.9	LOS F	26.2	184.	1.00	1.18	24.0
Approach		1281	0.9	1281	0.9	0.869	44.5	LOS D	54.5	84.'	0.96	0.98	24.8
East: Slade Rd E													
4	L2	1 !	0.0	1 !	0.0	0.251	0.(	LOS C	5.7	9.(	0.65	0.72	27.7
5	T1	194	0.0	194	0.0	0.880	65.	LOS E	29.9	209.2	1.00	0.98	26.0
6	R2	211	0.0	211	0.0	0.880	69.9	LOS E	29.9	209.2	1.00	0.98	20.7
Approach		544	0.0	544	0.0	0.880	58.1	LOS E	29.9	209.2	0.91	0.92	24.1
North: Bexley Rd N													
7	L2	152	0.0	152	0.0	0.867	60.4	LOS E	8.'	27 .	1.00	1.00	2 .
8	T1	976	1.2	976	1.2	0.867	54.	LOS D	9.:	277.6	1.00	0.98	9.2
Approach		1128	1.1	1128	1.1	0.867	55.2	LOS D	9.:	277.6	1.00	0.99	12.0
est: Shaw St													
10	L2	49	0.0	49	0.0	0. 0	69.2	LOS E	.'	25.8	0.97	0.75	20.6
11	T1	1 !	0.0	1 !	0.0	0.874	76.8	LOS F	12.7	88.8	1.00	0.99	24.2
12	R2	41	0.0	41	0.0	0.874	82.1	LOS F	12.7	88.8	1.00	1.00	16.1
Approach		225	0.0	225	0.0	0.874	76.1	LOS F	12.7	88.8	0.99	0.94	22.
All Vehicles		17!	0.8	17!	0.8	0.880	52.8	LOS D	54.5	84.'	0.97	0.97	20.6

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 0.9
Number o Iterations: 9 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o Ser ic	A erage Pedestrian Back o ped	ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	48.2	LOS E	0.2	0.2	0.8	0.8
P2	East Full Crossing	5	8.(	LOS D	0.2	0.2	0.74	0.74
P	North Full Crossing	5	64.	LOS F	0.2	0.2	0.96	0.96
P4	est Full Crossing	5	20.7	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	42.8	LOS E			0.77	0.77

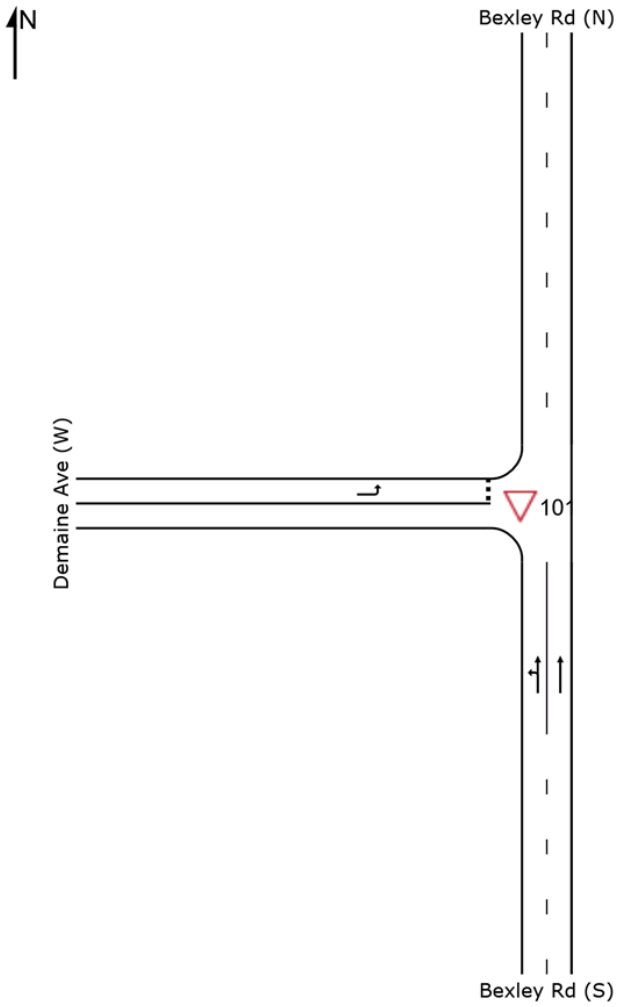
Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:59:27 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

SITE LAYOUT

Site: 101 [BEX_DEMX AM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield - Tway



Organisation: VARGA TRAFFIC PLANNING | Created: Tuesday, 18 September 2018 5:12:45 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Existing Network.sip7

MO EMENT SUMMARY

▽ Site: 101 [BEX_DEMX AM]

Net ork:N101 [E istin Net ork AM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0. 9	5.6	LOS A	2.8	19.7	0.00	0.00	58.
2	T1	1520	1.6	1520	1.6	0. 9	0.1	LOS A	2.8	19.7	0.00	0.00	59.9
Approach		1522	1.6	1522	1.6	0. 9	0.1	NA	2.8	19.7	0.00	0.00	59.9
est: Demaine A e													
10	L2	1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
Approach		1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
All Vehicles		1654	1.5	1654	1.5	0. 9	0.8	NA	2.8	19.7	0.05	0.07	57.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1 Iterations: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:18:49 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_DEMX PM]

Net ork:N101 [E istin Net ork PM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Arri al Flow Total eh	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S											
1	L2	8	0.0 8	0.0 0. 8	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
2	T1	1 2	1.6 1 2	1.6 0. 8	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		1	1.6 1	1.6 0. 8	0.1	NA	0.0	0.0	0.00	0.00	59.8
est: Demaine A e											
10	L2	12	0.0 12	0.0 0.017	6.9	LOS A	0.0	0.	0.51	0.6	42.2
Approach		12	0.0 12	0.0 0.017	6.9	LOS A	0.0	0.	0.51	0.6	42.2
All Vehicles		1 4	1.6 1 4	1.6 0. 8	0.2	NA	0.0	0.	0.00	0.01	59.6

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:19:48 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_DEMP AM]

Net ork:N101 [Proposed Net ork AM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0. 9	5.6	LOS A	1.1	8.1	0.00	0.00	58.
2	T1	1520	1.6	1520	1.6	0. 9	0.1	LOS A	1.1	8.1	0.00	0.00	59.9
Approach		1522	1.6	1522	1.6	0. 9	0.1	NA	1.1	8.1	0.00	0.00	59.9
est: Demaine A e													
10	L2	1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
Approach		1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
All Vehicles		1654	1.5	1654	1.5	0. 9	0.8	NA	1.1	8.1	0.05	0.07	57.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1 Iterations: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:44:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

▽ Site: 101 [BEX_DEMP PM]

Net ork:N101 [Proposed Net ork PM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield - Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Arri al Flow Total eh	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S											
1	L2	8	0.0 8 0.0	0. 8	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
2	T1	1 2	1.6 1 2 1.6	0. 8	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		1	1.6 1 1.6	0. 8	0.1	NA	0.0	0.0	0.00	0.00	59.8
est: Demaine A e											
10	L2	12	0.0 12 0.0	0.017	6.9	LOS A	0.0	0.	0.50	0.6	42.2
Approach		12	0.0 12 0.0	0.017	6.9	LOS A	0.0	0.	0.50	0.6	42.2
All Vehicles		1 4	1.6 1 4 1.6	0. 8	0.2	NA	0.0	0.	0.00	0.01	59.6

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 1.0
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:45:22 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_DEMP AM]

Net ork:N101 [Proposed Net ork AM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0. 9	5.6	LOS A	2.6	18.2	0.00	0.00	58.
2	T1	1520	1.6	1520	1.6	0. 9	0.1	LOS A	2.6	18.2	0.00	0.00	59.9
Approach		1522	1.6	1522	1.6	0. 9	0.1	NA	2.6	18.2	0.00	0.00	59.9
est: Demaine A e													
10	L2	1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
Approach		1 ;	0.0	1 ;	0.0	0. 7	9.9	LOS A	0.8	5.8	0.62	0.87	9.5
All Vehicles		1654	1.5	1654	1.5	0. 9	0.8	NA	2.6	18.2	0.05	0.07	57.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1 Iterations: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:58:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

MO EMENT SUMMARY

▽ Site: 101 [BEX_DEMP PM]

Net ork:N101 [Proposed Net ork PM]

Bexley Rd & Demaine A e, Bexley Nth
Gi eway ield - Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Arri al Flow Total eh	Deg. Satn	A erag Delay sec	Le el o Ser ice	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S											
1	L2	8	0.0 8 0.0	0. 8	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
2	T1	1 2	1.6 1 2 1.6	0. 8	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		1	1.6 1 1.6	0. 8	0.1	NA	0.0	0.0	0.00	0.00	59.8
est: Demaine A e											
10	L2	12	0.0 12 0.0	0.017	6.9	LOS A	0.0	0.	0.50	0.6	42.2
Approach		12	0.0 12 0.0	0.017	6.9	LOS A	0.0	0.	0.50	0.6	42.2
All Vehicles		1 4	1.6 1 4 1.6	0. 8	0.2	NA	0.0	0.	0.00	0.01	59.6

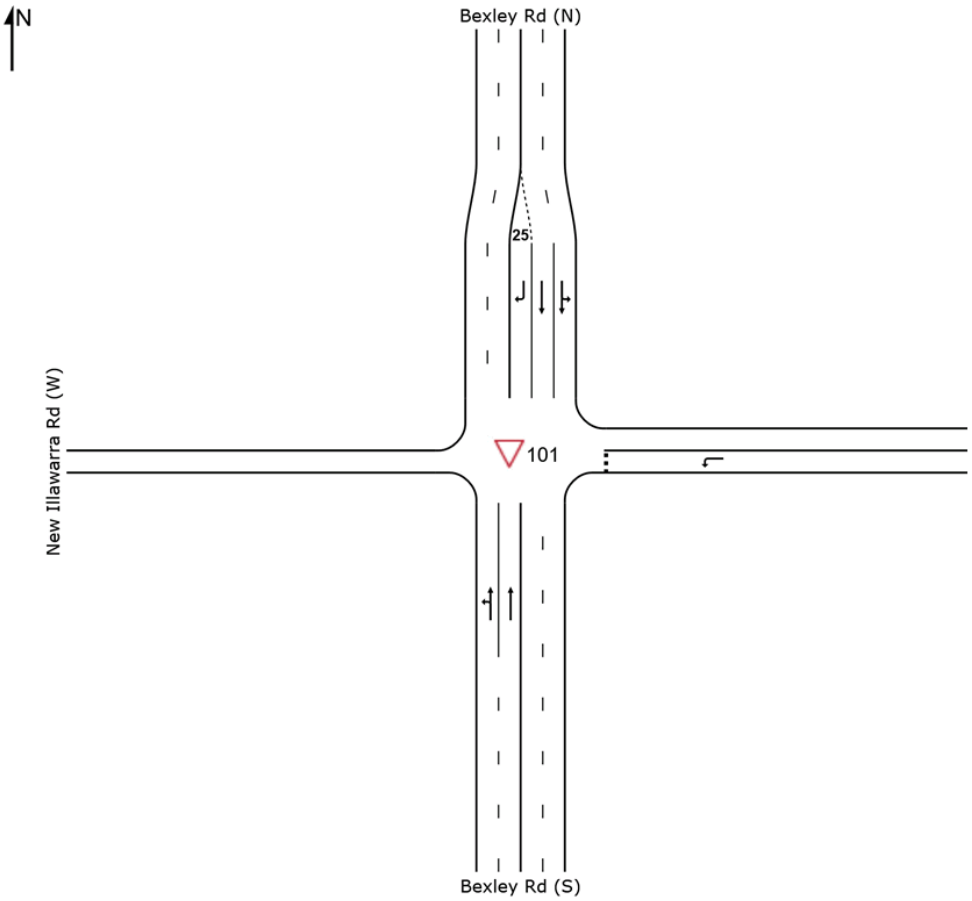
Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 9 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:59:27 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

SITE LAYOUT

Site: 101 [BEX_NE _SARX AM]

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield - Tway



Organisation: VARGA TRAFFIC PLANNING | Created: Tuesday, 18 September 2018 5:12:59 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARX AM]

Net ork:N101 [E istin Net ork AM]

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0.285	5.6	LOS A	76.4	540.4	0.00	0.00	57.6
2	T1	1102	1.	1102	1.	0.285	0.0	LOS A	76.4	540.4	0.00	0.00	59.9
Approach		1104	1.	1104	1.	0.285	0.0	NA	76.4	540.4	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
Approach		19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.28	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	769	2.1	769	2.1	0.28	0.8	LOS A	1.4	10.2	0.20	0.00	52.8
9	R2		0.0		0.0	0.718	19.9	LOS B	4.5	1.:	0.88	1.18	4.5
Approach		1110	1.4	1110	1.4	0.718	6.6	NA	4.5	1.:	0.40	0. (	8.4
All Vehicles		22	1.	22	1.	0.718	.·	NA	76.4	540.4	0.20	0.18	45.6

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:18:49 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARX PM]

Net ork:N101 [E istin Net ork PM]

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	1	0.0	1	0.0	0.271	5.5	LOS A	0.0	0.0	0.00	0.00	57.6
2	T1	1048	1.4	1048	1.4	0.271	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1049	1.4	1049	1.4	0.271	0.0	NA	0.0	0.0	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
Approach		!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.275	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	750	2.0	750	2.0	0.275	0.9	LOS A	1.4	9.9	0.19	0.00	52.4
9	R2	440	0.0	440	0.0	0.871	26.	LOS B	8.6	60.4	0.9	1.48	1.
Approach		119	1.	119	1.	0.871	10.	NA	8.6	60.4	0.47	0.55	4.7
All Vehicles		2277	1.	2277	1.	0.871	5.5	NA	8.6	60.4	0.25	0. (	41.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:19:48 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARP AM] **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0.285	5.6	LOS A	74.8	528.9	0.00	0.00	57.6
2	T1	1102	1.	1102	1.	0.285	0.0	LOS A	74.8	528.9	0.00	0.00	59.9
Approach		1104	1.	1104	1.	0.285	0.0	NA	74.8	528.9	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
Approach		19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.28	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	769	2.1	769	2.1	0.28	0.8	LOS A	1.4	10.2	0.20	0.00	52.8
9	R2	4	0.0	4	0.0	0.724	20.1	LOS B	4.5	1.	0.88	1.18	4.4
Approach		111	1.4	111	1.4	0.724	6.7	NA	4.5	1.	0.41	0.	8.
All Vehicles		22	1.	22	1.	0.724	.	NA	74.8	528.9	0.21	0.19	45.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:44:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARP PM] **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	1	0.0	1	0.0	0.271	5.5	LOS A	0.0	0.0	0.00	0.00	57.6
2	T1	1048	1.4	1048	1.4	0.271	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1049	1.4	1049	1.4	0.271	0.0	NA	0.0	0.0	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
Approach		!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.276	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	750	2.0	750	2.0	0.276	1.2	LOS A	1.4	10.0	0.19	0.00	50.4
9	R2	450	0.0	450	0.0	0.891	28.	LOS B	9.6	67.2	0.94	1.56	0.5
Approach		120	1.2	120	1.2	0.891	11.4	NA	9.6	67.2	0.47	0.58	.
All Vehicles		2287	1.	2287	1.	0.891	6.1	NA	9.6	67.2	0.26	0. :	40.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 1.0
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:45:22 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARP AM] **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	2	0.0	2	0.0	0.285	5.6	LOS A	76.2	5 9.	0.00	0.00	57.6
2	T1	1102	1.	1102	1.	0.285	0.0	LOS A	76.2	5 9.	0.00	0.00	59.9
Approach		1104	1.	1104	1.	0.285	0.0	NA	76.2	5 9.	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
Approach		19	0.0	19	0.0	0.024	7.2	LOS A	0.1	0.7	0.49	0.62	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.28	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	769	2.1	769	2.1	0.28	0.8	LOS A	1.4	10.2	0.20	0.00	52.8
9	R2	4	0.0	4	0.0	0.728	20.2	LOS B	4.6	2.	0.88	1.19	4.
Approach		1115	1.4	1115	1.4	0.728	6.8	NA	4.6	2.	0.41	0.	8.2
All Vehicles		22	1.	22	1.	0.728		NA	76.2	5 9.	0.21	0.19	45.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:58:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

MO EMENT SUMMARY

Site: 101 [BEX_NE _SARP PM] **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd, New Illawarra Rd & Sars ield Cct, Bexley Nth
Gi eway ield -Tway

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	1	0.0	1	0.0	0.271	5.5	LOS A	0.0	0.0	0.00	0.00	57.6
2	T1	1048	1.4	1048	1.4	0.271	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1049	1.4	1049	1.4	0.271	0.0	NA	0.0	0.0	0.00	0.00	59.9
East: Sars ield Cct E													
4	L2	!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
Approach		!	0.0	!	0.0	0.04	7.2	LOS A	0.2	1.2	0.49	0.6	41.9
North: Bexley Rd N													
7	L2		0.0		0.0	0.276	5.5	LOS A	0.0	0.0	0.00	0.00	57.2
8	T1	750	2.0	750	2.0	0.276	1.	LOS A	1.4	10.0	0.19	0.00	49.8
9	R2	452	0.0	452	0.0	0.895	28.7	LOS C	9.8	68.8	0.95	1.57	0.
Approach		1205	1.2	1205	1.2	0.895	11.6	NA	9.8	68.8	0.48	0.59	.
All Vehicles		2289	1.	2289	1.	0.895	6.2	NA	9.8	68.8	0.26	0. :	40.1

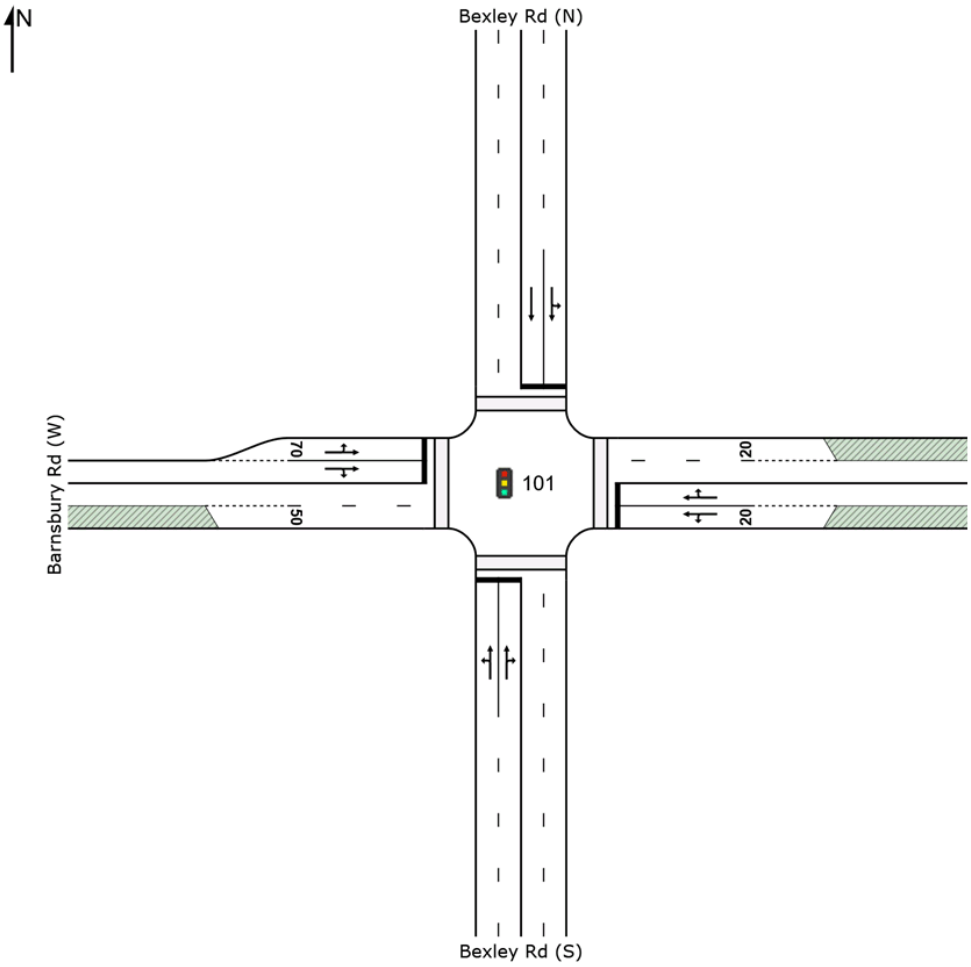
Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Minor Road Approach LOS alues are based on a erage delay or all ehicle mo ements.
NA: Intersection LOS and Major Road Approach LOS alues are Not Applicable or two-way sign control since the a erage dela is not a good LOS measure due to ero delays associated with major road mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 9 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:59:27 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

SITE LAYOUT

Site: 101 [BEX_BARX AM]

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated



Organisation: VARGA TRAFFIC PLANNING | Created: Tuesday, 18 September 2018 5:1 :28 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARX AM]

Net ork:N101 [E istin Net ork AM]

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 50 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	29	0.0	29	0.0	0.640	15.0	LOS B	11.5	81.2	0.77	0.69	45.7
2	T1	950	1.	950	1.	0.640	10.	LOS A	11.5	81.2	0.80	0.71	44.2
	R2	108	0.0	108	0.0	0.640	17.5	LOS B	8.8	62.5	0.86	0.7	45.0
Approach		1087	1.1	1087	1.1	0.640	11.2	LOS A	11.5	81.2	0.81	0.71	44.4
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.11	21.0	LOS B	1.0	7.	0.81	0.6	42.5
5	T1	121	0.0	121	0.0	0. 4	18.5	LOS B	2.5	17.7	0.87	0.69	2.7
6	R2		0.0		0.0	0. 4	24.2	LOS B	2.5	17.7	0.90	0.7	1.9
Approach		166	0.0	166	0.0	0. 4	19.9	LOS B	2.5	17.7	0.87	0.70	
North: Bexley Rd N													
7	L2	29	0.0	29	0.0	0.70	24.8	LOS B	9.1	6	0.95	0.86	9.0
8	T1	7	1.1	7	1.1	0.70	19.	LOS B	9.1	64.2	0.95	0.86	42.9
Approach		761	1.1	761	1.1	0.70	19.5	LOS B	9.1	64.2	0.95	0.86	42.8
est: Barnsbury Rd													
10	L2	111	0.0	111	0.0	0.249	21.8	LOS B	2.	16.0	0.85	0.75	1.5
11	T1	220	0.0	220	0.0	0.7	22.2	LOS B	7.4	51.9	0.98	0.9	7.9
12	R2	69	0.0	69	0.0	0.7	26.8	LOS B	7.4	51.9	0.98	0.9	9.7
Approach		400	0.0	400	0.0	0.7	22.9	LOS B	7.4	51.9	0.94	0.88	7.0
All Vehicles		2414	0.8	2414	0.8	0.7	16.	LOS B	11.5	81.2	0.88	0.78	41.

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o Ser ic	A erage Back o Pedestrian ped	ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P	North Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P4	est Full Crossing	5	11.6	LOS B	0.1	0.1	0.68	0.68
All Pedestrians		211	17.4	LOS B			0.8	0.8

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:18:49 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARX PM]

Net ork:N101 [E istin Net ork PM]

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 40 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	66	0.0	66	0.0	0.596	12.2	LOS A	8.4	59.7	0.72	0.65	48.6
2	T1	1020	1.4	1020	1.4	0.596	7.	LOS A	8.4	59.7	0.74	0.65	47.7
	R2	58	0.0	58	0.0	0.596	1 .	LOS A	7.5	52.9	0.77	0.65	47.8
Approach		1144	1.2	1144	1.2	0.596	7.9	LOS A	8.4	59.7	0.74	0.65	47.8
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.172	21.7	LOS B	0.9	6.4	0.91	0.68	42.2
5	T1	174	0.0	174	0.0	0.528	18.2	LOS B	2.9	20.1	0.95	0.75	.
6	R2	1	0.0	1	0.0	0.528	2 .	LOS B	2.9	20.1	0.97	0.78	.
Approach		195	0.0	195	0.0	0.528	18.7	LOS B	2.9	20.1	0.95	0.75	.
North: Bexley Rd N													
7	L2		0.0		0.0	0.855	28.0	LOS B	9.9	69.7	1.00	1.07	7.4
8	T1	790	1.0	790	1.0	0.855	22.5	LOS B	9.9	70.0	1.00	1.07	41.0
Approach		827	1.0	827	1.0	0.855	22.7	LOS B	9.9	70.0	1.00	1.07	40.8
est: Barnsbury Rd													
10	L2		0.0		0.0	0.126	21.5	LOS B	0.6	4.4	0.90	0.71	1.6
11	T1	102	0.0	102	0.0	0.565	19.0	LOS B	2.8	19.6	0.97	0.80	9.2
12	R2		0.0		0.0	0.565	2 .	LOS B	2.8	19.6	0.97	0.80	41.1
Approach		17	0.0	17	0.0	0.565	20.5	LOS B	2.8	19.6	0.96	0.78	8.5
All Vehicles		2	0.9	2	0.9	0.855	15.0	LOS B	9.9	70.0	0.87	0.82	42.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 0.9
Number o Iterations: 8 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P	North Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P4	est Full Crossing	5	9.8	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		211	1 .	LOS B			0.81	0.81

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:19:48 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARP AM] — **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 50 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	V	Arri al Flow Total eh	V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	29	0.0	29	0.0	0.640	15.0	LOS B	11.5	81.2	0.77	0.69	45.7
2	T1	950	1.	950	1.	0.640	10.	LOS A	11.5	81.2	0.80	0.71	44.2
	R2	108	0.0	108	0.0	0.640	17.5	LOS B	8.8	62.5	0.86	0.7	45.0
Approach		1087	1.1	1087	1.1	0.640	11.2	LOS A	11.5	81.2	0.81	0.71	44.4
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.11	21.0	LOS B	1.0	7.	0.81	0.6	42.5
5	T1	121	0.0	121	0.0	0. 4	18.5	LOS B	2.5	17.7	0.87	0.69	2.7
6	R2		0.0		0.0	0. 4	24.2	LOS B	2.5	17.7	0.90	0.7	1.9
Approach		166	0.0	166	0.0	0. 4	19.9	LOS B	2.5	17.7	0.87	0.70	
North: Bexley Rd N													
7	L2	29	0.0	29	0.0	0.70	24.8	LOS B	9.1	6	0.95	0.86	9.0
8	T1	7	1.1	7	1.1	0.70	19.	LOS B	9.1	64.2	0.95	0.86	42.9
Approach		761	1.1	761	1.1	0.70	19.5	LOS B	9.1	64.2	0.95	0.86	42.8
est: Barnsbury Rd													
10	L2	111	0.0	111	0.0	0.249	21.8	LOS B	2.	16.0	0.85	0.75	1.5
11	T1	220	0.0	220	0.0	0.7	22.2	LOS B	7.4	51.9	0.98	0.9	7.9
12	R2	69	0.0	69	0.0	0.7	26.8	LOS B	7.4	51.9	0.98	0.9	9.7
Approach		400	0.0	400	0.0	0.7	22.9	LOS B	7.4	51.9	0.94	0.88	7.0
All Vehicles		2414	0.8	2414	0.8	0.7	16.	LOS B	11.5	81.2	0.88	0.78	41.

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P	North Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P4	est Full Crossing	5	11.6	LOS B	0.1	0.1	0.68	0.68
All Pedestrians		211	17.4	LOS B			0.8	0.8

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:44:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network
ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARP PM] — **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 40 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o ueu Vehicles e	Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	68	0.0	68	0.0	0.597	12.2	LOS A	8.5	59.9	0.72	0.65	48.6
2	T1	1020	1.4	1020	1.4	0.597	7.	LOS A	8.5	59.9	0.74	0.65	47.7
	R2	58	0.0	58	0.0	0.597	1 .	LOS A	7.5	5 .	0.77	0.65	47.8
Approach		1146	1.2	1146	1.2	0.597	7.9	LOS A	8.5	59.9	0.74	0.65	47.8
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.172	21.7	LOS B	0.9	6.4	0.91	0.68	42.2
5	T1	174	0.0	174	0.0	0.528	18.2	LOS B	2.9	20.1	0.95	0.75	.
6	R2	1	0.0	1	0.0	0.528	2 .	LOS B	2.9	20.1	0.97	0.78	.
Approach		195	0.0	195	0.0	0.528	18.7	LOS B	2.9	20.1	0.95	0.75	.
North: Bexley Rd N													
7	L2		0.0		0.0	0.855	28.0	LOS B	9.9	69.7	1.00	1.07	7.4
8	T1	790	1.0	790	1.0	0.855	22.5	LOS B	9.9	70.0	1.00	1.07	41.0
Approach		827	1.0	827	1.0	0.855	22.7	LOS B	9.9	70.0	1.00	1.07	40.8
est: Barnsbury Rd													
10	L2		0.0		0.0	0.126	21.5	LOS B	0.6	4.4	0.90	0.71	1.6
11	T1	102	0.0	102	0.0	0.570	19.1	LOS B	2.8	19.8	0.97	0.81	9.1
12	R2		0.0		0.0	0.570	2 .	LOS B	2.8	19.8	0.97	0.81	41.0
Approach		174	0.0	174	0.0	0.570	20.5	LOS B	2.8	19.8	0.96	0.79	8.5
All Vehicles		2 4	0.9	2 4	0.9	0.855	15.0	LOS B	9.9	70.0	0.87	0.82	42.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 1.0
Number o Iterations: 8 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P	North Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P4	est Full Crossing	5	9.8	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		211	1 .	LOS B			0.81	0.81

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:45:22 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network
ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARP AM] — **Net ork:N101 [Proposed Net ork AM]**

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 50 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	Demand Flows V	Arri al Flow Total eh	Arri al Flow V	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o ueu Vehicles e	Back o ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	(	0.0	(	0.0	0.640	15.0	LOS B	11.5	81.	0.77	0.69	45.7
2	T1	950	1.	950	1.	0.640	10.4	LOS A	11.5	81.	0.80	0.71	44.2
	R2	108	0.0	108	0.0	0.640	17.5	LOS B	8.9	62.6	0.86	0.7	45.0
Approach		1088	1.1	1088	1.1	0.640	11.2	LOS A	11.5	81.	0.81	0.71	44.4
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.114	21.0	LOS B	1.0	7.	0.81	0.6	42.5
5	T1	121	0.0	121	0.0	0. 4	18.5	LOS B	2.5	17.7	0.87	0.69	2.7
6	R2	'	0.0	'	0.0	0. 4	24.2	LOS B	2.5	17.7	0.90	0.7	1.9
Approach		166	0.0	166	0.0	0. 4	19.9	LOS B	2.5	17.7	0.87	0.70	.:
North: Bexley Rd N													
7	L2	29	0.0	29	0.0	0.70	24.8	LOS B	9.1	6 .:	0.95	0.86	9.0
8	T1	7 :	1.1	7 :	1.1	0.70	19.	LOS B	9.1	64.2	0.95	0.86	42.9
Approach		761	1.1	761	1.1	0.70	19.5	LOS B	9.1	64.2	0.95	0.86	42.8
est: Barnsbury Rd													
10	L2	111	0.0	111	0.0	0.249	21.8	LOS B	2.	16.0	0.85	0.75	1.5
11	T1	220	0.0	220	0.0	0.754	22.7	LOS B	7.6	5 .·	0.98	0.95	7.7
12	R2	7	0.0	7	0.0	0.754	27.	LOS B	7.6	5 .·	0.98	0.95	9.4
Approach		404	0.0	404	0.0	0.754	2 .	LOS B	7.6	5 .·	0.95	0.89	6.9
All Vehicles		2419	0.8	2419	0.8	0.754	16.4	LOS B	11.5	81.	0.88	0.79	41.

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian	Back o ue Distance ped m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P	North Full Crossing	5	19.4	LOS B	0.1	0.1	0.88	0.88
P4	est Full Crossing	5	11.6	LOS B	0.1	0.1	0.68	0.68
All Pedestrians		211	17.4	LOS B			0.8	0.8

Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:58:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

MO EMENT SUMMARY

Site: 101 [BEX_BARP PM] — **Net ork:N101 [Proposed Net ork PM]**

Bexley Rd & Barnsbury Gr, Bexley Nth
Signals - Fixed Time Isolated Cycle Time 40 seconds Practical Cycle Time

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: Bexley Rd S													
1	L2	68	0.0	68	0.0	0.597	12.2	LOS A	8.5	59.9	0.72	0.65	48.6
2	T1	1020	1.4	1020	1.4	0.597	7.	LOS A	8.5	59.9	0.74	0.65	47.7
	R2	58	0.0	58	0.0	0.597	1 .(	LOS A	7.5	5 .(	0.77	0.65	47.8
Approach		1146	1.2	1146	1.2	0.597	7.9	LOS A	8.5	59.9	0.74	0.65	47.8
East: Barnsbury Rd E													
4	L2	8	0.0	8	0.0	0.172	21.7	LOS B	0.9	6.4	0.91	0.68	42.2
5	T1	174	0.0	174	0.0	0.528	18.2	LOS B	2.9	20.1	0.95	0.75	.
6	R2	1	0.0	1	0.0	0.528	2 .'	LOS B	2.9	20.1	0.97	0.78	.'
Approach		195	0.0	195	0.0	0.528	18.7	LOS B	2.9	20.1	0.95	0.75	.8
North: Bexley Rd N													
7	L2	'	0.0	'	0.0	0.855	28.0	LOS B	9.9	69.7	1.00	1.07	7.4
8	T1	790	1.0	790	1.0	0.855	22.5	LOS B	9.9	70.0	1.00	1.07	41.0
Approach		827	1.0	827	1.0	0.855	22.7	LOS B	9.9	70.0	1.00	1.07	40.8
est: Barnsbury Rd													
10	L2	5	0.0	5	0.0	0.126	21.5	LOS B	0.6	4.4	0.90	0.71	1.6
11	T1	102	0.0	102	0.0	0.570	19.1	LOS B	2.8	19.8	0.97	0.81	9.1
12	R2	'	0.0	'	0.0	0.570	2 .(	LOS B	2.8	19.8	0.97	0.81	41.0
Approach		174	0.0	174	0.0	0.570	20.5	LOS B	2.8	19.8	0.96	0.79	8.5
All Vehicles		2 4	0.9	2 4	0.9	0.855	15.0	LOS B	9.9	70.0	0.87	0.82	42.4

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last Iteration: 0.9
Number o Iterations: 9 maximum speci ied: 10

Mo ement Per ormance Pedestrians

Mo ID	Description	Demand Flow ped	A erag Delay sec	Le el o A erage Ser ic Pedestrian ped	Back o ue Distance m	Prop. ueuec	E ecti Stop Rate per ped
P1	South Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P	North Full Crossing	5	14.5	LOS B	0.1	0.1	0.85	0.85
P4	est Full Crossing	5	9.8	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		211	1 .	LOS B			0.81	0.81

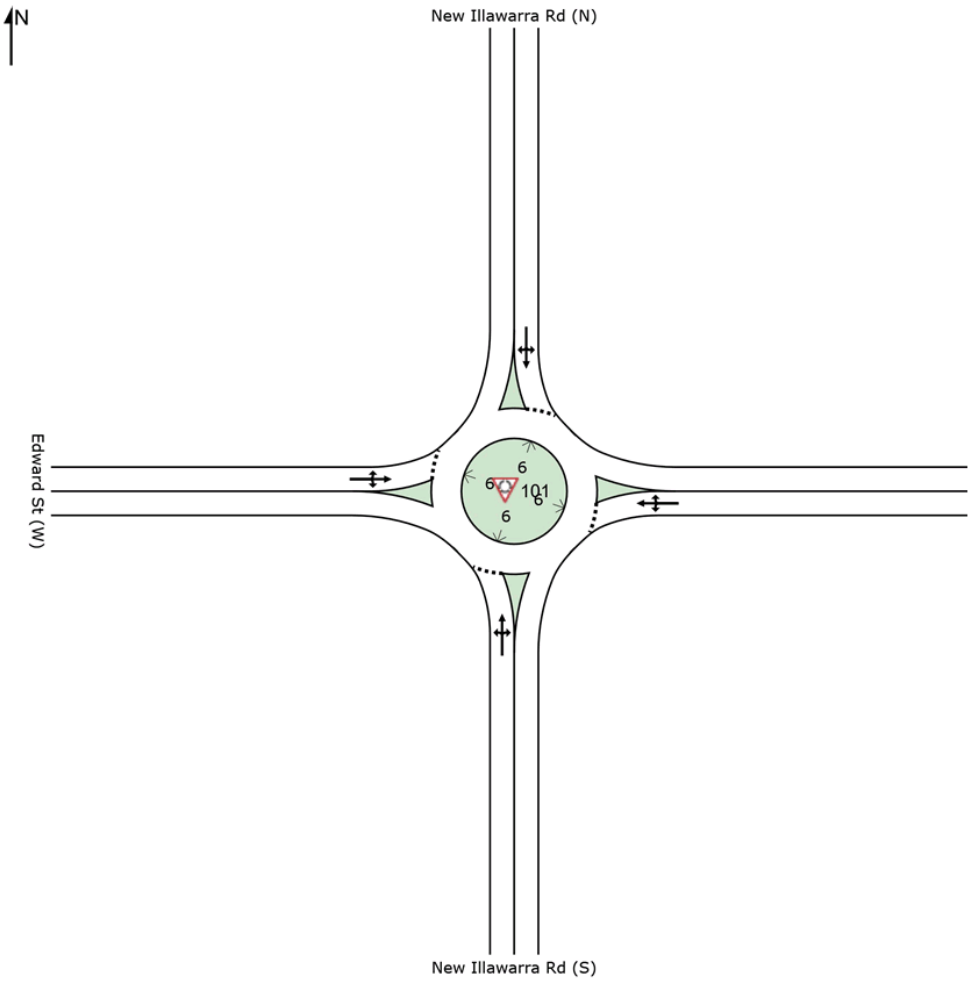
Le el o Ser ice LOS Method: SIDRA Pedestrian LOS Method Based on A erage Delay
Pedestrian mo ement LOS alues are based on a erage delay per pedestrian mo ement.
Intersection LOS alue or Pedestrians is based on a erage delay or all pedestrian mo ements.

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:59:27 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

SITE LAYOUT

Site: 101 [NE _ED _BARX AM]

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout



Organisation: VARGA TRAFFIC PLANNING | Created: Tuesday, 18 September 2018 5:1 :15 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARX AM]

Net ork:N101 [E istin Net ork AM]

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	(	0.0	(	0.0	0.4 (	6.0	LOS A	.4	24.1	0. (	0.58	48.
2	T1	278	2.9	278	2.9	0.4 (	5.7	LOS A	.4	24.1	0. (	0.58	52.4
	R2	2 (	0.0	2 (	0.0	0.4 (	8.	LOS A	.4	24.1	0. (	0.58	48.4
Approach		544	1.5	544	1.5	0.4 (	6.8	LOS A	.4	24.1	0. (	0.58	50.9
East: Barnsbury Gr E													
4	L2	85	0.0	85	0.0	0.174	6.	LOS A	0.9	6.0	0.44	0.61	48.
5	T1	62	0.0	62	0.0	0.174	5.7	LOS A	0.9	6.0	0.44	0.61	45.8
6	R2	1	0.0	1	0.0	0.174	8.4	LOS A	0.9	6.0	0.44	0.61	48.6
Approach		160	0.0	160	0.0	0.174	6.2	LOS A	0.9	6.0	0.44	0.61	47.
North: New Illawarra Rd N													
7	L2	27	0.0	27	0.0	0. 7	8.2	LOS A	2.	16.5	0.6	0.7	47.5
8	T1	268	2.2	268	2.2	0. 7	7.9	LOS A	2.	16.5	0.6	0.7	51.9
9	R2	29	0.0	29	0.0	0. 7	10.4	LOS A	2.	16.5	0.6	0.7	48.2
Approach		2	1.9	2	1.9	0. 7	8.1	LOS A	2.	16.5	0.6	0.7	51.
est: Edward St													
10	L2	7	0.0	7	0.0	0.210	7.9	LOS A	1.2	8.5	0.66	0.72	47.5
11	T1	148	0.0	148	0.0	0.210	7.4	LOS A	1.2	8.5	0.66	0.72	41.6
12	R2	7	0.0	7	0.0	0.210	10.1	LOS A	1.2	8.5	0.66	0.72	47.8
Approach		162	0.0	162	0.0	0.210	7.5	LOS A	1.2	8.5	0.66	0.72	42.4
All Vehicles		1190	1.2	1190	1.2	0.4 (	7.2	LOS A	.4	24.1	0.49	0.64	49.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:18:49 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARX PM] **Net ork:N101 [E istin Net ork PM]**

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	2	0.0	2	0.0	0. 5	7.6	LOS A	2.4	17.	0.62	0.71	47.7
2	T1	189	4.2	189	4.2	0. 5	7.4	LOS A	2.4	17.	0.62	0.71	51.6
	R2	110	0.0	110	0.0	0. 5	9.9	LOS A	2.4	17.	0.62	0.71	47.2
Approach		2	2.5	2	2.5	0. 5	8.2	LOS A	2.4	17.	0.62	0.71	50.2
East: Barnsbury Gr E													
4	L2	108	0.0	108	0.0	0.478	7.9	LOS A	.	21.8	0.6	0.76	47.0
5	T1	189	0.0	189	0.0	0.478	7.4	LOS A	.	21.8	0.6	0.76	44.7
6	R2	110	0.0	110	0.0	0.478	10.1	LOS A	.	21.8	0.6	0.76	47.
Approach		407	0.0	407	0.0	0.478	8.	LOS A	.	21.8	0.6	0.76	46.0
North: New Illawarra Rd N													
7	L2	11	0.0	11	0.0	0. 6	6.4	LOS A	2.5	17.7	0.45	0.58	49.0
8	T1	7	1.6	7	1.6	0. 6	6.0	LOS A	2.5	17.7	0.45	0.58	52.7
9	R2	22	0.0	22	0.0	0. 6	8.7	LOS A	2.5	17.7	0.45	0.58	48.9
Approach		412	1.5	412	1.5	0. 6	6.2	LOS A	2.5	17.7	0.45	0.58	52.5
est: Edward St													
10	L2	7	0.0	7	0.0	0.071	6.7	LOS A	0.4	2.6	0.55	0.61	48.1
11	T1	48	0.0	48	0.0	0.071	6.2	LOS A	0.4	2.6	0.55	0.61	42.5
12	R2	5	0.0	5	0.0	0.071	8.9	LOS A	0.4	2.6	0.55	0.61	48.4
Approach		60	0.0	60	0.0	0.071	6.5	LOS A	0.4	2.6	0.55	0.61	44.2
All Vehicles		1201	1.2	1201	1.2	0.478	7.5	LOS A	.	21.8	0.56	0.67	49.1

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:19:48 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\170 16\Existing Network.sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARP AM] **Net ork:N101 [Proposed Net ork AM]**

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	(	0.0	(	0.0	0.4 (	6.0	LOS A	.4	24.2	0. (	0.58	48.
2	T1	278	2.9	278	2.9	0.4 (	5.7	LOS A	.4	24.2	0. (	0.58	52.
	R2	2 (	0.0	2 (	0.0	0.4 (	8.	LOS A	.4	24.2	0. (	0.58	48.4
Approach		544	1.5	544	1.5	0.4 (	6.8	LOS A	.4	24.2	0. (	0.58	50.9
East: Barnsbury Gr E													
4	L2	85	0.0	85	0.0	0.175	6.	LOS A	0.9	6.1	0.44	0.61	48.
5	T1	62	0.0	62	0.0	0.175	5.7	LOS A	0.9	6.1	0.44	0.61	45.8
6	R2	14	0.0	14	0.0	0.175	8.4	LOS A	0.9	6.1	0.44	0.61	48.6
Approach		161	0.0	161	0.0	0.175	6.2	LOS A	0.9	6.1	0.44	0.61	47.
North: New Illawarra Rd N													
7	L2	29	0.0	29	0.0	0. 7	8.2	LOS A	2.	16.6	0.6	0.7	47.5
8	T1	268	2.2	268	2.2	0. 7	7.9	LOS A	2.	16.6	0.6	0.7	51.8
9	R2	29	0.0	29	0.0	0. 7	10.4	LOS A	2.	16.6	0.6	0.7	48.2
Approach		2(	1.8	2(	1.8	0. 7	8.1	LOS A	2.	16.6	0.6	0.7	51.
est: Edward St													
10	L2	7	0.0	7	0.0	0.211	7.9	LOS A	1.2	8.5	0.66	0.72	47.5
11	T1	148	0.0	148	0.0	0.211	7.4	LOS A	1.2	8.5	0.66	0.72	41.5
12	R2	7	0.0	7	0.0	0.211	10.1	LOS A	1.2	8.5	0.66	0.72	47.8
Approach		162	0.0	162	0.0	0.211	7.5	LOS A	1.2	8.5	0.66	0.72	42.4
All Vehicles		119	1.2	119	1.2	0.4 (	7.2	LOS A	.4	24.2	0.50	0.64	49.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iterations: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:44:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARP PM] **Net ork:N101 [Proposed Net ork PM]**

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	2	0.0	2	0.0	0. 5	7.6	LOS A	2.4	17.4	0.62	0.71	47.6
2	T1	189	4.2	189	4.2	0. 5	7.4	LOS A	2.4	17.4	0.62	0.71	51.6
	R2	110	0.0	110	0.0	0. 5	9.9	LOS A	2.4	17.4	0.62	0.71	47.2
Approach		2	2.5	2	2.5	0. 5	8.	LOS A	2.4	17.4	0.62	0.71	50.2
East: Barnsbury Gr E													
4	L2	108	0.0	108	0.0	0.481	8.0	LOS A	.	22.0	0.6	0.76	47.0
5	T1	189	0.0	189	0.0	0.481	7.4	LOS A	.	22.0	0.6	0.76	44.7
6	R2	112	0.0	112	0.0	0.481	10.1	LOS A	.	22.0	0.6	0.76	47.
Approach		409	0.0	409	0.0	0.481	8.	LOS A	.	22.0	0.6	0.76	46.0
North: New Illawarra Rd N													
7	L2	12	0.0	12	0.0	0. 7	6.4	LOS A	2.5	17.8	0.45	0.58	49.0
8	T1	7	1.6	7	1.6	0. 7	6.0	LOS A	2.5	17.8	0.45	0.58	52.7
9	R2	22	0.0	22	0.0	0. 7	8.7	LOS A	2.5	17.8	0.45	0.58	48.9
Approach		41	1.5	41	1.5	0. 7	6.2	LOS A	2.5	17.8	0.45	0.58	52.5
est: Edward St													
10	L2	7	0.0	7	0.0	0.071	6.7	LOS A	0.4	2.6	0.55	0.61	48.1
11	T1	48	0.0	48	0.0	0.071	6.2	LOS A	0.4	2.6	0.55	0.61	42.5
12	R2	5	0.0	5	0.0	0.071	8.9	LOS A	0.4	2.6	0.55	0.61	48.4
Approach		60	0.0	60	0.0	0.071	6.5	LOS A	0.4	2.6	0.55	0.61	44.2
All Vehicles		1204	1.2	1204	1.2	0.481	7.5	LOS A	.	22.0	0.56	0.68	49.1

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 1.0
Number o Iterations: 8 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:45:22 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network ighDensityResidential .sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARP AM] **Net ork:N101 [Proposed Net ork AM]**

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	(	0.0	(	0.0	0.4 (	6.0	LOS A	.4	24.2	0. (	0.58	48.
2	T1	278	2.9	278	2.9	0.4 (	5.7	LOS A	.4	24.2	0. (	0.58	52.
	R2	2 (	0.0	2 (	0.0	0.4 (	8.	LOS A	.4	24.2	0. (	0.58	48.4
Approach		544	1.5	544	1.5	0.4 (	6.8	LOS A	.4	24.2	0. (	0.58	50.9
East: Barnsbury Gr E													
4	L2	85	0.0	85	0.0	0.175	6.	LOS A	0.9	6.1	0.44	0.61	48.
5	T1	62	0.0	62	0.0	0.175	5.7	LOS A	0.9	6.1	0.44	0.61	45.8
6	R2	14	0.0	14	0.0	0.175	8.4	LOS A	0.9	6.1	0.44	0.61	48.6
Approach		161	0.0	161	0.0	0.175	6.2	LOS A	0.9	6.1	0.44	0.61	47.
North: New Illawarra Rd N													
7	L2	'	0.0	'	0.0	0. 7	8.2	LOS A	2.4	16.7	0.64	0.7	47.5
8	T1	268	2.2	268	2.2	0. 7	7.9	LOS A	2.4	16.7	0.64	0.7	51.8
9	R2	29	0.0	29	0.0	0. 7	10.5	LOS A	2.4	16.7	0.64	0.7	48.2
Approach		2	1.8	2	1.8	0. 7	8.1	LOS A	2.4	16.7	0.64	0.7	51.2
est: Edward St													
10	L2	7	0.0	7	0.0	0.211	7.9	LOS A	1.2	8.5	0.66	0.72	47.5
11	T1	148	0.0	148	0.0	0.211	7.4	LOS A	1.2	8.5	0.66	0.72	41.5
12	R2	7	0.0	7	0.0	0.211	10.1	LOS A	1.2	8.5	0.66	0.72	47.8
Approach		162	0.0	162	0.0	0.211	7.5	LOS A	1.2	8.5	0.66	0.72	42.4
All Vehicles		1195	1.2	1195	1.2	0.4 (	7.2	LOS A	.4	24.2	0.50	0.64	49.5

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iterations: 4.1
Number o Iterations: 10 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:58:21 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7

MO EMENT SUMMARY

Site: 101 [NE _ED _BARP PM] **Net ork:N101 [Proposed Net ork PM]**

New Illawarra Rd, Edward St & Barnsbury Gr, Bexley Nth
Roundabout

Mo ement Per ormance ehicles

Mo ID	OD Mo	Demand Flows Total eh	\	Arri al Flow Total eh	\	Deg. Satn	A erag Delay sec	Le el o Ser ic	95 Back o Vehicles e	ueu Distance m	Prop. ueuec	E ecti Stop Rate per e	A erage Speed km h
South: New Illawarra Rd S													
1	L2	2	0.0	2	0.0	0. 5	7.6	LOS A	2.4	17.4	0.62	0.71	47.6
2	T1	189	4.2	189	4.2	0. 5	7.4	LOS A	2.4	17.4	0.62	0.71	51.6
	R2	110	0.0	110	0.0	0. 5	9.9	LOS A	2.4	17.4	0.62	0.71	47.2
Approach		2	2.5	2	2.5	0. 5	8.	LOS A	2.4	17.4	0.62	0.71	50.2
East: Barnsbury Gr E													
4	L2	108	0.0	108	0.0	0.481	8.0	LOS A	.	22.0	0.6	0.76	47.0
5	T1	189	0.0	189	0.0	0.481	7.4	LOS A	.	22.0	0.6	0.76	44.7
6	R2	112	0.0	112	0.0	0.481	10.1	LOS A	.	22.0	0.6	0.76	47.
Approach		409	0.0	409	0.0	0.481	8.	LOS A	.	22.0	0.6	0.76	46.0
North: New Illawarra Rd N													
7	L2	12	0.0	12	0.0	0. 7	6.4	LOS A	2.5	17.8	0.45	0.58	49.0
8	T1	7	1.6	7	1.6	0. 7	6.0	LOS A	2.5	17.8	0.45	0.58	52.7
9	R2	22	0.0	22	0.0	0. 7	8.7	LOS A	2.5	17.8	0.45	0.58	48.9
Approach		41	1.5	41	1.5	0. 7	6.2	LOS A	2.5	17.8	0.45	0.58	52.5
est: Edward St													
10	L2	7	0.0	7	0.0	0.071	6.7	LOS A	0.4	2.6	0.55	0.61	48.1
11	T1	48	0.0	48	0.0	0.071	6.2	LOS A	0.4	2.6	0.55	0.61	42.5
12	R2	5	0.0	5	0.0	0.071	8.9	LOS A	0.4	2.6	0.55	0.61	48.4
Approach		60	0.0	60	0.0	0.071	6.5	LOS A	0.4	2.6	0.55	0.61	44.2
All Vehicles		1204	1.2	1204	1.2	0.481	7.5	LOS A	.	22.0	0.56	0.68	49.1

Site Le el o Ser ice LOS Method: Delay RTA NS . Site LOS Method is speci ied in the Network Data Network tab .
Vehicle mo ement LOS alues are based on a erage delay per mo ement.
Intersection and Approach LOS alues are based on a erage delay or all ehicle mo ements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard Ak elik M D .
V alues are calculated or All Mo ement Classes o All ea y Vehicle Model Designation.
Largest change in A erage Back o ueue or Degree o Saturation or any lane during the last iteration: 0.9
Number o Iterations: 9 maximum speci ied: 10

Organisation: VARGA TRAFFIC PLANNING | Processed: Tuesday, 18 September 2018 4:59:27 PM
Project: Z:\DATA\Data\Jobs01\Jobs\17work\17160_88-96NewIllawaraRdBexleyNorth\SIDRA\180918\Proposed Network RockdaleComparison .sip7