Planning Report

Statement of Environmental Effects

Nepean Hospital Expansion & Site Subdivision
Barber Avenue, Kingswood, NSW

December 2018

Memphis Strategic

Report preparation by:

Report Version	Report Title	Report Date	Author / QA
Version 1.0	Draft SEE	21 November 2018	W. Gersbach
Version 1.1	Final SEE	5 December 2018	W. Gersbach

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Executive Summary

This Statement of Environmental Effects (SEE) supports the expansion of the Nepean Private Hospital to provide a new endoscopy section and new facilities for practising doctors. It also supports the associated re-subdivision of the subject land.

The proposed expansion will effectively function as a 'western wing' of the existing hospital, by providing a new 4-level (ground level + 3 levels) building, albeit connected for pedestrian through-traffic at the first level only due to critical clinical links between new and old services at this floor.

The subject site is zoned B4 Mixed Use under Penrith Local Environmental Plan (LEP) 2010. Development for the purpose of a hospital (a 'health service facility') is permitted in the B4 zone courtesy of the State Environmental Planning Policy (SEPP) - Infrastructure 2007.

The private hospital operates alongside the adjacent and much larger Nepean Public Hospital campus but is, in itself, an important component of the Penrith Health and Education Precinct.

Council's LEP and DCP controls for the site anticipate a variety of land uses in the mixed-use zone, which essentially means that they are not entirely relevant to the private hospital proposal. Nonetheless the controls envisage sustainable development that is partially activated at ground level, with a well-considered public domain interface and which is safe and legible to site users.

The application responds well to these principles. Its height and bulk are within the LEP limits and its generous setbacks and edge landscaping allow the building to sit comfortably on the development site, without visual intrusion, overshadowing or other impact. It also includes a new hospital entry that is activated by the provision of ground floor retail space. The building is also designed to achieve a 4.0 Green-Star rating.

The proposal includes the provision of a new vehicular access to the Great Western Highway but also offers an alternate site layout should the consideration of this aspect of the proposal cause its final determination to be delayed.

The proposal incorporates sufficient on-site parking and does not generate a large enough amount of additional traffic to have any adverse impact on the operation of the local road network. The inclusion of the direct access to GWH, however, will improve the efficiency of the GWH/Parker Street and the Parker Street/Barber Avenue intersections, specifically by reducing their peak hour average delay times. The proposed access is therefore beneficial to the whole of the road network and to the function of the adjacent public hospital.

This report discusses and documents potential impacts relating to traffic management, safety by design, noise, local heritage, soil contamination, BCA compliance, accessibility and waste management. Detailed reports by qualified consultants on these individual matters are included as appendices to this report.

Overall, the assessment finds that the proposal is well suited to the subject site and should be a welcomed addition to the Penrith Health and Education Precinct.

1 Introduction

This Statement of Environmental Effects (SEE) addresses the proposed expansion of the Nepean Private Hospital, situated at the corner of the Great Western Highway, Parker Street and Barber Avenue in the Penrith City local government area (LGA).

The proposed expansion will provide additional medical facilities (a new endoscopy section in addition to a number of doctor's rooms to facilitate pre and post-operation patient consultations. The expansion will effectively operate as a 'western wing' of the existing hospital, albeit connected for through-pedestrian traffic at the first level only, due to critical clinical service links at this level.

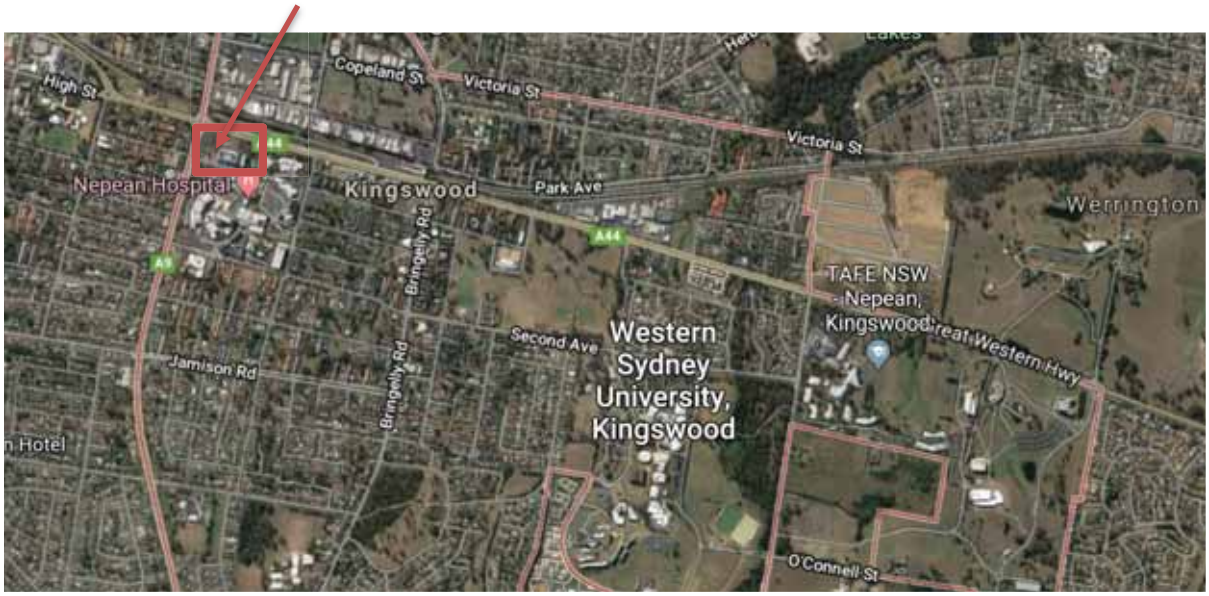
This SEE addresses the major planning, operational and environmental implications of the proposed development both in the context of the subject site and its immediate surrounds and in the context of the broader health and education precinct of which it is a part.

Chapters 1 and 2 of this document provide a site and strategic setting that frames the consideration of the proposal. Chapter 3 outlines the proposed expansion in detail. Chapter 4 addresses the primary planning and impact assessment criteria and provides an appraisal of the proposal against these measures. It references a range of studies undertaken by other consultants that deal with specific issues (e.g. traffic, noise etc). Chapter 5 provides a conclusion to the project assessment.

1.1 Site Context

The development site comprises a series of allotments located at the corner of Barber Avenue, Parker Street and the Great Western Highway, Kingswood.

Fig.1.1 Subject Site, Kingswood



Source: Google Maps, 2108

Kingswood is a suburb of around 11,500 residents (2017, ERP). It is situated immediately east of the strategic centre of Penrith in Sydney's west.

Kingswood accommodates the Nepean Health Precinct (which includes both public and private hospitals and related health services), the Nepean-Kingswood TAFE college and is also the home of a major component of Western Sydney University's main campus (south of the Great Western Highway). Together with local industry and retail services, these facilities generate over 7,000 jobs in Kingswood. The majority of local jobs at Kingswood are heath (circa 3,700) and education (circa 1,500)[1] based.

Kingswood is currently serviced by a rail station (on the Main Western Line), situated approximately 700 metres east of the Nepean Private Hospital. The health campus is also serviced by several local bus routes.

Fig.1.2 Kingswood Locality

Source: Nearmaaps Maps, 2018

Nepean Hospital forms part of a broader Greater Penrith health service framework and is supported by district-level services at Blue Mountains and Hawkesbury hospitals.

1.2 Health and Education Precinct

The Greater Penrith Health and Education Precinct is recognised as a critical element of the broader Western Sydney Economic Corridor. It includes the Nepean Health Precinct at Kingswood and the Western Sydney University campus further to the east and adjacent land that is zoned for supportive mixed use, business and higher density residential purposes.

[1] Penrith City Council and forecast id; https://economy.id.com.au/penrith/employment-locations, 2018

The public hospital component of the Nepean Health Precinct has recently accommodated a $139 million expansion, completed in February 2014. It involved the construction of a new Mental Health Unit and a new 3 storey 'east block' which incorporated an expansion of the hospital's Intensive Care Unit (ICU), a new chapel and associated parking and landscaping.

Further expansion and intensification of services at Nepean Hospital are planned. The hospital is undergoing a further $1 billion redevelopment, Stage 1 of which will entail:

- A new 14-storey clinical services tower
- A new and expanded Emergency Department
- More than 12 new operating theatres, 18 new birthing suites and 200 overnight beds
- A new Neonatal Intensive Care Unit
- A new helipad and a $26 million multi-storey car park that will add an additional 500 car spaces to the campus
- Expansion of cancer services (a doubling of chemotherapy chairs to 30); and
- New community health services

Stage 1 was announced in November 2016, with construction of the new car park commencing in October 2017. This new multi-deck carpark (see below) is positioned diagonally opposite the proposed Healthscope expansion, at the south-eastern corner of Parker Street and Barber Avenue. The car park is expected to be completed in early 2019. It provides a frame for the expected bulk and scale of development at this 'end' of the precinct.

Fig.1.3 Proposed Multi-Deck Carpark, cnr Parker Street and Barber Avenue

Source: http://www.nepeanredevelopment.health.nsw.gov.au

The Greater Penrith Health and Education Precinct will be further supported by the first stage of the planned North-South Rail Link and a potential future rail connection to Leppington and Campbelltown, via the Western Sydney Airport. The location of these transport services through the Western Sydney University campus (east of the hospital campus) and linking with St. Marys station will substantially enhance the connectivity of the broader health and education precinct.

To further the advancement of the precinct in conjunction with the growth and development of the strategic centre of Penrith, the Greater Sydney Commission has designated the Greater Penrith area as a 'collaboration area'.

With assistance and guidance provided by the Western Sydney City Deal[2], the Greater Penrith Collaboration Area aims to, inter alia:

- revitalise and grow the Penrith CBD
- protect and expand the health and education precinct
- implement healthy city initiatives and improve social infrastructure

The encouragement of private investment is critically important to the Greater Penrith Collaboration Area. The continued improvement and intensification of services at the Healthscope Nepean Private Hospital facility is integral to the area's progress and consistent with the productive and economic aims of the Greater Penrith Collaboration Area.

Fig.1.5 Public and Private Health Components – Nepean Health Precinct

Source: Nearmaps, 2018

[2] The Western Sydney City Deal is the single largest planning, investment and delivery partnership in the history of the nation, involving the Australian and NSW Governments, together with the eight local governments of the Western District. It will optimise infrastructure, investment and employment opportunities for the District. Collaboration Areas at Liverpool, Greater Penrith and Campbelltown-Macarthur will assess growth scenarios that best align land use, infrastructure and community benefits.

2 Site Details

2.1 Site Description and Current Land Uses

The subject site is situated at the corner of The Great Western Highway, Parker Street and Barber Avenue, Kingswood.

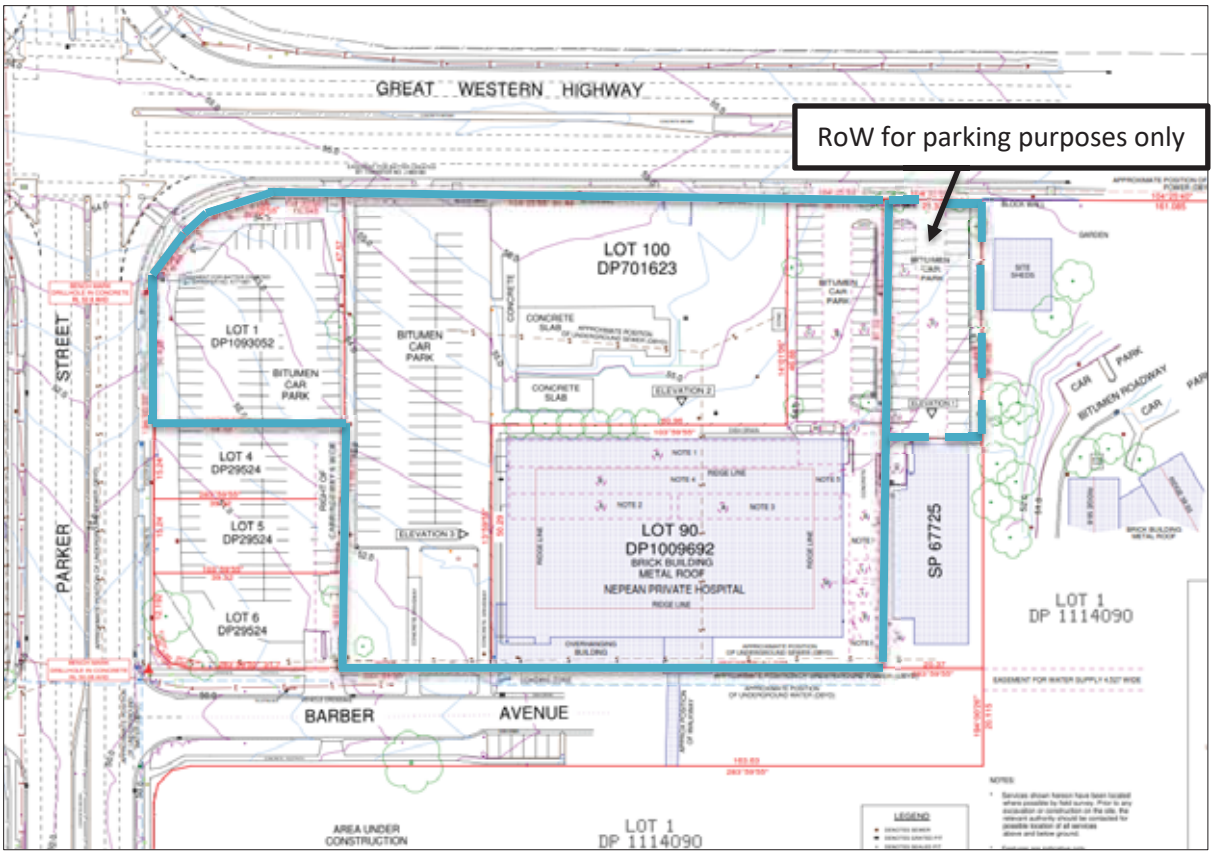
The land comprises Lot 1, DP 1093052 (78 Parker Street), Lot 100, DP 701623 (11 Barber Avenue) and Lot 90, DP 1009692 (1-9 Barber Avenue). Healthscope also benefits from an easement for carparking purposes over the adjacent Lot 91 DP1018760 (that is subject to SP 67725). The collective land parcel of the Healthscope land holding is 12,626.1m^2, not including that part of Lot 91 that is used for parking purposes.

Lot 1, at the corner of Great Western Highway and Parker Street benefits from a right-of-carriageway (RoW) over the adjacent Lots 4,5 and 6 in DP 29524, allowing it to be accessed from Barber Avenue. All other lots are accessible directly off Barber Avenue.

Lots 4, 5 and 6 in DP 29524 are privately owned and are not part of Healthscope's holdings at Kingswood. A Development Application that proposes the development of a professional medical centre on the property has been lodged with Penrith City Council.

The subject land (owned by Healthscope) and its lot configuration is depicted in the following diagram which also shows the location of existing buildings and associated parking areas.

Fig.2.1 Site and Lot Configuration – Healthscope Holdings



Source: Matthew Freeburn, Land Survey, Updated 13/03/2108

The land falls from its Great Western Highway frontage toward Barber Avenue, with a difference in level of approximately 6 metres. Accordingly, Lot 1, at the very corner of the Great Western Highway and Parker Street sits higher than Barber Avenue such that its RoW access will gradually ramp up.

In designing the proposed hospital expansion and parking layout for the subject site, consideration has been had to a current lodged (but as yet undetermined) Development Application on adjacent land (Lots 4,5 and 6 in DP 29524, corner of Barber Avenue and Parker Street).

Building floor levels for the proposed expansion have also had regard for the current floor levels of the existing Nepean Private Hospital, as it is intended to link the existing hospital and the new extension.

Barber Avenue services development across the broader hospital campus, providing access to the existing Healthscope Nepean Private Hospital, the Tresillian family care centre to its east (on Lot 1, DP 1114090) and to the newly approved (under construction) multi-level car-parking facilities situated to its south.

An existing overhead walkway also crosses Barber Avenue and connects the 1st floor level of the Nepean Private Hospital to the existing public hospital situated to its south, providing an important pedestrian linkage to the larger hospital campus.

Barber Avenue forms the border of the site's B4 zoning, with land further south and east being zoned for 'special (public hospital) purposes'.

2.2 Nepean Private Hospital

The existing Nepean Private Hospital was opened in 2003. It currently accommodates 109 beds and 174 full time employees (FTEs).

The site presently provides a total of 305 car parking spaces across a range of car parking areas, each having their own two-way access from Barber Avenue. The 2 car parking lots to the west of the hospital have an internal road connection.

Nepean Private Hospital provides a full range of surgical and medical services including orthopaedics, urology, ear, nose and throat, paediatrics, gastroenterology and endoscopy, general, bariatric, gynaecology, plastic and reconstructive surgeries as well as neurosurgery dental. The hospital also has a dedicated women's health unit which provides a holistic maternity service for mothers and a special care nursery.

In March 2016, a state-of-the-art Cardiac Cath Lab was commissioned to complement the hospital's Cardiology service and Critical Care Unit.

The hospital also provides a range of allied health services including diagnostic imaging, pathology and physiotherapy.

The hospital currently comprises a single stand-alone building and associated ground-level parking.

The existing building has a total gross floor area of 7,696m^2.

3 Proposed Development

3.1 Proposed Hospital Expansion

The proposal seeks to expand the range of medical services provided at Nepean Private Hospital by providing a new 3-level 'western wing' (ground level + 3 levels) connected for pedestrian through-traffic at the first level.

The site of the hospital expansion is, at present, either used for external parking purposes or is unused land.

The exact use of the proposed additional floorspace at this stage is not determined, but will include a new endoscopy section, new facilities for visiting doctors and potentially a new IVF clinic. The allocation of floorspace will ultimately depend on user demand, but for the purpose of assessment, has been assumed to include predominantly doctors' rooms and a new endoscopy section.

Currently, the proposed expansion incorporates the following provisions:

- **Ground level** – an improved and expanded main hospital entry with adjacent retail space (pharmacy, flowers, café with provision for outdoor seating), a new landscaped rear entry connecting to external parking areas and both undercover parking (for doctors) and additional ground level parking. This landscaped area will also function as a 'break-out' area for patients.

  The additional floorspace at this level is limited to the new entrance and retail/café space at the front of the site (422m^2). All other floorspace is used for circulation or for plant facilities and storage.

- **First level** – endoscopy and doctors' facilities but potentially a new IVF clinic.

  This level includes an additional 1,905m^2 of GFA.

- **Second level** – initially provisioned as doctor's rooms allowing for pre and post- surgery consultations but potentially available for additional theatre space / patient rooms.

  This level includes an additional 1,761m^2 of GFA.

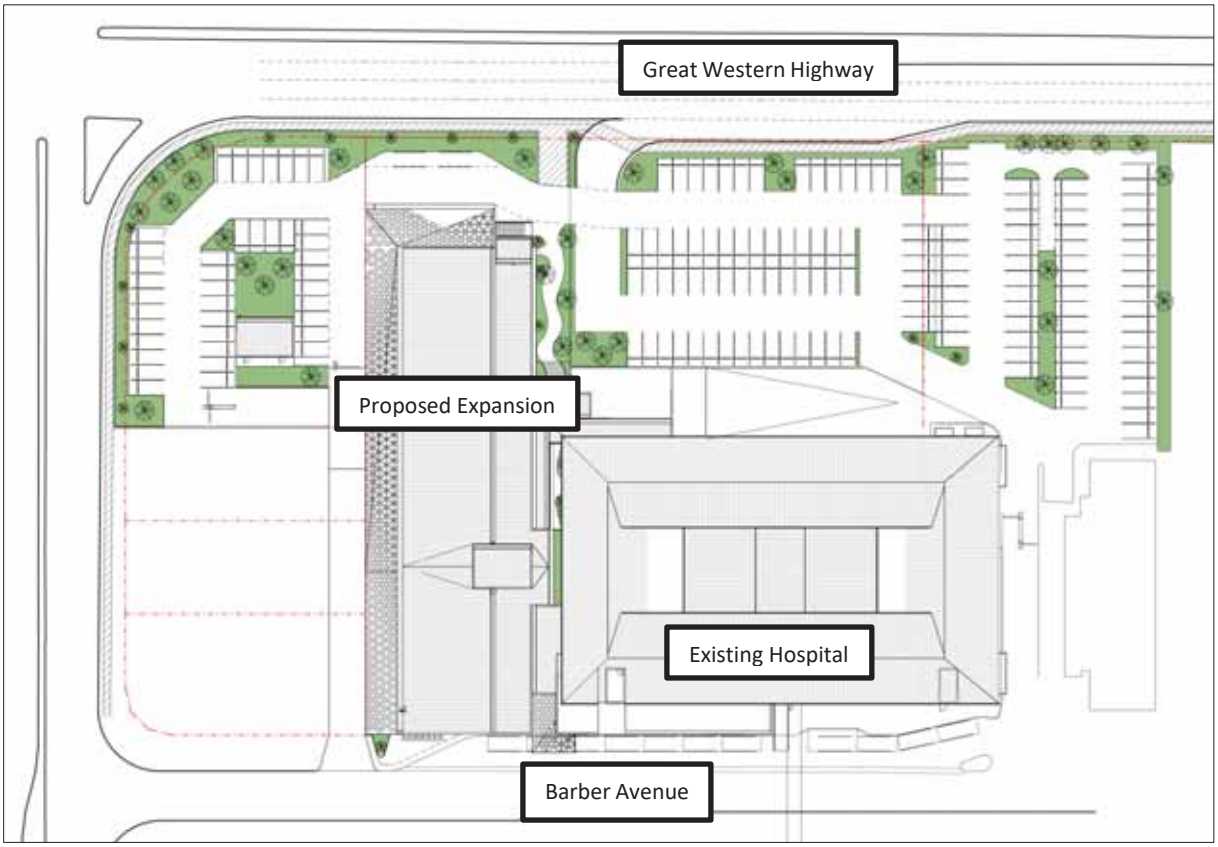
- **Third level** – initially provisioned as doctor's rooms allowing for pre and post- surgery consultations but potentially available for additional theatre space / patient rooms.

  This level includes an additional 1,761m^2 of GFA.

To maximise the collective site's development potential, further expansion of the hospital is likely to occur but has not yet been fully considered or designed. It is likely, however, that this would be in the form of additional building levels.

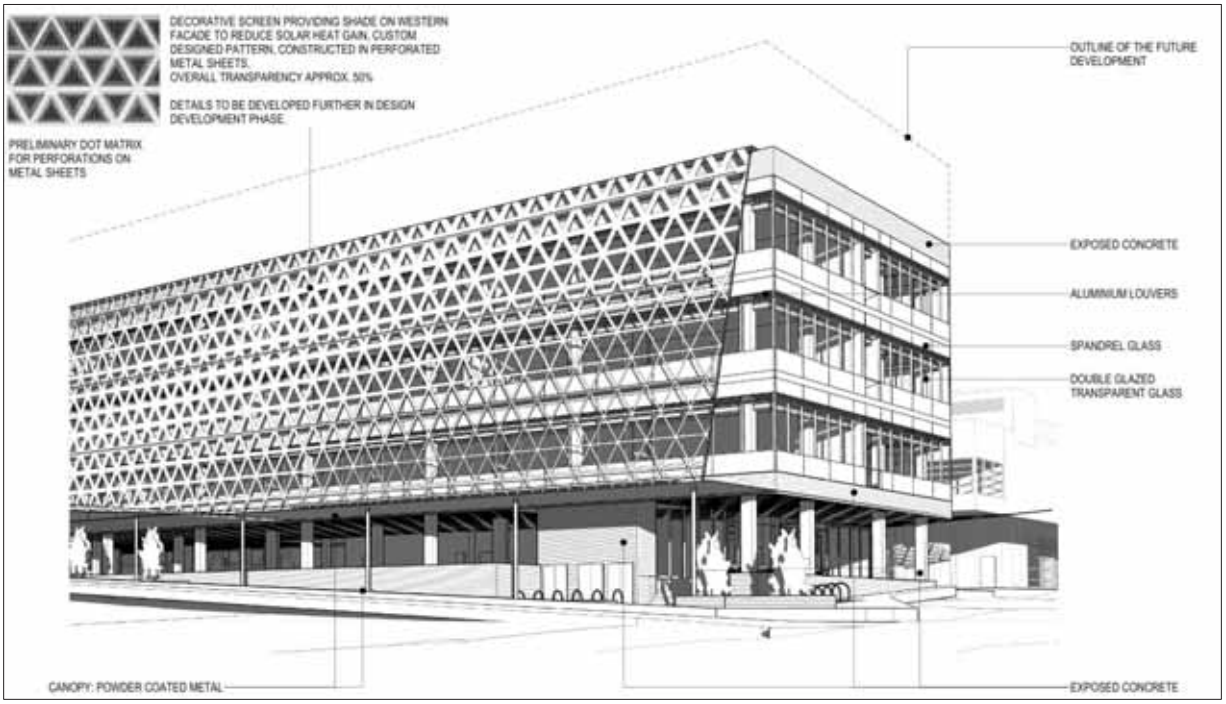
The proposed development is depicted in detail in the ***Architectural Plans and Design Report*** prepared by ***SKAr$^+$ Architects*** at ***Appendix A*** to this report. The proposed site layout of the project, its western elevation and its ground floor arrangement are presented in the following diagrams.

Fig. 3.1 Proposed Site Layout



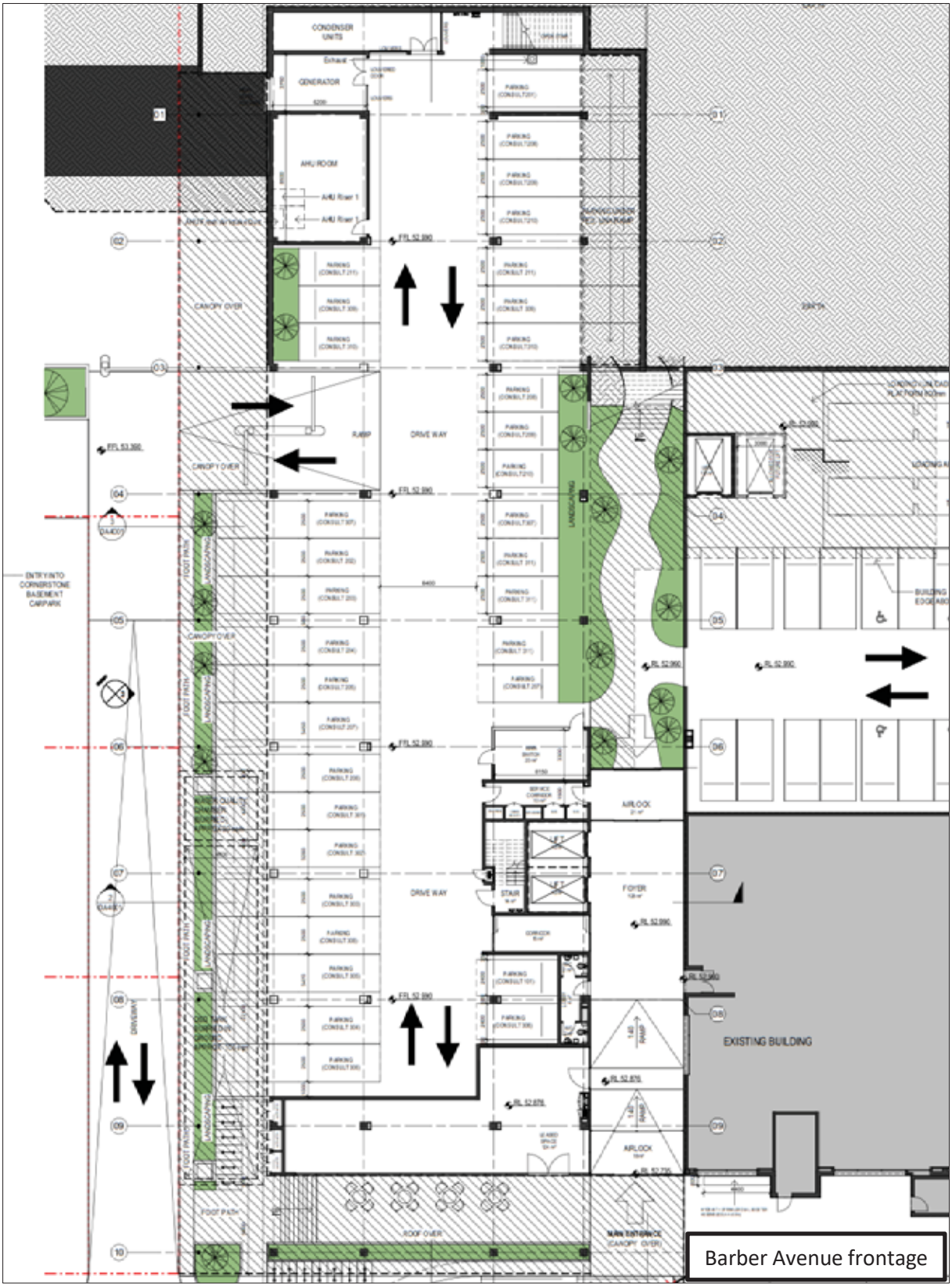
Source: SKAr+ Architects, December 2018

Fig. 3.2 Indicative Western Elevation, Nepean Private Expansion



Source: SKAr+ Architects, December 2018

Fig. 3.3 Proposed Ground Floor Building Arrangements



Source: SKAr+ Architects, December 2018

3.2 Proposed Parking and Site Access Arrangements

As the proposed expansion will occur on land that is currently utilised for external, ground-level parking it is necessary for both replacement and additional parking to be provided in conjunction with the new development.

The submitted plans incorporate provision for 286 – 297 car parking spaces on site, depending on which site layout option is considered. This includes the 33 spaces that Healthscope has an easement over to access on the adjacent Lot 91 DP1018760 (that is subject to SP 67725).

The primary access to on-site parking is provided from Barber Avenue, via the existing right-of-carriageway (RoW) that services Lot 1 DP1093052 (78 Parker Street) at the corner of Great Western Highway and Parker Street. Barber Street is also used for service vehicles and for access to staff parking spaces provided at the rear of the existing hospital building.

Alternate Access Options
The submitted plans also provide for a new direct access to be provided via a deceleration lane on the Great Western Highway. This access will require formal endorsement by Roads and Maritime Services (RMS). It is proposed to relieve pressure from the primary Parker Street / Barber Avenue access point and therefore to enhance traffic conditions for both the private hospital and other elements of the public hospital facilities that rely upon access from this intersection, such as the new multi-level carparking facility and the Tresillian family care centre.

Justification for this proposed additional vehicular access point is provided in the attached ***Transport and Traffic Impact Assessment Report*** prepared by ***TTPA*** (November 2018), included at ***Appendix B*** to this report.

The submitted plans incorporate two ground level layout plans – a preferred layout that incorporates the proposed GWH access and another without this access. The proposed development is possible (and compliant) under either scenario, however the alternate no-access plan is provided in case the required RMS approval for the preferred arrangement is not immediately forthcoming.

Rather than delay Council's final assessment of the proposal, the alternate no-access plan is provided to allow a timely determination.

It is suggested that, rather than dismissing the preferred access arrangement, it be included as a 'deferred commencement' matter as allowed for under Clauses 4.16 (3) – (5) of the EP&A Act:

> *(3)* ***"Deferred commencement" consent***
> *A development consent may be granted subject to a condition that the consent is not to operate until the applicant satisfies the consent authority, in accordance with the regulations, as to any matter specified in the condition. Nothing in this Act prevents a person from doing such things as may be necessary to comply with the condition.*
>
> *(4)* ***Total or partial consent***
> *A development consent may be granted:*
> *(a) for the development for which the consent is sought, or*
> *(b) for that development, except for a specified part or aspect of that development, or*
> *(c) for a specified part or aspect of that development.*
>
> *(5) The consent authority is not required to refuse consent to any specified part or aspect of development for which development consent is not initially granted under subsection (4), but development consent may subsequently be granted for that part or aspect of the development.*

The attached TTPA Report also outlines the demand for carparking generated by the combined floorspace of the existing and proposed hospital expansion.

The proposal also incorporates provision for a total of 26 bicycle spaces and a proposed transport travel plan that seeks to encourage non-private vehicle use by staff in accessing the site. As stated, the facility is within 700 metres of the Kingswood rail station and is serviced by local buses (with stops provided on High Street/GWH, west of the hospital, and on Parker Street and Derby Streets to the south). The provision of direct access from GWH also allows for a new pedestrian access to be provided to this street frontage, providing a pedestrian entrance to the private hospital at its closest point to the rail station.

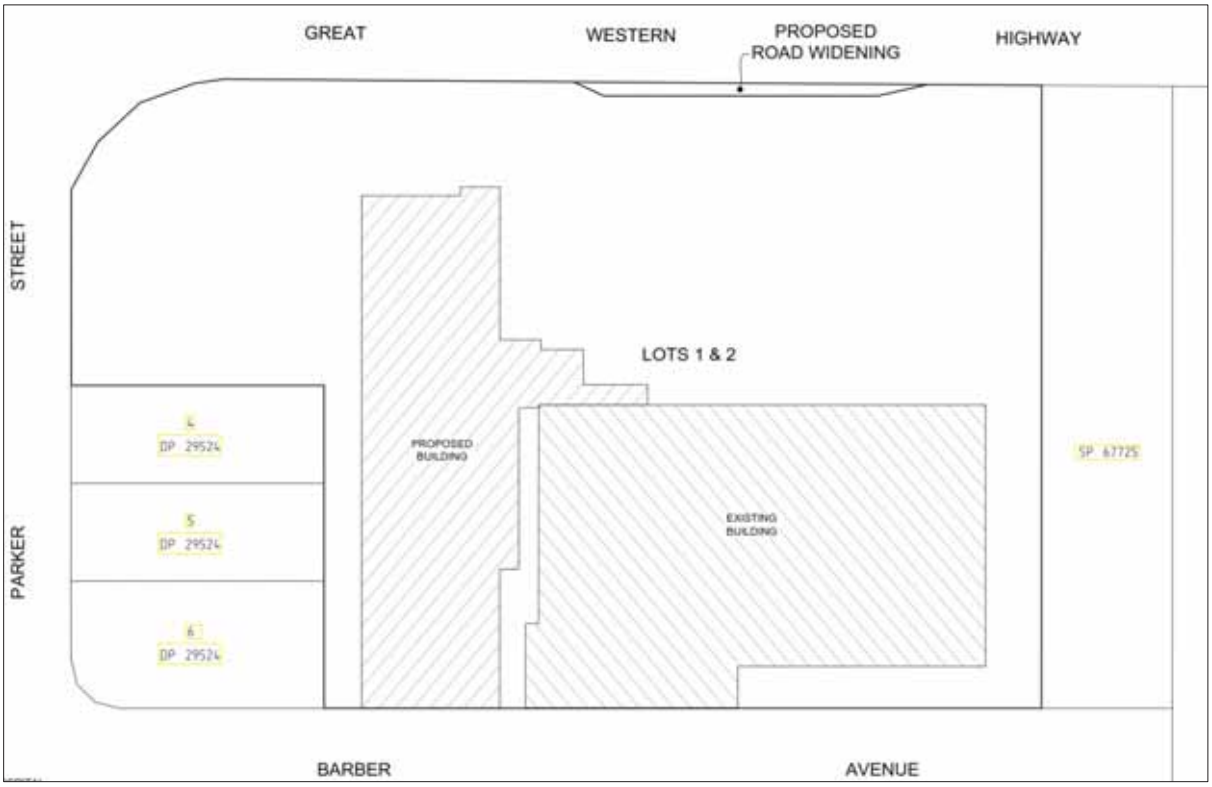
3.3 Site Subdivision

The proposed development includes the associated re-subdivision of the subject land, whilst recognising and honouring the various rights of carriageways that apply to the subject land and its adjoining properties.

The subdivision creates two separate allotments that recognise the use of the expanded building for doctor purposes and allows for connection to the existing hospital at the first level.

Full details of the proposed subdivision, including its various layers that reflect building levels, are included with the architectural drawings that support the proposal. Any potential future development on the site, likely to involve an upper level extension to the proposed building, will be incorporated within the main hospital allotment.

Fig. 3.4 Proposed Site Subdivision – Location Plan



Source: Plan of Subdivision of Lot 100 in DP 701623, Lot 90 in DP 1009692 and Lot 1 in DP 1093052 and easements over lots 4-6 in DP 29524 and CP/SP 67725, Mathew Smith Surveyor, 2018

The proposed subdivision is based on the preferred site layout plan, incorporating access to the Great Western Highway and the associated road widening to accommodate this allowance.

3.4 Site Operations and Other Matters

The site is proposed to operate on a 24-hour basis, although the majority of hospital services are typically provided from 8.00am – 6.00pm daily.

The expanded development will provide for an additional 62 full-time staff and up to 26 doctors, although not all of these are expected to be on site at the same time.

Signage and Lighting
New building identification signage will be incorporated as part of the expanded hospital project, comprising:

- A single sign to the northern elevation of the proposed building extension (i.e. facing the Great Western Highway).
- A single sign at the hospital entry facing Barber Avenue.
- A single sign at the south-west corner of the building providing identification within the broader health campus.

External parking areas will be flood-lit for practical and safety purposes.

Demolition and Construction
The proposed development will involve the demolition of the existing on grade car parking located on Lot 1, DP 1093052 and Lot 100, DP 701623 to allow the construction of a ground floor main reception and entry and undercroft carparking, 3 levels of consulting suits and a re-configured on grade car park extending across adjacent lots.

4 Planning & Impact Assessment

4.1 Land Use Permissibility and Planning Framework

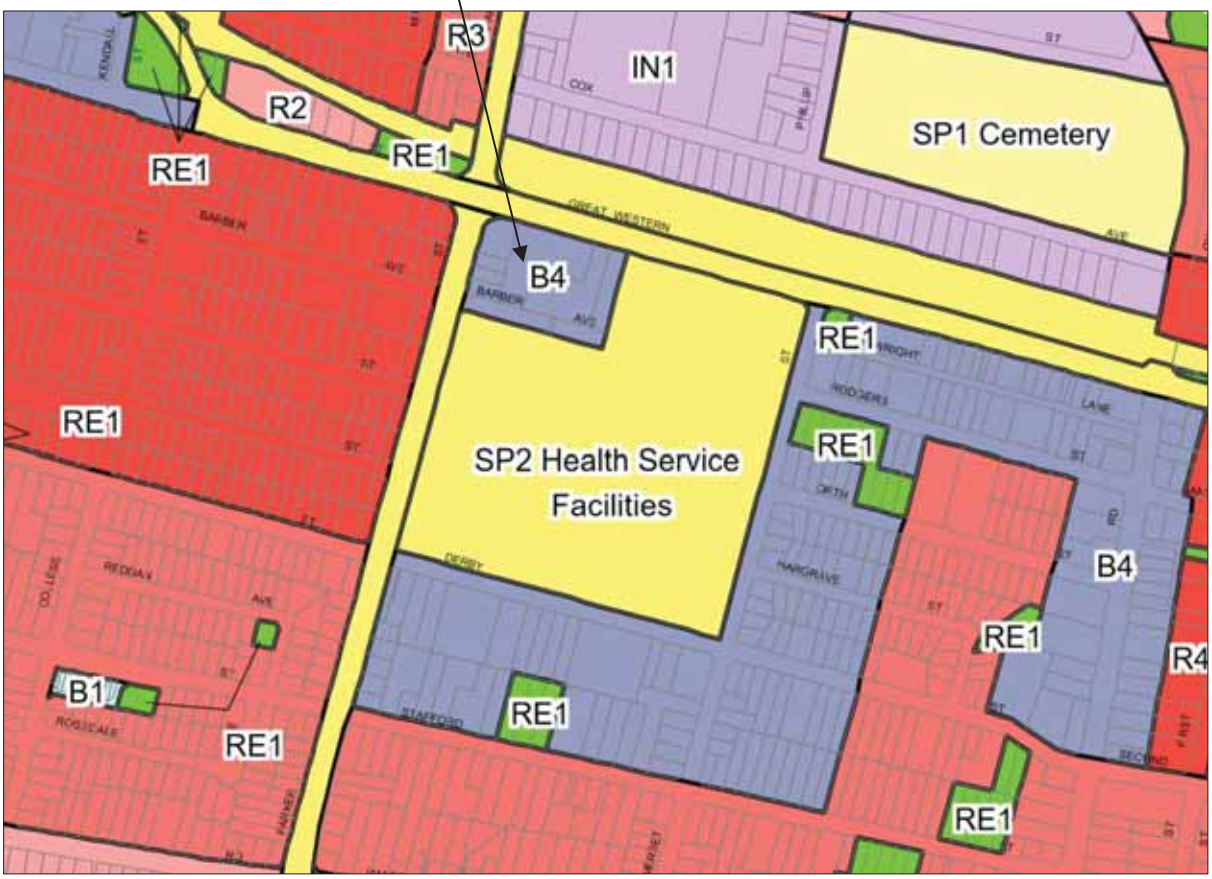
The Environmental Planning and Assessment (EP&A) Act 1979 and Environmental Planning and Assessment Regulation, 2000 is the guiding legislation for planning in NSW.

The EP&A Act allows for the making of local environmental plans (LEPs) which provide for specific planning controls to be introduced by the local council. It also allows for the making of state planning policies relating to specific development types.

The subject site is zoned B4 Mixed Use under the provisions of the Penrith LEP 2010. The purpose of this zone, as stated in the LEP, is to:

- *Provide a mixture of compatible land uses.*
- *Integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.*
- *Minimise conflict between land uses within the zone and land uses within adjoining zones.*
- *Create opportunities to improve public amenity; and to*
- *Provide a wide range of retail, business, office, residential, community and other suitable land uses.*

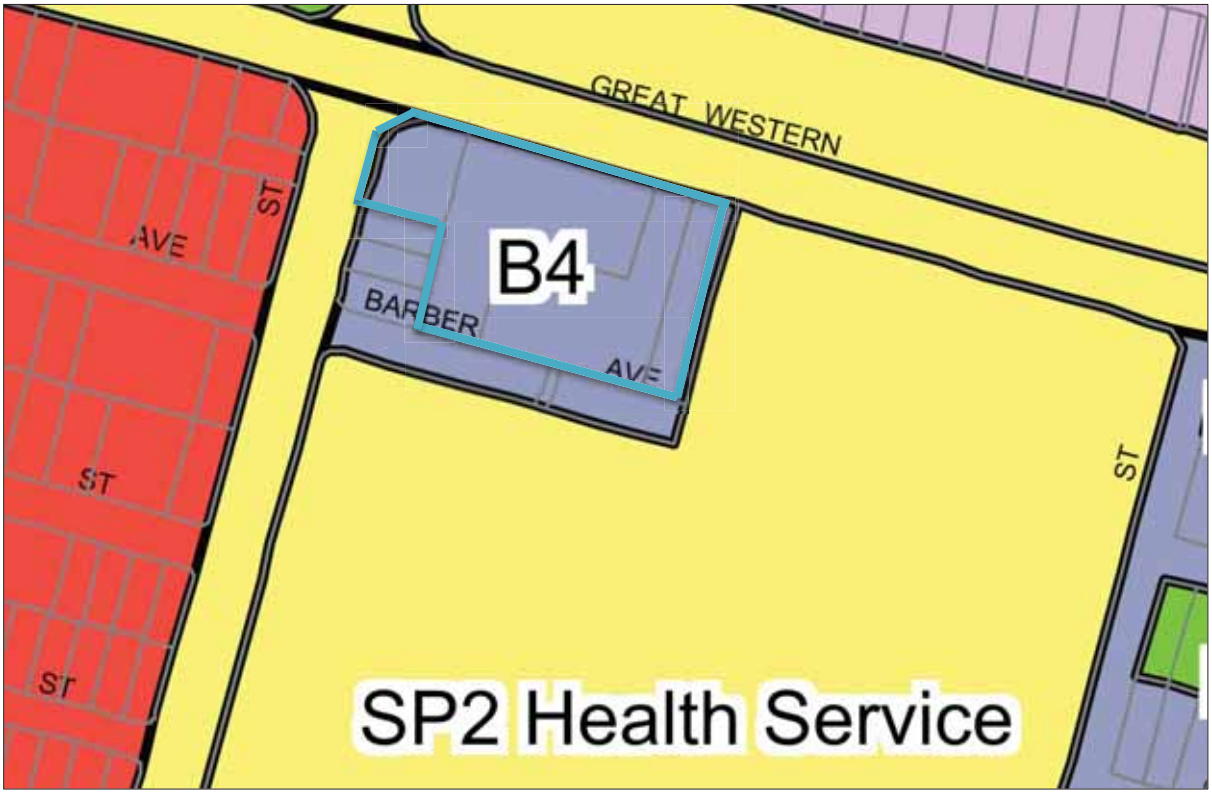
Fig 4.1 Land zoning (subject site)



Source: Penrith LEP 2010

The Healthscope land holding in the context of the site's zoning is depicted below:

Fig 4.2 Healthscope holdings and site zoning



Source: Penrith LEP 2010

Pursuant to the site's B4 zoning the following types of land uses are permissible with consent:

> ***3. Permitted with consent***
> *Amusement centres; Boarding houses; Car parks; Centre-based child care facilities; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Function centres; Home-based child care; Home businesses; Hostels; Hotel or motel accommodation; Information and education facilities; Medical centres; Mortuaries; Multi dwelling housing; Passenger transport facilities; Places of public worship; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Residential accommodation; Residential flat buildings; Respite day care centres; Restricted premises; Roads; Seniors housing; Serviced apartments; Sex services premises; Shop top housing; Signage; Veterinary hospitals*

As can be seen, development for the purpose of a hospital (or 'health service facility') is prohibited in the zone. This is because the B4 zone is intended to accommodate a broad range of land uses (business and residential) to complement activities in the adjacent Special Purpose zoned Nepean Public Hospital campus.

Pursuant to the **State Environmental Planning Policy (SEPP) – Infrastructure (2007)**, however, development for a health service facility is permissible across the state on land zoned for commercial purposes, including the B4 zone.

Its provisions include the following clauses:

Division 10 Health services facilities

56 Definitions

In this Division:

health services facility *means a building or place used to provide medical or other services relating to the maintenance or improvement of the health, or the restoration to health, of persons or the prevention of disease in or treatment of injury to persons, and includes any of the following:*
(a) a medical centre,
(b) community health service facilities,
(c) health consulting rooms,
(d) patient transport facilities, including helipads and ambulance facilities,
(e) hospital.

prescribed zone *means any of the following land use zones or a land use zone that is equivalent to any of those zones:*
(a) …
(g) B1 Neighbourhood Centre,
(h) B2 Local Centre,
(i) B3 Commercial Core,
(j) ***B4 Mixed Use,***
(k) B5 Business Development,
(l) B6 Enterprise Corridor,
(m) B7 Business Park,
…
(o) SP2 Infrastructure.

57 Development permitted with consent

(1) Development for the purpose of health services facilities may be carried out by any person with consent on land in a prescribed zone.

The proposed hospital expansion is therefore permissible development in the 'prescribed B$ Mixed Use zone, courtesy of the Infrastructure SEPP 2007.

The Infrastructure SEPP also specifies that the consent authority must not grant consent to development on land that has a frontage to a classified road (such as the Great Western Highway) unless it is satisfied that:

"(a) where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and
(b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:
(i) the design of the vehicular access to the land, or
(ii) the emission of smoke or dust from the development, or
(iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and
(c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road."

This provision is relevant to the application's request for direct vehicular access to the Great Western Highway and provides a context for the consideration of this request, i.e. that it can only be considered where it can be demonstrated that the safety, efficiency and ongoing operation of the classified road is not adversely impacted by the proposal.

Also, pursuant to the **State and Regional Development SEPP 2011** the following category of development is identified as 'state significant'.

Hospitals, medical centres and health research facilities

Development that has a capital investment value of more than $30 million for any of the following purposes:
(a) hospitals,
(b) medical centres,
(c) health, medical or related research facilities (which may also be associated with the facilities or research activities of a NSW local health district board, a University or an independent medical research institute).

Clause 4.5 of the EP&A Act specifies that the Independent Planning Commission is the consent authority for state significant development and that the local council is the consent authority for other development.

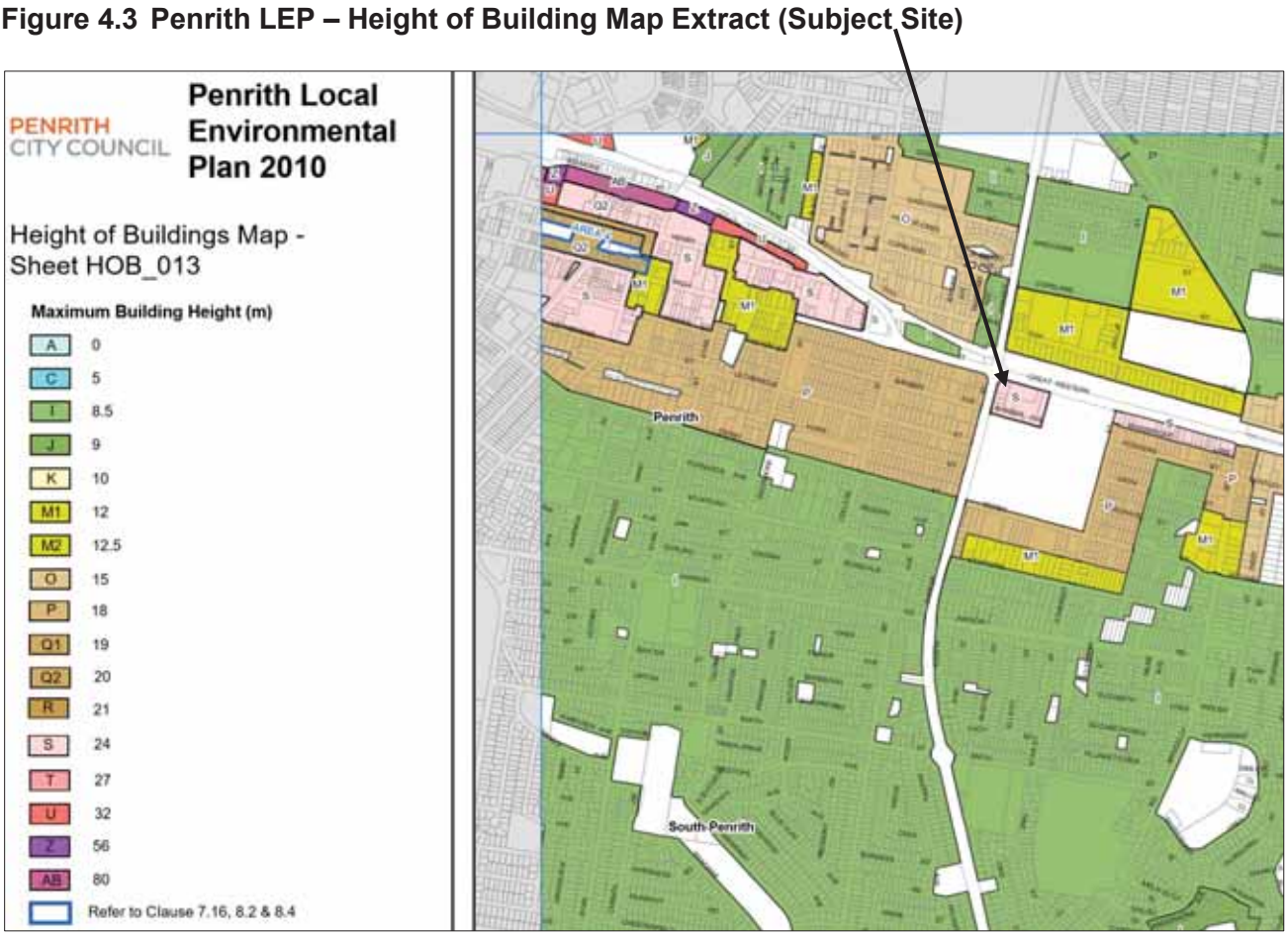
The subject proposal has a capital investment value (CIV) of $29.9 million[3] and is therefore not technically 'state significant development'. The application to which this SEE relates will therefore be lodged with Penrith City Council for its determination.

4.2 Other LEP Provisions

Other provisions of the Penrith LEP 2010 relate to the building height and the floor space ratio that is permitted at the site, and also introduce specific planning provisions that apply to the 'Penrith Health and Education Precinct'.

Relevant extracts from the Penrith LEP 2010 follow.

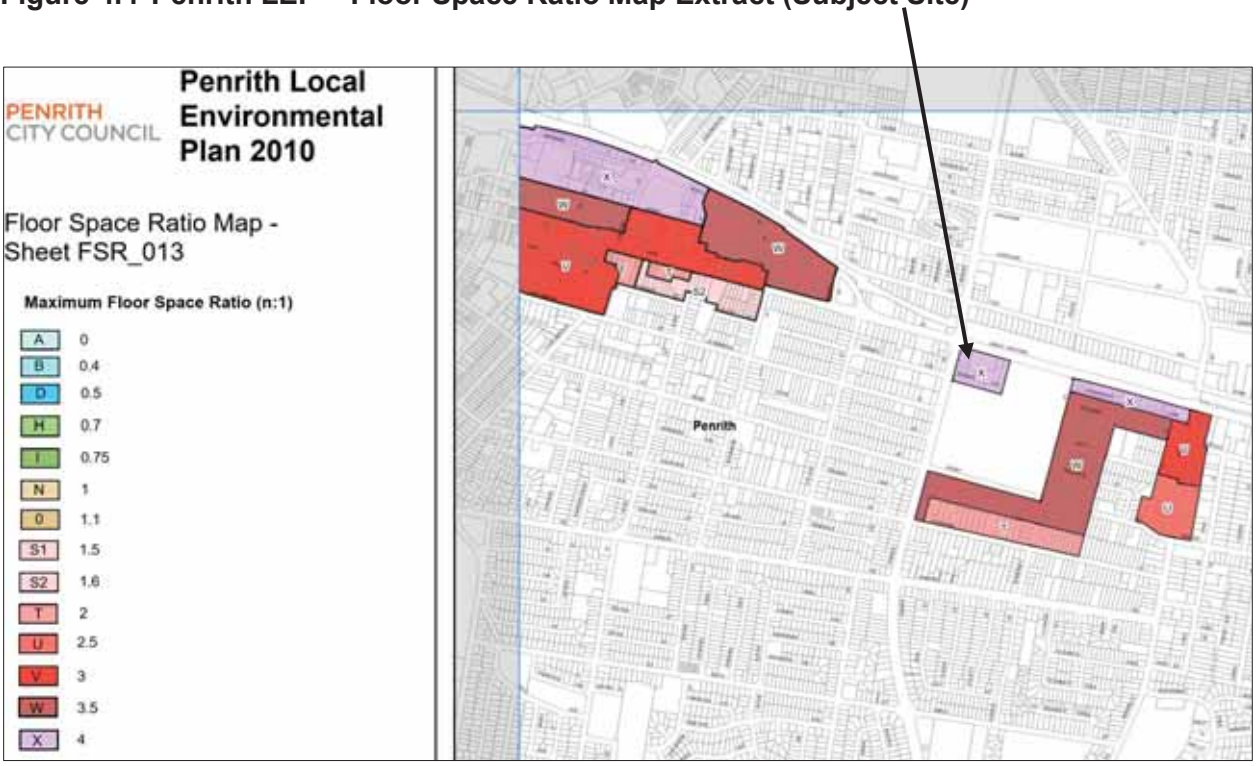
Figure 4.3 Penrith LEP – Height of Building Map Extract (Subject Site)



Source: Penrith LEP 2010

[3] Based on the Capital Investment Report (CIV) prepared by Altus Group and included at ***Appendix C***.

Figure 4.4 Penrith LEP – Floor Space Ratio Map Extract (Subject Site)



Source: Penrith LEP 2010

Pursuant to Clause 4.3 of the LEP 2010 the allowable building height at the site is 24 metres. Pursuant to Clause 4.2 the applicable floor space ratio at the site is 4:1.

The subject site is also identified in the Clause Application Map as being within the 'Penrith Health and Education Precinct' and is affected by the provisions of Clause 7.11.

Figure 4.5 Penrith LEP – Clause Application Map extract (Subject Site)

Source: Penrith LEP 2010

Clause 7.11 requires:

> ***7.11 Penrith Health and Education Precinct***
> *(1) The objectives of this clause are as follows:*
> *(a) to encourage a built form that is suitable for both residential and health services facilities,*
> *(b) to encourage adaptive reuse of residential buildings for health services facilities in the Penrith Health and Education Precinct where the residential use within the building ceases in the future.*
> *(2) This clause applies to land identified as "Penrith Health and Education Precinct" on the Clause Application Map.*
> *(3) Despite clause 4.3, development consent may be granted to development on land that exceeds the maximum height shown for that land on the Height of Buildings Map by up to 20% if the floor to ceiling height of both the ground and first floors are equal to or greater than 3.5 metres.*

The clause mainly seeks to encourage health-related development in the precinct and a range of uses that complement this purpose. A 20% height of building bonus is available for buildings that provide ground and first floor ceiling heights of greater than 3.5 metres, enabling their use as, or conversion to, commercial (health-related) use.

Other LEP provisions relate to:

- Active street frontages (Clause 7.8) - relates to nominated areas predominantly in and adjacent to the Penrith town centre; and
- Design excellence (Clause 8.4) – relating also to specific key sites in and around the Penrith town centre.
- Local heritage conservation (Clause 5.10) – identifies items of environmental heritage, some of which are located close to the subject site (e.g. "Kelvin Brae" house at 142 High Street; a weatherboard cottage at 71 Parker Street and the Penrith General Cemetery at Kingswood). The subject site does not fall within a 'conservation area' or within the 'curtilage' of identified items, such that the type or scale of the proposed development has no heritage significance or impact.

Accordingly, these specific clauses have no bearing on development at the subject site.

4.3 Penrith DCP 2014 Provisions

Penrith City's Development Control Plan (DCP) 2014 incorporates a number of provisions that relate to development at the subject site, as discussed below:

- **Section C1 - Site Planning and Design Principles**
  This section of the DCP aims to improve the sustainability of development through improved site planning and to ensure that new development addresses the key principles of site planning, urban design and design excellence.

  Notably, under this section, the subject site is not identified as a 'Gateway' or an 'Area of Visual Sensitivity'.

  Notwithstanding, other provisions introduced under Section C1 of the DCP which relate to built form, building articulation, acoustic privacy, façade treatment, street context and landscape character are relevant to the proposed hospital expansion.

  Section C1 also acknowledges that buildings and public spaces can impact on perceptions of safety and security, and should therefore be designed with regard to the principles of 'Crime Prevention through Environmental Design'.

- **Section C8 – The Public Domain**
  This section of the DCP relates primarily to commercial areas or areas where there is a high degree of interaction between the public domain and the private domain.

  The public domain comprises the shared urban area and spaces, the structures that relate to those spaces and the infrastructure that supports and serves them.

  At the subject site, the primary public domain areas include the main hospital entry, the site edges to Parker Street and the Great Western Highway and pedestrian connections throughout the site's at-grade parking areas.

  Section C8 aims to ensure that the public domain is attractive, safe, interesting, connected, comfortable and easily understood and that it enhances the natural setting and landscape character of Penrith.

- **Section E12 – Penrith Health and Education Precinct**
  This section provides specific controls for the Hospital Precinct in addition to the general controls elsewhere in the DCP. It aims to promote the revitalisation of Kingswood by promoting high quality urban design, high levels of accessibility within the precinct, and by encouraging development that prioritises the public domain.

  Under this section of the DCP the Healthscope properties are identified as being part of a 'Commercial Mixed Use' area. This precinct encourages development that supports the operation of the adjacent public hospital, such as medical offices, pharmacies, accommodation and retail services.

  > *The north western part of the Commercial Precinct offers three frontages to the Great Western Highway, Parker Street and Barber Avenue and is a major gateway site to the whole Hospital Precinct. Development within this part of the precinct will be encouraged to incorporate high quality architectural design standards and landscaping, fitting for its location as the gateway to the Hospital Precinct.*

  The existence of the private hospital within this area, however, changes the dynamics of the area's mixed-use intentions. Whilst the DCP encourages a variety of uses and a mix of activity to complement nearby medical services, in reality the area has become an extension of the medical core itself.

  Notwithstanding, some of the DCP's provisions are relevant to the hospital use, such as the encouragement of ground level activation (e.g. as part of the hospital entrance to Barber Avenue), a public domain interface that is safe and legible and the provision of deep soil landscaping where possible.

4.4 Assessment of Impacts

Built Form
The proposed hospital expansion is 4 levels in height (ground + 3 levels) and achieves a maximum building wall height of RL 69.7 (16.8 metres) and a maximum overall height (with lift overrun) of RL 73.79 (20.8 metres). This is within the 24m height of building limit set by Penrith LEP 2010.

The proposed extension is rectangular in shape and is connected to the western façade of the existing hospital building. The extension is aligned north-south on the subject land, such that its major facades are east and west facing.

The proposed building extension is 5,849m^2 in area. Together with the existing hospital facilities, the combined GFA of the development is 13,545m^2. With a site area of 12,626.1m^2, the overall FSR achieved as a result of the proposed expansion is 1.07:1. This is well within the 4:1 FSR limitation imposed by Penrith LEP 2010.

Council's LEP and DCP documents seek to ensure that the built form of new projects within the Penrith Health and Education Precinct is sustainable and of high-quality design.

The proposed hospital extension is designed to achieve a 4 Star Green Star 'Design & As-Built' rating, achieved through a variety of means including its projected energy and water consumption budgets, its nominated waste streams, its demolition waste reduction approaches and through its indoor air quality provisions. The building's environmental performance is also enhanced by an engineered 'wrapped metal' screen to its western wall. This building 'skin' provides an important shading to west-facing windows.

Details of the building's sustainability achievements are included in the Green Star scoresheet prepared by Northrop Pty Ltd and included as part of its civil design package.

Other facades of the proposed extension are presented as a high-quality double-glazed glass curtain wall with an exposed concrete trim to enhance the existing hospital building.

The submitted design plans for the project provide a generous setback to the Great Western Highway (over 11 metres) and to Parker Street (over 30 metres). The building will not visually overwhelm the surrounding locality and is complementary to new development within the public hospital campus including the new 14-storey clinical services tower and the multi-level carpark under construction at the south-eastern corner of Parker Street and Barber Avenue.

Site Landscaping

Notwithstanding its 'commercial' nature, the proposed development incorporates ample site edge landscaping to the Great Western Highway and to Parker Street, significantly improving the presentation of the existing development to these street frontages.

The setbacks and planting bays provided at these site edges are of sufficient size and dimension to allow for the growth of large trees. These will provide an appropriate screened canopy and will soften the view enjoyed by passing motorists and pedestrians. Mature plantings are proposed.

The main Barber Avenue entrance to the expanded hospital Is also improved through selective site landscaping that acts to separate parking areas from pedestrian areas and enhances the public domain frontage to the street. Further landscaping is provided throughout the ground level carpark to help define carriageways and pedestrian connections

Landscape plans for the project have been prepared by SKAr$^+$ and are included as part of the architectural package at ***Appendix A*** to this report.

An extract of the architectural package showing the project's proposed landscape treatment is provided below.

Fig 4.6 Project Landscaping Details

Source: SKAr+ Architects, December 2018

Safety by Design (CPTED)
As per the CPTED (Crime Prevention Through Environmental Design) Guidelines there are two important steps to be taken when assessing crime risk:

- Obtain an understanding of the crime risk of the area, and if required
- Apply (CPTED) treatments that correspond with levels of risk present in the area.

Preliminary discussions have been had with Penrith local police, who have advised that there is not a high level of crime at the health precinct, however a recent knifing incident at Nepean public hospital has heightened awareness of the need to protect site users from random events.

Accordingly, the proposed hospital extension has been designed with consideration to the safety of staff, patients and visitors to the site.

Notably the straight edges of the building and its ground level parking arrangement enable clear sight lines across and around most of the site. Natural surveillance is further enhanced through the proposed widening of the hospital entry and its activation with retail uses (potentially a florist, pharmacy and café)

Where proposed structures prevent clear sight, e.g. where lift wells and plant buildings are located within the ground level parking area, appropriate site lighting will be installed (and corner mirrors where necessary).

A separate CPTED report has been commissioned and will be submitted to Council once its assessment of the proposed building structures is near complete. In this way, the CPTED report can address any variations to the site layout and buildings that may be required.

Other operational precautions will be taken to ensure the safety of the hospital users. These measures will include:

- CCTV video surveillance and signage throughout the public areas of the complex.
- Double entry doorways to enable the 'shut-down' of the building or specific areas.
- Appropriate way-finding signage throughout the site and buildings to minimise disorientation and to ensure a 'pleasant' visitor experience.
- An allocation and grouping of staff parking and cycling facilities, enabling staff to leave their shifts and to access transport options together.
- External at-grade and under cover carpark lighting.
- Access control (fencing) to be provided to the site perimeters to the Great Western Highway and Parker Street and temporary fencing to other adjacent properties.
- Hostile Vehicle Mitigation (HVM) measures at the Barber Street frontage of the site, to be confirmed with final designs but potentially to include a physical barrier of 500mm or higher (e.g. a set of metal or concrete bollards).
- An access-controlled vehicular entry from the Great Western Highway

Traffic and Transport Impacts
A detailed traffic and transport assessment of the proposed development has been undertaken by **TTPA** (see ***Appendix B***).

TTPA's report includes an assessment of carparking need and provisions. The hospital currently has 109 patient beds, 174 full time employees (FTEs) and 305 car parking spaces, which well exceeds its current parking requirements.

With the proposed expansion, the number of full-time employees could increase by 62 staff and up to 26 doctors. The additional doctors, however, will not all visit the hospital at the same time, nor are all full-time staff on site at once.

With the new extension, the estimated carparking need, as per Council and RMS requirements, is for 264 spaces.

The development will reconfigure the existing off-street car parking facilities and retain the existing 7 short-term spaces and 1 disabled space at the Barber Avenue frontage of the hospital.

The submitted plans allow for 286 carparking spaces to be provided on site (incorporating the preferred 'Option A' direct access from the Great Western Highway) and for 297 spaces if the preferred access is not approved ('Option B'). The submitted plans therefore are able to comply with the nominated parking requirements, regardless of which site layout plan is finally endorsed.

TTPA has modelled intersection performances adjacent to the site having regard for pre and post-development traffic levels and with and without the proposed direct GWH access. These intersections are expected to mainly operate beyond capacity upon completion of the proposed Nepean Public Hospital redevelopment works.

The modelling demonstrates that the efficiency of the GWH / Parker Street and the Parker Street / Barber Avenue intersections is improved with the inclusion of the proposed direct GWH access. Importantly, the inclusion of the access will reduce the average vehicle delay at these intersections during peak periods. The ingress will also improve the safety of road users by reducing conflict between left-turning traffic (from GWH into Parker Street) with pedestrians crossing the westbound left-turn slip lane and potentially reduce crash rates by reducing westbound left-turning traffic volumes.

Furthermore, all deliveries to the existing hospital are currently undertaken via the loading zone along the increasingly congested Barber Avenue. If the proposed highway access is included, service vehicles would be able to enter via GWH and exit via Barber Avenue, eliminating the need for large trucks to manoeuvre in Barber Avenue, thereby minimising conflict with other vehicles and pedestrians at this point.

Given the current high levels of reliance on private transportation by hospital staff and visitors[4] TTPA has considered the potential advantages that could be gained by the introduction of travel demand management practices.

Travel demand management (TDM) aims to modify travel decisions rather than providing costly infrastructure and additional transport services to support the current and future transport demands. TDM has the following key objectives:

- Reduce the need to travel
- Reduce the amount of travel
- Reduce the impact of travel.

A Work Travel Plan (WTP) is a tool that hospitals can use to manage the transport mode choices of their staff. A WTP typically comprises a list of strategies aimed at encouraging walking, cycling, public transport and carpooling for travel to and from work. Whilst acknowledging the challenges of hospital operations (including night-time shift work, the emergency needs of patients and the unpredictability of hospital activities) TTPA has suggested a number of measures to reduce private car reliance.

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[4] TTPA has assessed the travel patterns of 19 Sydney hospitals and found that an average of 87 per cent of people travelling to each hospital did so by private car and the mode share attributed to car-based trips ranged from 67 per cent to 98 per cent. Average vehicle occupancy was 1.3 persons per vehicle.

Bicycle parking is proposed (13 spaces for staff and 13 for visitors). Facilities are located in the undercroft carpark to the north of the existing building. This level of provision is consistent with projected usage. Other possible measures include on-demand transport, car-pooling and bike groups. Of note, the proposed vehicular access to GWH will enable pedestrian access from that part of the site closest to Kingswood rail station, which in itself will encourage the use of public transport.

Noise Impacts

Noise impacts have been assessed by **Northrop Pty Ltd** both from the perspective of potential noise intrusion generated by the hospital's construction and operation (on nearby residential premises) and also from the perspective of hospital operations being impacted by background noise, generated mainly from the adjacent Great Western Highway.

The Northrop report, included at ***Appendix D,*** provides details of noise measurements taken at and near to the development site. It finds that:

- Noise form mechanical plant can be controlled to meet the relevant standards, assuming that noise engineering measures are utilised to meet the environmental noise criteria for plant and equipment.
- Noise emissions at the nearest affected residential receivers are predicted to comply with the standard hours criteria, assuming the use of screens and acoustic-rated hoardings with a minimum transmission loss of >Rw25 around the site are in place. These measures will reduce noise impacts from the site to achieve a 5-6 dB(A) noise attenuation.
- The projected increase in traffic levels generated by the development is not expected to increase background traffic noise by more than 2 dB. This level of increase does not warrant any specific noise mitigation measures.

Northrop concludes that compliance with the Penrith City Council DCP 2014 and the NSW EPA Noise Policy for Industry (2017) noise criteria can be achieved.

Site Contamination

A separate report which details the historical use of the subject site and preliminary soil sampling investigations has been prepared by **EP Risk Pty Ltd** and included at ***Appendix E*** to this report.

The soil sampling program was designed to allow for a sufficient characterisation of the site and also included a desktop study of soil conditions. All soil samples reported metals TRH, BTEX, PAH, OCP, OPP and PCB concentrations that are below applicable human health criteria and/or laboratory reporting limits. Asbestos was not detected in the soil samples analysed.

Overall, results from these investigations suggest that the condition of the site does not preclude it from being developed for the proposed hospital expansion. Some bonded (non-friable) asbestos-containing materials ('ACM'), however, were observed on the surface the site as part of the soil sampling process. EP Risk therefore recommends that surficial soils (0.0 – 0.1 mBGL) be scraped and cleared by a licenced Asbestos Assessor as part of the construction process.

Should other site materials require disposal these should be assessed either in accordance with the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste or any current Resource Recovery Orders made under the Protection of the Environment (Waste) Regulation 2014.

Site and Building Accessibility
McKenzie Group has undertaken an assessment of site and building accessibility conditions based on the architectural plans prepared by SKAr+ as included at Appendix A.

McKenzie's report, included at ***Appendix F***, provides a compliance overview of the project with respect to achieving compliance with the Building Code of Australia (BCA) and the Disability Discrimination Act (and Disability Standards) (DDA).

The assessment provides an overview of compliance with relevant regulatory requirements and provides advisory recommendations that could be adopted to improve building functionality, accessibility and the safety of occupants.

The report considers all aspects of the site/building construction and publicly accessible places including pedestrian access at the site boundary, external walkways, drop-off zones, pedestrian crossings, carparking areas, doors, lifts, stairs, ramps, internal walkways, sanitary facilities and ambulant cubicles as well as wayfinding signage, furniture and other fixtures to ensure that accessibility is not compromised.

The assessment includes a number of recommended actions for each aspect of the overall site and building design. Subject to addressing the actions identified, McKenzie Group confirm that the project documentation will achieve an appropriate level of accessibility that is capable of complying with the BCA & Disability (Access to Premises – Buildings) Standards 2010 and the spirit and intent of the DDA.

BCA Compliance
A report documenting the proposed hospital expansion's compliance with the Building Code of Australia (BCA) has been prepared by **Metro Building Consultancy (MBC)** to assist with the preparation of the Development Application plans and project costing.

MBC's report is included at ***Appendix G***. It considers compliance with the 'deemed-to-satisfy' provisions of the Building Code of Australia 2016 excluding Section B (structure), Part G5 (bushfire) and Section J (energy efficiency). It has principally involved a review of the drawings provided by SKAr+.

The proposed hospital expansion will be fire separated from the existing building so that it can be treated as a completely independent building. On this basis MBC has determined that the building is a class 5, 9b and 7a building with a rise in storeys of 4 and is required to comply with the BCA Type A requirements.

The report advises that the following aspects of the building do not meet the BCA's 'deemed-to-satisfy' requirements and therefore need to be assessed against the relevant performance provisions of the BCA:

- Separation by fire walls
- The protection of openings in external walls
- The separation of External Walls in Different Fire Compartments
- Extended travel distances
- Travel via fire isolated exits
- Sprinkler protection and
- Zone smoke control

MBC provides specific advice as to how each of these building components can be designed/constructed to meet the performance provisions of the BCA. It also advises that the project's Construction Certificate will need to include verification from a suitably accredited fire engineer.

Arboricultural Impact
An arboricultural impact and tree protection specification report has been prepared by **Tree IQ**. The report is included at ***Appendix H***. It includes a visual tree assessment to determine the impact of proposed works on the existing trees and, where appropriate, recommends sensitive construction methods to minimise adverse impacts.

23 trees were visually assessed. These include a mix of locally indigenous and Australian native species such as Corymbia maculate (Spotted Gum), Lophostemon confertus (Brush Box) and Eucalyptus botryoides (Bangalay). A range of exotic species are also present at the site including Lagerstroemia indica (Crepe Myrtle), Jacaranda mimosifolia (Jacaranda) and Plumeria acutifolia (Frangipani). In general, the trees are of low quality and value, with no trees of high or very high landscape significance.

The submitted architectural drawings show that 18 trees will need to be removed to accommodate the proposed development and that 5 trees can be retained. These 5 trees, at the eastern end of the site, are proposed to be retained in the landscaping plans prepared by SKAr+ Architects.

Tree sensitive design and construction methods will need to be used to minimise adverse impacts on these trees. The trees to be retained should be protected in accordance with the Recommended Tree Protection Specification

Tree IQ recommends that the proposed development should include the provision of new tree planting across the site and that replacement planting should be supplied in accordance with Australian Standard 2303 (2015) Tree Stock for Landscape Use.

Civil Works, Stormwater and Waste Management
A Civil Design Statement has been prepared by **Northrop Pty Ltd** and is included at ***Appendix I*** to this report. It addresses site works, erosion and sediment control, stormwater detention and water sensitive urban design.

The proposed stormwater management strategy implements the use of an on-site detention to minimise the site discharge. The peak 100-year ARI post development discharges are restricted to 5-year ARI pre-development discharges. Each storm event has also been assessed to ensure that the post-developed flows are below the pre-development levels.

The development will comprise of roof catchments, hardstand catchments (car parking & footpaths) and landscaped areas. The site falls towards the south and south west of the subject site. Its catchment will be directed to the southern boundary of the site via an internal pit and pipe stormwater drainage network.

Other pre-treatment strategies include uses of surface trash traps at each surface inlet pit. All surface runoff will be treated by a proprietary filtration system which is located within the on-site detention tank before discharging to Council's existing kerb inlet pit.

Erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Department of Housing Manual, "Managing Urban Stormwater Soil & Construction" 2004 prior to any earthworks commencing on site.

A concept sediment basin has been designed to capture site runoff during construction. It will be constructed in stages to enable maximum runoff capture assisted by the diversion of swales that capture and direct runoff to the basins. The concept sediment and erosion control measures are documented in Northrop's Development Application drawing 172490DA00-C03.11. Calculations supporting the concept design are detailed in the Northrop report.

Included with Northrop's Civil Engineering Report is its statement on the overall building's environmental performance. The statement outlines the various aspects of the building's 4 Star Green Star 'Design & As-Built' rating, including its waste management approach.

Construction waste will be treated as mixed waste and will be delivered to an approved waste recycling facility where it will be processed. Accurate reporting will be available and efficient management of waste separation for recycling is assured.

Hospital waste includes healthcare and administrative waste. Healthcare waste includes infectious, chemical, expired pharmaceutical and radioactive items and sharps. These items can be pathogenic and environmentally adverse. Other waste items that are not hazardous include medication boxes, the packaging of medical items and food, remains of food, and waste from offices.

Hospital waste generated by the proposed building extension will be managed in accordance with existing procedures in place for Nepean Private Hospital.

At least 4 different waste streams are incorporated in hospital operations with facilities in place to collect and separate distinct waste streams.

These procedures are undertaken in accordance with Healthscope policy and the requirements of licenced waste contractors that are reviewed regularly by Healthscope to ensure that they comply with all relevant legislation and best practice. These facilities are regularly reviewed and certified by third parties.

The proposed expansion of hospital facilities is not expected to alter existing arrangements for the management of waste on the site, with the existing facilities to be maintained during construction and for ongoing hospital operations.

5 Conclusion

The proposed hospital expansion and re-subdivision of the subject land is permissible by virtue of the Infrastructure SEPP 2007. The SEPP identifies categories of infrastructure development and creates a uniform planning basis for their assessment and determination.

Pursuant to SEPP 2011, if the project has a CIV of $30 million or over, it would be classified as 'state significant', for which the consent authority would an Independent Planning Commission. The subject proposal, however, has a CIV value of just less than this amount and is therefore required to be lodged with and assessed by Penrith City Council.

Our review of the planning suitability and potential impacts associated with the proposed expansion of the Nepean Private Hospital finds that the proposal is unlikely to have a negative impact on the locality either aesthetically or in a landscape sense, or through its traffic generation, noise emissions or associated civil works.

Indeed, the provision of expanded medical services within the Penrith Health and Education Precinct is entirely consistent with the precinct's designation as a major employing and investment centre in Sydney's western district. The project is integral to the area's progress and to the productive and economic aims of the Greater Penrith Collaboration Area.

Council's LEP and DCP controls for the site anticipate a variety of land uses in the mixed-use zone and envisage new sustainable development that is partially activated at ground level, with a well-considered public domain interface and which is safe and legible to site users.

The application responds well to these principles. Its height and bulk are within the LEP limits and its generous setbacks and edge landscaping allow the building to sit comfortably on the development site, without visual intrusion, overshadowing or other impact. It also includes a new hospital entry that is activated by the provision of ground floor retail space. The new building is designed to achieve a 4.0 Green-Star rating and its associated site landscaping helps to integrate the site at the public domain level with the broader health campus.

The proposal includes the provision of a new vehicular access to the Great Western Highway but also offers an alternate site layout should the consideration of this aspect of the proposal cause its final determination to be delayed. The re-subdivision of the site reflects the preferred access arrangements and incorporates road widening along the site's GWH frontage.

The proposal incorporates sufficient on-site parking and does not generate a large enough amount of additional traffic to have any adverse impact on the operation of the local road network. The inclusion of the direct access to GWH, however, will improve the efficiency of the GWH/Parker Street and the Parker Street/Barber Avenue intersections, specifically by reducing their peak hour average delay times. The proposed access is therefore beneficial to the whole of the road network and to the function of the adjacent public hospital.

This report has considered in detail a range of potential impacts relating to traffic management, safety by design, noise, local heritage, soil contamination, BCA compliance, accessibility and waste management. Detailed reports by qualified consultants on these individual matters are included as appendices to this report. Overall, the assessment finds that the proposal is well suited to the subject site and should be a welcomed addition to the Penrith Health and Education Precinct.

List of Appendices:

A. SKAr+ Architects – Architectural Plan Package & Subdivision Plans *(Refer to separate A3 Pack)*
B. Transport and Traffic Planning Associates – Traffic & Transport Impact Assessment

C. Altus Group – Capital Investment Report (CIV)

D. Northrop Pty Ltd – Acoustic Assessment Report

E. EP Risk Pty Ltd – Soil Contamination Assessment

F. McKenzie Group Pty Ltd – Site & Building Accessibility Report

G. Metro Building Consultancy – Building Code Compliance Report

H. Tree IQ – Arboriculture Impact Assessment

I. Northrop Pty Ltd – Civil Design Statement & Green Star Rating Scorecard

Appendix B.

Transport and Traffic Planning Association – Traffic and Transport Impact Statement – dated 27th November 2018

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Nepean Private Hospital Expansion Stage 1
1-9 Barber Avenue, Kingswood
Proposed Medical Centre Development

Ref: 18219
Date: Nov 2018
Rev: B

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1.0 Introduction

The Nepean Private Hospital Expansion Stage 1 project includes an extension of the existing Nepean Private Hospital located at 1-9 Barber Avenue, Kingswood (Figure 1). The extension is to increase the available services and will be located on an adjacent on-grade car park lot to the northwest of the hospital.

The proposed Stage 1 extension are detailed as follows:

* site strip and recontouring of the vacant site (Lot 1 DP1093052 and Lot 100 DP701623) for construction of on-grade car park and new building
* ground floor main reception entry and undercroft car parking
* level 1 as consulting suites together with endoscopy suites
* levels 2 and 3 as consulting suites

TTPA has been engaged by Healthscope to prepare a Traffic Impact Assessment for the proposed Stage 1 building. This assessment accompanies a Development Application and will be presented to Penrith City Council.

The purpose of this assessment is to assess the traffic, parking and transport implications associated with the proposed development under 2 options:

* Option A: 286 car parking spaces with a new ingress from the Great Western Highway
* Option B: 297 car parking spaces without a new ingress from the Great Western Highway

It is noted that Option A is the preferred option with its key advantages from a safety, vehicle delay, accessibility and road network capacity perspective detailed in Section 6.1 of the report.

PENRITH
2750
CAMBRIDGE PARK
2747
KINGSWOOD
2747
CADDENS
2747
ORCHARD HILLS
2748
Parker Athletics Reserve
St Soccer
Penrith Cemetery
Penrith
Hospital
Chapman Gardens
University of Western Sydney Kingswood Campus
Peppermint Reserve
Kingswood South Pmy
Kingswood High
Montgrove College
Reservoirs
Telstra Exchange
Penrith Christian Cmnty
Orchard Hills Pmy
Mary Mackillop Cath Pmy
Penrith Pmy
Penrith High
Penrith South Pmy
Kingswood Pmy
Cambridge Park High
St Dominics College
St Josephs
Lincoln Park
Devon Park
Shaw Park
Werrington
Harold Corr Oval
Sports Stadium
Lamrock Res
Newmarch House
Excelsior Estate Winery
Garden Barn
Rotary Pk
Spence Pk
Harry Lawler Park
Jenkins Park
Butler Park
Barbrosa Park
Penrose Pk
Norman Peck Res
Kanangra Res
Resvr
Nepean
Tresham
Steam-roller Park
Wainwright Park
Nhood Cntr
Doug Rennie Field
Cmnty Health Cntr
Alisopp Oval
Cambridge Park
Oval
Smiths Paddock
Army Reserve Army Regiment
Hudson Timber & Hardware
Nurs Home
Wentworth Area Health Service
Ret Vill
Club
Pmy
Cem
Substn
Evacuation
Flood
Evacuation route
Rail
Station
Bus Stop
Hwy
Rd
Ave
Cr
Pl
Ln
Tce
Cct
Pk
Reserve
Gardens
Park
Cottage
Gates
Gate
Pav
Cmnty
Cntr

Nepean Private Hospital currently has 109 beds and 174 full-time employees (FTEs). The site currently provides a total of 305 car parking spaces at 3 car parking lots, each having their two-way accesses located off Barber Avenue. The 2 car parking lots to the west of the Hospital have an internal road connection.

The hospital is part of the Nepean Hospital precinct, a major regional health facility covering an extensive area to the east of the Penrith City centre and largely bounded by the Great Western Highway, Parker Street, Derby Street and Somerset Street. The continuing development of the precinct to meet the population growth in the region has also included other associated hospital and medical facilities.

The proposed private medical centre development in Barber Avenue will provide 24 consulting suites and 2 endoscopy suites will be connected with the adjoining private hospital, on the ground floor and Level 1.

The purpose of this report is to:

* describe the site and the proposed development scheme
* describe the road network serving the site and the prevailing traffic conditions on that network
* assess the adequacy and appropriateness of the proposed on-site parking provision
* assess the potential traffic implications of the development
* assess the proposed vehicle access, internal circulation and servicing arrangements.

2.0 Proposed Development

2.1 Site, Context and Existing Use

The hospital site (Figure 2) is a consolidation of two lots (Lot 1 DP1093052 and Lot 100 DP701623) at the eastern end of Barber Avenue occupying a total area of some 1,973m^2 with road frontages of some 150m to Barber Avenue and the Great Western Highway and 100m to Parker Street. The existing survey plan is shown in the following figure.

Source: SKAr+

Nepean Private Hospital is a 109 bed hospital and currently has 2 operating theaters, a maternity unit, critical care unit (CCU), orthopaedics, cardiology, surgical and medical services. The hospital specialises in diagnostic imaging, pathology,

LEGEND

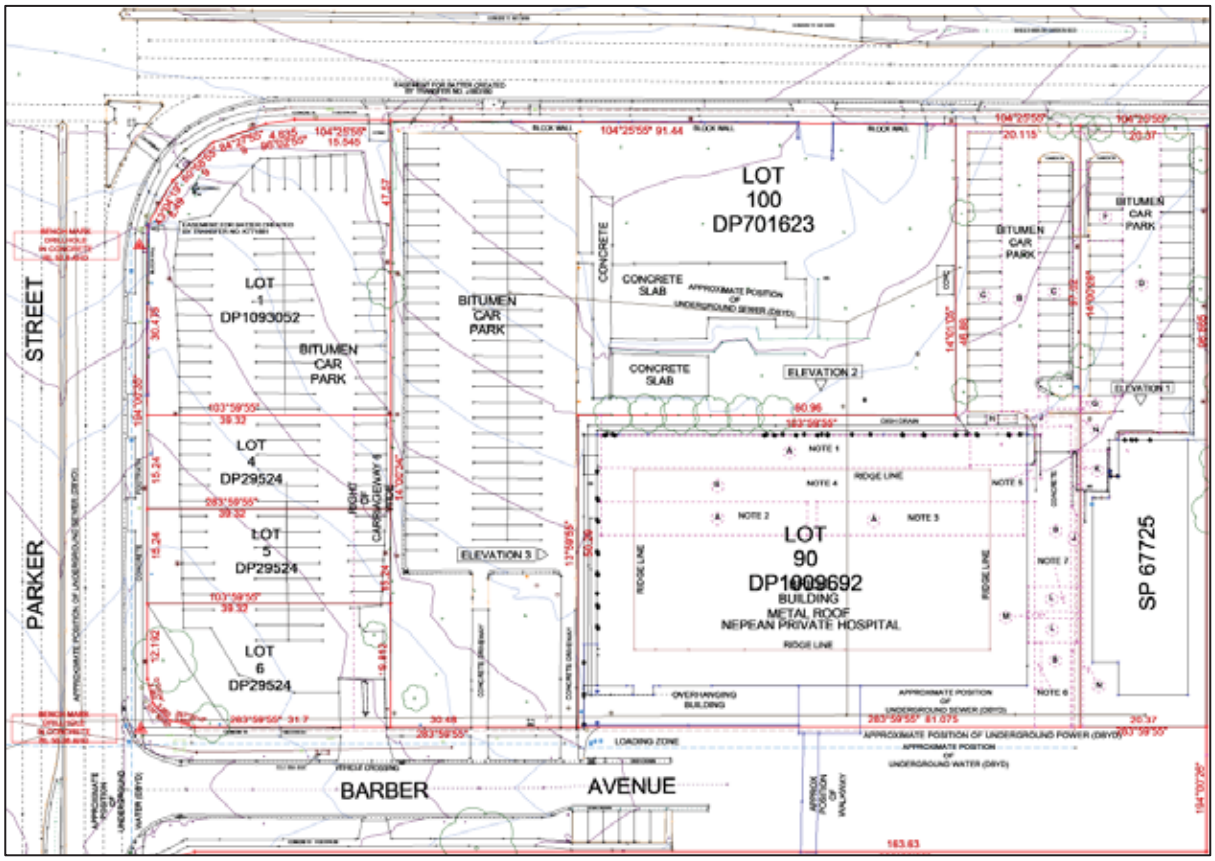
SITE

FIG 2

physiotherapy, haematology, medical cardiology, sleep studies and surgical services. The hospital currently has 174 full time employees (FTEs).

The site currently provides a total of 305 car parking spaces at 4 car parking lots, located off Barber Avenue as shown in the following figure and summarised below:

* 184 spaces in the 2 parking lots on the western side of the building for staff
* 45 spaces located in the building undercroft car park for staff
* 68 spaces located at the rear of the building for visitor which is shared with the adjacent Tresillian Family Care Centre and with some overflow parking from Nepean Hospital due to the current construction of the new multi-storey car park and roof top helipad on the corner of Barber Avenue and Parker Streets. It is expected that the new car park will be completed in early 2019.
* 7 short-term spaces, 1 disabled space and a 7m of drop-off and pick-up are located within the access road across the frontage of the Hospital



Source: SKAr+

In the context of the surrounding land use, the Hospital's area is classified as a Mixed Use Zone (B4) and is surrounded by a variety of different land uses:

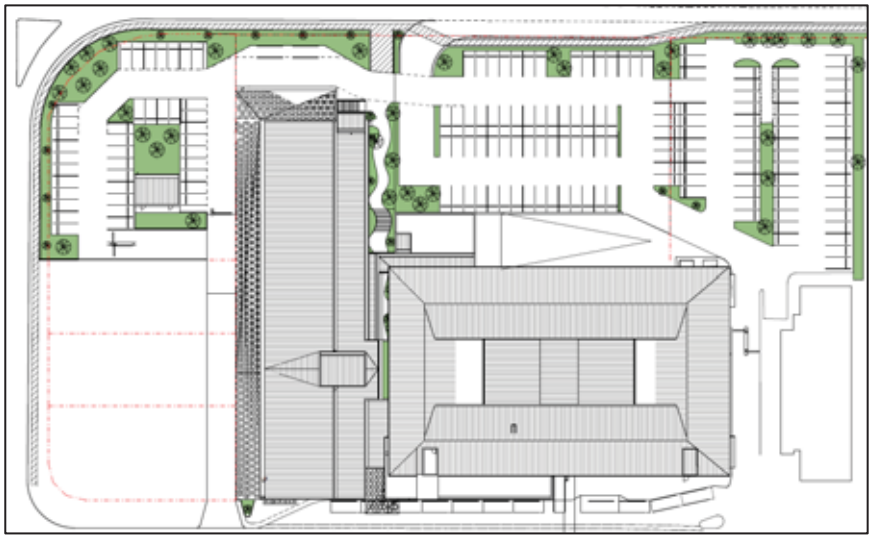
* The west of the hospital is characterised by Medium (R3) and High (R4) Density Residential housings

* Immediately to the east and south of the hospital is an Infrastructure Zone (SP2) area, followed by Medium (R3) and High (R4) Density Residential housings and the Chapman Gardens Oval, zoned as Public Recreation (R1)

* To the north-east of the Hospital lies a General Industrial (IN1) area, accommodating railway tracks, the Kingswood Railway station and several automotive outlets along the Great Western Highway. Behind these is the Kingswood Cemetery, zoned as Special Activities (SP1).

2.2 Proposed Development

The proposed development represents a 3-storey private medical centre facility and will sit on an adjacent lot to the northwest of the existing hospital which is currently used by the hospital as an on-grade car park which sits on the land legally described as Lot 100 DP 701623. The development site is situated directly to the west and north of the existing Nepean Private Hospital and to the north of the Nepean Hospital. The following figure provides an understanding of the proposed footprint for the proposed medical centre in relation to the existing hospital building.



Source: SKAr+

The expected staffing breakdown is summarised in the following:

Level	Room	Number of Staff at any one time	
		Doctor	Supporting Staff
1	Reception, office, interview rooms, recovery lounge, recovery bay	0	6
	2 Endoscopy suites	2	8
	Consult Room 101	1	2
	Consult Room 102	1	2
	Subtotal	**4**	**18**
2	Consult Room 201	1	2
	Consult Room 202	1	2
	Consult Room 203	1	2
	Consult Room 204	1	2
	Consult Room 205	1	2
	Consult Room 206	1	2
	Consult Room 207	1	2
	Consult Room 208	1	2
	Consult Room 209	1	2
	Consult Room 210	1	2
	Consult Room 211	1	2
	Subtotal	**11**	**22**
3	Consult Room 301	1	2
	Consult Room 302	1	2
	Consult Room 303	1	2
	Consult Room 304	1	2
	Consult Room 305	1	2
	Consult Room 306	1	2
	Consult Room 307	1	2
	Consult Room 308	1	2
	Consult Room 309	1	2
	Consult Room 310	1	2
	Consult Room 311	1	2
	Subtotal	**11**	**22**
	TOTAL	**26**	**62**

The projected additional fulltime equivalent (FTE) staff for the proposed development when is fully operational in 2020 is 88 (26 doctors and 62 supporting staff). This equates to an ASDS (Average Staff per Weekday Shift) of 88 given that the staff will be available during the normal working schedule between 8 am and 8 pm.

The anticipated numbers of beds/ chairs/ rooms/ suites for the proposed development are summarised in the following:

Level	Room	Number of Beds/Chairs/Rooms/Suites
1	Interview rooms	3
	Recovery lounge	8
	Recovery bay	7
	Hold bay	2
	2 Endoscopy suites	2
	Consult Room 101	4
	Consult Room 102	6
	Subtotal	**32**
2	Consult Room 201	2
	Consult Room 202	2
	Consult Room 203	2
	Consult Room 204	2
	Consult Room 205	2
	Consult Room 206	2
	Consult Room 207	4
	Consult Room 208	4
	Consult Room 209	4
	Consult Room 210	4
	Consult Room 211	4
	Subtotal	**32**
3	Consult Room 301	2
	Consult Room 302	2
	Consult Room 303	2
	Consult Room 304	2
	Consult Room 305	2
	Consult Room 306	2
	Consult Room 307	4
	Consult Room 308	4
	Consult Room 309	4
	Consult Room 310	4
	Consult Room 311	4
	Subtotal	**32**
	TOTAL	**96**

The proposed development will result in an increase of 96 beds/chairs/rooms/suites.

The new centre will be closely interrelated with the adjoining private hospital, both in terms of physical connection and medical practitioners/patients, which will be facilitated

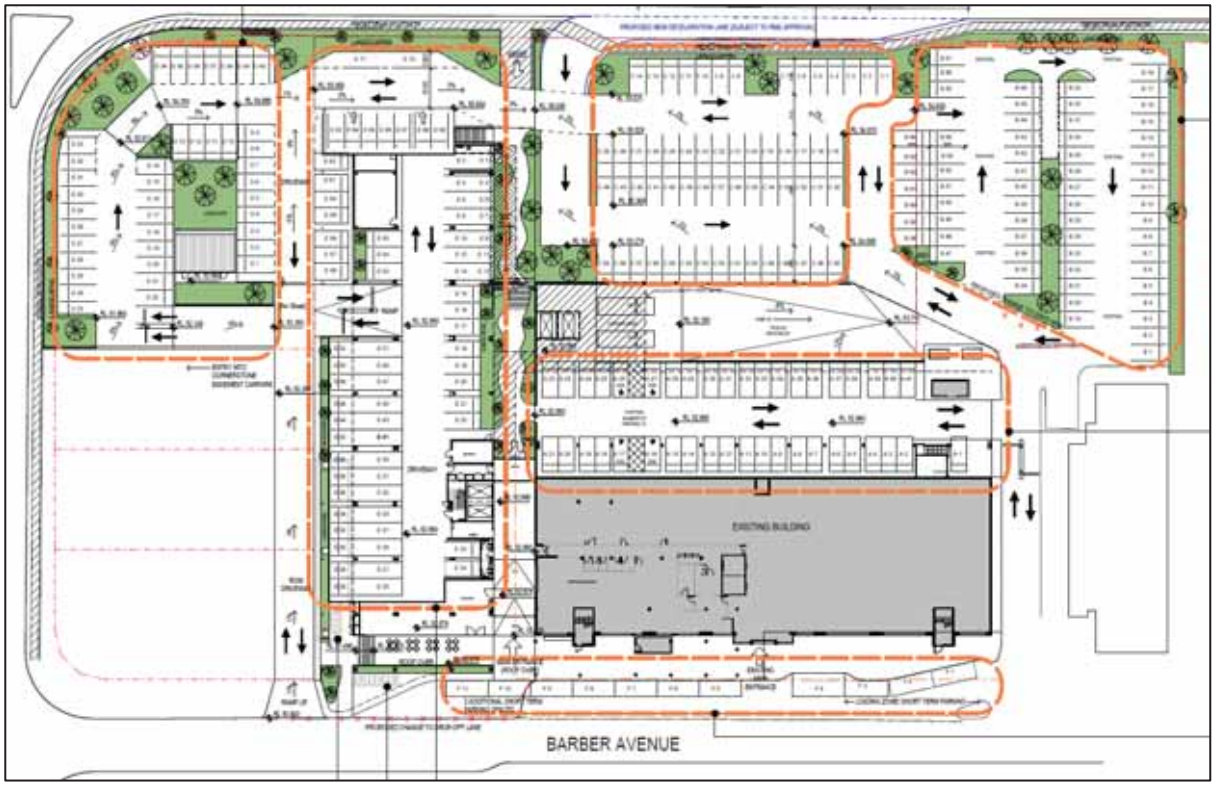
by an enclosed walkway to the existing building on the ground floor and non-enclosed walkway on Level 1. Such connections provide particular advantages for doctors and patients who will not be required to travel unnecessarily.

A single two-way driveway will be provided off Barber Avenue to the reconfigured at-grade and undercroft car park facilities. The driveway will be shared with the adjacent development located at 84-88 Parker Street as shown below.

Source: ASPECT

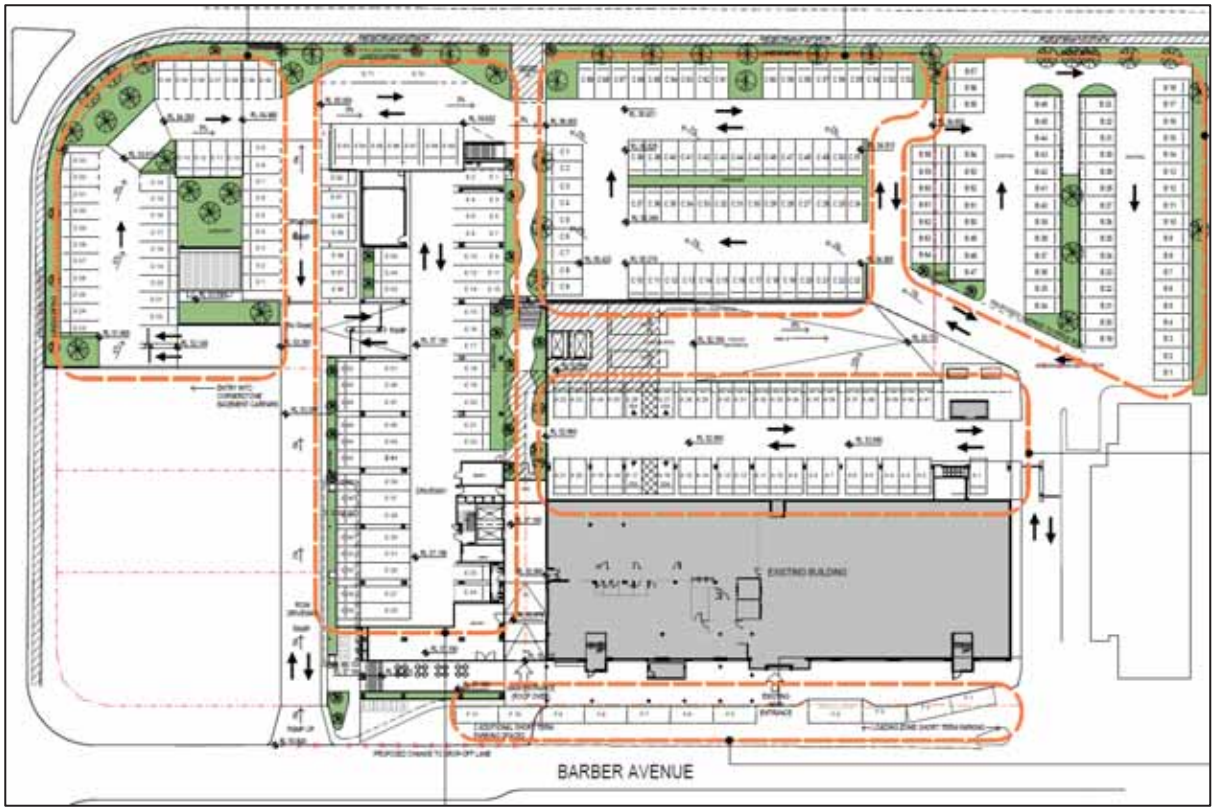
The existing site access located to the east of the existing building will be retained.

As discussed, the proposed development proposes an ingress from the Great Western Highway under Option A, allowing all development traffic from the east and northeast to enter the car parking area without the need to travel through the intersections of Great Western Highway/Parker Street and Barber Avenue/Parker Street. A total of 286 on-site car parking (including 5 disabled) spaces will be provided under Option A. The proposed Option A's driveway, internal circulation and car parking layout is shown in the following figure.



Source: SKAr+

Option B (without an ingress from the Great Western Highway) will result in a total provision of 297 on-site car parking (including 5 disabled) spaces. The proposed Option B's driveway, internal circulation and car parking layout is shown in the following figure.



Source: SKAr+

The internal circulation will be a mix of one-way and two-way arrangements to ensure an optimised circulation outcome.

The proposed development is scheduled for completion by August 2020.

Architectural details of the envisaged development are provided on the plans prepared by SKAr+ which accompany the Development Application and are reproduced in part in Appendix A.

3.0 Existing Road Network and Traffic Conditions

3.1 Road Network

The road network serving the site (Figure 3) comprises:

* the arterial route of The Northern Road and Parker Street which links between Elizabeth Drive and the Great Western Highway and includes a major interchange with the M4 Motorway
* the arterial route of the Great Western Highway which extends westward from Sydney City linking with Parramatta, Penrith and the Blue Mountains crossing
* the sub-arterial routes of Jamison Street, Bringelly Road and Evan Street
* the collector road routes of Derby Street and Second Avenue.

The Great Western Highway in the vicinity of the site has 3 through lanes in each direction allowing for a parking lane on the northern side and No Stopping at the site frontage.

Barber Avenue is a 2-lane road allowing for a parking lane on the southern side and No Stopping at the site frontage.

3.2 Traffic Controls

The existing traffic controls which have been applied to the roads in the vicinity of the site (Figure 4) include:

* the traffic signals of the Great Western Highway/Parker Street and Derby Street/Parker Street intersections. Details of this signal arrangement are shown on an extract from the traffic signal control plans which is reproduced in Appendix B
* the traffic control signals at the Parker Street and Derby Street intersection

LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR

N

ROAD NETWORK

FIG 3

PENRITH
CAMBRIDGE PARK
KINGSWOOD
Parker Athletics Reserve
St Soccer
Penrith Cemetery
Nepean Hospital
Penrith Pmy
Penrith High
Penrith South Pmy
Kingswood South Pmy
Kingswood High
St Dominics College
Cambridge Park
Patterson Oval
Allsopp Oval
Wainwright Park
Doug Rennie Field
Peppermint Reserve
Jenkins Park
Lawler Park
Spence Pk
Penrose Pk
Butler Park
Baronesa Park
Steam-roller Park
Kanangra Res
Norman Peek Res
Hudson Timber & Hardware
Army Reserve Army Regiment
Smiths Paddock
Cmnty Health Cntr
Nurs Home
Wentworth Area Health Service
Ret Vill
Substn
Priv Spec Cntr
Tresilian
Gate
Kingswood
Penrith
Penrose
Taloma
Peppermint
Cambridge
Oxford
Cambridge
Derby
Derby
Parker
Parker
Parker

* the central median islands along Parker Street and the Great Western Highway
* the STOP sign controls in Somerset Street at Derby Street
* the NO STOPPING restrictions along Parker Street, the northern side of Derby Street
* the ¼ hour and 2 hour period parking restrictions along the southern side of Barber Avenue.

Barber Avenue has a 9.5-metre-wide roadway, with 1.25-metre footways, and is straight and relatively level.

3.3 Traffic Conditions

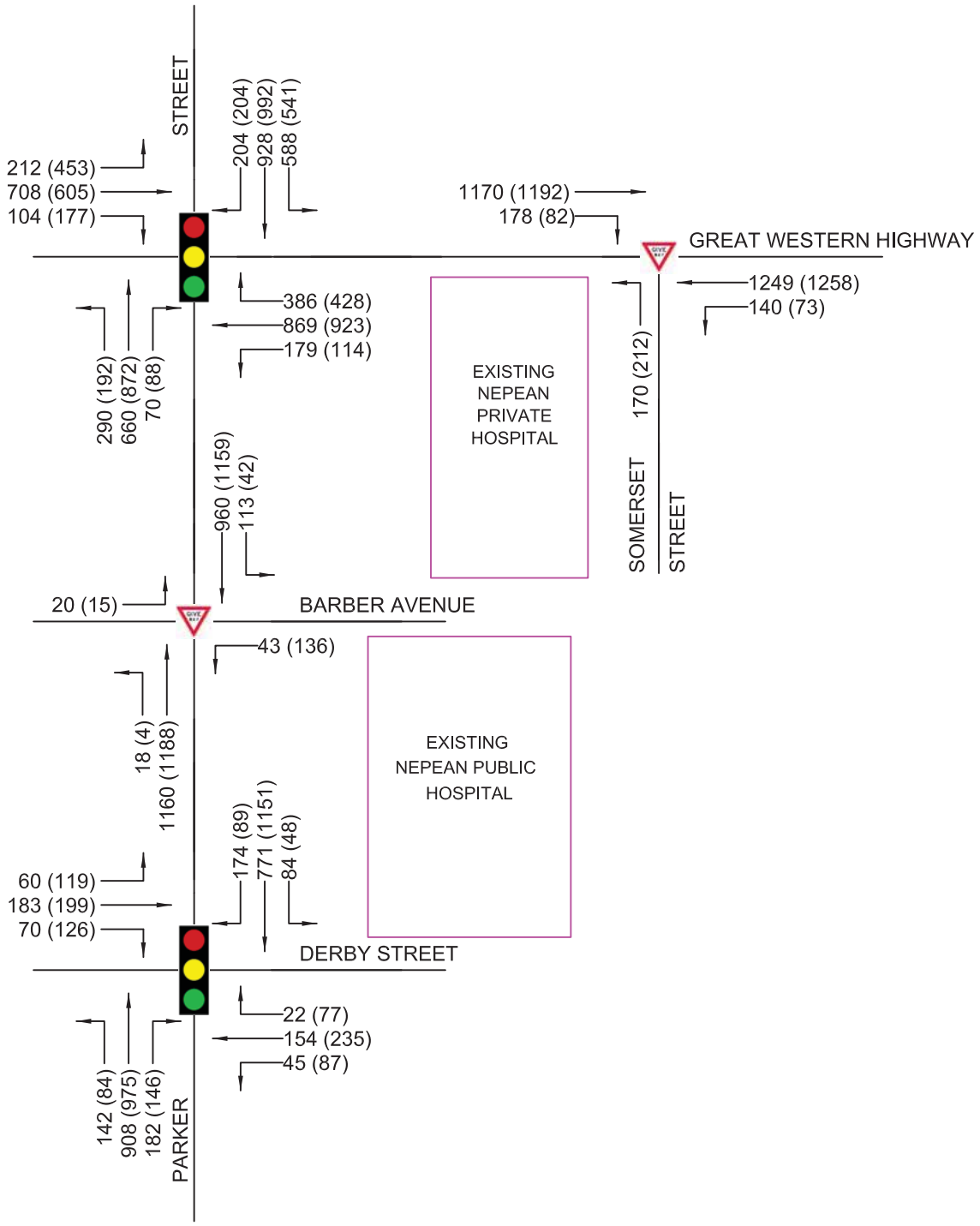
An indication of the existing traffic conditions in the vicinity of the site is provided by data published by the RMS[1] and surveys undertaken as part of this study. The data published by the RMS is expressed in terms of Annual Average Daily Traffic (AADT) and the most recent recordings indicate the following:

	AADT
Great Western Highway, East of Bridge Street	33,800
Parker Street south of Cox Avenue	42,300

The results of traffic surveys at the various intersections in the vicinity of the site during the weekday morning and afternoon peak periods are provided in Appendix C and illustrated in Figure 5.

The operational performance of these intersections has been assessed using SIDRA with the SIDRA network layout illustrated in the following.

[1] *Traffic Volume Data Southern Region*
Roads and Maritime Services

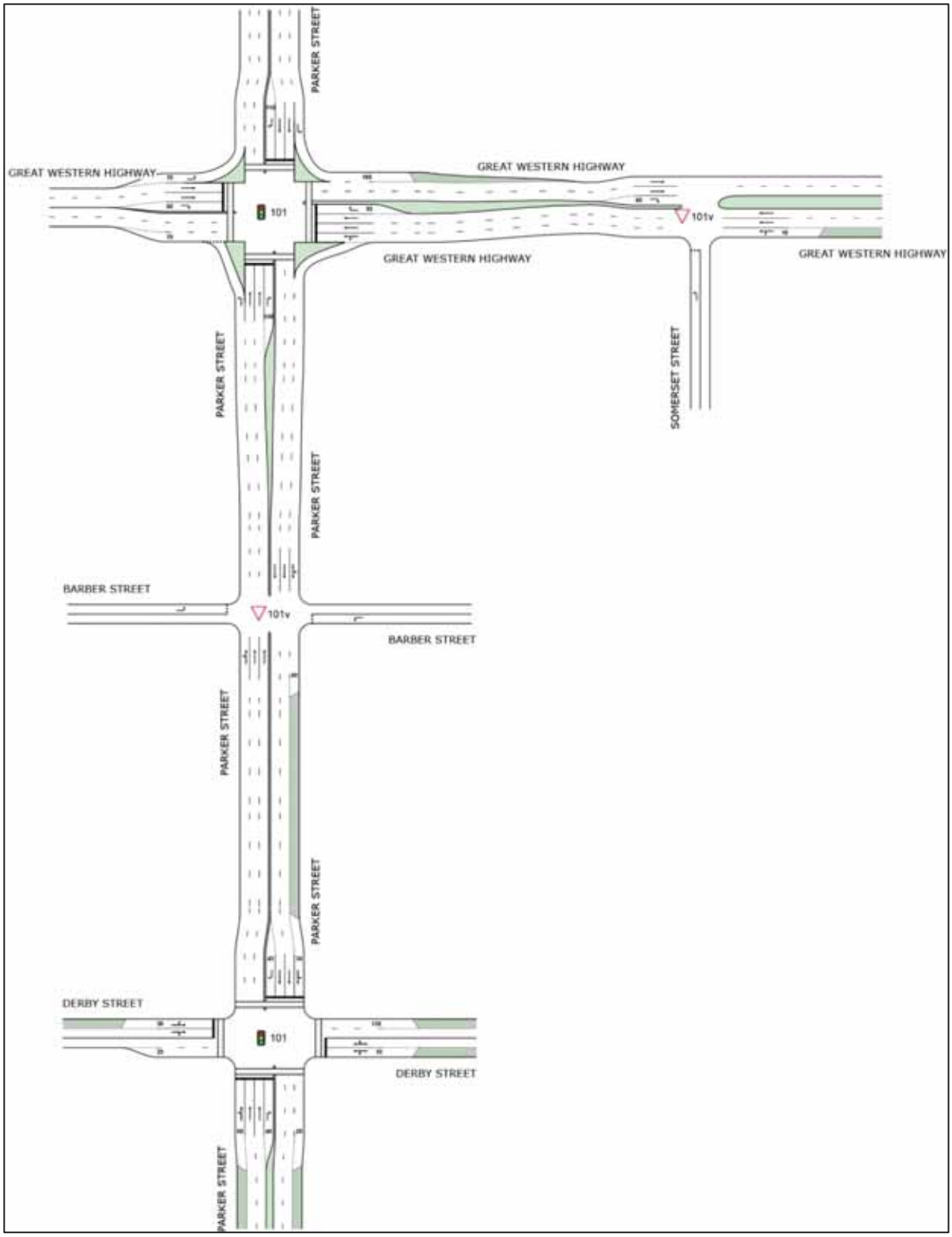


LEGEND

AM PEAK (PM PEAK) INTERSECTION
TURNING VOLUMES

EXISTING 2018 TRAFFIC VOLUME

FIG 5



The results are provided in Appendix D and summarised in the following while the criteria for interpreting SIDRA results are reproduced overleaf.

Criteria for Interpreting Results of SIDRA Analysis

1. *Level of Service (LOS)*

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good	Good
'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, Roundabouts	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*

	AM		PM	
	LOS	AVD (S)	LOS	AVD (S)
Great Western Highway/Parker Street	D	57	E	68
Derby Street/Parker Street	C	34	D	47
Great Western Highway/Somerset Street*	E	69	B	26
Barber Avenue/Parker Street*	A	7	A	7

** Worst movement reported for unsignalised intersection.*

The results indicate acceptable levels of service in the local network under the prevailing peak circumstances with the intersection of Great Western Highway/Parker Street operating at capacity during the PM peak hour.

The intersection of Great Western Highway/Somerset Street currently operates at LOS E during the AM peak hour with peak period queuing and delay for the eastbound right-turn movement.

3.4 Transport Services

A number of public transport options are available in the vicinity of the site in the form of buses and rail. The closest station, Kingswood Railway Station, is located approximately 1km (walking distance) from the main Hospital entry while bus stops are located along Derby Street, in close proximity to the main Hospital entrance of the South Block. The available public transport services comprise:

Bus Services

The Hospital is relatively well serviced by bus, with a number of routes and regular services (every 30 mins on weekdays).

The nearest bus stops are located on the Great Western Highway within 180m to the west of the Hospital. Other bus stops within 400m to the south of the hospital are located on Derby Street and Parker Street with bus stops along Copeland Street located within 500m to the north of the hospital.

The Hospital Precinct is serviced by the bus routes presented in the following:

Route No.	Description
677	Richmond to Penrith via Londonderry
774	Mount Druitt to Penrith via Nepean Hospital
775	Mount Druitt to Penrith via Erskine Park
776	Mount Druitt to Penrith via St Clair
780	Mount Druitt to Penrith via Ropes Crossing
785	Werrington to Penrith via Cambridge Park
789	Luddenham to Penrith

Rail Services

Kingswood railway station is located approximately 0.6km to the east of the Hospital, which is within reasonable walking distance for staff and visitors.

The station is on the T1 - Western Line (Gordon via Central, Emu Plains via Parramatta, Penrith via Parramatta and Penrith). Services operate every 5 – 15 minutes during peak hours, with services operating from 3.12am to 11.23pm.

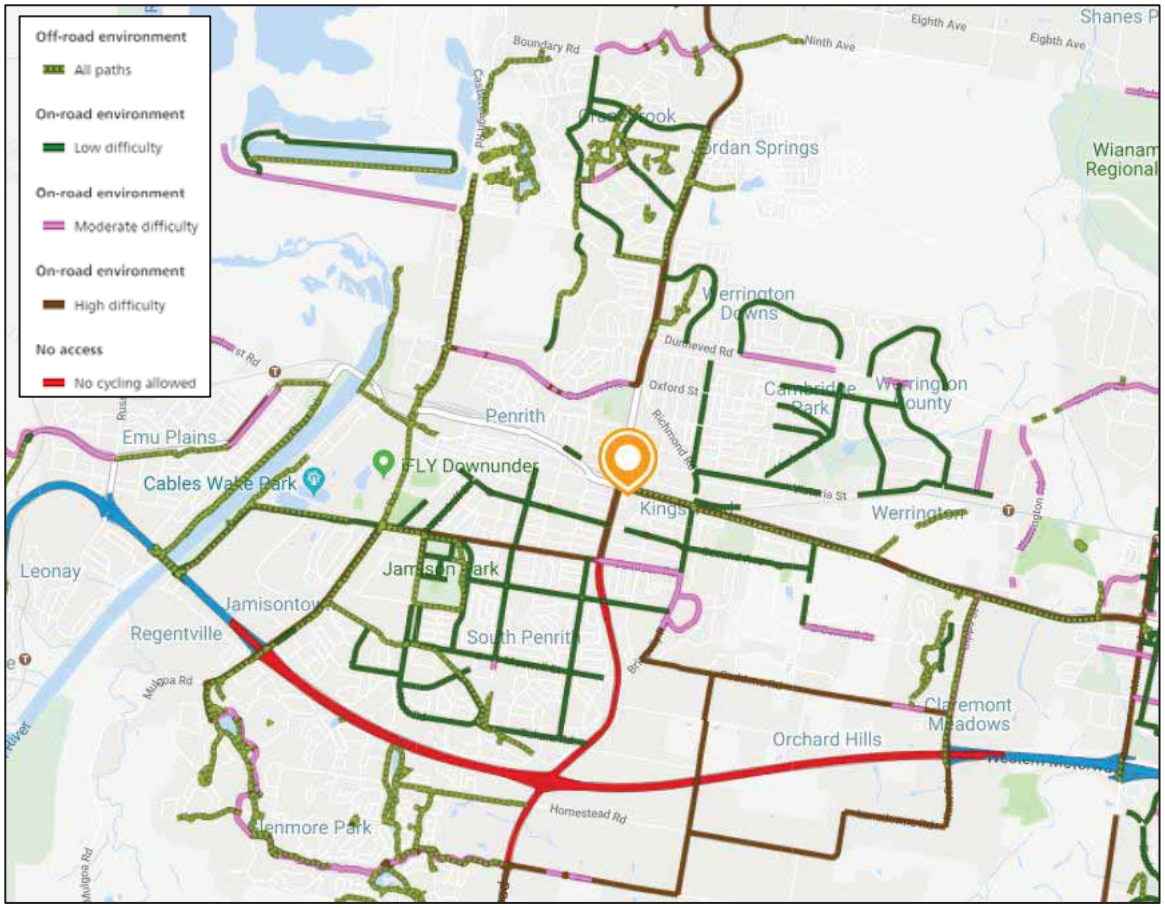
Details of the bus and rail services available near the site are provided in Appendix E.

3.5 Cycling Facility

Off-road shared paths are provided on the northern side of the Great Western Highway between Parker Street and Bringelly Road, crossing at the intersection of the Great Western Highway /Bringelly Road, and continue on the southern side of the Great Western Highway towards Pages Road.

A range of on-road bicycle facilities are provided along the Great Western Highway, Parker Street, Richmond Road, College Street, Bringelly Road, Derby Street, Second Avenue, Jamison Road and O'Connell Street are available in the vicinity of the Hospital.

Extracts from the RMS Cycleway Finder illustrating the cycleways in the vicinity of the site are shown in the figures below.



Source: https://www.rms.nsw.gov.au/maps/cycleway_finder

3.6 Pedestrian Facility

Pedestrian footpaths are located on both sides of most of the streets within the vicinity of the Hospital. These paths provide good connectivity between the Hospital and Kingswood Railway Station and surrounding low- and medium-density residential developments.

Signalised pedestrian crossings are provided on all legs at the intersections of the Great Western Highway with Parker Street and Bringelly Road and Derby Street/Parker Street, allowing for safer crossing.

There is a signalised mid-block pedestrian crossing to the southwest of the site, adjacent to the Nepean Hospital, providing safe crossing along Parker Street to/from the residential areas to the west and southwest of the Hospital.

4.0 Parking

4.1 Parking Demand

There is a total of 305 on-site car parking spaces available within the Hospital. The existing off-street and on-street parking circumstances in an area covering up to 400m in radii of the Hospital have been surveyed to identify the occupancy levels of these spaces during the Hospital peak periods. The locations of the surveys are shown in the figure below:

Napean Hospital Carpark 1	
Napean Hospital Carpark 2	
Barber Avenue - EAST (NORTH)	
Barber Avenue - EAST (SOUTH)	
Barber Avenue - WEST (NORTH)	
Barber Avenue - WEST (SOUTH)	
Lethbridge Street (NORTH)	
Lethbridge Street (SOUTH)	

Details of the survey are provided in Appendix C while its outcome summarised as follows:

		Minimum Vacancy Level	
	Capacity	**AM**	**PM**
	Off-Street		
Nepean Hospital Carpark 1	184	5	63
Nepean Hospital Carpark 2	113	12	50
Off-Street Subtotal	***297***	***17***	***113***
	On-Street		
Barber Avenue - East (North)	45	0	9
Barber Avenue - East (South)	7	0	0
Barber Avenue - West (North)	29	0	12
Barber Avenue - West (South)	37	0	16
Lethbridge Street (North)	29	1	10
Lethbridge Street (South)	35	0	21
On-Street Subtotal	***182***	***1***	***68***
Total	**479 spaces**	**18 spaces**	**181 spaces**

Based on the above, at the busiest AM and PM peaks, there are 1 and 68 spaces available in the on-street parking facilities respectively.

4.2 DCP Requirement for Existing Hospital

Council's DCP 2014 specifies a parking provision for hospital development as follows:

1 space per 3 beds

1 space per 2 employees

Application of this criteria to the existing development of 109 beds and 174 FTEs would indicate the following:

109 beds	37 spaces
174 staff	87 spaces
Total:	**124 spaces**

4.3 DCP Requirement for Proposed Development

Council's DCP 2014 specifies a parking provision for Health Consulting Room/ Medical Centre developments as follows:

3 spaces per health care professional practising at any one time

1 space per receptionist/support staff

1 space per associated dwelling

Application of this criteria to the proposed development and no associated dwelling would indicate the following:

26 doctors	78 spaces
62 staff	62 spaces
Total:	**140 spaces**

4.4 Adequacy of Car Parking Provision based on DCP Requirement

The combined car parking requirements for the existing and proposed developments would equate to 264 spaces.

Options A and B will result in a total of 286 and 297 car parking spaces respectively. The car parking provision of both Options is in accordance with the DCP requirement and is considered appropriate and likely to meet the parking demand of the existing and future developments.

4.5 Disabled Car Parking Space

A review of the Building Code of Australia (BCA) suggests a disabled car parking requirement of 1 space for every 100 spaces or part thereof. Based on up to 297 spaces, it is recommended that a minimum of 3 disabled spaces be provided off-street. The existing 1 and proposed 4 disabled spaces are in accordance with the BCA requirement.

4.6 Bicycle Parking

DCP 2014 states that:

Bicycle parking in accordance with the suggested bicycle parking provision rates for different land use types in the document 'Planning Guidelines for Walking and Cycling' (NSW Government 2004). Bicycle parking spaces should comply with AS2890.3:1993 Bicycle Parking Facilities.

The Planning Guidelines suggest the following bicycle parking provisions for a hospital and a medical centre:

Existing Hospital

- Staff (long-term use) – 5% to 10% of staff or 10% to 15% of bed
- Visitor (short-term use) – 5% to 10% of staff

Proposed Medical Centre

- Staff (long-term use) – 5% to 10% of practitioners, professional
- Visitor (short-term use) – 5% to 10% of staff

A travel mode share survey completed by Parking & Traffic Consultants[2] for the existing Nepean Hospital show that only 1.5% of staff cycle to work. Given the current low usage of bicycle to the Hospital, it is recommended that a bicycle parking rate of 5% of staff/practitioners/professionals is adopted.

Applying the above rates, the existing hospital (with 174 FTE) and the proposed development (with 88 staff) should provide a total of 26 bicycle spaces (13 spaces for staff and 13 spaces for visitors):

2 *Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA, Traffic Impact Assessment, for Health Infrastructure, 24 July 2018, by Parking & Traffic Consultants*

Existing Hospital

* Staff – 5% of staff: 9 spaces

* Visitor – 5% of staff: 9 spaces

Proposed Medical Centre

* Staff – 5% of practitioners, professional: 4 spaces

* Visitor – 5% of staff: 4 spaces

The bicycle parking facilities are proposed to be located in the southwestern corner and the southern edges of the undercroft car park with convenient access via Barber Avenue.

5.0 Access, Internal Circulation and Servicing

5.1 Access

The new shared vehicle access to the proposed 84-88 Parker Street building, at-grade carpark to the west of the proposed building and to the proposed undercroft car park of the new proposed building comprise of a 5.5m wide driveway and the access ramp in accordance with AS2890.1. The driveway will be located on Barber Avenue at the southern site boundary in the same location of the existing driveway.

The existing two-way driveway at the southeastern end of the site is to be retained for visitor access to the new and reconfigured at-grade car parking facility.

It is proposed to provide an additional 5m wide ingress driveway on the Great Western Highway located towards the northeastern boundary of the site for heavy, light and emergency vehicle access. This driveway will accord with the design requirements of Guide to Road Design Part 3: Geometric Design (2016 Edition) with a deceleration lane of 35m and 15m taper along the Great Western Highway. The Great Western Highway is also relatively straight and level at this location where there is an excellent sight distance available.

TTPA has consulted Roads and Maritime Services in regards to the proposed ingress off the Great Western Highway. Roads and Maritime has reviewed the request and provides the following comments:

Roads and Maritime advises that current practice is to limit the number of vehicular conflict points along the arterial road network to maintain network efficiency and road safety. This current practice is reflected in Section 5.2.1 of Roads and Maritime current publication of the Guide to Traffic Generating Developments, which states 'access across the boundary with a major road is to be avoided wherever possible'.

Great Western Highway is a major arterial road, which carries a high volume of traffic,

where transport efficiency of through traffic is of great importance.

Further to the above, clause 101(2a) of State Environmental Planning Policy (Infrastructure) 2007, which reads as follows:

"The consent authority must not grant consent to development on land that has frontage to a classified road unless it is satisfied that:

(a) where practicable, vehicular access to the land is provided by a road other than the classified road".

As the subject site already benefits from alternative vehicular access via the local road network, Roads and Maritime does not support an additional ingress from Great Western Highway.

The proposed ingress along the Great Western Highway offers the following benefits:

* The new public hospital car park entry will be left-in and left-out only off Barber Avenue. Given that no eastbound right-turn movement into the new carpark will be allowed, all traffic will be required to enter Barber Avenue from Parker Street, travel east, make a U-turn at a new roundabout on Barber Avenue, then travel west prior to turning left into the new carpark. The projected entering traffic to the new carpark from the new public hospital during the AM and PM peak hours will be 675 and 419 vehicle trips per hour. This equates to up to 12 vehicle trips per minute. In addition to the traffic associated with existing hospital and the proposed development, Barber Avenue will likely to approach its capacity resulting in vehicle queue onto Parker Street and Great Western Highway. As such, the proposed ingress is highly practicable and will provide a capacity relief to Barber Avenue and Parker Street by removing most of the entering traffic from Great Western Highway westbound. Although the proposed development has an alternative vehicle access via Barber Avenue, the development does not benefit from the single shared access due to high traffic generation from the adjacent

public hospital and the traffic condition will be worsened by the proposed multi-storey car park that will accommodate up to 627 cars. The proposed ingress will improve accessibility by allowing patients to receive the appropriate medical care services in a faster manner.

* The proposed ingress is consistent with an existing ingress off the Great Western Highway which was recently constructed at Bunnings Minchinbury, which has increased the capacity of the adjacent intersection of Great Western Highway/John Hines Avenue. The ingress is shown in the following figure.

* As part of the Reform Plan for NSW Ambulance, the NSW Government has identified five strategic directions that will assist in improving the capacity of NSW Ambulance to focus on its key role – responding to emergencies and providing patients with timely access to the health system. The proposed ingress will allow the proposed development and the existing hospital to effectively reduce ambulance travel time (thus reducing response time) by providing a direct access from the Great Western Highway without the need to travel along Parker Street and Barber Avenue.

* The proposed ingress will increase the network efficiency by reduces queuing

and delays on the network as a result of the reduction of left-turning traffic from the Great Western Highway onto Parker Street and left-turning traffic from Parker Street onto Barber Avenue. The provision will result in less queuing and delays for the westbound traffic on the Great Western Highway by increasing the turning and storage capacity for the turning movements at the intersection, which result in less impedance and greater efficiency of through traffic along the Great Western Highway, noting the important role of Great Western Highway as a major arterial road.

* The intersections in the vicinity of the proposed development (Great Western Highway/Parker Street, Derby Street/Parker Street and Great Western Highway/Somerset Street) are expected to be operating beyond capacities with the proposed Nepean Public Hospital redevelopment project. As such, the proposed ingress is necessary to alleviate the congestion at these intersections.

* The proposed ingress will improve the safety of all road users by reduces the conflict between left-turning traffic with pedestrians crossing the westbound left-turn slip lane and potentially reduce crash rates by reducing the westbound left-turning traffic.

* All deliveries to the existing Hospital currently are being carried out at the loading zone along Barber Avenue. The expanded hospital will require larger truck deliveries. With the proposed loading area, trucks would be able to enter via Great Western Highway and exit via Barber Avenue. The proposed ingress will eliminate the need for large trucks to enter via Barber Avenue, minimising conflict with other entering light vehicles.

A further traffic assessment to study the impact of the proposed ingress was undertaken and detailed in Section 6 of this report.

5.2 Porte Cochere

It is proposed to retain the existing 7m of drop-off and pick-up area (porte-cochere) and 7 short-term spaces at the main entrance to the existing Hospital. In addition to the

existing arrangement, the development proposes 2 additional spaces for pick-up and drop-off activities with an appropriate taper to guide vehicles to the porte-cochere area.

5.3 Internal Circulation and Parking

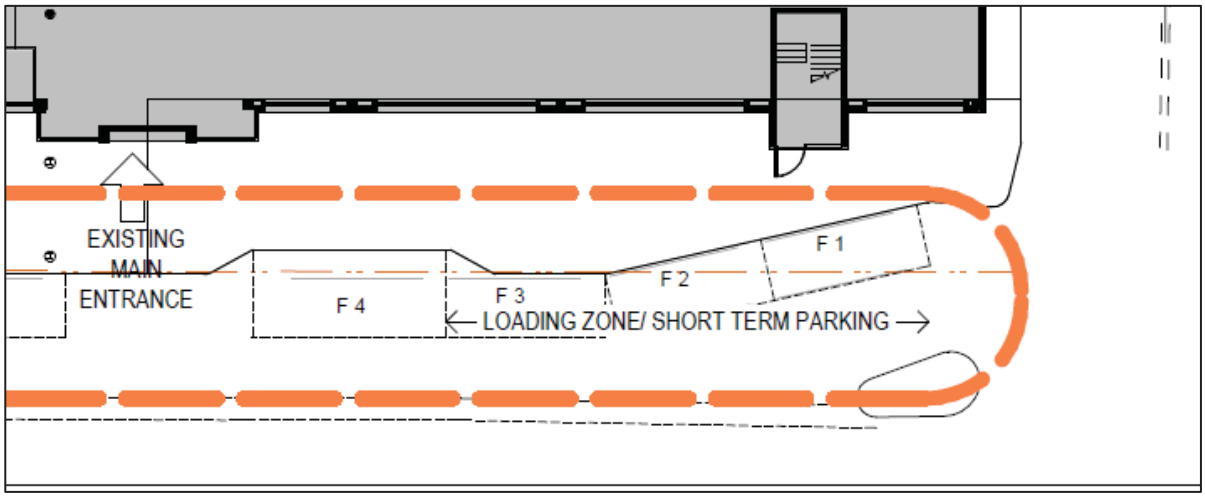
The design of the proposed internal circulation and parking arrangements accords with the requirements of AS2890.1 and AS2890.5. The arrangements will be simple and efficient for both regular users and unfamiliar visitors and there will be clear way finding signage to assist visitors.

5.4 Servicing

A new loading area which can accommodate up to 8.8m medium rigid vehicle (HRV). The loading area can accommodate up to 2 trucks at any one time. Vehicles will approach the loading area via the proposed ingress from Great Western Highway and via the existing driveway along Barber Avenue, with all departures via Barber Avenue.

Occasional needs for other smaller service vehicles (up to 5.4m small rigid vehicle) can be satisfied by the use of the existing loading zone along the southern hospital frontage as per existing arrangements.

It is proposed to designate the existing 3 on-street car parking spaces along the southern frontage of the existing hospital building to loading zone in between 8.30pm and 5.30am. The proposed loading zone is shown in the following figure.



A loading management plan will be in place to ensure that a 12.5m heavy rigid vehicle (HRV) will be able to use these spaces outside of the hospital/medical centre peak periods. The HRV will approach the loading zone via Barber Avenue and make a 5-point turn at the eastern end of Barber Avenue on departure.

The proposed loading area arrangements will be satisfactory as confirmed by the turning path assessment for an 8.8m MRV and 12.5m HRV manoeuvres in and out of the loading areas which are provided in Appendix F.

Servicing for the proposed additional elements for the hospital will be absorbed into the existing service vehicle activity (e.g. normal and medical refuse removal, linen and kitchen supplies, etc.). Any increased movements of service/delivery vehicles during the peak hours will be minor.

6.0 Traffic

6.1 Traffic Generation

Existing Hospital

It is difficult to determine the peak traffic generation, noting the on-street parking demand associated with the hospital. On this basis, the Roads and Maritime Services Guide to Traffic Generating Developments, 2002 (Roads and Maritime Guide) has been referenced to understand the impact of the proposed development.

For private hospitals, the Roads and Maritime Guide recommends the following trip generation rates based on the number of beds and the average number of staff per weekday shift:

* AM Peak Vehicle Trips (MVT) = -10.21 + 0.47B + 0.06ASDS
* PM Peak Vehicle Trips (EVT) = -2.84 + 0.25B + 0.40ASDS.

Where 'B' represents the number of beds proposed

The trip generation rates were developed using survey data collected by Roads and Maritime in 1994 from 19 private hospitals across the Sydney region. The hospitals surveyed had between 30 to 99 beds and an average day shift workforce of between 10 and 102 employees.

Of the 19 hospitals surveyed, the majority recorded their respective daily traffic peak (PVT) between 3 pm and 4 pm. This period generally coincided with a staff shift change at the surveyed hospitals and would coincide with the start of the on-road peak near the site.

It should also be noted that of the 19 hospitals surveyed, an average of 87 per cent of

people travelling to each hospital did so by private car and the mode share attributed to car-based trips ranged from 67 per cent to 98 per cent. Average vehicle occupancy was 1.3 persons per vehicle.

Based on a total of 96 rooms/suites/bays/chairs and an ASDS of 88, the peak hour increase in traffic generation would result in around 40 and 56 additional trips per hour during the AM and PM peak hours, respectively.

The projected traffic movements equate to 1 vehicle every minute and will not present any adverse access, delay or capacity implications.

If it is assumed that directional split of traffic (i.e., The ratio between the inbound and outbound traffic movements) to be 80:20 during the AM peak hour and 20:80 during the PM peak hour, then the following traffic generation characteristics are projected.

Peak Hour Vehicle Movements

AM		PM	
IN	**OUT**	**IN**	**OUT**
32	8	12	44

6.2 Background Traffic

To assess the impact of background traffic growth on the surrounding road network, an annual growth rate of 1.5% for 2030 (10-year post completion) has been applied to the modelling. This is consistent with the traffic modelling for the Nepean Hospital Redevelopment traffic study[3].

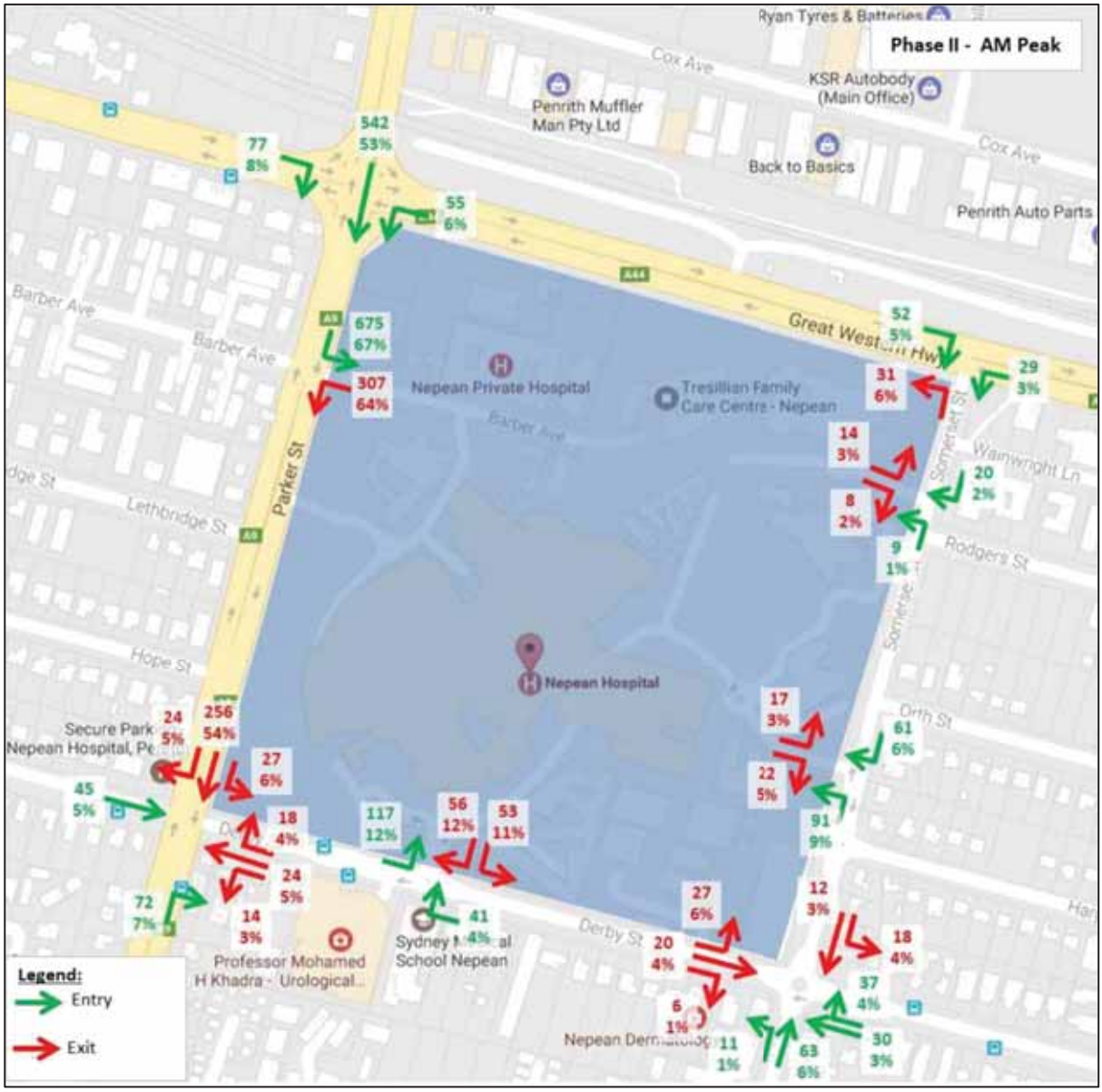
6.3 Nepean Hospital Redevelopment Phase 2 Traffic

The proposed trip distribution for Phase 2 of the development is obtained from the

3 *Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA, Traffic Impact Assessment, for Health Infrastructure, 24 July 2018, by Parking & Traffic Consultants*

Nepean Hospital Redevelopment traffic study[4] and are shown in the following figures.

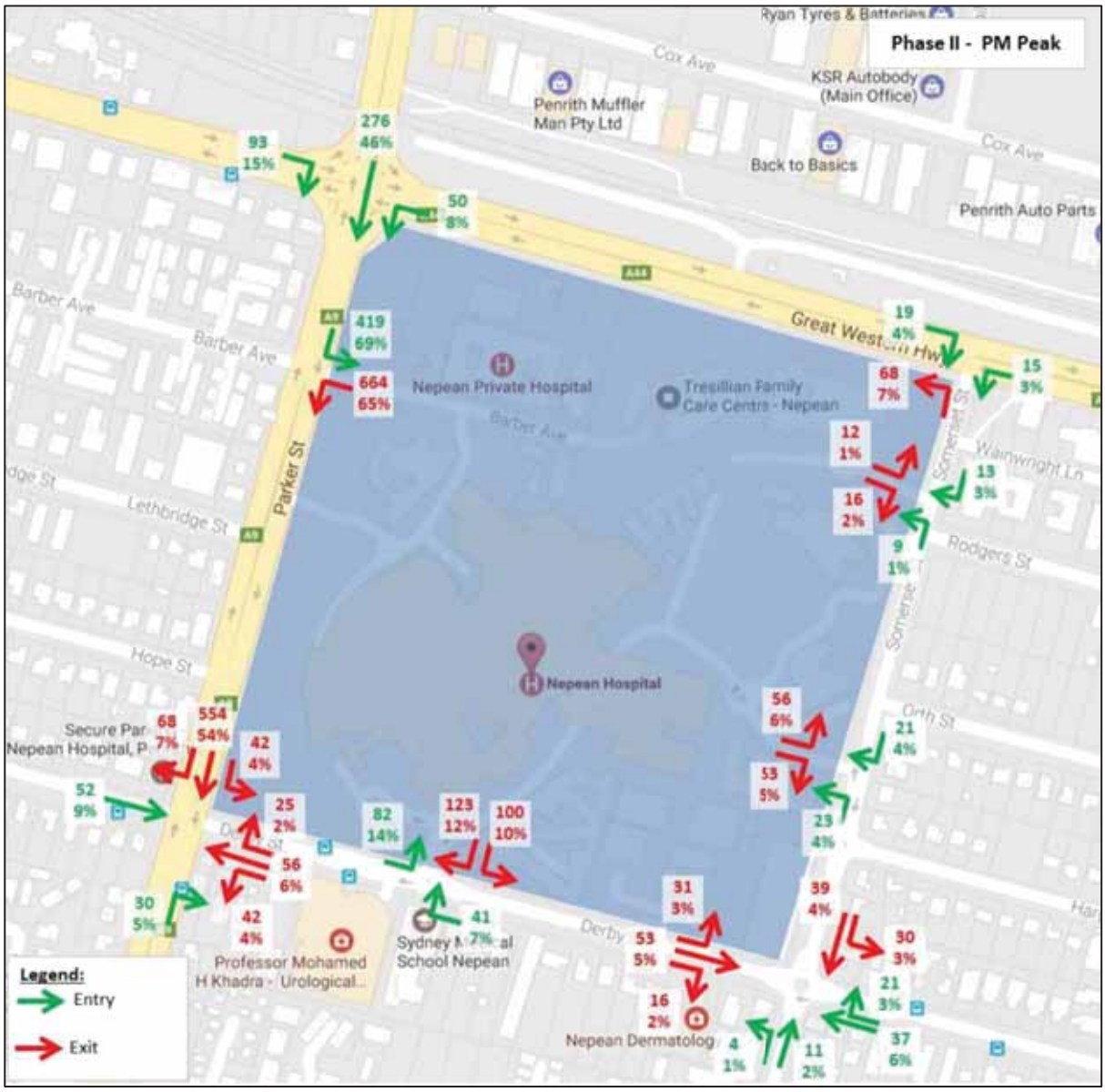
Traffic Distribution for Phase 2 development – AM



Source: Parking & Traffic Consultants

4 *Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA, Traffic Impact Assessment, for Health Infrastructure, 24 July 2018, by Parking & Traffic Consultants*

Traffic Distribution for Phase 2 development – PM



Source: Parking & Traffic Consultants

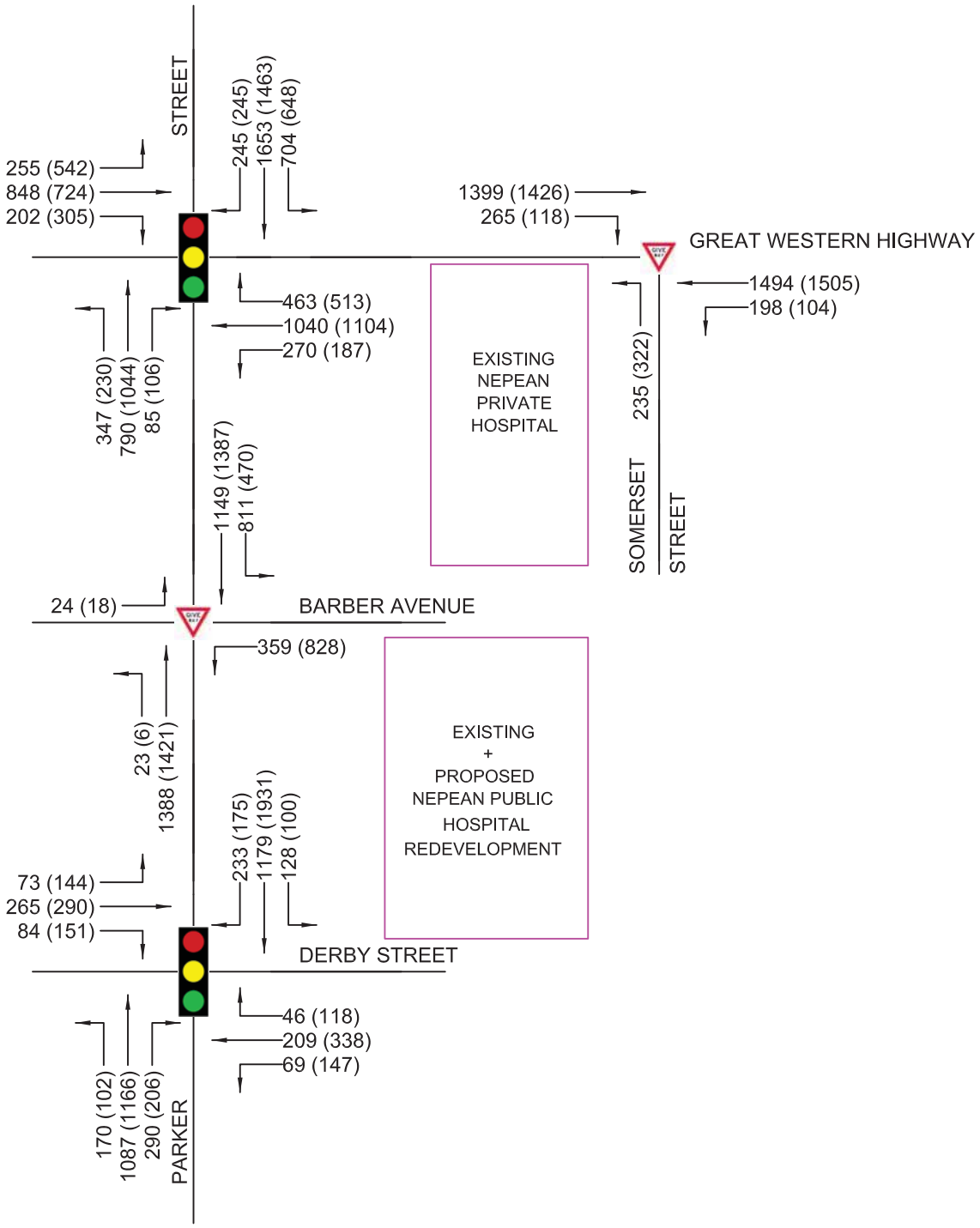
6.4 Future Traffic Modelling Scenarios

To assess the potential traffic impact associated with the proposed development and the impacts of background traffic growth and the adjacent Nepean Hospital Phase 2 traffic as well as the impact of the proposed ingress from the Great Western Highway, a number of modelling scenarios have been developed and modelled. The assessment scenarios are summarised in the following table:

Scenario	Traffic Volumes Figure	Year 2030
S1	6	Existing + 1.5% Growth + Nepean Hospital Development Phase 2
S2	7	Existing + 1.5% Growth + Nepean Hospital Development Phase 2 + Proposed Improvements as part of Nepean Hospital Phase 2
S3 (Option B)	8	Existing + 1.5% Growth + Nepean Hospital Development Phase 2 + Proposed Improvements as part of Nepean Hospital Phase 2 + Proposed Development
S4 (Option A)	9	Existing + 1.5% Growth + Nepean Hospital Development Phase 2 + Proposed Development + Proposed Improvements as part of Nepean Hospital Phase 2 + Ingress from the Great Western Highway

The SIDRA network layout for S1 is similar to the existing layout.

The SIDRA network layout with proposed improvements as part of Nepean Hospital Phase 2 (S2 and S3) is shown in the following figure.

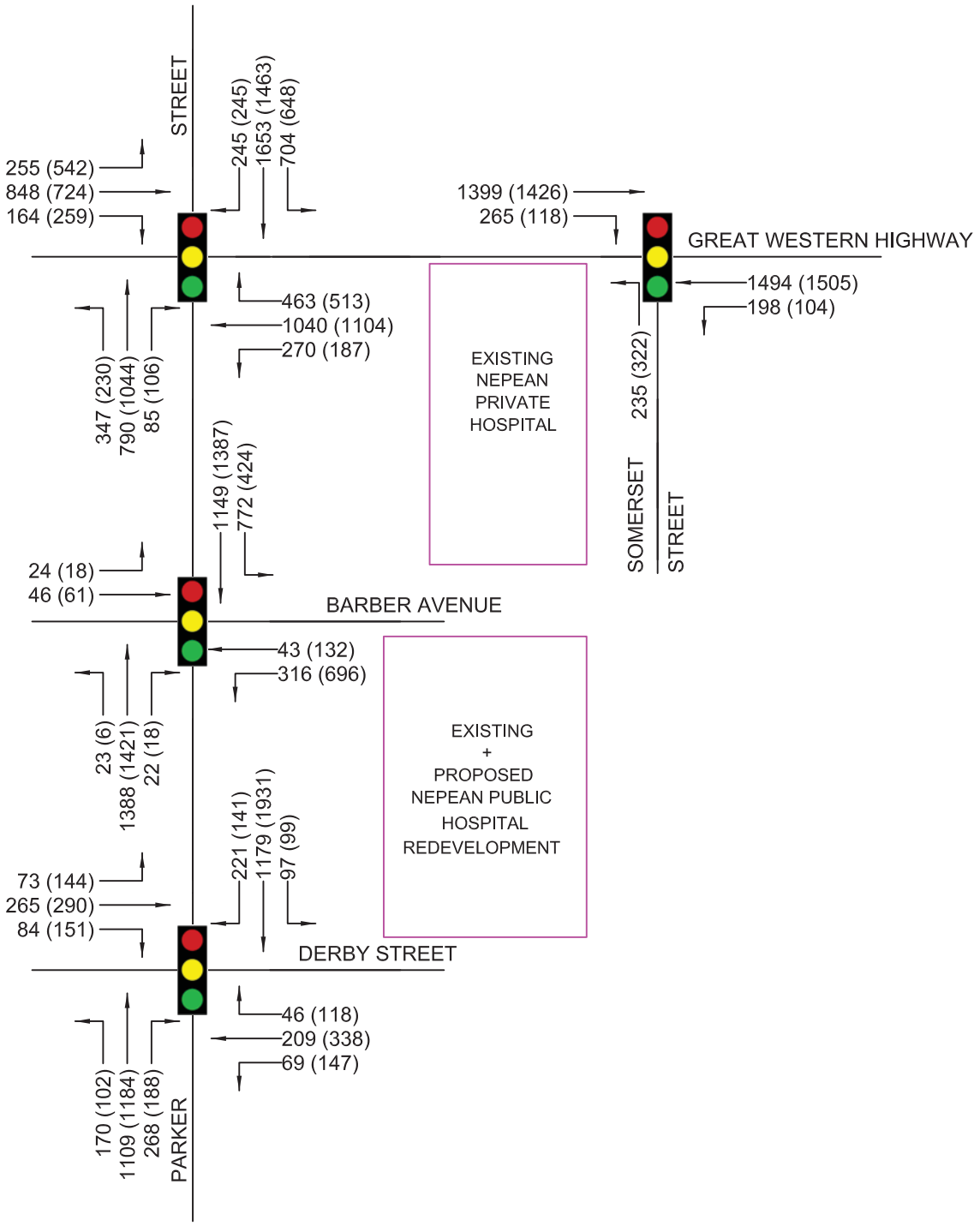


LEGEND

AM PEAK (PM PEAK) INTERSECTION
TURNING VOLUMES

FUTURE YEAR 2030 SCENARIO S1 TRAFFIC VOLUME

FIG 6

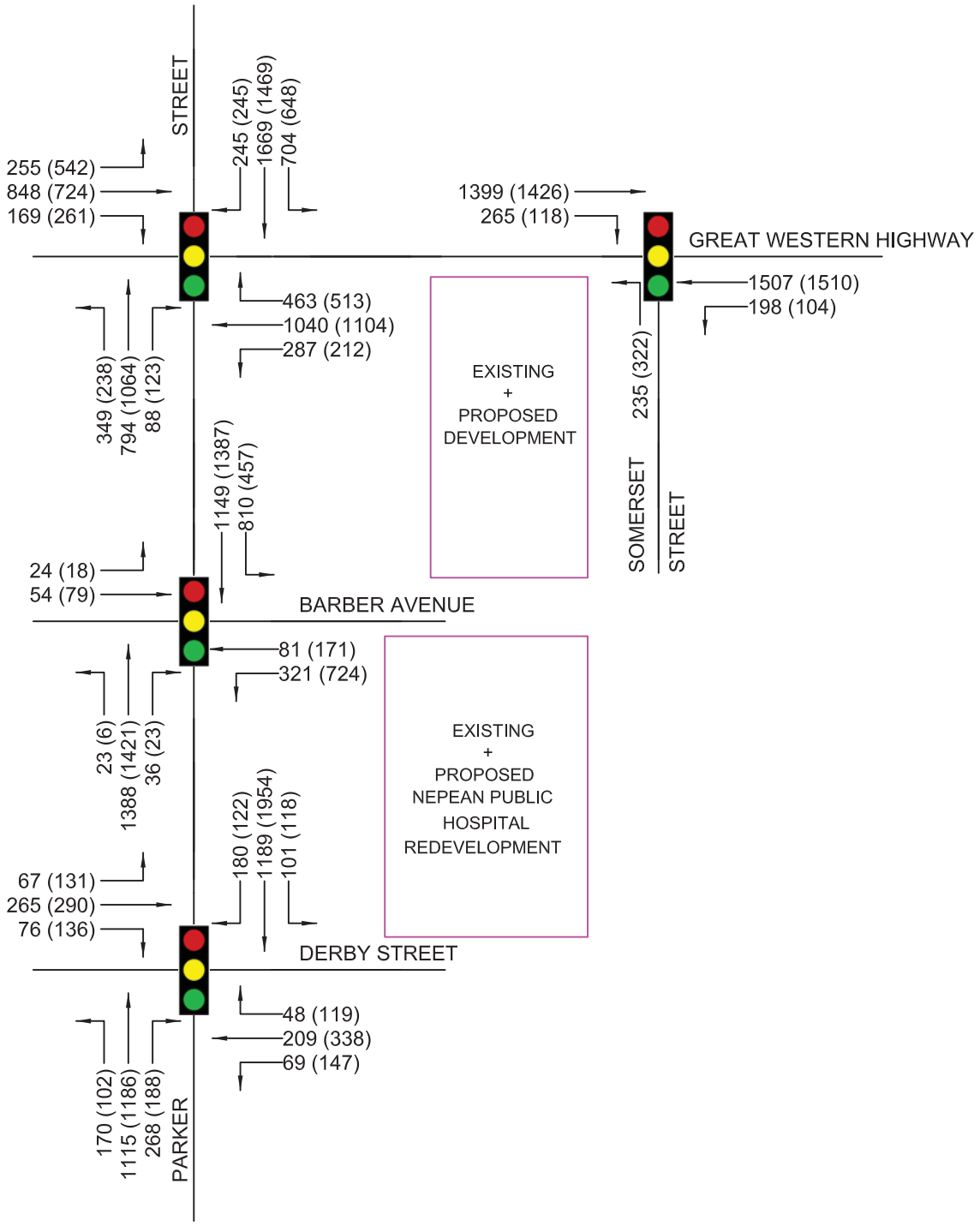


LEGEND

AM PEAK (PM PEAK) INTERSECTION
TURNING VOLUMES

FUTURE YEAR 2030 SCENARIO S2 TRAFFIC VOLUME

FIG 7

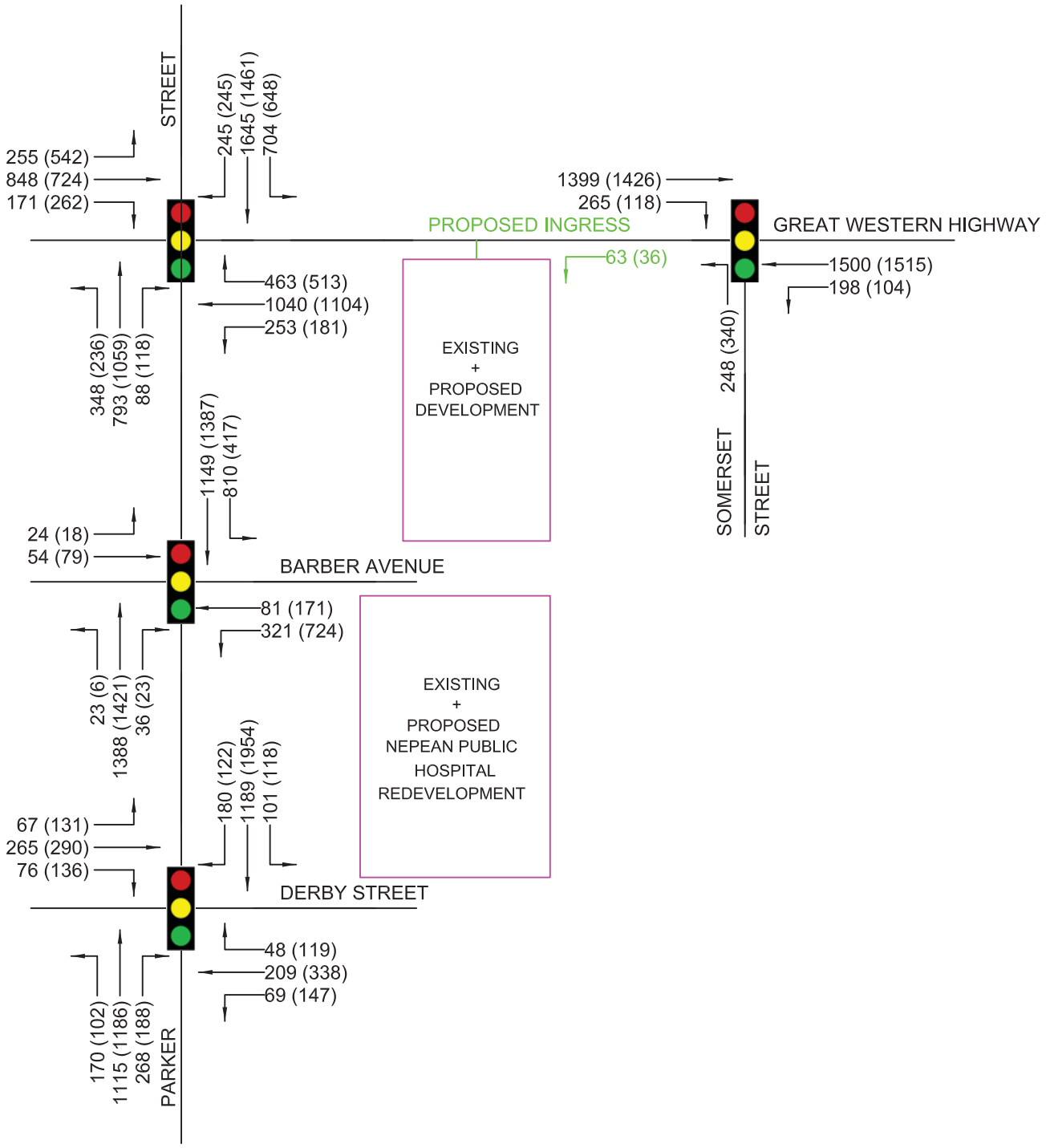


LEGEND

AM PEAK (PM PEAK) INTERSECTION TURNING VOLUMES

FUTURE YEAR 2030 SCENARIO S3 (OPTION B) TRAFFIC VOLUME

FIG 8

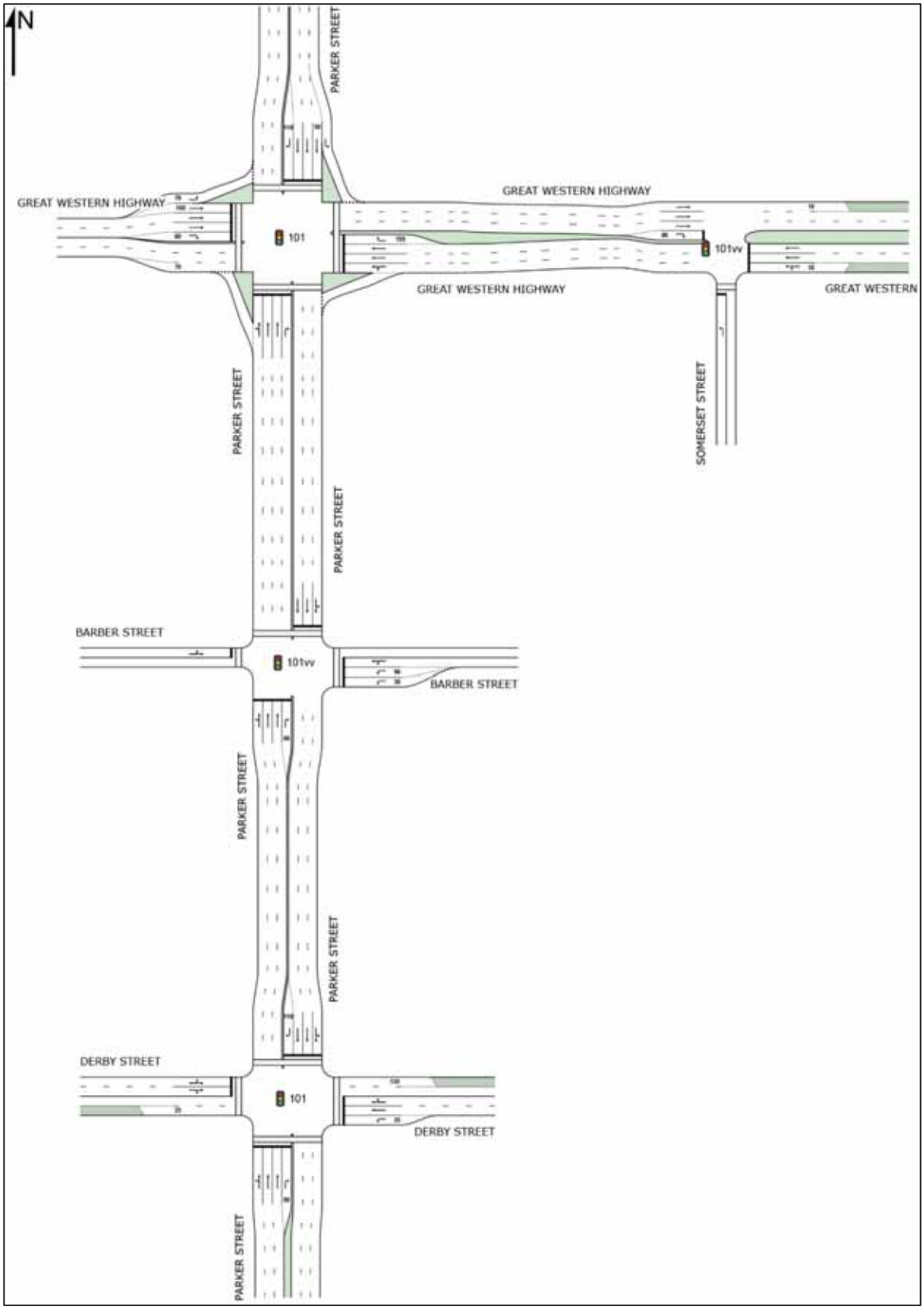


LEGEND

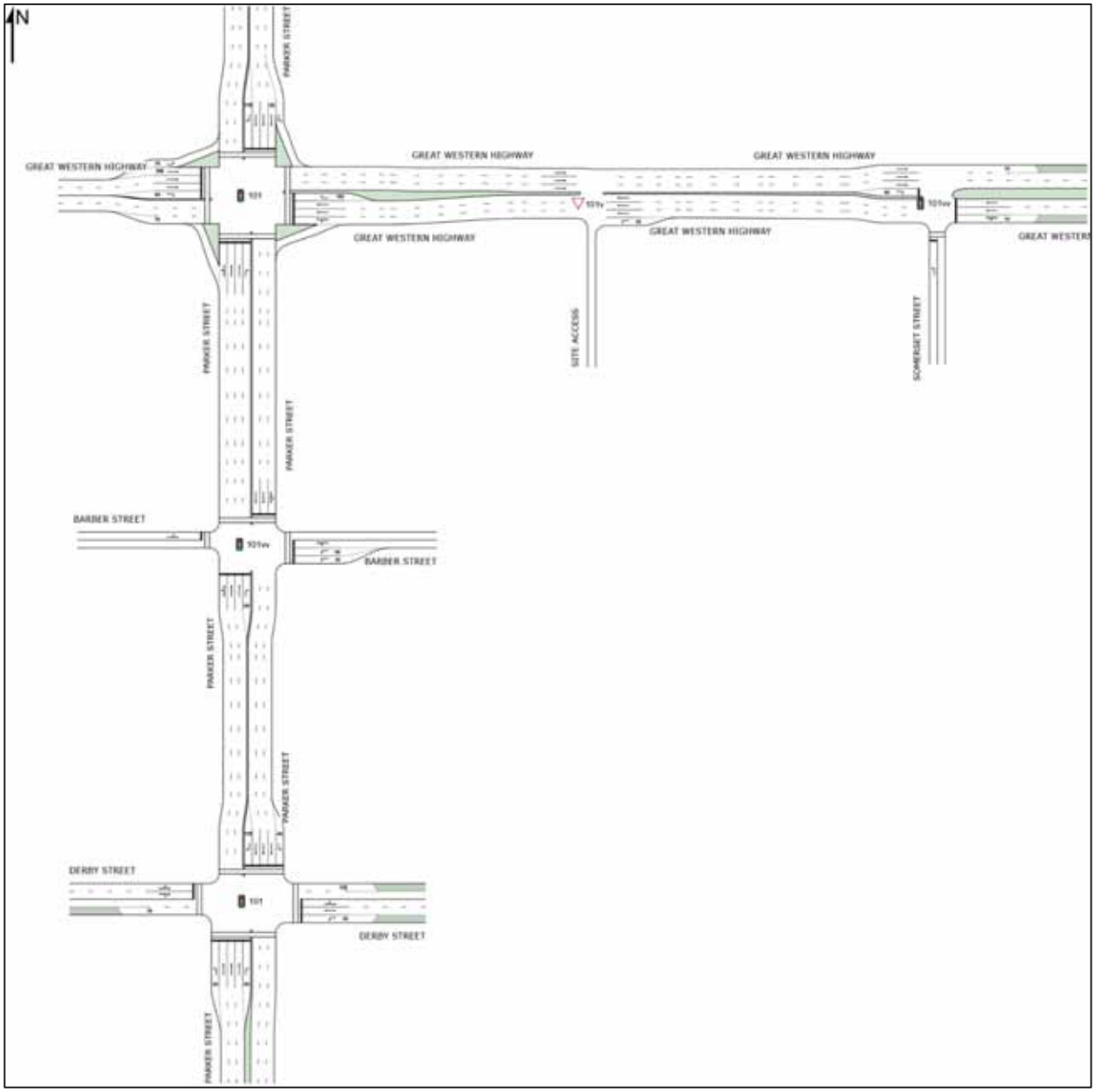
AM PEAK (PM PEAK) INTERSECTION TURNING VOLUMES

FUTURE YEAR 2030 SCENARIO S4 (OPTION A) TRAFFIC VOLUME

FIG 9


N
PARKER STREET
GREAT WESTERN HIGHWAY
GREAT WESTERN HIGHWAY
101
101vv
GREAT WESTERN HIGHWAY
GREAT WESTERN
PARKER STREET
SOMERSET STREET
PARKER STREET
BARBER STREET
101vv
BARBER STREET
PARKER STREET
PARKER STREET
DERBY STREET
101
DERBY STREET
PARKER STREET

The SIDRA network layout with proposed improvements as part of Nepean Hospital Phase 2 and ingress from the Great Western Highway (S4) is shown in the following figure.



6.5 Traffic Modelling Results for Scenario S1

The key intersections near the site were analysed under 2030 traffic conditions without the inclusion of traffic generated by the proposed development to confirm the future intersection operation under the existing intersection configurations. The outcome of the assessment for Scenario S1 are summarised in the following with SIDRA outputs provided in Appendix D:

Scenario S1

	AM		PM	
	LOS	AVD (S)	LOS	AVD (S)
Great Western Highway/Parker Street	F	185	F	296
Derby Street/Parker Street	E	59	F	204
Great Western Highway/Somerset Street*	F	312	D	54
Barber Avenue/Parker Street *	F	106	A	7

** Worst movement reported for unsignalised intersection.*

Based on the table above, the background traffic growth and traffic generated by the Nepean Public Hospital has a notable impact to the operation of all the study intersections - Great Western Highway/Parker Street, Derby Street/Parker Street, Great Western Highway/Somerset Street and Barber Avenue/Parker Street. These intersections will operate at over capacity (LOS F) during one or both AM and PM peak hours.

During the PM peak hour, the vehicle queue on the westbound approach at the intersection of Great Western Highway/Parker Street will extend 400 metres towards the intersection of Great Western Highway/Somerset Street.

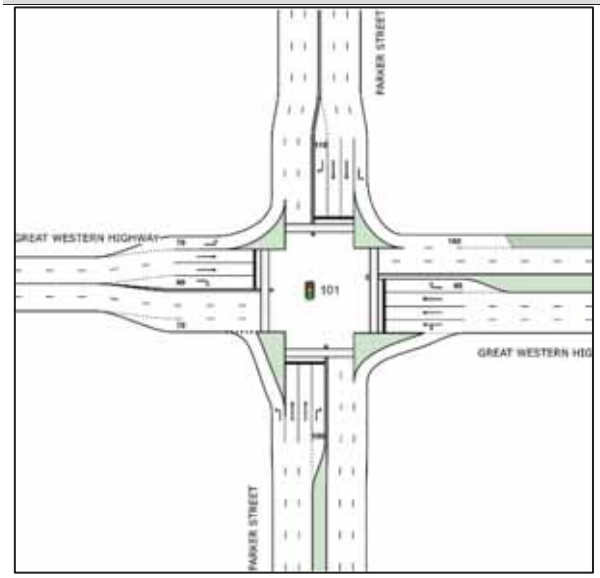
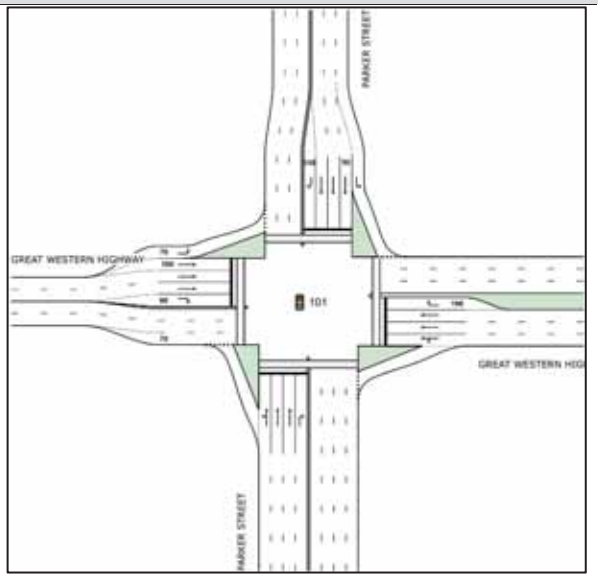
It is noted that the vehicle queue on the southbound approach the intersection of Derby Street/Parker Street will extend 290 metres towards the intersection of Barber Avenue/Parker Street during the peak hours resulting in no opportunity for vehicles to exit from Barber Avenue onto Parker Street.

6.6 Traffic Modelling Results for Scenario S2

The expected future operation of the 4 nominated intersections could be improved via road widening, removal of on-street car parking spaces, lane reconfigurations and signal optimisation. The applied mitigation measures at the intersections are shown in

the following figures and summarised below. It is noted that most of the mitigation measures are consistent with the Nepean Hospital Redevelopment traffic study[5].

Great Western Highway/Parker Street

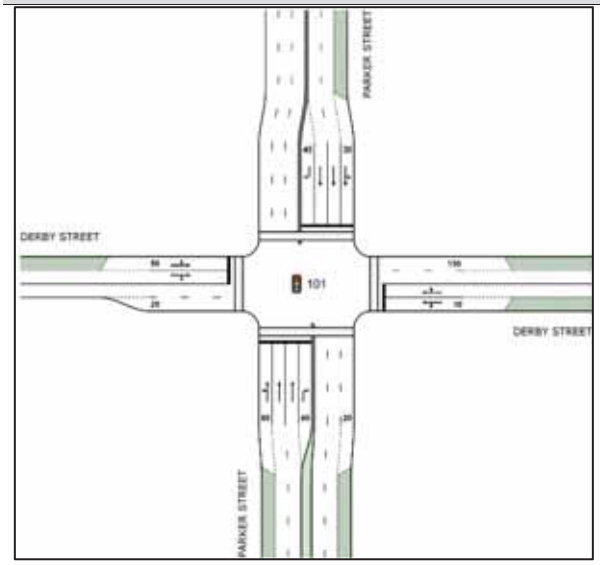
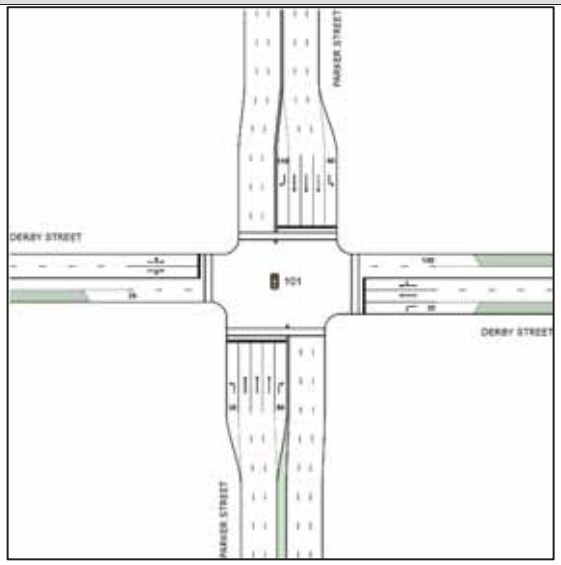
Year 2018 Existing	Year 2030 Scenario S2
	

- Remove existing on-street car parking spaces along the Great Western Highway between Parker Street and Somerset Street
- Convert existing eastbound, westbound and southbound continuous left-turn lane to slip left-turn lane
- Provide a short 100m eastbound thru lane
- Provide a short 50m southbound thru lane
- Extend existing northbound right-turn short lane to a full lane up to Barber Avenue
- Convert existing northbound left-turn lane only to a shared thru and left-turn lane

5 *Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA, Traffic Impact Assessment, for Health Infrastructure, 24 July 2018, by Parking & Traffic Consultants*

* Provide signal optimisation

Derby Street/Parker Street

Year 2018 Existing	Year 2030 Scenario S2
	

* Remove existing on-street car parking spaces along Parker Street between the Barber Avenue and Derby Street

* Remove existing on-street car parking spaces along Derby Street between the Parker Street and Colless Street

* Remove existing on-street car parking spaces along Derby Street between the Parker Street and Nepean Public Hospital access

* Remove existing on-street car parking spaces along the southern side of Derby Street between Parker Street and Nepean Public Hospital site access.

* Convert and extend existing 30m southbound shared thru- and left-turn lane to a full southbound thru-lane only all the way to Barber Avenue

* Extend existing 45m southbound right-turn short lane to 110m

* Provide an additional 40m short southbound left-turn lane only

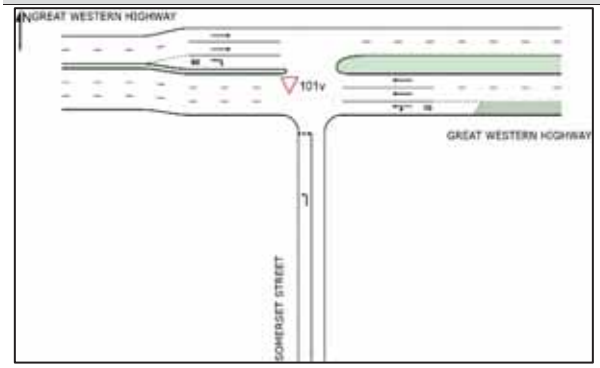
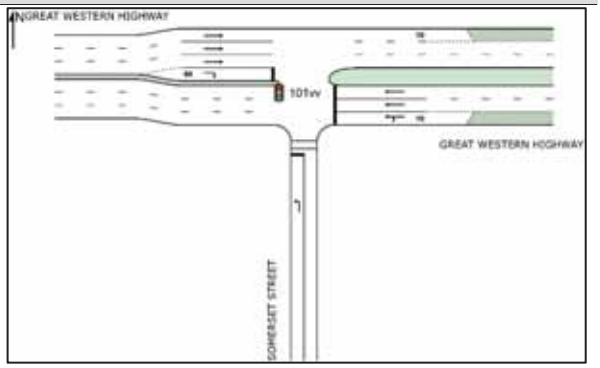
* Extend existing 10m westbound shared thru and left-turn short lane to a full 130m lane

* Provide an additional 25m short westbound left-turn lane only

* Extend existing 50m eastbound shared thru- and left-turn lane to a full thru-lane only all the way to Colless Street

* Provide signal optimisation

Great Western Highway/Somerset Street

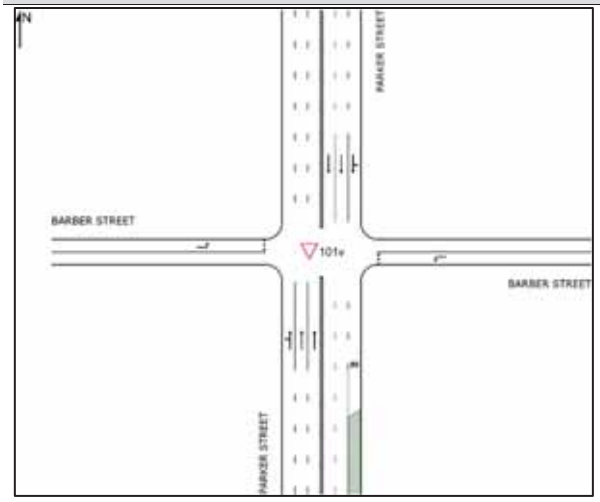
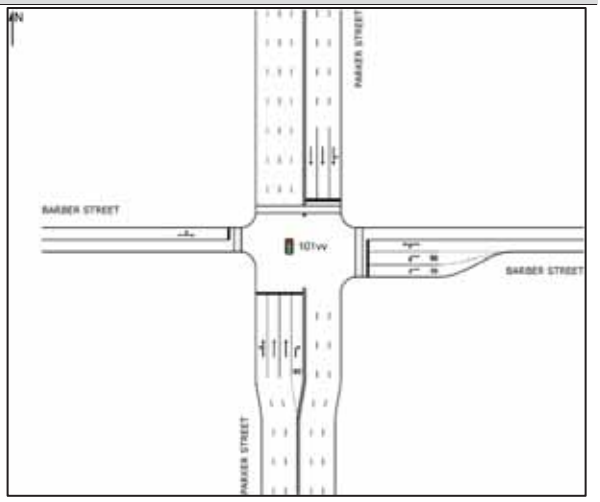
Year 2018 Existing	Year 2030 Scenario S2
	

* Signalise the intersection of Great Western Highway/Somerset Street with a signal-controlled east-west pedestrian crossing.

* Coordinate signalised intersection with the intersection of Great Western Highway/Parker Street

* Remove existing on-street car parking spaces along the Great Western Highway between Parker Street and Somerset Street

Barber Avenue/Parker Street

Year 2018 Existing	Year 2030 Scenario S2
	

- Signalise the intersection of Barber Avenue/Parker Street with signal-controlled pedestrian crossings on the western, eastern and northern legs
- Coordinate signalised intersection with the intersections of Great Western Highway/Parker Street and Derby Street/Parker Street
- Provide an additional 60m northbound right-turn short lane
- Remove existing on-street car parking spaces along the southern side of Barber Avenue between Parker Street and the 90-degree angled spaces
- Provide additional 30m and 90m westbound left-turn short lanes
- Convert existing westbound left-turn lane to shared thru- and left-turn lane
- Convert existing eastbound left-turn lane to shared thru- and left-turn lane
- Remove existing on-street car parking spaces along the eastern side of Parker Street between the Great Western Highway and Barber Avenue

It is noted that these improvements are required based on forecast traffic growth in the area and the proposed Nepean Public Hospital Redevelopment and not as a result of the proposed development. It should also be noted that the proposed road upgrades

are mostly within the existing road reserve and practical without the need for major land acquisition.

The expected future operating conditions of the key intersections with the proposed mitigation measures and without the proposed development are summarised in the following with SIDRA outputs provided in Appendix D:

Scenario S2

	AM		PM	
	LOS	**AVD (S)**	**LOS**	**AVD (S)**
Great Western Highway/Parker Street	F	100	F	90
Derby Street/Parker Street	C	40	E	70
Great Western Highway/Somerset Street	A	12	B	15
Barber Avenue/Parker Street	A	11	B	26

Based on the above table, with the proposed road widening, removal of on-street car parking spaces, lane reconfigurations and signal optimisation:

* the intersection of Great Western Highway/Parker Street will continue to operate at LOS F during the peak hours, which are similar to the operating conditions under scenario S1 without the proposed mitigation measures. While the intersection will operate above its capacity, there will be a significant reduction in average vehicle delays of up to 206 seconds.

* the intersection of Derby Street/Parker Street will continue to operate at capacity of LOS E during the PM peak hour. While the intersection will operate at capacity, there will be a significant reduction in average vehicle delays of up to 134 seconds.

* the Great Western Highway/Somerset Street and Barber Avenue/Parker Street intersections would operate at LOS B or better during the peak hours.

The proposed intersection upgrades to achieve LOS D or better for the intersections

of Great Western Highway/Parker Street and Derby Street/Parker Street would be significantly extensive.

Based on the travel mode share survey completed by Parking & Traffic Consultants[6] for the existing Nepean Hospital, train and bus travel make up no more than 4% of the travel completed by outpatients/visitors and no more than 1% by staff.

As discussed, the Hospital is relatively well serviced by bus, with a number of routes and regular services (every 30 mins on weekdays). As such, there is an opportunity to manage/ reduce private vehicle travel demands for the existing hospital and proposed medical centre.

A travel plan will be implemented at the start of the medical centre operation, to encourage the use of public and active transport modes.

The specific recommendations detailed in Section 7 of the report would require further investigations and consultation with the other surrounding medical developments, Roads and Maritime Services, TfNSW and bus operators to ensure there will be sufficient demand. The recommendations could contribute to increasing the use of public transport by staff/ students and discourage the use of private motor vehicles.

6.7 Traffic Modelling Results for Scenario S3 (Option B)

The analysis for Scenario S3 (Option b) assumes the proposed improvements as part of Scenario S2 have been implemented.

The key intersections in the vicinity of the site were reanalysed under 2030 traffic conditions with the inclusion of traffic caused by the proposed development. The outcome of the assessment for Scenario S3 including the traffic generated by the

6 *Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA, Traffic Impact Assessment, for Health Infrastructure, 24 July 2018, by Parking & Traffic Consultants*

proposed development, are summarised in the following with SIDRA outputs provided in Appendix D:

Scenario S3

	AM		PM	
	LOS	AVD (S)	LOS	AVD (S)
Great Western Highway/Parker Street	F	101	F	93
Derby Street/Parker Street	C	40	E	68
Great Western Highway/Somerset Street	A	13	B	15
Barber Avenue/Parker Street	A	11	B	26

With the proposed mitigation measures, the traffic generated by the proposed development is not anticipated to have notable impacts to the 4 key intersections, with a very minor increase in vehicle delays of up to 3 seconds for the intersection of Great Western Highway/Parker Street during the peak hours.

6.8 Traffic Modelling Results for Scenario S4 (Option A)

The proposed ingress from the Great Western Highway under preferred Option A would provide some capacity relief to the adjacent key intersections. The outcome of the assessment for Scenario S4 including the traffic generated by the proposed development, are summarised in the following with SIDRA outputs provided in Appendix D:

Scenario S4

	AM		PM	
	LOS	AVD (S)	LOS	AVD (S)
Great Western Highway/Parker Street	F	100	F	93
Derby Street/Parker Street	C	39	E	68
Great Western Highway/Somerset Street	A	10	B	15
Barber Avenue/Parker Street	A	11	B	26

As shown in the above table, the proposed ingress will contribute to up to average

vehicle delay reduction of 3 seconds to the 4 key intersections during the peak hours.

6.9 Queuing Analysis for Scenario S4

It is proposed to upgrade the existing conventional ticket-controlled boom gate system to Automatic Number Plate Recognition (ANPR) system. The ANPR system allows the boom gate to be opened for vehicles, greatly expediting entrance efficiency (service rate of 4 seconds per vehicle for ANPR system as compared to a minimum of 8 seconds per vehicle for a ticket-controlled system)

The ingress will generate up to 63 vtph during the busiest peak hour. An assessment has been completed to determine the likely queues that may be experienced by the vehicles ingressing from the Great Western Highway during peak flow conditions. This is to ensure that the vehicles associated with the Nepean Private Hospital will not extend beyond the proposed 35m storage onto the Great Western Highway.

The equation for calculating queue lengths is detailed in Figure 1 with a summary of the analysis presented below.

Equation 17-37 is used to calculate the 95th-percentile queue.

$$Q_{95} \approx 900T\left[\frac{v_x}{c_{m,x}} - 1 + \sqrt{\left(\frac{v_x}{c_{m,x}} - 1\right)^2 + \frac{\left(\frac{3600}{c_{m,x}}\right)\left(\frac{v_x}{c_{m,x}}\right)}{150T}}\right]\left(\frac{c_{m,x}}{3600}\right)$$

where

Q_{95} = 95th-percentile queue (veh),
v_x = flow rate for movement x (veh/h),
$c_{m,x}$ = capacity of movement x (veh/h), and
T = analysis time period (h) (T = 0.25 for a 15-min period).

Source: Highway Capacity Manual 2000

The boom gate service rate of 4 seconds has been determined using information provided in consultation with potential equipment supplier Sensor Dynamics. Using the above equation and adopting an effective service rate for the boom gate of 900 vehicles per hour (Cm,x) and a vehicle arrival rate (Vx) of 63vtph results in a 95th percentile queue of up to one vehicle (equivalent to 6m).

Based on the above, the proposed ANPR management and control measures would ensure that the entering vehicles will not queue onto the Great Western Highway.

7.0 Work Travel Plan

7.1 Purpose of a Work Travel Plan

A facility such as a hospital generates a significant level of transport demand, primarily for private vehicle trips. Travel demand management (TDM) aims to modify travel decisions rather than providing costly infrastructure and additional transport services to support the current and future transport demands. TDM has the following key objectives:

* Reduce the need to travel
* Reduce the amount of travel
* Reduce the impact of travel.

In this regard, a Work Travel Plan (WTP) is a tool that hospitals can use to manage the transport mode choices of their staff. The plan aims to promote and encourage sustainable travel and reduce reliance on the private vehicle. The WTP comprises a list of strategies aimed at encouraging walking, cycling, public transport and car-pooling for travel to and from work and aims at a shift away from the reliance on single occupant vehicle travel.

7.2 Typical Challenges for Regional Hospitals

Most staff activity associated with regional hospitals in Greater Western Sydney occurs via vehicles due to the nature of staff shift times and the limited availability of convenient public transport. Walking and cycling often proves difficult due to the distance between the home and work place as well as a lack of quality facilities. In this regard, the following factors are typically attributed to a high mode share for private vehicles at regional hospitals:

* Residential locations and hospital locations can have limited access to public transport services

* Driving presents attractive travel time advantages for many key staff origins
* Limited number of locations have access to direct public transport connections that do not require interchanging. This typically results in longer travel times, as well as influencing the perception of a lack of convenience and reliability
* Time of arrival/ departure, due to shift work, potentially limits the access to frequent public transport services. The staff that work in shifts with start/ end times outside of peak hours might also experience personal security issues
* Time of arrival/ departure influences the perceived comfort of traveling via alternate modes of transport, in particular, outside peak hours
* Unpredictable hospital activities may extend staff shift finish times. This can leave staff 'stranded' if public transport options are limited
* Staff may need to drive to efficiently conduct other activities on their way to/ from the hospital such as school set-down/ pick-up activities.

Strategies can be implemented to encourage staff to reduce their reliance on private vehicles.

7.3 Travel Demand Strategies

While it is recognised that the site's location somewhat limits the practicality of using sustainable transport modes, there remains potential for improved utilisation of public transport and associated provision of sustainable transport infrastructure.

Several opportunities exist to provide staff with incentives to consider alternative modes of travel to and from work. The following recommendations are high-level strategies that would need to be developed in greater detail and through consultation with relevant stakeholders closer to the opening of the new building:

* Shuttle Bus Service

- Provide a shuttle bus service between the hospital and key public transport interchanges, such as the Penrith and Kingswood Railway Stations, aligned with staff shifts. A regular, flexible service is likely to increase staff perception of convenience and reliability
- Develop shuttle bus routes targeting key residential areas near the hospital with low public transport connectivity.

* Public Transport

  - Arrange public transport trips to be aligned with hospital shifts through consultation with Roads and Maritime Services, TfNSW and bus operators.

* On-Demand Transport

  - Liaise with TfNSW and other stakeholders to implement the Regional on Demand Transport project.

* Active Travel

  - Provide high quality and prominent bicycle parking and change/ shower facilities
  - Provide clear pedestrian and cyclist wayfinding
  - Provide shelters along walkways or near bus stops and street lighting
  - Encourage cultural change through:
    - Creating a bike user group (targeting staff living within 5 km of the Hospital).
    - Events such as annual ‘ride to work’ day
    - Providing information detailing opportunities and facilities available to staff. This may include providing maps of the available cycling routes to and within the Hospital site.

- **Promote Car-Pooling**
  - Provide prioritised car pool parking spaces on-site, including consideration for incentives such as prices, location and proximity to services.

8.0 Conclusion

There is an increasing demand for medical centre facilities as a consequence of ongoing urban development and population aging in the Penrith area. The existing Hospital Precinct on the eastern edge of Penrith CBD presents an ideal opportunity for the expansion of services to provide for these needs.

Assessment of the proposal has concluded that:

* the proposed parking provision will be suitable and appropriate for normal peak demands

* the vehicle access and internal circulation arrangements will be suitable and appropriate

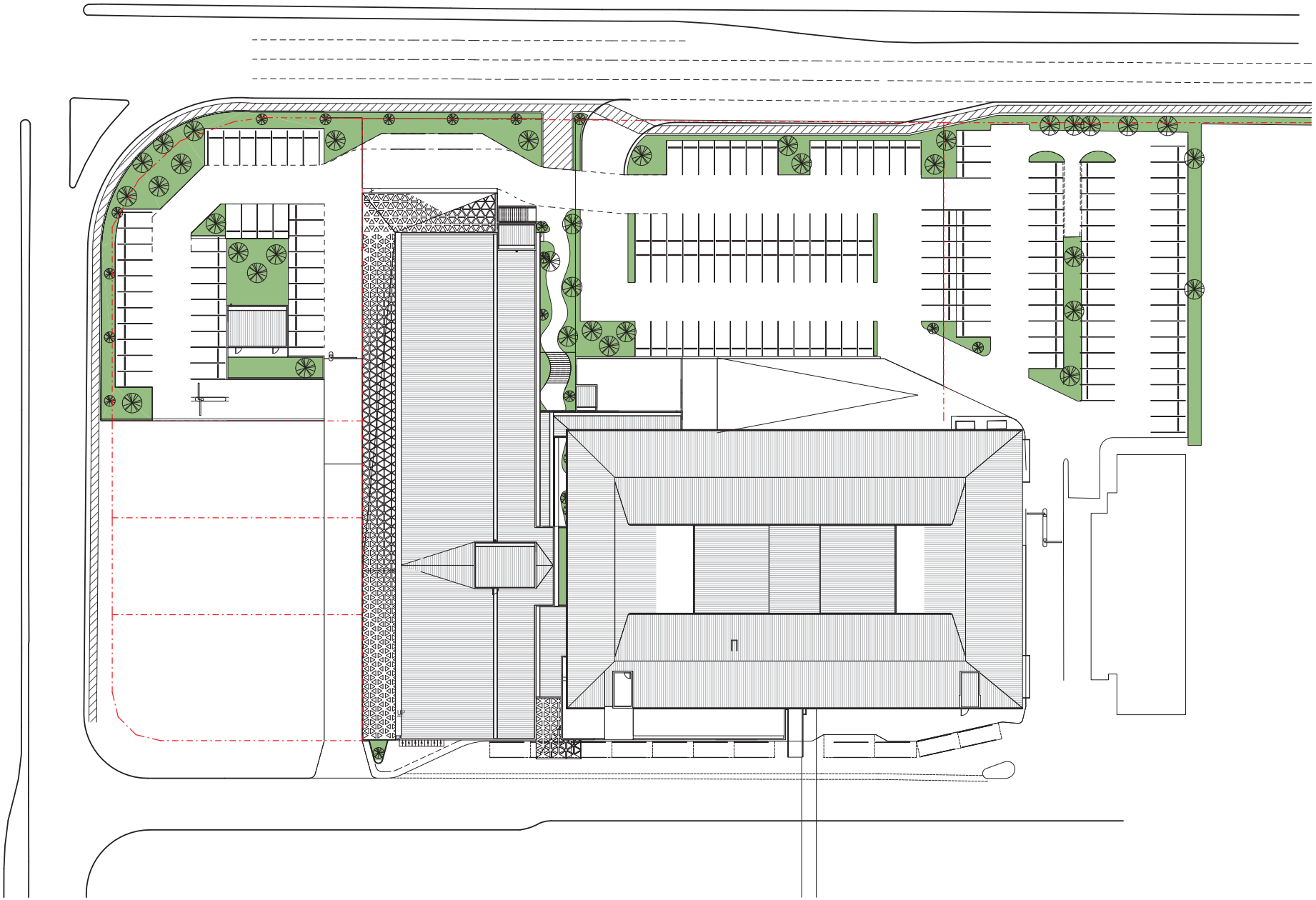
* there will not be any unsatisfactory traffic outcomes

* there will be very accessible and frequent public transport services available for staff, patients and visitors

Appendix A

Architectural Plans

ISSUE	REVISION	DATE
R1	DA SUBMISSION	26/11/18



1 SITE PLAN (ROOF)
SCALE 1 : 300

NOTE:

ALL PROVIDED AREAS AND DIMENSIONS ARE INDICATIVE ONLY AND MAY CHANGE DURING THE DESIGN PROCESS.
FINAL AREAS AND DIMENSIONS TO BE VARYFIED ON SITE BY A QUALIFIED BUILDING SURVEYOR.

CONSULTANTS:

MASTER PLANNING
ARCHITECTURE
INTERIOR DESIGN

BRISBANE
SYDNEY
MELBOURNE
PERTH
DARWIN
CAIRNS
GOLD COAST
SUNSHINE COAST

SKAr

A.B.N. 28602941659
PO Box 1120,
Spring Hill QLD. 4000
Tel +61 4 11120244
stanton.krosenwald@ozemail.com.au

DEVELOPMENT APPROVAL

REASON FOR ISSUE
TOWN PLANNING

- THESE DESIGNS AND PLANS ARE THE COPYRIGHT OF SKAr AND CANNOT BE REPRODUCED WITHOUT WRITTEN PERMISSION
- VERIFY ALL THE DIMENSIONS PRIOR TO THE COMMENCEMENT OF WORK.
- DO NOT SCALE OFF THESE DRAWINGS.
- REPORT DISCREPANCIES TO THE ARCHITECT BEFORE CARRYING OUT WORK
- THE FINISHES NOTED IN THE RUB ARE ONLY NOTE TO THE FINE OBJECTS THAT ARE ACTUALLY DRAWN. THERE FORA COMPLETE FINISHES LISTING THAT ALSO INCLUDES NOT-MODELLED ITEMS, PLEASE REFER TO THE ROOM DATA SHEETS.
- FOR ALL SERVICES CATEGORY FINISHES THE VARIOUS CONSULTANT PACKAGES TAKE PRECEDENCE OVER THE RUB & RIBA PACKAGES.

PROJECT:
Nepean Private Hospital Expansion Stage 1

PROJECT ADDRESS:
1-9 Barber Avenue, Kingswood N.S.W. 2747

CLIENT:
Healthscope

DRAWING TITLE:

SITE PLAN (ROOF)

PROJECT No.:
18-008

NORTH:

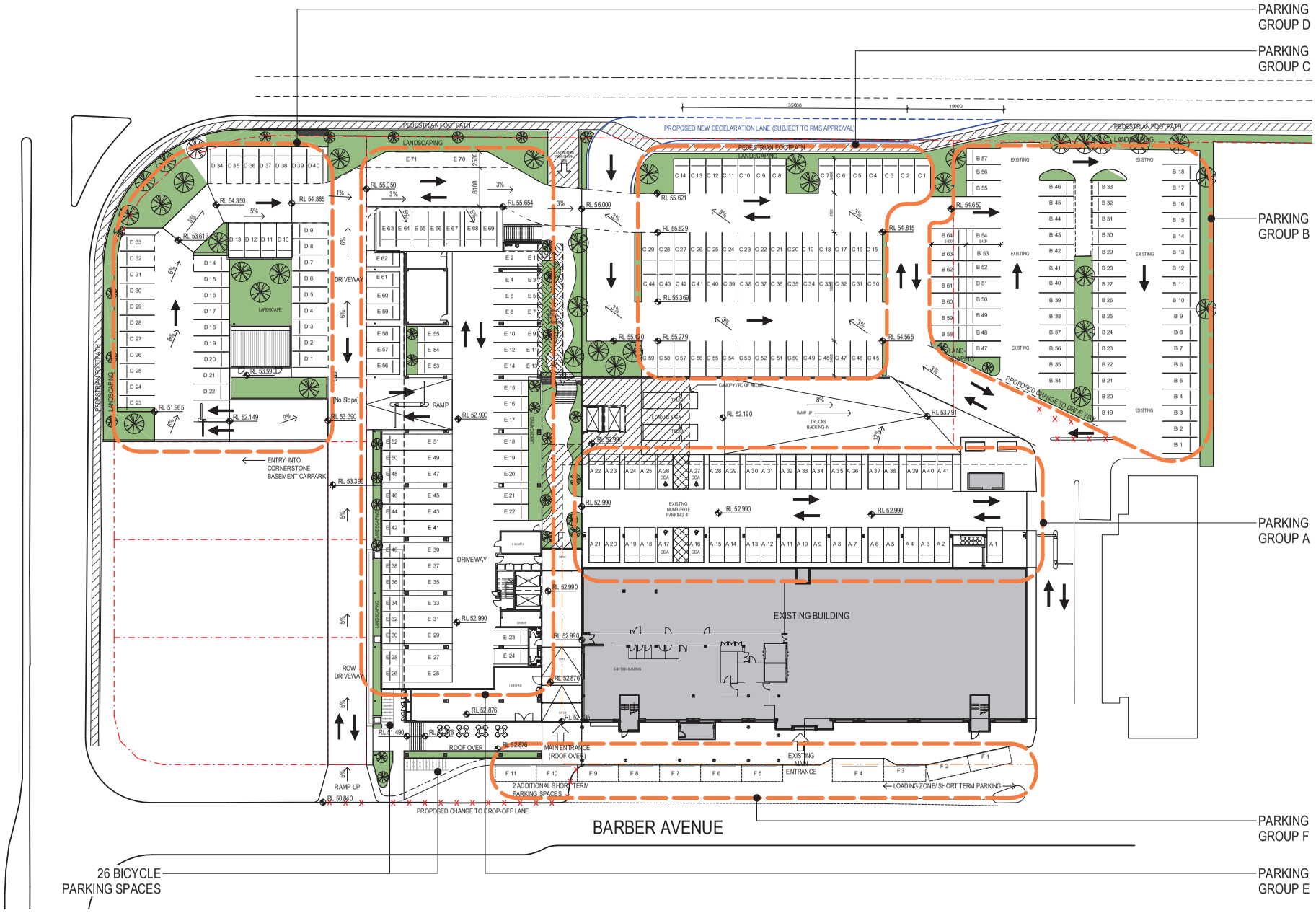
SCALE:
1 : 300 @ A1

PROJECT DATE:
26/11/2018

DRAWING No.:
DA1501

REVISION:
R1

ISSUE	REVISION	DATE
R1	DA SUBMISSION	26/11/18



1 SITE PLAN (OVERALL PARKING / TRAFFIC OPT.A)
A3000 SCALE 1 : 300

PARKING SCHEDULE

Parking Group	Quantity	Note
A	41	Existing Parking
B	64	Existing Parking
C	59	Proposed Parking
D	40	Proposed Parking
E	71	Proposed Parking
F	11	Short term parking
TOTAL NUMBER	286	

NOTE:

ALL PROVIDED AREAS AND DIMENSIONS ARE INDICATIVE ONLY AND MAY CHANGE DURING THE DESIGN PROCESS.
FINAL AREAS AND DIMENSIONS TO BE VARYFIED ON SITE BY A QUALIFIED BUILDING SURVEYOR.

CONSULTANTS:

MASTER PLANNING
ARCHITECTURE
INTERIOR DESIGN

BRISBANE
SYDNEY
MELBOURNE
PERTH
DARWIN
CAIRNS
GOLD COAST
SUNSHINE COAST

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DEVELOPMENT APPROVAL

REASON FOR ISSUE
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- DO NOT SCALE OFF THESE DRAWINGS.
- REPORT DISCREPANCIES TO THE ARCHITECT BEFORE CARRYING OUT WORK
- THE FINALLOSHEDS IN THE FILE ARE ONLY KEYS TO THE FINE OBJECTS THAT ARE ACTUALLY DRAWN. THERE FORA COMPLETE FINAE LISTING THAT ALSO INCLUDES NOT-MODELLED ITEMS, PLEASE REFER TO THE ROOM DATA SHEETS
- FORALL SERVICES GA TE DORY FINE THE VARIOUS CONSULTANT PADKAGES TAKE PRECEDENCE OVER THE RUE & REGIPA DKAGES.

PROJECT:
Nepean Private Hospital Expansion Stage 1

PROJECT ADDRESS:
1-9 Barber Avenue, Kingswood N.S.W. 2747

CLIENT:
Healthscope

DRAWING TITLE:

SITE PLAN (OVERALL PARKING / TRAFFIC OPT.A)

PROJECT No.: 18-008

NORTH:

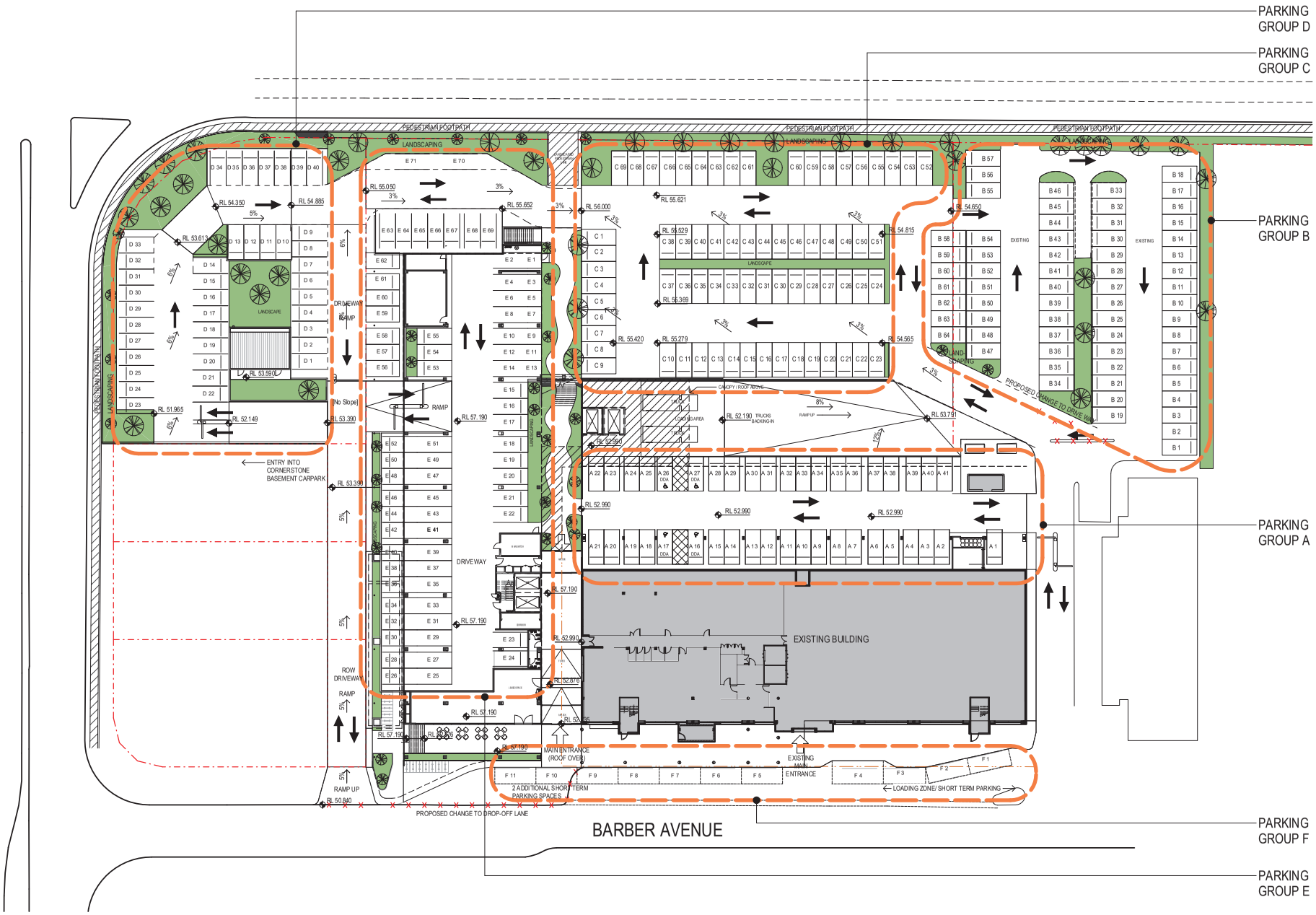
SCALE: 1 : 300 @ A1

PROJECT DATE: 26/11/2018

DRAWING No.: DA1502-A

REVISION: R1

ISSUE	REVISION	DATE
R1	DA SUBMISSION	26/11/18



PARKING SCHEDULE		
Parking Group	Quantity	Note
A	41	Existing Parking
B	64	Existing Parking
C	69	Proposed Parking
D	40	Proposed Parking
E	72	Proposed Parking
F	11	Short term Parking
TOTAL NUMBER	297	

1 A3000 SITE PLAN (OVERALL PARKING / TRAFFIC OPT.B)
SCALE 1 : 300

CONSULTANTS:

MASTER PLANNING
ARCHITECTURE
INTERIOR DESIGN

BRISBANE
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PERTH
DARWIN
CAIRNS
GOLD COAST
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DEVELOPMENT APPROVAL

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- DO NOT SCALE OFF THESE DRAWINGS
- REPORT DISCREPANCIES TO THE ARCHITECT BEFORE CARRYING OUT WORK
- THE FF&E LISTED IN THE FLS ARE ONLY KEYED TO THE FF&E OBJECTS THAT ARE ACTUALLY DRAWN. THERE FORA COMPLETE FF&E LISTING THAT ALSO INCLUDES NOT-MODELLED ITEMS, PLEASE REFER TO THE ROOM DATA SHEETS
- FOR ALL SERVICES CONTENT FF&E THE VARIOUS CONSULTANT PACKAGES TAKE PRECEDENCE OVER THE FLS & RESPA CKAGES.

PROJECT:
Nepean Private Hospital Expansion Stage 1

PROJECT ADDRESS:
1-9 Barber Avenue, Kingswood N.S.W. 2747

CLIENT:
Healthscope

DRAWING TITLE:

SITE PLAN (OVERALL PARKING / TRAFFIC OPT.B)

PROJECT No.: 18-008

NORTH:

SCALE: 1 : 300 @ A1

PROJECT DATE: 26/11/2018

DRAWING No.: DA1502-B

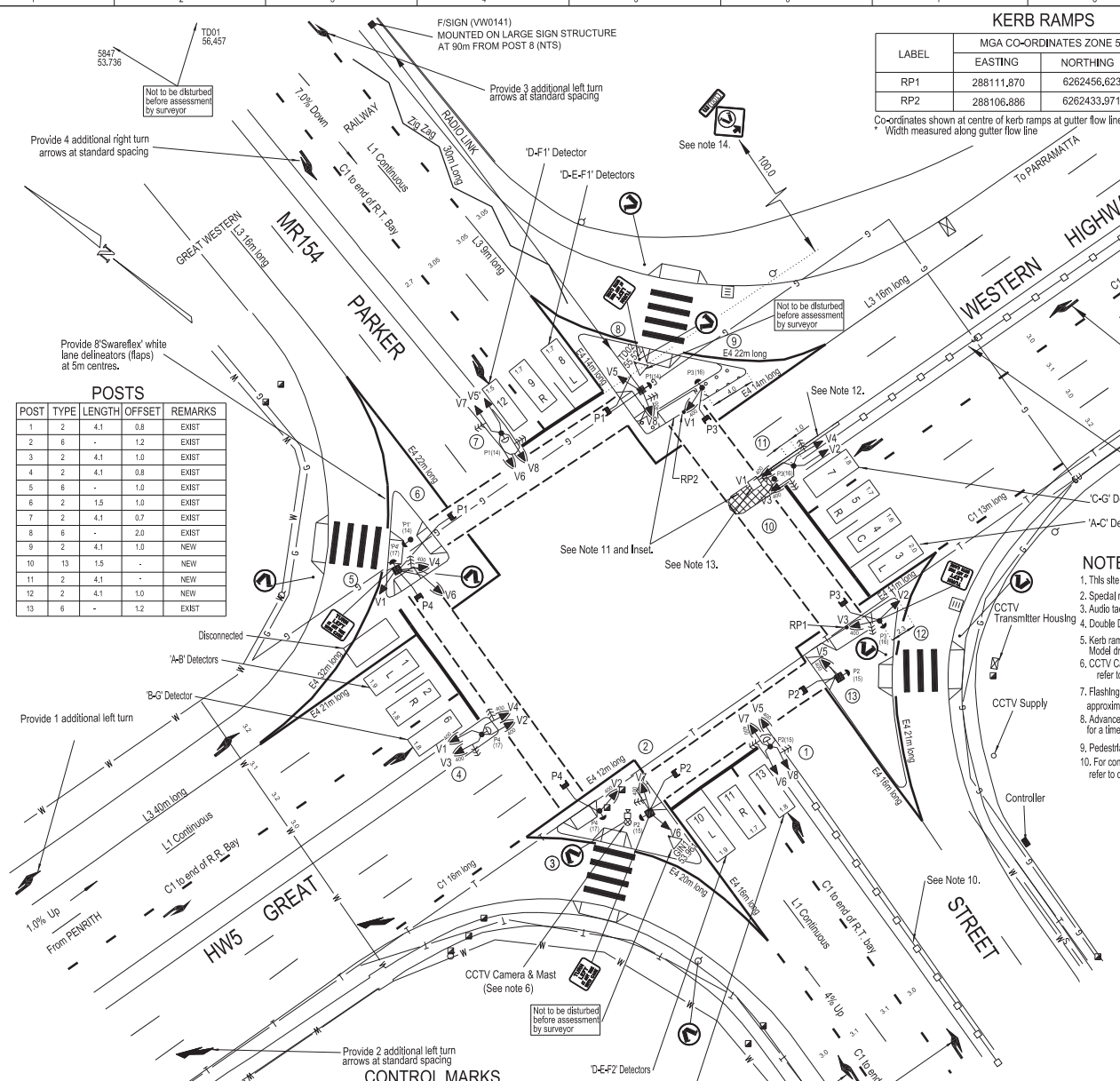
REVISION: R1

Appendix B

Traffic Control Plan

ttpa

Date In Service..... 26. 7. 67
Date of Reconstruction.....

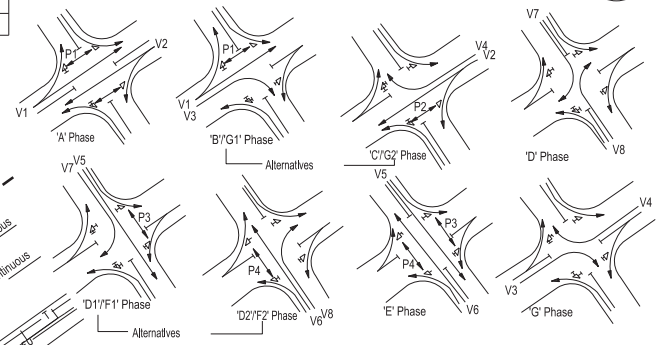


KERB RAMPS

LABEL	MGA CO-ORDINATES ZONE 56		WIDTH*
	EASTING	NORTHING	
RP1	288111.870	6262456.623	3.6
RP2	288106.886	6262433.971	3.6

Co-ordinates shown at centre of kerb ramps at gutter flow line
* Width measured along gutter flow line

MOVEMENT DIAGRAMS



POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS
1	2	4.1	0.8	EXIST
2	6	-	1.2	EXIST
3	2	4.1	1.0	EXIST
4	2	4.1	0.8	EXIST
5	6	-	1.0	EXIST
6	2	1.5	1.0	EXIST
7	2	4.1	0.7	EXIST
8	6	-	2.0	EXIST
9	2	4.1	1.0	NEW
10	13	1.5	-	NEW
11	2	4.1	-	NEW
12	2	4.1	1.0	NEW
13	6	-	1.2	EXIST

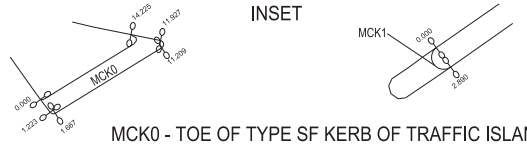
SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE DURING WHICH GREEN DISPLAYED												OVERLAPS PERMITTED	OVERLAP CONDITIONS
	A	B	C	D	D1	D2	E	F1	F2	G	G1	G2		
V1	X	X									X		G1/A/B,B/A, A/G1 *	*P1 NOT RUNNING
V2	X		X									X	G2/A/C,C/A, A/G2 *	*P2 NOT RUNNING
V3		X								X	X		G/G1,B/G	
V4			X							X		X	G/G2,C/G	
V5					X		X	X					D1/E/F1	
V6						X	X		X				D2/E/F2	
V7				X	X			X					D/D1	
V8				X		X			X				D/D2	
P1	X	X									X		G1/A /B	* CLEARANCE ONLY
P2	X		X									X	G2/A /C	* CLEARANCE ONLY
P3					X		X	X					D1/E	
P4						X	X		X				D2/E	

NOTES

1. This site is SCATS linked.
2. Special regulatory stop signs (R1-202) to be placed on posts 1, 2, 7 & 8.
3. Audio tactile pushbuttons provided on posts 2,3,5,6,8,9,11&12.
4. Double Diamond Overlap refer to TS_TN_027.
5. Kerb ramps are constructed in accordance with Model drawing MD.R173.B01.A.1.
6. CCTV Camera mounted on special Mast (height 7.0m), refer to plan Riverton Engineering M 327.
7. Flashing warning sign (VW0141) is mounted on large sign structure (13275) approximately 90m from post 8 and radio linked to post 8.
8. Advance warning sign flashes during ECO prior to V5 amber and start of V5 green for a time. Detector T8 monitors the sign MSS Bit 1 set if sign not operating correctly.
9. Pedestrian Fence is constructed in accordance with Model Drawings MD,R201,C01.A.
10. For construction details of pedestrian fence along Parker Street refer to drawings DS2013/001645.
11. Civil works:
    (i) Remove 7sq.m of concrete median.
    (ii) Construct 17m type SF kerb.
    (iii) Reconstruct 7sq.m of new/rehabilitate pavement shown .....
    (iv) Construct 13.5sq.m of concrete island shown .....
    (iv) Construct 50m pedestrian fence along Great Western Highway median.
12. Install 7m of Kerb drain type QK200SF and connect to existing drainage pipe.
13. Convert the existing pit to drainage junction box.
14. Install "Pedestrian Crossing Left" sign with "100m" sign on existing power post south of the intersection of Cox Ave and Parker St.

INSET



MCK0 - TOE OF TYPE SF KERB OF TRAFFIC ISLAND

	CO-ORDINATES STATION	EASTING	NORTHING	BEARING	RADIUS
START	0.000	288108.644	6262459.231	192 42 1.3	
T.P.	1.223	288108.375	6262458.038	192 42 1.3	
CENTRE		288108.667	6262457.972		-0.300
T.P.	1.667	288108.575	6262457.686	107 55 50.0	
T.P.	11.209	288117.654	6262454.749	107 55 50.0	
CENTRE		288117.746	6262455.034		-0.300
T.P.	11.927	288118.009	6262455.180	330 54 26.1	
END	14.225	288116.891	6262457.188	330 54 26.1	

MCK1- TOE OF TYPE SF KERB OF MEDIAN

	CO-ORDINATES STATION	EASTING	NORTHING	BEARING	RADIUS
TART	0.000	288113.022	6262447.813	282 51 33.9	
CENTRE		288112.817	6262446.915		-0.921
END	2.890	288112.608	6262446.017		

MCP6 - CENTRE LINE OF PEDESTRIAN FENCE

	CO-ORDINATES STATION	EASTING	NORTHING	BEARING	RADIUS
START	0.000	288113.515	6262446.736	104 44 47.7	
END	50.000	288161.868	6262434.008	104 44 47.7	

UTILITY LEGEND

EU	ELECTRICITY
G	GAS
T	TELSTRA
W	WATER
S	SEWER

CONTROL MARKS

LABEL	MARK	MGA CO-ORDINATES		R.L.	DESCRIPTION
		EASTING	NORTHING		
GIN1	-	288083.314	6262432.912	53.961	G.I.NAIL [C]
5847	PM 15847	288098.818	6262547.679	53.736	S.S PIN [P]
TD01	-	288122.286	6262514.500	56.457	HILTI [C]
TD02	-	288112.366	6262487.801	55.522	HILTI [C]

STANDARD KERB SHAPE

A ORIGINAL ISSUE

'B' ISSUE JI.SWR.5144 2-3-90
ALTERED: LINE MARKING ON THE NORTHERN DEPT. SIDE OF (MR. 154) PARKER ST.
ADDED: NOTES 4 & 5
DRAWN: J.S.L. CHECKED: F.O.R. 29.3.90

'C' ISSUE JI. SWR 2369 27-2-91
NOTE 6 ADDED, ANTTS SYST. NOTE 3 ADDED, POST PLANS.
CNJ.JONES.

'D' Issue: JI.SWR5427 5-9-91
Designated left turn lane provided SHE Ebound.
Deleted: Wide loop around detector. NB: T disconnected.
Drawn: T.L. Checked: G.R.
R. 18.92

'E' Issue
CCTV Cameras facilities added.
T.C. 27.01.98 L.C.

'F' Issue
Signal Timing changed at Parker Street/Great Western Hwy intersection.
Added: Blue lane in Parker Street.
K.L. 2/6/00

G Issue Office Instruct.
Added: Pedestrian crossing, detector numbering.
Added: Flashing.
K.L. 2/6/00

H Issue Office Instruct.
Added 'Busses excepted' in SW 4th lane.
Added: Flashing.
K.L. 2/6/00

I Issue J.I SW 378.30.6.2004
Drawing altered to electronic format.
Added: Audio tactile push buttons on posts 2,3,5,6,8,&11.
K.L. 12.7.2004

J Issue: JI SM 579
Advance Warning Sign added on Parker Street.
M.M 29/08/09 L.C.

K Issue: JI SM580
Advance pedestrian crossing across the western approach of the Great Western Hwy.
C.S. 22/11/13

M Issue
Advance detail for installation of pedestrian crossing phase.
C.S. 23/01/14

N Issue
Install Pedestrian Crossing Sign, Pedestrian Crossing Left Arrow.
Installed 30m of 3p-2p advance pavement marking
C.S. 06/03/14

REFERENCE PLANS	
Symbols&Abb	BD001.5
Standard Posit	BD001.3
Pres. Detectors	2C005.9
Type 2 Posts	PM202.1
Det.Schedule.Eqd.	VD018.10
ANTTS SYSTEM	VE542-13

SURVEYOR .....
DATE .....
FLD.BK. .....
U.D.B. REF. MAP 163 P11
DESIGNED G. TROTTER
CHECKED G. JONES
PASSED

THESE DRAWINGS HAVE BEEN TAKEN TO THE SITE OF THE WORK AND ARE RECOMMENDED.
SUPERVISING ENGINEER
DATE 28 March 1988

APPROVED
DIVISIONAL ENGINEER
DATE 31 March 1988

ROADS & TRAFFIC AUTHORITY N.S.W.
CITY OF PENRITH
(S.H.5) GREAT WESTERN HIGHWAY AND
(M.R.154) PARKER STREET-KINGSWOOD
T.C.S. No. 442

DIVISION: PARRAMATTA
FILE NO 358 TS 105
No. OF SHEETS -
SHEET. No. 16
SCALE 1:200
REG. No. 0005.358.VV.0442

SUPERSEDES SHEET 9
ISSUE

SD 6286-TRAFFIC CONTROL SYSTEM LAYOUT DRAWING SHEET ISSUED FEB 1977
SD 6286

DRAWN USING CAD
DO NOT AMEND MANUALLY

DATE IN SERVICE : 00/00/00

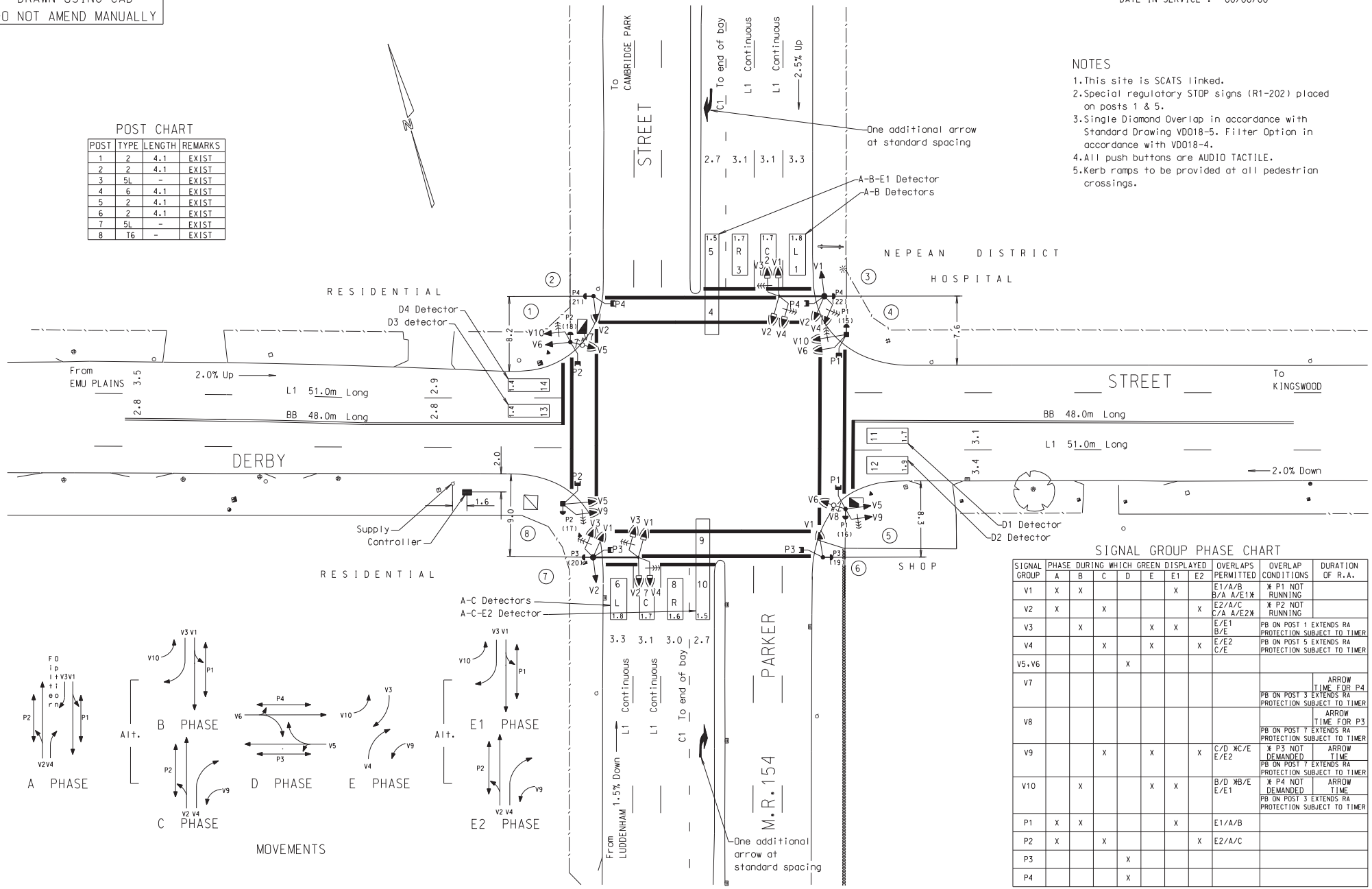
0154.358.VV.2716

POST CHART

POST	TYPE	LENGTH	REMARKS
1	2	4.1	EXIST
2	2	4.1	EXIST
3	5L	-	EXIST
4	6	4.1	EXIST
5	2	4.1	EXIST
6	2	4.1	EXIST
7	5L	-	EXIST
8	T6	-	EXIST

NOTES

1. This site is SCATS linked.
2. Special regulatory STOP signs (R1-202) placed on posts 1 & 5.
3. Single Diamond Overlap in accordance with Standard Drawing VD018-5. Filter Option in accordance with VD018-4.
4. All push buttons are AUDIO TACTILE.
5. Kerb ramps to be provided at all pedestrian crossings.



SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE DURING WHICH GREEN DISPLAYED A	B	C	D	E	E1	E2	OVERLAPS PERMITTED	OVERLAP CONDITIONS	DURATION OF R.A.
V1	X	X				X		E1/A/B B/A A/E1✱	✱ P1 NOT RUNNING	
V2	X		X				X	E2/A/C C/A A/E2✱	✱ P2 NOT RUNNING	
V3		X			X	X		E/E1 B/E	PB ON POST 1 EXTENDS RA PROTECTION SUBJECT TO TIMER	
V4			X		X		X	E/E2 C/E	PB ON POST 5 EXTENDS RA PROTECTION SUBJECT TO TIMER	
V5.V6				X						
V7									PB ON POST 3 EXTENDS RA PROTECTION SUBJECT TO TIMER	ARROW TIME FOR P4
V8									PB ON POST 7 EXTENDS RA PROTECTION SUBJECT TO TIMER	ARROW TIME FOR P3
V9			X		X		X	C/D ✱C/E E/E2	✱ P3 NOT DEMANDED PB ON POST 7 EXTENDS RA PROTECTION SUBJECT TO TIMER	ARROW TIME
V10		X			X	X		B/D ✱B/E E/E1	✱ P4 NOT DEMANDED PB ON POST 3 EXTENDS RA PROTECTION SUBJECT TO TIMER	ARROW TIME
P1	X	X				X		E1/A/B		
P2	X		X				X	E2/A/C		
P3				X						
P4				X						

A ORIGINAL ISSUE 16605
28 ISSUE T6 WAE
POST 8 WAS TYPE 2.
TDPA 01/96

PUBLIC UTILITY LEGEND	
HYDRANT	□
STOP VALVE	▲
GAS VALVE	#
SEWER MANHOLE	⊕
TELECOM PIT	◪
ELECT LIGHT POLE	☾
POWER POLE	○
STAY POLE	⊘
TELEPHONE BOX	☎
TELECOM PILLAR	◐

REFERENCE PLANS	
SYMBOLS/ABBS.	VD003-7
STD POSIT	VD001-5
DET SCHED EXP	VD018-10
PRES. DETECT	VC005-17
SSG DIS. SEQ.	VD018-8
SURVEYOR : V.CARNUCCIO	
DATE : MARCH 1993	

U.B.D. Ref. MAP 46 H3
I.S.G. CO-ORDS E: 273 108 N: 1 262 889
DESIGNED G.HIGGINBOTHAM
CHECKED G.EYRE
G.HIGGINBOTHAM SITE CHECKED
F.D.REID RECOMMENDED

APPROVED
R.J. WESLEY
DESIGN ENGINEER
030697
DATE
ACCEPTED
100693
DATE

Roads and Traffic Authority.N.S.W

CITY OF PENRITH
M.R.154 PARKER STREET
AND DERBY STREET
PENRITH

DESIGN LAYOUT
TCS No 2716

REGION: SYDNEY
BRANCH: CONSULTANT SERVICES
LOGIN: TCS
DGGS DRAWING FILE: VV_2716_1B.DES
SCALE 5 0 (1:200) 5 10
ISSUE B
FILE 358.TS.221
SUPERSEDES SHEET/ISSUE -
REGN. 0154.358.VV.2716
SHEET 1

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VV2716_01B.dgn 5/12/2008 10:53:04 AM

Appendix C

Traffic and Parking Surveys

ttpa

Traffic Information Specialist

Location	Parker Street	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Parker Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per 15 Mins	NORTH Parker Street										EAST Great Western Highway										TOTAL		
	L			T			R				L			T			R						
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL
7:00 - 7:15	124	13	137	186	17	203	28	1	29	369	31	3	34	179	3	182	82	2	84	300	1047	64	1111
7:15 - 7:30	121	11	132	218	19	237	28	6	34	403	33	2	35	185	6	191	90	2	92	318	1132	69	1201
7:30 - 7:45	118	9	127	249	8	257	24	9	33	417	31	2	33	116	3	119	94	3	97	249	1149	55	1204
7:45 - 8:00	139	7	146	217	13	230	45	5	50	426	32	1	33	163	11	174	88	12	100	307	1133	74	1207
8:00 - 8:15	128	12	140	201	9	210	22	7	29	379	32	1	33	160	14	174	98	20	118	325	1176	82	1258
8:15 - 8:30	140	12	152	219	10	229	21	5	26	407	41	0	41	265	14	279	73	14	87	407	1207	94	1301
8:30 - 8:45	132	8	140	226	16	242	68	4	72	454	44	1	45	226	9	235	75	5	80	360	1257	71	1328
8:45 - 9:00	153	3	156	235	12	247	74	3	77	480	58	2	60	176	5	181	97	4	101	342	1252	59	1311
9:00 - 9:15	146	6	152	188	13	201	69	2	71	424	39	6	45	208	10	218	80	9	89	352	1152	70	1222
9:15 - 9:30	131	18	149	164	0	164	52	0	52	365	32	1	33	185	4	189	76	8	84	306	1074	59	1133
9:30 - 9:45	106	4	110	145	4	149	22	0	22	281	29	0	29	194	6	200	70	6	76	305	994	40	1034
9:45 - 10:00	85	5	90	141	7	148	63	1	64	302	26	0	26	192	6	198	73	5	78	302	1032	55	1087
Period End	1523	108	1631	2389	128	2517	516	43	559	4707	428	19	447	2249	91	2340	996	90	1086	3873	13605	792	14397
16:00 - 16:15	112	6	118	218	21	239	51	6	57	414	23	2	25	278	9	287	82	4	86	398	1326	80	1363
16:15 - 16:30	145	3	148	228	3	231	52	3	55	434	31	4	35	213	4	217	98	4	102	354	1322	42	1364
16:30 - 16:45	118	2	120	235	11	246	47	6	53	419	43	2	45	271	7	278	104	6	110	433	1402	66	1468
16:45 - 17:00	129	4	133	240	15	255	43	4	47	435	22	0	22	206	9	215	101	9	110	347	1326	63	1389
17:00 - 17:15	136	4	140	252	8	260	49	0	49	449	18	0	18	198	15	213	97	9	106	337	1322	52	1374
17:15 - 17:30	141	6	147	246	4	250	55	0	55	452	16	0	16	168	25	193	85	11	96	305	1239	62	1301
17:30 - 17:45	145	3	148	237	4	241	61	4	65	454	24	1	25	195	10	205	87	13	100	330	1263	49	1312
17:45 - 18:00	158	5	163	229	7	236	63	4	67	466	20	0	20	168	9	177	77	4	81	278	1270	40	1310
18:00 - 18:15	102	2	104	161	0	161	61	2	63	328	23	4	27	148	3	151	86	3	89	267	1076	22	1098
18:15 - 18:30	130	1	131	188	1	189	38	1	39	359	35	3	38	136	0	136	81	0	81	255	1076	21	1097
18:30 - 18:45	88	1	89	155	2	157	44	1	45	291	32	2	34	131	4	135	74	2	76	245	934	17	951
18:45 - 19:00	59	1	60	148	3	151	42	2	44	255	21	0	21	127	0	127	98	0	98	246	876	10	886
Period End	1463	38	1501	2537	79	2616	606	33	639	4756	308	18	326	2239	95	2334	1070	65	1135	3795	14432	524	14913

All Vehicles Time Per 15 Mins	SOUTH Parker Street										WEST Great Western Highway										TOTAL		
	L			T			R				L			T			R						
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL
7:00 - 7:15	57	2	59	169	15	184	30	2	32	275	24	3	27	118	2	120	19	1	20	167	1047	64	1111
7:15 - 7:30	55	1	56	161	10	171	34	1	35	262	34	4	38	161	6	167	12	1	13	218	1132	69	1201
7:30 - 7:45	88	1	89	186	12	198	25	0	25	312	38	2	40	166	6	172	14	0	14	226	1149	55	1204
7:45 - 8:00	65	2	67	144	9	153	31	2	33	253	43	2	45	150	8	158	16	2	18	221	1133	74	1207
8:00 - 8:15	68	0	68	197	5	202	24	0	24	294	48	3	51	185	9	194	13	2	15	260	1176	82	1258
8:15 - 8:30	63	4	67	133	23	156	14	2	16	239	53	2	55	168	7	175	17	1	18	248	1207	94	1301
8:30 - 8:45	74	5	79	156	6	162	12	2	14	255	49	4	53	167	7	174	28	4	32	259	1257	71	1328
8:45 - 9:00	71	5	76	124	16	140	14	2	16	232	51	2	53	161	4	165	38	1	39	257	1252	59	1311
9:00 - 9:15	74	6	80	152	14	166	16	2	18	264	45	2	47	97	0	97	38	0	38	182	1152	70	1222
9:15 - 9:30	81	4	85	147	14	161	33	3	36	282	55	4	59	87	2	89	31	1	32	180	1074	59	1133
9:30 - 9:45	73	5	78	145	8	153	27	2	29	260	53	3	56	92	1	93	38	1	39	188	994	40	1034
9:45 - 10:00	85	4	89	134	17	151	16	4	20	260	51	4	55	121	1	122	45	1	46	223	1032	55	1087
Period End	854	39	893	1848	149	1997	276	22	298	3188	544	35	579	1673	53	1726	309	15	324	2629	13605	792	14397
16:00 - 16:15	41	2	0	214	11	225	20	7	27	252	73	5	78	161	5	166	53	2	55	299	1326	80	1363
16:15 - 16:30	46	2	48	197	5	202	21	4	25	275	96	3	99	145	7	152	50	0	50	301	1322	42	1364
16:30 - 16:45	54	2	56	195	19	214	24	0	24	294	109	1	110	158	7	165	44	3	47	322	1402	66	1468
16:45 - 17:00	50	0	50	209	17	226	21	0	21	297	120	4	124	147	1	148	38	0	38	310	1326	63	1389
17:00 - 17:15	37	1	38	223	7	230	17	1	18	286	114	6	120	140	0	140	41	1	42	302	1322	52	1374
17:15 - 17:30	39	1	40	193	5	198	18	2	20	258	108	4	112	132	1	133	38	3	41	286	1239	62	1301
17:30 - 17:45	33	1	34	176	4	180	19	2	21	235	113	2	115	134	4	138	39	1	40	293	1263	49	1312
17:45 - 18:00	47	2	49	185	4	189	17	3	20	258	121	2	123	143	0	143	42	0	42	308	1270	40	1310
18:00 - 18:15	32	0	32	179	5	184	19	0	19	235	101	1	102	125	2	127	39	0	39	268	1076	22	1098
18:15 - 18:30	43	0	43	181	11	192	18	0	18	253	85	2	87	101	2	103	40	0	40	230	1076	21	1097
18:30 - 18:45	45	2	47	177	2	179	17	0	17	243	63	1	64	71	0	71	37	0	37	172	934	17	951
18:45 - 19:00	43	2	45	179	0	179	23	2	25	249	41	0	41	62	0	62	33	0	33	136	876	10	886
Period End	510	15	482	2308	90	2398	234	21	255	3135	1144	31	1175	1519	29	1548	494	10	504	3227	14432	524	14913

Location	Parker Street	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Parker Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

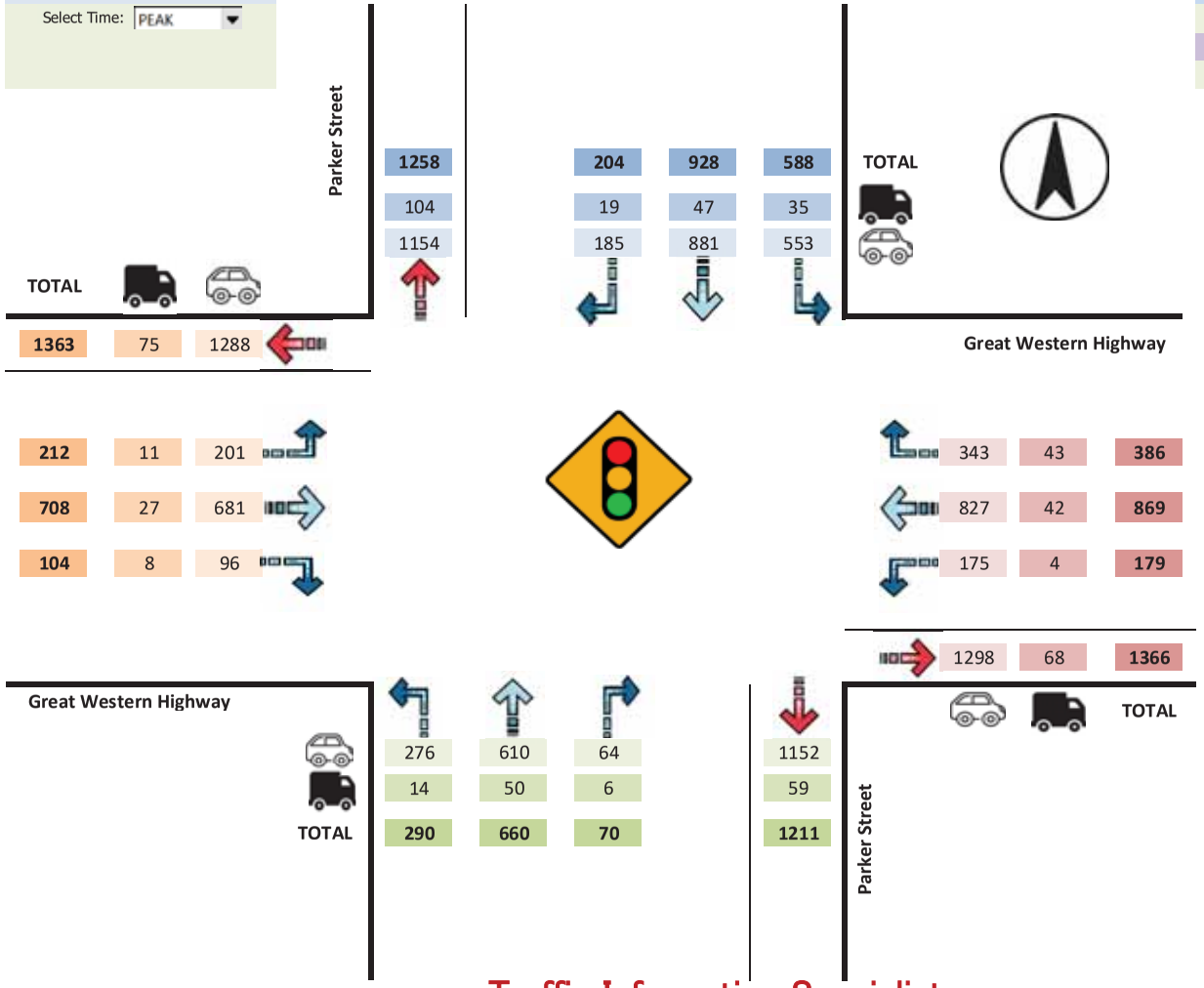
All Vehicles Time Per Hour	NORTH Parker Street										EAST Great Western Highway												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	502	40	542	870	57	927	125	21	146	1615	127	8	135	643	23	666	354	19	373	1174	4461	262	4723
7:15 - 8:15	506	39	545	885	49	934	119	27	146	1625	128	6	134	624	34	658	370	37	407	1199	4590	280	4870
7:30 - 8:30	525	40	565	886	40	926	112	26	138	1629	136	4	140	704	42	746	353	49	402	1288	4665	305	4970
7:45 - 8:45	539	39	578	863	48	911	156	21	177	1666	149	3	152	814	48	862	334	51	385	1399	4773	321	5094
8:00 - 9:00	553	35	588	881	47	928	185	19	204	1720	175	4	179	827	42	869	343	43	386	1434	4892	306	5198
8:15 - 9:15	571	29	600	868	51	919	232	14	246	1765	182	9	191	875	38	913	325	32	357	1461	4868	294	5162
8:30 - 9:30	562	35	597	813	41	854	263	9	272	1723	173	10	183	795	28	823	328	26	354	1360	4735	259	4994
8:45 - 9:45	536	31	567	732	29	761	217	5	222	1550	158	9	167	763	25	788	323	27	350	1305	4472	228	4700
9:00 - 10:00	468	33	501	638	24	662	206	3	209	1372	126	7	133	779	26	805	299	28	327	1265	4252	224	4476
Period End	4762	321	5083	7436	386	7822	1615	145	1760	14665	1354	60	1414	6824	306	7130	3029	312	3341	11885	41708	2479	44187
16:00 - 17:00	504	15	519	921	50	971	193	19	212	1702	119	8	127	968	29	997	385	23	408	1532	5376	251	5584
16:15 - 17:15	528	13	541	955	37	992	191	13	204	1737	114	6	120	888	35	923	400	28	428	1471	5372	223	5595
16:30 - 17:30	524	16	540	973	38	1011	194	10	204	1755	99	2	101	843	56	899	387	35	422	1422	5289	243	5532
16:45 - 17:45	551	17	568	975	31	1006	208	8	216	1790	80	1	81	767	59	826	370	42	412	1319	5150	226	5376
17:00 - 18:00	580	18	598	964	23	987	228	8	236	1821	78	1	79	729	59	788	346	37	383	1250	5094	203	5297
17:15 - 18:15	546	16	562	873	15	888	240	10	250	1700	83	5	88	679	47	726	335	31	366	1180	4848	173	5021
17:30 - 18:30	535	11	546	815	12	827	223	11	234	1607	102	8	110	647	22	669	331	20	351	1130	4685	132	4817
17:45 - 18:45	478	9	487	733	10	743	206	8	214	1444	110	9	119	583	16	599	318	9	327	1045	4356	100	4456
18:00 - 19:00	379	5	384	652	6	658	185	6	191	1233	111	9	120	542	7	549	339	5	344	1013	3962	70	4032
Period End	4625	120	4745	7861	222	8083	1868	93	1961	14789	896	49	945	6646	330	6976	3211	230	3441	11362	44132	1621	45710

All Vehicles Time Per Hour	SOUTH Parker Street										WEST Great Western Highway												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	265	6	271	660	46	706	120	5	125	1102	139	11	150	595	22	617	61	4	65	832	4461	262	4723
7:15 - 8:15	276	4	280	688	36	724	114	3	117	1121	163	11	174	662	29	691	55	5	60	925	4590	280	4870
7:30 - 8:30	284	7	291	660	49	709	94	4	98	1098	182	9	191	669	30	699	60	5	65	955	4665	305	4970
7:45 - 8:45	270	11	281	630	43	673	81	6	87	1041	193	11	204	670	31	701	74	9	83	988	4773	321	5094
8:00 - 9:00	276	14	290	610	50	660	64	6	70	1020	201	11	212	681	27	708	96	8	104	1024	4892	306	5198
8:15 - 9:15	282	20	302	565	59	624	56	8	64	990	198	10	208	593	18	611	121	6	127	946	4868	294	5162
8:30 - 9:30	300	20	320	579	50	629	75	9	84	1033	200	12	212	512	13	525	135	6	141	878	4735	259	4994
8:45 - 9:45	299	20	319	568	52	620	90	9	99	1038	204	11	215	437	7	444	145	3	148	807	4472	228	4700
9:00 - 10:00	313	19	332	578	53	631	92	11	103	1066	204	13	217	397	4	401	152	3	155	773	4252	224	4476
Period End	2565	121	2686	5538	438	5976	786	61	847	9509	1684	99	1783	5216	181	5397	899	49	948	8128	41708	2479	44187
16:00 - 17:00	191	6	154	815	52	867	86	11	97	1118	398	13	411	611	20	631	185	5	190	1232	5376	251	5584
16:15 - 17:15	187	5	192	824	48	872	83	5	88	1152	439	14	453	590	15	605	173	4	177	1235	5372	223	5595
16:30 - 17:30	180	4	184	820	48	868	80	3	83	1135	451	15	466	577	9	586	161	7	168	1220	5289	243	5532
16:45 - 17:45	159	3	162	801	33	834	75	5	80	1076	455	16	471	553	6	559	156	5	161	1191	5150	226	5376
17:00 - 18:00	156	5	161	777	20	797	71	8	79	1037	456	14	470	549	5	554	160	5	165	1189	5094	203	5297
17:15 - 18:15	151	4	155	733	18	751	73	7	80	986	443	9	452	534	7	541	158	4	162	1155	4848	173	5021
17:30 - 18:30	155	3	158	721	24	745	73	5	78	981	420	7	427	503	8	511	160	1	161	1099	4685	132	4817
17:45 - 18:45	167	4	171	722	22	744	71	3	74	989	370	6	376	440	4	444	158	0	158	978	4356	100	4456
18:00 - 19:00	163	4	167	716	18	734	77	2	79	980	290	4	294	359	4	363	149	0	149	806	3962	70	4032
Period End	1509	38	1504	6929	283	7212	689	49	738	9454	3722	98	3820	4716	78	4794	1460	31	1491	10105	44132	1621	45710

Location	Parker Street	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Parker Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION
Select Time: PEAK

TIME RANGE		
PEAK	-	AM
PEAK		
8:00	-	9:00

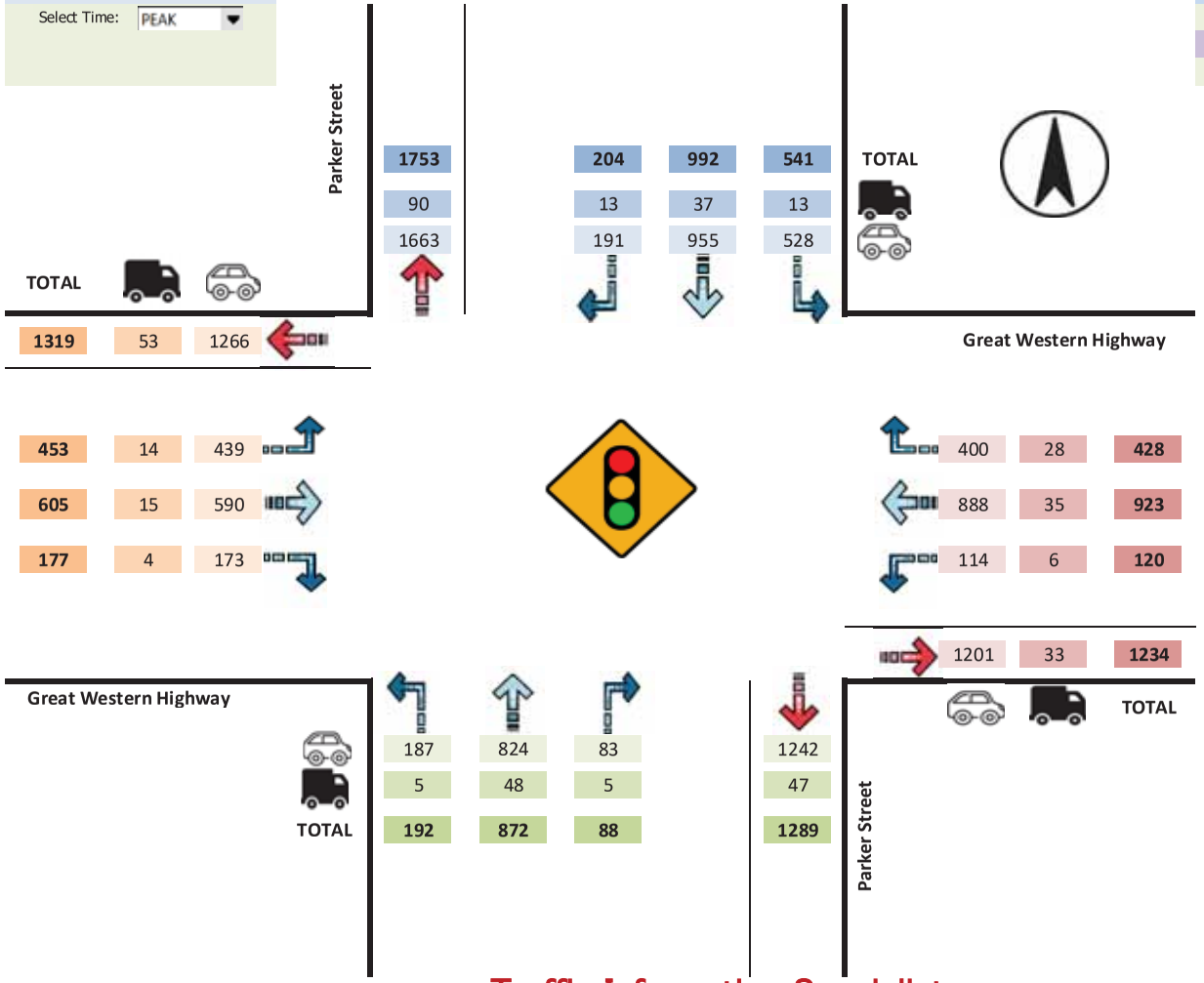


Traffic Information Specialists
ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au

Location	Parker Street	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Parker Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION
Select Time: PEAK

TIME RANGE		
PEAK	-	PM
PEAK		
16:15	-	17:15



Traffic Information Specialists
ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au

Traffic Information Specialist

Location	Parker Street	Duration	0700 - 1000
	Derby Street		1600 - 1900
	Parker Street		-
	Derby Street	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per 15 Mins	NORTH Parker Street										EAST Derby Street												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15	7	1	8	177	15	192	16	1	17	217	5	0	5	12	2	14	13	1	14	33	534	48	582
7:15 - 7:30	8	0	8	180	14	194	25	2	27	229	8	1	9	21	2	23	5	0	5	37	567	52	619
7:30 - 7:45	19	0	19	178	15	193	37	1	38	250	17	0	17	21	1	22	8	0	8	47	664	34	698
7:45 - 8:00	12	0	12	203	15	218	34	0	34	264	8	2	10	35	0	35	2	0	2	47	675	34	709
8:00 - 8:15	15	0	15	206	20	226	19	0	19	260	4	0	4	42	3	45	7	1	8	57	663	39	702
8:15 - 8:30	23	0	23	151	7	158	27	1	28	209	9	0	9	27	1	28	8	0	8	45	603	39	642
8:30 - 8:45	18	0	18	201	12	213	31	0	31	262	8	0	8	32	1	33	5	0	5	46	656	40	696
8:45 - 9:00	24	0	24	184	18	202	58	0	58	284	11	1	12	43	2	45	7	0	7	64	692	51	743
9:00 - 9:15	19	0	19	186	10	196	46	0	46	261	12	0	12	42	0	42	7	1	8	62	657	32	689
9:15 - 9:30	23	0	23	145	15	160	39	0	39	222	13	0	13	31	3	34	2	0	2	49	622	45	667
9:30 - 9:45	21	0	21	162	19	181	33	0	33	235	13	1	14	34	1	35	5	2	7	56	598	33	631
9:45 - 10:00	12	0	12	155	7	162	40	1	41	215	17	1	18	33	3	36	8	1	9	63	580	35	615
Period End	201	1	202	2128	167	2295	405	6	411	2908	125	6	131	373	19	392	77	6	83	606	7511	482	7993
16:00 - 16:15	12	0	12	292	19	311	16	0	16	339	15	0	15	43	1	44	14	0	14	73	801	42	843
16:15 - 16:30	14	0	14	280	8	288	27	0	27	329	21	0	21	46	2	48	16	0	16	85	857	21	878
16:30 - 16:45	12	0	12	272	12	284	20	0	20	316	16	1	17	58	3	61	18	0	18	96	776	35	811
16:45 - 17:00	13	0	13	257	15	272	26	0	26	311	23	0	23	59	2	61	20	0	20	104	762	36	798
17:00 - 17:15	9	0	9	299	8	307	16	0	16	332	26	0	26	64	1	65	22	1	23	114	828	21	849
17:15 - 17:30	11	0	11	298	5	303	16	0	16	330	21	0	21	86	2	88	21	0	21	130	792	19	811
17:30 - 17:45	9	0	9	329	11	340	10	0	10	359	15	0	15	58	1	59	11	0	11	85	798	24	822
17:45 - 18:00	9	0	9	236	8	244	17	0	17	270	15	0	15	49	1	50	19	0	19	84	667	18	685
18:00 - 18:15	6	1	7	278	4	282	8	0	8	297	13	0	13	41	2	43	16	0	16	72	654	14	668
18:15 - 18:30	7	0	7	201	3	204	15	0	15	226	9	0	9	37	2	39	13	0	13	61	564	13	577
18:30 - 18:45	8	0	8	231	4	235	8	0	8	251	7	0	7	28	1	29	5	0	5	41	591	11	602
18:45 - 19:00	3	0	3	167	4	171	15	0	15	189	6	0	6	29	2	31	13	0	13	50	480	12	492
Period End	113	1	114	3140	101	3241	194	0	194	3549	187	1	188	598	20	618	188	1	189	995	8570	266	8836

All Vehicles Time Per 15 Mins	SOUTH Parker Street										WEST Derby Street												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15	15	2	17	242	23	265	13	1	14	296	6	0	6	17	2	19	11	0	11	36	534	48	582
7:15 - 7:30	28	1	29	236	26	262	23	3	26	317	9	0	9	8	2	10	16	1	17	36	567	52	619
7:30 - 7:45	36	1	37	280	13	293	21	0	21	351	9	1	10	21	1	22	17	1	18	50	664	34	698
7:45 - 8:00	32	1	33	261	13	274	33	1	34	341	10	0	10	24	2	26	21	0	21	57	675	34	709
8:00 - 8:15	23	1	24	274	12	286	20	0	20	330	11	0	11	22	1	23	20	1	21	55	663	39	702
8:15 - 8:30	31	0	31	220	28	248	35	1	36	315	14	0	14	37	1	38	21	0	21	73	603	39	642
8:30 - 8:45	33	0	33	218	24	242	46	0	46	321	7	1	8	45	2	47	12	0	12	67	656	40	696
8:45 - 9:00	37	0	37	208	25	233	50	2	52	322	14	1	15	37	2	39	19	0	19	73	692	51	743
9:00 - 9:15	34	0	34	183	18	201	40	0	40	275	17	1	18	48	2	50	23	0	23	91	657	32	689
9:15 - 9:30	38	0	38	209	23	232	42	2	44	314	19	0	19	45	2	47	16	0	16	82	622	45	667
9:30 - 9:45	27	0	27	176	7	183	44	0	44	254	21	2	23	39	1	40	23	0	23	86	598	33	631
9:45 - 10:00	25	1	26	187	18	205	37	0	37	268	19	1	20	31	2	33	16	0	16	69	580	35	615
Period End	359	7	366	2694	230	2924	404	10	414	3704	156	7	163	374	20	394	215	3	218	775	7511	482	7993
16:00 - 16:15	22	0	22	255	18	273	34	1	35	330	32	0	32	37	3	40	29	0	29	101	801	42	843
16:15 - 16:30	28	0	28	270	10	280	41	1	42	350	27	0	27	46	0	46	41	0	41	114	857	21	878
16:30 - 16:45	18	0	18	207	16	223	38	0	38	279	38	1	39	54	2	56	25	0	25	120	776	35	811
16:45 - 17:00	22	0	22	209	17	226	30	1	31	279	24	0	24	54	1	55	25	0	25	104	762	36	798
17:00 - 17:15	15	1	16	238	8	246	35	0	35	297	29	0	29	40	2	42	35	0	35	106	828	21	849
17:15 - 17:30	19	0	19	195	10	205	27	0	27	251	26	0	26	46	2	48	26	0	26	100	792	19	811
17:30 - 17:45	24	0	24	210	9	219	38	1	39	282	25	0	25	48	2	50	21	0	21	96	798	24	822
17:45 - 18:00	17	0	17	192	6	198	41	1	42	257	19	0	19	31	2	33	22	0	22	74	667	18	685
18:00 - 18:15	14	0	14	186	5	191	27	0	27	232	24	0	24	21	2	23	20	0	20	67	654	14	668
18:15 - 18:30	19	0	19	187	7	194	29	0	29	242	12	0	12	21	0	21	14	1	15	48	564	13	577
18:30 - 18:45	16	1	17	218	3	221	20	0	20	258	10	0	10	26	2	28	14	0	14	52	591	11	602
18:45 - 19:00	17	0	17	153	5	158	20	0	20	195	21	0	21	21	1	22	15	0	15	58	480	12	492
Period End	231	2	233	2520	114	2634	380	5	385	3252	287	1	288	445	19	464	287	1	288	1040	8570	266	8836

Location	Parker Street	Duration	0700 - 1000
	Derby Street		1600 - 1900
	Parker Street		-
	Derby Street	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per Hour	NORTH Parker Street										EAST Derby Street												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	46	1	47	738	59	797	112	4	116	960	38	3	41	89	5	94	28	1	29	164	2440	168	2608
7:15 - 8:15	54	0	54	767	64	831	115	3	118	1003	37	3	40	119	6	125	22	1	23	188	2569	159	2728
7:30 - 8:30	69	0	69	738	57	795	117	2	119	983	38	2	40	125	5	130	25	1	26	196	2605	146	2751
7:45 - 8:45	68	0	68	761	54	815	111	1	112	995	29	2	31	136	5	141	22	1	23	195	2597	152	2749
8:00 - 9:00	80	0	80	742	57	799	135	1	136	1015	32	1	33	144	7	151	27	1	28	212	2614	169	2783
8:15 - 9:15	84	0	84	722	47	769	162	1	163	1016	40	1	41	144	4	148	27	1	28	217	2608	162	2770
8:30 - 9:30	84	0	84	716	55	771	174	0	174	1029	44	1	45	148	6	154	21	1	22	221	2627	168	2795
8:45 - 9:45	87	0	87	677	62	739	176	0	176	1002	49	2	51	150	6	156	21	3	24	231	2569	161	2730
9:00 - 10:00	75	0	75	648	51	699	158	1	159	933	55	2	57	140	7	147	22	4	26	230	2457	145	2602
Period End	647	1	648	6509	506	7015	1260	13	1273	8936	362	17	379	1195	51	1246	215	14	229	1854	23086	1430	24516
16:00 - 17:00	51	0	51	1101	54	1155	89	0	89	1295	75	1	76	206	8	214	68	0	68	358	3196	134	3330
16:15 - 17:15	48	0	48	1108	43	1151	89	0	89	1288	86	1	87	227	8	235	76	1	77	399	3223	113	3336
16:30 - 17:30	45	0	45	1126	40	1166	78	0	78	1289	86	1	87	267	8	275	81	1	82	444	3158	111	3269
16:45 - 17:45	42	0	42	1183	39	1222	68	0	68	1332	85	0	85	267	6	273	74	1	75	433	3180	100	3280
17:00 - 18:00	38	0	38	1162	32	1194	59	0	59	1291	77	0	77	257	5	262	73	1	74	413	3085	82	3167
17:15 - 18:15	35	1	36	1141	28	1169	51	0	51	1256	64	0	64	234	6	240	67	0	67	371	2911	75	2986
17:30 - 18:30	31	1	32	1044	26	1070	50	0	50	1152	52	0	52	185	6	191	59	0	59	302	2683	69	2752
17:45 - 18:45	30	1	31	946	19	965	48	0	48	1044	44	0	44	155	6	161	53	0	53	258	2476	56	2532
18:00 - 19:00	24	1	25	877	15	892	46	0	46	963	35	0	35	135	7	142	47	0	47	224	2289	50	2339
Period End	344	4	348	9688	296	9984	578	0	578	10910	604	3	607	1933	60	1993	598	4	602	3202	26201	790	26991

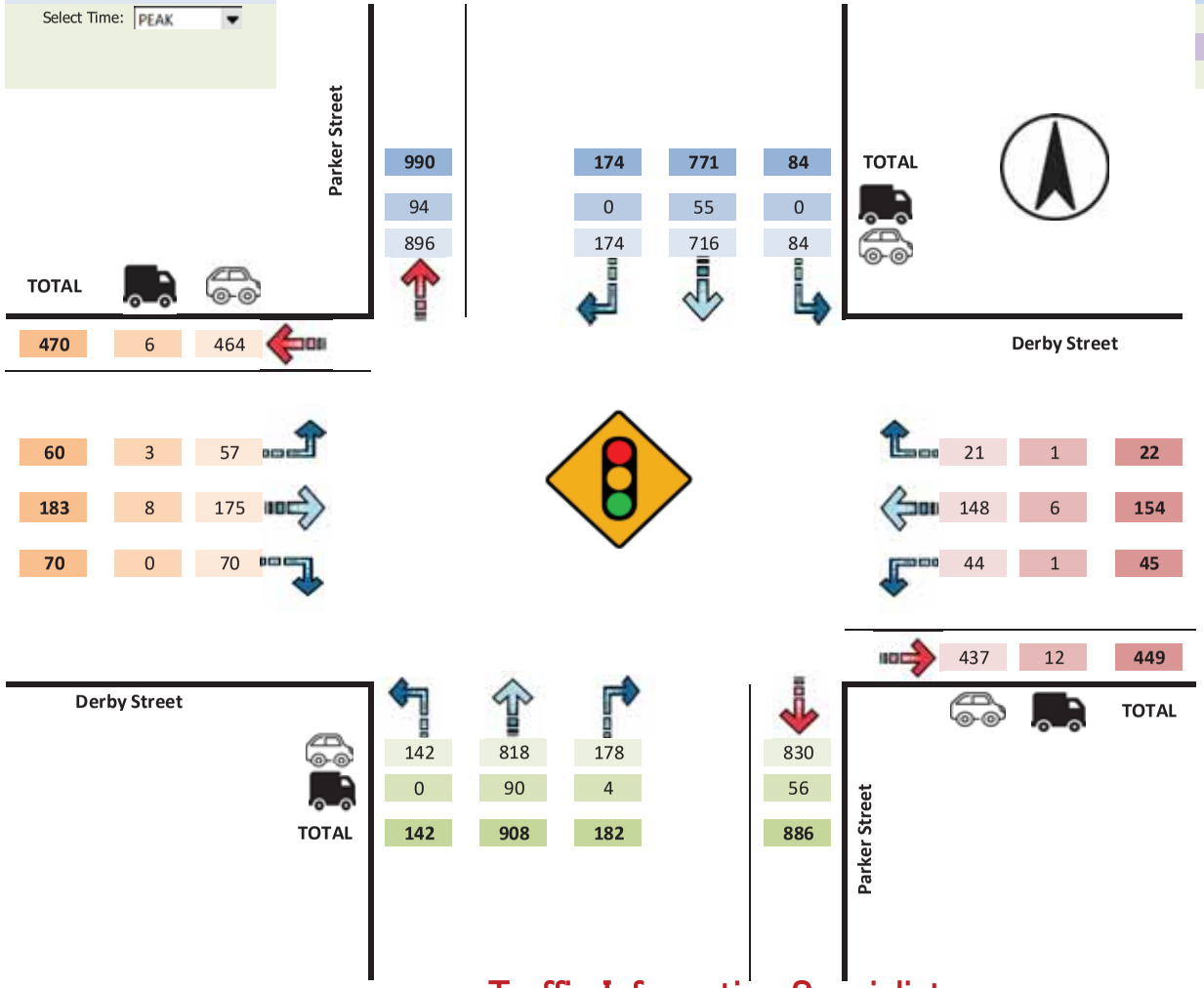
All Vehicles Time Per Hour	SOUTH Parker Street										WEST Derby Street												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	111	5	116	1019	75	1094	90	5	95	1305	34	1	35	70	7	77	65	2	67	179	2440	168	2608
7:15 - 8:15	119	4	123	1051	64	1115	97	4	101	1339	39	1	40	75	6	81	74	3	77	198	2569	159	2728
7:30 - 8:30	122	3	125	1035	66	1101	109	2	111	1337	44	1	45	104	5	109	79	2	81	235	2605	146	2751
7:45 - 8:45	119	2	121	973	77	1050	134	2	136	1307	42	1	43	128	6	134	74	1	75	252	2597	152	2749
8:00 - 9:00	124	1	125	920	89	1009	151	3	154	1288	46	2	48	141	6	147	72	1	73	268	2614	169	2783
8:15 - 9:15	135	0	135	829	95	924	171	3	174	1233	52	3	55	167	7	174	75	0	75	304	2608	162	2770
8:30 - 9:30	142	0	142	818	90	908	178	4	182	1232	57	3	60	175	8	183	70	0	70	313	2627	168	2795
8:45 - 9:45	136	0	136	776	73	849	176	4	180	1165	71	4	75	169	7	176	81	0	81	332	2569	161	2730
9:00 - 10:00	124	1	125	755	66	821	163	2	165	1111	76	4	80	163	7	170	78	0	78	328	2457	145	2602
Period End	1132	16	1148	8176	695	8871	1269	29	1298	11317	461	20	481	1192	59	1251	668	9	677	2409	23086	1430	24516
16:00 - 17:00	90	0	90	941	61	1002	143	3	146	1238	121	1	122	191	6	197	120	0	120	439	3196	134	3330
16:15 - 17:15	83	1	84	924	51	975	144	2	146	1205	118	1	119	194	5	199	126	0	126	444	3223	113	3336
16:30 - 17:30	74	1	75	849	51	900	130	1	131	1106	117	1	118	194	7	201	111	0	111	430	3158	111	3269
16:45 - 17:45	80	1	81	852	44	896	130	2	132	1109	104	0	104	188	7	195	107	0	107	406	3180	100	3280
17:00 - 18:00	75	1	76	835	33	868	141	2	143	1087	99	0	99	165	8	173	104	0	104	376	3085	82	3167
17:15 - 18:15	74	0	74	783	30	813	133	2	135	1022	94	0	94	146	8	154	89	0	89	337	2911	75	2986
17:30 - 18:30	74	0	74	775	27	802	135	2	137	1013	80	0	80	121	6	127	77	1	78	285	2683	69	2752
17:45 - 18:45	66	1	67	783	21	804	117	1	118	989	65	0	65	99	6	105	70	1	71	241	2476	56	2532
18:00 - 19:00	66	1	67	744	20	764	96	0	96	927	67	0	67	89	5	94	63	1	64	225	2289	50	2339
Period End	682	6	688	7486	338	7824	1169	15	1184	9696	865	3	868	1387	58	1445	867	3	870	3183	26201	790	26991

Location	Parker Street	Duration	0700 - 1000
	Derby Street		1600 - 1900
	Parker Street		-
	Derby Street	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	-	AM
PEAK		
8:30	-	9:30



Traffic Information Specialists

ABN: 42 613 389 923

Email info@trafficinfospecialist.com.au

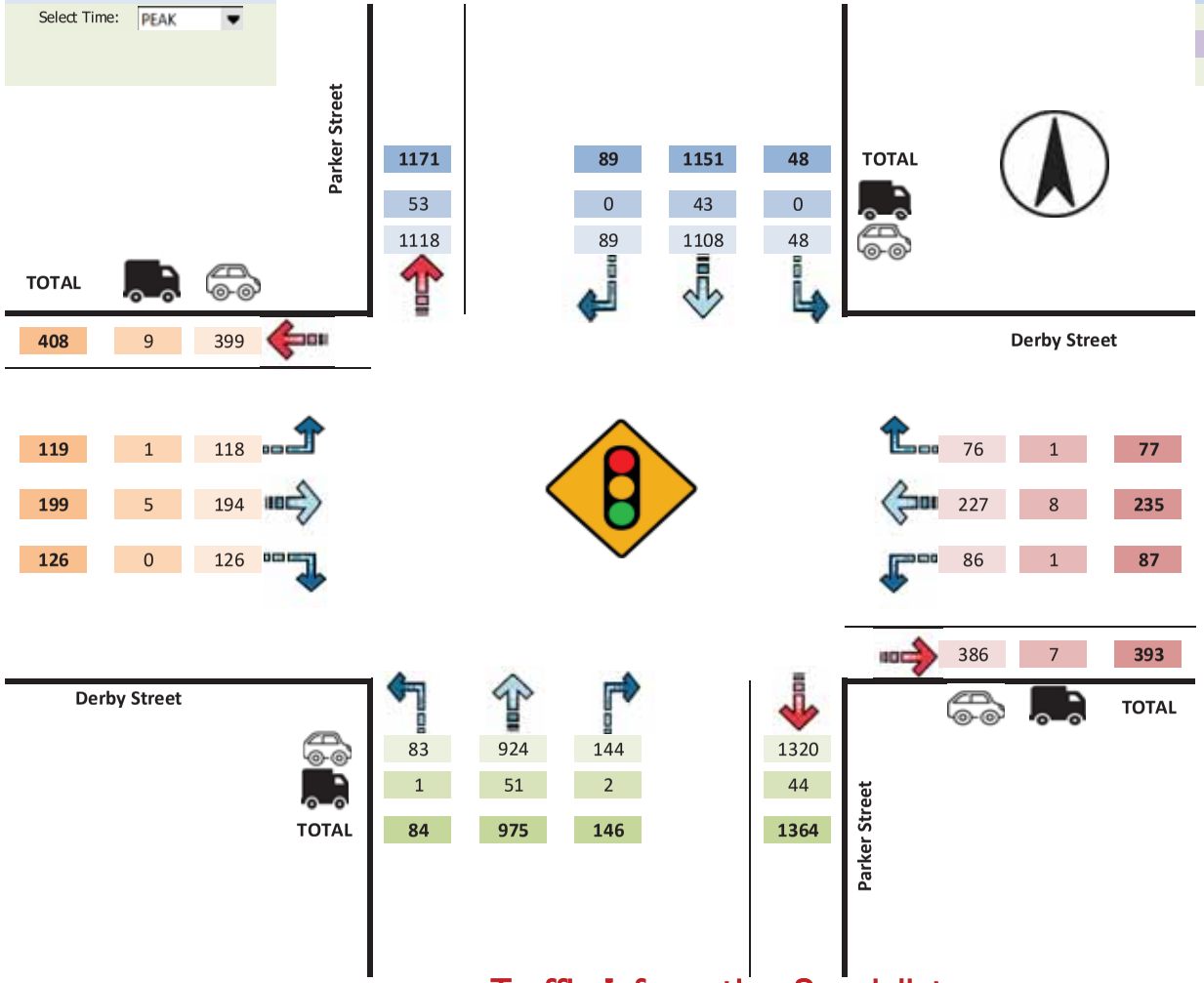
Traffic Information Specialist

Location	Parker Street	Duration	0700 - 1000
	Derby Street		1600 - 1900
	Parker Street		-
	Derby Street	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	-	PM
PEAK		
16:15	-	17:15



Traffic Information Specialists

ABN: 42 613 389 923

Email info@trafficinfospecialist.com.au

Traffic Information Specialist

Location	-	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Somerset Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles	NORTH										EAST												
Time Per 15 Mins	-										Great Western Highway												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15											40	0	40	270	7	277				317	602	20	622
7:15 - 7:30											48	0	48	282	11	293				341	686	34	720
7:30 - 7:45											38	0	38	212	12	224				262	589	25	614
7:45 - 8:00											38	0	38	253	15	268				306	645	29	674
8:00 - 8:15											43	0	43	251	10	261				304	667	25	692
8:15 - 8:30											36	1	37	325	20	345				382	727	34	761
8:30 - 8:45											31	0	31	303	17	320				351	677	28	705
8:45 - 9:00											29	0	29	301	22	323				352	715	34	749
9:00 - 9:15											27	2	29	276	14	290				319	619	29	648
9:15 - 9:30											34	0	34	264	8	272				306	577	22	599
9:30 - 9:45											24	0	24	264	16	280				304	573	39	612
9:45 - 10:00											25	1	26	250	15	265				291	551	27	578
Period End											413	4	417	3251	167	3418				3835	7628	346	7974
16:00 - 16:15											16	0	16	314	15	329				345	704	33	737
16:15 - 16:30											21	1	22	307	13	320				342	682	28	710
16:30 - 16:45											16	0	16	290	15	305				321	677	20	697
16:45 - 17:00											19	0	19	285	19	304				323	649	24	673
17:00 - 17:15											19	0	19	269	29	298				317	637	38	675
17:15 - 17:30											16	0	16	246	39	285				301	603	49	652
17:30 - 17:45											12	1	13	267	27	294				307	604	32	636
17:45 - 18:00											23	0	23	260	13	273				296	599	19	618
18:00 - 18:15											12	0	12	233	11	244				256	536	13	549
18:15 - 18:30											10	0	10	237	9	246				256	473	10	483
18:30 - 18:45											15	0	15	304	4	308				323	531	7	538
18:45 - 19:00											18	1	19	310	4	314				333	499	10	509
Period End											197	3	200	3322	198	3520				3720	7194	283	7477

All Vehicles	SOUTH										WEST												
Time Per 15 Mins	Somerset Street										Great Western Highway												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15	26	1	27							27				237	12	249	29	0	29	278	602	20	622
7:15 - 7:30	28	2	30							30				293	21	314	35	0	35	349	686	34	720
7:30 - 7:45	45	1	46							46				261	12	273	33	0	33	306	589	25	614
7:45 - 8:00	34	1	35							35				276	13	289	44	0	44	333	645	29	674
8:00 - 8:15	41	0	41							41				294	15	309	38	0	38	347	667	25	692
8:15 - 8:30	42	0	42							42				278	13	291	46	0	46	337	727	34	761
8:30 - 8:45	37	0	37							37				255	11	266	51	0	51	317	677	28	705
8:45 - 9:00	50	0	50							50				292	12	304	43	0	43	347	715	34	749
9:00 - 9:15	56	0	56							56				235	13	248	25	0	25	273	619	29	648
9:15 - 9:30	36	1	37							37				213	12	225	30	1	31	256	577	22	599
9:30 - 9:45	45	0	45							45				218	23	241	22	0	22	263	573	39	612
9:45 - 10:00	45	1	46							46				200	9	209	31	1	32	241	551	27	578
Period End	485	7	492							492				3052	166	3218	427	2	429	3647	7628	346	7974
16:00 - 16:15	62	0	62							62				291	18	309	21	0	21	330	704	33	737
16:15 - 16:30	43	0	43							43				294	14	308	17	0	17	325	682	28	710
16:30 - 16:45	56	0	56							56				293	5	298	22	0	22	320	677	20	697
16:45 - 17:00	51	0	51							51				272	5	277	22	0	22	299	649	24	673
17:00 - 17:15	49	0	49							49				283	9	292	17	0	17	309	637	38	675
17:15 - 17:30	39	0	39							39				280	10	290	22	0	22	312	603	49	652
17:30 - 17:45	27	0	27							27				282	4	286	16	0	16	302	604	32	636
17:45 - 18:00	31	0	31							31				269	4	273	16	2	18	291	599	19	618
18:00 - 18:15	39	0	39							39				229	2	231	23	0	23	254	536	13	549
18:15 - 18:30	33	0	33							33				170	1	171	23	0	23	194	473	10	483
18:30 - 18:45	24	0	24							24				164	3	167	24	0	24	191	531	7	538
18:45 - 19:00	24	0	24							24				122	5	127	25	0	25	152	499	10	509
Period End	478	0	478							478				2949	80	3029	248	2	250	3279	7194	283	7477

Location	-	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Somerset Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per Hour	NORTH -										EAST Great Western Highway											TOTAL		
	L			T			R				L			T			R							
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL
7:00 - 8:00											164	0	164	1017	45	1062				1226	2522	108	2630
7:15 - 8:15											167	0	167	998	48	1046				1213	2587	113	2700
7:30 - 8:30											155	1	156	1041	57	1098				1254	2628	113	2741
7:45 - 8:45											148	1	149	1132	62	1194				1343	2716	116	2832
8:00 - 9:00											139	1	140	1180	69	1249				1389	2786	121	2907
8:15 - 9:15											123	3	126	1205	73	1278				1404	2738	125	2863
8:30 - 9:30											121	2	123	1144	61	1205				1328	2588	113	2701
8:45 - 9:45											114	2	116	1105	60	1165				1281	2484	124	2608
9:00 - 10:00											110	3	113	1054	53	1107				1220	2320	117	2437
Period End											1241	13	1254	9876	528	10404				11658	23369	1050	24419
16:00 - 17:00											72	1	73	1196	62	1258				1331	2712	105	2817
16:15 - 17:15											75	1	76	1151	76	1227				1303	2645	110	2755
16:30 - 17:30											70	0	70	1090	102	1192				1262	2566	131	2697
16:45 - 17:45											66	1	67	1067	114	1181				1248	2493	143	2636
17:00 - 18:00											70	1	71	1042	108	1150				1221	2443	138	2581
17:15 - 18:15											63	1	64	1006	90	1096				1160	2342	113	2455
17:30 - 18:30											57	1	58	997	60	1057				1115	2212	74	2286
17:45 - 18:45											60	0	60	1034	37	1071				1131	2139	49	2188
18:00 - 19:00											55	1	56	1084	28	1112				1168	2039	40	2079
Period End											588	7	595	9667	677	10344				10939	21591	903	22494

All Vehicles Time Per Hour	SOUTH Somerset Street										WEST Great Western Highway											TOTAL		
	L			T			R				L			T			R							
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	TOTAL
7:00 - 8:00	133	5	138							138				1067	58	1125	141	0	141	1266	2522	108	2630
7:15 - 8:15	148	4	152							152				1124	61	1185	150	0	150	1335	2587	113	2700
7:30 - 8:30	162	2	164							164				1109	53	1162	161	0	161	1323	2628	113	2741
7:45 - 8:45	154	1	155							155				1103	52	1155	179	0	179	1334	2716	116	2832
8:00 - 9:00	170	0	170							170				1119	51	1170	178	0	178	1348	2786	121	2907
8:15 - 9:15	185	0	185							185				1060	49	1109	165	0	165	1274	2738	125	2863
8:30 - 9:30	179	1	180							180				995	48	1043	149	1	150	1193	2588	113	2701
8:45 - 9:45	187	1	188							188				958	60	1018	120	1	121	1139	2484	124	2608
9:00 - 10:00	182	2	184							184				866	57	923	108	2	110	1033	2320	117	2437
Period End	1500	16	1516							1516				9401	489	9890	1351	4	1355	11245	23369	1050	24419
16:00 - 17:00	212	0	212							212				1150	42	1192	82	0	82	1274	2712	105	2817
16:15 - 17:15	199	0	199							199				1142	33	1175	78	0	78	1253	2645	110	2755
16:30 - 17:30	195	0	195							195				1128	29	1157	83	0	83	1240	2566	131	2697
16:45 - 17:45	166	0	166							166				1117	28	1145	77	0	77	1222	2493	143	2636
17:00 - 18:00	146	0	146							146				1114	27	1141	71	2	73	1214	2443	138	2581
17:15 - 18:15	136	0	136							136				1060	20	1080	77	2	79	1159	2342	113	2455
17:30 - 18:30	130	0	130							130				950	11	961	78	2	80	1041	2212	74	2286
17:45 - 18:45	127	0	127							127				832	10	842	86	2	88	930	2139	49	2188
18:00 - 19:00	120	0	120							120				685	11	696	95	0	95	791	2039	40	2079
Period End	1431	0	1431							1431				9178	211	9389	727	8	735	10124	21591	903	22494

Traffic Information Specialist

Location	-	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Somerset Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION
Select Time: PEAK

TIME RANGE		
PEAK	-	AM
PEAK		
8:00	-	9:00

TOTAL			
1419	69	1350	Great Western Highway

1170	51	1119	
178	0	178	

1180	69	1249	
139	1	140	
1119	51	1170	

Great Western Highway	
	170
	0
TOTAL	170

317	
1	
318	

Somerset Street	TOTAL

Traffic Information Specialists
ABN: 42 613 389 923
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Traffic Information Specialist

Location	-	Duration	0700 - 1000
	Great Western Highway		1600 - 1900
	Somerset Street		-
	Great Western Highway	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION
Select Time: PEAK

TIME RANGE		
PEAK	-	PM
PEAK		
16:00	-	17:00

TOTAL		
1470	62	1408

Great Western Highway

1192	42	1150
82	0	82

1196	62	1258
72	1	73

1150	42	1192

Great Western Highway

	212
	0
TOTAL	212

154
1
155

Somerset Street

TOTAL

Traffic Information Specialists
ABN: 42 613 389 923
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Traffic Information Specialist

Location	Parker Street	Duration	0700 - 1000
	Barber Avenue		1600 - 1900
	Parker Street		-
	Barber Avenue	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per 15 Mins	NORTH Parker Street										EAST Barber Avenue												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15	25	1	26	194	17	211				237	6	0	6							6	489	44	533
7:15 - 7:30	23	3	26	198	15	213				239	15	1	16							16	491	45	536
7:30 - 7:45	21	0	21	224	15	239				260	10	1	11							11	557	30	587
7:45 - 8:00	37	1	38	241	14	255				293	8	1	9							9	562	29	591
8:00 - 8:15	27	1	28	234	19	253				281	6	1	7							7	566	34	600
8:15 - 8:30	30	0	30	197	8	205				235	4	0	4							4	477	37	514
8:30 - 8:45	29	0	29	245	12	257				286	5	0	5							5	512	37	549
8:45 - 9:00	24	0	24	256	18	274				298	10	0	10							10	523	44	567
9:00 - 9:15	27	1	28	239	10	249				277	12	0	12							12	489	31	520
9:15 - 9:30	24	0	24	198	15	213				237	9	0	9							9	463	38	501
9:30 - 9:45	24	0	24	202	19	221				245	14	0	14							14	443	30	473
9:45 - 10:00	30	1	31	189	8	197				228	18	0	18							18	454	29	483
Period End	321	8	329	2617	170	2787				3116	117	4	121							121	6026	428	6454
16:00 - 16:15	18	0	18	287	18	305				323	33	1	34							34	645	37	682
16:15 - 16:30	9	0	9	284	8	292				301	37	0	37							37	646	18	664
16:30 - 16:45	7	0	7	269	12	281				288	35	0	35							35	579	29	608
16:45 - 17:00	8	0	8	266	15	281				289	30	0	30							30	558	32	590
17:00 - 17:15	6	0	6	300	8	308				314	24	0	24							24	620	17	637
17:15 - 17:30	5	0	5	300	5	305				310	25	0	25							25	574	15	589
17:30 - 17:45	5	0	5	337	11	348				353	11	0	11							11	599	20	619
17:45 - 18:00	5	0	5	240	8	248				253	22	0	22							22	501	14	515
18:00 - 18:15	3	0	3	269	5	274				277	23	0	23							23	522	10	532
18:15 - 18:30	4	0	4	211	3	214				218	12	0	12							12	440	10	450
18:30 - 18:45	8	0	8	235	4	239				247	12	0	12							12	491	7	498
18:45 - 19:00	10	0	10	180	4	184				194	5	0	5							5	382	9	391
Period End	88	0	88	3178	101	3279				3367	269	1	270							270	6557	218	6775

All Vehicles Time Per 15 Mins	SOUTH Parker Street										WEST Barber Avenue												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 7:15	12	1	13	249	23	272				285	3	2	5							5	489	44	533
7:15 - 7:30	4	0	4	246	26	272				276	5	0	5							5	491	45	536
7:30 - 7:45	8	0	8	289	14	303				311	5	0	5							5	557	30	587
7:45 - 8:00	2	0	2	271	13	284				286	3	0	3							3	562	29	591
8:00 - 8:15	3	1	4	289	12	301				305	7	0	7							7	566	34	600
8:15 - 8:30	6	0	6	236	28	264				270	4	1	5							5	477	37	514
8:30 - 8:45	1	0	1	229	25	254				255	3	0	3							3	512	37	549
8:45 - 9:00	1	1	2	228	25	253				255	4	0	4							4	523	44	567
9:00 - 9:15	3	0	3	204	20	224				227	4	0	4							4	489	31	520
9:15 - 9:30	2	1	3	228	22	250				253	2	0	2							2	463	38	501
9:30 - 9:45	1	0	1	201	11	212				213	1	0	1							1	443	30	473
9:45 - 10:00	4	0	4	210	20	230				234	3	0	3							3	454	29	483
Period End	47	4	51	2880	239	3119				3170	44	3	47							47	6026	428	6454
16:00 - 16:15	0	0	0	301	18	319				319	6	0	6							6	645	37	682
16:15 - 16:30	0	0	0	313	10	323				323	3	0	3							3	646	18	664
16:30 - 16:45	1	1	2	262	16	278				280	5	0	5							5	579	29	608
16:45 - 17:00	2	0	2	251	17	268				270	1	0	1							1	558	32	590
17:00 - 17:15	2	0	2	287	9	296				298	1	0	1							1	620	17	637
17:15 - 17:30	3	0	3	239	10	249				252	2	0	2							2	574	15	589
17:30 - 17:45	1	0	1	245	9	254				255	0	0	0							0	599	20	619
17:45 - 18:00	0	0	0	230	6	236				236	4	0	4							4	501	14	515
18:00 - 18:15	0	0	0	226	5	231				231	1	0	1							1	522	10	532
18:15 - 18:30	1	0	1	211	7	218				219	1	0	1							1	440	10	450
18:30 - 18:45	3	0	3	230	3	233				236	3	0	3							3	491	7	498
18:45 - 19:00	2	0	2	185	5	190				192	0	0	0							0	382	9	391
Period End	15	1	16	2980	115	3095				3111	27	0	27							27	6557	218	6775

Location	Parker Street	Duration	0700 - 1000
	Barber Avenue		1600 - 1900
	Parker Street		-
	Barber Avenue	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

All Vehicles Time Per Hour	NORTH Parker Street										EAST Barber Avenue												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	106	5	111	857	61	918				1029	39	3	42							42	2099	148	2247
7:15 - 8:15	108	5	113	897	63	960				1073	39	4	43							43	2176	138	2314
7:30 - 8:30	115	2	117	896	56	952				1069	28	3	31							31	2162	130	2292
7:45 - 8:45	123	2	125	917	53	970				1095	23	2	25							25	2117	137	2254
8:00 - 9:00	110	1	111	932	57	989				1100	25	1	26							26	2078	152	2230
8:15 - 9:15	110	1	111	937	48	985				1096	31	0	31							31	2001	149	2150
8:30 - 9:30	104	1	105	938	55	993				1098	36	0	36							36	1987	150	2137
8:45 - 9:45	99	1	100	895	62	957				1057	45	0	45							45	1918	143	2061
9:00 - 10:00	105	2	107	828	52	880				987	53	0	53							53	1849	128	1977
Period End	980	20	1000	8097	507	8604				9604	319	13	332							332	18387	1275	19662
16:00 - 17:00	42	0	42	1106	53	1159				1201	135	1	136							136	2428	116	2544
16:15 - 17:15	30	0	30	1119	43	1162				1192	126	0	126							126	2403	96	2499
16:30 - 17:30	26	0	26	1135	40	1175				1201	114	0	114							114	2331	93	2424
16:45 - 17:45	24	0	24	1203	39	1242				1266	90	0	90							90	2351	84	2435
17:00 - 18:00	21	0	21	1177	32	1209				1230	82	0	82							82	2294	66	2360
17:15 - 18:15	18	0	18	1146	29	1175				1193	81	0	81							81	2196	59	2255
17:30 - 18:30	17	0	17	1057	27	1084				1101	68	0	68							68	2062	54	2116
17:45 - 18:45	20	0	20	955	20	975				995	69	0	69							69	1954	41	1995
18:00 - 19:00	25	0	25	895	16	911				936	52	0	52							52	1835	36	1871
Period End	223	0	223	9793	299	10092				10315	817	1	818							818	19854	645	20499

All Vehicles Time Per Hour	SOUTH Parker Street										WEST Barber Avenue												
	L			T			R				L			T			R				TOTAL		TOTAL
	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	LIGHT	HEAVY	Σ	TOTAL	LIGHT	HEAVY	
7:00 - 8:00	26	1	27	1055	76	1131				1158	16	2	18							18	2099	148	2247
7:15 - 8:15	17	1	18	1095	65	1160				1178	20	0	20							20	2176	138	2314
7:30 - 8:30	19	1	20	1085	67	1152				1172	19	1	20							20	2162	130	2292
7:45 - 8:45	12	1	13	1025	78	1103				1116	17	1	18							18	2117	137	2254
8:00 - 9:00	11	2	13	982	90	1072				1085	18	1	19							19	2078	152	2230
8:15 - 9:15	11	1	12	897	98	995				1007	15	1	16							16	2001	149	2150
8:30 - 9:30	7	2	9	889	92	981				990	13	0	13							13	1987	150	2137
8:45 - 9:45	7	2	9	861	78	939				948	11	0	11							11	1918	143	2061
9:00 - 10:00	10	1	11	843	73	916				927	10	0	10							10	1849	128	1977
Period End	120	12	132	8732	717	9449				9581	139	6	145							145	18387	1275	19662
16:00 - 17:00	3	1	4	1127	61	1188				1192	15	0	15							15	2428	116	2544
16:15 - 17:15	5	1	6	1113	52	1165				1171	10	0	10							10	2403	96	2499
16:30 - 17:30	8	1	9	1039	52	1091				1100	9	0	9							9	2331	93	2424
16:45 - 17:45	8	0	8	1022	45	1067				1075	4	0	4							4	2351	84	2435
17:00 - 18:00	6	0	6	1001	34	1035				1041	7	0	7							7	2294	66	2360
17:15 - 18:15	4	0	4	940	30	970				974	7	0	7							7	2196	59	2255
17:30 - 18:30	2	0	2	912	27	939				941	6	0	6							6	2062	54	2116
17:45 - 18:45	4	0	4	897	21	918				922	9	0	9							9	1954	41	1995
18:00 - 19:00	6	0	6	852	20	872				878	5	0	5							5	1835	36	1871
Period End	46	3	49	8903	342	9245				9294	72	0	72							72	19854	645	20499

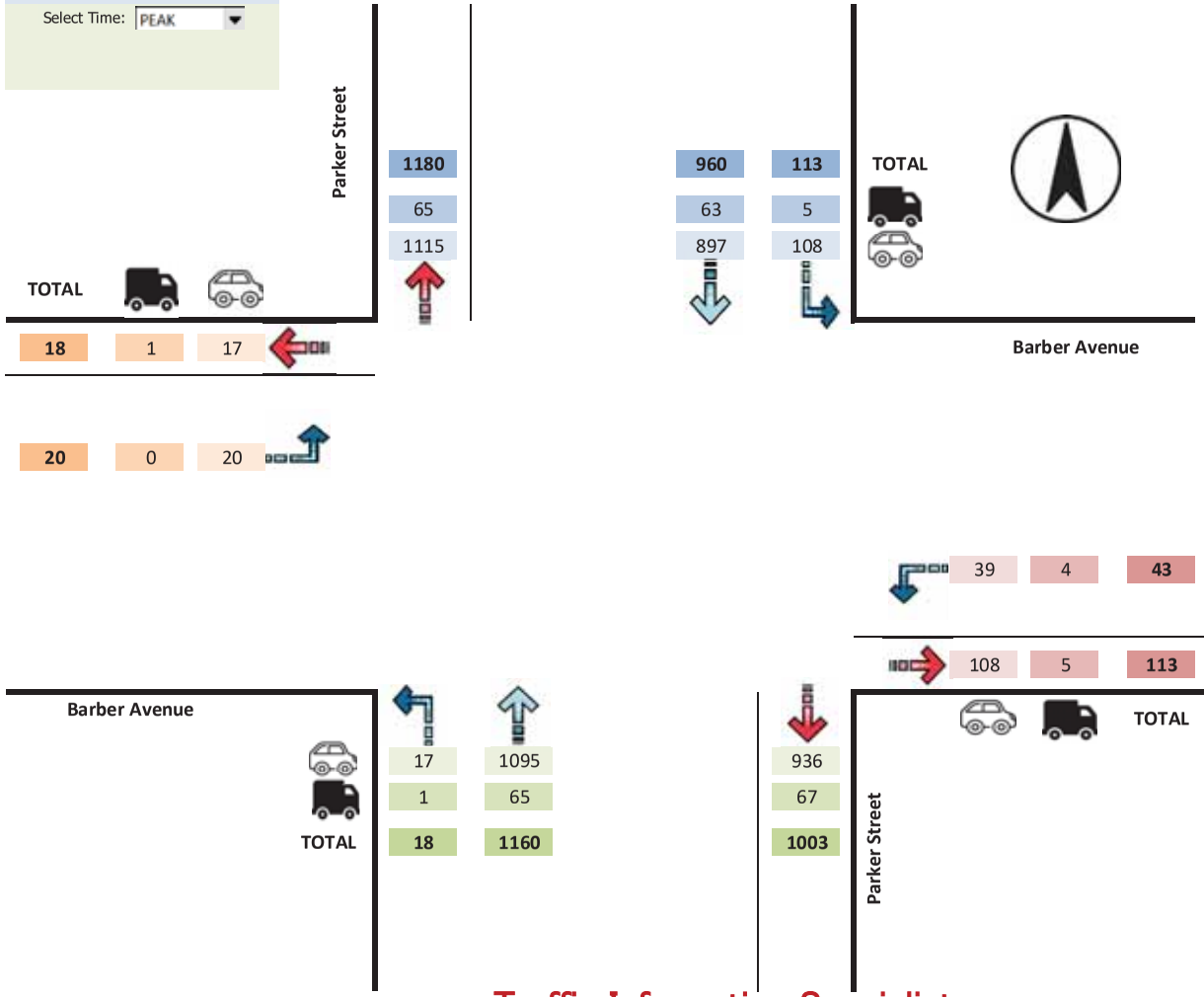
Traffic Information Specialist

Location	Parker Street	Duration	0700 - 1000
	Barber Avenue		1600 - 1900
	Parker Street		-
	Barber Avenue	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	-	AM
PEAK		
7:15	-	8:15



Traffic Information Specialists

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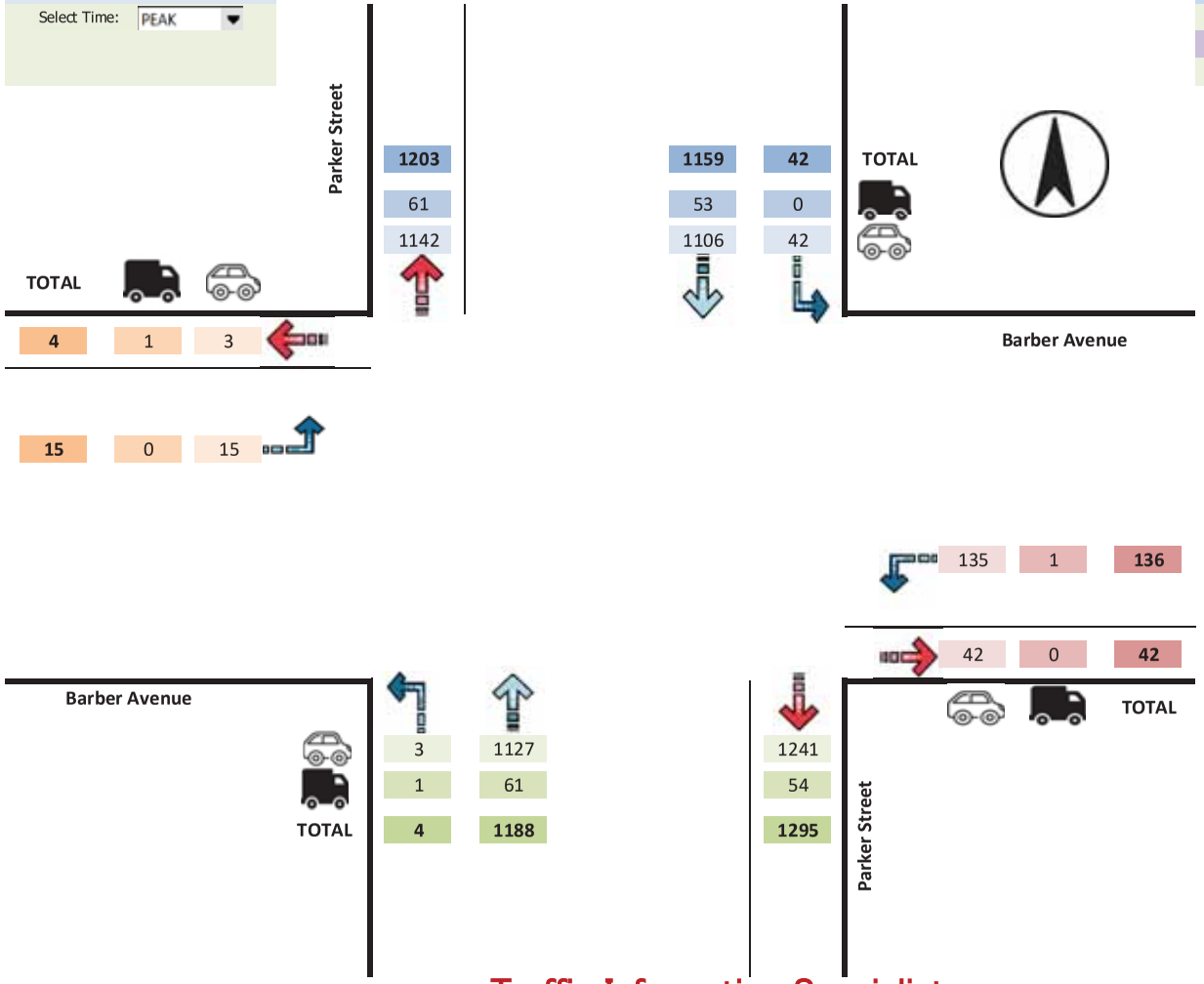
Location	Parker Street	Duration	0700 - 1000
	Barber Avenue		1600 - 1900
	Parker Street		-
	Barber Avenue	Day/Date	Tuesday, October 16, 2018
Suburb	PENRITH	Weather	-

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	-	PM
PEAK		
16:00	-	17:00



Traffic Information Specialists

ABN: 42 613 389 923

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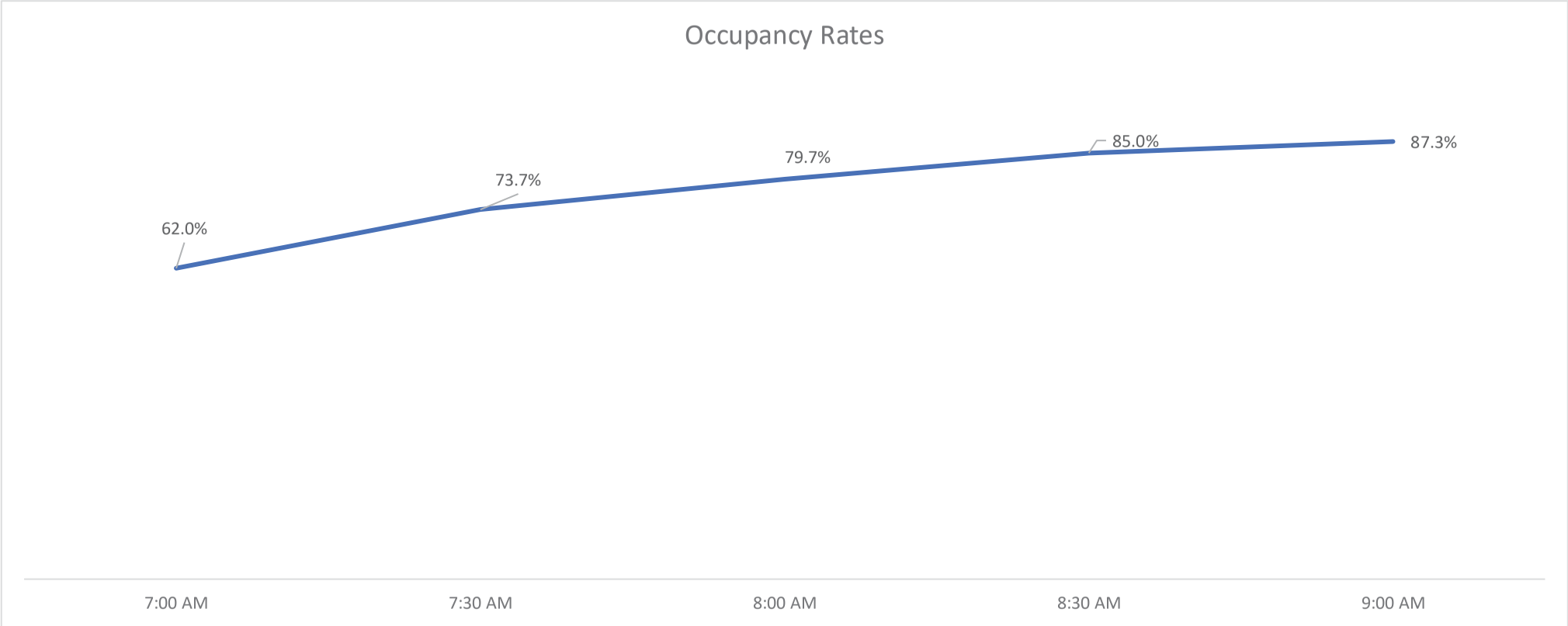
Traffic Information Specialist

Location	NAPEAN HOSPITAL
Suburb	PENRITH
Client	TTPA
Job No/Name	18130
Survey Duration	3 Hours
Day/Date	Monday, 22 October 2018

Location	Capacity	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
Napean Hospital Carpark 1	184	100	134	147	158	165	176	179
Napean Hospital Carpark 2	113	55	58	69	72	76	87	101
Barber Avenue - EAST (NORTH)	45	38	42	43	45	45	45	45
Barber Avenue - EAST (SOUTH)	7	5	5	3	6	7	7	7
Barber Avenue - WEST (NORTH)	29	29	28	27	28	29	29	29
Barber Avenue - WEST (SOUTH)	37	28	31	35	35	34	36	37
Lethbridge Street (NORTH)	29	21	27	27	28	29	29	28
Lethbridge Street (SOUTH)	35	21	28	31	35	33	35	35
Total Vehicles Parked	479	297	353	382	407	418	444	461
Number of Vacant Spaces		182	126	97	72	61	35	18
% of Capacity Used		62.0%	73.7%	79.7%	85.0%	87.3%	92.7%	96.2%

Traffic Information Specialists
ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au



Traffic Information Specialists
ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au

Traffic Information Specialist

Location	NAPEAN HOSPITAL
Suburb	PENRITH
Client	TTPA
Job No/Name	18113
Survey Duration	3 Hours
Day/Date	Monday, 22 October 2018

Location	Capacity	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM
Napean Hospital Carpark 1	184	121	102	71	62	45	32	29
Napean Hospital Carpark 2	113	63	62	60	58	57	55	53
Barber Avenue - EAST (NORTH)	45	36	35	30	29	29	34	35
Barber Avenue - EAST (SOUTH)	7	7	7	7	6	7	7	7
Barber Avenue - WEST (NORTH)	29	17	15	14	14	13	11	10
Barber Avenue - WEST (SOUTH)	37	21	18	14	16	11	14	16
Lethbridge Street (NORTH)	29	19	17	11	12	14	12	13
Lethbridge Street (SOUTH)	35	14	13	12	11	12	12	13
Total Vehicles Parked	479	298	269	219	208	188	177	176
Number of Vacant Spaces		181	210	260	271	291	302	303
% of Capacity Used		62.2%	56.2%	45.7%	43.4%	39.2%	37.0%	36.7%

Traffic Information Specialists
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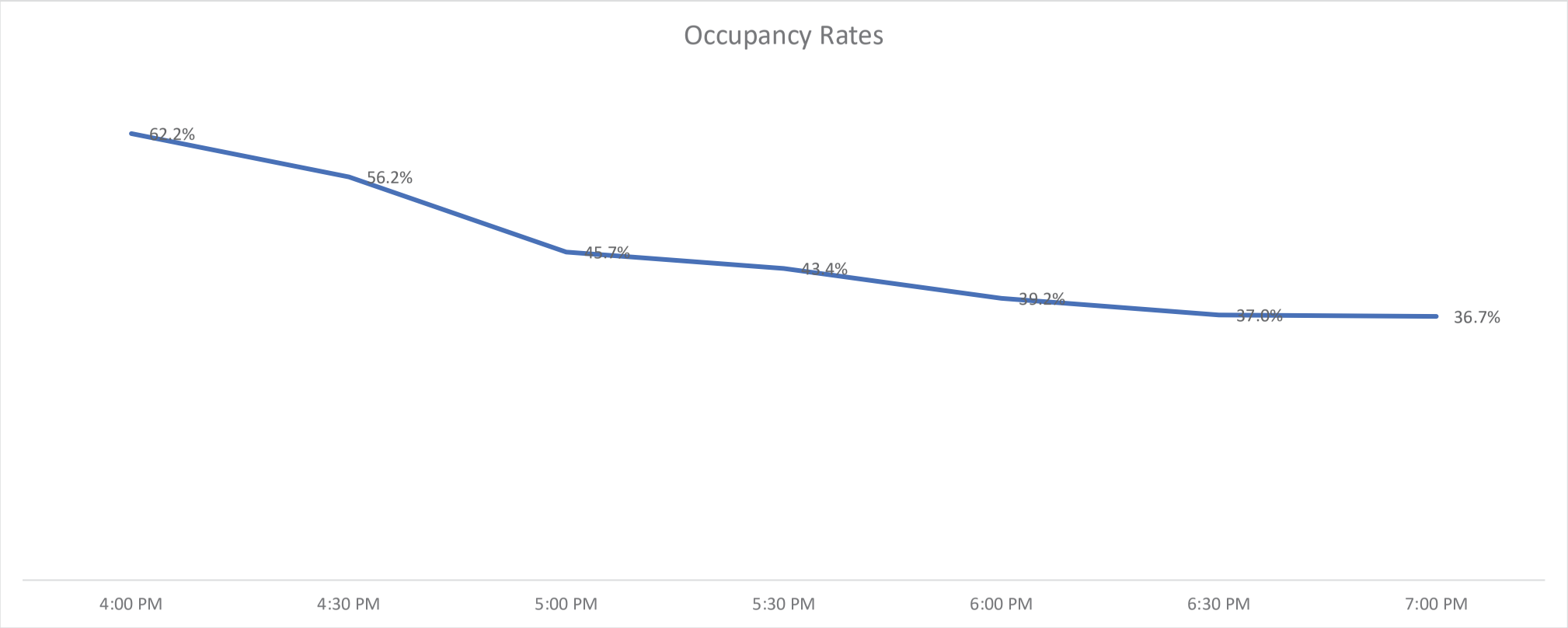

Traffic Information Specialists
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Appendix D

SIDRA Output Results

MOVEMENT SUMMARY

Site: 101v [EX AM GWH-SOMERSET]

Network: N101 [AM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	170	0.0	170	0.0	0.173	6.2	LOS A	0.3	2.0	0.41	0.62	0.41	41.4
Approach		170	0.0	170	0.0	0.173	6.2	LOS A	0.3	2.0	0.41	0.62	0.41	41.4
East: GREAT WESTERN HIGHWAY														
4	L2	140	0.7	140	0.7	0.246	5.6	LOS A	0.0	0.0	0.00	0.18	0.00	56.0
5	T1	1249	5.5	1249	5.5	0.246	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	58.9
Approach		1389	5.0	1389	5.0	0.246	0.6	NA	0.0	0.0	0.00	0.06	0.00	58.3
West: GREAT WESTERN HIGHWAY														
11	T1	1170	4.4	1170	4.4	0.311	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	178	0.0	178	0.0	0.937	68.2	LOS E	2.8	19.6	0.99	1.54	3.19	24.7
Approach		1348	3.8	1348	3.8	0.937	9.0	NA	2.8	19.6	0.13	0.20	0.42	50.4
All Vehicles		2907	4.2	2907	4.2	0.937	4.8	NA	2.8	19.6	0.08	0.16	0.22	52.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER]

Network: N101 [AM PEAK]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	142	0.0	142	0.0	0.591	30.1	LOS C	8.3	61.2	0.88	0.79	0.88	39.4
2	T1	908	9.9	908	9.9	0.591	23.6	LOS B	8.3	61.2	0.88	0.76	0.88	32.9
3	R2	182	2.2	182	2.2	0.390	33.0	LOS C	4.4	31.4	0.86	0.79	0.86	39.7
Approach		1232	7.6	1232	7.6	0.591	25.7	LOS B	8.3	62.8	0.88	0.77	0.88	35.4
East: DERBY STREET														
4	L2	45	2.2	45	2.2	0.158	44.2	LOS D	1.8	13.0	0.74	0.69	0.74	33.1
5	T1	154	3.9	154	3.9	0.591	55.8	LOS D	6.5	47.0	0.92	0.76	0.92	28.1
6	R2	22	4.5	22	4.5	0.591	63.0	LOS E	6.5	47.0	0.93	0.77	0.93	21.1
Approach		221	3.6	221	3.6	0.591	54.2	LOS D	6.5	47.0	0.88	0.75	0.88	28.5
North: PARKER STREET														
7	L2	84	0.0	84	0.0	0.130	33.8	LOS C	2.7	19.4	0.64	0.70	0.64	37.8
8	T1	771	7.1	771	7.1	0.601	32.7	LOS C	13.2	97.8	0.77	0.67	0.77	36.8
9	R2	174	0.0	174	0.0	0.348	29.4	LOS C	4.3	30.4	0.72	0.75	0.72	35.0
Approach		1029	5.3	1029	5.3	0.601	32.2	LOS C	13.2	97.8	0.75	0.69	0.75	36.6
West: DERBY STREET														
10	L2	60	5.0	60	5.0	0.379	54.5	LOS D	5.7	41.6	0.88	0.81	1.19	15.9
11	T1	183	4.4	183	4.4	0.499	54.1	LOS D	5.9	41.9	0.91	0.80	1.09	25.9
12	R2	70	0.0	70	0.0	0.499	65.0	LOS E	5.9	41.9	0.95	0.79	0.95	22.9
Approach		313	3.5	313	3.5	0.499	56.6	LOS E	5.9	41.9	0.91	0.80	1.08	23.8
All Vehicles		2795	6.0	2795	6.0	0.601	33.8	LOS C	13.2	97.8	0.83	0.74	0.85	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	33.7	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	60.4	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [EX AM BARBER-PARKER]

Network: N101 [AM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	18	5.6	18	5.6	0.209	6.4	LOS A	0.0	0.0	0.00	0.03	0.00	62.1
2	T1	1160	5.6	1160	5.6	0.209	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	69.5
Approach		1178	5.6	1178	5.6	0.209	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.3
East: BARBER STREET														
4	L2	43	9.3	43	9.3	0.034	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	20.0
Approach		43	9.3	43	9.3	0.034	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	20.0
North: PARKER STREET														
7	L2	113	4.4	113	4.4	0.215	6.5	LOS A	0.0	0.0	0.00	0.61	0.00	54.0
8	T1	960	6.6	960	6.6	0.257	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1073	6.3	1073	6.3	0.257	0.7	NA	0.0	0.0	0.00	0.06	0.00	66.9
West: BARBER STREET														
10	L2	20	0.0	20	0.0	0.022	6.2	LOS A	0.0	0.2	0.34	0.57	0.34	39.8
Approach		20	0.0	20	0.0	0.022	6.2	LOS A	0.0	0.2	0.34	0.57	0.34	39.8
All Vehicles		2314	6.0	2314	6.0	0.257	0.4	NA	0.0	0.2	0.00	0.04	0.00	65.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [EX AM GWH-PARKER]

Network: N101 [AM PEAK]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	290	4.8	290	4.8	0.298	18.1	LOS B	5.7	41.6	0.51	0.73	0.51	45.1
2	T1	660	7.6	660	7.6	0.921	82.2	LOS F	17.2	128.0	1.00	1.05	1.29	21.0
3	R2	70	8.6	70	8.6	0.857	94.5	LOS F	3.5	26.3	1.00	0.90	1.39	13.1
Approach		1020	6.9	1020	6.9	0.921	64.8	LOS E	17.2	128.0	0.86	0.95	1.08	24.4
East: GREAT WESTERN HIGHWAY														
4	L2	179	2.2	179	2.2	0.282	34.4	LOS C	6.1	43.5	0.68	0.72	0.68	26.1
5	T1	869	4.8	869	4.8	0.615	40.5	LOS C	15.5	112.7	0.86	0.76	0.86	31.2
6	R2	386	11.1	386	11.1	0.935	62.5	LOS E	14.2	108.6	1.00	1.01	1.33	23.2
Approach		1434	6.2	1434	6.2	0.935	45.7	LOS D	15.5	112.7	0.88	0.83	0.97	28.2
North: PARKER STREET														
7	L2	588	6.0	588	6.0	0.330	2.9	LOS A	0.0	0.0	0.00	0.36	0.00	36.0
8	T1	928	5.1	928	5.1	0.947	82.7	LOS F	26.5	193.6	1.00	1.12	1.31	9.5
9	R2	204	9.3	204	9.3	0.925	92.5	LOS F	10.7	81.0	1.00	1.08	1.39	14.8
Approach		1720	5.9	1720	5.9	0.947	56.6	LOS E	26.5	193.6	0.66	0.86	0.87	13.6
West: GREAT WESTERN HIGHWAY														
10	L2	212	5.2	212	5.2	0.118	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	50.9
11	T1	708	3.8	708	3.8	0.927	79.2	LOS F	18.8	135.9	0.99	1.08	1.30	12.2
12	R2	104	7.7	104	7.7	0.385	68.0	LOS E	4.2	31.7	0.95	0.78	0.95	13.7
Approach		1024	4.5	1024	4.5	0.927	62.8	LOS E	18.8	135.9	0.78	0.94	0.99	16.3
All Vehicles		5198	5.9	5198	5.9	0.947	56.4	LOS D	26.5	193.6	0.78	0.88	0.96	20.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM GWH-PARKER]

Network: N101 [PM PEAK]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	192	2.6	192	2.6	0.187	20.7	LOS B	3.9	28.1	0.51	0.71	0.51	43.4
2	T1	872	5.5	872	5.5	0.989	104.6	LOS F	26.9	197.5	1.00	1.19	1.45	17.7
3	R2	88	5.7	88	5.7	0.924	100.6	LOS F	4.6	33.7	1.00	0.97	1.52	12.5
Approach		1152	5.0	1152	5.0	0.989	90.3	LOS F	26.9	197.5	0.92	1.10	1.30	19.4
East: GREAT WESTERN HIGHWAY														
4	L2	120	5.0	120	5.0	0.390	49.4	LOS D	7.6	55.3	0.84	0.76	0.84	21.3
5	T1	923	3.8	923	3.8	0.849	57.8	LOS E	20.9	151.2	0.96	0.92	1.06	25.9
6	R2	428	6.5	428	6.5	1.005	94.8	LOS F	20.8	153.7	1.00	1.09	1.51	14.9
Approach		1471	4.7	1471	4.7	1.005	67.9	LOS E	20.9	153.7	0.96	0.96	1.17	21.2
North: PARKER STREET														
7	L2	541	2.4	541	2.4	0.296	6.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.4
8	T1	992	3.7	992	3.7	0.904	66.8	LOS E	25.9	187.1	0.99	1.02	1.18	12.7
9	R2	204	6.4	204	6.4	0.957	105.2	LOS F	11.3	83.3	1.00	1.02	1.48	15.4
Approach		1737	3.6	1737	3.6	0.957	52.6	LOS D	25.9	187.1	0.68	0.88	0.85	16.8
West: GREAT WESTERN HIGHWAY														
10	L2	453	3.1	453	3.1	0.249	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.2
11	T1	605	2.5	605	2.5	0.996	111.0	LOS F	18.8	134.6	1.00	1.22	1.55	9.2
12	R2	177	2.3	177	2.3	0.501	64.1	LOS E	7.1	50.9	0.94	0.81	0.94	14.3
Approach		1235	2.7	1235	2.7	0.996	65.7	LOS E	18.8	134.6	0.63	0.91	0.89	17.0
All Vehicles		5595	4.0	5595	4.0	1.005	67.3	LOS E	26.9	197.5	0.79	0.95	1.04	18.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [EX PM GWH-SOMERSET]

Network: N101 [PM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	212	0.0	212	0.0	0.227	6.6	LOS A	0.3	2.4	0.39	0.64	0.39	41.0
Approach		212	0.0	212	0.0	0.227	6.6	LOS A	0.3	2.4	0.39	0.64	0.39	41.0
East: GREAT WESTERN HIGHWAY														
4	L2	73	1.4	73	1.4	0.235	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	56.8
5	T1	1258	4.9	1258	4.9	0.235	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.3
Approach		1331	4.7	1331	4.7	0.235	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.0
West: GREAT WESTERN HIGHWAY														
11	T1	1192	3.5	1192	3.5	0.314	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	82	0.0	82	0.0	0.394	25.7	LOS B	0.5	3.6	0.87	0.99	1.07	38.5
Approach		1274	3.3	1274	3.3	0.394	1.7	NA	0.5	3.6	0.06	0.06	0.07	57.8
All Vehicles		2817	3.7	2817	3.7	0.394	1.4	NA	0.5	3.6	0.05	0.09	0.06	57.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [EX PM BARBER-PARKER]

Network: N101 [PM PEAK]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	4	25.0	4	25.0	0.211	6.7	LOS A	0.0	0.0	0.00	0.01	0.00	56.2
2	T1	1188	5.1	1188	5.1	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1192	5.2	1192	5.2	0.211	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.7
East: BARBER STREET														
4	L2	136	0.7	136	0.7	0.105	4.7	LOS A	0.2	1.3	0.10	0.50	0.10	38.7
Approach		136	0.7	136	0.7	0.105	4.7	LOS A	0.2	1.3	0.10	0.50	0.10	38.7
North: PARKER STREET														
7	L2	42	0.0	42	0.0	0.131	6.4	LOS A	0.0	0.0	0.00	0.36	0.00	58.4
8	T1	1159	4.6	1159	4.6	0.306	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	69.6
Approach		1201	4.4	1201	4.4	0.306	0.3	NA	0.0	0.0	0.00	0.02	0.00	68.9
West: BARBER STREET														
10	L2	15	0.0	15	0.0	0.016	6.3	LOS A	0.0	0.2	0.35	0.57	0.35	39.7
Approach		15	0.0	15	0.0	0.016	6.3	LOS A	0.0	0.2	0.35	0.57	0.35	39.7
All Vehicles		2544	4.6	2544	4.6	0.306	0.4	NA	0.2	1.3	0.01	0.04	0.01	67.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [EX PM DERBY-PARKER]

Network: N101 [PM PEAK]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	84	1.2	84	1.2	0.812	41.8	LOS C	11.1	80.4	0.97	0.88	1.05	31.5
2	T1	975	5.2	975	5.2	0.812	36.2	LOS C	11.1	80.4	0.97	0.88	1.05	24.4
3	R2	146	1.4	146	1.4	0.393	32.4	LOS C	3.7	26.4	0.85	0.79	0.85	37.2
Approach		1205	4.5	1205	4.5	0.812	36.1	LOS C	11.1	80.9	0.95	0.87	1.03	27.1
East: GREAT WESTERN HIGHWAY														
4	L2	87	1.1	87	1.1	0.236	25.7	LOS B	2.1	15.0	0.55	0.68	0.55	40.2
5	T1	235	3.4	235	3.4	0.884	67.6	LOS E	14.5	104.1	0.95	0.99	1.18	25.2
6	R2	77	1.3	77	1.3	0.884	74.5	LOS F	14.5	104.1	0.97	1.00	1.20	18.6
Approach		399	2.5	399	2.5	0.884	59.8	LOS E	14.5	104.1	0.87	0.93	1.05	26.5
North: PARKER STREET														
7	L2	48	0.0	48	0.0	0.193	39.9	LOS C	4.0	28.9	0.71	0.65	0.71	36.3
8	T1	1151	3.7	1151	3.7	0.895	55.5	LOS D	24.2	175.1	0.92	0.93	1.06	27.6
9	R2	89	0.0	89	0.0	0.225	36.2	LOS C	2.5	17.4	0.78	0.74	0.78	31.7
Approach		1288	3.3	1288	3.3	0.895	53.6	LOS D	24.2	175.1	0.90	0.91	1.03	28.1
West: GREAT WESTERN HIGHWAY														
10	L2	119	0.8	119	0.8	0.361	40.1	LOS C	7.2	51.2	0.77	0.77	1.03	20.9
11	T1	199	2.5	199	2.5	0.474	39.8	LOS C	7.2	51.2	0.81	0.78	0.99	32.3
12	R2	126	0.0	126	0.0	0.474	56.9	LOS E	7.2	50.8	0.90	0.79	0.90	26.4
Approach		444	1.4	444	1.4	0.474	44.8	LOS D	7.2	51.2	0.82	0.78	0.98	28.3
All Vehicles		3336	3.4	3336	3.4	0.895	46.9	LOS D	24.2	175.1	0.91	0.88	1.02	27.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	37.8	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	61.4	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [EX AM BARBER-PARKER - S1]

Network: N101 [AM PEAK - S1]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	23	4.3	23	4.4	0.248	6.4	LOS A	0.0	0.0	0.00	0.03	0.00	62.5
2	T1	1388	4.7	1384	4.7	0.248	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	69.5
Approach		1411	4.7	1407 N1	4.7	0.248	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.2
East: BARBER STREET														
4	L2	359	1.1	359	1.1	0.217	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	20.0
Approach		359	1.1	359	1.1	0.217	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	20.0
North: PARKER STREET														
7	L2	811	0.6	692	0.6	1.280	106.0	LOS F	0.0	0.0	0.00	0.00	0.00	11.8
8	T1	1149	5.5	981	5.6	0.311	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1960	3.5	1673 N1	3.5	1.280	43.8	NA	0.0	0.0	0.00	0.00	0.00	19.5
West: BARBER STREET														
10	L2	24	0.0	24	0.0	0.028	6.6	LOS A	0.0	0.3	0.38	0.59	0.38	39.2
Approach		24	0.0	24	0.0	0.028	6.6	LOS A	0.0	0.3	0.38	0.59	0.38	39.2
All Vehicles		3754	3.7	3463 N1	4.0	1.280	21.3	NA	0.0	0.3	0.00	0.01	0.00	25.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 101v [EX AM GWH-SOMERSET - S1]

Network: N101 [AM PEAK - S1]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	235	0.0	235	0.0	0.322	8.8	LOS A	0.6	4.4	0.59	0.85	0.69	38.6
Approach		235	0.0	235	0.0	0.322	8.8	LOS A	0.6	4.4	0.59	0.85	0.69	38.6
East: GREAT WESTERN HIGHWAY														
4	L2	198	0.5	198	0.5	0.411	5.6	LOS A	0.0	0.0	0.00	0.15	0.00	56.2
5	T1	1494	4.6	1494	4.6	0.411	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	58.5
Approach		1692	4.1	1692	4.1	0.411	0.7	NA	0.0	0.0	0.00	0.07	0.00	58.0
West: GREAT WESTERN HIGHWAY														
11	T1	1399	3.6	1245	3.7	0.503	4.8	LOS A	1.9	13.5	0.19	0.00	0.29	54.6
12	R2	265	0.0	236	0.0	1.309	311.6	LOS F	15.8	110.9	1.00	3.54	11.98	8.0
Approach		1664	3.1	1480 N1	3.1	1.309	53.6	NA	15.8	110.9	0.32	0.56	2.15	28.3
All Vehicles		3591	3.4	3407 N1	3.6	1.309	24.3	NA	15.8	110.9	0.18	0.34	0.98	35.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 101 [EX AM GWH-PARKER - S1]

Network: N101 [AM PEAK - S1]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	347	4.0	346	4.0	0.332	21.7	LOS B	7.5	54.6	0.56	0.78	0.64	42.6
2	T1	790	6.3	788	6.3	0.856	64.6	LOS E	18.8	139.0	1.00	0.96	1.13	24.7
3	R2	85	7.1	85	7.1	1.199	265.9	LOS F	7.9	58.5	1.00	1.24	2.43	5.1
Approach		1222	5.7	1219 N1	5.7	1.199	66.4	LOS E	18.8	139.0	0.87	0.93	1.08	23.8
East: GREAT WESTERN HIGHWAY														
4	L2	270	1.5	270	1.5	0.567	52.1	LOS D	11.5	81.5	0.89	0.82	0.89	20.1
5	T1	1040	4.0	1040	4.0	1.236	277.4	LOS F	50.2	363.3	1.00	1.89	2.32	7.9
6	R2	463	9.3	463	9.3	1.246	301.2	LOS F	47.2	356.7	1.00	1.54	2.42	6.9
Approach		1773	5.0	1773	5.0	1.246	249.3	LOS F	50.2	363.3	0.98	1.63	2.13	8.1
North: PARKER STREET														
7	L2	704	5.0	704	5.0	0.393	2.9	LOS A	0.0	0.0	0.00	0.36	0.00	36.0
8	T1	1653	2.8	1653	2.8	1.233	278.7	LOS F	89.3	640.4	1.00	1.96	2.32	3.3
9	R2	245	7.8	245	7.8	0.870	80.1	LOS F	12.0	89.3	1.00	0.99	1.23	16.2
Approach		2602	3.9	2602	3.9	1.233	185.4	LOS F	89.3	640.4	0.73	1.43	1.59	5.2
West: GREAT WESTERN HIGHWAY														
10	L2	255	4.3	255	4.3	0.142	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.0
11	T1	848	3.2	848	3.2	1.251	300.3	LOS F	43.7	313.9	1.00	1.89	2.45	3.6
12	R2	202	4.0	202	4.0	0.524	62.1	LOS E	8.1	58.3	0.94	0.82	0.94	14.6
Approach		1305	3.5	1305	3.5	1.251	205.8	LOS F	43.7	313.9	0.80	1.46	1.73	5.9
All Vehicles		6902	4.4	6899 N1	4.4	1.251	184.7	LOS F	89.3	640.4	0.83	1.40	1.67	7.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER - S1]

Network: N101 [AM PEAK - S1]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	170	0.0	170	0.0	0.675	29.3	LOS C	10.6	77.3	0.86	0.78	0.86	39.9
2	T1	1087	8.3	1087	8.3	0.675	22.8	LOS B	10.6	77.3	0.86	0.75	0.86	33.4
3	R2	290	1.4	290	1.4	0.632	40.3	LOS C	8.6	60.9	0.93	0.84	0.96	36.6
Approach		1547	6.1	1547	6.1	0.675	26.8	LOS B	10.6	78.5	0.87	0.77	0.88	35.2
East: DERBY STREET														
4	L2	69	1.4	69	1.4	0.291	38.1	LOS C	2.4	16.9	0.69	0.69	0.69	35.1
5	T1	209	2.9	209	2.9	1.090	166.1	LOS F	18.4	132.1	0.98	1.35	1.85	13.5
6	R2	46	2.2	46	2.2	1.090	180.9	LOS F	18.4	132.1	1.00	1.39	1.93	8.9
Approach		324	2.5	324	2.5	1.090	140.9	LOS F	18.4	132.1	0.92	1.21	1.62	15.0
North: PARKER STREET														
7	L2	128	0.0	114	0.0	0.210	40.2	LOS C	4.4	31.0	0.72	0.73	0.72	35.0
8	T1	1179	4.7	1051	4.6	0.974	85.1	LOS F	31.3	228.0	0.92	1.10	1.30	20.9
9	R2	233	0.0	208	0.0	0.574	46.7	LOS D	6.0	42.1	0.88	0.88	1.11	27.5
Approach		1540	3.6	1374 N1	3.5	0.974	75.5	LOS F	31.3	228.0	0.90	1.04	1.22	22.5
West: DERBY STREET														
10	L2	73	4.1	73	4.1	0.506	56.7	LOS E	9.3	66.8	0.90	0.84	1.23	15.5
11	T1	265	3.0	265	3.0	0.665	56.6	LOS E	9.3	66.8	0.93	0.83	1.17	25.4
12	R2	84	0.0	84	0.0	0.665	71.3	LOS F	7.2	50.8	1.00	0.83	1.01	21.7
Approach		422	2.6	422	2.6	0.665	59.5	LOS E	9.3	66.8	0.94	0.83	1.15	23.4
All Vehicles		3833	4.4	3667 N1	4.6	1.090	58.9	LOS E	31.3	228.0	0.89	0.92	1.10	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	34.5	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	60.6	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [EX PM BARBER-PARKER - S1]

Network: N101 [PM PEAK - S1]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	6	16.7	6	16.9	0.245	6.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.6
2	T1	1421	4.3	1387	4.4	0.245	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		1427	4.3	1393 N1	4.4	0.245	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.7
East: BARBER STREET														
4	L2	828	0.1	828	0.1	0.621	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	39.4
Approach		828	0.1	828	0.1	0.621	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	39.4
North: PARKER STREET														
7	L2	470	0.0	330	0.0	0.608	6.7	LOS A	0.0	0.0	0.00	0.61	0.00	54.4
8	T1	1387	3.8	977	4.0	0.257	0.0	LOS A	47.1	341.1	0.00	0.00	0.00	69.9
Approach		1857	2.9	1307 N1	3.0	0.608	1.7	NA	47.1	341.1	0.00	0.15	0.00	63.7
West: BARBER STREET														
10	L2	18	0.0	18	0.0	0.021	6.7	LOS A	0.0	0.2	0.38	0.59	0.38	39.2
Approach		18	0.0	18	0.0	0.021	6.7	LOS A	0.0	0.2	0.38	0.59	0.38	39.2
All Vehicles		4130	2.8	3546 N1	3.3	0.621	1.7	NA	47.1	341.1	0.00	0.18	0.00	59.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 101v [EX PM GWH-SOMERSET - S1]

Network: N101 [PM PEAK - S1]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	322	0.0	322	0.0	0.369	7.7	LOS A	0.7	5.0	0.46	0.73	0.54	39.8
Approach		322	0.0	322	0.0	0.369	7.7	LOS A	0.7	5.0	0.46	0.73	0.54	39.8
East: GREAT WESTERN HIGHWAY														
4	L2	104	1.0	104	1.0	0.283	5.6	LOS A	0.0	0.0	0.00	0.12	0.00	56.6
5	T1	1505	4.1	1505	4.1	0.283	0.0	LOS A	12.3	89.3	0.00	0.03	0.00	59.2
Approach		1609	3.9	1609	3.9	0.283	0.4	NA	12.3	89.3	0.00	0.04	0.00	58.9
West: GREAT WESTERN HIGHWAY														
11	T1	1426	2.9	1224	3.0	0.323	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	118	0.0	101	0.0	0.743	53.3	LOS D	1.2	8.1	0.96	1.15	1.66	28.3
Approach		1544	2.7	1325 N1	2.8	0.743	4.1	NA	1.2	8.1	0.07	0.09	0.13	55.2
All Vehicles		3475	3.0	3256 N1	3.2	0.743	2.6	NA	12.3	89.3	0.08	0.13	0.10	55.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 101 [EX PM GWH-PARKER - S1]

Network: N101 [PM PEAK - S1]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	230	2.2	224	2.2	0.202	18.9	LOS B	4.3	30.7	0.47	0.70	0.47	44.8
2	T1	1044	4.6	1019	4.7	0.895	64.4	LOS E	25.6	186.6	1.00	1.01	1.16	24.8
3	R2	106	4.7	103	4.8	1.440	468.9	LOS F	13.1	95.6	1.00	1.47	3.12	3.0
Approach		1380	4.2	1347 N1	4.3	1.440	87.9	LOS F	25.6	186.6	0.91	0.99	1.19	19.4
East: GREAT WESTERN HIGHWAY														
4	L2	187	3.2	187	3.2	0.684	64.4	LOS E	11.0	79.4	0.98	0.84	0.98	17.5
5	T1	1104	3.2	1104	3.2	1.490	472.6	LOS F	55.6	400.0	1.00	2.29	2.98	4.9
6	R2	513	5.5	513	5.5	1.484	505.3	LOS F	54.6	400.0	1.00	1.87	3.12	4.3
Approach		1804	3.8	1804	3.8	1.490	439.6	LOS F	55.6	400.0	1.00	2.02	2.82	5.0
North: PARKER STREET														
7	L2	648	2.0	648	2.0	0.354	6.7	LOS A	0.0	0.0	0.00	0.57	0.00	48.4
8	T1	1463	2.5	1463	2.5	1.489	506.5	LOS F	101.0	722.2	1.00	2.48	3.13	1.9
9	R2	245	5.3	245	5.3	0.893	87.3	LOS F	12.3	89.9	1.00	0.95	1.28	17.7
Approach		2356	2.7	2356	2.7	1.489	325.4	LOS F	101.0	722.2	0.72	1.79	2.08	3.3
West: GREAT WESTERN HIGHWAY														
10	L2	542	2.6	542	2.6	0.297	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.3
11	T1	724	2.1	724	2.1	1.339	376.1	LOS F	42.9	305.7	1.00	1.98	2.75	2.9
12	R2	305	1.3	305	1.3	1.416	450.6	LOS F	38.4	271.9	1.00	1.79	2.99	2.4
Approach		1571	2.1	1571	2.1	1.416	262.7	LOS F	42.9	305.7	0.65	1.44	1.85	5.1
All Vehicles		7111	3.1	7078 N1	3.2	1.490	295.4	LOS F	101.0	722.2	0.81	1.62	2.05	5.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM DERBY-PARKER - S1]

Network: N101 [PM PEAK - S1]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	102	1.0	102	1.0	1.022	111.8	LOS F	23.9	172.4	1.00	1.23	1.59	15.0
2	T1	1166	4.4	1166	4.4	1.022	106.0	LOS F	24.8	180.2	1.00	1.23	1.59	9.9
3	R2	206	1.0	206	1.0	0.747	44.0	LOS D	7.2	50.6	0.94	0.87	1.02	32.9
Approach		1474	3.7	1474	3.7	1.022	97.7	LOS F	24.8	180.2	0.99	1.18	1.51	12.5
East: GREAT WESTERN HIGHWAY														
4	L2	147	0.7	147	0.7	0.448	20.6	LOS B	2.9	20.6	0.48	0.69	0.48	42.7
5	T1	338	2.4	338	2.4	1.328	367.6	LOS F	52.6	374.3	1.00	2.09	2.70	6.9
6	R2	118	0.8	118	0.8	1.328	373.2	LOS F	52.6	374.3	1.00	2.09	2.70	4.6
Approach		603	1.7	603	1.7	1.328	284.1	LOS F	52.6	374.3	0.87	1.75	2.16	8.3
North: PARKER STREET														
7	L2	100	0.0	83	0.0	0.288	44.5	LOS D	5.5	38.6	0.77	0.71	0.77	34.0
8	T1	1931	2.2	1595	2.1	1.333	348.8	LOS F	40.7	290.0	0.99	2.11	2.57	6.4
9	R2	175	0.0	145	0.0	0.545	50.0	LOS D	4.4	30.8	0.96	0.83	1.07	26.5
Approach		2206	1.9	1822 [N1]	1.8	1.333	311.2	LOS F	40.7	290.0	0.98	1.94	2.37	7.1
West: GREAT WESTERN HIGHWAY														
10	L2	144	0.7	144	0.7	0.508	41.8	LOS C	12.5	88.2	0.78	0.80	1.13	20.6
11	T1	290	1.7	290	1.7	0.668	37.6	LOS C	12.5	88.2	0.79	0.80	1.10	33.4
12	R2	151	0.0	151	0.0	0.668	55.8	LOS D	6.7	47.0	0.88	0.79	0.90	26.4
Approach		585	1.0	585	1.0	0.668	43.3	LOS D	12.5	88.2	0.81	0.80	1.06	29.1
All Vehicles		4868	2.3	4484 [N1]	2.5	1.333	202.5	LOS F	52.6	374.3	0.95	1.52	1.89	9.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	44.2	LOS E	0.2	0.2	0.92	0.92
All Pedestrians		200	63.0	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM GWH-SOMERSET - S2]

Network: N101 [AM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	235	0.0	235	0.0	0.723	24.3	LOS B	3.1	21.4	0.99	0.92	1.23	27.6
Approach		235	0.0	235	0.0	0.723	24.3	LOS B	3.1	21.4	0.99	0.92	1.23	27.6
East: GREAT WESTERN HIGHWAY														
4	L2	198	0.5	198	0.5	0.830	20.6	LOS B	5.5	39.5	0.68	0.87	1.08	43.1
5	T1	1494	4.6	1494	4.6	0.830	15.1	LOS B	10.0	72.7	0.80	0.90	1.13	36.8
Approach		1692	4.1	1692	4.1	0.830	15.7	LOS B	10.0	72.7	0.78	0.90	1.12	38.0
West: GREAT WESTERN HIGHWAY														
11	T1	1399	3.6	1368	3.7	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	265	0.0	259	0.0	0.797	27.1	LOS B	3.6	25.0	1.00	0.98	1.39	37.8
Approach		1664	3.1	1627 N1	3.1	0.797	4.3	LOS A	3.6	25.0	0.16	0.16	0.22	54.8
All Vehicles		3591	3.4	3554 N1	3.4	0.830	11.1	LOS A	10.0	72.7	0.51	0.56	0.72	45.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		53	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [EX AM GWH-PARKER - S2]

Network: N101 [AM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	347	4.0	347	4.0	0.812	65.0	LOS E	16.8	121.8	0.99	1.06	1.57	25.5
2	T1	790	6.3	790	6.3	0.812	62.6	LOS E	16.8	121.8	1.00	0.94	1.15	25.1
3	R2	85	7.1	85	7.1	1.030	139.9	LOS F	5.4	40.0	1.00	1.07	1.86	9.3
Approach		1222	5.7	1222	5.7	1.030	68.7	LOS E	16.8	121.8	1.00	0.98	1.31	23.5
East: GREAT WESTERN HIGHWAY														
4	L2	270	1.5	270	1.5	0.501	42.6	LOS D	9.2	65.5	0.84	0.92	1.12	22.7
5	T1	1040	4.0	1040	4.0	1.056	138.2	LOS F	35.1	253.9	0.99	1.40	1.65	14.3
6	R2	463	9.3	463	9.3	1.049	124.0	LOS F	26.7	201.9	1.00	1.18	1.67	12.8
Approach		1773	5.0	1773	5.0	1.056	120.0	LOS F	35.1	253.9	0.97	1.27	1.58	14.4
North: PARKER STREET														
7	L2	704	5.0	704	5.0	0.549	10.8	LOS A	12.1	88.6	0.47	0.62	0.47	28.0
8	T1	1653	2.8	1653	2.8	1.051	138.0	LOS F	49.3	353.6	1.00	1.40	1.65	6.3
9	R2	245	7.8	245	7.8	0.835	75.6	LOS F	11.5	86.2	1.00	0.95	1.17	16.8
Approach		2602	3.9	2602	3.9	1.051	97.7	LOS F	49.3	353.6	0.86	1.15	1.28	8.9
West: GREAT WESTERN HIGHWAY														
10	L2	255	4.3	255	4.3	0.311	26.1	LOS B	6.2	45.3	0.64	0.74	0.64	33.8
11	T1	848	3.2	848	3.2	1.043	140.2	LOS F	20.6	148.3	1.00	1.31	1.72	7.5
12	R2	164	4.9	164	4.9	0.457	62.8	LOS E	6.5	47.4	0.93	0.80	0.93	14.5
Approach		1267	3.6	1267	3.6	1.043	107.2	LOS F	20.6	148.3	0.92	1.13	1.40	10.6
All Vehicles		6864	4.5	6864	4.5	1.056	100.0	LOS F	49.3	353.6	0.92	1.15	1.39	13.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM BARBER-PARKER - S2]

Network: N101 [AM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	23	4.3	23	4.3	0.474	13.1	LOS A	3.6	26.5	0.67	0.60	0.67	52.8
2	T1	1388	4.7	1388	4.7	0.474	6.6	LOS A	3.7	26.6	0.67	0.59	0.67	49.0
3	R2	23	27.3	23	27.3	0.117	20.5	LOS B	0.2	2.1	0.82	0.70	0.82	33.7
Approach		1434	5.0	1434	5.0	0.474	7.0	LOS A	3.7	26.6	0.68	0.59	0.68	48.5
East: BARBER STREET														
4	L2	316	1.3	316	1.3	0.374	17.6	LOS B	1.4	9.7	0.92	0.74	0.92	15.4
5	T1	45	9.3	45	9.3	0.374	20.9	LOS B	1.4	9.9	0.92	0.78	0.92	32.4
Approach		361	2.3	361	2.3	0.374	18.0	LOS B	1.4	9.9	0.92	0.74	0.92	17.7
North: PARKER STREET														
7	L2	748	0.7	719	0.7	0.741	16.4	LOS B	7.6	53.4	0.83	0.88	0.93	44.2
8	T1	1191	5.3	1146	5.3	0.579	7.2	LOS A	4.8	35.2	0.73	0.64	0.73	52.4
Approach		1939	3.5	1865 N1	3.5	0.741	10.7	LOS A	7.6	53.4	0.77	0.73	0.81	48.1
West: BARBER STREET														
10	L2	24	0.0	24	0.0	0.220	21.5	LOS B	0.8	5.7	0.89	0.70	0.89	31.0
11	T1	48	4.3	48	4.3	0.220	16.3	LOS B	0.8	5.7	0.89	0.70	0.89	38.2
Approach		72	2.9	72	2.9	0.220	18.0	LOS B	0.8	5.7	0.89	0.70	0.89	36.3
All Vehicles		3807	4.0	3733 N1	4.0	0.741	10.1	LOS A	7.6	53.4	0.75	0.68	0.77	43.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER - S2]

Network: N101 [AM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	170	0.0	170	0.0	0.677	31.3	LOS C	10.6	77.4	0.92	0.82	0.92	38.7
2	T1	1109	8.1	1109	8.1	0.677	25.0	LOS B	10.6	77.4	0.92	0.80	0.92	32.0
3	R2	268	1.5	268	1.5	0.573	37.7	LOS C	7.4	52.8	0.92	0.82	0.92	37.8
Approach		1547	6.1	1547	6.1	0.677	27.9	LOS B	10.6	79.4	0.92	0.80	0.92	34.5
East: DERBY STREET														
4	L2	69	1.4	69	1.4	0.069	22.3	LOS B	1.4	10.0	0.50	0.69	0.50	41.7
5	T1	209	2.9	209	2.9	0.754	59.1	LOS E	7.1	50.8	0.92	0.78	0.98	27.3
6	R2	46	2.2	46	2.2	0.754	76.3	LOS F	7.1	50.8	1.00	0.88	1.11	18.2
Approach		324	2.5	324	2.5	0.754	53.7	LOS D	7.1	50.8	0.84	0.77	0.89	28.4
North: PARKER STREET														
7	L2	97	0.0	94	0.0	0.588	46.5	LOS D	14.7	106.3	0.86	0.78	0.86	33.9
8	T1	1187	4.6	1152	4.6	0.588	40.1	LOS C	14.8	107.7	0.86	0.76	0.86	33.2
9	R2	221	0.0	214	0.0	0.538	46.8	LOS D	6.2	43.4	0.88	0.88	1.12	27.5
Approach		1505	3.7	1460 N1	3.6	0.588	41.5	LOS C	14.8	107.7	0.86	0.78	0.90	32.3
West: DERBY STREET														
10	L2	66	4.5	66	4.5	0.632	60.3	LOS E	12.3	88.2	0.94	0.86	1.25	14.9
11	T1	265	3.0	265	3.0	0.831	57.0	LOS E	12.3	88.2	0.94	0.86	1.26	25.4
12	R2	84	0.0	84	0.0	0.831	85.6	LOS F	4.7	33.0	1.00	0.95	1.31	19.1
Approach		415	2.7	415	2.7	0.831	63.3	LOS E	12.3	88.2	0.95	0.88	1.27	22.8
All Vehicles		3791	4.4	3746 N1	4.5	0.831	39.3	LOS C	14.8	107.7	0.89	0.80	0.95	30.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	33.1	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	60.2	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM DERBY-PARKER - S2]

Network: N101 [PM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	102	1.0	102	1.0	0.101	14.6	LOS B	1.3	9.3	0.51	0.69	0.51	43.6
2	T1	1186	4.3	1186	4.3	0.633	27.0	LOS B	11.2	81.6	0.89	0.77	0.89	28.9
3	R2	188	1.1	188	1.1	0.664	53.9	LOS D	6.7	47.4	1.00	0.95	1.26	30.0
Approach		1476	3.7	1476	3.7	0.664	29.6	LOS C	11.2	81.6	0.88	0.79	0.91	30.2
East: DERBY STREET														
4	L2	147	0.7	147	0.7	0.265	29.5	LOS C	3.3	23.5	0.80	0.76	0.80	38.3
5	T1	338	2.4	338	2.4	0.972	86.2	LOS F	20.5	145.6	0.97	1.02	1.27	21.9
6	R2	119	0.8	119	0.8	0.972	104.8	LOS F	20.5	145.6	1.00	1.16	1.43	14.3
Approach		604	1.7	604	1.7	0.972	76.0	LOS F	20.5	145.6	0.93	0.99	1.19	23.1
North: PARKER STREET														
7	L2	118	0.0	117	0.0	0.104	19.3	LOS B	2.1	14.9	0.44	0.70	0.44	45.8
8	T1	1954	2.2	1933	2.2	0.995	96.8	LOS F	40.7	290.0	0.99	1.22	1.40	19.2
9	R2	122	0.8	121	0.8	0.450	66.7	LOS E	5.1	35.9	0.96	0.87	1.13	22.0
Approach		2194	2.0	2171 N1	2.0	0.995	90.9	LOS F	40.7	290.0	0.96	1.17	1.33	20.0
West: DERBY STREET														
10	L2	131	0.8	131	0.8	0.747	71.9	LOS F	10.0	70.6	1.00	0.97	1.51	13.4
11	T1	290	1.7	290	1.7	0.960	83.3	LOS F	16.9	119.2	1.00	1.06	1.46	22.1
12	R2	136	0.0	136	0.0	0.960	101.4	LOS F	16.9	119.2	1.00	1.12	1.42	18.5
Approach		557	1.1	557	1.1	0.960	85.1	LOS F	16.9	119.2	1.00	1.06	1.46	19.7
All Vehicles		4831	2.4	4808 N1	2.4	0.995	69.5	LOS E	40.7	290.0	0.94	1.02	1.20	22.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	38.6	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	61.6	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM GWH-PARKER - S2]

Network: N101 [PM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	230	2.2	230	2.2	0.933	96.3	LOS F	22.9	164.9	1.00	1.16	1.90	19.9
2	T1	1044	4.6	1044	4.6	0.933	83.4	LOS F	22.9	164.9	1.00	1.09	1.42	20.8
3	R2	106	4.7	106	4.7	0.983	116.8	LOS F	6.1	44.1	1.00	1.04	1.67	11.0
Approach		1380	4.2	1380	4.2	0.983	88.1	LOS F	22.9	164.9	1.00	1.10	1.52	19.8
East: GREAT WESTERN HIGHWAY														
4	L2	187	3.2	187	3.2	0.491	52.4	LOS D	9.7	69.8	0.88	0.80	0.88	20.3
5	T1	1104	3.2	1104	3.2	1.034	122.7	LOS F	34.6	248.7	0.99	1.31	1.54	15.7
6	R2	513	5.5	513	5.5	1.025	99.0	LOS F	26.1	191.3	1.00	1.12	1.49	14.8
Approach		1804	3.8	1804	3.8	1.034	108.7	LOS F	34.6	248.7	0.98	1.20	1.46	15.7
North: PARKER STREET														
7	L2	648	2.0	648	2.0	0.499	13.3	LOS A	10.4	73.8	0.44	0.72	0.44	36.5
8	T1	1463	2.5	1463	2.5	1.022	121.7	LOS F	40.4	289.1	1.00	1.29	1.56	7.6
9	R2	245	5.3	245	5.3	0.978	112.4	LOS F	14.2	104.0	1.00	1.06	1.52	14.8
Approach		2356	2.7	2356	2.7	1.022	90.9	LOS F	40.4	289.1	0.85	1.11	1.25	10.6
West: GREAT WESTERN HIGHWAY														
10	L2	542	2.6	542	2.6	0.788	38.9	LOS C	18.8	134.6	0.89	0.85	0.89	28.2
11	T1	724	2.1	724	2.1	0.902	81.7	LOS F	12.8	91.3	1.00	1.03	1.30	12.0
12	R2	259	1.5	259	1.5	0.804	69.8	LOS E	11.4	80.9	0.98	0.89	1.10	13.4
Approach		1525	2.2	1525	2.2	0.902	64.5	LOS E	18.8	134.6	0.96	0.94	1.12	17.0
All Vehicles		7065	3.2	7065	3.2	1.034	89.2	LOS F	40.4	289.1	0.93	1.09	1.33	15.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX PM GWH-SOMERSET - S2]

Network: N101 [PM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	322	0.0	322	0.0	0.650	57.0	LOS E	12.8	89.5	0.95	0.84	0.95	17.2
Approach		322	0.0	322	0.0	0.650	57.0	LOS E	12.8	89.5	0.95	0.84	0.95	17.2
East: GREAT WESTERN HIGHWAY														
4	L2	104	1.0	104	1.0	0.659	17.8	LOS B	8.5	61.1	0.48	0.50	0.48	45.6
5	T1	1505	4.1	1505	4.1	0.659	14.5	LOS B	20.4	148.2	0.57	0.54	0.57	37.5
Approach		1609	3.9	1609	3.9	0.659	14.7	LOS B	20.4	148.2	0.57	0.53	0.57	38.3
West: GREAT WESTERN HIGHWAY														
11	T1	1426	2.9	1426	2.9	0.339	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	118	0.0	118	0.0	0.238	67.0	LOS E	5.2	36.2	1.00	0.81	1.00	25.0
Approach		1544	2.7	1544	2.7	0.339	5.1	LOS A	5.2	36.2	0.08	0.06	0.08	54.1
All Vehicles		3475	3.0	3475	3.0	0.659	14.4	LOS A	20.4	148.2	0.39	0.35	0.39	42.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101vv [EX PM BARBER-PARKER - S2]

Network: N101 [PM PEAK - S2]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	6	16.7	6	16.7	0.456	15.4	LOS B	5.2	37.5	0.64	0.57	0.64	47.9
2	T1	1421	4.3	1421	4.3	0.456	8.8	LOS A	5.2	37.5	0.64	0.56	0.64	44.9
3	R2	19	33.3	19	33.3	0.150	34.2	LOS C	0.3	3.0	0.93	0.70	0.93	26.9
Approach		1446	4.7	1446	4.7	0.456	9.1	LOS A	5.2	37.5	0.65	0.57	0.65	44.3
East: BARBER STREET														
4	L2	696	0.1	696	0.1	0.880	41.3	LOS C	8.5	65.6	1.00	1.13	1.56	14.8
5	T1	139	31.8	139	31.8	0.880	35.2	LOS C	8.5	65.6	1.00	1.11	1.44	27.7
Approach		835	5.4	835	5.4	0.880	40.3	LOS C	8.5	65.6	1.00	1.13	1.54	17.4
North: PARKER STREET														
7	L2	396	0.0	389	0.0	0.897	35.6	LOS C	16.5	117.2	0.96	1.10	1.33	33.6
8	T1	1408	3.8	1384	3.8	0.897	32.0	LOS C	16.5	117.2	0.96	1.11	1.40	27.6
Approach		1804	2.9	1774 N1	2.9	0.897	32.8	LOS C	16.5	117.2	0.96	1.11	1.39	29.2
West: BARBER STREET														
10	L2	18	0.0	18	0.0	0.208	25.2	LOS B	1.2	11.0	0.83	0.68	0.83	28.7
11	T1	64	44.3	64	44.3	0.208	20.1	LOS B	1.2	11.0	0.83	0.68	0.83	36.1
Approach		82	34.6	82	34.6	0.208	21.2	LOS B	1.2	11.0	0.83	0.68	0.83	34.8
All Vehicles		4167	4.7	4137 N1	4.7	0.897	25.8	LOS B	16.5	117.2	0.85	0.91	1.15	29.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		158	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM GWH-SOMERSET - S3]

Network: N101 [AM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	239	0.0	239	0.0	0.735	24.5	LOS B	3.1	21.9	1.00	0.93	1.26	27.5
Approach		239	0.0	239	0.0	0.735	24.5	LOS B	3.1	21.9	1.00	0.93	1.26	27.5
East: GREAT WESTERN HIGHWAY														
4	L2	198	0.5	198	0.5	0.852	22.9	LOS B	6.0	43.1	0.69	0.91	1.16	41.7
5	T1	1507	4.6	1507	4.6	0.852	17.3	LOS B	10.8	78.4	0.81	0.95	1.21	34.9
Approach		1705	4.1	1705	4.1	0.852	17.9	LOS B	10.8	78.4	0.79	0.95	1.21	36.1
West: GREAT WESTERN HIGHWAY														
11	T1	1399	3.6	1365	3.7	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	265	0.0	258	0.0	0.795	27.1	LOS B	3.6	24.9	1.00	0.97	1.39	37.8
Approach		1664	3.1	1623 N1	3.1	0.795	4.3	LOS A	3.6	24.9	0.16	0.16	0.22	54.8
All Vehicles		3608	3.4	3567 N1	3.4	0.852	12.2	LOS A	10.8	78.4	0.52	0.59	0.76	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		53	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [EX AM GWH-PARKER - S3]

Network: N101 [AM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	349	4.0	349	4.0	0.815	64.7	LOS E	16.9	122.6	0.99	1.06	1.56	25.6
2	T1	794	6.3	794	6.3	0.815	62.8	LOS E	16.9	122.6	1.00	0.94	1.15	25.1
3	R2	88	6.8	88	6.8	1.065	162.0	LOS F	6.1	45.2	1.00	1.11	1.97	8.1
Approach		1231	5.7	1231	5.7	1.065	70.4	LOS E	16.9	122.6	1.00	0.99	1.32	23.1
East: GREAT WESTERN HIGHWAY														
4	L2	287	1.4	287	1.4	0.504	42.4	LOS C	9.7	68.7	0.84	0.92	1.12	22.7
5	T1	1040	4.0	1040	4.0	1.062	143.3	LOS F	35.8	259.6	0.99	1.42	1.68	13.9
6	R2	463	9.3	463	9.3	1.078	144.4	LOS F	28.9	218.3	1.00	1.23	1.78	11.5
Approach		1790	5.0	1790	5.0	1.078	127.4	LOS F	35.8	259.6	0.97	1.29	1.62	13.7
North: PARKER STREET														
7	L2	704	5.0	704	5.0	0.549	10.8	LOS A	12.1	88.6	0.47	0.62	0.47	28.0
8	T1	1669	2.8	1669	2.8	1.042	132.1	LOS F	48.9	350.7	1.00	1.38	1.61	6.5
9	R2	245	7.8	245	7.8	0.803	72.3	LOS F	11.2	83.8	1.00	0.92	1.12	17.3
Approach		2618	3.9	2618	3.9	1.042	93.9	LOS F	48.9	350.7	0.86	1.13	1.26	9.2
West: GREAT WESTERN HIGHWAY														
10	L2	255	4.3	255	4.3	0.307	25.5	LOS B	6.1	44.6	0.63	0.74	0.63	34.1
11	T1	848	3.2	848	3.2	1.044	140.8	LOS F	20.7	148.8	1.00	1.31	1.73	7.5
12	R2	169	4.7	169	4.7	0.487	64.0	LOS E	6.8	49.5	0.94	0.81	0.94	14.3
Approach		1272	3.6	1272	3.6	1.044	107.5	LOS F	20.7	148.8	0.92	1.13	1.40	10.5
All Vehicles		6911	4.4	6911	4.4	1.078	100.9	LOS F	48.9	350.7	0.92	1.15	1.39	12.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER - S3]

Network: N101 [AM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	170	0.0	170	0.0	0.221	25.5	LOS B	3.7	25.8	0.68	0.76	0.68	39.9
2	T1	1109	8.1	1109	8.1	0.501	21.8	LOS B	9.6	71.9	0.78	0.68	0.78	34.8
3	R2	268	1.5	268	1.5	0.491	37.5	LOS C	8.1	57.2	0.87	0.81	0.87	37.9
Approach		1547	6.1	1547	6.1	0.501	24.9	LOS B	9.6	71.9	0.79	0.71	0.79	36.4
East: DERBY STREET														
4	L2	69	1.4	69	1.4	0.064	19.4	LOS B	1.3	9.1	0.45	0.68	0.45	43.3
5	T1	209	2.9	209	2.9	0.857	61.5	LOS E	6.7	47.9	0.90	0.79	1.02	26.8
6	R2	46	2.2	46	2.2	0.857	89.6	LOS F	6.7	47.9	1.00	0.96	1.29	16.2
Approach		324	2.5	324	2.5	0.857	56.5	LOS E	6.7	47.9	0.82	0.79	0.94	27.7
North: PARKER STREET														
7	L2	104	0.0	101	0.0	0.164	43.7	LOS D	3.2	22.1	0.74	0.76	0.74	33.1
8	T1	1190	4.6	1161	4.6	0.643	44.8	LOS D	15.3	111.5	0.90	0.78	0.90	31.4
9	R2	181	0.0	177	0.0	0.566	45.7	LOS D	5.4	37.6	0.89	0.84	1.02	27.9
Approach		1475	3.7	1439 N1	3.7	0.643	44.8	LOS D	15.3	111.5	0.89	0.79	0.90	31.1
West: DERBY STREET														
10	L2	66	4.5	66	4.5	0.624	61.4	LOS E	12.6	90.5	0.93	0.86	1.30	14.8
11	T1	265	3.0	265	3.0	0.802	56.9	LOS E	12.6	90.5	0.93	0.86	1.30	25.5
12	R2	76	0.0	76	0.0	0.802	91.8	LOS F	3.9	27.0	1.00	0.90	1.26	18.3
Approach		407	2.7	407	2.7	0.802	64.1	LOS E	12.6	90.5	0.94	0.87	1.30	22.7
All Vehicles		3753	4.5	3717 N1	4.5	0.857	39.7	LOS C	15.3	111.5	0.84	0.76	0.90	30.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	36.0	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	60.9	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER - S3]

Network: N101 [AM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	170	0.0	170	0.0	0.221	25.5	LOS B	3.7	25.8	0.68	0.76	0.68	39.9
2	T1	1109	8.1	1109	8.1	0.501	21.8	LOS B	9.6	71.9	0.78	0.68	0.78	34.8
3	R2	268	1.5	268	1.5	0.491	37.5	LOS C	8.1	57.2	0.87	0.81	0.87	37.9
Approach		1547	6.1	1547	6.1	0.501	24.9	LOS B	9.6	71.9	0.79	0.71	0.79	36.4
East: DERBY STREET														
4	L2	69	1.4	69	1.4	0.064	19.4	LOS B	1.3	9.1	0.45	0.68	0.45	43.3
5	T1	209	2.9	209	2.9	0.857	61.5	LOS E	6.7	47.9	0.90	0.79	1.02	26.8
6	R2	46	2.2	46	2.2	0.857	89.6	LOS F	6.7	47.9	1.00	0.96	1.29	16.2
Approach		324	2.5	324	2.5	0.857	56.5	LOS E	6.7	47.9	0.82	0.79	0.94	27.7
North: PARKER STREET														
7	L2	104	0.0	101	0.0	0.164	43.7	LOS D	3.2	22.1	0.74	0.76	0.74	33.1
8	T1	1190	4.6	1161	4.6	0.643	44.8	LOS D	15.3	111.5	0.90	0.78	0.90	31.4
9	R2	181	0.0	177	0.0	0.566	45.7	LOS D	5.4	37.6	0.89	0.84	1.02	27.9
Approach		1475	3.7	1439 N1	3.7	0.643	44.8	LOS D	15.3	111.5	0.89	0.79	0.90	31.1
West: DERBY STREET														
10	L2	66	4.5	66	4.5	0.624	61.4	LOS E	12.6	90.5	0.93	0.86	1.30	14.8
11	T1	265	3.0	265	3.0	0.802	56.9	LOS E	12.6	90.5	0.93	0.86	1.30	25.5
12	R2	76	0.0	76	0.0	0.802	91.8	LOS F	3.9	27.0	1.00	0.90	1.26	18.3
Approach		407	2.7	407	2.7	0.802	64.1	LOS E	12.6	90.5	0.94	0.87	1.30	22.7
All Vehicles		3753	4.5	3717 N1	4.5	0.857	39.7	LOS C	15.3	111.5	0.84	0.76	0.90	30.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	36.0	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	60.9	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM BARBER-PARKER - S3]

Network: N101 [AM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	23	4.3	23	4.3	0.474	13.1	LOS A	3.6	26.5	0.67	0.60	0.67	52.8
2	T1	1388	4.7	1388	4.7	0.474	6.6	LOS A	3.7	26.6	0.67	0.59	0.67	49.0
3	R2	32	20.0	32	20.0	0.160	21.6	LOS B	0.3	2.8	0.86	0.72	0.86	33.6
Approach		1443	5.0	1443	5.0	0.474	7.1	LOS A	3.7	26.6	0.68	0.59	0.68	48.3
East: BARBER STREET														
4	L2	321	1.2	321	1.2	0.361	17.4	LOS B	1.3	9.3	0.92	0.74	0.92	15.2
5	T1	26	16.0	26	16.0	0.361	22.5	LOS B	1.3	9.5	0.92	0.79	0.92	30.1
Approach		347	2.4	347	2.4	0.361	17.8	LOS B	1.3	9.5	0.92	0.74	0.92	16.5
North: PARKER STREET														
7	L2	810	0.6	784	0.6	0.808	19.4	LOS B	9.6	67.7	0.89	0.94	1.09	41.8
8	T1	1149	5.5	1112	5.5	0.563	7.1	LOS A	4.6	33.8	0.72	0.63	0.72	52.6
Approach		1959	3.5	1897 [N1]	3.5	0.808	12.2	LOS A	9.6	67.7	0.79	0.76	0.87	46.4
West: BARBER STREET														
10	L2	24	0.0	24	0.0	0.238	21.6	LOS B	0.9	6.2	0.90	0.70	0.90	31.2
11	T1	55	3.8	55	3.8	0.238	16.4	LOS B	0.9	6.2	0.90	0.70	0.90	38.4
Approach		79	2.7	79	2.7	0.238	18.0	LOS B	0.9	6.2	0.90	0.70	0.90	36.6
All Vehicles		3828	3.9	3765 [N1]	4.0	0.808	10.8	LOS A	9.6	67.7	0.76	0.69	0.80	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX PM BARBER-PARKER - S3]

Network: N101 [PM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	6	16.7	6	16.7	0.470	16.1	LOS B	5.4	38.9	0.67	0.59	0.67	47.2
2	T1	1421	4.3	1421	4.3	0.470	9.5	LOS A	5.4	38.9	0.67	0.59	0.67	43.7
3	R2	24	26.1	24	26.1	0.044	15.9	LOS B	0.3	2.2	0.65	0.67	0.65	36.6
Approach		1451	4.7	1451	4.7	0.470	9.6	LOS A	5.4	38.9	0.67	0.59	0.67	43.5
East: BARBER STREET														
4	L2	724	0.1	724	0.1	0.881	41.1	LOS C	9.2	70.4	1.00	1.13	1.55	14.9
5	T1	180	24.6	180	24.6	0.881	34.4	LOS C	9.2	70.4	1.00	1.12	1.43	28.1
Approach		904	5.0	904	5.0	0.881	39.8	LOS C	9.2	70.4	1.00	1.13	1.52	18.1
North: PARKER STREET														
7	L2	457	0.0	443	0.0	0.895	35.1	LOS C	16.7	118.1	0.96	1.08	1.32	33.7
8	T1	1387	3.8	1344	3.8	0.895	31.7	LOS C	16.7	118.1	0.96	1.11	1.40	27.8
Approach		1844	2.9	1787 N1	2.9	0.895	32.5	LOS C	16.7	118.1	0.96	1.10	1.38	29.5
West: BARBER STREET														
10	L2	18	0.0	18	0.0	0.232	24.5	LOS B	1.5	12.7	0.82	0.67	0.82	29.7
11	T1	83	34.2	83	34.2	0.232	19.2	LOS B	1.5	12.7	0.82	0.67	0.82	37.0
Approach		101	28.1	101	28.1	0.232	20.1	LOS B	1.5	12.7	0.82	0.67	0.82	36.0
All Vehicles		4300	4.5	4243 N1	4.6	0.895	25.9	LOS B	16.7	118.1	0.87	0.92	1.15	29.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		158	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX PM GWH-SOMERSET - S3]

Network: N101 [PM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	342	0.0	342	0.0	0.658	55.7	LOS D	13.5	94.4	0.94	0.85	0.94	17.5
Approach		342	0.0	342	0.0	0.658	55.7	LOS D	13.5	94.4	0.94	0.85	0.94	17.5
East: GREAT WESTERN HIGHWAY														
4	L2	104	1.0	104	1.0	0.666	18.7	LOS B	8.7	62.6	0.50	0.51	0.50	44.9
5	T1	1510	4.1	1510	4.1	0.666	15.6	LOS B	21.3	154.1	0.59	0.55	0.59	36.5
Approach		1614	3.9	1614	3.9	0.666	15.8	LOS B	21.3	154.1	0.59	0.55	0.59	37.3
West: GREAT WESTERN HIGHWAY														
11	T1	1426	2.9	1424	2.9	0.338	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	118	0.0	118	0.0	0.227	65.7	LOS E	5.1	36.0	1.00	0.81	1.00	25.3
Approach		1544	2.7	1541 N1	2.7	0.338	5.1	LOS A	5.1	36.0	0.08	0.06	0.08	54.2
All Vehicles		3500	3.0	3497 N1	3.0	0.666	15.0	LOS B	21.3	154.1	0.40	0.36	0.40	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [EX PM GWH-PARKER - S3]

Network: N101 [PM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	238	2.1	238	2.1	0.953	103.6	LOS F	24.6	177.0	1.00	1.19	1.95	18.9
2	T1	1064	4.5	1064	4.5	0.953	90.2	LOS F	24.6	177.0	1.00	1.13	1.47	19.6
3	R2	123	4.1	123	4.1	1.022	135.5	LOS F	7.7	55.8	1.00	1.11	1.77	9.6
Approach		1425	4.1	1425	4.1	1.022	96.4	LOS F	24.6	177.0	1.00	1.14	1.58	18.4
East: GREAT WESTERN HIGHWAY														
4	L2	212	2.8	212	2.8	0.484	50.2	LOS D	9.9	71.4	0.86	0.80	0.86	20.8
5	T1	1104	3.2	1104	3.2	1.020	115.3	LOS F	33.9	243.8	0.99	1.28	1.50	16.5
6	R2	513	5.5	513	5.5	1.001	84.4	LOS F	24.1	176.7	1.00	1.07	1.41	16.2
Approach		1829	3.8	1829	3.8	1.020	99.1	LOS F	33.9	243.8	0.98	1.17	1.40	16.7
North: PARKER STREET														
7	L2	648	2.0	648	2.0	0.505	13.6	LOS A	10.6	75.4	0.45	0.72	0.45	36.0
8	T1	1469	2.5	1469	2.5	1.043	135.1	LOS F	42.5	303.7	1.00	1.34	1.64	6.8
9	R2	245	5.3	245	5.3	0.978	112.4	LOS F	14.2	104.0	1.00	1.06	1.52	14.8
Approach		2362	2.7	2362	2.7	1.043	99.4	LOS F	42.5	303.7	0.85	1.14	1.30	9.8
West: GREAT WESTERN HIGHWAY														
10	L2	542	2.6	542	2.6	0.808	41.9	LOS C	19.6	140.5	0.90	0.87	0.93	27.1
11	T1	724	2.1	724	2.1	0.944	92.1	LOS F	13.7	97.4	1.00	1.09	1.41	10.9
12	R2	261	1.5	261	1.5	0.845	74.3	LOS F	12.0	85.0	0.99	0.92	1.17	12.7
Approach		1527	2.2	1527	2.2	0.944	71.2	LOS F	19.6	140.5	0.96	0.98	1.20	15.9
All Vehicles		7143	3.1	7143	3.1	1.043	92.7	LOS F	42.5	303.7	0.94	1.11	1.36	14.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM DERBY-PARKER - S3]

Network: N101 [PM PEAK - S3]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	102	1.0	102	1.0	0.101	14.6	LOS B	1.3	9.3	0.51	0.69	0.51	43.6
2	T1	1186	4.3	1186	4.3	0.633	27.0	LOS B	11.2	81.6	0.89	0.77	0.89	28.9
3	R2	188	1.1	188	1.1	0.662	53.5	LOS D	6.7	47.3	1.00	0.95	1.25	30.2
Approach		1476	3.7	1476	3.7	0.662	29.5	LOS C	11.2	81.6	0.88	0.79	0.91	30.2
East: DERBY STREET														
4	L2	147	0.7	147	0.7	0.265	29.5	LOS C	3.3	23.5	0.80	0.76	0.80	38.3
5	T1	338	2.4	338	2.4	0.982	89.8	LOS F	21.2	150.5	0.97	1.04	1.30	21.3
6	R2	119	0.8	119	0.8	0.982	109.4	LOS F	21.2	150.5	1.00	1.18	1.46	13.8
Approach		604	1.7	604	1.7	0.982	79.0	LOS F	21.2	150.5	0.93	1.00	1.21	22.5
North: PARKER STREET														
7	L2	118	0.0	116	0.0	0.103	19.3	LOS B	2.1	14.8	0.44	0.70	0.44	45.8
8	T1	1954	2.2	1916	2.2	0.986	91.5	LOS F	40.7	290.0	0.99	1.19	1.36	20.0
9	R2	122	0.8	120	0.8	0.446	66.6	LOS E	5.0	35.6	0.96	0.86	1.12	22.1
Approach		2194	2.0	2151 N1	2.0	0.986	86.3	LOS F	40.7	290.0	0.96	1.14	1.30	20.8
West: DERBY STREET														
10	L2	131	0.8	131	0.8	0.747	71.9	LOS F	10.0	70.6	1.00	0.97	1.51	13.4
11	T1	290	1.7	290	1.7	0.960	83.3	LOS F	16.9	119.2	1.00	1.06	1.46	22.1
12	R2	136	0.0	136	0.0	0.960	101.4	LOS F	16.9	119.2	1.00	1.12	1.42	18.5
Approach		557	1.1	557	1.1	0.960	85.1	LOS F	16.9	119.2	1.00	1.06	1.46	19.7
All Vehicles		4831	2.4	4788 N1	2.4	0.986	67.7	LOS E	40.7	290.0	0.94	1.01	1.19	22.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	38.6	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	61.6	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM BARBER-PARKER - S4]

Network: N101 [AM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	23	4.3	23	4.3	0.474	13.1	LOS A	3.6	26.5	0.67	0.60	0.67	52.8
2	T1	1388	4.7	1388	4.7	0.474	6.6	LOS A	3.7	26.6	0.67	0.59	0.67	49.0
3	R2	32	20.0	32	20.0	0.154	20.6	LOS B	0.3	2.7	0.83	0.72	0.83	34.1
Approach		1443	5.0	1443	5.0	0.474	7.0	LOS A	3.7	26.6	0.68	0.59	0.68	48.4
East: BARBER STREET														
4	L2	321	1.2	321	1.2	0.361	17.4	LOS B	1.3	9.3	0.92	0.74	0.92	15.2
5	T1	26	16.0	26	16.0	0.361	22.5	LOS B	1.3	9.5	0.92	0.79	0.92	30.1
Approach		347	2.4	347	2.4	0.361	17.8	LOS B	1.3	9.5	0.92	0.74	0.92	16.5
North: PARKER STREET														
7	L2	753	0.7	726	0.7	0.748	16.6	LOS B	7.8	54.7	0.84	0.89	0.95	44.0
8	T1	1149	5.5	1108	5.5	0.561	7.1	LOS A	4.6	33.6	0.72	0.63	0.72	52.6
Approach		1902	3.6	1835 N1	3.6	0.748	10.8	LOS A	7.8	54.7	0.77	0.73	0.81	47.9
West: BARBER STREET														
10	L2	24	0.0	24	0.0	0.238	21.6	LOS B	0.9	6.2	0.90	0.70	0.90	31.2
11	T1	55	3.8	55	3.8	0.238	16.4	LOS B	0.9	6.2	0.90	0.70	0.90	38.4
Approach		79	2.7	79	2.7	0.238	18.0	LOS B	0.9	6.2	0.90	0.70	0.90	36.6
All Vehicles		3771	4.0	3703 N1	4.1	0.748	10.2	LOS A	7.8	54.7	0.75	0.68	0.77	42.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX AM GWH-SOMERSET - S4]

Network: N101 [AM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 40 seconds (Network Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	239	0.0	239	0.0	0.735	24.5	LOS B	3.1	21.9	1.00	0.93	1.26	27.5
Approach		239	0.0	239	0.0	0.735	24.5	LOS B	3.1	21.9	1.00	0.93	1.26	27.5
East: GREAT WESTERN HIGHWAY														
4	L2	198	0.5	198	0.5	0.782	17.2	LOS B	4.7	33.6	0.67	0.80	0.94	45.3
5	T1	1508	4.6	1508	4.6	0.782	11.6	LOS A	8.9	64.9	0.77	0.81	0.98	40.3
Approach		1706	4.1	1706	4.1	0.782	12.2	LOS A	8.9	64.9	0.76	0.81	0.97	41.3
West: GREAT WESTERN HIGHWAY														
11	T1	1399	3.6	1369	3.6	0.327	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	265	0.0	259	0.0	0.798	27.2	LOS B	3.6	25.0	1.00	0.98	1.40	37.8
Approach		1664	3.1	1629 N1	3.1	0.798	4.4	LOS A	3.6	25.0	0.16	0.16	0.22	54.8
All Vehicles		3609	3.4	3574 N1	3.4	0.798	9.5	LOS A	8.9	64.9	0.50	0.52	0.65	47.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		53	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [EX AM GWH-PARKER - S4]

Network: N101 [AM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	349	4.0	349	4.0	0.816	65.5	LOS E	17.0	123.5	0.99	1.06	1.57	25.4
2	T1	794	6.3	794	6.3	0.816	63.0	LOS E	17.0	123.5	1.00	0.94	1.15	25.0
3	R2	88	6.8	88	6.8	1.065	162.0	LOS F	6.1	45.2	1.00	1.11	1.97	8.1
Approach		1231	5.7	1231	5.7	1.065	70.8	LOS F	17.0	123.5	1.00	0.99	1.33	23.0
East: GREAT WESTERN HIGHWAY														
4	L2	253	1.6	253	1.6	0.498	44.3	LOS D	9.0	63.9	0.85	0.92	1.15	22.2
5	T1	1040	4.0	1040	4.0	1.049	133.7	LOS F	34.3	248.5	0.99	1.38	1.63	14.7
6	R2	463	9.3	463	9.3	1.049	124.0	LOS F	26.7	201.9	1.00	1.18	1.67	12.8
Approach		1756	5.1	1756	5.1	1.049	118.3	LOS F	34.3	248.5	0.97	1.26	1.57	14.6
North: PARKER STREET														
7	L2	704	5.0	704	5.0	0.549	10.8	LOS A	12.1	88.6	0.47	0.62	0.47	28.0
8	T1	1646	2.9	1646	2.9	1.047	135.4	LOS F	48.7	349.1	1.00	1.39	1.63	6.4
9	R2	245	7.8	245	7.8	0.835	75.6	LOS F	11.5	86.2	1.00	0.95	1.17	16.8
Approach		2595	3.9	2595	3.9	1.047	96.0	LOS F	48.7	349.1	0.86	1.14	1.27	9.1
West: GREAT WESTERN HIGHWAY														
10	L2	255	4.3	255	4.3	0.310	26.1	LOS B	6.2	45.3	0.63	0.74	0.63	33.8
11	T1	848	3.2	848	3.2	1.044	140.8	LOS F	20.7	148.8	1.00	1.31	1.73	7.5
12	R2	169	4.7	169	4.7	0.470	63.0	LOS E	6.7	49.0	0.93	0.81	0.93	14.5
Approach		1272	3.6	1272	3.6	1.044	107.4	LOS F	20.7	148.8	0.92	1.13	1.40	10.5
All Vehicles		6854	4.5	6854	4.5	1.065	99.3	LOS F	48.7	349.1	0.92	1.14	1.38	13.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX AM DERBY-PARKER - S4]

Network: N101 [AM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	170	0.0	170	0.0	0.269	33.7	LOS C	4.6	31.9	0.77	0.77	0.77	35.5
2	T1	1115	8.1	1115	8.1	0.619	31.3	LOS C	12.1	90.6	0.88	0.76	0.88	28.6
3	R2	268	1.5	268	1.5	0.584	48.1	LOS D	9.1	64.6	0.93	0.85	1.00	33.8
Approach		1553	6.1	1553	6.1	0.619	34.5	LOS C	12.1	90.6	0.88	0.78	0.89	30.9
East: DERBY STREET														
4	L2	69	1.4	69	1.4	0.057	15.3	LOS B	1.1	7.6	0.38	0.66	0.38	45.8
5	T1	209	2.9	209	2.9	0.491	44.6	LOS D	6.2	44.6	0.81	0.67	0.81	31.5
6	R2	48	2.1	48	2.1	0.491	61.7	LOS E	6.2	44.6	0.93	0.78	0.93	21.3
Approach		326	2.5	326	2.5	0.491	40.9	LOS C	6.2	44.6	0.74	0.69	0.74	32.4
North: PARKER STREET														
7	L2	101	0.0	98	0.0	0.198	51.7	LOS D	3.4	23.6	0.82	0.77	0.82	30.3
8	T1	1189	4.6	1156	4.6	0.812	58.2	LOS E	17.9	130.3	0.99	0.91	1.06	27.0
9	R2	180	0.0	175	0.0	0.750	64.0	LOS E	6.2	43.5	1.00	0.94	1.36	22.7
Approach		1470	3.7	1430 N1	3.7	0.812	58.5	LOS E	17.9	130.3	0.98	0.90	1.08	26.7
West: DERBY STREET														
10	L2	67	4.5	67	4.5	0.398	43.8	LOS D	9.0	64.5	0.77	0.74	1.09	18.8
11	T1	265	3.0	265	3.0	0.511	44.1	LOS D	9.0	64.5	0.81	0.75	1.08	28.5
12	R2	76	0.0	76	0.0	0.511	75.4	LOS F	5.2	37.0	1.00	0.81	1.00	21.0
Approach		408	2.7	408	2.7	0.511	49.8	LOS D	9.0	64.5	0.84	0.76	1.07	25.8
All Vehicles		3757	4.5	3717 N1	4.5	0.812	46.0	LOS D	17.9	130.3	0.90	0.81	0.97	28.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	39.5	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	61.8	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX PM BARBER-PARKER - S4]

Network: N101 [PM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	6	16.7	6	16.7	0.470	16.1	LOS B	5.4	38.9	0.67	0.59	0.67	47.2
2	T1	1421	4.3	1421	4.3	0.470	9.5	LOS A	5.4	38.9	0.67	0.59	0.67	43.7
3	R2	26	24.0	26	24.0	0.047	15.9	LOS B	0.3	2.3	0.65	0.67	0.65	36.8
Approach		1453	4.7	1453	4.7	0.470	9.6	LOS A	5.4	38.9	0.67	0.59	0.67	43.5
East: BARBER STREET														
4	L2	724	0.1	724	0.1	0.882	41.2	LOS C	9.2	70.5	1.00	1.13	1.55	14.9
5	T1	180	24.6	180	24.6	0.882	34.5	LOS C	9.2	70.5	1.00	1.12	1.43	28.1
Approach		904	5.0	904	5.0	0.882	39.8	LOS C	9.2	70.5	1.00	1.13	1.53	18.0
North: PARKER STREET														
7	L2	417	0.0	405	0.0	0.887	33.8	LOS C	15.8	111.9	0.95	1.07	1.29	34.5
8	T1	1387	3.8	1347	3.8	0.887	30.0	LOS C	15.8	111.9	0.95	1.08	1.36	28.7
Approach		1804	2.9	1751 N1	2.9	0.887	30.9	LOS C	15.8	111.9	0.95	1.08	1.34	30.3
West: BARBER STREET														
10	L2	18	0.0	18	0.0	0.234	24.5	LOS B	1.5	12.8	0.82	0.67	0.82	29.7
11	T1	84	33.8	84	33.8	0.234	19.2	LOS B	1.5	12.8	0.82	0.67	0.82	37.0
Approach		102	27.8	102	27.8	0.234	20.1	LOS B	1.5	12.8	0.82	0.67	0.82	36.0
All Vehicles		4264	4.6	4211 N1	4.6	0.887	25.2	LOS B	15.8	111.9	0.86	0.91	1.14	29.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		158	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101vv [EX PM GWH-SOMERSET - S4]

Network: N101 [PM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SOMERSET STREET														
1	L2	340	0.0	340	0.0	0.670	56.6	LOS E	13.5	94.7	0.95	0.85	0.95	17.3
Approach		340	0.0	340	0.0	0.670	56.6	LOS E	13.5	94.7	0.95	0.85	0.95	17.3
East: GREAT WESTERN HIGHWAY														
4	L2	104	1.0	104	1.0	0.665	18.3	LOS B	8.6	62.2	0.49	0.51	0.49	45.3
5	T1	1515	4.1	1515	4.1	0.665	15.1	LOS B	21.0	152.4	0.59	0.55	0.59	36.9
Approach		1619	3.9	1619	3.9	0.665	15.3	LOS B	21.0	152.4	0.58	0.54	0.58	37.8
West: GREAT WESTERN HIGHWAY														
11	T1	1426	2.9	1424	2.9	0.338	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	118	0.0	118	0.0	0.232	66.3	LOS E	5.2	36.1	1.00	0.81	1.00	25.1
Approach		1544	2.7	1541 N1	2.7	0.338	5.1	LOS A	5.2	36.1	0.08	0.06	0.08	54.1
All Vehicles		3503	3.0	3500 N1	3.0	0.670	14.8	LOS B	21.0	152.4	0.39	0.36	0.39	42.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [EX PM GWH-PARKER - S4]

Network: N101 [PM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	238	2.1	238	2.1	0.952	102.9	LOS F	24.5	176.5	1.00	1.19	1.95	19.0
2	T1	1064	4.5	1064	4.5	0.952	89.8	LOS F	24.5	176.5	1.00	1.13	1.47	19.7
3	R2	123	4.1	123	4.1	1.022	135.5	LOS F	7.7	55.8	1.00	1.11	1.77	9.6
Approach		1425	4.1	1425	4.1	1.022	96.0	LOS F	24.5	176.5	1.00	1.14	1.57	18.5
East: GREAT WESTERN HIGHWAY														
4	L2	181	3.3	181	3.3	0.489	52.4	LOS D	9.6	69.1	0.88	0.79	0.88	20.3
5	T1	1104	3.2	1104	3.2	1.031	120.5	LOS F	34.2	246.0	0.99	1.30	1.53	16.0
6	R2	513	5.5	513	5.5	1.025	99.7	LOS F	26.1	191.3	1.00	1.12	1.49	14.7
Approach		1798	3.8	1798	3.8	1.031	107.7	LOS F	34.2	246.0	0.98	1.20	1.45	15.8
North: PARKER STREET														
7	L2	648	2.0	648	2.0	0.505	13.7	LOS A	10.7	76.1	0.45	0.72	0.45	36.0
8	T1	1461	2.5	1461	2.5	1.040	132.8	LOS F	42.0	300.1	1.00	1.33	1.62	7.0
9	R2	245	5.3	245	5.3	0.978	112.4	LOS F	14.2	104.0	1.00	1.06	1.52	14.8
Approach		2354	2.7	2354	2.7	1.040	97.9	LOS F	42.0	300.1	0.85	1.14	1.29	9.9
West: GREAT WESTERN HIGHWAY														
10	L2	542	2.6	542	2.6	0.793	39.8	LOS C	19.0	136.2	0.89	0.85	0.90	27.9
11	T1	724	2.1	724	2.1	0.902	81.9	LOS F	12.8	91.4	1.00	1.03	1.30	12.0
12	R2	261	1.5	261	1.5	0.814	70.6	LOS F	11.6	82.2	0.98	0.90	1.11	13.3
Approach		1527	2.2	1527	2.2	0.902	65.0	LOS E	19.0	136.2	0.96	0.94	1.13	16.9
All Vehicles		7104	3.1	7104	3.1	1.040	92.9	LOS F	42.0	300.1	0.94	1.11	1.35	14.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	69.3	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [EX PM DERBY-PARKER - S4]

Network: N101 [PM PEAK - S4]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: PARKER STREET														
1	L2	102	1.0	102	1.0	0.101	14.6	LOS B	1.3	9.3	0.51	0.69	0.51	43.6
2	T1	1186	4.3	1186	4.3	0.633	27.0	LOS B	11.2	81.6	0.89	0.77	0.89	28.9
3	R2	188	1.1	188	1.1	0.662	53.6	LOS D	6.7	47.3	1.00	0.95	1.25	30.1
Approach		1476	3.7	1476	3.7	0.662	29.5	LOS C	11.2	81.6	0.88	0.79	0.91	30.2
East: DERBY STREET														
4	L2	147	0.7	147	0.7	0.265	29.5	LOS C	3.3	23.5	0.80	0.76	0.80	38.3
5	T1	338	2.4	338	2.4	0.982	89.8	LOS F	21.2	150.5	0.97	1.04	1.30	21.3
6	R2	119	0.8	119	0.8	0.982	109.4	LOS F	21.2	150.5	1.00	1.18	1.46	13.8
Approach		604	1.7	604	1.7	0.982	79.0	LOS F	21.2	150.5	0.93	1.00	1.21	22.5
North: PARKER STREET														
7	L2	118	0.0	116	0.0	0.103	19.3	LOS B	2.1	14.8	0.44	0.70	0.44	45.8
8	T1	1954	2.2	1918	2.2	0.987	92.3	LOS F	40.7	290.0	0.99	1.19	1.37	19.8
9	R2	122	0.8	120	0.8	0.446	66.6	LOS E	5.1	35.6	0.96	0.87	1.12	22.1
Approach		2194	2.0	2154 N1	2.0	0.987	86.9	LOS F	40.7	290.0	0.96	1.15	1.31	20.7
West: DERBY STREET														
10	L2	131	0.8	131	0.8	0.747	71.9	LOS F	10.0	70.6	1.00	0.97	1.51	13.4
11	T1	290	1.7	290	1.7	0.960	83.3	LOS F	16.9	119.2	1.00	1.06	1.46	22.1
12	R2	136	0.0	136	0.0	0.960	101.4	LOS F	16.9	119.2	1.00	1.12	1.42	18.5
Approach		557	1.1	557	1.1	0.960	85.1	LOS F	16.9	119.2	1.00	1.06	1.46	19.7
All Vehicles		4831	2.4	4791 N1	2.4	0.987	68.0	LOS E	40.7	290.0	0.94	1.01	1.19	22.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	69.3	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	50	38.6	LOS D	0.1	0.1	0.92	0.92
All Pedestrians		200	61.6	LOS F			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix E

Transport Services

Sydney Trains Network

Transport Sydney Trains

To Central Coast & Newcastle Line
Berowra
Mount Kuring-gai
Mount Colah
Asquith
Hornsby
Normanhurst
Thornleigh
Pennant Hills
Beecroft
Cheltenham
Epping
Eastwood
Denistone
West Ryde
Meadowbank
Rhodes
Concord West
North Strathfield
Macquarie University
Macquarie Park
North Ryde
Waitara
Wahroonga
Warrawee
Turramurra
Pymble
Gordon
Killara
Lindfield
Roseville
Chatswood
Artarmon
St Leonards
Wollstonecraft
Waverton
North Sydney
Milsons Point
Richmond
East Richmond
Clarendon
Windsor
Mulgrave
Vineyard
Riverstone
Cudgegong Road
Rouse Hill
Kellyville
Bella Vista
Norwest
Showground
Castle Hill
Cherrybrook
Sydney Metro Northwest under construction
Schofields
Quakers Hill
Marayong
To Blue Mountains Line
Emu Plains
Penrith
Kingswood
Werrington
St Marys
Mount Druitt
Rooty Hill
Doonside
Blacktown
Seven Hills
Toongabbie
Pendle Hill
Wentworthville
Westmead
Parramatta
Harris Park
Carlingford
Telopea
Dundas
Rydalmere
Camellia
Rosehill
Olympic Park
Granville
Clyde
Auburn
Lidcombe
Flemington
Homebush
Strathfield
Burwood
Croydon
Ashfield
Summer Hill
Lewisham
Petersham
Stanmore
Newtown
Macdonaldtown
Erskineville
St Peters
Sydenham
Redfern
Central
Wynyard
Town Hall
Martin Place
Circular Quay
CITY
St James
Museum
Kings Cross
Edgecliff
Bondi Junction
Merrylands
Guildford
Yennora
Fairfield
Canley Vale
Cabramatta
Warwick Farm
Liverpool
Casula
Glenfield
Macquarie Fields
Ingleburn
Minto
Leumeah
Campbelltown
Macarthur
To Southern Highlands Line
Leppington
Edmondson Park
Berala
Regents Park
Carramar
Villawood
Leightonfield
Chester Hill
Sefton
Birrong
Yagoona
Bankstown
Punchbowl
Wiley Park
Lakemba
Belmore
Hurlstone Park
Canterbury
Campsie
Dulwich Hill
Marrickville
Holsworthy
East Hills
Panania
Revesby
Padstow
Riverwood
Turrella
Bardwell Park
Bexley North
Kingsgrove
Beverly Hills
Narwee
Tempe
Wolli Creek
Arncliffe
Banksia
Rockdale
Kogarah
Carlton
Allawah
Hurstville
Penshurst
Mortdale
Oatley
Como
Jannali
Sutherland
Kirrawee
Gymea
Miranda
Caringbah
Woolooware
Cronulla
Loftus
Engadine
Heathcote
Waterfall
To South Coast Line
Green Square
Mascot
Domestic Airport — Station Access Fee applies
International Airport — Station Access Fee applies

T1 North Shore, Northern & Western Line
T2 Airport, Inner West & South Line
T3 Bankstown Line
T4 Eastern Suburbs & Illawarra Line
T5 Cumberland Line
T6 Carlingford Line
T7 Olympic Park Line

Stop
Interchange
Interchange
End of line

Check timetables and trip planners for train services and connections

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Sydney Trains Network Map

Transport Sydney Trains

The following Sydney Trains Network information includes an alphabetical list of stations, its map grid references, wheel chair access and connecting train service details where applicable.

A	Allawah	E5	♿
	Arncliffe	E5	♿
	Artarmon	C5	♿
	Ashfield	D4	♿
	Asquith	B4	
	Auburn	D3	♿
B	Banksia	E5	
	Bankstown	E3	♿
	Bardwell Park	E4	
	Beecroft	B4	
	Belmore	E4	♿
	Berala	D3	
	Berowra	A4	♿
	Beverly Hills	E4	♿
	Bexley North	E4	
	Birrong	E3	
	Blacktown	C2	♿
	Bondi Junction	D6	♿
	Burwood	D4	♿
C	Cabramatta	E2	♿
	Camellia	C3	
	Campbelltown	F2	♿
	Campsie	E4	♿
	Canley Vale	D2	
	Canterbury	D4	
	Caringbah	F6	♿
	Carlingford	C3	♿
	Carlton	E5	♿
	Carramar	E3	
	Casula	E2	♿
	Central	D5	♿
	Chatswood	C5	♿
	Cheltenham	B4	♿
	Chester Hill	E3	
	Circular Quay	C5	♿
	Clarendon	B2	
	Clyde	D3	
	Como	F5	
	Concord West	C4	♿
	Cronulla	F6	♿
	Croydon	D4	
D	Denistone	C4	
	Domestic Airport	D5	♿
	Doonside	C2	
	Dulwich Hill	D4	
	Dundas	C3	♿
E	East Hills	E3	
	East Richmond	A1	♿
	Eastwood	C4	♿
	Edgecliff	D6	
	Edmondson Park	F2	♿
	Emu Plains	C1	♿
	Engadine	F5	♿
	Epping	B4	♿
	Erskineville	D5	
F	Fairfield	D2	♿
	Flemington	D3	
G	Glenfield	E2	♿
	Gordon	B4	♿
	Granville	D3	♿
	Green Square	D5	♿
	Guildford	D2	♿
	Gymea	F5	♿
H	Harris Park	D3	
	Heathcote	F5	
	Holsworthy	E3	♿
	Homebush	D3	
	Hornsby	B4	♿
	Hurlstone Park	D4	
	Hurstville	E5	♿
I	Ingleburn	F2	♿
	International Airport	D5	♿
J	Jannali	F5	
K	Killara	B4	
	Kings Cross	D6	♿
	Kingsgrove	E4	♿
	Kingswood	C1	
	Kirrawee	F5	♿
	Kogarah	E5	♿
L	Lakemba	E4	♿
	Leightonfield	E3	
	Leppington	F2	♿
	Leumeah	F2	♿
	Lewisham	D4	
	Lidcombe	D3	♿
	Lindfield	B4	♿
	Liverpool	E2	♿
	Loftus	F5	
M	Macarthur	G3	♿
	Macdonaldtown	D5	
	Macquarie Fields	F2	
	Macquarie Park	C4	♿
	Macquarie University	C4	♿
	Marayong	C2	♿
	Marrickville	D5	♿
	Martin Place	D5	♿
	Mascot	D5	♿
	Meadowbank	C4	♿
	Merrylands	D3	♿
	Milsons Point	C5	♿
	Minto	F2	♿
	Miranda	F6	♿
	Mortdale	F5	♿
	Mount Colah	A4	
	Mount Druitt	C2	♿
	Mount Kuring-gai	A4	
	Mulgrave	B2	
	Museum	D5	♿
N	Narwee	E4	
	Newtown	D5	♿
	Normanhurst	B4	
	North Ryde	C4	♿
	North Strathfield	D4	
	North Sydney	C5	♿
O	Oatley	F5	♿
	Olympic Park	C3	♿
P	Padstow	E4	♿
	Panania	E3	
	Parramatta	C3	♿
	Pendle Hill	C3	
	Pennant Hills	B4	♿
	Penrith	C1	♿
	Penshurst	E5	♿
	Petersham	D4	
	Punchbowl	E4	
	Pymble	B4	
Q	Quakers Hill	C2	♿
R	Redfern	D5	
	Regents Park	D3	♿
	Revesby	E3	♿
	Rhodes	C4	♿
	Richmond	A2	♿
	Riverstone	B2	
	Riverwood	E4	♿
	Rockdale	E5	♿
	Rooty Hill	C2	
	Rosehill	C3	
	Roseville	C5	
	Rydalmere	C3	
S	Schofields	B1	♿
	Sefton	E3	♿
	Seven Hills	C2	♿
	St James	D6	♿
	St Leonards	C5	♿
	St Marys	C2	♿
	St Peters	D5	
	Stanmore	D4	
	Strathfield	D4	♿
	Summer Hill	D4	♿
	Sutherland	F5	♿
	Sydenham	D5	♿
T	Telopea	C3	
	Tempe	D5	
	Thornleigh	B4	
	Toongabbie	C2	
	Town Hall	D5	♿
	Turramurra	B4	♿
	Turrella	E4	
V	Villawood	E3	
	Vineyard	B2	
W	Wahroonga	B4	
	Waitara	B4	
	Warrawee	B4	
	Warwick Farm	E2	♿
	Waterfall	G5	♿
	Waverton	C5	♿
	Wentworthville	C3	
	Werrington	C2	♿
	West Ryde	C4	♿
	Westmead	C3	♿
	Wiley Park	E4	
	Windsor	B2	♿
	Wolli Creek	E5	♿
	Wollstonecraft	C5	
	Woolooware	F6	♿
	Wynyard	C5	♿
Y	Yagoona	E3	
	Yennora	D2	

Key

♿ Wheelchair access

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1610TMS-E-MWT-A4P

Intercity Trains Network

Transport NSW TrainLink

Hunter Line: Scone, Aberdeen, Muswellbrook, Singleton, Branxton, Greta, Lochinvar, Maitland, Telarah, Mindaribba, Paterson, Martins Creek, Hillsdale, Wallarobba, Wirragulla, Dungog

Hunter Line: Maitland, High Street, East Maitland, Victoria Street, Metford, Thornton, Beresfield, Tarro, Hexham, Sandgate, Waratah, Waratah, Hamilton, Wickham, Civic, Queens Wharf, Newcastle

Hunter Line / Central Coast & Newcastle Line: Hamilton, Broadmeadow, Adamstown, Kotara, Cardiff, Cockle Creek, Teralba, Booragul, Fassifern, Awaba, Dora Creek, Morisset, Wyee, Warnervale, Wyong, Tuggerah, Ourimbah, Lisarow, Niagara Park, Narara, Gosford, Point Clare, Tascott, Koolewong, Woy Woy, Wondabyne, Hawkesbury River, Cowan, Berowra, Mount Kuring-gai, Mount Colah, Asquith, Hornsby

Central Coast Line: Hornsby, Epping, Eastwood

Central Coast Line: Hornsby, Gordon, Chatswood, St Leonards, North Sydney, Milsons Point, Martin Place, Kings Cross, Edgecliff, Bondi Junction

Central Coast & Newcastle Line / Blue Mountains Line: Hornsby, Wynyard, Town Hall, Central

Blue Mountains Line: Bathurst, Lithgow, Zig Zag, Bell, Mount Victoria, Blackheath, Medlow Bath, Katoomba, Leura, Wentworth Falls, Bullaburra, Lawson, Hazelbrook, Woodford, Linden, Faulconbridge, Springwood, Valley Heights, Warrimoo, Blaxland, Glenbrook, Lapstone, Emu Plains, Penrith, Blacktown, Parramatta, Strathfield, Central

Central, Redfern, Wolli Creek, Hurstville, Sutherland, Waterfall, Helensburgh, Otford, Stanwell Park, Coalcliff, Scarborough, Wombarra, Coledale, Austinmer, Thirroul, Bulli, Woonona, Bellambi, Corrimal, Towradgi, Fairy Meadow, North Wollongong, Wollongong, Coniston, Unanderra, Kembla Grange, Dapto, Albion Park, Oak Flats, Shellharbour Junction, Minnamurra, Bombo, Kiama, Gerringong, Berry, Bomaderry

South Coast Line: Wollongong, Lysaghts, Cringila, Port Kembla North, Port Kembla

See Sydney Trains Network map for connecting City services

Southern Highlands Line: Campbelltown, Macarthur, Menangle Park, Menangle, Douglas Park, Picton, Tahmoor, Bargo, Yerrinbool, Mittagong, Bowral, Burradoo, Moss Vale, Exeter, Bundanoon, Penrose, Wingello, Tallong, Marulan, Goulburn

Hunter, Central Coast, Blue Mountains, Sydney, Illawarra, Southern Highlands, South Coast, Lake Macquarie, Hawkesbury River, Tasman Sea

Blue Mountains Line
Central Coast & Newcastle Line
Hunter Line
South Coast Line
Southern Highlands Line

Bus
Train
Stop
Interchange
End of line/route

NORTH

Check timetables and trip planners for train services and connections

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Phone 131 500
TTY 1800 637 500

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1411TMI-E-MWT

Intercity Trains Network

Transport NSW TrainLink

The following Intercity Trains Network information includes an alphabetical list of stations, its map grid references, wheel chair access and connecting train service details where applicable.

For more information phone 131 500, (TTY 1800 637 500) or download a trip planning app at transportnsw.info/apps

A	Aberdeen	A3	♿	
	Adamstown	A5	♿	SP4
	Albion Park	G5	♿	
	Asquith	C5		SP6
	Austinmer	E5		
	Awaba	B5		SP4
B	Bargo	E4		SP2
	Bathurst	D2	♿	
	Bell	D2		SP4
	Bellambi	F5		SP6
	Beresfield	A5	♿	
	Berowra	C5	♿	
	Berry	G5	♿	
	Blackheath	D3		
	Blacktown	D4	♿	
	Blaxland	D4	♿	SP6
	Bomaderry	G5	♿	
	Bombo	G5	♿	
	Bondi Junction	D5	♿	
	Booragul	B5		SP4
	Bowral	F4	♿	
	Branxton	A3		SPM
	Broadmeadow	A5		SP6
	Bullaburra	D3		SP6
	Bulli	F5	♿	
	Bundanoon	F3		
	Burradoo	F3		SP2
C	Campbelltown	E4	♿	
	Cardiff	B5	♿	
	Central	D5	♿	
	Chatswood	D5	♿	
	Civic	A5		
	Coalcliff	E5		
	Cockle Creek	B5		SP4
	Coledale	E5		SP6
	Coniston	F5		
	Corrimal	F5	♿	
	Cowan	C5	♿	SP4
	Cringila	F5		
D	Dapto	F5		
	Dora Creek	B5		
	Douglas Park	E4		SP2
	Dungog	A4		
E	East Maitland	A4		
	Eastwood	D5	♿	
	Edgecliff	D5		
	Emu Plains	D4	♿	SP6
	Epping	D5	♿	
	Exeter	F3		SP2
F	Fairy Meadow	F5		
	Fassifern	B5	♿	
	Faulconbridge	D4		SP6
G	Gerringong	G5	♿	
	Glenbrook	D4		SP6
	Gordon	D5	♿	
	Gosford	C5	♿	
	Goulburn	F3		
	Greta	A3		SPM
H	Hamilton	A5	♿	SP6
	Hawkesbury River	C5		
	Hazelbrook	D3		SP6
	Helensburgh	E5	♿	SP6
	Hexham	A5		SPM
	High Street	A4		
	Hilldale	A4		SPM
	Hornsby	D5	♿	
	Hurstville	E5	♿	
K	Katoomba	D3	♿	
	Kembla Grange	F5		SP4
	Kiama	G5	♿	
	Kings Cross	D5	♿	
	Koolewong	C5		SP1r
	Kotara	B5		SP4
	Lapstone	D4		SP6
L	Lawson	D3		SP6
	Leura	D3		SP6
	Linden	D3		SP4
	Lisarow	C5		SP4
	Lithgow	D2	♿	
	Lochinvar	A4	♿	SPM
	Lysaghts	F5		SP6
M	Macarthur	E4	♿	
	Maitland	A4	♿	
	Martin Place	D5	♿	
	Martins Creek	A4	♿	SPM
	Marulan	F3	♿	SP2
	Medlow Bath	D3		SP6
	Menangle	E4		SP2
	Menangle Park	E4		SP2
	Metford	A4	♿	
	Milsons Point	D5	♿	
	Mindaribba	A4		SPM
	Minnamurra	G5	♿	
	Mittagong	E4		
	Morisset	B5	♿	SP4
	Moss Vale	F3		
	Mount Colah	C5		SP6
	Mount Kuring-gai	C5		SP6
	Mount Victoria	D2		
	Muswellbrook	A3	♿	
N	Narara	C5		SP4
	Newcastle	A6		
	Niagara Park	C5		SP4
	North Sydney	D5	♿	
	North Wollongong	F5	♿	
O	Oak Flats	G5	♿	
	Otford	E5		
	Ourimbah	B5		SP4
P	Parramatta	D5	♿	
	Paterson	A4		SPM
	Penrith	D4	♿	
	Penrose	F3		SP2
	Picton	E4	♿	
	Point Clare	C5		SP4
	Port Kembla	F5	♿	
	Port Kembla North	F5		
Q	Queens Wharf	A5		
R	Redfern	D5		SP6#
S	Sandgate	A5		
	Scarborough	E5		SP6
	Scone	A3	♿	
	Shellharbour Junction	G5	♿	
	Singleton	A3	♿	
	Springwood	D4	♿	SP6
	St Leonards	D5	♿	
	Stanwell Park	E5		
	Strathfield	D5	♿	
	Sutherland	E5	♿	
T	Tahmoor	E4		SP2
	Tallong	F3		SP2
	Tarro	A5		
	Tascott	C5		SP1r
	Telarah	A4	♿	
	Teralba	B5		SP4
	Thirroul	E5	♿	
	Thornton	A4	♿	
	Town Hall	D5	♿	
	Towradgi	F5		
	Tuggerah	B5	♿	
U	Unanderra	F5		SP6
V	Valley Heights	D4		SP6
	Victoria Street	A4		
W	Wallarobba	A4	♿	SPM
	Warabrook	A5	♿	
	Waratah	A5		
	Warnervale	B5		SP4
	Warrimoo	D4		SP6
	Waterfall	E5		
	Wentworth Falls	D3		SP6
	Wickham	A5		
	Wingello	F3		
	Wirragulla	A4		SPM
	Wolli Creek	D5	♿	
	Wollongong	F5	♿	
	Wombarra	E5		SP6
	Wondabyne	C5		SP1r
	Woodford	D3		SP6
	Woonona	F5	♿	
	Woy Woy	C5	♿	
	Wyee	B5		SP4
	Wynyard	D5	♿	
	Wyong	B5	♿	
Y	Yerrinbool	E4		SP2
Z	Zig Zag	D2		SP1r

Key

- ♿ Wheelchairs access
- SP1 Leave from rear car
- SP1r Leave from rear door of rear car
- SP2 Leave from rear 2 cars
- SP4 Leave from rear 4 cars
- SP6# Leave from front 6 cars
- SP6 Leave from rear 6 cars
- SPM Leave from middle doors

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780 Mount Druitt to Penrith via Ropes Crossing

B

How to use this timetable

This timetable provides a snap shot of service information in 24-hour time (e.g. 5am = 05:00, 5pm = 17:00). Information contained in this timetable is subject to change without notice. Please note that timetables do not include minor stops, additional trips for special events, short term changes, holiday timetable changes, real-time information or any disruption alerts.

For the most up-to-date times, use the Trip Planner or Departures on **transportnsw.info**

Real-time planning

You can plan your trip with real-time information using the Trip Planner or Departures on **transportnsw.info** or by downloading travel apps on your smartphone or tablet.

The Trip Planner, Departures and travel apps offer various features:

- favourite your regular trips
- see where your service is on the route
- get estimated pick up and arrival times
- receive service updates
- find nearby stations, stops, wharves and routes
- check accessibility information

Find the latest apps at **transportnsw.info/apps**

Accessible services

All new buses are wheelchair-accessible with low-level floors and space for wheelchairs, prams or strollers. Look for the ♿ symbol in this timetable. Some older buses may not have all the features you need. There will be more accessible services as older buses are replaced.

Who is providing my bus services?

The bus services shown in this timetable are run by Busways Western Sydney.

Fares

To travel on public transport in Sydney and surrounding regions, an Opal card is the cheapest and easiest ticket option.

An Opal card is a smartcard you keep and reuse. Add value before you travel and tap on and tap off to pay your fares throughout Sydney, the Blue Mountains, Central Coast, the Hunter and the Illawarra.

Fares are based on:

- the type of Opal card you use
- the distance you travel from tap on to tap off
- the mode of transport you choose
- any Opal benefits such as discounts and capped fares that apply

Find out more about Opal fares and benefits at **transportnsw.info/opal**

Which Opal card is right for you?

Adult - Customers 16 years and over who are not entitled to any concessions and normally pay full fare.

Child/Youth - For customers aged 4-15 (inclusive), or customers 16 years or older who hold a NSW/ACT Senior Secondary Student Concession Card.

Gold Senior/Pensioner - For eligible NSW and interstate seniors, pensioners, war widows/ers and asylum seekers.

Concession - For eligible tertiary students, job seekers, apprentices and trainees.

How to get an Opal card

You can get an Adult and Child/Youth Opal cards over the counter at thousands of Opal retailers that display the Opal sign. To find your nearest retailer visit **transportnsw.info/opal**.

If you are eligible to travel with concession fares you can apply for a Gold Senior/Pensioner or Concession Opal card. Visit **transportnsw.info/opal** for more information.

Explanation of definitions and symbols

♿	Wheelchair Accessible
T	Public school holidays bus operates through timing point 10 minutes later than time shown
L	Public school holidays bus operates through timing point 5 minutes later than time shown
S	Bus operates public school days only
D	Public school days bus operates via Griffiths St, Wattle Ave, Jackaranda Rd, Debrincat Ave & Glossop St, omitting Forrester Rd & Glossop St between Griffiths St & Debrincat Ave
N	Bus diverts via Hatherton Rd, Forrester Rd & Ellsworth Dr to Rymill Rd, then travels via Rymill Rd to Hatherton Rd

NSW GOVERNMENT | Transport

780 Penrith to Mount Druitt via Ropes Crossing

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	-	-	-	-	06:08	06:29	06:36	06:52	07:05
Kradle Krayon, High St, Penrith	-	-	-	-	06:12	06:33	06:40	06:56	07:09
Cambrige Park Shops Oxford St, Cambridge Park	-	-	-	-	06:15	06:36	06:43	06:59	07:12
Dunheved Rd opp Werrington County Shopping Village, Werrington County	-	-	-	-	06:20	06:41	06:48	07:04	07:17
Christie St opp Lee Holm Rd, St Marys	-	-	-	-	06:23	06:44	06:51	07:07	07:20
Ropes Crossing Shops Hollows Pde, Ropes Crossing	05:25	-	06:00	-	06:27	06:49	06:56	07:12	07:25
Rymill Rd opp Bernacci St, Tregear	05:28	05:46	06:03	06:18	06:30	06:53	07:00	07:16	07:29
Luxford Rd after Popondetta Rd, Whalan	05:33	05:51	06:08	06:23	06:35	07:00	07:07	07:23	07:36
Mount Druitt Station, Mount Druitt	05:41	05:59	06:17	06:32	06:44	07:10	07:17	07:33	07:46

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	07:24	-	07:50	-	08:27	08:44	09:01	09:16	09:46
Lawson St before High St, Penrith	–	-	–	-	–	08:46	–	–	–
Kradle Krayon, High St, Penrith	07:28	-	07:55	-	08:31	08:50	09:05	09:20	09:50
Cambrige Park Shops Oxford St, Cambridge Park	07:31	-	08:00	-	08:35	08:54	09:09	09:24	09:54
Dunheved Rd opp Werrington County Shopping Village, Werrington County	07:36	-	08:09	-	08:43	09:00	09:15	09:30	10:00
Christie St opp Lee Holm Rd, St Marys	07:39	-	08:12	-	08:46	09:03	09:18	09:33	10:03
Ropes Crossing Shops Hollows Pde, Ropes Crossing	07:44	-	08:17	-	08:51	09:08	09:23	09:38	10:08
Rymill Rd opp Bernacci St, Tregear	07:48	07:55	08:21	08:30	08:55	09:12	09:27	09:42	10:12
Luxford Rd after Popondetta Rd, Whalan	07:55	08:02	08:28	08:37	09:02	09:18	09:33	09:48	10:18
Mount Druitt Station, Mount Druitt	08:05	08:12	08:39	08:50	09:13	09:29	09:43	09:58	10:28

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	10:16	10:46	11:16	11:46	12:16	12:46	13:16	13:46	-
Kradle Krayon, High St, Penrith	10:20	10:50	11:20	11:50	12:20	12:50	13:20	13:50	-
Cambrige Park Shops Oxford St, Cambridge Park	10:24	10:54	11:24	11:54	12:24	12:54	13:24	13:54	-
Dunheved Rd opp Werrington County Shopping Village, Werrington County	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	-
Christie St opp Lee Holm Rd, St Marys	10:33	11:03	11:33	12:03	12:33	13:03	13:33	14:03	-
Ropes Crossing Shops Hollows Pde, Ropes Crossing	10:38	11:08	11:38	12:08	12:38	13:08	13:38	14:08	-
Rymill Rd opp Bernacci St, Tregear	10:42	11:12	11:42	12:12	12:42	13:12	13:42	14:12	14:27
Luxford Rd after Popondetta Rd, Whalan	10:48	11:18	11:48	12:18	12:48	13:18	13:48	14:18	14:33
Mount Druitt Station, Mount Druitt	10:58	11:28	11:58	12:28	12:58	13:28	13:58	14:28	14:43

Monday to Friday		♿			♿	♿			♿
Penrith Station	14:16	14:40	**T**14:56	15:33	16:03	16:20	16:38	16:52	17:04
Kradle Krayon, High St, Penrith	14:20	14:44	**T**15:02	15:39	16:08	16:25	16:43	16:57	17:09
Cambrige Park Shops Oxford St, Cambridge Park	14:24	14:48	**T**15:07	15:44	16:13	16:30	16:48	17:02	17:14
Dunheved Rd opp Werrington County Shopping Village, Werrington County	14:30	14:54	**L**15:16	15:51	16:20	16:37	16:55	17:09	17:21
Christie St opp Lee Holm Rd, St Marys	14:33	14:57	**L**15:19	15:54	16:23	16:40	16:58	17:12	17:24
Ropes Crossing Shops Hollows Pde, Ropes Crossing	14:38	15:02	**L**15:24	15:59	16:27	16:44	17:02	17:16	17:28
Rymill Rd opp Bernacci St, Tregear	14:42	15:06	**L**15:29	16:04	16:31	16:48	17:06	17:20	17:32
Luxford Rd after Popondetta Rd, Whalan	14:48	15:12	15:38	16:10	16:36	16:53	17:11	17:25	17:37
Mount Druitt Station, Mount Druitt	14:58	15:22	15:49	16:20	16:45	17:02	17:20	17:34	17:46

780 Penrith to Mount Druitt via Ropes Crossing

B

Monday to Friday	♿	♿		♿	♿	♿	♿	♿	♿
Penrith Station	17:22	17:37	17:48	18:12	18:37	19:04	19:43	20:53	21:55
Kradle Krayon, High St, Penrith	17:27	17:41	17:52	18:16	18:41	19:08	19:47	20:57	21:59
Cambrige Park Shops Oxford St, Cambridge Park	17:32	17:44	17:55	18:19	18:44	19:11	19:50	21:00	22:02
Dunheved Rd opp Werrington County Shopping Village, Werrington County	17:39	17:50	18:01	18:25	18:50	19:17	19:56	21:06	22:06
Christie St opp Lee Holm Rd, St Marys	17:42	17:53	18:04	18:28	-	19:20	19:59	21:09	22:09
Ropes Crossing Shops Hollows Pde, Ropes Crossing	17:46	17:57	18:08	18:32	-	19:24	20:03	21:13	22:13
Rymill Rd opp Bernacci St, Tregear	17:50	18:01	18:12	18:36	-	19:28	20:06	21:16	22:16
Luxford Rd after Popondetta Rd, Whalan	17:55	18:06	18:17	18:41	-	19:33	20:11	21:21	22:21
Mount Druitt Station, Mount Druitt	18:04	18:15	18:26	18:50	-	19:42	20:18	21:28	22:28

Monday to Friday	♿
Penrith Station	22:55
Kradle Krayon, High St, Penrith	22:59
Cambrige Park Shops Oxford St, Cambridge Park	23:02
Dunheved Rd opp Werrington County Shopping Village, Werrington County	23:06

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	-	07:16	-	08:16	-	09:41	10:41	11:41	12:41
Kradle Krayon, High St, Penrith	-	07:20	-	08:20	-	09:46	10:46	11:46	12:46
Cambrige Park Shops Oxford St, Cambridge Park	-	07:23	-	08:23	-	09:50	10:50	11:50	12:50
Dunheved Rd opp Werrington County Shopping Village, Werrington County	-	07:28	-	08:28	-	09:56	10:56	11:56	12:56
Christie St opp Lee Holm Rd, St Marys	-	07:31	-	08:31	-	09:59	10:59	11:59	12:59
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	07:35	-	08:35	09:04	10:03	11:03	12:03	13:03
Rymill Rd opp Bernacci St, Tregear	07:09	07:39	08:09	08:39	09:08	10:07	11:07	12:07	13:07
Luxford Rd after Popondetta Rd, Whalan	07:14	07:44	08:14	08:44	09:14	10:13	11:13	12:13	13:13
Mount Druitt Station, Mount Druitt	07:23	07:53	08:23	08:53	09:23	10:22	11:22	12:22	13:22

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	13:41	14:41	15:41	16:41	17:41	18:41	19:41	20:41	21:41
Kradle Krayon, High St, Penrith	13:46	14:46	15:46	16:46	17:46	18:46	19:45	20:45	21:45
Cambrige Park Shops Oxford St, Cambridge Park	13:50	14:50	15:50	16:50	17:50	18:50	19:48	20:48	21:48
Dunheved Rd opp Werrington County Shopping Village, Werrington County	13:56	14:56	15:56	16:56	17:56	18:56	19:53	20:53	21:53
Christie St opp Lee Holm Rd, St Marys	13:59	14:59	15:59	16:59	17:59	18:59	19:56	20:56	21:56
Ropes Crossing Shops Hollows Pde, Ropes Crossing	14:03	15:03	16:03	17:03	18:03	19:03	20:00	21:00	22:00
Rymill Rd opp Bernacci St, Tregear	14:07	15:07	16:07	17:07	18:07	19:07	20:03	21:03	22:03
Luxford Rd after Popondetta Rd, Whalan	14:13	15:13	16:13	17:13	18:13	19:13	20:07	21:07	22:07
Mount Druitt Station, Mount Druitt	14:22	15:22	16:22	17:22	18:22	19:22	20:14	21:14	22:14

Saturday	♿
Penrith Station	22:41
Kradle Krayon, High St, Penrith	22:45
Cambrige Park Shops Oxford St, Cambridge Park	22:48
Dunheved Rd opp Werrington County Shopping Village, Werrington County	22:53

780 Penrith to Mount Druitt via Ropes Crossing

B

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	-	-	08:26	-	09:26	10:26	11:26	12:26	13:26
Kradle Krayon, High St, Penrith	-	-	08:30	-	09:30	10:30	11:30	12:30	13:30
Cambrige Park Shops Oxford St, Cambridge Park	-	-	08:34	-	09:34	10:34	11:34	12:34	13:34
Dunheved Rd opp Werrington County Shopping Village, Werrington County	-	-	08:40	-	09:40	10:40	11:40	12:40	13:40
Christie St opp Lee Holm Rd, St Marys	-	-	08:43	-	09:43	10:43	11:43	12:43	13:43
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	-	08:47	-	09:47	10:47	11:47	12:47	13:47
Rymill Rd opp Bernacci St, Tregear	07:51	08:21	08:51	09:21	09:51	10:51	11:51	12:51	13:51
Luxford Rd after Popondetta Rd, Whalan	07:56	08:26	08:56	09:26	09:56	10:56	11:56	12:56	13:56
Mount Druitt Station, Mount Druitt	08:05	08:35	09:05	09:35	10:05	11:05	12:05	13:05	14:05

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿
Penrith Station	14:26	15:26	16:26	17:26	18:27	19:27	20:27
Kradle Krayon, High St, Penrith	14:30	15:30	16:30	17:30	18:30	19:30	20:30
Cambrige Park Shops Oxford St, Cambridge Park	14:34	15:34	16:34	17:34	18:33	19:33	20:33
Dunheved Rd opp Werrington County Shopping Village, Werrington County	14:40	15:40	16:40	17:40	18:39	19:39	20:39
Christie St opp Lee Holm Rd, St Marys	14:43	15:43	16:43	17:43	18:42	-	-
Ropes Crossing Shops Hollows Pde, Ropes Crossing	14:47	15:47	16:47	17:47	18:46	-	-
Rymill Rd opp Bernacci St, Tregear	14:51	15:51	16:51	17:51	18:49	-	-
Luxford Rd after Popondetta Rd, Whalan	14:56	15:56	16:56	17:56	18:53	-	-
Mount Druitt Station, Mount Druitt	15:05	16:05	17:05	18:05	19:00	-	-

780 Mount Druitt to Penrith via Ropes Crossing

B

Monday to Friday	♿	♿	♿		♿		♿	♿	♿
Service Information								S	
Mount Druitt Station, Mount Druitt	05:18	05:46	06:20	-	06:52	07:03	07:22	07:39	08:16
Luxford Rd opp Popondetta Rd, Whalan	05:22	05:50	06:24	-	06:56	07:07	07:26	07:43	08:20
Rymill Rd before Ellsworth Dr, Tregear	05:26	05:54	06:28	-	07:00	07:11	07:30	07:48	08:25
Ropes Crossing Shops Hollows Pde, Ropes Crossing	05:29	05:57	06:31	06:46	07:03	07:14	07:33	D07:53	08:30
Griffiths St after Viney St, North St Marys	–	–	–	–	–	–	–	07:57	–
St Marys Station, Forrester Rd, North St Marys	–	–	–	–	–	–	–	08:02	–
Christie St after Lee Holm Rd, St Marys	05:33	06:01	06:35	06:50	07:07	07:18	07:37	D08:06	08:35
Werrington County Shopping Village, Dunheved Rd, Werrington County	05:36	06:04	06:38	06:53	07:10	07:21	07:40	08:10	08:39
Cambrige Park Shops Oxford St, Cambridge Park	05:42	06:11	06:45	07:00	07:17	07:28	07:47	08:20	08:48
High St opp Kradle Krayons, Penrith	05:47	06:16	06:50	07:05	07:22	07:33	07:53	08:28	08:56
Penrith Station	05:53	06:23	06:57	07:12	07:29	07:40	08:02	08:37	09:05

Monday to Friday	♿		♿	♿	♿		♿	♿	♿
Mount Druitt Station, Mount Druitt	08:50	09:16	09:30	09:46	10:01	10:16	10:31	10:46	11:01
Luxford Rd opp Popondetta Rd, Whalan	08:54	09:20	09:34	N09:50	10:05	N10:20	10:35	N10:50	11:05
Rymill Rd opp Bernacci St, Tregear	–	–	–	N09:57	–	N10:27	–	N10:57	–
Luxford Rd after Popondetta Rd, Whalan	–	–	–	10:03	–	10:33	–	11:03	–
Mount Druitt Station, Mount Druitt	–	–	–	10:13	–	10:43	–	11:13	–
Rymill Rd before Ellsworth Dr, Tregear	08:59	09:26	09:40	-	10:11	-	10:41	-	11:11
Ropes Crossing Shops Hollows Pde, Ropes Crossing	09:03	-	09:43	-	10:14	-	10:44	-	11:14
Christie St after Lee Holm Rd, St Marys	09:08	-	09:48	-	10:19	-	10:49	-	11:19
Werrington County Shopping Village, Dunheved Rd, Werrington County	09:11	-	09:51	-	10:22	-	10:52	-	11:22
Cambrige Park Shops Oxford St, Cambridge Park	09:18	-	09:57	-	10:28	-	10:58	-	11:28
High St opp Kradle Krayons, Penrith	09:25	-	10:03	-	10:34	-	11:04	-	11:34
Penrith Station	09:34	-	10:12	-	10:43	-	11:13	-	11:43

Monday to Friday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	11:16	11:31	11:46	12:01	12:16	12:31	12:46	13:01	13:16
Luxford Rd opp Popondetta Rd, Whalan	N11:20	11:35	N11:50	12:05	N12:20	12:35	N12:50	13:05	N13:20
Rymill Rd opp Bernacci St, Tregear	N11:27	–	N11:57	–	N12:27	–	N12:57	–	N13:27
Luxford Rd after Popondetta Rd, Whalan	11:33	–	12:03	–	12:33	–	13:03	–	13:33
Mount Druitt Station, Mount Druitt	11:43	–	12:13	–	12:43	–	13:13	–	13:43
Rymill Rd before Ellsworth Dr, Tregear	-	11:41	-	12:11	-	12:41	-	13:11	-
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	11:44	-	12:14	-	12:44	-	13:14	-
Christie St after Lee Holm Rd, St Marys	-	11:49	-	12:19	-	12:49	-	13:19	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	-	11:52	-	12:22	-	12:52	-	13:22	-
Cambrige Park Shops Oxford St, Cambridge Park	-	11:58	-	12:28	-	12:58	-	13:28	-
High St opp Kradle Krayons, Penrith	-	12:04	-	12:34	-	13:04	-	13:34	-
Penrith Station	-	12:13	-	12:43	-	13:13	-	13:43	-

Monday to Friday	♿	♿	♿	♿	♿	♿	♿		
Mount Druitt Station, Mount Druitt	13:31	13:46	14:01	14:16	14:26	14:36	T14:52	15:10	15:33
Luxford Rd opp Popondetta Rd, Whalan	13:35	N13:50	14:05	14:20	14:30	14:40	L14:58	15:17	15:40
Rymill Rd opp Bernacci St, Tregear	–	N13:57	–	–	–	–	–	–	–
Luxford Rd after Popondetta Rd, Whalan	–	14:03	–	–	–	–	–	–	–
Mount Druitt Station, Mount Druitt	–	14:13	–	–	–	–	–	–	–
Rymill Rd before Ellsworth Dr, Tregear	13:41	-	14:11	14:26	14:36	14:46	L15:04	15:23	15:46
Ropes Crossing Shops Hollows Pde, Ropes Crossing	13:44	-	14:14	-	14:39	-	L15:08	15:27	-
Christie St after Lee Holm Rd, St Marys	13:49	-	14:19	-	14:44	-	L15:14	15:33	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	13:52	-	14:22	-	14:47	-	L15:17	15:36	-
Cambrige Park Shops Oxford St, Cambridge Park	13:58	-	14:28	-	14:53	-	15:26	15:42	-
High St opp Kradle Krayons, Penrith	14:04	-	14:34	-	14:59	-	15:35	15:51	-
Penrith Station	14:13	-	14:43	-	15:08	-	15:44	16:00	-

780 Mount Druitt to Penrith via Ropes Crossing

B

Monday to Friday	♿	♿			♿		♿	♿	♿
Mount Druitt Station, Mount Druitt	15:50	16:04	16:20	16:28	16:38	16:50	17:00	17:07	17:20
Luxford Rd opp Popondetta Rd, Whalan	15:57	16:11	16:25	16:33	16:43	16:55	17:05	17:12	17:24
Rymill Rd before Ellsworth Dr, Tregear	16:03	16:17	16:31	16:39	16:49	17:01	17:11	17:18	17:28
Ropes Crossing Shops Hollows Pde, Ropes Crossing	16:07	16:21	16:35	-	16:53	17:05	-	17:22	17:32
Christie St after Lee Holm Rd, St Marys	16:12	16:26	16:40	-	16:58	17:10	-	17:27	17:37
Werrington County Shopping Village, Dunheved Rd, Werrington County	16:15	16:29	16:43	-	17:01	17:13	-	17:30	17:40
Cambrige Park Shops Oxford St, Cambridge Park	16:20	16:34	16:48	-	17:06	17:18	-	17:35	17:45
High St opp Kradle Krayons, Penrith	16:27	16:41	16:55	-	17:13	17:25	-	17:42	17:50
Penrith Station	16:36	16:50	17:04	-	17:22	17:34	-	17:51	17:59

Monday to Friday		♿	♿		♿	♿		♿	♿
Mount Druitt Station, Mount Druitt	17:30	17:40	17:51	18:00	18:10	18:20	18:30	18:40	19:08
Luxford Rd opp Popondetta Rd, Whalan	17:34	17:44	17:55	18:04	18:14	18:24	18:34	18:44	19:12
Rymill Rd before Ellsworth Dr, Tregear	17:38	17:48	17:59	18:08	18:18	18:28	18:38	18:48	19:16
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	17:52	18:03	-	18:22	18:31	-	18:51	19:19
Christie St after Lee Holm Rd, St Marys	-	17:57	18:08	-	18:27	18:35	-	18:55	19:23
Werrington County Shopping Village, Dunheved Rd, Werrington County	-	18:00	18:11	-	18:30	18:38	-	18:58	19:26
Cambrige Park Shops Oxford St, Cambridge Park	-	18:05	18:16	-	18:35	18:43	-	19:03	19:31
High St opp Kradle Krayons, Penrith	-	18:10	18:21	-	18:40	18:48	-	19:08	19:36
Penrith Station	-	18:19	18:30	-	18:49	18:55	-	19:15	19:43

Monday to Friday	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	19:38	20:12	20:42	21:12	22:12	23:13
Luxford Rd opp Popondetta Rd, Whalan	19:42	20:15	20:45	21:15	22:15	23:16
Rymill Rd before Ellsworth Dr, Tregear	19:46	20:19	20:49	21:19	22:19	23:20
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	20:22	-	21:22	22:22	-
Christie St after Lee Holm Rd, St Marys	-	20:25	-	21:25	22:25	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	-	20:28	-	21:28	22:28	-
Cambrige Park Shops Oxford St, Cambridge Park	-	20:33	-	21:33	22:33	-
High St opp Kradle Krayons, Penrith	-	20:38	-	21:38	22:38	-
Penrith Station	-	20:44	-	21:44	22:44	-

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	06:31	07:31	08:31	09:25	09:55	10:25	10:55	11:25	11:55
Luxford Rd opp Popondetta Rd, Whalan	06:35	07:35	08:35	09:30	10:00	**N**10:30	11:00	**N**11:30	12:00
Rymill Rd opp Bernacci St, Tregear	–	–	–	09:37	–	**N**10:37	–	**N**11:37	–
Luxford Rd after Popondetta Rd, Whalan	–	–	–	09:43	–	10:43	–	11:43	–
Mount Druitt Station, Mount Druitt	–	–	–	09:52	–	10:52	–	11:52	–
Rymill Rd before Ellsworth Dr, Tregear	06:39	07:39	08:39	-	10:06	-	11:06	-	12:06
Ropes Crossing Shops Hollows Pde, Ropes Crossing	06:42	07:42	08:42	-	10:09	-	11:09	-	12:09
Christie St after Lee Holm Rd, St Marys	06:46	07:46	08:46	-	10:13	-	11:13	-	12:13
Werrington County Shopping Village, Dunheved Rd, Werrington County	06:49	07:49	08:49	-	10:16	-	11:16	-	12:16
Cambrige Park Shops Oxford St, Cambridge Park	06:55	07:55	08:55	-	10:22	-	11:22	-	12:22
High St opp Kradle Krayons, Penrith	07:00	08:00	09:00	-	10:27	-	11:27	-	12:27
Penrith Station	07:07	08:07	09:07	-	10:36	-	11:36	-	12:36

780 Mount Druitt to Penrith via Ropes Crossing

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Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	12:25	12:55	13:25	13:55	14:25	14:55	15:25	15:55	16:25
Luxford Rd opp Popondetta Rd, Whalan	N12:30	13:00	N13:30	14:00	N14:30	15:00	N15:30	16:00	N16:30
Rymill Rd opp Bernacci St, Tregear	N12:37	–	N13:37	–	N14:37	–	N15:37	–	N16:37
Luxford Rd after Popondetta Rd, Whalan	12:43	–	13:43	–	14:43	–	15:43	–	16:43
Mount Druitt Station, Mount Druitt	12:52	–	13:52	–	14:52	–	15:52	–	16:52
Rymill Rd before Ellsworth Dr, Tregear	-	13:06	-	14:06	-	15:06	-	16:06	-
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	13:09	-	14:09	-	15:09	-	16:09	-
Christie St after Lee Holm Rd, St Marys	-	13:13	-	14:13	-	15:13	-	16:13	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	-	13:16	-	14:16	-	15:16	-	16:16	-
Cambrige Park Shops Oxford St, Cambridge Park	-	13:22	-	14:22	-	15:22	-	16:22	-
High St opp Kradle Krayons, Penrith	-	13:27	-	14:27	-	15:27	-	16:27	-
Penrith Station	-	13:36	-	14:36	-	15:36	-	16:36	-

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	16:55	17:25	17:55	18:25	18:55	19:25	20:25	21:25	22:25
Luxford Rd opp Popondetta Rd, Whalan	17:00	17:30	18:00	18:30	19:00	19:29	20:29	21:29	22:29
Rymill Rd before Ellsworth Dr, Tregear	17:06	17:36	18:06	18:36	19:06	19:34	20:34	21:34	22:34
Ropes Crossing Shops Hollows Pde, Ropes Crossing	17:09	-	18:09	18:39	-	19:36	20:36	21:36	-
Christie St after Lee Holm Rd, St Marys	17:13	-	18:13	18:43	-	19:40	20:40	21:40	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	17:16	-	18:16	18:46	-	19:43	20:43	21:43	-
Cambrige Park Shops Oxford St, Cambridge Park	17:21	-	18:21	18:50	-	19:47	20:47	21:47	-
High St opp Kradle Krayons, Penrith	17:26	-	18:26	18:54	-	19:51	20:51	21:51	-
Penrith Station	17:33	-	18:33	19:00	-	19:57	20:57	21:57	-

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	-	-	08:41	09:41	10:11	10:41	11:11	11:41	12:11
Luxford Rd opp Popondetta Rd, Whalan	-	-	08:45	09:45	N10:15	10:45	N11:15	11:45	N12:15
Rymill Rd opp Bernacci St, Tregear	-	-	–	–	N10:21	–	N11:21	–	N12:21
Luxford Rd after Popondetta Rd, Whalan	-	-	–	–	10:26	–	11:26	–	12:26
Mount Druitt Station, Mount Druitt	-	-	–	–	10:35	–	11:35	–	12:35
Rymill Rd before Ellsworth Dr, Tregear	-	-	08:50	09:50	-	10:50	-	11:50	-
Ropes Crossing Shops Hollows Pde, Ropes Crossing	-	-	08:54	09:54	-	10:54	-	11:54	-
Christie St after Lee Holm Rd, St Marys	-	-	08:58	09:58	-	10:58	-	11:58	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	07:01	08:01	09:01	10:01	-	11:01	-	12:01	-
Cambrige Park Shops Oxford St, Cambridge Park	07:06	08:06	09:06	10:06	-	11:06	-	12:06	-
High St opp Kradle Krayons, Penrith	07:11	08:11	09:11	10:11	-	11:11	-	12:11	-
Penrith Station	07:19	08:19	09:19	10:19	-	11:19	-	12:19	-

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	12:41	13:11	13:41	14:11	14:41	15:11	15:41	16:11	16:41
Luxford Rd opp Popondetta Rd, Whalan	12:45	N13:15	13:45	N14:15	14:45	N15:15	15:45	16:15	16:45
Rymill Rd opp Bernacci St, Tregear	–	N13:21	–	N14:21	–	N15:21	–	–	–
Luxford Rd after Popondetta Rd, Whalan	–	13:26	–	14:26	–	15:26	–	–	–
Mount Druitt Station, Mount Druitt	–	13:35	–	14:35	–	15:35	–	–	–
Rymill Rd before Ellsworth Dr, Tregear	12:50	-	13:50	-	14:50	-	15:50	16:20	16:50
Ropes Crossing Shops Hollows Pde, Ropes Crossing	12:54	-	13:54	-	14:54	-	15:54	-	16:54
Christie St after Lee Holm Rd, St Marys	12:58	-	13:58	-	14:58	-	15:58	-	16:58
Werrington County Shopping Village, Dunheved Rd, Werrington County	13:01	-	14:01	-	15:01	-	16:01	-	17:01
Cambrige Park Shops Oxford St, Cambridge Park	13:06	-	14:06	-	15:06	-	16:06	-	17:06
High St opp Kradle Krayons, Penrith	13:11	-	14:11	-	15:11	-	16:11	-	17:11
Penrith Station	13:19	-	14:19	-	15:19	-	16:19	-	17:19

780 Mount Druitt to Penrith via Ropes Crossing

B

Sunday & Public Holidays	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt	17:41	18:51	19:51	20:51
Luxford Rd opp Popondetta Rd, Whalan	17:45	18:55	19:55	20:55
Rymill Rd before Ellsworth Dr, Tregear	17:50	18:59	19:59	20:59
Ropes Crossing Shops Hollows Pde, Ropes Crossing	17:54	19:03	20:03	21:03
Christie St after Lee Holm Rd, St Marys	17:58	19:07	-	-
Werrington County Shopping Village, Dunheved Rd, Werrington County	18:01	19:10	-	-
Cambrige Park Shops Oxford St, Cambridge Park	18:06	19:15	-	-
High St opp Kradle Krayons, Penrith	18:11	19:19	-	-
Penrith Station	18:19	19:26	-	-

785 Werrington to Penrith via Cambridge Park

B

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If you are eligible to travel with concession fares you can apply for a Gold Senior/Pensioner or Concession Opal card. Visit **transportnsw.info/opal** for more information.

Explanation of definitions and symbols

♿	Wheelchair Accessible
P	Bus commences from Richmond Rd & Copeland St 1 minutes earlier
T	Public school holidays bus operates through timing point 10 minutes later than time shown
S	Bus operates public school days only
C	Public school days bus diverts from Richmond Rd via Cox Ave & Phillip St, omitting Copeland St between Richmond Rd & Phillip St

NSW GOVERNMENT | Transport

785 Penrith to Werrington via Cambridge Park

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday	♿	♿	♿	♿	♿	♿	♿		♿
Penrith Station	-	-	-	-	07:01	07:30	08:05	08:31	09:06
Lemongrove Rd opp Thurston St, Penrith	-	-	-	-	07:04	07:33	08:08	08:34	09:10
St Josephs Primary School Richmond Rd,	-	-	-	-	–	–	–	08:40	–
Kingswood					–	–	–		–
Richmond Rd after College St, Kingswood (2747)	05:08	05:38	06:12	06:42	07:07	07:36	08:11	08:42	09:13
Cambridge St near Cam St, Cambridge Park	P05:09	P05:39	P06:13	P06:43	07:09	07:38	08:13	08:45	09:15
Burton St opp Lack Pl, Werrington	05:14	05:44	06:18	06:48	07:15	07:44	08:19	08:51	09:21
Werrington Station	05:19	05:49	06:23	06:53	07:21	07:50	08:25	08:57	09:27

Monday to Friday	♿	♿	♿	♿	♿		♿	♿	♿
Penrith Station	09:39	10:39	11:39	12:39	13:39	14:50	15:30	16:00	16:27
Lemongrove Rd opp Thurston St, Penrith	09:43	10:43	11:43	12:43	13:43	T14:54	15:35	16:05	16:32
St Josephs Primary School Richmond Rd,	–	–	–	–	–	15:03	–	–	–
Kingswood	–	–	–	–	–		–	–	–
Richmond Rd after College St, Kingswood (2747)	09:46	10:46	11:46	12:46	13:46	15:06	15:39	16:09	16:36
Cambridge St near Cam St, Cambridge Park	09:48	10:48	11:48	12:48	13:48	15:08	15:42	16:11	16:38
Burton St opp Lack Pl, Werrington	09:54	10:54	11:54	12:54	13:54	15:14	15:48	16:16	16:43
Werrington Station	10:00	11:00	12:00	13:00	14:00	15:20	15:54	16:22	16:49

Monday to Friday	♿	♿		♿		♿	♿	♿	
Penrith Station	16:55	17:26	17:54	18:24	18:54	19:24	19:50	20:48	
Lemongrove Rd opp Thurston St, Penrith	17:00	17:31	17:58	18:28	18:57	19:27	19:53	20:51	
Richmond Rd after College St, Kingswood (2747)	17:04	17:35	18:02	18:32	19:00	19:30	19:56	20:54	
Cambridge St near Cam St, Cambridge Park	17:06	17:37	18:04	18:34	19:02	19:32	19:58	20:56	
Burton St opp Lack Pl, Werrington	17:11	17:42	18:09	18:39	19:07	19:37	20:03	21:01	
Werrington Station	17:16	17:47	18:14	18:44	19:12	19:42	20:08	21:06	

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	07:13	08:13	09:45	10:45	11:45	12:45	13:45	14:45	15:45
Lemongrove Rd opp Thurston St, Penrith	07:16	08:16	09:49	10:49	11:49	12:49	13:49	14:49	15:49
Richmond Rd after College St, Kingswood (2747)	07:18	08:18	09:53	10:53	11:53	12:53	13:53	14:53	15:53
Cambridge St near Cam St, Cambridge Park	07:20	08:20	09:55	10:55	11:55	12:55	13:55	14:55	15:55
Burton St opp Lack Pl, Werrington	07:25	08:25	10:00	11:00	12:00	13:00	14:00	15:00	16:00
Werrington Station	07:31	08:31	10:06	11:06	12:06	13:06	14:06	15:06	16:06

Saturday	♿	♿	♿
Penrith Station	16:45	17:45	18:45
Lemongrove Rd opp Thurston St, Penrith	16:49	17:49	18:49
Richmond Rd after College St, Kingswood (2747)	16:53	17:53	18:53
Cambridge St near Cam St, Cambridge Park	16:55	17:55	18:55
Burton St opp Lack Pl, Werrington	17:00	18:00	19:00
Werrington Station	17:06	18:06	19:06

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station	08:19	09:19	10:19	11:19	12:19	13:19	14:19	15:19	16:19
Lemongrove Rd opp Thurston St, Penrith	08:23	09:23	10:23	11:23	12:23	13:23	14:23	15:23	16:23
Richmond Rd after College St, Kingswood (2747)	08:26	09:26	10:26	11:26	12:26	13:26	14:26	15:26	16:26
Cambridge St near Cam St, Cambridge Park	08:28	09:28	10:28	11:28	12:28	13:28	14:28	15:28	16:28
Burton St opp Lack Pl, Werrington	08:33	09:33	10:33	11:33	12:33	13:33	14:33	15:33	16:33
Werrington Station	08:39	09:39	10:39	11:39	12:39	13:39	14:39	15:39	16:39

785 Werrington to Penrith via Cambridge Park

B

Monday to Friday	♿	♿	♿	♿	♿	♿	♿		♿
Werrington Station	05:21	05:51	06:24	06:54	07:22	07:51	08:28	08:58	09:28
Burton St after Heavey St, Werrington	05:23	05:53	06:26	06:56	07:25	07:54	08:32	09:02	09:30
Cambridge St near Cam St, Cambridge Park	05:27	05:57	06:30	07:00	07:30	08:00	08:38	09:08	09:35
Lemongrove Rd at Thurston St, Penrith	05:33	06:03	06:36	07:06	07:37	08:08	08:46	09:16	09:43
Penrith Station	05:40	06:10	06:43	07:13	07:44	08:15	08:54	09:24	09:51

Monday to Friday	♿	♿	♿	♿	♿		♿	♿	♿
Service Information						**S**			
Werrington Station	10:02	11:02	12:02	13:02	14:02	15:22	15:57	16:23	16:50
Burton St after Heavey St, Werrington	10:04	11:04	12:04	13:04	14:04	15:26	15:59	16:25	16:52
Cambridge St near Cam St, Cambridge Park	10:09	11:09	12:09	13:09	14:09	**C**15:31	16:04	16:30	16:57
St Josephs Primary School Richmond Rd, Kingswood	–	–	–	–	–	15:33	–	–	–
Lemongrove Rd at Thurston St, Penrith	10:17	11:17	12:17	13:17	14:17	**C**15:39	16:11	16:37	17:04
Penrith Station	10:25	11:25	12:25	13:25	14:25	15:48	16:20	16:46	17:12

Monday to Friday	♿	♿		♿	♿
Werrington Station	17:17	17:48	18:15	18:45	19:45
Burton St after Heavey St, Werrington	17:19	17:50	18:17	18:48	19:48
Cambridge St near Cam St, Cambridge Park	17:24	17:55	18:22	18:53	19:53
Lemongrove Rd at Thurston St, Penrith	17:31	18:00	18:27	18:58	19:58
Penrith Station	17:39	18:08	18:35	19:04	20:04

Saturday	♿	♿	♿	♿	♿	♿	♿	♿	♿
Werrington Station	07:32	08:32	09:07	10:07	11:07	12:07	13:07	14:07	15:07
Burton St after Heavey St, Werrington	07:34	08:34	09:09	10:09	11:09	12:09	13:09	14:09	15:09
Cambridge St near Cam St, Cambridge Park	07:38	08:39	09:14	10:14	11:14	12:14	13:14	14:14	15:14
Lemongrove Rd at Thurston St, Penrith	07:44	08:46	09:21	10:21	11:21	12:21	13:21	14:21	15:21
Penrith Station	07:51	08:54	09:29	10:29	11:29	12:29	13:29	14:29	15:29

Saturday	♿	♿	♿
Werrington Station	16:07	17:07	18:07
Burton St after Heavey St, Werrington	16:09	17:09	18:09
Cambridge St near Cam St, Cambridge Park	16:14	17:14	18:14
Lemongrove Rd at Thurston St, Penrith	16:21	17:21	18:21
Penrith Station	16:29	17:29	18:29

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿	♿	♿	♿
Werrington Station	08:40	09:40	10:40	11:40	12:40	13:40	14:40	15:40	16:40
Burton St after Heavey St, Werrington	08:42	09:42	10:42	11:42	12:42	13:42	14:42	15:42	16:42
Cambridge St near Cam St, Cambridge Park	08:47	09:47	10:47	11:47	12:47	13:47	14:47	15:47	16:47
Lemongrove Rd at Thurston St, Penrith	08:54	09:54	10:54	11:54	12:54	13:54	14:54	15:54	16:54
Penrith Station	09:01	10:01	11:01	12:01	13:01	14:01	15:01	16:01	17:01

789 Luddenham to Penrith

B

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Explanation of definitions and symbols

P	Bus operates via Parker St direct, omitting Smith St & Bringelly Rd
S	Bus operates public school days only

NSW GOVERNMENT | Transport

789 Penrith to Luddenham

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday

Service Information		S
Penrith Station	06:57	15:37
St Nicholas of Myra School Lethbridge St, Penrith	–	15:41
Parker St after Derby St, Kingswood	07:05	15:45
Orchard Hills Medical Centre, Bringelly Rd,	–	15:51
Orchard Hills	–	
The Northern Rd after Castle Rd, Orchard Hills	**P**07:11	15:51
Cross Rd Penrith Anglican College, Orchard Hills	–	15:54
Old Northern Rd opp 2051, Orchard Hills	07:15	15:59
The Northern Rd near Elizabeth Dr, Luddenham	07:23	16:07
Adams Rd at The Northern Rd, Luddenham	07:27	16:11

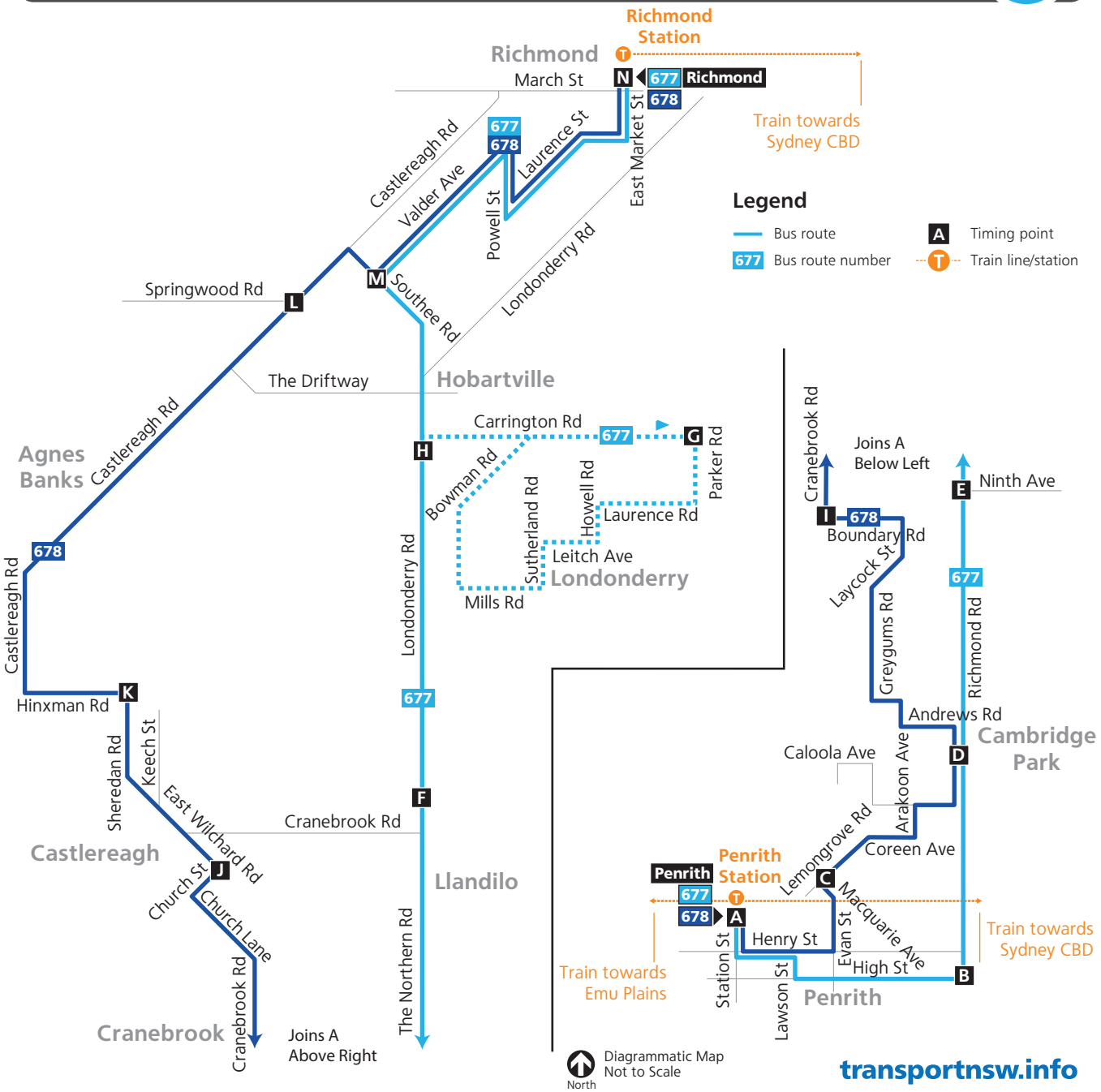
789 Luddenham to Penrith

B

Monday to Friday		
Adams Rd at The Northern Rd, Luddenham	07:28	16:18
The Northern Rd near Elizabeth Dr, Luddenham	07:32	16:21
2051 The Northern Rd, Glenmore Park	07:41	16:29
Bringelly Rd after The Northern Rd, Kingswood	07:46	16:34
Kingswood High School, Bringelly Rd, Kingswood	07:52	–
Parker St at Derby St, Penrith	07:54	16:40
Penrith Station	08:02	16:48

Routes 677, 678

B

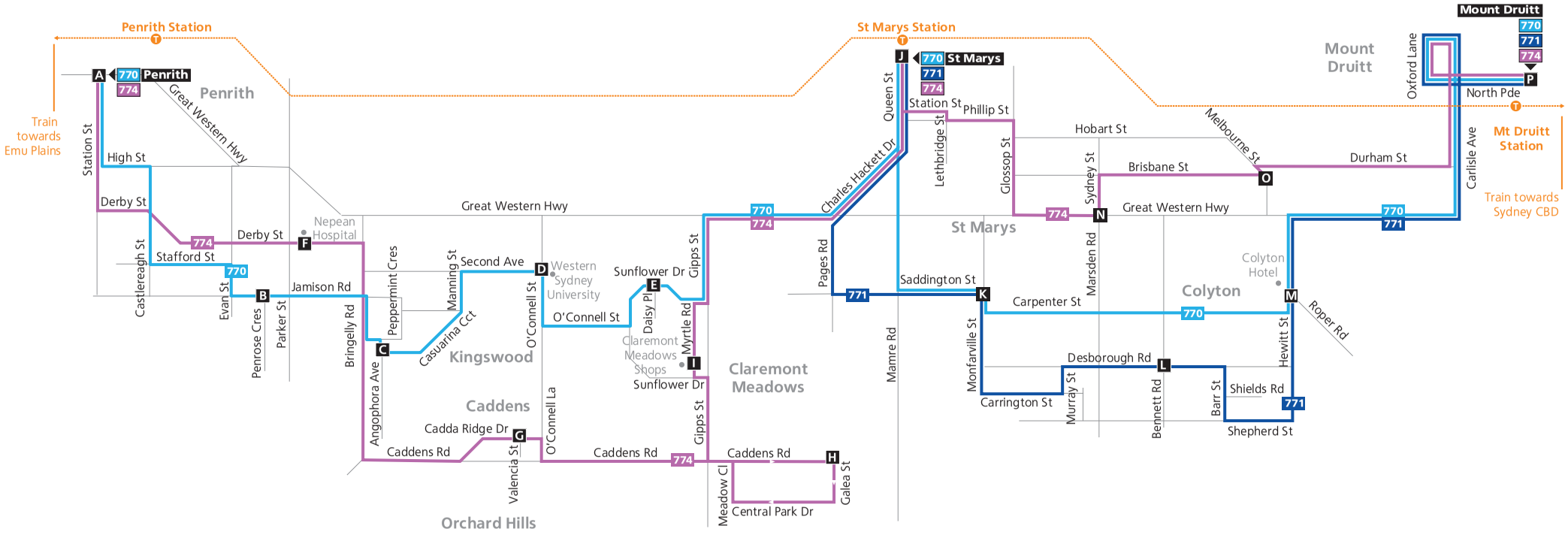


Timing Points

- **A** **Penrith Interchange**
- **B** **Penrith** High Street & Parker Street
- **C** **Penrith** Lemongrove Road & Thurston Street
- **D** **Penrith** Richmond Road & Cooper Street
- **E** **Cranebrook** The Northern Road & Ninth Avenue
- **F** **Londonderry** Londonderry Road & The Northern Road
- **G** **Londonderry** Parker Road & Carrington Road
- **H** **Londonderry Public School** Trahlee Road
- **I** **Cranebrook** Cranebrook Road & Boundary Road
- **J** **Cranebrook** Church Street & East Wilchard Road
- **K** **Castlereagh** Hinxman Road & Sheredan Road
- **L** **Agnes Banks** Castlereagh Road & Springwood Road
- **M** **Hobartville** Valder Avenue & Southee Road
- **N** **Richmond Station** East Market Street

Routes 770, 771, 774

B



Legend

- Bus route
- 770 Bus route number
- A Timing point
- T Train line/station

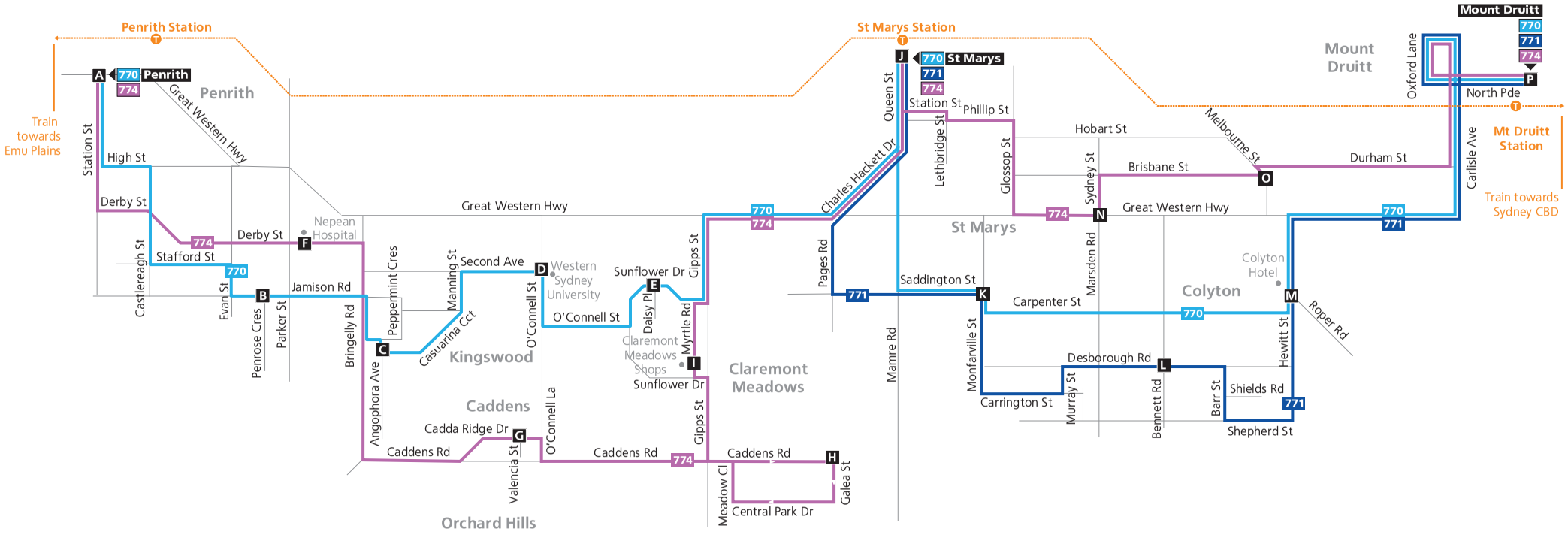
Diagrammatic Map
Not to Scale
North

Timing Points

- **A** **Penrith Interchange**
- **B** **South Penrith** Jamison Road & Penrose Crescent
- **C** **Kingswood** Angophora Avenue & Casuarina Circuit
- **D** **WSU Kingswood** Second Avenue & O'Connell Street
- **E** **Claremont Meadows** Sunflower Drive & Daisy Place
- **F** **Nepean Hospital** Derby Street
- **G** **Caddens** Cadda Ridge Drive & Valencia Street
- **H** **Claremont Meadows** Caddens Road & Galea Street
- **I** **Claremont Meadows Shops** Myrtle Road
- **J** **St Marys Interchange**
- **K** **St Marys** Monfarville Street & Saddington Street
- **L** **Colyton** Desborough Road & Bennett Road
- **M** **Colyton Hotel** Hewitt Street & Roper Road
- **N** **Oxley Park** Great Western Highway & Sydney Street
- **O** **Oxley Park** Brisbane Street & Melbourne Street
- **P** **Mt Druitt Interchange**

Routes 770, 771, 774

B



Legend

- Bus route
- 770 Bus route number
- A Timing point
- T Train line/station

Diagrammatic Map
Not to Scale
North

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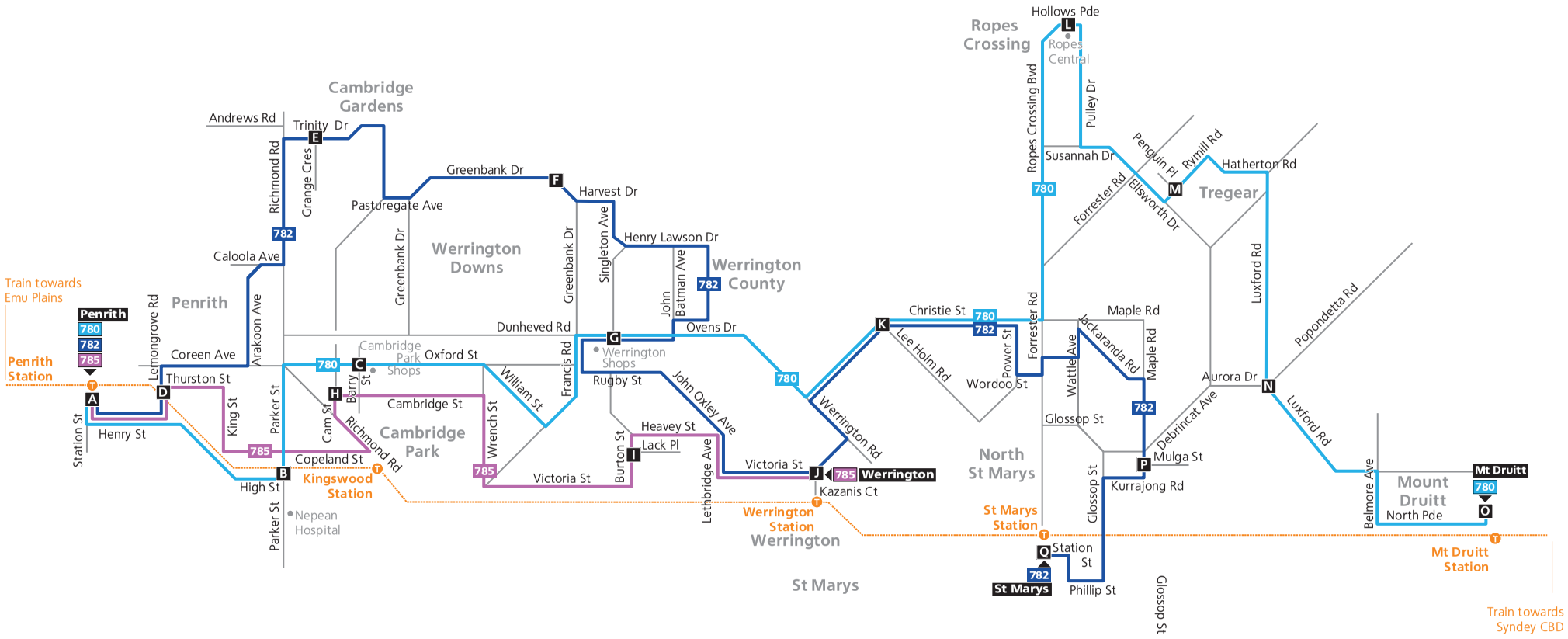
- **M** **Colyton Hotel** Hewitt Street & Roper Road
- **N** **Oxley Park** Great Western Highway & Sydney Street
- **O** **Oxley Park** Brisbane Street & Melbourne Street
- **P** **Mt Druitt Interchange**

Routes 780, 782, 785

B



Legend

- Bus route
- 780 Bus route number
- A Timing point
- T Train line/station

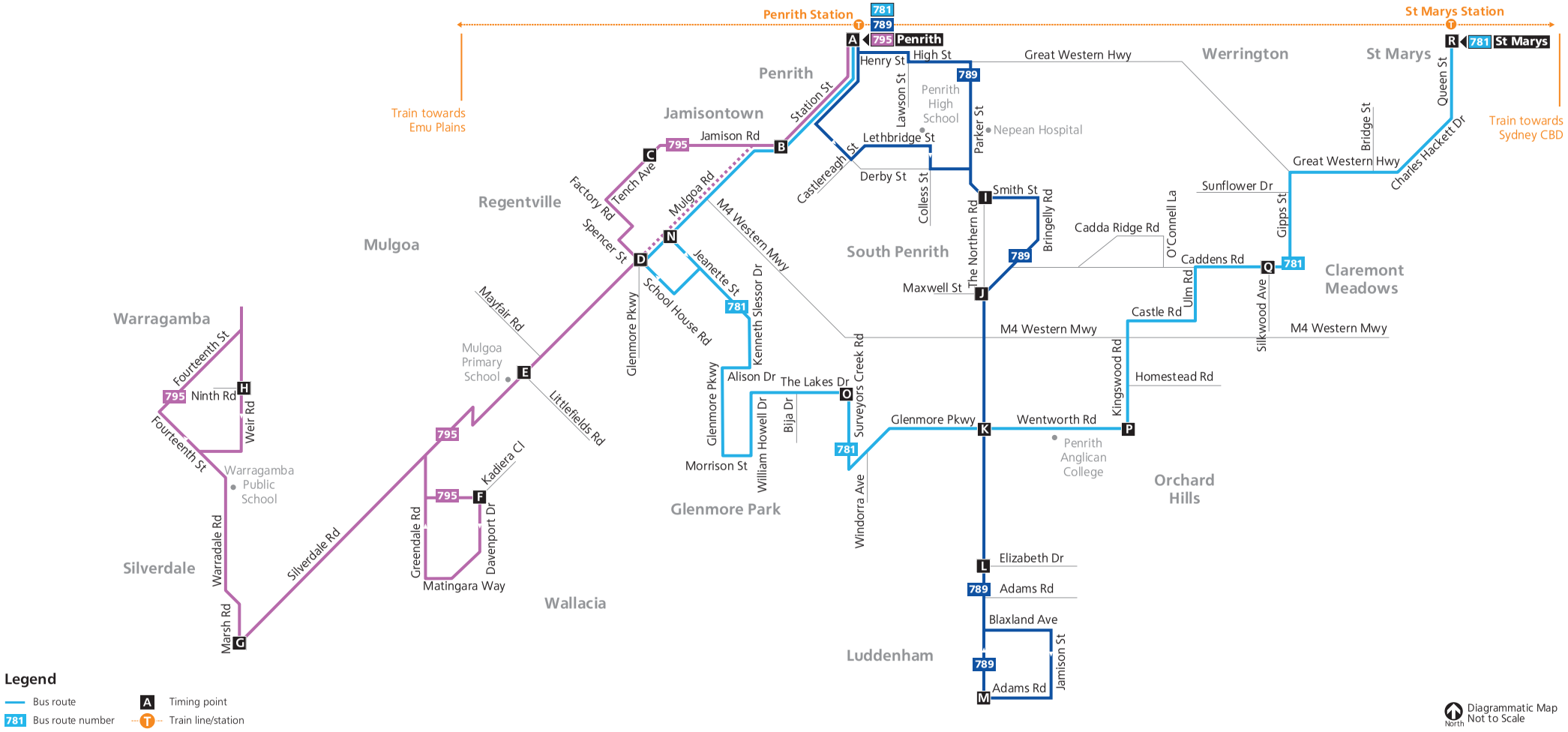
Diagrammatic Map
Not to Scale
North

Timing Points

- **A** **Penrith Interchange**
- **B** **Penrith** High Street & Parker Street
- **C** **Cambridge Park Shops** Oxford Street & Barry St
- **D** **Penrith** Lemongrove Road & Thurston Street
- **E** **Cambridge Gardens** Trinity Drive & Grange Crescent
- **F** **Werrington Downs** Greenbank Drive & Harvest Drive
- **G** **Werrington County Shops** Dunheved Road
- **H** **Cambridge Park** Cambridge Street & Cam Street
- **I** **Werrington** Burton Street & Lack Place
- **J** **Werrington Station** Kazanis Court
- **K** **St Marys** Christie Street & Lee Holm Road
- **L** **Ropes Crossing Shops** Hollows Parade
- **M** **Tregear** Rymill Road & Penguin Place
- **N** **Whalan** Luxford Road & Popondetta Road
- **O** **Mt Druitt Interchange**
- **P** **North St Marys** Maple Street & Mulga Street
- **Q** **St Marys Interchange**

Routes 781, 789, 795

B



Timing Points

- **A** **Penrith Interchange**
- **B** **Penrith** Station Street & Jamison Road
- **C** **Nepean Shores Resort** Tench Avenue
- **D** **Regentville** Mulgoa Road & Spencer Street
- **E** **Mulgoa** Mulgoa Road & Littlefields Road
- **F** **Wallacia** Davenport Drive & Kadiera Close
- **G** **Silverdale** Marsh Road & Silverdale Road
- **H** **Warragamba** Weir Road & Ninth Street
- **I** **Nepean Hospital** Derby Street & Parker Street
- **J** **Kingswood** Bringelly Road & The Northern Road
- **K** **Orchard Hills** The Northern Road & Wentworth Road
- **L** **Luddenham** The Northern Road & Elizabeth Drive
- **M** **Luddenham** Adams Road & The Northern Road
- **N** **Regentville** Jeanette Street & Mulgoa Road
- **O** **Glenmore Park** Surveyors Creek Road & The Lakes Dr
- **P** **Orchard Hills** Wentworth Road & Kingswood Road
- **Q** **Claremont Meadows** Caddens Road & Silkwood Ave
- **R** **Claremont Meadows** Gipps Street & Great Western Highway
- **S** **St Marys Interchange**

677 Richmond to Penrith via Londonderry

B

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The bus services shown in this timetable are run by Busways Western Sydney.

Fares

To travel on public transport in Sydney and surrounding regions, an Opal card is the cheapest and easiest ticket option.

An Opal card is a smartcard you keep and reuse. Add value before you travel and tap on and tap off to pay your fares throughout Sydney, the Blue Mountains, Central Coast, the Hunter and the Illawarra.

Fares are based on:

- the type of Opal card you use
- the distance you travel from tap on to tap off
- the mode of transport you choose
- any Opal benefits such as discounts and capped fares that apply

Find out more about Opal fares and benefits at **transportnsw.info/opal**

Which Opal card is right for you?

Adult - Customers 16 years and over who are not entitled to any concessions and normally pay full fare.

Child/Youth - For customers aged 4-15 (inclusive), or customers 16 years or older who hold a NSW/ACT Senior Secondary Student Concession Card.

Gold Senior/Pensioner - For eligible NSW and interstate seniors, pensioners, war widows/ers and asylum seekers.

Concession - For eligible tertiary students, job seekers, apprentices and trainees.

How to get an Opal card

You can get an Adult and Child/Youth Opal cards over the counter at thousands of Opal retailers that display the Opal sign. To find your nearest retailer visit **transportnsw.info/opal**.

If you are eligible to travel with concession fares you can apply for a Gold Senior/Pensioner or Concession Opal card. Visit **transportnsw.info/opal** for more information.

Explanation of definitions and symbols

♿	Wheelchair Accessible
Q	Bus diverts from The Northern Rd via Cranebrook Rd, Taylor Rd, Nutt Rd & Torkington Rd, omitting Londonderry Rd between Cranebrook Rd & Torkington Rd
S	Bus operates public school days only
A	Bus operates via Belmore St, Station St, Derby St, Castlereagh St, Lethbridge St & Parker St to Great Western Hwy, then via normal route

NSW GOVERNMENT | Transport

677 Penrith to Richmond via Londonderry

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday	♿		♿	♿	♿	♿			♿
Service Information		S				S			
Penrith Station	07:09	08:09	09:09	11:19	13:09	15:39	16:39	17:24	18:24
Kradle Krayon, High St, Penrith	07:13	08:14	09:14	11:24	13:14	–	16:44	17:29	18:29
Penrith PS and HS, Lethbridge St, Penrith	–	–	–	–	–	**A**15:45	–	–	–
Richmond St after Cooper St, Penrith	07:17	08:18	09:18	11:28	13:18	15:54	16:49	17:34	18:33
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	07:20	08:23	09:21	11:31	13:21	15:58	16:53	17:38	18:36
The Northern Rd before Cranebrook Rd, Cranebrook	**Q**07:24	08:27	09:25	11:35	13:25	**Q**16:01	16:57	17:42	18:40
St Pauls Grammar (SchoolGrounds), Cranebrook	–	08:31	–	–	–	16:05	–	–	–
Londonderry Public School Trahlee Rd, Londonderry	**Q**07:37	08:41	09:32	11:42	13:32	**Q**16:13	17:04	17:49	18:47
Bell Av near Valder Av, Hobartville	07:43	08:47	09:49	11:49	13:49	16:19	17:11	18:06	18:53
East Market St opp Richmond Station, Richmond	07:50	08:55	09:56	11:56	13:56	16:26	17:18	18:13	19:00

Saturday	♿	♿	♿	♿	♿	♿
Penrith Station	08:44	10:54	12:54	14:54	16:44	18:54
Kradle Krayon, High St, Penrith	08:48	10:58	12:58	14:58	16:48	18:58
Richmond St after Cooper St, Penrith	08:52	11:02	13:02	15:02	16:52	19:02
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	08:55	11:05	13:05	15:05	16:55	19:05
The Northern Rd before Cranebrook Rd, Cranebrook	08:58	11:08	13:08	15:08	16:58	19:08
Londonderry Public School Trahlee Rd, Londonderry	09:05	11:15	13:15	15:15	17:05	19:15
Bell Av near Valder Av, Hobartville	09:22	11:22	13:22	15:22	17:22	19:22
East Market St opp Richmond Station, Richmond	09:29	11:29	13:29	15:29	17:29	19:29

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿
Penrith Station	08:44	10:54	12:54	14:54	16:44	18:44
Kradle Krayon, High St, Penrith	08:48	10:58	12:58	14:58	16:48	18:48
Richmond St after Cooper St, Penrith	08:52	11:02	13:02	15:02	16:52	18:52
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	08:55	11:05	13:05	15:05	16:55	18:55
The Northern Rd before Cranebrook Rd, Cranebrook	08:58	11:08	13:08	15:08	16:58	18:58
Londonderry Public School Trahlee Rd, Londonderry	09:05	11:15	13:15	15:15	17:05	19:05
Bell Av near Valder Av, Hobartville	09:22	11:22	13:22	15:22	17:22	19:12
East Market St opp Richmond Station, Richmond	09:29	11:29	13:29	15:29	17:29	19:19

677 Richmond to Penrith via Londonderry

B

Monday to Friday	♿	♿		♿	♿	♿	♿		♿
Service Information			S				S		
Richmond Station	06:17	07:15	07:56	10:06	12:06	14:06	15:43	16:33	17:28
Bell Av near Valder Av, Hobartville	06:20	07:18	07:59	10:09	12:09	14:09	15:46	16:36	17:31
Londonderry Public School Trahlee Rd, Londonderry	06:26	07:25	08:06	10:16	12:16	14:16	16:15	16:43	17:38
Londonderry Rd before The Northern Rd, Londonderry	06:32	07:31	08:12	10:33	12:23	14:33	-	16:49	17:56
St Pauls Grammar (SchoolGrounds), Cranebrook	–	–	08:16	–	–	–	-	–	–
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	06:36	07:36	08:23	10:36	12:26	14:36	-	16:52	17:59
Richmond St opp Cooper St, Cambridge Gardens	06:40	07:41	08:29	10:40	12:30	14:40	-	16:56	18:03
High St opp Kradle Krayons, Penrith	06:47	07:49	08:40	10:46	12:36	14:46	-	17:04	18:09
Penrith Station	06:54	07:59	08:51	10:55	12:45	14:55	-	17:14	18:18

Monday to Friday	♿
Richmond Station	18:28
Bell Av near Valder Av, Hobartville	18:31
Londonderry Public School Trahlee Rd, Londonderry	18:38
Londonderry Rd before The Northern Rd, Londonderry	18:44
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	18:47
Richmond St opp Cooper St, Cambridge Gardens	18:51
High St opp Kradle Krayons, Penrith	18:57
Penrith Station	19:06

Saturday	♿	♿	♿	♿	♿	♿
Richmond Station	07:40	09:40	11:40	13:40	15:40	17:40
Bell Av near Valder Av, Hobartville	07:43	09:43	11:43	13:43	15:43	17:43
Londonderry Public School Trahlee Rd, Londonderry	07:49	09:49	11:49	13:49	15:49	17:49
Londonderry Rd before The Northern Rd, Londonderry	07:56	10:06	11:56	13:56	15:56	18:06
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	07:59	10:09	11:59	13:59	15:59	18:09
Richmond St opp Cooper St, Cambridge Gardens	08:02	10:12	12:02	14:02	16:02	18:12
High St opp Kradle Krayons, Penrith	08:08	10:18	12:08	14:08	16:08	18:18
Penrith Station	08:17	10:27	12:17	14:17	16:17	18:27

Sunday & Public Holidays	♿	♿	♿	♿	♿	♿
Richmond Station	07:35	09:40	11:40	13:40	15:40	17:40
Bell Av near Valder Av, Hobartville	07:38	09:43	11:43	13:43	15:43	17:43
Londonderry Public School Trahlee Rd, Londonderry	07:44	09:49	11:49	13:49	15:49	17:49
Londonderry Rd before The Northern Rd, Londonderry	07:51	10:06	11:56	13:56	15:56	18:06
The Northern Rd near Ninth Av - Timetable Timing Point, Jordan Springs	07:54	10:09	11:59	13:59	15:59	18:09
Richmond St opp Cooper St, Cambridge Gardens	07:57	10:12	12:02	14:02	16:02	18:12
High St opp Kradle Krayons, Penrith	08:03	10:18	12:08	14:08	16:08	18:18
Penrith Station	08:12	10:27	12:17	14:17	16:17	18:27

774 Mount Druitt to Penrith via Nepean Hospital B

How to use this timetable

This timetable provides a snap shot of service information in 24-hour time (e.g. 5am = 05:00, 5pm = 17:00). Information contained in this timetable is subject to change without notice. Please note that timetables do not include minor stops, additional trips for special events, short term changes, holiday timetable changes, real-time information or any disruption alerts.

For the most up-to-date times, use the Trip Planner or Departures on **transportnsw.info**

Real-time planning

You can plan your trip with real-time information using the Trip Planner or Departures on **transportnsw.info** or by downloading travel apps on your smartphone or tablet.

The Trip Planner, Departures and travel apps offer various features:

- favourite your regular trips
- see where your service is on the route
- get estimated pick up and arrival times
- receive service updates
- find nearby stations, stops, wharves and routes
- check accessibility information

Find the latest apps at **transportnsw.info/apps**

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Explanation of definitions and symbols

♿	Wheelchair Accessible
B	Public school days bus diverts from Derby St via Castlereagh St, Lethbridge St, Colless St & Derby St, omitting Derby St between Castlereagh St & Colless St

NSW GOVERNMENT | Transport

774 Penrith to Mount Druitt via Nepean Hospital

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday		♿	♿	♿	♿	♿		♿	♿	♿
Penrith Station		05:04	05:36	06:06	06:36	06:50	07:18	08:06	08:42	09:12
Nepean Hospital Derby St, Kingswood		05:10	05:42	06:12	06:42	06:57	07:27	08:15	08:51	09:21
Cadda Ridge Dr at Murcott Tce, Caddens		05:16	05:48	06:18	06:48	07:05	07:35	08:23	08:59	09:29
Caddens Rd at Galea St, Claremont Meadows		05:25	05:57	06:27	06:57	07:16	07:46	08:34	09:10	09:40
Myrtle Rd opp Massa Pl, Claremont Meadows		05:29	06:01	06:31	07:01	07:21	07:51	08:39	09:15	09:45
St Marys Interchange	ARR	05:36	06:08	06:38	07:08	07:29	07:59	08:47	09:23	09:53
St Marys Interchange	DEP	05:37	06:09	06:39	07:09	07:31	08:01	08:49	09:25	09:55
Belltrees Village, Great Western Hwy, St Marys		05:42	06:14	06:44	07:14	07:36	08:06	08:54	09:30	10:00
Brisbane St near Melbourne St, Oxley Park		05:46	06:18	06:48	07:18	07:41	08:11	08:59	09:35	10:05
Mount Druitt Station, Mount Druitt		05:56	06:28	06:58	07:28	07:52	08:22	09:10	09:46	10:16

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		09:42	10:12	10:42	11:12	11:42	12:12	12:42	13:12	13:47
Nepean Hospital Derby St, Kingswood		09:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:56
Cadda Ridge Dr at Murcott Tce, Caddens		09:59	10:29	10:59	11:29	11:59	12:29	12:59	13:29	14:04
Caddens Rd at Galea St, Claremont Meadows		10:10	10:40	11:10	11:40	12:10	12:40	13:10	13:40	14:15
Myrtle Rd opp Massa Pl, Claremont Meadows		10:15	10:45	11:15	11:45	12:15	12:45	13:15	13:45	14:20
St Marys Interchange	ARR	10:23	10:53	11:23	11:53	12:23	12:53	13:23	13:53	14:28
St Marys Interchange	DEP	10:25	10:55	11:25	11:55	12:25	12:55	13:25	13:55	14:30
Belltrees Village, Great Western Hwy, St Marys		10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:35
Brisbane St near Melbourne St, Oxley Park		10:35	11:05	11:35	12:05	12:35	13:05	13:35	14:05	14:40
Mount Druitt Station, Mount Druitt		10:46	11:16	11:46	12:16	12:46	13:16	13:46	14:16	14:51

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		14:31	15:06	**B**15:34	16:06	16:30	16:58	17:28	17:58	18:33
St Nicholas of Myra School Lethbridge St, Penrith		–	–	15:40	–	–	–	–	–	–
Penrith PS and HS, Lethbridge St, Penrith		–	–	15:42	–	–	–	–	–	–
Nepean Hospital Derby St, Kingswood		14:40	15:15	**B**15:45	16:15	16:39	17:07	17:37	18:06	18:41
Cadda Ridge Dr at Murcott Tce, Caddens		14:48	15:23	15:53	16:23	16:47	17:15	17:45	18:13	18:48
Caddens Rd at Galea St, Claremont Meadows		14:59	15:34	16:04	16:34	16:58	17:26	17:56	18:23	18:58
Myrtle Rd opp Massa Pl, Claremont Meadows		15:04	15:39	16:09	16:39	17:03	17:31	18:01	18:28	19:03
St Marys Interchange	ARR	15:15	15:50	16:20	16:50	17:14	17:42	18:12	18:37	19:12
St Marys Interchange	DEP	15:17	15:52	16:22	16:52	17:16	17:44	18:14	18:39	19:14
Belltrees Village, Great Western Hwy, St Marys		15:23	15:58	16:28	16:58	17:22	17:50	18:20	18:44	19:19
Brisbane St near Melbourne St, Oxley Park		15:29	16:04	16:34	17:04	17:27	17:55	18:25	18:48	19:23
Mount Druitt Station, Mount Druitt		15:40	16:15	16:45	17:15	17:37	18:05	18:35	18:57	19:32

Monday to Friday		♿	♿	♿	♿	♿	♿	♿
Penrith Station		19:05	19:35	20:10	20:40	21:10	21:40	22:10
Nepean Hospital Derby St, Kingswood		19:13	19:43	20:16	20:46	21:16	21:45	22:15
Cadda Ridge Dr at Murcott Tce, Caddens		19:20	19:50	20:23	20:53	21:23	21:52	22:22
Caddens Rd at Galea St, Claremont Meadows		19:30	20:00	20:33	21:03	21:33	22:02	22:32
Myrtle Rd opp Massa Pl, Claremont Meadows		19:35	20:05	20:38	21:08	21:38	22:07	22:37
St Marys Interchange	ARR	19:44	20:14	20:47	21:17	21:47	22:15	22:45
St Marys Interchange	DEP	19:46	20:16	20:49	21:19	21:49	-	-
Belltrees Village, Great Western Hwy, St Marys		19:51	20:21	20:53	21:23	21:53	-	-
Brisbane St near Melbourne St, Oxley Park		19:55	20:25	20:57	21:27	21:57	-	-
Mount Druitt Station, Mount Druitt		20:04	20:34	21:06	21:36	22:06	-	-

774 Penrith to Mount Druitt via Nepean Hospital

B

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		05:28	06:11	07:13	08:13	09:18	10:18	11:18	12:18	13:18
Nepean Hospital Derby St, Kingswood		05:33	06:16	07:18	08:18	09:25	10:25	11:25	12:25	13:25
Cadda Ridge Dr at Murcott Tce, Caddens		05:39	06:22	07:24	08:24	09:33	10:33	11:33	12:33	13:33
Caddens Rd at Galea St, Claremont Meadows		05:48	06:31	07:33	08:33	09:44	10:44	11:44	12:44	13:44
Myrtle Rd opp Massa Pl, Claremont Meadows		05:53	06:36	07:38	08:38	09:49	10:49	11:49	12:49	13:49
St Marys Interchange	ARR	06:02	06:45	07:47	08:47	09:58	10:58	11:58	12:58	13:58
St Marys Interchange	DEP	06:03	06:46	07:48	08:48	10:00	11:00	12:00	13:00	14:00
Belltrees Village, Great Western Hwy, St Marys		06:07	06:50	07:52	08:52	10:04	11:04	12:04	13:04	14:04
Brisbane St near Melbourne St, Oxley Park		06:12	06:55	07:57	08:57	10:09	11:09	12:09	13:09	14:09
Mount Druitt Station, Mount Druitt		06:23	07:06	08:08	09:08	10:20	11:20	12:20	13:20	14:20

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		14:18	15:18	16:18	17:18	18:17	19:17	20:17	21:17	22:17
Nepean Hospital Derby St, Kingswood		14:25	15:25	16:25	17:25	18:22	19:22	20:22	21:22	22:22
Cadda Ridge Dr at Murcott Tce, Caddens		14:33	15:33	16:33	17:33	18:30	19:30	20:30	21:30	22:30
Caddens Rd at Galea St, Claremont Meadows		14:44	15:44	16:44	17:44	18:40	19:40	20:40	21:40	22:40
Myrtle Rd opp Massa Pl, Claremont Meadows		14:49	15:49	16:49	17:49	18:45	19:45	20:45	21:45	22:45
St Marys Interchange	ARR	14:58	15:58	16:58	17:58	18:53	19:53	20:53	21:53	22:53
St Marys Interchange	DEP	15:00	16:00	17:00	18:00	18:54	19:54	20:54	21:54	-
Belltrees Village, Great Western Hwy, St Marys		15:04	16:04	17:04	18:04	18:58	19:58	20:58	21:58	-
Brisbane St near Melbourne St, Oxley Park		15:09	16:09	17:09	18:09	19:02	20:02	21:02	22:02	-
Mount Druitt Station, Mount Druitt		15:20	16:20	17:20	18:20	19:12	20:12	21:12	22:12	-

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		07:30	08:30	09:24	10:24	11:24	12:24	13:24	14:24	15:24
Nepean Hospital Derby St, Kingswood		07:35	08:35	09:31	10:31	11:31	12:31	13:31	14:31	15:31
Cadda Ridge Dr at Murcott Tce, Caddens		07:41	08:41	09:39	10:39	11:39	12:39	13:39	14:39	15:39
Caddens Rd at Galea St, Claremont Meadows		07:50	08:50	09:50	10:50	11:50	12:50	13:50	14:50	15:50
Myrtle Rd opp Massa Pl, Claremont Meadows		07:55	08:55	09:55	10:55	11:55	12:55	13:55	14:55	15:55
St Marys Interchange	ARR	08:04	09:04	10:04	11:04	12:04	13:04	14:04	15:04	16:04
St Marys Interchange	DEP	08:05	09:05	10:06	11:06	12:06	13:06	14:06	15:06	16:06
Belltrees Village, Great Western Hwy, St Marys		08:09	09:09	10:10	11:10	12:10	13:10	14:10	15:10	16:10
Brisbane St near Melbourne St, Oxley Park		08:14	09:14	10:15	11:15	12:15	13:15	14:15	15:15	16:15
Mount Druitt Station, Mount Druitt		08:25	09:25	10:26	11:26	12:26	13:26	14:26	15:26	16:26

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿
Penrith Station		16:24	17:24	18:29	19:29	20:29	21:29
Nepean Hospital Derby St, Kingswood		16:31	17:31	18:36	19:34	20:34	21:34
Cadda Ridge Dr at Murcott Tce, Caddens		16:39	17:39	18:44	19:42	20:40	21:40
Caddens Rd at Galea St, Claremont Meadows		16:50	17:50	18:55	19:52	20:49	21:49
Myrtle Rd opp Massa Pl, Claremont Meadows		16:55	17:55	19:00	19:57	20:53	21:53
St Marys Interchange	ARR	17:04	18:04	19:09	20:05	21:00	22:00
St Marys Interchange	DEP	17:06	18:06	19:11	20:06	-	-
Belltrees Village, Great Western Hwy, St Marys		17:10	18:10	19:15	20:10	-	-
Brisbane St near Melbourne St, Oxley Park		17:15	18:15	19:20	20:14	-	-
Mount Druitt Station, Mount Druitt		17:26	18:26	19:31	20:24	-	-

774 Mount Druitt to Penrith via Nepean Hospital

B

Monday to Friday		♿	♿	♿	♿	♿	♿	♿		♿
Mount Druitt Station, Mount Druitt		-	05:43	06:13	06:33	07:07	07:40	08:06	08:36	09:21
Brisbane St near Melbourne St, Oxley Park		-	05:49	06:19	06:40	07:14	07:47	08:14	08:44	09:29
Great Western Hwy at Fleming St, St Marys		-	05:53	06:23	06:45	07:19	07:52	08:21	08:51	09:35
St Marys Interchange	ARR	-	05:59	06:29	06:52	07:26	07:59	08:29	08:59	09:43
St Marys Interchange	DEP	04:59	06:00	06:30	06:54	07:28	08:01	08:31	09:01	09:45
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		05:05	06:06	06:36	07:01	07:35	08:08	08:38	09:08	09:52
Caddens Rd at Galea St, Claremont Meadows		05:08	06:09	06:39	07:04	07:38	08:11	08:42	09:12	09:56
Cadda Ridge Dr at Valencia St, Caddens		05:16	06:17	06:47	07:12	07:46	08:19	08:51	09:21	10:05
Nepean Hospital Derby St, Kingswood		05:22	06:23	06:53	07:19	07:53	08:26	08:58	09:28	10:12
Penrith Station		05:33	06:34	07:04	07:30	08:04	08:37	09:12	09:42	10:25

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		09:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:51
Brisbane St near Melbourne St, Oxley Park		09:59	10:29	10:59	11:29	11:59	12:29	12:59	13:29	13:59
Great Western Hwy at Fleming St, St Marys		10:05	10:35	11:05	11:35	12:05	12:35	13:05	13:35	14:05
St Marys Interchange	ARR	10:13	10:43	11:13	11:43	12:13	12:43	13:13	13:43	14:13
St Marys Interchange	DEP	10:15	10:45	11:15	11:45	12:15	12:45	13:15	13:45	14:15
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		10:22	10:52	11:22	11:52	12:22	12:52	13:22	13:52	14:22
Caddens Rd at Galea St, Claremont Meadows		10:26	10:56	11:26	11:56	12:26	12:56	13:26	13:56	14:26
Cadda Ridge Dr at Valencia St, Caddens		10:35	11:05	11:35	12:05	12:35	13:05	13:35	14:05	14:35
Nepean Hospital Derby St, Kingswood		10:42	11:12	11:42	12:12	12:42	13:12	13:42	14:12	14:42
Penrith Station		10:55	11:25	11:55	12:25	12:55	13:25	13:55	14:25	14:55

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		14:21	14:47	15:16	15:46	16:21	16:54	17:21	17:53	18:23
Brisbane St near Melbourne St, Oxley Park		14:29	14:57	15:26	15:56	16:30	17:03	17:30	18:02	18:30
Great Western Hwy at Fleming St, St Marys		14:35	15:04	15:33	16:03	16:36	17:09	17:36	18:08	18:36
St Marys Interchange	ARR	14:43	15:12	15:41	16:11	16:44	17:17	17:44	18:16	18:44
St Marys Interchange	DEP	14:45	15:14	15:43	16:13	16:46	17:19	17:46	18:18	18:46
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		14:52	15:21	15:50	16:20	16:53	17:26	17:53	18:25	18:53
Caddens Rd at Galea St, Claremont Meadows		14:56	15:25	15:54	16:24	16:56	17:29	17:56	18:28	18:56
Cadda Ridge Dr at Valencia St, Caddens		15:05	15:32	16:01	16:31	17:03	17:36	18:03	18:35	19:03
Nepean Hospital Derby St, Kingswood		15:12	15:39	16:08	16:38	17:09	17:42	18:09	18:41	19:09
Penrith Station		15:25	15:51	16:20	16:50	17:21	17:54	18:21	18:53	19:19

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		18:54	19:27	19:51	20:11	20:41	21:24	22:24	23:26
Brisbane St near Melbourne St, Oxley Park		19:01	19:34	19:58	20:18	20:48	21:31	22:31	23:33
Great Western Hwy at Fleming St, St Marys		19:07	19:40	20:04	20:24	20:54	21:37	22:37	23:39
St Marys Interchange	ARR	19:15	19:48	20:10	20:30	21:00	21:43	22:43	23:45
St Marys Interchange	DEP	19:17	19:50	20:12	20:31	21:01	21:44	22:44	23:46
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		19:24	19:57	20:18	20:37	21:07	21:50	22:50	23:52
Caddens Rd at Galea St, Claremont Meadows		19:27	20:00	20:21	20:40	21:10	21:53	22:53	23:55
Cadda Ridge Dr at Valencia St, Caddens		19:34	20:07	20:28	20:47	21:17	22:00	23:00	00:02
Nepean Hospital Derby St, Kingswood		19:40	20:13	20:34	20:53	21:23	22:06	23:06	00:08
Penrith Station		19:50	20:23	20:43	21:02	21:32	22:15	23:15	00:17

774 Mount Druitt to Penrith via Nepean Hospital

B

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		06:57	08:09	09:16	10:16	11:16	12:16	13:16	14:16	15:16
Brisbane St near Melbourne St, Oxley Park		07:04	08:16	09:24	10:24	11:24	12:24	13:24	14:24	15:24
Great Western Hwy at Fleming St, St Marys		07:09	08:21	09:30	10:30	11:30	12:30	13:30	14:30	15:30
St Marys Interchange	ARR	07:16	08:28	09:38	10:38	11:38	12:38	13:38	14:38	15:38
St Marys Interchange	DEP	07:18	08:30	09:40	10:40	11:40	12:40	13:40	14:40	15:40
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		07:25	08:37	09:47	10:47	11:47	12:47	13:47	14:47	15:47
Caddens Rd at Galea St, Claremont Meadows		07:28	08:40	09:51	10:51	11:51	12:51	13:51	14:51	15:51
Cadda Ridge Dr at Valencia St, Caddens		07:36	08:48	09:59	10:59	11:59	12:59	13:59	14:59	15:59
Nepean Hospital Derby St, Kingswood		07:43	08:55	10:06	11:06	12:06	13:06	14:06	15:06	16:06
Penrith Station		07:54	09:06	10:18	11:18	12:18	13:18	14:18	15:18	16:18

Saturday		♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		16:16	17:16	18:16	19:16	20:16	21:16	22:16
Brisbane St near Melbourne St, Oxley Park		16:24	17:24	18:24	19:23	20:23	21:23	22:23
Great Western Hwy at Fleming St, St Marys		16:30	17:30	18:30	19:29	20:29	21:29	22:29
St Marys Interchange	ARR	16:38	17:38	18:38	19:37	20:37	21:37	22:37
St Marys Interchange	DEP	16:40	17:40	18:40	19:39	20:39	21:39	22:39
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		16:47	17:47	18:47	19:46	20:46	21:46	22:46
Caddens Rd at Galea St, Claremont Meadows		16:51	17:51	18:51	19:49	20:49	21:49	22:49
Cadda Ridge Dr at Valencia St, Caddens		16:59	17:59	18:59	19:56	20:56	21:56	22:56
Nepean Hospital Derby St, Kingswood		17:06	18:06	19:06	20:02	21:02	22:02	23:02
Penrith Station		17:18	18:18	19:18	20:12	21:12	22:12	23:12

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		-	08:33	09:33	10:33	11:33	12:33	13:33	14:33	15:33
Brisbane St near Melbourne St, Oxley Park		-	08:41	09:41	10:41	11:41	12:41	13:41	14:41	15:41
Great Western Hwy at Fleming St, St Marys		-	08:47	09:47	10:47	11:47	12:47	13:47	14:47	15:47
St Marys Interchange	ARR	-	08:55	09:55	10:55	11:55	12:55	13:55	14:55	15:55
St Marys Interchange	DEP	07:51	08:57	09:57	10:57	11:57	12:57	13:57	14:57	15:57
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		07:57	09:04	10:04	11:04	12:04	13:04	14:04	15:04	16:04
Caddens Rd at Galea St, Claremont Meadows		08:00	09:08	10:08	11:08	12:08	13:08	14:08	15:08	16:08
Cadda Ridge Dr at Valencia St, Caddens		08:08	09:16	10:16	11:16	12:16	13:16	14:16	15:16	16:16
Nepean Hospital Derby St, Kingswood		08:14	09:23	10:23	11:23	12:23	13:23	14:23	15:23	16:23
Penrith Station		08:23	09:35	10:35	11:35	12:35	13:35	14:35	15:35	16:35

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		16:33	17:33	18:28	19:28	20:28	-
Brisbane St near Melbourne St, Oxley Park		16:41	17:41	18:35	19:35	20:35	-
Great Western Hwy at Fleming St, St Marys		16:47	17:47	18:41	19:41	20:41	-
St Marys Interchange	ARR	16:55	17:55	18:49	19:49	20:49	-
St Marys Interchange	DEP	16:57	17:57	18:51	19:51	20:51	22:02
Claremont Meadows Shopping Centre, Myrtle Rd, Claremont Meadows		17:04	18:04	18:58	19:58	20:58	22:09
Caddens Rd at Galea St, Claremont Meadows		17:08	18:08	19:01	20:01	21:01	22:12
Cadda Ridge Dr at Valencia St, Caddens		17:16	18:16	19:08	20:08	21:08	22:19
Nepean Hospital Derby St, Kingswood		17:23	18:23	19:14	20:14	21:14	22:25
Penrith Station		17:35	18:35	19:24	20:24	21:24	22:35

775 Mount Druitt to Penrith via Erskine Park

B

How to use this timetable

This timetable provides a snap shot of service information in 24-hour time (e.g. 5am = 05:00, 5pm = 17:00). Information contained in this timetable is subject to change without notice. Please note that timetables do not include minor stops, additional trips for special events, short term changes, holiday timetable changes, real-time information or any disruption alerts.

For the most up-to-date times, use the Trip Planner or Departures on **transportnsw.info**

Real-time planning

You can plan your trip with real-time information using the Trip Planner or Departures on **transportnsw.info** or by downloading travel apps on your smartphone or tablet.

The Trip Planner, Departures and travel apps offer various features:

- favourite your regular trips
- see where your service is on the route
- get estimated pick up and arrival times
- receive service updates
- find nearby stations, stops, wharves and routes
- check accessibility information

Find the latest apps at **transportnsw.info/apps**

Accessible services

All new buses are wheelchair-accessible with low-level floors and space for wheelchairs, prams or strollers. Look for the ♿ symbol in this timetable. Some older buses may not have all the features you need. There will be more accessible services as older buses are replaced.

Who is providing my bus services?

The bus services shown in this timetable are run by Busways Western Sydney.

Fares

To travel on public transport in Sydney and surrounding regions, an Opal card is the cheapest and easiest ticket option.

An Opal card is a smartcard you keep and reuse. Add value before you travel and tap on and tap off to pay your fares throughout Sydney, the Blue Mountains, Central Coast, the Hunter and the Illawarra.

Fares are based on:

- the type of Opal card you use
- the distance you travel from tap on to tap off
- the mode of transport you choose
- any Opal benefits such as discounts and capped fares that apply

Find out more about Opal fares and benefits at **transportnsw.info/opal**

Which Opal card is right for you?

Adult - Customers 16 years and over who are not entitled to any concessions and normally pay full fare.

Child/Youth - For customers aged 4-15 (inclusive), or customers 16 years or older who hold a NSW/ACT Senior Secondary Student Concession Card.

Gold Senior/Pensioner - For eligible NSW and interstate seniors, pensioners, war widows/ers and asylum seekers.

Concession - For eligible tertiary students, job seekers, apprentices and trainees.

How to get an Opal card

You can get an Adult and Child/Youth Opal cards over the counter at thousands of Opal retailers that display the Opal sign. To find your nearest retailer visit **transportnsw.info/opal**.

If you are eligible to travel with concession fares you can apply for a Gold Senior/Pensioner or Concession Opal card. Visit **transportnsw.info/opal** for more information.

Explanation of definitions and symbols

♿	Wheelchair Accessible
S	Bus operates public school days only
J	Public school days bus diverts from Queen St via Charles Hackett Dr, Pages Rd & Saddington St to Mamre Rd, then via normal route, omitting Queen St & Mamre Rd between Charles Hackett Dr & Saddington St
B	Public school days bus diverts from Derby St via Castlereagh St, Lethbridge St, Colless St & Derby St, omitting Derby St between Castlereagh St & Colless St
C	Public school days bus diverts from Derby St via Doonmore St, High St, Lawson St, Henry St & Riley St to Penrith Interchange, omitting Derby St & Station St between Doonmore St & Henry St
A	Public school days bus diverts from Carlisle Ave via Ropes Creek Rd, Mt Druitt Rd & Great Western Hwy to Carlisle Ave, then via normal route, omitting Carlisle Ave between Ropes Creek Rd & Great Western Hwy

NSW GOVERNMENT | Transport

775 Penrith to Mount Druitt via Erskine Park

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday		♿	♿	♿	♿	♿	♿		♿	♿
Penrith Station		-	-	-	05:56	06:30	06:59	07:20	07:51	08:36
Nepean Hospital Derby St, Kingswood		-	-	-	06:01	06:35	07:04	07:26	07:58	08:45
Second Ave at Morphett St, Kingswood		-	-	-	06:04	06:38	07:07	07:29	08:01	08:49
Great Western Hwy after Water St, Werrington		-	-	-	06:07	06:41	07:10	07:33	08:06	08:53
St Marys Interchange	ARR	-	-	-	06:14	06:48	07:17	07:40	08:14	09:00
St Marys Interchange	DEP	-	-	-	06:15	06:49	07:19	07:42	08:16	09:02
St Marys RSL Mamre Rd, St Marys		-	-	-	06:20	06:54	07:25	07:48	08:21	09:07
St Clair Av near Banks Dr, St Clair		-	-	-	06:22	06:56	07:27	07:50	08:23	09:09
St Clair Shopping Centre Bennett Rd, St Clair		-	-	-	06:26	07:02	07:33	07:57	08:29	09:15
Peppertree Dr near Dilga Cr, Erskine Park		05:08	05:38	06:14	06:29	07:06	07:37	08:01	08:33	09:19
Erskine Park High School Swallow Dr, Erskine Park		05:10	05:40	06:16	06:31	07:08	07:39	08:04	08:36	09:21
Swallow Dr near Peppertree Dr, Erskine Park		05:12	05:42	06:18	06:35	07:12	07:43	08:08	08:39	09:23
Roper Rd opp Carlisle Ave, Colyton		05:16	05:46	06:22	06:40	07:17	07:49	08:14	08:45	09:28
Mount Druitt Station, Mount Druitt		05:24	05:54	06:30	06:49	07:26	07:59	08:25	08:56	09:38

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		09:06	09:36	10:06	10:36	11:06	11:36	12:06	12:36	13:06
Nepean Hospital Derby St, Kingswood		09:15	09:45	10:15	10:45	11:15	11:45	12:15	12:45	13:15
Second Ave at Morphett St, Kingswood		09:19	09:49	10:19	10:49	11:19	11:49	12:19	12:49	13:19
Great Western Hwy after Water St, Werrington		09:23	09:53	10:23	10:53	11:23	11:53	12:23	12:53	13:23
St Marys Interchange	ARR	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30
St Marys Interchange	DEP	09:32	10:02	10:32	11:02	11:32	12:02	12:32	13:02	13:32
St Marys RSL Mamre Rd, St Marys		09:37	10:07	10:37	11:07	11:37	12:07	12:37	13:07	13:37
St Clair Av near Banks Dr, St Clair		09:39	10:09	10:39	11:09	11:39	12:09	12:39	13:09	13:39
St Clair Shopping Centre Bennett Rd, St Clair		09:45	10:15	10:45	11:15	11:45	12:15	12:45	13:15	13:45
Peppertree Dr near Dilga Cr, Erskine Park		09:49	10:19	10:49	11:19	11:49	12:19	12:49	13:19	13:49
Erskine Park High School Swallow Dr, Erskine Park		09:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:51
Swallow Dr near Peppertree Dr, Erskine Park		09:53	10:23	10:53	11:23	11:53	12:23	12:53	13:23	13:53
Roper Rd opp Carlisle Ave, Colyton		09:58	10:28	10:58	11:28	11:58	12:28	12:58	13:28	13:58
Mount Druitt Station, Mount Druitt		10:08	10:38	11:08	11:38	12:08	12:38	13:08	13:38	14:08

Monday to Friday		♿	♿	♿	♿		♿	♿	♿	
Service Information				**S**		**S**				
Penrith Station		13:36	14:03	14:30	14:58	**B**15:28	15:55	16:20	16:40	17:10
St Nicholas of Myra School Lethbridge St, Penrith		–	–	–	–	15:35	–	–	–	–
Penrith PS and HS, Lethbridge St, Penrith		–	–	–	–	15:37	–	–	–	–
Nepean Hospital Derby St, Kingswood		13:45	14:12	14:39	15:07	**B**15:41	16:04	16:29	16:49	17:19
Kingswood High School, Bringelly Rd, Kingswood		–	–	–	–	–	16:07	–	–	–
Second Ave at Morphett St, Kingswood		13:49	14:16	14:43	15:12	15:46	16:11	16:33	16:53	17:23
Great Western Hwy after Water St, Werrington		13:53	14:20	14:47	15:18	15:52	16:17	16:37	16:57	17:27
St Marys Interchange	ARR	14:00	14:28	**J**14:55	15:27	16:01	16:26	16:45	17:05	17:35
St Marys Interchange	DEP	14:02	14:30	**J**14:57	15:29	16:03	16:28	16:47	17:07	17:37
St Marys RSL Mamre Rd, St Marys		14:07	14:35	**J**15:11	15:35	16:09	16:34	16:53	17:13	17:43
St Clair Av near Banks Dr, St Clair		14:09	14:37	15:13	15:37	16:11	16:36	16:56	17:16	17:46
St Clair Shopping Centre Bennett Rd, St Clair		14:15	14:44	15:19	15:43	16:17	16:42	17:02	17:22	17:52
Peppertree Dr near Dilga Cr, Erskine Park		14:19	14:48	15:23	15:47	16:21	16:46	17:06	17:26	17:56
Erskine Park High School Swallow Dr, Erskine Park		14:21	14:51	15:26	15:49	16:22	16:47	17:08	17:28	17:57
Swallow Dr near Peppertree Dr, Erskine Park		14:23	14:54	15:29	15:51	16:25	16:50	17:10	17:30	17:59
Roper Rd opp Carlisle Ave, Colyton		14:28	14:59	15:34	15:56	16:30	16:55	17:14	17:34	18:03
Mount Druitt Station, Mount Druitt		14:38	15:09	15:44	16:06	16:40	17:05	17:24	17:44	18:13

775 Penrith to Mount Druitt via Erskine Park

B

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		17:40	18:10	18:41	19:11	19:41	20:22	21:22	22:22	23:24
Nepean Hospital Derby St, Kingswood		17:49	18:17	18:48	19:18	19:48	20:27	21:27	22:27	23:29
Second Ave at Morphett St, Kingswood		17:53	18:20	18:51	19:21	19:51	20:30	21:30	22:30	23:32
Great Western Hwy after Water St, Werrington		17:57	18:24	18:55	19:24	19:54	20:33	21:33	22:33	23:35
St Marys Interchange	ARR	18:05	18:31	19:02	19:30	20:00	20:39	21:39	22:39	23:41
St Marys Interchange	DEP	18:07	18:33	19:04	19:32	20:02	20:40	21:40	22:40	-
St Marys RSL Mamre Rd, St Marys		18:13	18:38	19:09	19:37	20:07	20:45	21:45	22:45	-
St Clair Av near Banks Dr, St Clair		18:16	18:40	19:11	19:39	20:09	20:47	21:47	22:47	-
St Clair Shopping Centre Bennett Rd, St Clair		18:22	18:46	19:17	19:45	20:15	20:52	21:52	22:52	-
Peppertree Dr near Dilga Cr, Erskine Park		18:26	18:49	19:20	19:48	20:18	20:55	21:55	22:55	-
Erskine Park High School Swallow Dr, Erskine Park		18:27	18:50	19:21	19:49	20:19	20:56	21:56	22:56	-
Swallow Dr near Peppertree Dr, Erskine Park		18:29	18:52	19:23	19:51	20:21	20:58	21:58	22:58	-
Roper Rd opp Carlisle Ave, Colyton		18:33	18:56	19:27	19:55	20:25	21:01	22:01	23:01	-
Mount Druitt Station, Mount Druitt		18:43	19:05	19:36	20:04	20:34	21:09	22:09	23:09	-

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		07:11	08:11	09:03	10:03	11:03	12:03	13:03	14:03	15:03
Nepean Hospital Derby St, Kingswood		07:16	08:16	09:10	10:10	11:10	12:10	13:10	14:10	15:10
Second Ave at Morphett St, Kingswood		07:20	08:20	09:13	10:13	11:13	12:13	13:13	14:13	15:13
Great Western Hwy after Water St, Werrington		07:23	08:23	09:17	10:17	11:17	12:17	13:17	14:17	15:17
St Marys Interchange	ARR	07:30	08:30	09:25	10:25	11:25	12:25	13:25	14:25	15:25
St Marys Interchange	DEP	07:31	08:31	09:27	10:27	11:27	12:27	13:27	14:27	15:27
St Marys RSL Mamre Rd, St Marys		07:35	08:35	09:32	10:32	11:32	12:32	13:32	14:32	15:32
St Clair Av near Banks Dr, St Clair		07:37	08:37	09:34	10:34	11:34	12:34	13:34	14:34	15:34
St Clair Shopping Centre Bennett Rd, St Clair		07:43	08:43	09:40	10:40	11:40	12:40	13:40	14:40	15:40
Peppertree Dr near Dilga Cr, Erskine Park		07:45	08:45	09:44	10:44	11:44	12:44	13:44	14:44	15:44
Erskine Park High School Swallow Dr, Erskine Park		07:47	08:47	09:46	10:46	11:46	12:46	13:46	14:46	15:46
Swallow Dr near Peppertree Dr, Erskine Park		07:50	08:50	09:49	10:49	11:49	12:49	13:49	14:49	15:49
Roper Rd opp Carlisle Ave, Colyton		07:54	08:54	09:53	10:53	11:53	12:53	13:53	14:53	15:53
Mount Druitt Station, Mount Druitt		08:03	09:03	10:03	11:03	12:03	13:03	14:03	15:03	16:03

Saturday		♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		16:03	17:03	17:59	18:59	19:59	20:59	21:59	22:59
Nepean Hospital Derby St, Kingswood		16:10	17:10	18:04	19:04	20:04	21:04	22:04	23:04
Second Ave at Morphett St, Kingswood		16:13	17:13	18:07	19:07	20:07	21:07	22:06	23:06
Great Western Hwy after Water St, Werrington		16:17	17:17	18:11	19:11	20:11	21:11	22:10	23:10
St Marys Interchange	ARR	16:25	17:25	18:18	19:18	20:18	21:18	22:16	23:16
St Marys Interchange	DEP	16:27	17:27	18:19	19:19	20:19	21:19	22:17	-
St Marys RSL Mamre Rd, St Marys		16:32	17:32	18:24	19:24	20:24	21:24	22:21	-
St Clair Av near Banks Dr, St Clair		16:34	17:34	18:26	19:26	20:26	21:26	22:23	-
St Clair Shopping Centre Bennett Rd, St Clair		16:40	17:40	18:31	19:31	20:31	21:31	22:28	-
Peppertree Dr near Dilga Cr, Erskine Park		16:44	17:44	18:34	19:34	20:34	21:34	22:31	-
Erskine Park High School Swallow Dr, Erskine Park		16:46	17:46	18:36	19:36	20:36	21:36	22:33	-
Swallow Dr near Peppertree Dr, Erskine Park		16:49	17:49	18:38	19:38	20:38	21:38	22:35	-
Roper Rd opp Carlisle Ave, Colyton		16:53	17:53	18:42	19:42	20:42	21:42	22:39	-
Mount Druitt Station, Mount Druitt		17:03	18:03	18:50	19:50	20:50	21:50	22:46	-

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		08:10	09:10	10:10	11:10	12:10	13:10	14:10	15:10	16:10
Nepean Hospital Derby St, Kingswood		08:15	09:17	10:17	11:17	12:17	13:17	14:17	15:17	16:17
Second Ave at Morphett St, Kingswood		08:18	09:20	10:20	11:20	12:20	13:20	14:20	15:20	16:20
Great Western Hwy after Water St, Werrington		08:22	09:24	10:24	11:24	12:24	13:24	14:24	15:24	16:24
St Marys Interchange	ARR	08:28	09:32	10:32	11:32	12:32	13:32	14:32	15:32	16:32
St Marys Interchange	DEP	08:34	09:34	10:34	11:34	12:34	13:34	14:34	15:34	16:34
St Marys RSL Mamre Rd, St Marys		08:39	09:39	10:39	11:39	12:39	13:39	14:39	15:39	16:39
St Clair Av near Banks Dr, St Clair		08:41	09:41	10:41	11:41	12:41	13:41	14:41	15:41	16:41
St Clair Shopping Centre Bennett Rd, St Clair		08:47	09:47	10:47	11:47	12:47	13:47	14:47	15:47	16:47
Peppertree Dr near Dilga Cr, Erskine Park		08:51	09:51	10:51	11:51	12:51	13:51	14:51	15:51	16:51
Erskine Park High School Swallow Dr, Erskine Park		08:53	09:53	10:53	11:53	12:53	13:53	14:53	15:53	16:53
Swallow Dr near Peppertree Dr, Erskine Park		08:56	09:56	10:56	11:56	12:56	13:56	14:56	15:56	16:56
Roper Rd opp Carlisle Ave, Colyton		09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00
Mount Druitt Station, Mount Druitt		09:10	10:10	11:10	12:10	13:10	14:10	15:10	16:10	17:10

775 Penrith to Mount Druitt via Erskine Park

B

Sunday & Public Holidays		♿	♿	♿	♿	♿
Penrith Station		17:10	18:14	19:14	20:17	21:17
Nepean Hospital Derby St, Kingswood		17:17	18:21	19:19	20:22	21:22
Second Ave at Morphett St, Kingswood		17:20	18:24	19:22	20:25	21:25
Great Western Hwy after Water St, Werrington		17:24	18:28	19:26	20:29	21:29
St Marys Interchange	ARR	17:32	18:36	19:32	20:35	21:35
St Marys Interchange	DEP	17:34	18:38	19:35	20:38	-
St Marys RSL Mamre Rd, St Marys		17:38	18:42	19:39	20:42	-
St Clair Av near Banks Dr, St Clair		17:40	18:44	19:41	20:44	-
St Clair Shopping Centre Bennett Rd, St Clair		17:45	18:49	19:46	20:49	-
Peppertree Dr near Dilga Cr, Erskine Park		17:48	18:52	19:49	20:52	-
Erskine Park High School Swallow Dr, Erskine Park		17:50	18:54	19:51	20:54	-
Swallow Dr near Peppertree Dr, Erskine Park		17:52	18:56	19:53	20:56	-
Roper Rd opp Carlisle Ave, Colyton		17:55	18:59	19:56	20:59	-
Mount Druitt Station, Mount Druitt		18:03	19:07	20:04	21:07	-

775 Mount Druitt to Penrith via Erskine Park

B

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	
Service Information								**S**		
Mount Druitt Station, Mount Druitt		-	-	-	06:01	06:31	06:58	07:30	07:57	08:27
Roper Rd after Carlisle Ave, Colyton		-	-	-	06:05	06:35	07:03	07:37	08:04	08:34
Swallow Dr near Peppertree Dr, Erskine Park		-	-	-	06:07	06:37	07:05	07:40	08:07	08:37
Peppertree Dr near Dilga Cr, Erskine Park		04:48	05:16	05:40	06:10	06:40	07:09	07:45	08:12	08:41
St Clair Shopping Centre Bennett Rd, St Clair		04:51	05:19	05:43	06:13	06:43	07:13	07:50	08:17	08:45
St Clair Av near Banks Dr, St Clair		04:55	05:23	05:49	06:19	06:49	07:21	07:58	08:25	08:53
St Marys RSL Mamre Rd, St Marys		04:59	05:27	05:54	06:24	06:54	07:26	08:03	08:30	08:58
St Marys Interchange	ARR	05:05	05:33	06:01	06:31	07:02	07:34	08:12	08:41	09:07
St Marys Interchange	DEP	05:06	05:34	06:02	06:32	07:04	07:36	08:14	08:43	09:09
Great Western Hwy opp Water St, Claremont Meadows		05:10	05:38	06:07	06:37	07:09	07:41	08:19	08:48	09:14
Second Ave after O'Connell St, Kingswood		05:12	05:40	06:09	06:39	07:11	07:44	08:22	08:52	09:17
Nepean Hospital Derby St, Kingswood		05:16	05:44	06:14	06:44	07:16	07:49	**C**08:27	08:58	09:23
Doonmore St opp Penrith Public School, Penrith		–	–	–	–	–	–	08:31	–	–
Penrith Station		05:25	05:53	06:24	06:54	07:26	08:00	**C**08:40	09:11	09:36

Monday to Friday		♿	♿	♿		♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		08:57	09:27	09:57	10:27	10:57	11:27	11:57	12:27	12:57
Roper Rd after Carlisle Ave, Colyton		09:04	09:34	10:04	10:34	11:04	11:34	12:04	12:34	13:04
Swallow Dr near Peppertree Dr, Erskine Park		09:07	09:37	10:07	10:37	11:07	11:37	12:07	12:37	13:07
Peppertree Dr near Dilga Cr, Erskine Park		09:11	09:41	10:11	10:41	11:11	11:41	12:11	12:41	13:11
St Clair Shopping Centre Bennett Rd, St Clair		09:15	09:45	10:15	10:45	11:15	11:45	12:15	12:45	13:15
St Clair Av near Banks Dr, St Clair		09:21	09:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21
St Marys RSL Mamre Rd, St Marys		09:25	09:55	10:25	10:55	11:25	11:55	12:25	12:55	13:25
St Marys Interchange	ARR	09:34	10:04	10:34	11:04	11:34	12:04	12:34	13:04	13:34
St Marys Interchange	DEP	09:36	10:06	10:36	11:06	11:36	12:06	12:36	13:06	13:36
Great Western Hwy opp Water St, Claremont Meadows		09:41	10:11	10:41	11:11	11:41	12:11	12:41	13:11	13:41
Second Ave after O'Connell St, Kingswood		09:44	10:14	10:44	11:14	11:44	12:14	12:44	13:14	13:44
Nepean Hospital Derby St, Kingswood		09:49	10:19	10:49	11:19	11:49	12:19	12:49	13:19	13:49
Penrith Station		10:02	10:32	11:02	11:32	12:02	12:32	13:02	13:32	14:02

Monday to Friday		♿	♿	♿	♿	♿		♿	♿	
Service Information					**S**					
Mount Druitt Station, Mount Druitt		13:32	14:09	14:38	**A**14:58	15:36	15:56	16:24	16:58	17:32
Roper Rd after Carlisle Ave, Colyton		13:39	14:16	14:45	**A**15:11	15:45	16:05	16:33	17:07	17:38
Swallow Dr near Peppertree Dr, Erskine Park		13:42	14:19	14:48	15:15	15:48	16:08	16:36	17:10	17:41
Peppertree Dr near Dilga Cr, Erskine Park		13:46	14:23	14:54	15:20	15:53	16:13	16:41	17:15	17:46
St Clair Shopping Centre Bennett Rd, St Clair		13:50	14:27	14:58	15:25	15:57	16:17	16:45	17:19	17:50
St Clair Av near Banks Dr, St Clair		13:56	14:36	15:07	15:33	16:02	16:22	16:50	17:24	17:55
St Marys RSL Mamre Rd, St Marys		14:00	14:40	15:11	15:37	16:06	16:26	16:54	17:28	17:59
St Marys Interchange	ARR	14:09	14:49	15:20	15:46	16:14	16:34	17:02	17:36	18:07
St Marys Interchange	DEP	14:11	14:51	15:22	15:48	16:16	16:36	17:04	17:38	18:09
Great Western Hwy opp Water St, Claremont Meadows		14:16	14:57	15:27	15:55	16:23	16:42	17:10	17:44	18:15
Second Ave after O'Connell St, Kingswood		14:19	15:00	15:30	15:58	16:26	16:45	17:13	17:47	18:18
Nepean Hospital Derby St, Kingswood		14:24	15:06	15:36	16:04	16:32	16:50	17:18	17:52	18:23
Penrith Station		14:37	15:18	15:48	16:15	16:43	17:01	17:29	18:03	18:34

775 Mount Druitt to Penrith via Erskine Park

B

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		17:58	18:28	18:55	19:24	19:52	20:20	21:20	22:20	-
Roper Rd after Carlisle Ave, Colyton		18:04	18:34	19:01	19:30	19:58	20:24	21:24	22:24	-
Swallow Dr near Peppertree Dr, Erskine Park		18:07	18:37	19:04	19:33	20:01	20:27	21:27	22:27	-
Peppertree Dr near Dilga Cr, Erskine Park		18:11	18:41	19:08	19:37	20:05	20:30	21:30	22:30	-
St Clair Shopping Centre Bennett Rd, St Clair		18:14	18:44	19:11	19:40	20:08	20:33	21:33	22:33	-
St Clair Av near Banks Dr, St Clair		18:18	18:48	19:15	19:44	20:12	20:37	21:37	22:37	-
St Marys RSL Mamre Rd, St Marys		18:20	18:50	19:17	19:46	20:14	20:39	21:39	22:39	-
St Marys Interchange	ARR	18:27	18:57	19:24	19:52	20:20	20:45	21:45	22:45	-
St Marys Interchange	DEP	18:29	18:59	19:26	19:54	20:22	20:46	21:46	22:46	23:46
Great Western Hwy opp Water St, Claremont Meadows		18:34	19:04	19:31	19:57	20:25	20:49	21:49	22:49	23:49
Second Ave after O'Connell St, Kingswood		18:36	19:06	19:33	19:59	20:27	20:51	21:51	22:51	23:51
Nepean Hospital Derby St, Kingswood		18:41	19:11	19:38	20:03	20:31	20:55	21:55	22:55	23:55
Penrith Station		18:51	19:21	19:48	20:12	20:40	21:04	22:04	23:04	00:04

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		06:28	07:18	08:18	09:07	10:07	11:07	12:07	13:07	14:07
Roper Rd after Carlisle Ave, Colyton		06:32	07:22	08:22	09:13	10:13	11:13	12:13	13:13	14:13
Swallow Dr near Peppertree Dr, Erskine Park		06:35	07:25	08:25	09:16	10:16	11:16	12:16	13:16	14:16
Peppertree Dr near Dilga Cr, Erskine Park		06:39	07:29	08:29	09:20	10:20	11:20	12:20	13:20	14:20
St Clair Shopping Centre Bennett Rd, St Clair		06:42	07:32	08:32	09:23	10:23	11:23	12:23	13:23	14:23
St Clair Av near Banks Dr, St Clair		06:47	07:37	08:37	09:29	10:29	11:29	12:29	13:29	14:29
St Marys RSL Mamre Rd, St Marys		06:50	07:40	08:40	09:33	10:33	11:33	12:33	13:33	14:33
St Marys Interchange	ARR	06:57	07:47	08:47	09:40	10:40	11:40	12:40	13:40	14:40
St Marys Interchange	DEP	-	07:48	08:48	09:42	10:42	11:42	12:42	13:42	14:42
Great Western Hwy opp Water St, Claremont Meadows		-	07:52	08:52	09:48	10:48	11:48	12:48	13:48	14:48
Second Ave after O'Connell St, Kingswood		-	07:54	08:54	09:51	10:51	11:51	12:51	13:51	14:51
Nepean Hospital Derby St, Kingswood		-	07:58	08:58	09:56	10:56	11:56	12:56	13:56	14:56
Penrith Station		-	08:08	09:08	10:08	11:08	12:08	13:08	14:08	15:08

Saturday		♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		15:07	16:07	17:12	18:12	19:12	20:12	21:12	22:12
Roper Rd after Carlisle Ave, Colyton		15:13	16:13	17:18	18:18	19:18	20:18	21:17	22:17
Swallow Dr near Peppertree Dr, Erskine Park		15:16	16:16	17:21	18:21	19:21	20:21	21:19	22:19
Peppertree Dr near Dilga Cr, Erskine Park		15:20	16:20	17:25	18:25	19:25	20:25	21:23	22:23
St Clair Shopping Centre Bennett Rd, St Clair		15:23	16:23	17:28	18:28	19:28	20:28	21:26	22:26
St Clair Av near Banks Dr, St Clair		15:29	16:29	17:34	18:34	19:32	20:32	21:30	22:30
St Marys RSL Mamre Rd, St Marys		15:33	16:33	17:38	18:38	19:36	20:36	21:34	22:34
St Marys Interchange	ARR	15:40	16:40	17:45	18:45	19:43	20:43	21:40	22:40
St Marys Interchange	DEP	15:42	16:42	17:47	18:47	19:44	20:44	21:41	22:41
Great Western Hwy opp Water St, Claremont Meadows		15:48	16:48	17:53	18:53	19:49	20:49	21:44	22:44
Second Ave after O'Connell St, Kingswood		15:51	16:51	17:56	18:56	19:52	20:52	21:46	22:46
Nepean Hospital Derby St, Kingswood		15:56	16:56	18:01	19:01	19:57	20:57	21:51	22:51
Penrith Station		16:08	17:08	18:13	19:13	20:06	21:06	21:59	22:59

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		-	08:19	09:14	10:14	11:14	12:14	13:14	14:14	15:14
Roper Rd after Carlisle Ave, Colyton		-	08:24	09:19	10:19	11:19	12:19	13:19	14:19	15:19
Swallow Dr near Peppertree Dr, Erskine Park		-	08:27	09:23	10:23	11:23	12:23	13:23	14:23	15:23
Peppertree Dr near Dilga Cr, Erskine Park		-	08:31	09:27	10:27	11:27	12:27	13:27	14:27	15:27
St Clair Shopping Centre Bennett Rd, St Clair		-	08:34	09:30	10:30	11:30	12:30	13:30	14:30	15:30
St Clair Av near Banks Dr, St Clair		-	08:40	09:36	10:36	11:36	12:36	13:36	14:36	15:36
St Marys RSL Mamre Rd, St Marys		-	08:44	09:40	10:40	11:40	12:40	13:40	14:40	15:40
St Marys Interchange	ARR	-	08:52	09:48	10:48	11:48	12:48	13:48	14:48	15:48
St Marys Interchange	DEP	07:54	08:54	09:49	10:49	11:49	12:49	13:49	14:49	15:49
Great Western Hwy opp Water St, Claremont Meadows		07:58	08:58	09:54	10:54	11:54	12:54	13:54	14:54	15:54
Second Ave after O'Connell St, Kingswood		08:00	09:00	09:57	10:57	11:57	12:57	13:57	14:57	15:57
Nepean Hospital Derby St, Kingswood		08:05	09:05	10:02	11:02	12:02	13:02	14:02	15:02	16:02
Penrith Station		08:14	09:14	10:14	11:14	12:14	13:14	14:14	15:14	16:14

775 Mount Druitt to Penrith via Erskine Park

B

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		16:14	17:14	18:14	19:14	-	-
Roper Rd after Carlisle Ave, Colyton		16:19	17:19	18:19	19:19	-	-
Swallow Dr near Peppertree Dr, Erskine Park		16:23	17:22	18:22	19:22	-	-
Peppertree Dr near Dilga Cr, Erskine Park		16:27	17:25	18:25	19:25	-	-
St Clair Shopping Centre Bennett Rd, St Clair		16:30	17:29	18:29	19:29	-	-
St Clair Av near Banks Dr, St Clair		16:36	17:34	18:34	19:34	-	-
St Marys RSL Mamre Rd, St Marys		16:40	17:36	18:36	19:36	-	-
St Marys Interchange	ARR	16:48	17:43	18:43	19:43	-	-
St Marys Interchange	DEP	16:49	17:45	18:45	19:45	20:45	21:45
Great Western Hwy opp Water St, Claremont Meadows		16:54	17:49	18:49	19:49	20:49	21:49
Second Ave after O'Connell St, Kingswood		16:57	17:51	18:51	19:51	20:51	21:51
Nepean Hospital Derby St, Kingswood		17:02	17:56	18:56	19:56	20:56	21:56
Penrith Station		17:14	18:05	19:05	20:05	21:05	22:05

776 Mount Druitt to Penrith via St Clair B

How to use this timetable

This timetable provides a snap shot of service information in 24-hour time (e.g. 5am = 05:00, 5pm = 17:00). Information contained in this timetable is subject to change without notice. Please note that timetables do not include minor stops, additional trips for special events, short term changes, holiday timetable changes, real-time information or any disruption alerts.

For the most up-to-date times, use the Trip Planner or Departures on **transportnsw.info**

Real-time planning

You can plan your trip with real-time information using the Trip Planner or Departures on **transportnsw.info** or by downloading travel apps on your smartphone or tablet.

The Trip Planner, Departures and travel apps offer various features:

- favourite your regular trips
- see where your service is on the route
- get estimated pick up and arrival times
- receive service updates
- find nearby stations, stops, wharves and routes
- check accessibility information

Find the latest apps at **transportnsw.info/apps**

Accessible services

All new buses are wheelchair-accessible with low-level floors and space for wheelchairs, prams or strollers. Look for the ♿ symbol in this timetable. Some older buses may not have all the features you need. There will be more accessible services as older buses are replaced.

Who is providing my bus services?

The bus services shown in this timetable are run by Busways Western Sydney.

Fares

To travel on public transport in Sydney and surrounding regions, an Opal card is the cheapest and easiest ticket option.

An Opal card is a smartcard you keep and reuse. Add value before you travel and tap on and tap off to pay your fares throughout Sydney, the Blue Mountains, Central Coast, the Hunter and the Illawarra.

Fares are based on:

- the type of Opal card you use
- the distance you travel from tap on to tap off
- the mode of transport you choose
- any Opal benefits such as discounts and capped fares that apply

Find out more about Opal fares and benefits at **transportnsw.info/opal**

Which Opal card is right for you?

Adult - Customers 16 years and over who are not entitled to any concessions and normally pay full fare.

Child/Youth - For customers aged 4-15 (inclusive), or customers 16 years or older who hold a NSW/ACT Senior Secondary Student Concession Card.

Gold Senior/Pensioner - For eligible NSW and interstate seniors, pensioners, war widows/ers and asylum seekers.

Concession - For eligible tertiary students, job seekers, apprentices and trainees.

How to get an Opal card

You can get an Adult and Child/Youth Opal cards over the counter at thousands of Opal retailers that display the Opal sign. To find your nearest retailer visit **transportnsw.info/opal**.

If you are eligible to travel with concession fares you can apply for a Gold Senior/Pensioner or Concession Opal card. Visit **transportnsw.info/opal** for more information.

Explanation of definitions and symbols

♿	Wheelchair Accessible
E	Public schoool days bus diverts from corner Banks Dr & Endeavour Ave via Moore St & Endeavour Ave (or vice versa), omitting Endeavour Ave between Banks Dr & Moore St
S	Bus operates public school days only
J	Public school days bus diverts from Queen St via Charles Hackett Dr, Pages Rd & Saddington St to Mamre Rd, then via normal route, omitting Queen St & Mamre Rd between Charles Hackett Dr & Saddington St
B	Public school days bus diverts from Derby St via Castlereagh St, Lethbridge St, Colless St & Derby St, omitting Derby St between Castlereagh St & Colless St
C	Public school days bus diverts from Derby St via Doonmore St, High St, Lawson St, Henry St & Station St to Penrith Interchange, omitting Derby St & Station St between Doonmore St & Henry St
A	Public school days bus diverts from Carlisle Ave via Ropes Creek Rd, Mt Druitt Rd & Great Western Hwy to Carlisle Ave, then via normal route, omitting Carlisle Ave between Ropes Creek Rd & Great Western Hwy. Public school holidays bus operates through timing point 10 minutes later than time shown
T	Public school holidays bus operates through timing point 10 minutes later than time shown
U	Public schoool days bus diverts from corner Banks Dr & Endeavour Ave via Moore St & Endeavour Ave (or vice versa), omitting Endeavour Ave between Banks Dr & Moore St. Public school holidays bus operates through timing point 10 minutes later than time shown
L	Public school holidays bus operates through timing point 5 minutes later than time shown
T	Public schoool days bus diverts from corner Banks Dr & Endeavour Ave via Moore St & Endeavour Ave (or vice versa), omitting Endeavour Ave between Banks Dr & Moore St. Public school holidays bus operates through timing point 5 minutes later than time shown

776 Penrith to Mount Druitt via St Clair

B

Valid from: 15 Oct 2018

Creation date: 31 Oct 2018
NOTE: Information is correct on date of download.

Monday to Friday		♿	♿	♿	♿	♿	♿			♿
Penrith Station		-	-	-	06:11	06:41	07:04	07:28	07:59	08:21
Nepean Hospital Derby St, Kingswood		-	-	-	06:16	06:46	07:10	07:35	08:08	08:30
Second Ave at Morphett St, Kingswood		-	-	-	06:19	06:49	07:13	07:38	08:12	08:34
Great Western Hwy after Water St, Werrington		-	-	-	06:22	06:52	07:17	07:43	08:16	08:38
St Marys Interchange	ARR	-	-	-	06:29	06:59	07:24	07:51	08:23	08:45
St Marys Interchange	DEP	05:10	05:40	06:14	06:30	07:00	07:26	07:53	08:25	08:47
St Marys RSL Mamre Rd, St Marys		05:13	05:43	06:17	06:33	07:03	07:30	07:58	08:30	08:52
Solander Dr opp Cameo Cres, St Clair		05:17	05:47	06:21	06:37	07:07	07:34	08:02	08:34	08:56
Blackwell Public School Blackwell Av, St Clair	ARR	05:20	05:50	06:24	06:41	07:11	07:37	E08:06	08:38	09:00
Blackwell Public School Blackwell Av, St Clair	DEP	05:20	05:50	06:24	06:41	07:11	07:38	E08:06	08:38	09:00
Holy Spirit Parish School Moore St, St Clair		–	–	–	–	–	–	08:10	–	–
St Clair Shopping Centre Bennett Rd, St Clair		05:24	05:54	06:28	06:45	07:15	07:45	E08:13	08:42	09:05
Colorado Dr at Explorers Way, St Clair		05:28	05:58	06:32	06:50	07:20	07:50	08:18	08:47	09:09
Roper Rd opp Carlisle Ave, Colyton		05:31	06:01	06:35	06:53	07:24	07:54	08:22	08:51	09:12
Mount Druitt Station, Mount Druitt		05:40	06:10	06:44	07:03	07:35	08:05	08:33	09:02	09:22

Monday to Friday		♿		♿	♿	♿	♿	♿	♿	♿
Penrith Station		08:51	09:21	09:51	10:21	10:51	11:21	11:51	12:21	12:51
Nepean Hospital Derby St, Kingswood		09:00	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00
Second Ave at Morphett St, Kingswood		09:04	09:34	10:04	10:34	11:04	11:34	12:04	12:34	13:04
Great Western Hwy after Water St, Werrington		09:08	09:38	10:08	10:38	11:08	11:38	12:08	12:38	13:08
St Marys Interchange	ARR	09:15	09:45	10:15	10:45	11:15	11:45	12:15	12:45	13:15
St Marys Interchange	DEP	09:17	09:47	10:17	10:47	11:17	11:47	12:17	12:47	13:17
St Marys RSL Mamre Rd, St Marys		09:22	09:52	10:22	10:52	11:22	11:52	12:22	12:52	13:22
Solander Dr opp Cameo Cres, St Clair		09:26	09:56	10:26	10:56	11:26	11:56	12:26	12:56	13:26
Blackwell Public School Blackwell Av, St Clair	ARR	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30
Blackwell Public School Blackwell Av, St Clair	DEP	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30
St Clair Shopping Centre Bennett Rd, St Clair		09:35	10:05	10:35	11:05	11:35	12:05	12:35	13:05	13:35
Colorado Dr at Explorers Way, St Clair		09:39	10:09	10:39	11:09	11:39	12:09	12:39	13:09	13:39
Roper Rd opp Carlisle Ave, Colyton		09:42	10:12	10:42	11:12	11:42	12:12	12:42	13:12	13:42
Mount Druitt Station, Mount Druitt		09:52	10:22	10:52	11:22	11:52	12:22	12:52	13:22	13:52

Monday to Friday		♿	♿		♿		♿	♿	♿	
Service Information				S		S				
Penrith Station		13:21	14:01	14:40	15:08	B15:48	16:10	16:50	17:18	17:48
Penrith PS and HS, Lethbridge St, Penrith		–	–	–	–	15:54	–	–	–	–
Nepean Hospital Derby St, Kingswood		13:30	14:10	14:49	15:17	B15:57	16:19	16:59	17:27	17:57
Kingswood High School, Bringelly Rd, Kingswood		–	–	–	–	16:01	–	–	–	–
Second Ave at Morphett St, Kingswood		13:34	14:14	14:54	15:22	16:06	16:23	17:03	17:31	18:01
Great Western Hwy after Water St, Werrington		13:38	14:18	15:00	15:28	16:12	16:27	17:07	17:35	18:05
St Marys Interchange	ARR	13:45	14:26	J15:09	15:37	16:21	16:35	17:15	17:43	18:13
St Marys Interchange	DEP	13:47	14:28	J15:11	15:39	16:23	16:38	17:18	17:46	18:16
St Marys RSL Mamre Rd, St Marys		13:52	14:35	J15:19	15:45	16:29	16:43	17:23	17:51	18:21
Solander Dr opp Cameo Cres, St Clair		13:56	14:39	15:24	15:50	16:34	16:47	17:27	17:55	18:25
Blackwell Public School Blackwell Av, St Clair	ARR	14:00	14:43	15:29	15:55	16:39	16:50	17:30	17:58	18:28
Blackwell Public School Blackwell Av, St Clair	DEP	14:00	14:43	15:29	15:55	16:39	16:50	17:30	17:58	18:28
St Clair Shopping Centre Bennett Rd, St Clair		14:05	14:48	15:34	16:00	16:44	16:55	17:35	18:03	18:33
Colorado Dr at Explorers Way, St Clair		14:09	14:52	15:38	16:04	16:48	16:59	17:38	18:06	18:36
Roper Rd opp Carlisle Ave, Colyton		14:12	14:55	15:41	16:07	16:51	17:03	17:41	18:09	18:39
Mount Druitt Station, Mount Druitt		14:22	15:05	15:51	16:17	17:01	17:13	17:50	18:18	18:48

Monday to Friday		♿	♿	♿	♿	♿	♿	♿
Penrith Station		18:16	18:51	19:21	19:51	20:51	21:51	22:51
Nepean Hospital Derby St, Kingswood		18:23	18:58	19:28	19:58	20:56	21:56	22:56
Second Ave at Morphett St, Kingswood		18:26	19:01	19:31	20:01	20:59	21:59	22:59
Great Western Hwy after Water St, Werrington		18:30	19:05	19:34	20:04	21:02	22:02	23:02
St Marys Interchange	ARR	18:37	19:12	19:40	20:10	21:08	22:08	23:08
St Marys Interchange	DEP	18:39	19:14	19:42	20:12	21:10	22:10	-
St Marys RSL Mamre Rd, St Marys		18:44	19:19	19:47	20:17	21:14	22:14	-
Solander Dr opp Cameo Cres, St Clair		18:48	19:23	19:50	20:20	21:17	22:17	-
Blackwell Public School Blackwell Av, St Clair	ARR	18:51	19:26	19:53	20:23	21:20	22:20	-
Blackwell Public School Blackwell Av, St Clair	DEP	18:51	19:26	19:53	20:23	21:20	22:20	-
St Clair Shopping Centre Bennett Rd, St Clair		18:56	19:31	19:57	20:27	21:24	22:24	-
Colorado Dr at Explorers Way, St Clair		18:59	19:34	20:00	20:30	21:27	22:27	-
Roper Rd opp Carlisle Ave, Colyton		19:02	19:37	20:03	20:33	21:30	22:30	-
Mount Druitt Station, Mount Druitt		19:11	19:46	20:12	20:42	21:39	22:39	-

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		05:43	06:43	07:40	08:40	09:33	10:33	11:33	12:33	13:33
Nepean Hospital Derby St, Kingswood		05:48	06:48	07:45	08:45	09:40	10:40	11:40	12:40	13:40
Second Ave at Morphett St, Kingswood		05:52	06:52	07:49	08:49	09:43	10:43	11:43	12:43	13:43
Great Western Hwy after Water St, Werrington		05:55	06:55	07:52	08:52	09:47	10:47	11:47	12:47	13:47
St Marys Interchange	ARR	06:02	07:02	07:59	08:59	09:55	10:55	11:55	12:55	13:55
St Marys Interchange	DEP	-	07:04	08:00	09:00	09:57	10:57	11:57	12:57	13:57
St Marys RSL Mamre Rd, St Marys		-	07:07	08:04	09:04	10:02	11:02	12:02	13:02	14:02
Solander Dr opp Cameo Cres, St Clair		-	07:10	08:07	09:07	10:06	11:06	12:06	13:06	14:06
Blackwell Public School Blackwell Av, St Clair	ARR	-	07:13	08:10	09:10	10:09	11:09	12:09	13:09	14:09
Blackwell Public School Blackwell Av, St Clair	DEP	-	07:13	08:10	09:10	10:09	11:09	12:09	13:09	14:09
St Clair Shopping Centre Bennett Rd, St Clair		-	07:16	08:16	09:16	10:15	11:15	12:15	13:15	14:15
Colorado Dr at Explorers Way, St Clair		-	07:20	08:20	09:20	10:19	11:19	12:19	13:19	14:19
Roper Rd opp Carlisle Ave, Colyton		-	07:23	08:23	09:23	10:22	11:22	12:22	13:22	14:22
Mount Druitt Station, Mount Druitt		-	07:32	08:32	09:32	10:32	11:32	12:32	13:32	14:32

776 Penrith to Mount Druitt via St Clair B

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		14:33	15:33	16:33	17:33	18:33	19:33	20:33	21:33	22:33
Nepean Hospital Derby St, Kingswood		14:40	15:40	16:40	17:40	18:38	19:38	20:38	21:38	22:38
Second Ave at Morphett St, Kingswood		14:43	15:43	16:43	17:43	18:41	19:41	20:41	21:40	22:40
Great Western Hwy after Water St, Werrington		14:47	15:47	16:47	17:47	18:45	19:45	20:45	21:44	22:44
St Marys Interchange	ARR	14:55	15:55	16:55	17:55	18:52	19:52	20:52	21:50	22:50
St Marys Interchange	DEP	14:57	15:57	16:57	17:57	18:53	19:53	20:53	21:51	22:51
St Marys RSL Mamre Rd, St Marys		15:02	16:02	17:02	18:02	18:58	19:58	20:58	21:55	22:55
Solander Dr opp Cameo Cres, St Clair		15:06	16:06	17:06	18:06	19:01	20:01	21:01	21:58	22:58
Blackwell Public School Blackwell Av, St Clair	ARR	15:09	16:09	17:09	18:09	19:04	20:04	21:04	22:01	23:01
Blackwell Public School Blackwell Av, St Clair	DEP	15:09	16:09	17:09	18:09	19:04	20:04	21:04	22:01	23:01
St Clair Shopping Centre Bennett Rd, St Clair		15:15	16:15	17:15	18:15	19:08	20:08	21:08	22:05	23:05
Colorado Dr at Explorers Way, St Clair		15:19	16:19	17:19	18:19	19:12	20:12	21:12	22:08	23:08
Roper Rd opp Carlisle Ave, Colyton		15:22	16:22	17:22	18:22	19:15	20:15	21:15	22:10	23:10
Mount Druitt Station, Mount Druitt		15:32	16:32	17:32	18:32	19:23	20:23	21:23	22:17	23:17

Saturday		♿
Penrith Station		23:33
Nepean Hospital Derby St, Kingswood		23:38
Second Ave at Morphett St, Kingswood		23:42
Great Western Hwy after Water St, Werrington		23:45
St Marys Interchange	ARR	23:52

Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Penrith Station		07:40	08:40	09:40	10:40	11:40	12:40	13:40	14:40	15:40
Nepean Hospital Derby St, Kingswood		07:47	08:47	09:47	10:47	11:47	12:47	13:47	14:47	15:47
Second Ave at Morphett St, Kingswood		07:50	08:50	09:50	10:50	11:50	12:50	13:50	14:50	15:50
Great Western Hwy after Water St, Werrington		07:54	08:54	09:54	10:54	11:54	12:54	13:54	14:54	15:54
St Marys Interchange	ARR	08:02	09:02	10:02	11:02	12:02	13:02	14:02	15:02	16:02
St Marys Interchange	DEP	-	09:04	10:04	11:04	12:04	13:04	14:04	15:04	16:04
St Marys RSL Mamre Rd, St Marys		-	09:09	10:09	11:09	12:09	13:09	14:09	15:09	16:09
Solander Dr opp Cameo Cres, St Clair		-	09:12	10:12	11:12	12:12	13:12	14:12	15:12	16:12
Blackwell Public School Blackwell Av, St Clair	ARR	-	09:15	10:15	11:15	12:15	13:15	14:15	15:15	16:15
Blackwell Public School Blackwell Av, St Clair	DEP	-	09:15	10:15	11:15	12:15	13:15	14:15	15:15	16:15
St Clair Shopping Centre Bennett Rd, St Clair		-	09:21	10:21	11:21	12:21	13:21	14:21	15:21	16:21
Colorado Dr at Explorers Way, St Clair		-	09:25	10:25	11:25	12:25	13:25	14:25	15:25	16:25
Roper Rd opp Carlisle Ave, Colyton		-	09:27	10:27	11:27	12:27	13:27	14:27	15:27	16:27
Mount Druitt Station, Mount Druitt		-	09:37	10:37	11:37	12:37	13:37	14:37	15:37	16:37

Sunday & Public Holidays		♿	♿	♿	♿	♿
Penrith Station		16:40	17:40	18:54	19:54	20:54
Nepean Hospital Derby St, Kingswood		16:47	17:47	19:01	19:59	20:59
Second Ave at Morphett St, Kingswood		16:50	17:50	19:04	20:02	21:02
Great Western Hwy after Water St, Werrington		16:54	17:54	19:08	20:06	21:06
St Marys Interchange	ARR	17:02	18:02	19:16	20:12	21:12
St Marys Interchange	DEP	17:04	18:04	19:18	20:14	21:14
St Marys RSL Mamre Rd, St Marys		17:09	18:08	19:22	20:18	21:18
Solander Dr opp Cameo Cres, St Clair		17:12	18:11	19:25	20:21	21:21
Blackwell Public School Blackwell Av, St Clair	ARR	17:15	18:14	19:28	20:24	21:24
Blackwell Public School Blackwell Av, St Clair	DEP	17:15	18:14	19:28	20:24	21:24
St Clair Shopping Centre Bennett Rd, St Clair		17:21	18:18	19:32	20:28	21:28
Colorado Dr at Explorers Way, St Clair		17:25	18:21	19:35	20:31	21:31
Roper Rd opp Carlisle Ave, Colyton		17:27	18:23	19:37	20:33	21:33
Mount Druitt Station, Mount Druitt		17:37	18:31	19:45	20:41	21:41

776 Mount Druitt to Penrith via St Clair

B

Monday to Friday		♿	♿	♿	♿	♿	♿	♿	♿	
Service Information								S		
Mount Druitt Station, Mount Druitt		-	05:16	05:57	06:24	06:46	07:13	07:50	08:10	08:38
Roper Rd after Carlisle Ave, Colyton		-	05:21	06:02	06:29	06:51	07:20	07:57	08:18	08:46
Colorado Dr after Explorers Way, St Clair (2759)		-	05:23	06:04	06:31	06:53	07:22	07:59	08:20	08:48
St Clair Shopping Centre Bennett Rd, St Clair		05:05	05:26	06:07	06:34	06:56	07:25	08:02	08:23	08:51
Blackwell PS, Blackwell Av, St Clair	ARR	05:08	05:31	06:12	06:39	07:01	07:30	08:07	08:27	08:55
Blackwell PS, Blackwell Av, St Clair	DEP	05:08	05:31	06:12	06:39	07:01	07:30	08:07	08:28	08:56
Solander Dr at Cameo Cres, St Clair		05:10	05:35	06:16	06:43	07:05	07:34	08:11	08:32	09:00
St Marys RSL Mamre Rd, St Marys		05:14	05:42	06:23	06:50	07:12	07:41	08:18	08:39	09:07
St Marys Interchange	ARR	05:21	05:49	06:30	06:57	07:19	07:50	08:27	08:50	09:18
St Marys Interchange	DEP	05:22	05:50	06:31	06:58	07:21	07:52	08:29	08:52	09:20
Great Western Hwy opp Water St, Claremont Meadows		05:26	05:54	06:35	07:03	07:26	07:57	08:34	08:57	09:25
Second Ave after O'Connell St, Kingswood		05:28	05:56	06:37	07:05	07:28	08:00	08:37	09:01	09:28
Nepean Hospital Derby St, Kingswood		05:32	06:00	06:41	07:10	07:33	08:05	C08:42	09:07	09:34
Doonmore St opp Penrith Public School, Penrith		--	--	--	--	--	--	08:46	--	--
Penrith Station		05:41	06:09	06:50	07:20	07:43	08:16	C08:55	09:20	09:46

Monday to Friday			♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		09:13	09:43	10:13	10:43	11:13	11:43	12:13	12:43	13:13
Roper Rd after Carlisle Ave, Colyton		09:20	09:50	10:20	10:50	11:20	11:50	12:20	12:50	13:20
Colorado Dr after Explorers Way, St Clair (2759)		09:22	09:52	10:22	10:52	11:22	11:52	12:22	12:52	13:22
St Clair Shopping Centre Bennett Rd, St Clair		09:26	09:56	10:26	10:56	11:26	11:56	12:26	12:56	13:26
Blackwell PS, Blackwell Av, St Clair	ARR	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30
Blackwell PS, Blackwell Av, St Clair	DEP	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30
Solander Dr at Cameo Cres, St Clair		09:34	10:04	10:34	11:04	11:34	12:04	12:34	13:04	13:34
St Marys RSL Mamre Rd, St Marys		09:40	10:10	10:40	11:10	11:40	12:10	12:40	13:10	13:40
St Marys Interchange	ARR	09:49	10:19	10:49	11:19	11:49	12:19	12:49	13:19	13:49
St Marys Interchange	DEP	09:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:51
Great Western Hwy opp Water St, Claremont Meadows		09:56	10:26	10:56	11:26	11:56	12:26	12:56	13:26	13:56
Second Ave after O'Connell St, Kingswood		09:59	10:29	10:59	11:29	11:59	12:29	12:59	13:29	13:59
Nepean Hospital Derby St, Kingswood		10:05	10:35	11:05	11:35	12:05	12:35	13:05	13:35	14:05
Penrith Station		10:17	10:47	11:17	11:47	12:17	12:47	13:17	13:47	14:17

Monday to Friday		♿	♿		♿		♿		♿	♿
Service Information					S					
Mount Druitt Station, Mount Druitt		13:43	14:13	14:38	A15:10	15:55	16:18	16:44	17:18	17:48
Roper Rd after Carlisle Ave, Colyton		13:50	14:20	14:45	A15:21	16:04	16:27	16:53	17:24	17:54
Colorado Dr after Explorers Way, St Clair (2759)		13:52	14:22	14:47	T15:23	16:06	16:29	16:55	17:26	17:56
St Clair Shopping Centre Bennett Rd, St Clair		13:56	14:26	14:51	U15:27	16:10	16:33	16:59	17:29	17:59
Holy Spirit Parish School Moore St, St Clair		--	--	--	L15:30	--	--	--	--	--
Blackwell PS, Blackwell Av, St Clair	ARR	14:00	14:30	14:57	T15:35	16:15	16:38	17:04	17:34	18:04
Blackwell PS, Blackwell Av, St Clair	DEP	14:00	14:30	14:57	T15:36	16:15	16:38	17:04	17:34	18:04
Solander Dr at Cameo Cres, St Clair		14:04	14:34	15:01	15:40	16:18	16:41	17:07	17:37	18:07
St Marys RSL Mamre Rd, St Marys		14:10	14:40	15:07	15:46	16:24	16:47	17:13	17:42	18:12
St Marys Interchange	ARR	14:19	14:49	15:17	15:56	16:33	16:56	17:22	17:51	18:21
St Marys Interchange	DEP	14:21	14:52	15:19	15:58	16:35	16:58	17:24	17:53	18:23
Great Western Hwy opp Water St, Claremont Meadows		14:26	14:57	15:26	16:05	16:41	17:04	17:30	17:58	18:28
Second Ave after O'Connell St, Kingswood		14:29	15:00	15:29	16:08	16:44	17:07	17:33	18:00	18:30
Nepean Hospital Derby St, Kingswood		14:35	15:06	15:36	16:14	16:49	17:12	17:38	18:05	18:35
Penrith Station		14:47	15:17	15:47	16:25	17:00	17:23	17:49	18:15	18:45

Monday to Friday			♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		18:18	18:48	19:10	19:40	20:19	20:57	21:57
Roper Rd after Carlisle Ave, Colyton		18:24	18:54	19:16	19:45	20:24	21:02	22:02
Colorado Dr after Explorers Way, St Clair (2759)		18:26	18:56	19:18	19:47	20:26	21:04	22:04
St Clair Shopping Centre Bennett Rd, St Clair		18:29	18:59	19:21	19:50	20:29	21:07	22:07
Blackwell PS, Blackwell Av, St Clair	ARR	18:34	19:04	19:26	19:54	20:33	21:11	22:11
Blackwell PS, Blackwell Av, St Clair	DEP	18:34	19:04	19:26	19:54	20:33	21:11	22:11
Solander Dr at Cameo Cres, St Clair		18:37	19:07	19:29	19:57	20:36	21:14	22:14
St Marys RSL Mamre Rd, St Marys		18:42	19:12	19:34	20:02	20:41	21:19	22:19
St Marys Interchange	ARR	18:51	19:21	19:43	20:11	20:50	21:28	22:28
St Marys Interchange	DEP	18:53	19:23	-	20:12	20:51	21:29	22:29
Great Western Hwy opp Water St, Claremont Meadows		18:58	19:28	-	20:15	20:54	21:32	22:32
Second Ave after O'Connell St, Kingswood		19:00	19:30	-	20:17	20:56	21:34	22:34
Nepean Hospital Derby St, Kingswood		19:05	19:35	-	20:21	21:00	21:38	22:38
Penrith Station		19:15	19:45	-	20:30	21:09	21:47	22:47

Saturday		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		07:49	08:36	09:36	10:36	11:36	12:36	13:36	14:36	15:36
Roper Rd after Carlisle Ave, Colyton		07:52	08:41	09:41	10:41	11:41	12:41	13:41	14:41	15:41
Colorado Dr after Explorers Way, St Clair (2759)		07:54	08:43	09:43	10:43	11:43	12:43	13:43	14:43	15:43
St Clair Shopping Centre Bennett Rd, St Clair		07:58	08:46	09:46	10:46	11:46	12:46	13:46	14:46	15:46
Blackwell PS, Blackwell Av, St Clair	ARR	08:02	08:50	09:50	10:50	11:50	12:50	13:50	14:50	15:50
Blackwell PS, Blackwell Av, St Clair	DEP	08:02	08:50	09:50	10:50	11:50	12:50	13:50	14:50	15:50
Solander Dr at Cameo Cres, St Clair		08:05	08:54	09:54	10:54	11:54	12:54	13:54	14:54	15:54
St Marys RSL Mamre Rd, St Marys		08:10	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
St Marys Interchange	ARR	08:17	09:10	10:10	11:10	12:10	13:10	14:10	15:10	16:10
St Marys Interchange	DEP	08:18	09:12	10:12	11:12	12:12	13:12	14:12	15:12	16:12
Great Western Hwy opp Water St, Claremont Meadows		08:22	09:18	10:18	11:18	12:18	13:18	14:18	15:18	16:18
Second Ave after O'Connell St, Kingswood		08:24	09:21	10:21	11:21	12:21	13:21	14:21	15:21	16:21
Nepean Hospital Derby St, Kingswood		08:28	09:26	10:26	11:26	12:26	13:26	14:26	15:26	16:26
Penrith Station		08:38	09:38	10:38	11:38	12:38	13:38	14:38	15:38	16:38

776 Mount Druitt to Penrith via St Clair B

Saturday		♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		16:36	17:36	18:29	19:29	20:29	21:27	22:27
Roper Rd after Carlisle Ave, Colyton		16:41	17:41	18:33	19:33	20:33	21:31	22:31
Colorado Dr after Explorers Way, St Clair (2759)		16:43	17:43	18:35	19:35	20:35	21:33	22:33
St Clair Shopping Centre Bennett Rd, St Clair		16:46	17:46	18:38	19:38	20:38	21:36	22:36
Blackwell PS, Blackwell Av, St Clair	ARR	16:50	17:50	18:42	19:42	20:42	21:40	22:40
Blackwell PS, Blackwell Av, St Clair	DEP	16:50	17:50	18:42	19:42	20:42	21:40	22:40
Solander Dr at Cameo Cres, St Clair		16:54	17:54	18:45	19:45	20:45	21:43	22:43
St Marys RSL Mamre Rd, St Marys		17:00	18:00	18:50	19:50	20:50	21:47	22:47
St Marys Interchange	ARR	17:10	18:10	18:58	19:58	20:58	21:54	22:53
St Marys Interchange	DEP	17:12	18:12	18:59	19:59	20:59	21:55	22:54
Great Western Hwy opp Water St, Claremont Meadows		17:18	18:18	19:04	20:04	21:04	21:58	22:57
Second Ave after O'Connell St, Kingswood		17:21	18:21	19:07	20:07	21:07	22:00	22:59
Nepean Hospital Derby St, Kingswood		17:26	18:26	19:12	20:12	21:12	22:05	23:04
Penrith Station		17:38	18:38	19:21	20:21	21:21	22:13	23:12

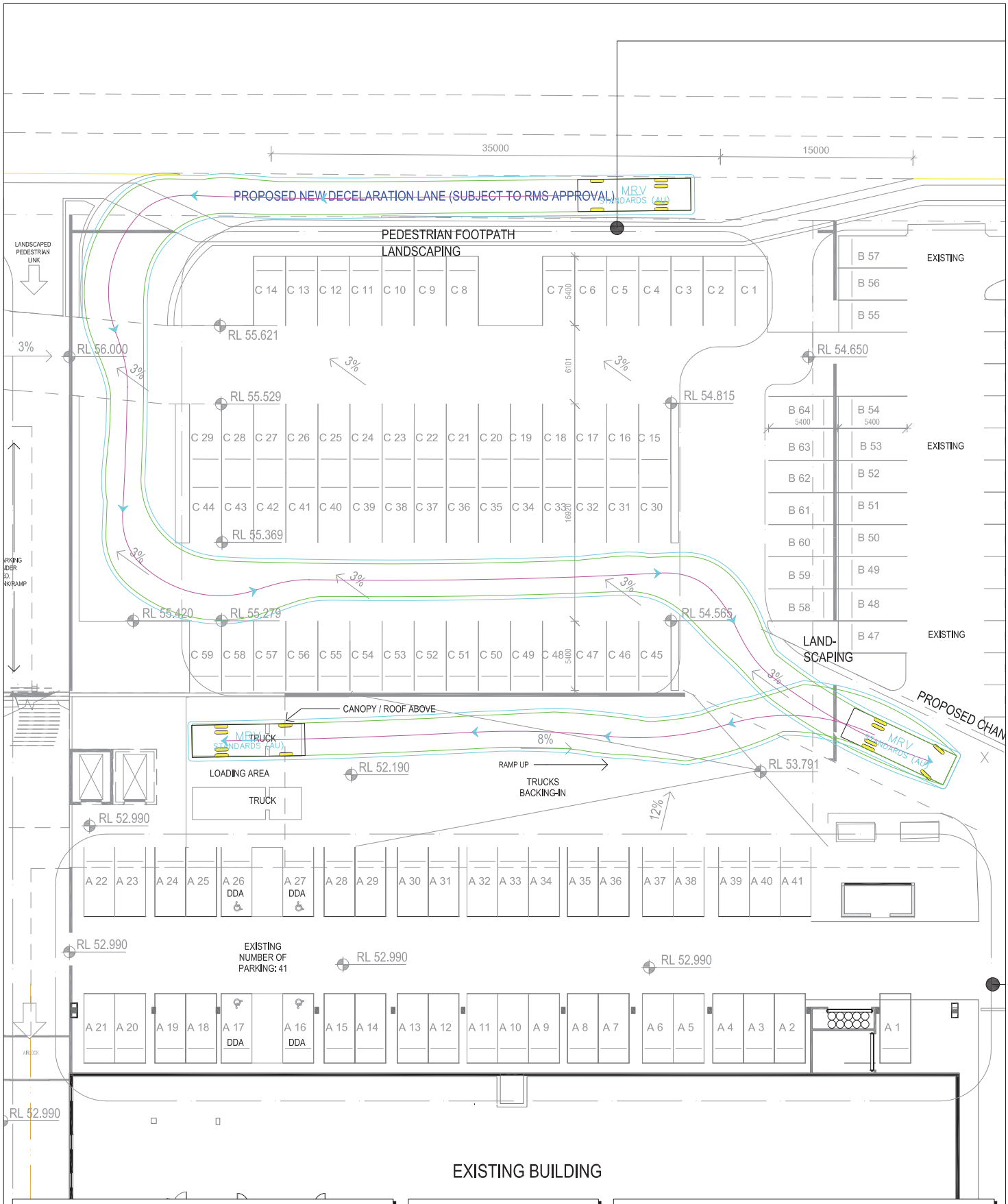
Sunday & Public Holidays		♿	♿	♿	♿	♿	♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		08:45	09:45	10:45	11:45	12:45	13:45	14:45	15:45	16:45
Roper Rd after Carlisle Ave, Colyton		08:50	09:50	10:50	11:50	12:50	13:50	14:50	15:50	16:50
Colorado Dr after Explorers Way, St Clair (2759)		08:52	09:52	10:52	11:52	12:52	13:52	14:52	15:52	16:52
St Clair Shopping Centre Bennett Rd, St Clair		08:56	09:56	10:56	11:56	12:56	13:56	14:56	15:56	16:56
Blackwell PS, Blackwell Av, St Clair	ARR	09:01	10:01	11:01	12:01	13:01	14:01	15:01	16:01	17:01
Blackwell PS, Blackwell Av, St Clair	DEP	09:01	10:01	11:01	12:01	13:01	14:01	15:01	16:01	17:01
Solander Dr at Cameo Cres, St Clair		09:04	10:04	11:04	12:04	13:04	14:04	15:04	16:04	17:04
St Marys RSL Mamre Rd, St Marys		09:09	10:09	11:09	12:09	13:09	14:09	15:09	16:09	17:09
St Marys Interchange	ARR	09:17	10:17	11:17	12:17	13:17	14:17	15:17	16:17	17:17
St Marys Interchange	DEP	09:19	10:19	11:19	12:19	13:19	14:19	15:19	16:19	17:19
Great Western Hwy opp Water St, Claremont Meadows		09:24	10:24	11:24	12:24	13:24	14:24	15:24	16:24	17:24
Second Ave after O'Connell St, Kingswood		09:27	10:27	11:27	12:27	13:27	14:27	15:27	16:27	17:27
Nepean Hospital Derby St, Kingswood		09:32	10:32	11:32	12:32	13:32	14:32	15:32	16:32	17:32
Penrith Station		09:44	10:44	11:44	12:44	13:44	14:44	15:44	16:44	17:44

Sunday & Public Holidays		♿	♿	♿	♿
Mount Druitt Station, Mount Druitt		17:45	18:48	19:48	20:48
Roper Rd after Carlisle Ave, Colyton		17:50	18:53	19:53	20:53
Colorado Dr after Explorers Way, St Clair (2759)		17:52	18:55	19:55	20:55
St Clair Shopping Centre Bennett Rd, St Clair		17:55	18:58	19:58	20:58
Blackwell PS, Blackwell Av, St Clair	ARR	17:59	19:02	20:02	21:02
Blackwell PS, Blackwell Av, St Clair	DEP	17:59	19:02	20:02	21:02
Solander Dr at Cameo Cres, St Clair		18:02	19:05	20:05	21:05
St Marys RSL Mamre Rd, St Marys		18:06	19:09	20:09	21:09
St Marys Interchange	ARR	18:13	19:16	20:16	21:16
St Marys Interchange	DEP	18:15	19:18	20:18	21:18
Great Western Hwy opp Water St, Claremont Meadows		18:19	19:22	20:22	21:22
Second Ave after O'Connell St, Kingswood		18:21	19:24	20:24	21:24
Nepean Hospital Derby St, Kingswood		18:26	19:29	20:29	21:29
Penrith Station		18:35	19:38	20:38	21:38

Appendix F

Turning Path Assessment

ttpa



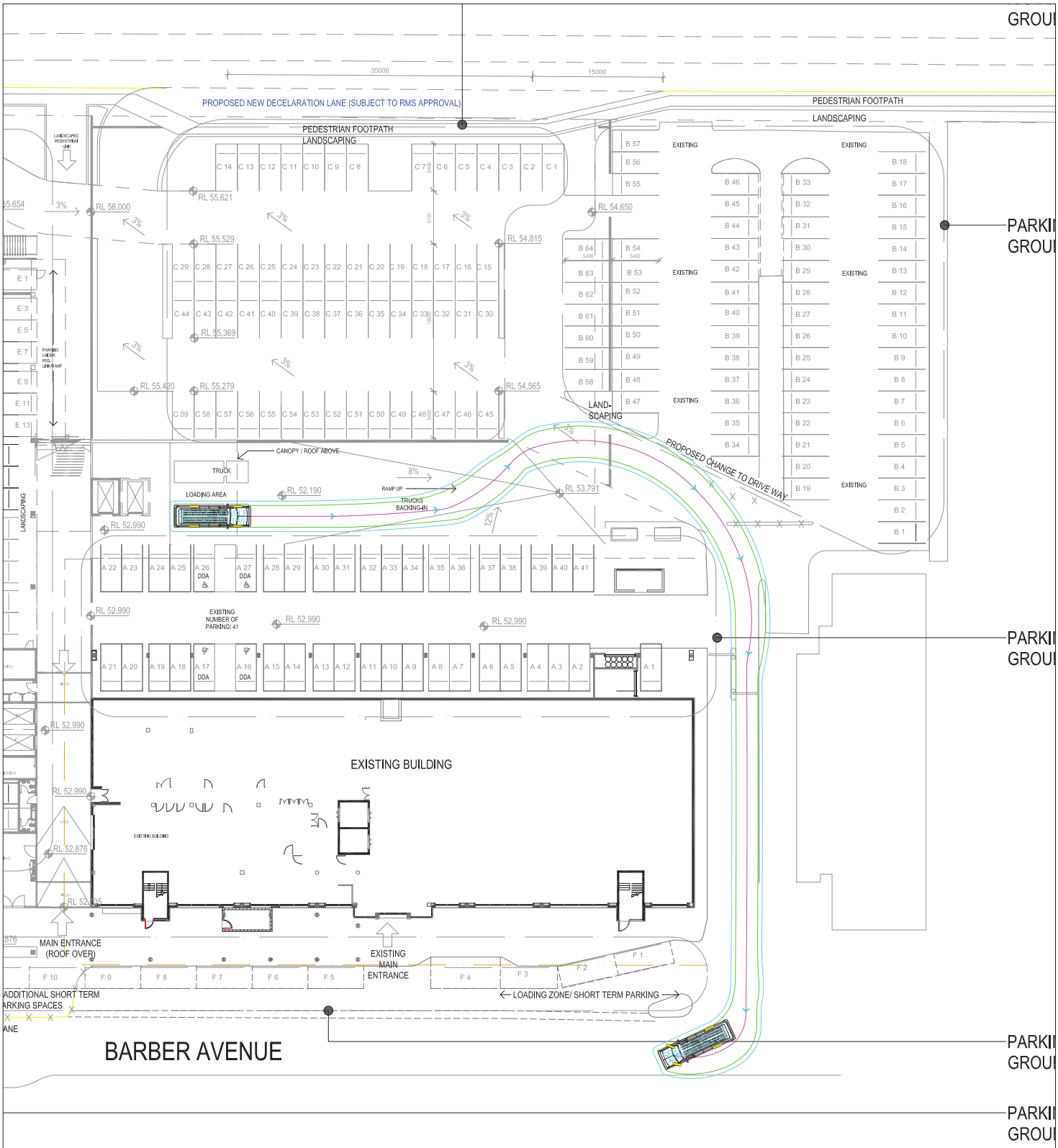
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTURN PRO10 in conjunction with AutoCAD 2018. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF AN 8.8M MEDIUM RIGID VEHICLE ENTERING FROM THE GREAT WESTERN HIGHWAY

SP 1



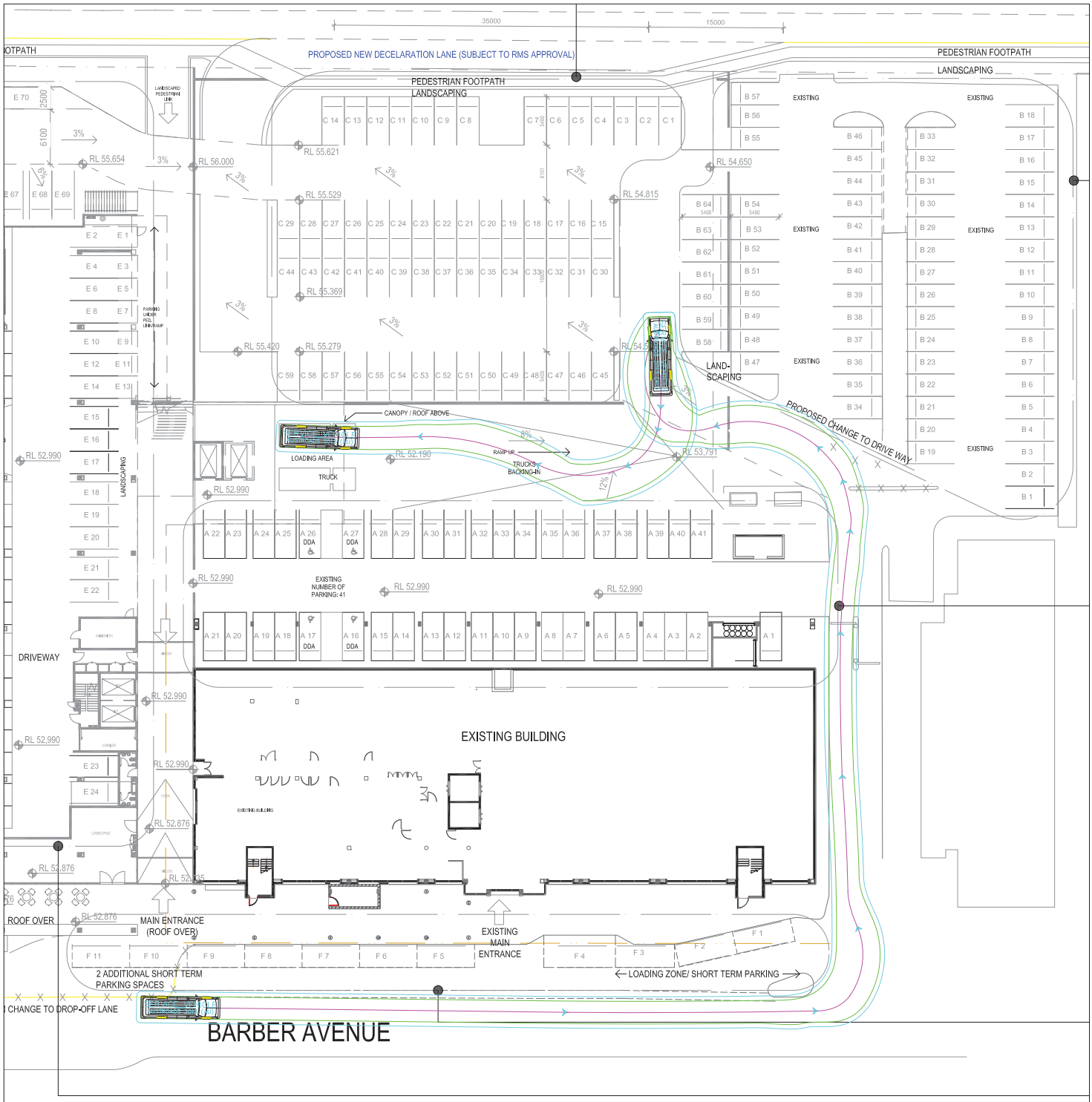
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTURN PRO10 in conjunction with AutoCAD 2018. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF AN 8.8M MEDIUM RIGID VEHICLE EXITING ONTO BARBER AVENUE

SP 2



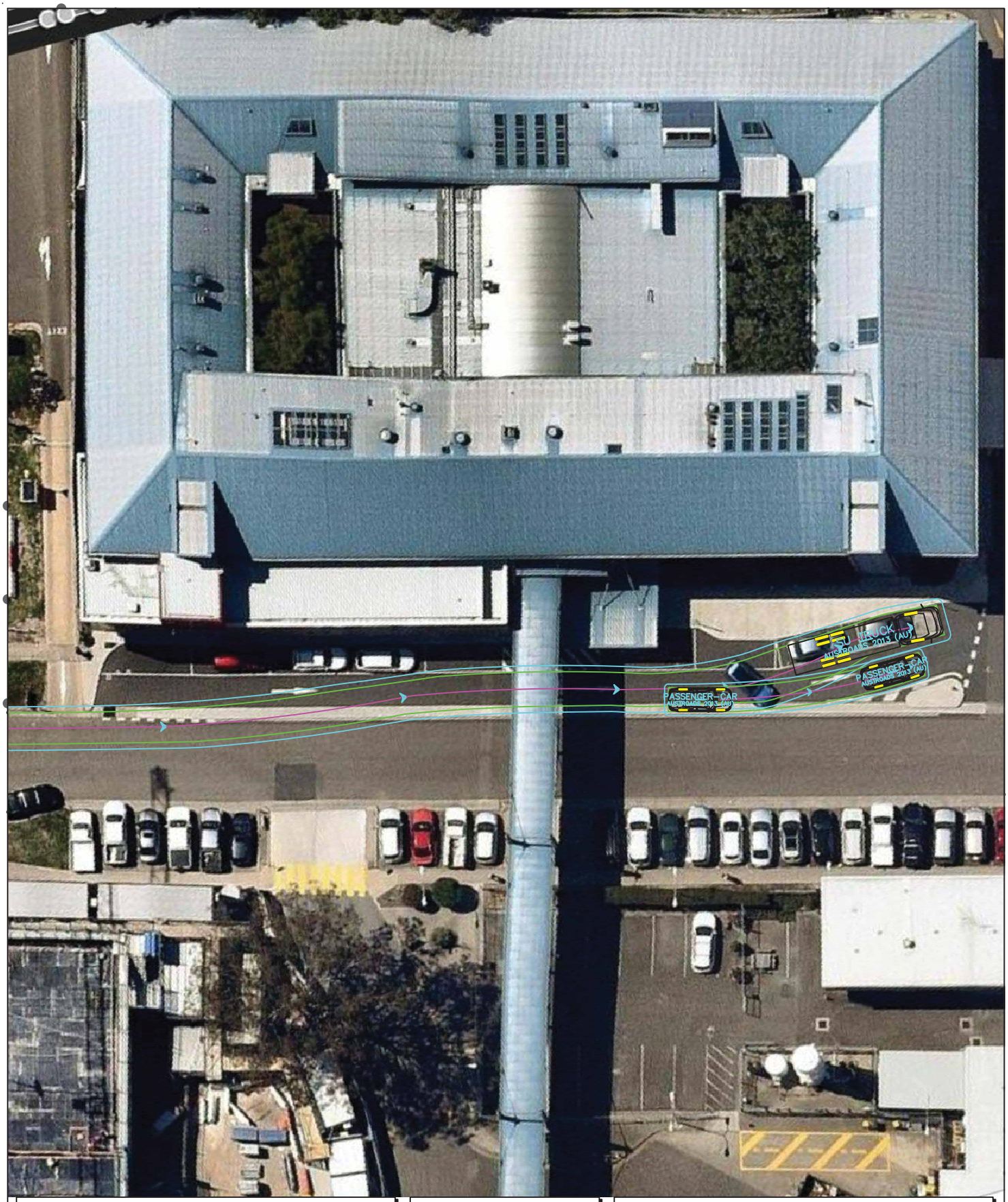
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTURN PRO10 in conjunction with AutoCAD 2018. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF AN 8.8M MEDIUM RIGID VEHICLE ENTERING FROM BARBER AVENUE

SP 3



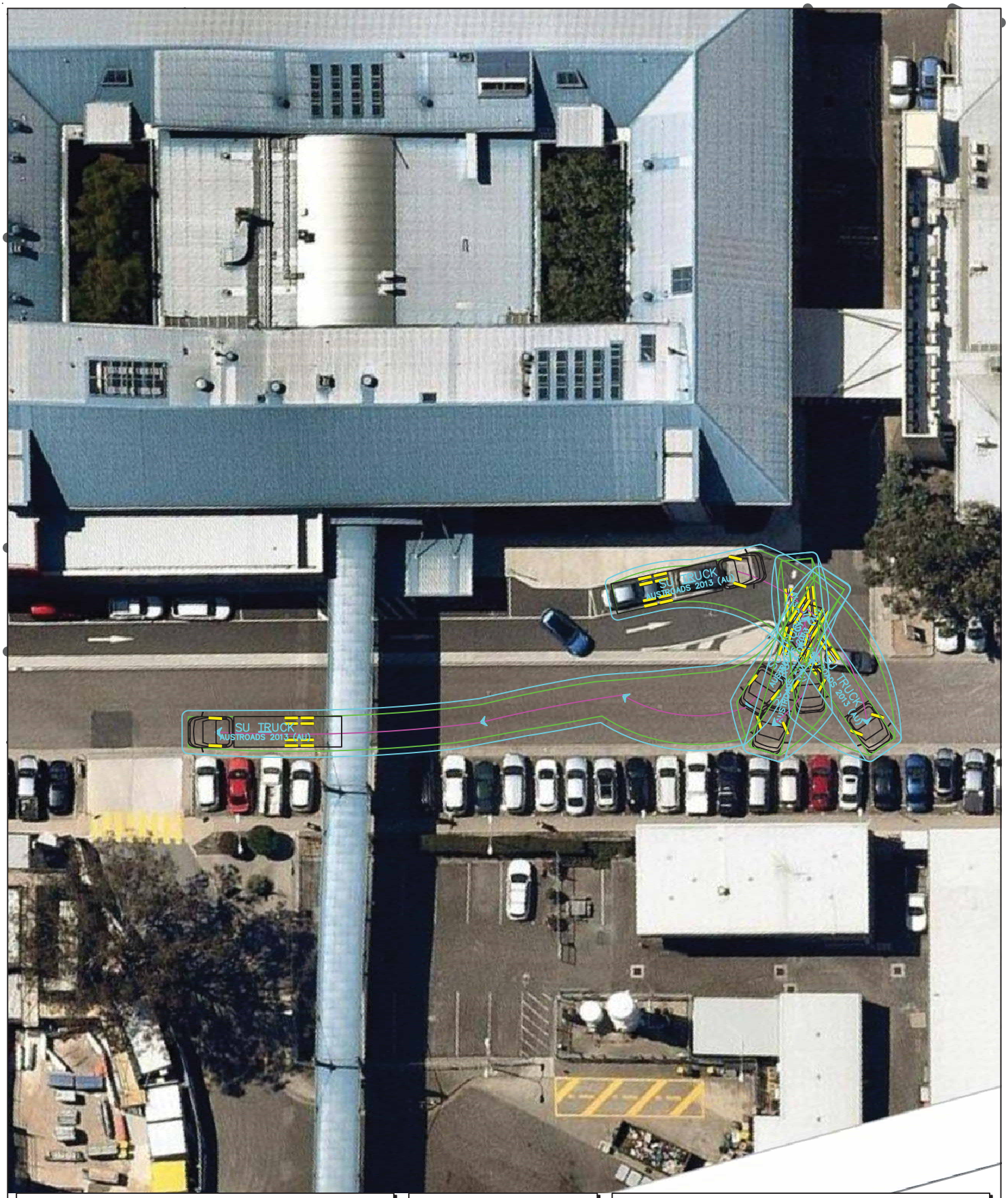
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTURN PRO10 in conjunction with AutoCAD 2018. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF AN 12.5M HEAVY RIGID VEHICLE ENTERING FROM BARBER AVENUE

SP 4



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTURN PRO10 in conjunction with AutoCAD 2018. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF AN 12.5M HEAVY RIGID VEHICLE EXITING ONTO BARBER AVENUE

SP 5

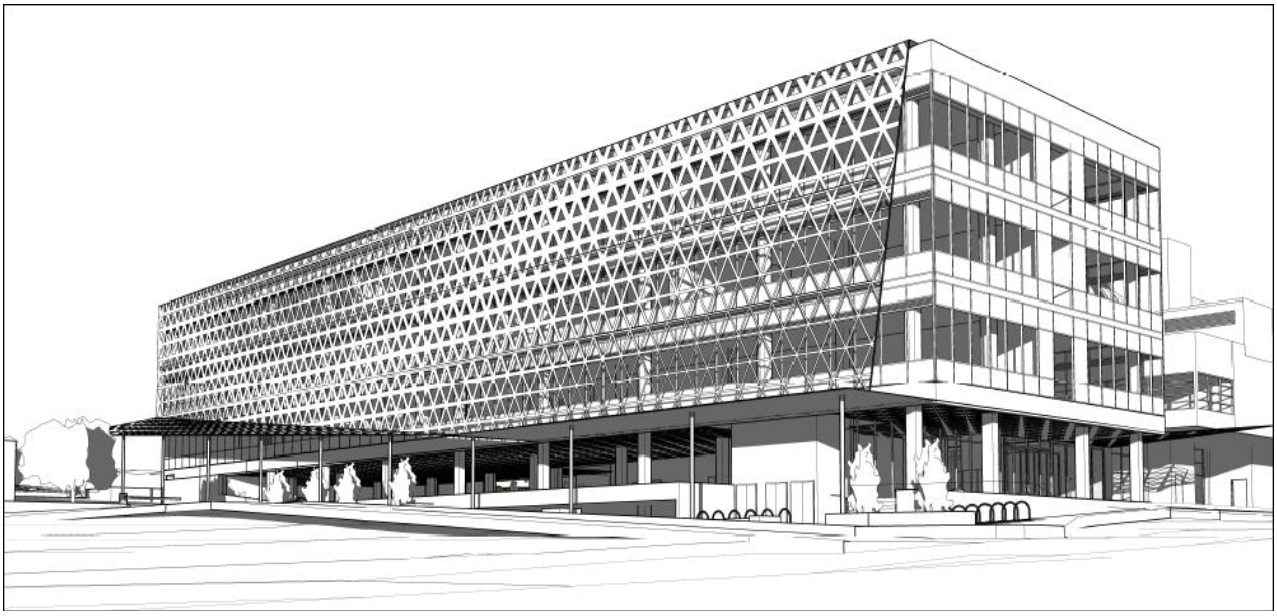
Appendix C.

Altus Group – Capital Investment Report (CIV) – dated 28th November 2018

Altus Group

Capital Investment Value (CIV)

Nepean Private Hospital
Healthscope Operations



PROJECT NO.:	71130.103049
PREPARED BY:	KF
DOCUMENT TITLE:	Capital Investment Report (CIV)
ISSUE DATE:	28th November 2018

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Quality Information

Document: Nepean Private Hospital-AG-CIV-v0

Project No.: 71130.103049

Revision: 0

Prepared By: Kevin Fagan

Reviewed By: Alan Fox

Issue Register

Version	Issue Date	Details	Authorised	
			Name (Position)	Signature
0	27/11/2018	Capital Investment Report	Alan Fox [Associate]	

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1. EXECUTIVE SUMMARY

Altus Group (AG) has been engaged by Healthscope Operations Pty Ltd to prepare a Capital Investment Value (CIV) report for the Nepean Private Hospital expansion Stage 1.

This report represents the costs associated with the new hospital building and external carparking. This CIV report is based off the estimate prepared by HPAC, as instructed by JohnStaff. HPAC have been engaged as an ECI process, and have provided a detailed estimate.

2. CAPITAL INVESTMENT VALUE

Capital Investment Value (CIV) is defined by the Environmental Planning and Assessment Regulation 2000 – Rev 3, as required by the State Environmental Planning Policy Amendment (Capital Investment Value) 2010 to be:

"Capital Investment Value of a development or project includes all costs necessary to establish and operate the project, including the design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment, other than the following costs:

a) amounts payable, or the cost of land dedicated or any other benefit provided, under a condition imposed under Division 6 or 6A of Part 4 of the Act or a planning agreement under that Division,

b) costs relating to any part of the development or project that is the subject of a separate development consent or project approval,

c) land costs (including any costs of marketing and selling land),

d) GST (within the meaning of A New Tax System (Goods and Services Tax) Act 1999 of the Commonwealth)."

3. CALCULATION OF CIV

The CIV has been prepared utilising the values represented in the

Cost Plan prepared by HPAC. The Capital Investment Value is estimated at $29,913,184 broken down as follows:

DESCRIPTION	COST
Gross Construction Costs	$25,084,387
Consultant / Design Fees	$1,900,000
Statutory Fees	Excluded
Development Management Fees	Excluded
Transition / Commissioning	Excluded
Furniture, Fittings and equipment / ICT	$1,800,000
Land Acquisition/ Property settlements / Temporary Leasing	Excluded
External Funding Contribution	Excluded
Escalation	$1,128,797
Contingencies	Excluded
TOTAL ESTIMATED CIV EXCLUDING GST	**$29,913,184**

Refer to Appendix A for Break-down of Estimate

4. BASIS OF ESTIMATE

4.1 Scope of Project

- Nepean Private Hospital works comprising:
    - New Hospital Building consisting of GF and three upper floors, incorporating Undercroft carparking, Main Entry, IVF services, Endoscopy services, Recovery bays/lounge, Scrub bays, Change facilities. External Carping including earthworks, pavement works, kerbs & gutter and pathways.
    - Perforated aluminium façade to x1 side
    - Bulk excavation
    - Site preparation works including piling and retaining walls
    - Building services infrastructure and connections to utilities.
    - Site landscaping.

4.2 Drawings & Information Used

Design documentation prepared by SKAr Architects and consultant reports issued October 2018. HPAC estimate received November 2018.

4.3 Area Measurement

Building

Area Measurement is taken off drawings provided by SKAr on October 2018.

4.4 Fees

4.4.1 Consultant Fees

- Based on JohnStaff advice.

4.5 Qualifications

4.5.1 Specific Inclusions / Assumptions

We note that this Cost Plan provided by HPAC is limited by the level of documentation and project information available to date. AG would assume that HPAC has made appropriate allowances and benchmarked against similar projects complemented by assumptions that account for areas of undefined scope.

4.5.2 Specific Exclusions

1. GST
2. Statutory Fees
3. Finance Costs
4. Contingencies
5. Development Management Fees
6. Transitioning and Commissioning Fees
7. Land Acquisition costs
8. Latent site conditions
9. Removal of inground hazardous / contaminated materials [Scope TBC]
10. Diversions of major services infrastructure other than those identified by engineers to date
11. Works outside the site boundary

5. REPORT PARAMETERS

Please note this report is provided for the purposes of the named party only and must not be used by any third party for any other purpose whatsoever without the prior written consent of Altus Group. This report has been prepared from the HPAC estimate and the documentation and/or information provided to Altus Group by third parties in circumstances where Altus Group

a) Has not performed our own independent investigations in order to ascertain the veracity and/or accuracy of the documentation and/or information so provided; and
b) Do not, in any way, warrant the veracity and/or accuracy of the said documentation and/or information; and
c) Do not, in any way, adopt the said documentation and information as our own.

Altus Group note this report is an expression of opinion based upon the documentation and/or information provided by third parties and Altus Group expressly disclaims any liability to the named party and any third parties where the documentation and/or information is found to be untrue and/or inaccurate in any way.

Please note the following Project Contacts:

Client:	Healthscope Operations
Project Manager:	JOHNSTAFF
Cost Manager:	Altus Group
Architect:	Stanton Kroenert (SKAr)
Electrical Engineer:	Northrop
Mechanical Engineer:	Northrop
Hydraulic & Fire Engineer:	Northrop
Structural & Civil Engineer:	Northrop

APPENDICES

Appendix A – CIV

NPH - Budget Summary

Job Name : NEPEAN **Job Description**
Client's Name:

Trd No.	Trade Description	Trade %	Cost/m2	Sub Total	Mark Up %	Trade Total
	SUBSTRUCTURE	3.88		973,540		973,540
	COLUMNS	1.67		417,766		417,766
	UPPER FLOORS	13.31		3,339,705		3,339,705
	STAIRCASES	0.50		125,200		125,200
	ROOF (INCLUDING ROOF PLUMBING)	4.66		1,170,007		1,170,007
	FACADE (INCLUDING EXTERNAL DOORS)	17.50		4,389,397		4,389,397
	INTERNAL WALLS & SCREENS	5.85		1,467,673		1,467,673
	INTERNAL DOORS & HARDWARE	1.13		283,690		283,690
	WALL FINISHES	0.65		162,345		162,345
	FLOOR FINISHES	1.00		251,890		251,890
	CEILING FINISHES	1.45		364,700		364,700
	FITMENTS	0.52		130,801		130,801
	HYDRAULIC SERVICES	3.34		837,042		837,042
	FIRE SERVICES	2.67		669,785		669,785
	MECHANICAL SERVICES	5.61		1,407,600		1,407,600
	ELECTRICAL SERVICES	8.78		2,203,066		2,203,066
	TRANSPORTATION	2.23		560,000		560,000
	Subtotal					*18,754,207*
	DEMOLITION/SITE PREPARATION	5.55		1,391,110		1,391,110
	EXTERNAL WORKS	4.08		1,022,972		1,022,972
	INFRASTRUCTURE SERVICES	0.69		174,095		174,095
	LANDSCAPING AND IMPROVEMENTS	0.61		152,850		152,850
	Subtotal					*2,741,027*
	PRELIMINARIES	10.46		2,624,368		2,624,368
	MARGIN	3.85		964,784		964,785
	STAGING					
	Subtotal					*3,589,153*
	TOTAL					*25,084,387*
		100.00		**25,084,386**		**25,084,387**

Final Total : $ 25,084,387

Appendix D.

Northrop Pty Ltd – Acoustic Assessment Report - dated 19th November 2018

Acoustic Report for Development Application

Nepean Private Hospital Expansion Stage 1

1-9 Barber Avenue, Kingswood NSW 2747

REPORT

PREPARED FOR
Johnstaff Projects Pty Ltd
Level 5
9 Castlereagh Street
Sydney NSW 2000

Tel: 02 8256 0500

PREPARED BY
Northrop Consulting Engineers
Level 11, 345 George Street
Sydney NSW 2000

Tel: 02 9241 4188

Ref: SY182350-AUR01
Rev: C
Date: 19/11/2018

ACOUSTIC REPORT FOR DEVELOPMENT APPLICATION

Activity Schedule

Date	Revision	Issue	Prepared By	Approved By
12/11/2018	A	Preliminary	I. Adlington	D. Luck
14/11/2018	B	Final	I. Adlington	D. Luck
19/11/2018	C	Final	I. Adlington	D. Luck

Northrop Consulting Engineers Pty Ltd

ACN 064 775 088 | ABN 81 094 433 100

Level 11, 345 George Street, Sydney NSW 2000

02 9241 4188 | sydney@northrop.com.au | www.northrop.com.au

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1 EXECUTIVE SUMMARY

Northrop Consulting Engineers Pty Ltd (Northrop) Acoustics have been engaged by Johnstaff Projects Pty Ltd to provide an acoustic report for development application for Nepean Private Hospital Expansion Stage 1 to be located at 1-9 Barber Avenue, Kingswood NSW 2747.

This assessment discusses the potential noise impact from the development on the nearest affected receivers. This report provides a statement of compliance with the relevant statutory criteria for the proposed development within the vicinity of the nearest potentially affected receivers and recommendations for noise mitigation measures for the proposed development for compliance with the relevant criteria.

This assessment has been prepared using acoustic data collected on site using long term noise loggers and a hand-held sound level meter for spectral analysis.

2 REFERENCED DOCUMENTS

This assessment has been prepared considering the following documentation:

Table 1: *Referenced documents – project documents*

Document title	Document #	Type	Revision	Date	Issued by
Architectural Design Pack	AR_18-008	Arch. drawings	–	06/11/2018	SKAr Architects
Traffic report	18219	Traffic report	DRAFT	12/11/2018	TTPA

Table 2: *Referenced documents – consent authority and other references*

Document title	Abbreviation	Year	Issued by
Penrith City Council Development Control Plan	DCP	2014	Penrith City Council
Penrith Local Environment Plan Land Zoning Map – Sheet LZN_013	LEP	2010	Penrith City Council
NSW Noise Policy for Industry	NPI	2017	NSW Environmental Protection Authority
State Environmental Planning Policy (Infrastructure)	SEPP	2007	NSW Department of Planning
NSW Interim Construction Noise Guideline	ICNG	2009	NSW Department of Environment, Climate Change and Water
NSW Road Noise Policy	RNP	2011	NSW Department of Environment, Climate Change and Water
Guide to Noise and vibration control on construction demolition sites	AS 2436:2010	2010	Standards Australia
Vibration and shock – Guide to the evaluation of human exposure to whole body vibration	AS 2670:2001	2001	Standards Australia
Update of Noise Data Base for the Prediction of Noise on Construction Sites	–	2005	UK Department for Environment Food and Rural Affairs

3 SITE DESCRIPTION

The proposed site, shown outlined in red in Figure 1, is located at 1-9 Barber Avenue, Kingswood NSW 2747. The nearest affected residential receivers are 120 High Street, 79 Parker Street, 15 Barber Avenue and the wards at Nepean Public and Private Hospitals, shown outlined in yellow in Figure 1. Figure 1 also shows the locations of the long-term noise monitor, and the locations of the operator attended measurements.

The Site is zoned B4 – mixed use and is surrounded by SP2 – Infrastructure and R4 High Density Residential zoned land. (Penrith City Council Local Environmental Plan 2010 Land Zoning Map – Sheet LZN_013). The residential receiver category would be classified as "urban" with reference to Table 2.3 in the Noise Policy for Industry (2017) based on the Land Zoning and measured noise levels.

Figure 1: *Aerial view of site with measurement locations.*

4 ENVIRONMENTAL NOISE CRITERIA

4.1 Penrith City Council Development Control Plan (2014)

The following are excerpts from Penrith City Council Development Control Plan (2014) Section C12: Noise and Vibration:

Section C12: Noise and Vibration

The objective of this section is to ensure that future development that generates noise or vibration does not adversely affect the amenity of surrounding land uses.

12.1. Road Traffic Noise

C. Controls

1) Road traffic noise criteria including sensitive land uses

a) Council will not grant consent to development, particularly residential development, including subdivisions, unless the impact of traffic noise from freeway, arterial, designated or collector roads complies with the standards and guidelines for road traffic noise prepared by the relevant State Government authorities or agencies, as well as relevant Australian Standards.

b) Council will not grant consent to development for sensitive land uses unless it complies with the provisions and standards for road traffic noise prepared by the relevant State Government authorities or agencies, as well as relevant Australian Standards.

c) Sensitive land uses subject to road traffic noise criteria referred to in b) above include educational establishments (including schools), places of public worship, hospitals, and passive and active recreation areas.

Noise Impact Statements - Specific Requirements

a) Where a site is likely to be affected by unacceptable levels of road traffic noise, the applicant is required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in the DA Submission Requirements Appendix of this DCP.

b) The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with EPA and Department of Planning Criteria, as well as relevant Australian Standards.

12.2. Rail Traffic Noise and Vibration

C. Controls

1) Rail noise and vibration

a) The siting and design of developments on land sited on, or within, 80m of an operating rail corridor or land reserved for the construction of a railway line is to address the matters raised in the Development Near Rail Corridors and Busy Roads – Interim Guideline (Department of Planning, 2008) and, where appropriate, incorporate any recommendations into the design of the development.

b) Council will not grant consent to residential development, residential subdivision or other sensitive land uses on land in the vicinity of a rail corridor unless it complies with the relevant standards and criteria set by the EPA and Department of Planning, as well as any relevant Australian Standards.

c) Council will not grant consent to any development which potentially has sensitive occupancies (such as residential, office or laboratory premises) and is proposed to be constructed within 20m of the rail line unless an

assessment of the vibration impacts from the rail line has been carried out. This is to be undertaken by a recognised acoustic consultant to demonstrate that the impact of vibration from the rail corridor will not significantly impact upon the future occupants of the development.

d) Sensitive land uses subject to rail noise and vibration criteria referred to in (b) above include educational establishments (including schools), places of public worship, hospitals, nursing homes, mixed use development, offices/workplaces, and passive and active recreation areas.

Noise Impact Statements - specific requirements

a) Where a site is likely to be affected by unacceptable levels of rail noise or vibration, the applicant is required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in Appendix F3 – Submission Requirements of this DCP.

b) The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with EPA and Department of Planning criteria, as well as relevant Australian Standards and Clause 87 – Impact of Rail Noise or Vibration on Non-Rail Development of SEPP (Infrastructure) 2007.

4.2 NSW EPA Noise Policy for Industry (2017)

The NSW Environment Protection Authority (EPA) Noise Policy for Industry (2017) sets out noise criteria to control the noise emission from industrial noise sources. Mechanical, building services and operational noise from the development shall be addressed following the guideline in the NSW EPA Noise Policy for Industry.

The determination of the criteria is based on the results of the ambient and background noise unattended monitoring, addressing two components:

- Controlling intrusive noise into nearby residences (Intrusiveness Criteria)
- Maintaining noise level amenity for particular land uses (Amenity Criteria)

Once both criteria are established the most stringent for each considered assessment period (day, evening, night) is adopted as the Project Noise Trigger Level (PNTL). The project noise trigger level becomes the benchmark for assessing the noise impact from the proposed site upon the surrounding noise-sensitive receivers for the external noise emissions from the development. The assessment periods are:

- Day: 7am – 6pm Monday – Saturday, 8am – 6pm Sunday
- Evening: 6pm – 10pm Monday – Sunday
- Night: 10pm – 7am Monday – Saturday, 10pm – 8am Sunday

The applicable parts of Table 2.2: Amenity noise levels from the Noise Policy for Industry which are relevant to the project are reproduced in Table 3 below:

Table 3: *Amenity criteria for external noise levels.*

Receiver	Noise amenity area	Time of Day	Recommended Amenity Noise Level (ANL), L_{Aeq} – dB(A)
Residential	Urban	Day	60
		Evening	50
		Night	45
Hospital ward:			
Internal	All	Noisiest 1-hour	35
External	All	Noisiest 1-hour	50

4.3 NSW State Environmental Planning Policy (Infrastructure) (2007)

The NSW State Environmental Planning Policy SEPP (Infrastructure) for the purposes of determining the impacts of a rail corridor and major roadway on a health care facility under SEPP 87 & 102 have set the following conditions for compliance:

Clause 87: *Development for any of the following purposes that is on land that is in or immediately adjacent to a rail corridor and the consent authority considers development is likely to be adversely affected by rail noise or vibration:*

- *building for residential use*
- *a place of public worship*
- *a hospital*
- *an educational establishment or*
- *childcare centre*

Clause 102: *This clause applies for any development for any of the following purposes that is on land in or adjacent to the road for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*

- *a building for residential use,*
- *a place of public worship,*
- *a hospital,*
- *an educational establishment or childcare centre.*

For Clauses 87 (Rail) and 102 (Road): *If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*

- *in any bedroom in the building – 35 dB(A) at any time between 10pm and 7am*
- *anywhere else in the building (other than a garage, kitchen, bathroom or hallway)-40 dB(A) at any time.*

4.4 NSW EPA Interim Construction Noise Guideline

Construction noise is a major environmental noise issue in NSW and it is well accepted that this activity can adversely affect, sleep, concentration and learning performance and mental and physical health. While construction noise is temporary in nature, its impacts need to be controlled.

The NSW Interim Construction Noise Guideline (ICNG) is specifically aimed at managing noise from construction works. From a regulatory perspective, the local Council is the appropriate regulatory authority for non-scheduled construction activities.

Table 4: *GCN noise criteria at residences, using quantitative assessment, L_{Aeq}*

Time of Day	Management Level – $L_{Aeq\ (15min)}$	How to apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining, regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) If the community is prepared to accept longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for work outside the recommended standard hours The proponent should apply all feasible and reasonable work practices to meet the noise affected level Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community For guidance on negotiating agreements see Section 7.2.2 (NSW Interim Construction Noise Guideline)
Active Play Areas (Childcare Centres)	65 dB(A)	When in Use

4.4.1 Construction Vibration Limits

Construction vibration levels depend on several factors. These include the activity, the equipment being used, the ground geology and the distance between the building and the source. In Australia there is no current specific standard for construction vibration. This methodology is equivalent to the guidelines issued in current international standards and described in *'AS 2670:2001 Vibration and shock - Guide to the evaluation of human exposure to whole body vibration'*, as shown below in Figure 2.

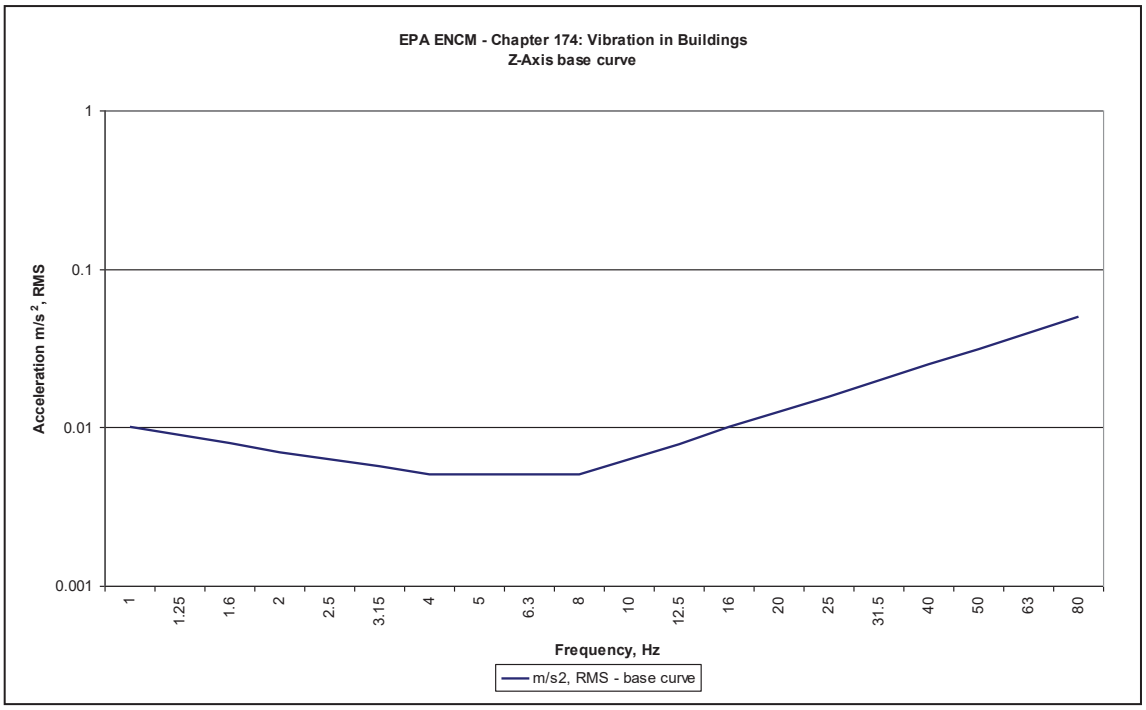


Figure 2: *AS2670 Base Vibration Criteria*

To assess vibration impact to different types of buildings, for example residential, multiplying factors shown in Table 5 need to be applied to the base criteria.

Table 5: *Multiplying factors to obtain limit vibration levels*

Place	**Multiplying factors**		
	Time	**Continuous vibration**	**Intermittent or impulsive**
Residential	Day 0700-2200	2	60
	Night 2200-0700	1.4	20
Office	Day 0700-2200	4	128
	Night 2200-0700	4	128
Workshops	Day 0700-2200	8	128
	Night 2200-0700	8	128

The NSW Office of Environment and Heritage (OEH) does not directly relate to damage levels to buildings. The German DIN4150 and NSW OEH/British Standard BS6472 provide guidelines relevant to this assessment. These criteria are summarised below in Table 6.

Table 6: *Typical vibration limit criteria (mm/s)*

Criterion	**Typical Vibration Velocity**	**Standard**
Disturbance to persons (day) 0700-2200	0.3 – 0.6 peak	BS6472
Disturbance to persons (night) 2200-0700	0.2 peak	BS6472
Damage to dwellings	5 – 15 rms	DIN 4150
Damage to heritage buildings	3 – 8 rms	DIN 4150

Management of noise and vibration impacts during construction is best mitigated through the implementation of a site noise and vibration management plan by the prospective builder.

4.5 NSW Road Noise Policy

Road traffic noise impact is assessed in accordance with the introduced NSW Road Noise Policy (2011). The criterion (Table 3 in Road Traffic Noise Assessment Criteria for Residential Land Uses) divides land use developments into different categories and lists the respective criteria for each case. The category that is relevant to the proposed use of this site is shown below:

Table 7: *Road traffic noise assessment criteria for residential land uses*

Road category	**Type of project/land use**	**Assessment criteria $L_{Aeq, period}$ – dB(A)**	
		Day (7am – 10pm)	**Night (10pm – 7am)**
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, 15 hour}$ 60 (external)	$L_{Aeq, 9 hour}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, 1 hour}$ 55 (external)	$L_{Aeq, 1 hour}$ 50 (external)

If the traffic noise at the site already in exceeds the criteria noted above, the NSW RNP states that the primary objective is to reduce the existing level through feasible and reasonable measures to meet the criteria above. If this is not achievable, Section 3.4.1 Process for applying the criteria - Step 4 states that for existing residences affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise should be limited to 2 dB above that of the corresponding 'no build option'.

5 SITE MEASUREMENTS

5.1 Instrumentation

The survey was conducted with the following instruments:

- Acoustic Research Laboratories EL-215 Type 2 noise logger
- NTI Precision Integrating Octave Band Sound Level Meter, Type XL2 with 1/3 Octave band filter unit, which conforms to applicable standards of IEC 61672-1:2002-05 CLASS1 & IEC 60651 TYPE1.

All equipment was calibrated before and after the measurements using a Brüel & Kjær Acoustic Calibrator. No calibration deviations were recorded.

5.2 Operator attended measurements

15 minute attended measurements were conducted to verify unattended background noise levels, to establish the octave band noise levels and to characterise the acoustic environment around the site. Operator attended noise measurement survey was conducted with an integrating Type 1 sound level meter and windshield. Measurements were taken continuously, and the microphone was set to receive direct frontal sound and facing the direction of sound emission.

The operator attended noise measurements were performed on 16th October 2018 at locations *M1-6,* marked in blue in Figure 1. Results are presented in Table 8 below.

***Table 8**: Operator attended measurements 16/10/2018*

Location	L_{Aeq} – dB(A)	L_{A10} – dB(A)	L_{A90} – dB(A)	L_{Amax} – dB(A)	L_{Amin} – dB(A)	Notes
M1	64	68	58	72	55	Traffic noise from Highway
M2	65	68	59	78	57	Traffic noise from Highway
M3	68	73	56	79	52	Traffic noise from Parker St.
M4	61	64	55	75	49	Construction noise on Barber St.
M5	63	66	55	77	51	Traffic noise from Highway
M6	58	60	54	68	50	Traffic noise from Highway

Figure 3: *Operator attended measurement* M1

Figure 4: *Operator attended measurement* M5

5.3 Long-term noise logging

Automatic logging noise measurements were performed at the site to document the existing acoustic environment at Locations L1 and L2, as shown in Figure 5 and Figure 6 below.

Long-term noise monitoring was conducted between Tuesday 16th October 2018 and Tuesday 23th October 2018 at Logger location shown in Figure 1 above. Detailed results of the logger measurements are shown in Appendix 1. Meteorological data was retrieved from a Bureau of Meteorology station located within 30km of the site.

The results of the automatic logging measurements are shown in Table 9 below.

Table 9: *Long-term noise monitoring results*

Logger location	Period	Equivalent Continuous Noise Level $L_{Aeq,15min}$ – dB(A)	Rating Background Noise Level RBL $L_{A90,15min}$ – dB(A)
L1	Day	64	58
	Evening	63	57
	Night	59	49
L2	Day	69	58
	Evening	67	55
	Night	62	47

The L_{A90} rating background noise levels were determined using the methodology as described in the Noise Policy for Industry.

Figure 5: *Unattended measurement location L1, facing Great Western Highway*

Figure 6: *Unattended measurement location* L2*, facing Parker Street*

5.4 Determination of Noise Policy for Industry criteria

The NSW EPA Noise Policy defines the following noise descriptors:

- The **Intrusiveness Criterion** states that the $L_{Aeq,\ 15\ minutes}$ generated from the operation of the development cannot exceed the rating background noise level (RBL) plus 5 dB.
- The **Project Amenity Noise Level** is the ANL (Table 3) minus 5 dB, plus 3 dB to convert from a period level to a 15-minute level.
- The **Project Noise Trigger Level** (PNTL) is the more stringent (lowest) value of the intrusiveness and amenity noise levels, which becomes the benchmark for assessing the noise impact from the proposed site upon the surrounding noise-sensitive receivers.

Table 10, below, shows the project specific noise levels that have been determined in accordance with the requirements of the NSW Noise Policy for Industry. The PNTL (in bold) shall be assessed at the boundary of the nearest affected receiver.

Table 10: *EPA Noise Policy noise criteria for residential receivers*

Logger location	Period	Intrusiveness Criteria – dB(A)	Project Amenity Noise Level – dB(A)	Project Noise Tigger Level – dB(A)
L1	Day	63 $L_{Aeq,15min}$ (58+5)	58 $L_{Aeq,15min}$ (60–5+3)	**58 $L_{Aeq,15min}$**
	Evening	62 $L_{Aeq,15min}$ (57+5)	48 $L_{Aeq,15min}$ (50–5+3)	**48 $L_{Aeq,15min}$**
	Night	49 $L_{Aeq,15min}$ (54+5)	43 $L_{Aeq,15min}$ (45–5+3)	**43 $L_{Aeq,15min}$**
L2	Day	63 $L_{Aeq,15min}$ (58+5)	58 $L_{Aeq,15min}$ (60–5+3)	**58 $L_{Aeq,15min}$**
	Evening	60 $L_{Aeq,15min}$ (55+5)	48 $L_{Aeq,15min}$ (50–5+3)	**48 $L_{Aeq,15min}$**
	Night	47 $L_{Aeq,15min}$ (47+5)	43 $L_{Aeq,15min}$ (45–5+3)	**43 $L_{Aeq,15min}$**

6 ACOUSTIC ASSESSMENT

6.1 Road traffic noise intrusion

To assess road traffic noise impacts in accordance with the NSW SEPP measured ambient levels at the facade measured at the site were as shown in Table 11. As this stage, the final glazing selection in not yet finalised. For the purposes of this assessment, we have conservatively applied 6mm/12mm/6mm glazing (R_w 34), with a typical worst-case traffic noise level for day and night, as shown below.

Table 11: *Predicted internal noise internal noise levels, L_{Aeq}*

Use	Measured traffic noise, L_{Aeq} – dB(A)	SEPP criteria – dB(A)	Predicted internal noise level – dB(A)	Complies? Yes/No
Typical Bedroom (10pm-7am)	63	35	35	Yes
Other Areas (all hours)	66*	40	39	Yes

*Worst case - Daytime (0700-1800).

Predicted internal noise into the Bedroom and Living Room spaces is predicted to meet the requirements of the SEPP (Infrastructure) 2007 requirements.

6.2 Construction noise

At this stage, the proposed nature of construction works, and activity has not been finalised and will be subject to final input by the construction contractor. However, as the proposed facility will include excavation works, we have assumed typical plant and activity will entail the following stages and typical plant items as follows:

- Site establishment and excavation works – bump in, truck deliveries, site excavation works, spoil removal, screw piling;
- Structural works – main structural works, crane hoists, concrete pumps, concrete saws, grinding hammering;
- Fit out works – mainly enclosed finishing works. For the purposes of this assessment we have assumed a typical shielding loss of 20 dB.

Representative plant and plant sound power levels have been derived from the UK Department for Environment Food and Rural Affairs (DEFRA 2005) *'Update of Noise Data Base for the Prediction of Noise on Construction Sites.'*

Table 12: *Predicted construction noise from various works phases, $L_{Aeq,15minute}$ – dB(A)*

Plant	Octave band centre frequency								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
1. Site Establishment and Excavation Works									
Excavator,5t	99	99	94	87	87	86	82	76	**93**
Screw piler	114	110	105	102	98	94	90	83	**104**
Truck delivery/spoil	104	101	90	94	90	86	82	77	**95**
Hammer	94	94	96	96	91	85	83	79	**97**
Angle grinder	85	79	80	88	98	105	101	101	**109**
2. Structural Works									
Excavator	99	99	94	87	87	86	82	76	**93**
Truck delivery	104	101	90	94	90	86	82	77	**95**
Concrete pump, 25kW	99	99	94	87	87	86	82	76	**93**
Concrete saws, 3kW	110	110	100	99	97	96	90	92	**104**
Mobile crane	113	101	95	99	100	97	91	84	**104**
Angle grinder	85	79	80	88	98	105	101	101	**109**
Hammer	94	94	96	96	91	85	83	79	**97**
3. Fit out Works									
Angle grinder	85	79	80	88	98	105	101	101	**109**
Hammer	94	94	96	96	91	85	83	79	**97**
Truck delivery	104	101	90	94	90	86	82	77	**95**

Table 13: *Predicted construction noise levels, $L_{Aeq\ 15minute}$ dB(A) during standard hours*

Receivers	Works phase	Typical operating distances, m	Predicted construction noise levels – dB(A)	GCN criteria – dB(A)	Complies Y/N	Predicted exceedances
□ocation A □□esidential□	1□Site est□□ excavation	80	45 – 62	□58 □ 10□□ 68	□es	–
	2□Structural		45 – 64		□es	–
	3□□it out		40 – 41		□es	–
□ocation □ □Hospital building□	1□Site est□□ excavation	30	54 – 73	□58 □ 10□□ 68	□o	5 d□ □See □ote 1□
	2□Structural		54 – 74		□o	6 d□ □See □ote 1□
	3□□it out		40 – 52		□es	–

□ote 1□□redicted noise levels are defined as 'Noise Affected' under t□e □SW □C□□□ T□is will re□uire t□e application o□ □easible and reasonable work practices, e□g□AS 2436□2010□

□redicted exceedances □rom t□e proposed construction works, based upon typical plant and activity are predicted result in only minor exceedances o□t□e external noise criteria i□e□5 – 6 d□ at t□e nearest a□□ected commercial receivers□

6□3 Tra□□ic noise assessment

T□e operation o□t□e development is expected to increase t□e background noise levels due to increased ve□icle activity□T□e extent o□t□e increase in □$_{Ae□15\ minute}$ is dependent on t□e existing and proposed tra□□ic volume, retrieved □rom t□e tra□□ic data provided by Transport and Tra□□ic □lanning Associates□T□e expected increase in background noise □as been calculated, s□own in Table 14 below□

Table 14: *Calculated increase in background noise level due to increased vehicle activity*

Time	Location	Direction	Number of vehicles		Increase in $L_{Aeq,\ 15\ minute}$ – (dB)
			Existing	Proposed	
am	□arker Street	□ort□bound	1180	1180	0
	□arker Street	Sout□bound	1073	1083	0□04
	□arber Avenue	Eastbound	113	131	0□64
	□arber Avenue	Westbound	43	56	1□15
pm	□arker Street	□ort□bound	1203	1203	0
	□arker Street	Sout□bound	1201	1205	0□01
	□arber Avenue	Eastbound	42	49	0□67
	□arber Avenue	Westbound	136	202	1□72

7 RECOMMENDATIONS

7.1 Operational noise

At the time of writing, the proposed mechanical plant and equipment has not been proposed for the project. Assuming typical worst-case distances of 70m to the nearest affected residential receivers, it is proposed that the limiting aggregate sound power level L_{Aw} for the project is limited to 88 dBA. This will be required to comply with the residential night time criteria of L_{eq} 43 dBA.

At this stage, we understand that the proposed mechanical plant and equipment will be predominantly housed inside a rooftop plant room and the car park areas.

Anticipated that in principle noise engineering measures can be utilised to meet the environmental noise criteria such as:

- Enclosures – housing of plant and equipment inside the rooftop plant room, typically 20 to 30 dBA reduction.
- Acoustic louvers and Acoustically intakes and discharges – to acoustically treat air intakes into plant rooms using acoustic louvers, lined intakes/discharges and attenuators.
- Barriers – use of acoustic barriers or screens to shield sensitive receivers.

Hence it is anticipated that mechanical plant that standard engineering noise control measures can be controlled using standard engineering control measures for this project.

7.2 Construction noise

In addition, predicted noise emissions at the nearest affected residential receivers were predicted to comply with the standard hours criteria at the nearest affected residences at location . Australian Standards AS 2436:2010 *'Guide to Noise and Vibration Control on Construction Demolition Sites'* provides a list of measures for controlling noise from site related activity. Information in Table 15 referenced from AS 2436:2010 details the potential noise reduction of standard engineering mitigation measures, typically utilised on construction and demolition sites.

Table 15: *AS 2436:2010 – Construction noise mitigation measures*

Noise mitigation measure	Typical noise reduction, L_p – dB(A)
Distance attenuation	6 dB per doubling of distance
Screening and barriers	Typically, 5 to 10 dBA maximum 15 dBA
Enclosure	Typically, 15 to 25 dBA maximum 50 dBA
Silencing	Typically, 5 to 10 dBA maximum 20 dBA

Based upon predicted noise levels it is anticipated that the use of screens and acoustic rated hoardings with a minimum transmission loss of L_w 25 around the site could be utilised to minimise noise impacts from the site to location . to achieve a 5-6 dBA noise attenuation, as required under the NSW EPA .

7.3 Traffic noise

The NSW Road Noise Policy 2011 states that an increase in traffic noise less than 2 dB do not require any noise mitigation measures. The projected increase in traffic is not expected to increase background noise due to traffic by more than 2 dB (see Table 14 in 6.3).

8 C□ □C□□S□□ □

T□is report □orms part o□t□e development application submission □or t□e proposed development o□□epean □rivate Hospital Expansion Stage 1 at 1□9 □arber Avenue, □ingswood □SW 2747□ □perator attended, and long□term measurements were conducted at t□e site□T□e pro□ect criteria at t□e nearest a□□ected receiver □ave been determined □rom t□e results o□t□e measurements using □SW □oise □olicy □or □ndustry met□odology and advice □or acoustic compliance □ave been speci□ied□Acoustic compliance wit□ t□e □enrit□ City Council □C□ and t□e □SW E□A □oise □olicy □or □ndustry □2017□noise criteria can be ac□ieved□

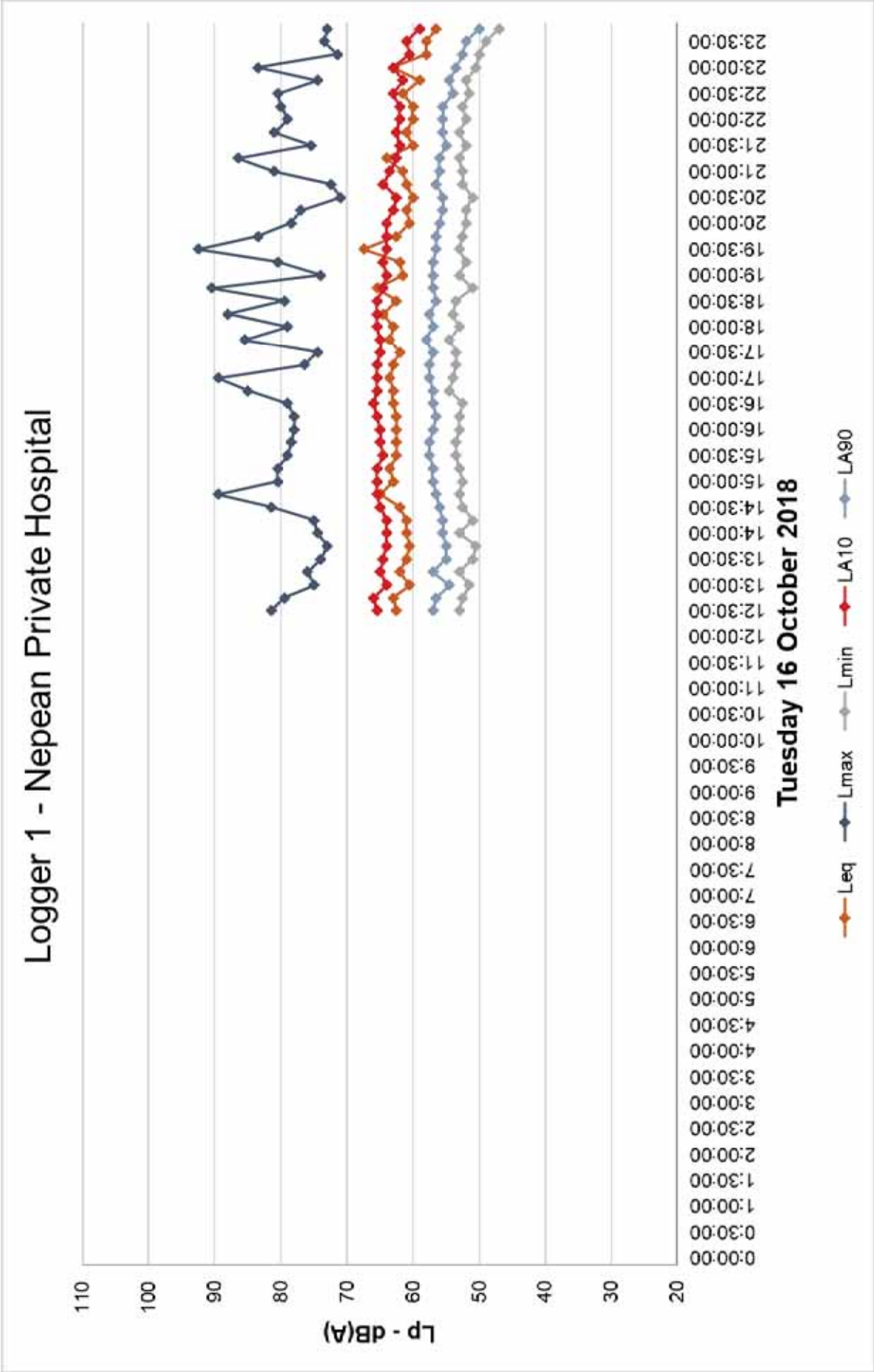
A□□E□□□□ A – □□ □□ □TE□M □□ □SE M□ □□T□ □□□□

T□e details are o□t□e noise logging measurements are s□own below□T□e measurements are in accordance wit□ t□e □SW E□A □oise □olicy □or □ndustry □2017□□

To describe t□e overall noise environment, several noise descriptors □ave been developed and t□ese involve statistical and ot□er analysis o□t□e varying noise over sampling periods, typically taken as 15 minutes□T□ese descriptors, w□ic□ are plotted in t□e grap□s below, are □ere de□ined□

T□e sections marked in blue □ave been omitted due to rain t□at may □ave a□ected t□e measurements□

- □$_{Amax}$ – T□e Maximum □oise □evel □□$_{Amax}$□over a sample period is t□e maximum level, measured on □ast response, during t□e sample period□
- □$_{A10}$ – T□e noise level w□ic□ is exceeded □or 10□ o□t□e sample period□□uring t□e sample period, t□e noise level is below t□e □$_{A10}$ level □or 90□ o□t□e time□T□e □$_{A10}$ is a common noise descriptor □or environmental noise and road tra□□ic noise□
- □$_{Ae□}$ – T□e e□uivalent continuous sound level □□$_{Ae□}$□is t□e energy average o□t□e varying noise over t□e sample period and is e□uivalent to t□e level o□a constant noise w□ic□ contains t□e same energy as t□e varying noise environment□T□is measure is also a common measure o□environmental noise and road tra□□ic noise□
- □$_{A90}$ – T□e noise level w□ic□ is exceeded □or 90□ o□t□e sample period□□uring t□e sample period, t□e noise level is below t□e □$_{A90}$ level □or 10□ o□t□e time□T□is measure is commonly re□erred to as t□e background noise level or □□□□
- □$_{Amin}$ – T□e Minimum □oise □evel □□$_{Amin}$□over a sample period is t□e minimum level, measured on □ast response, during t□e sample period□


Logger 1 - Nepean Private Hospital
Lp - dB(A)
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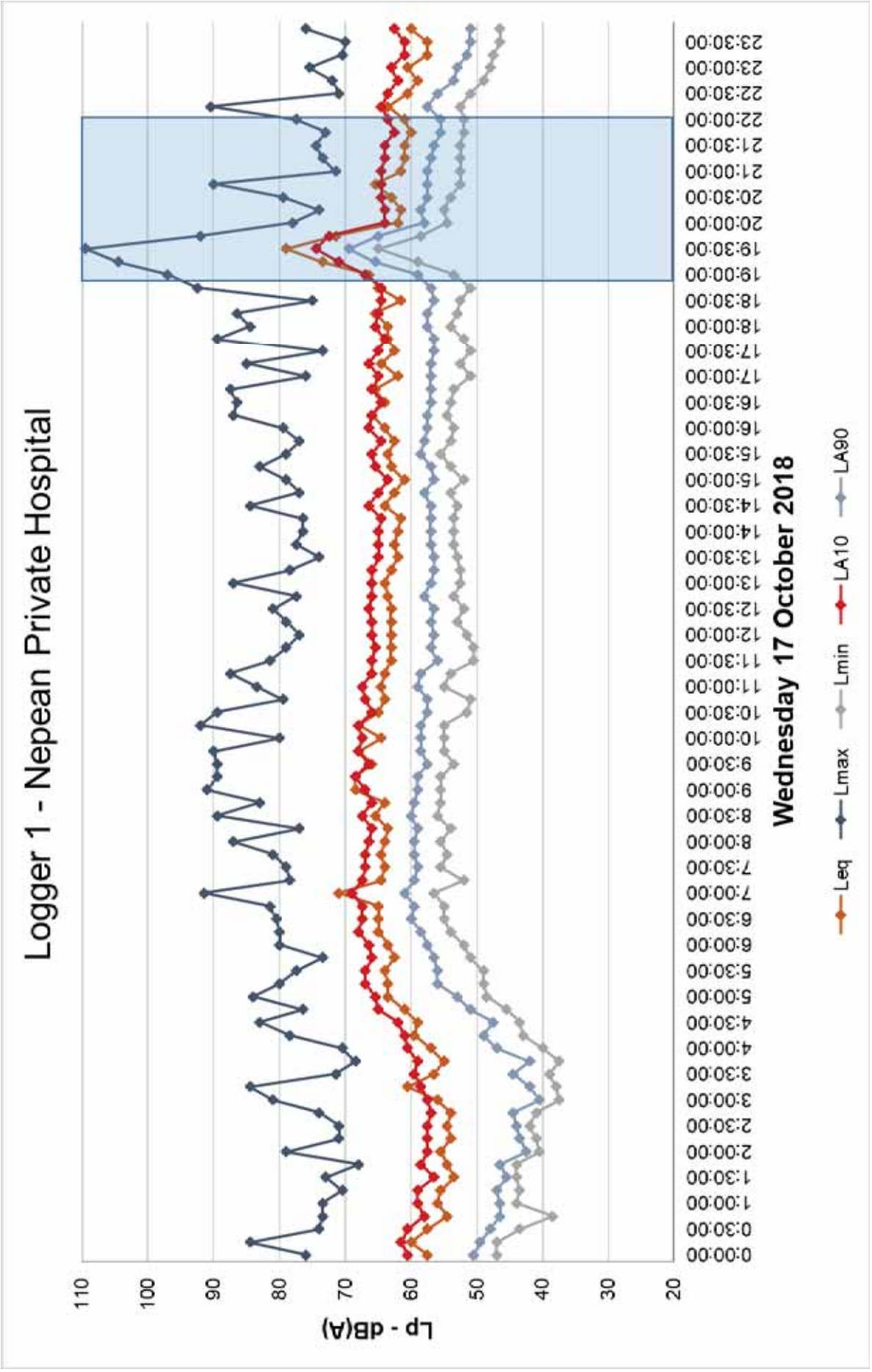
Logger 1 - Nepean Private Hospital
Wednesday 17 October 2018
Lp - dB(A)
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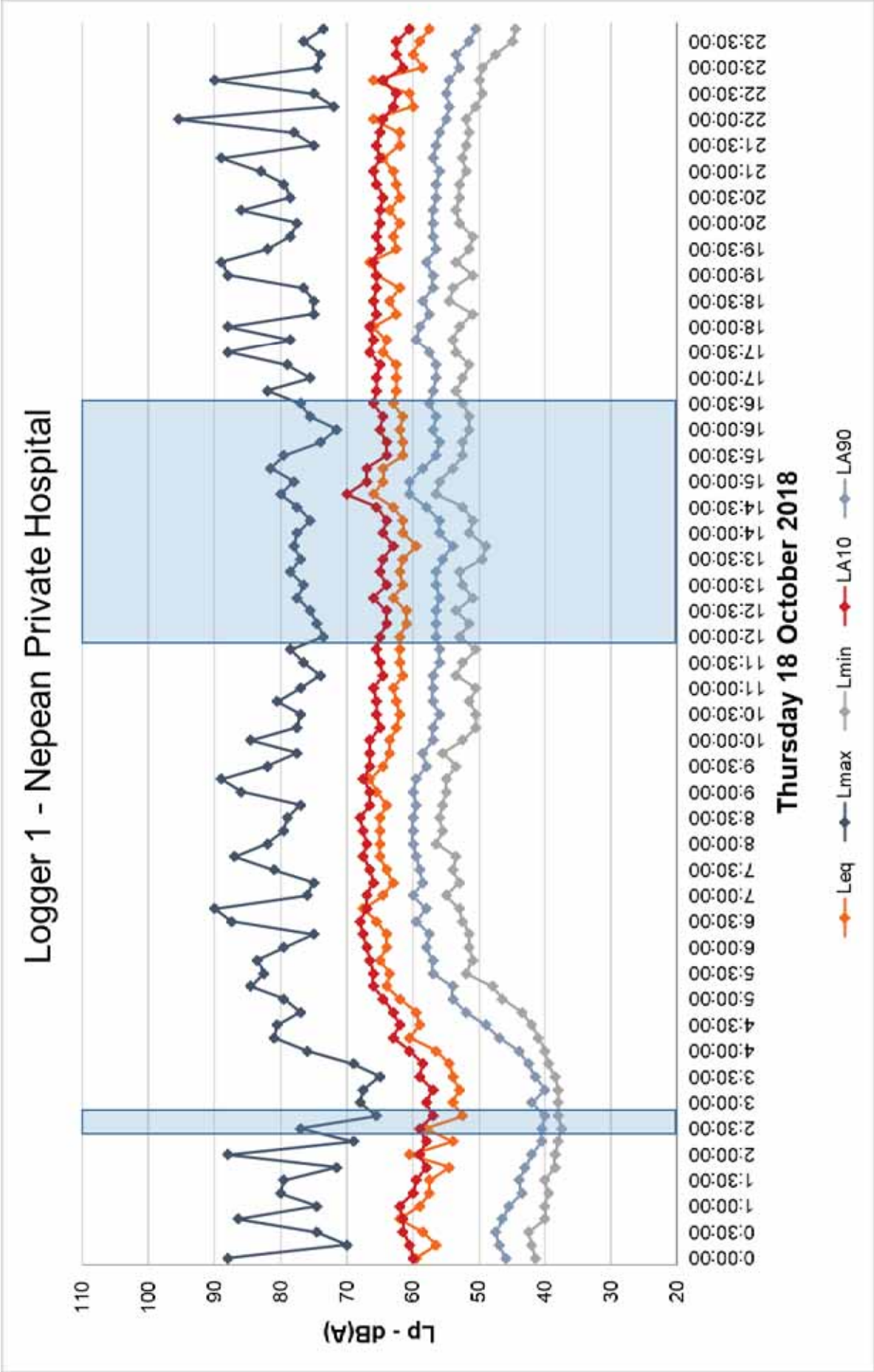
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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Thursday 18 October 2018
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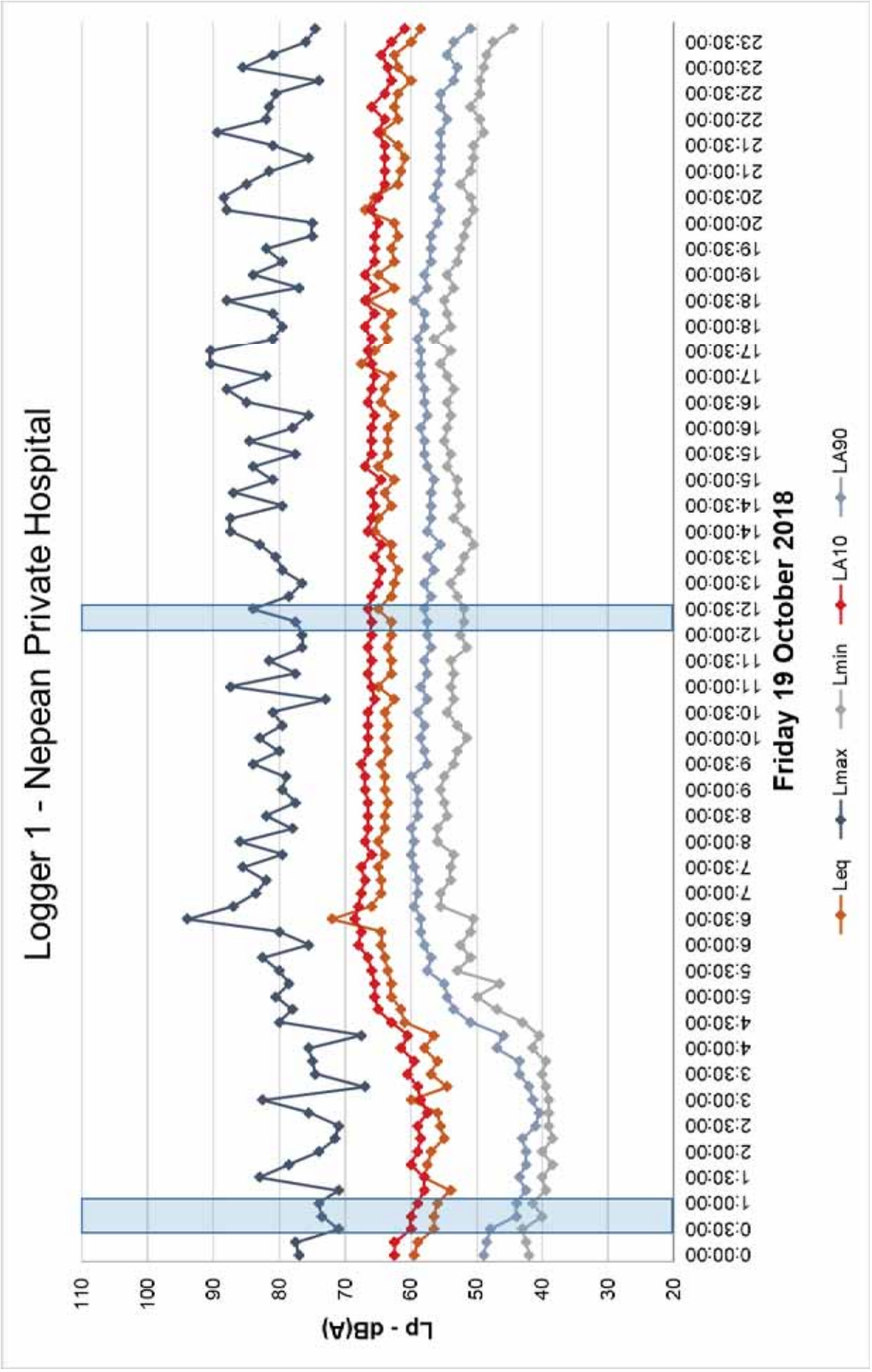
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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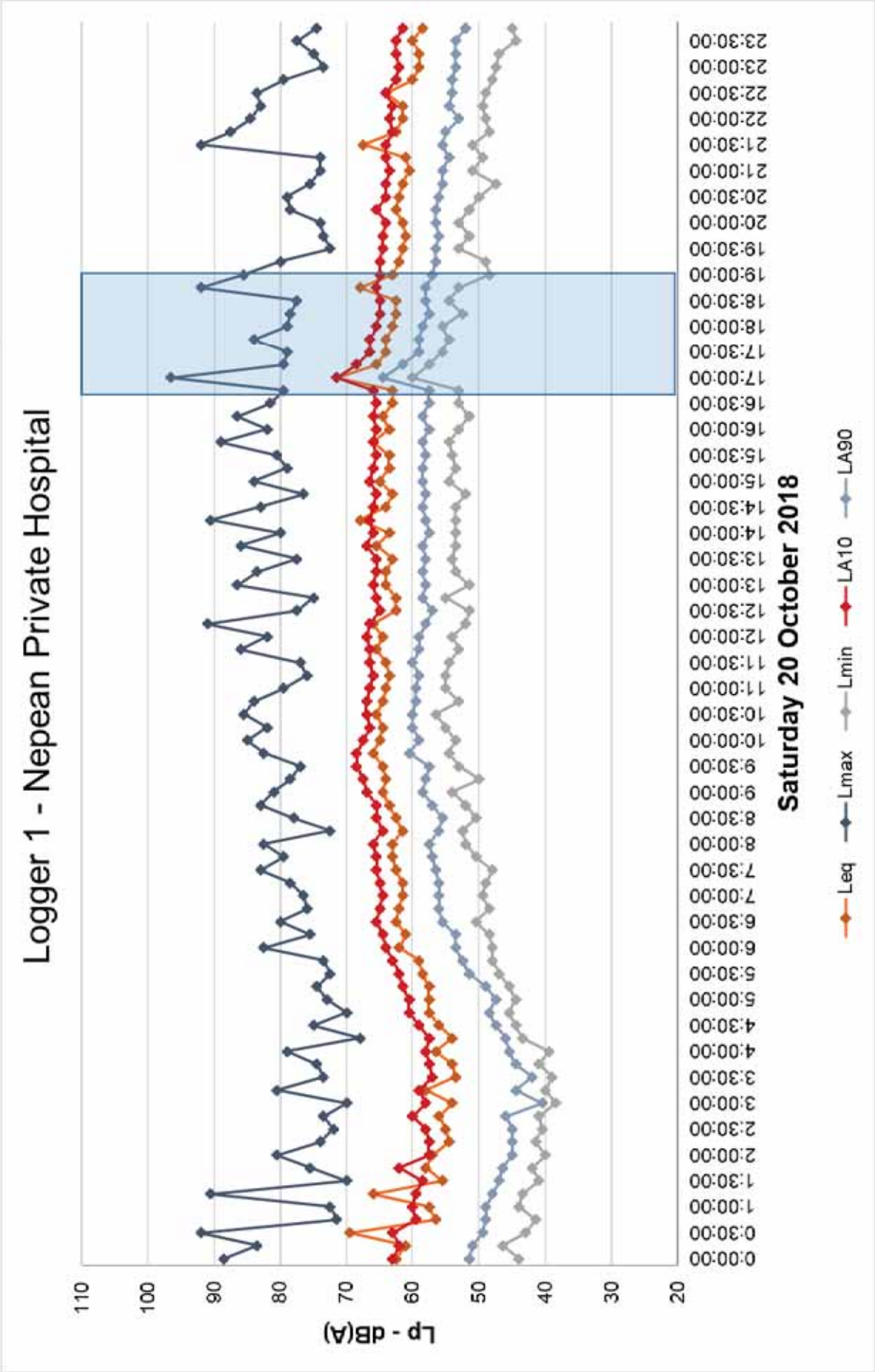
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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Saturday 20 October 2018
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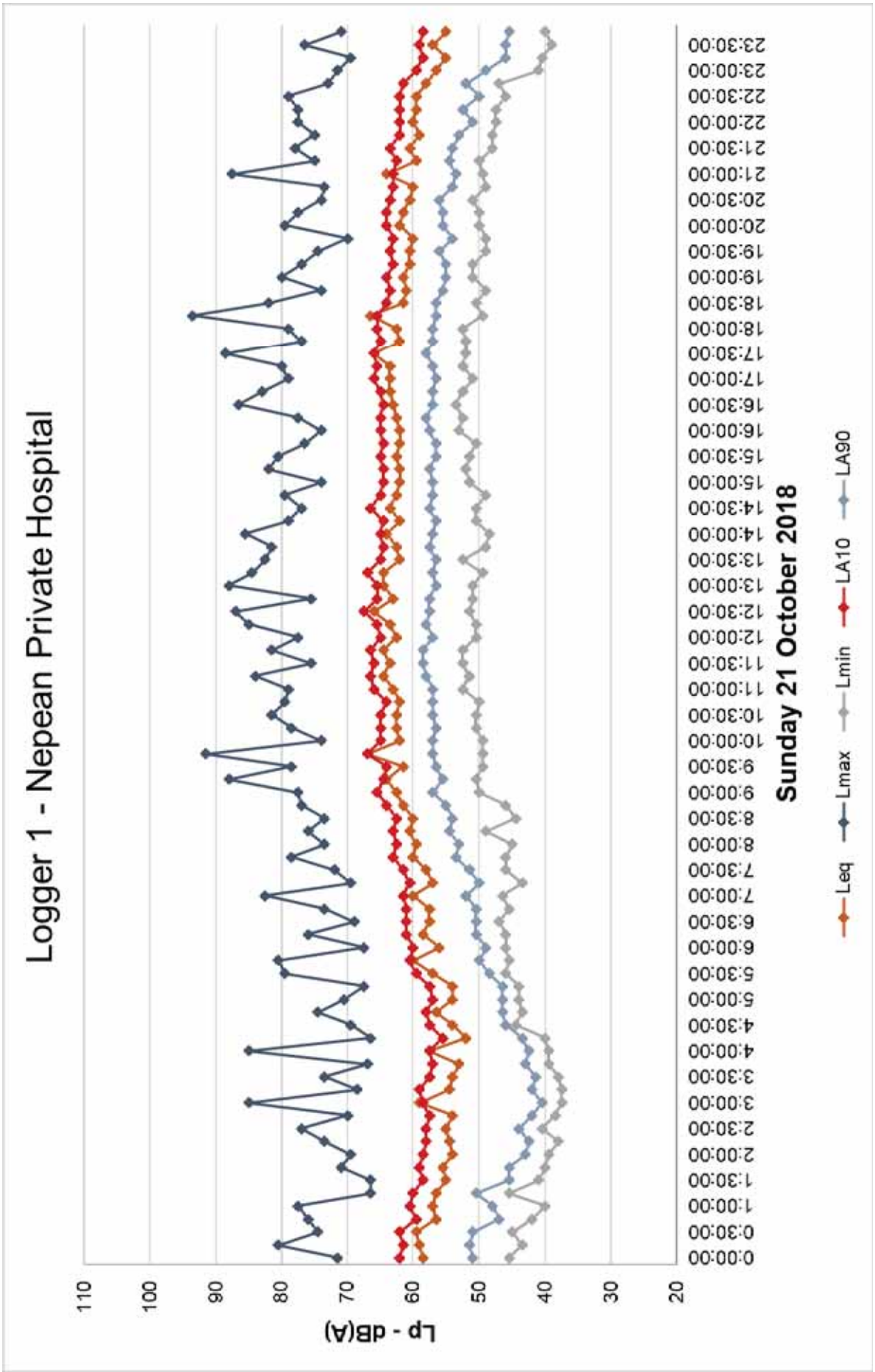
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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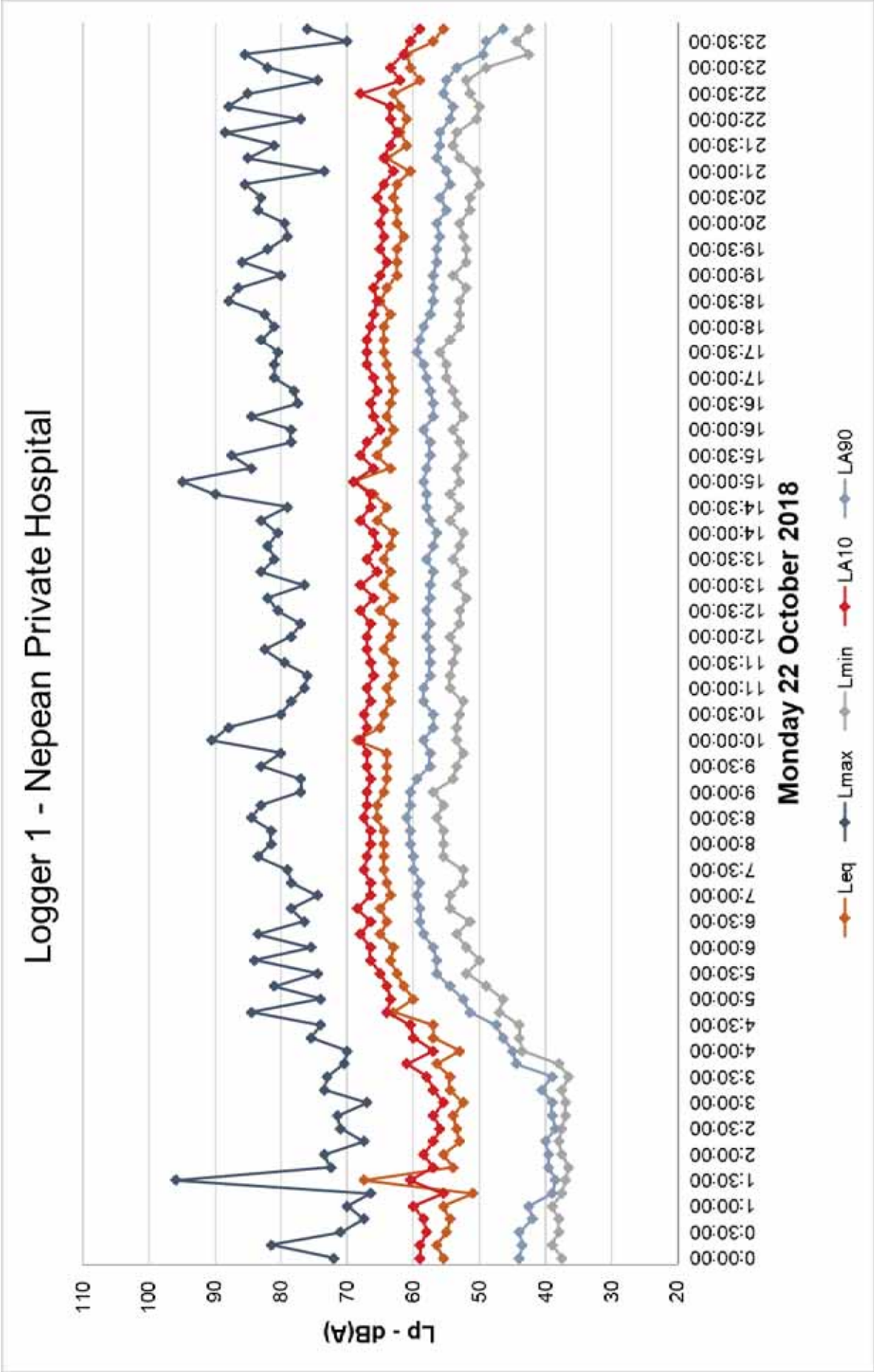
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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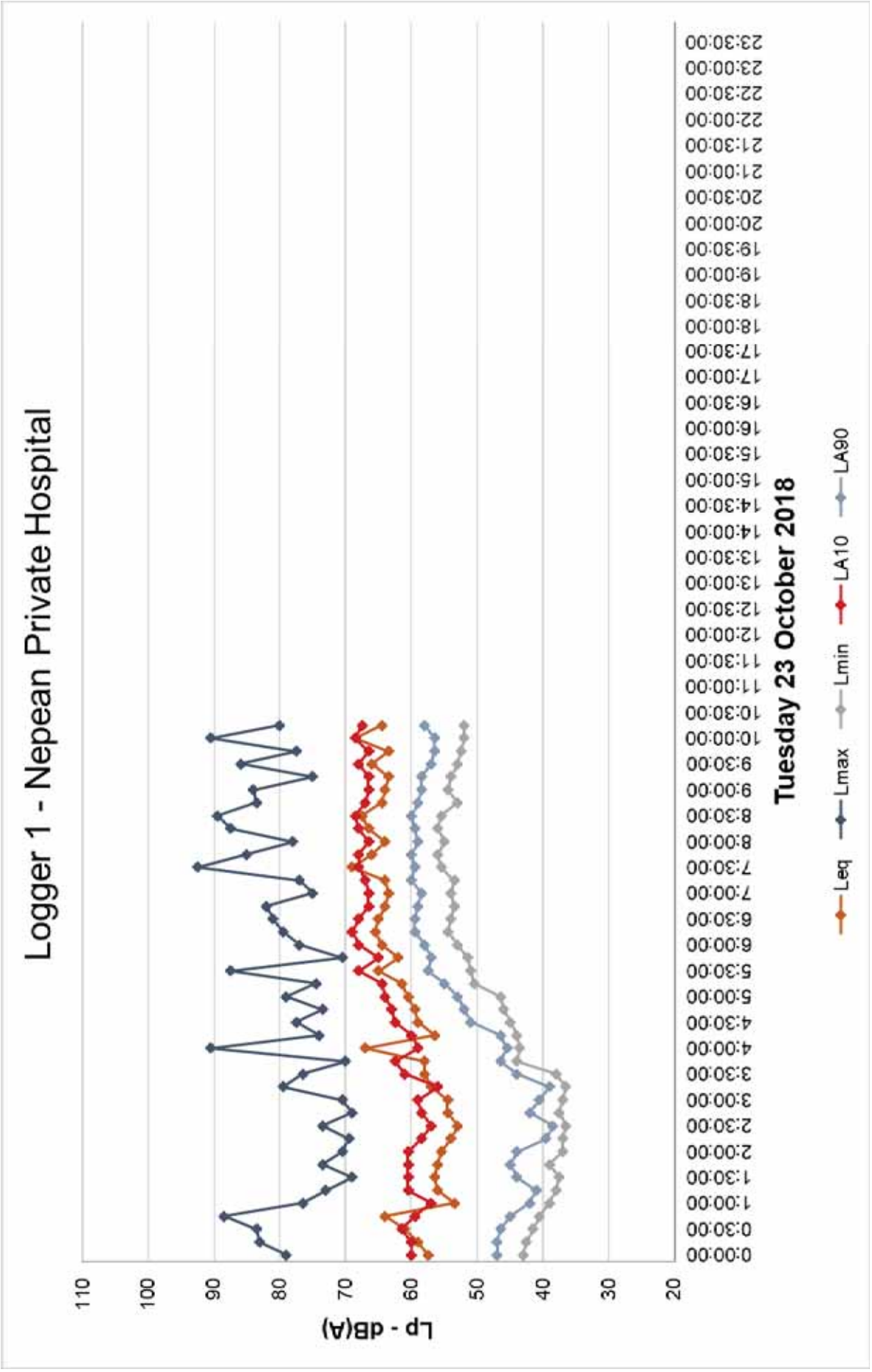
Logger 1 - Nepean Private Hospital
Lp - dB(A)
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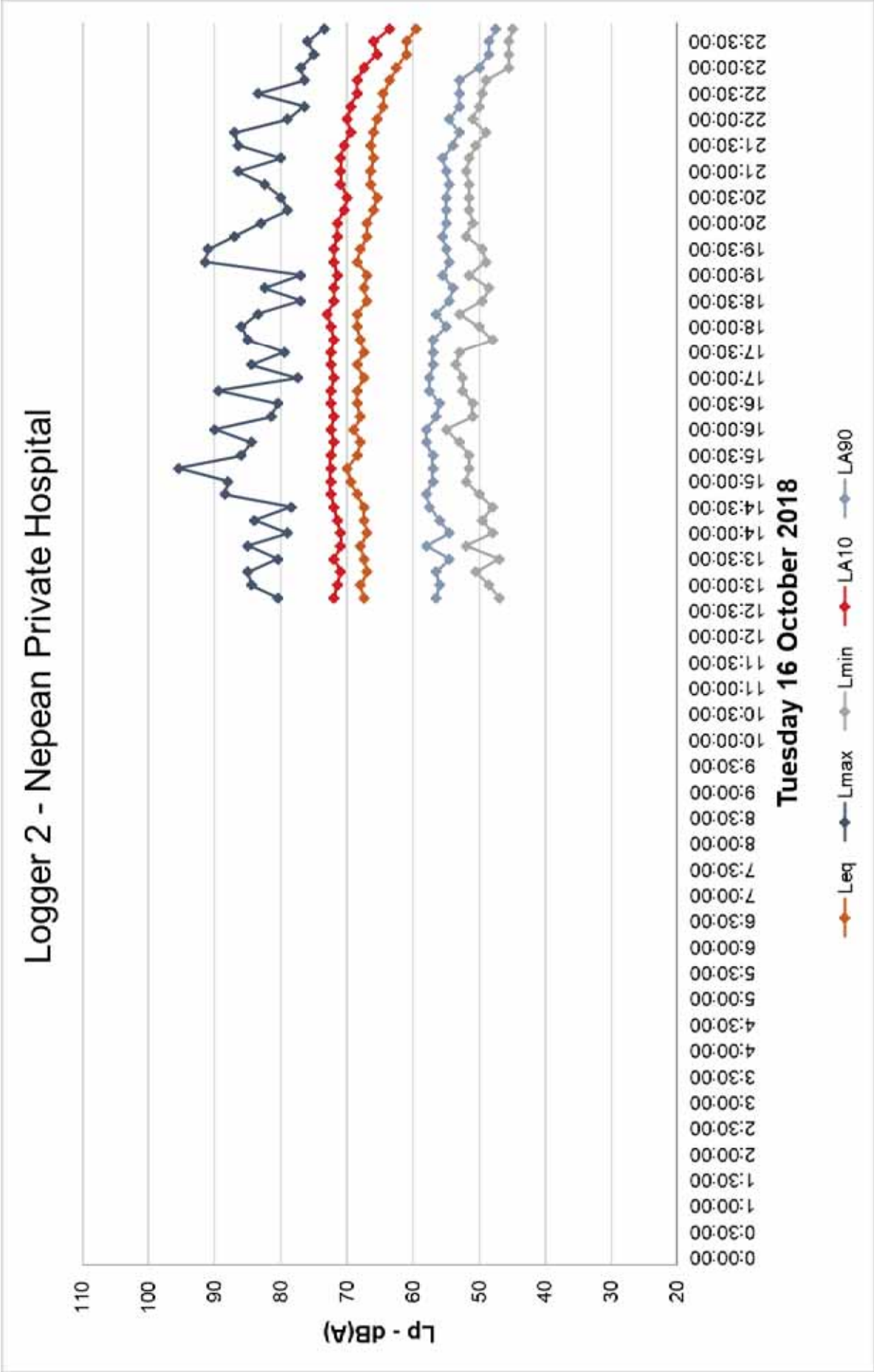
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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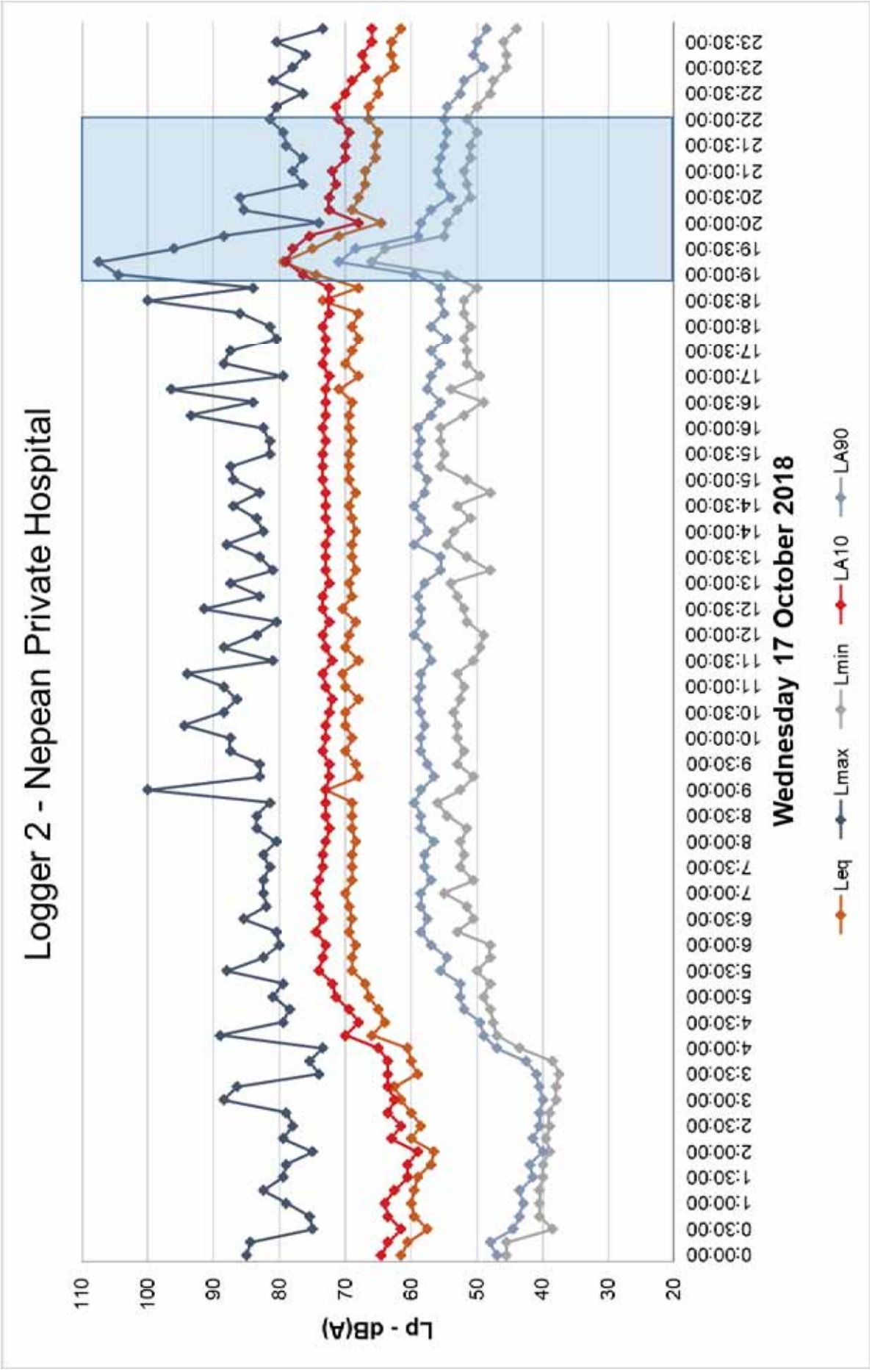
Logger 2 - Nepean Private Hospital
Wednesday 17 October 2018
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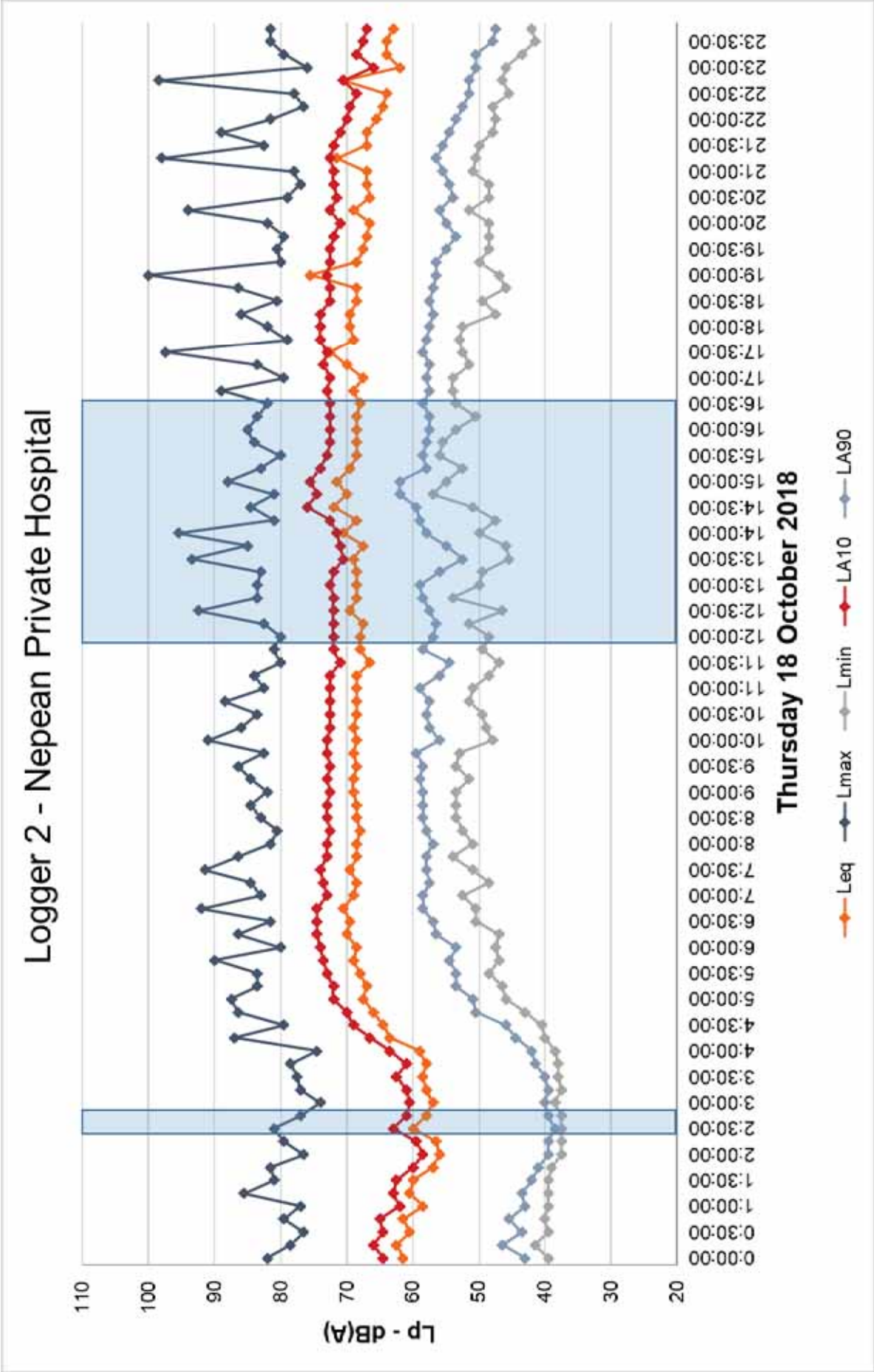
Logger 2 - Nepean Private Hospital
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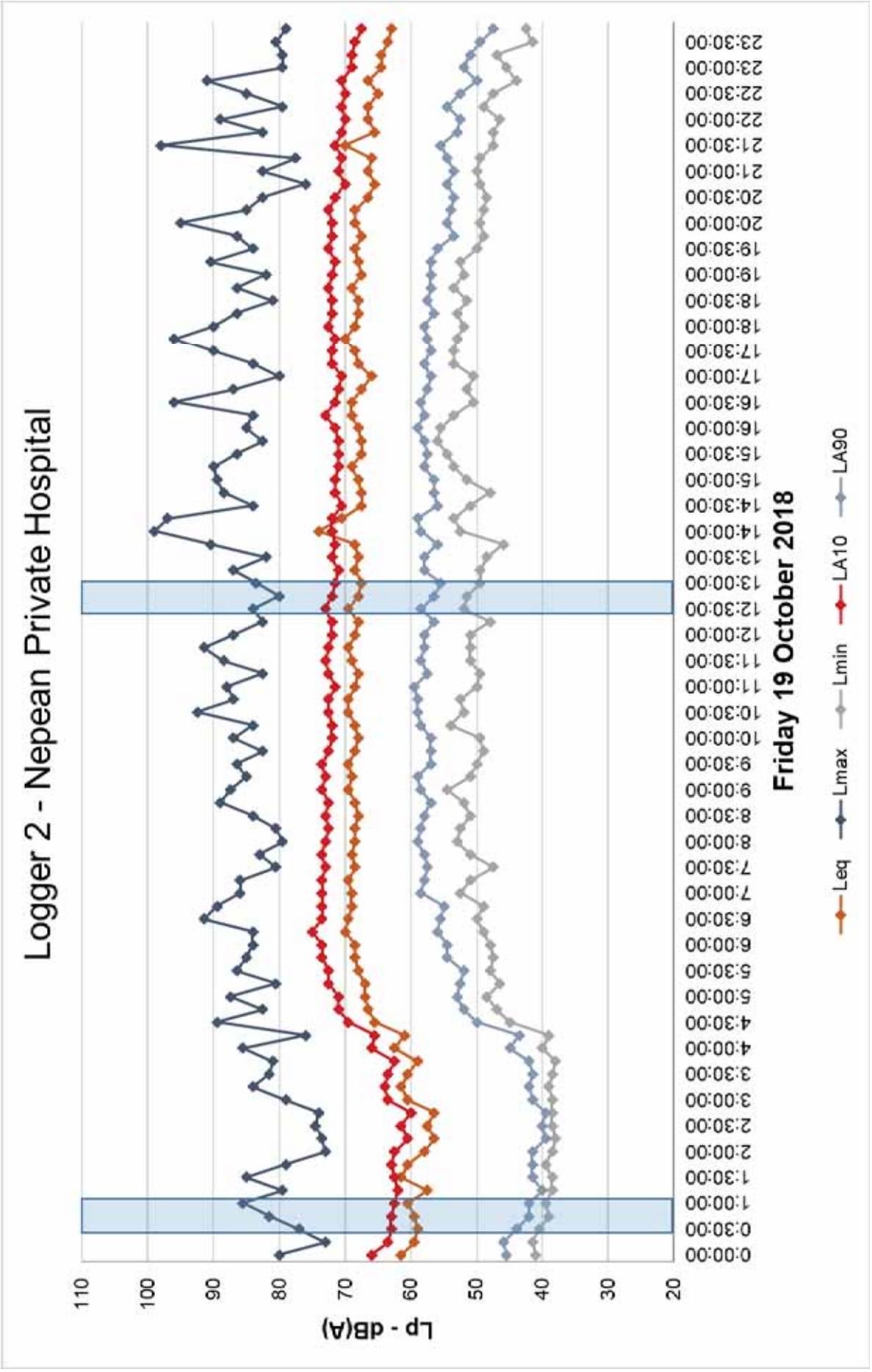
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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Friday 19 October 2018
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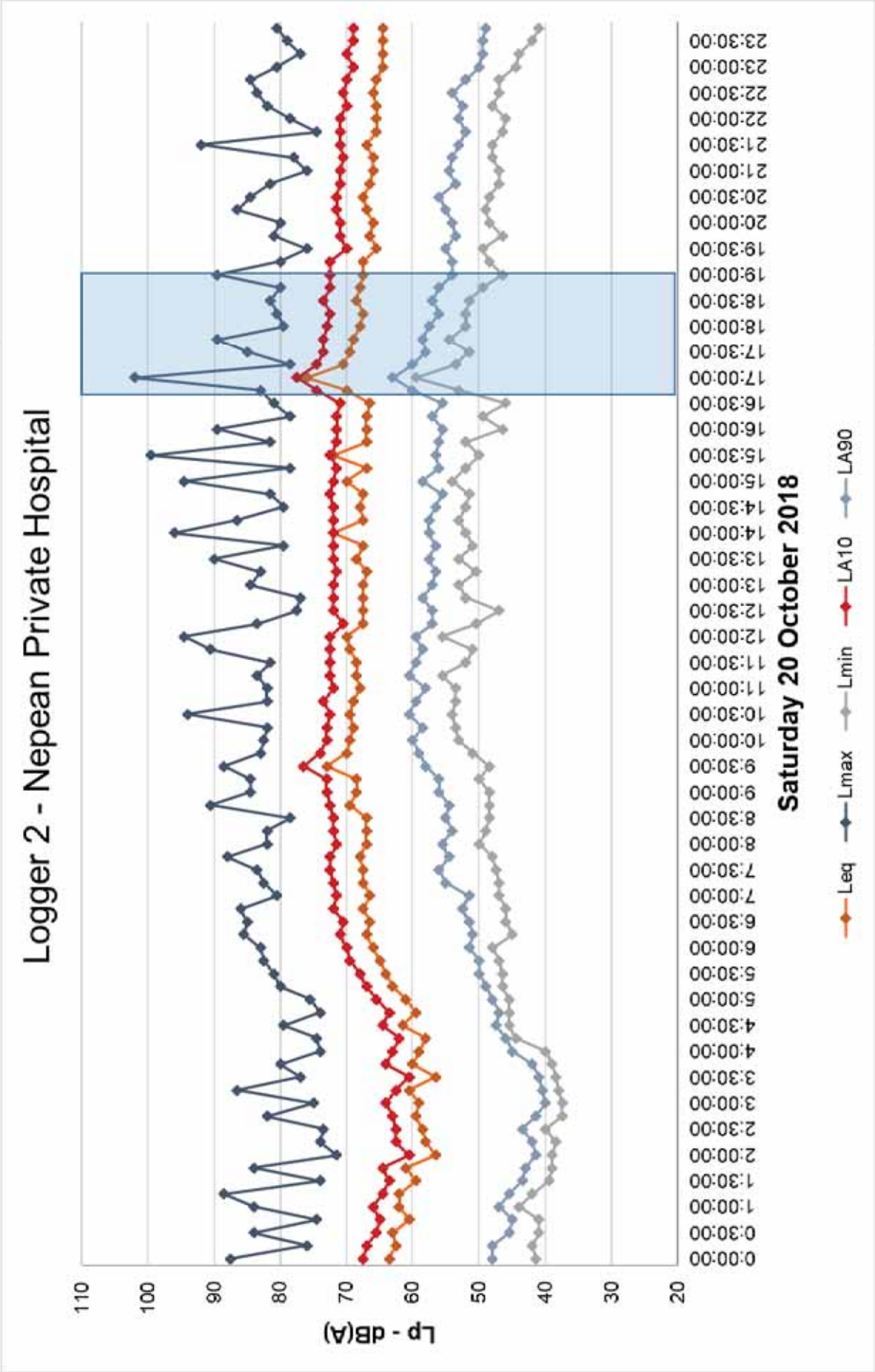
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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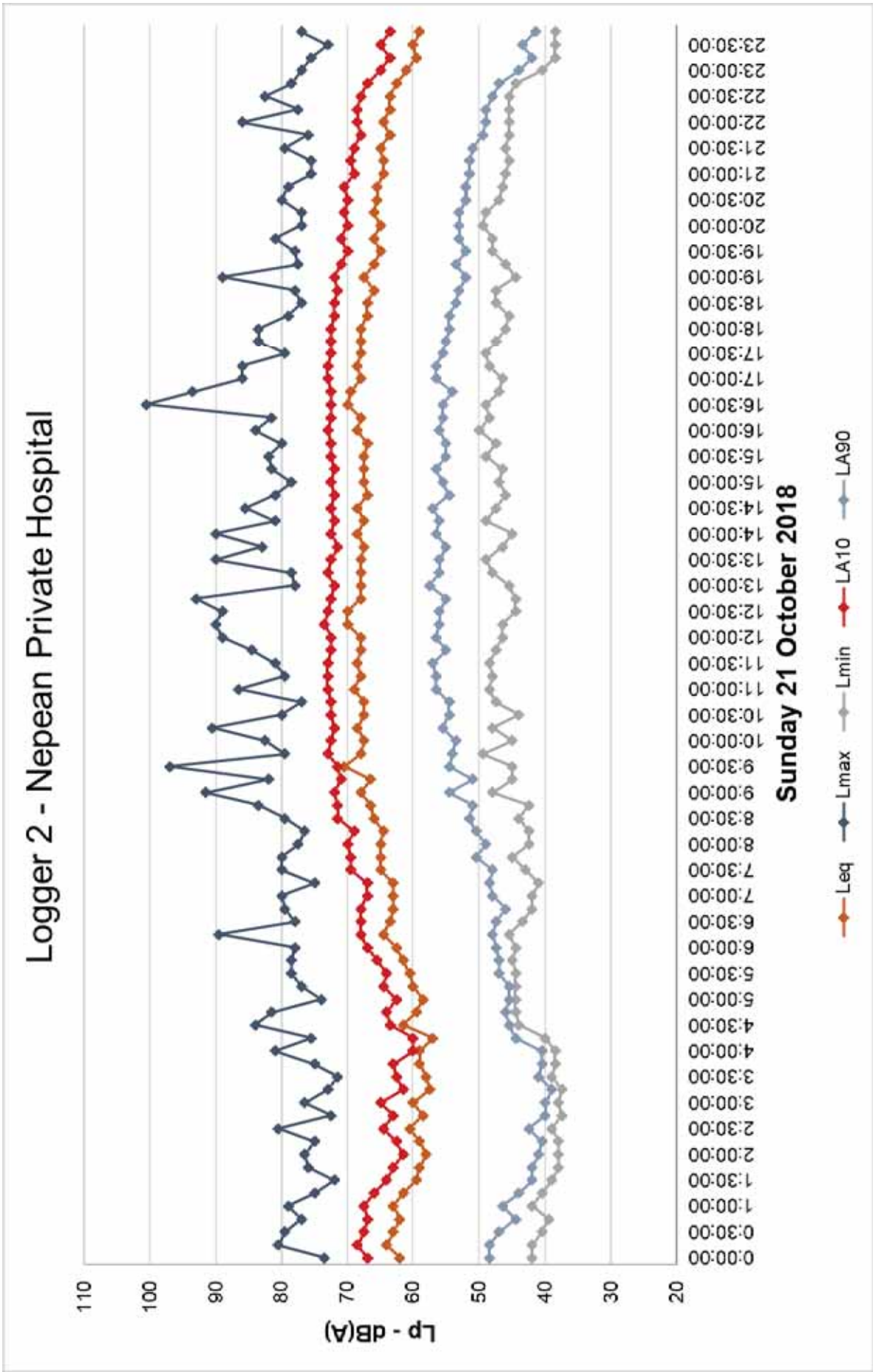
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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Sunday 21 October 2018
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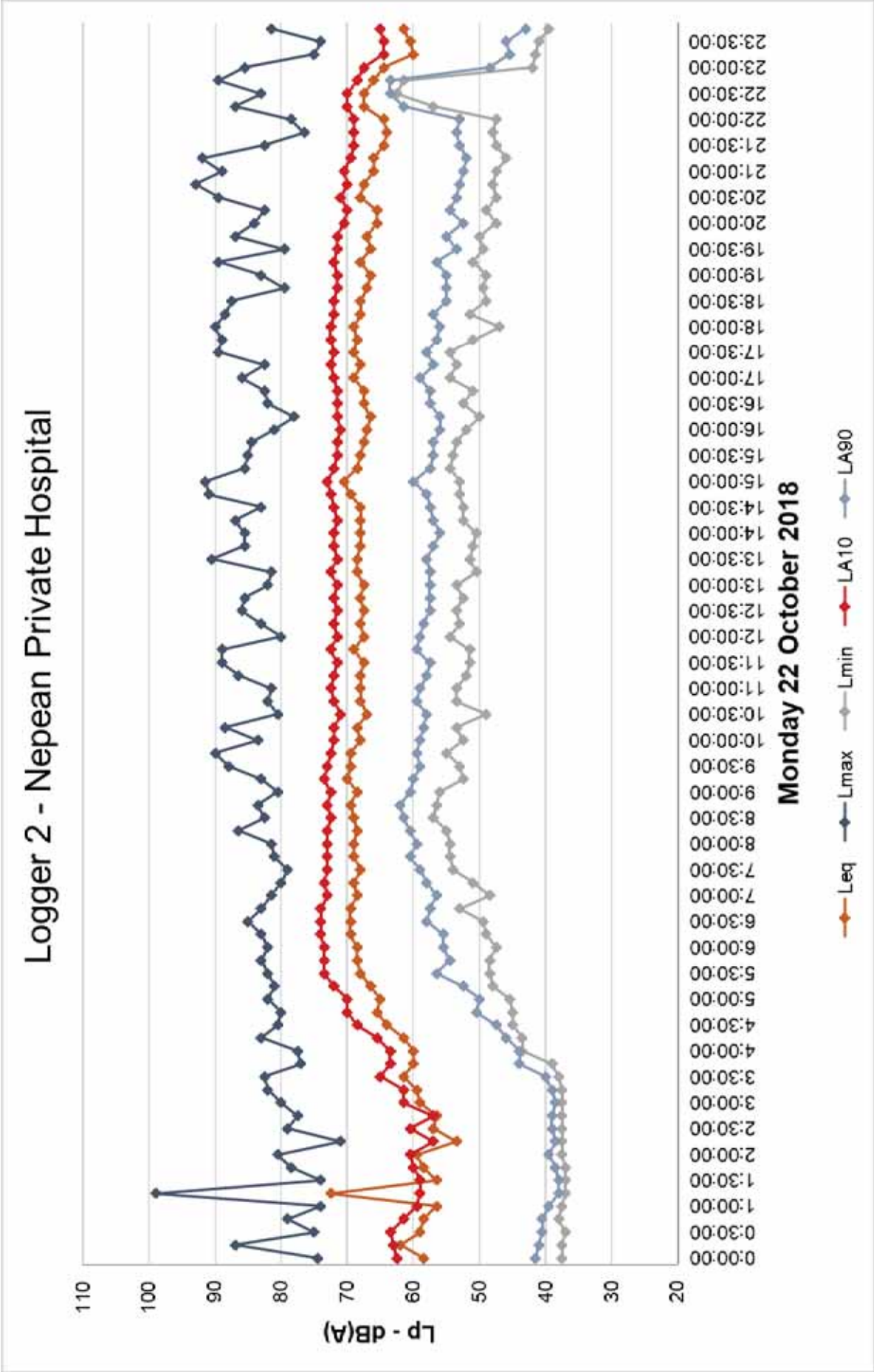
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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Monday 22 October 2018
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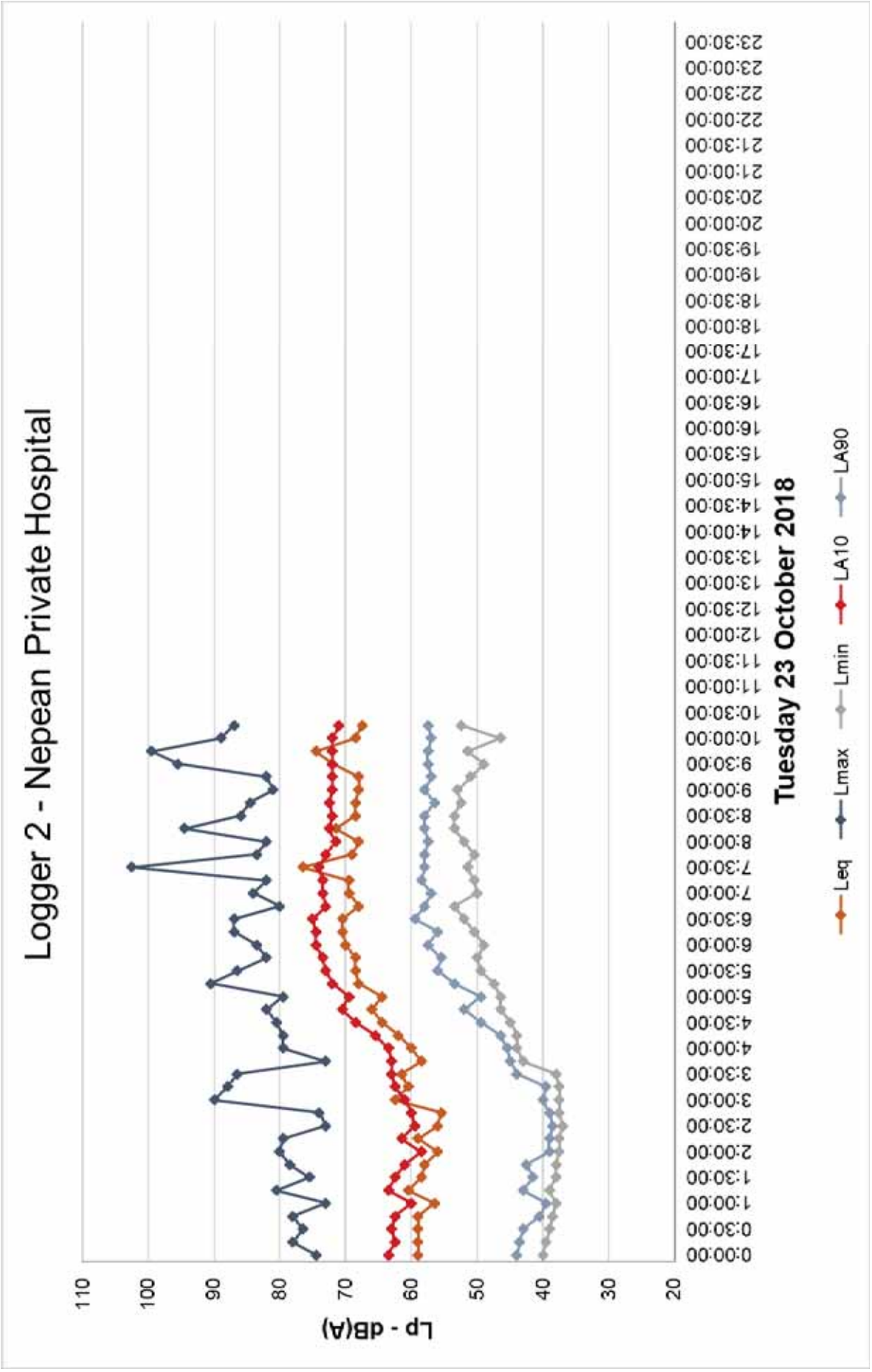
Logger 2 - Nepean Private Hospital
Lp - dB(A)
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Appendix E.

EP Risk Pty Ltd – Soil Contamination Report – dated 20th November 2018

Soil Contamination Assessment

Nepean Private Hospital Expansion Stage 1, 1-9 Barber Avenue, Kingswood, NSW

Prepared for: Johnstaff Projects

EP0991.001 v3 20 November 2018

APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

APPROVED COMPANY AS/NZS 4801 OH&S Management Systems QMS Certification Services

APPROVED COMPANY ISO 14001 Environmental Management Systems QMS Certification Services

EP RISK

Soil Contamination Assessment

Nepean Private Hospital Expansion Stage 1, 1-9 Barber Avenue, Kingswood, NSW, 2747

Johnstaff Projects (NSW) Pty Ltd
Level 12, 70 Pitt St
Sydney NSW 2000
Via Email: nikki.duff@johnstaff.com.au

20 November 2018

Ref: EP0991.001 v3

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QUALITY CONTROL

Version	Author	Date	Reviewer	Date	Quality Review	Date
v.1	M. Burcher	06.11.2018	K. Guenther	06.11.2018	K. Guenther	06.11.2018
v.2	M. Burcher	16.11.2018	K. Guenther	16.11.2018	K. Guenther	16.11.2018
v.3	M. Burcher	20.11.2018	Minor edit, exclusion of reference to Stage 2			

DOCUMENT CONTROL

Version	Date	Reference	Submitted to
v.1	*06.11.2018*	*EP0991_Johnstaff_Nepean Hospital_SCA_v1*	*Johnstaff Projects (NSW) Pty Ltd*
v.2	*16.11.2018*	*EP0991_Johnstaff_Nepean Hospital_SCA_v2*	*Johnstaff Projects (NSW) Pty Ltd*
v.3	*20.11.2018*	*EP0991_Johnstaff_Nepean Hospital_SCA_v2*	*Johnstaff Projects (NSW) Pty Ltd*

Executive Summary

Johnstaff Projects (NSW) Pty Ltd ('the Client') engaged EP Risk Management Pty Ltd ('EP Risk') on behalf of Healthscope Operations Limited ('Healthscope') to undertake a Soil Contamination Assessment ('SCA') of the property located at 1-9 Barber Avenue, Kingswood, NSW, 2747 ('the Site').

The Site is legally described as Lot 100 in Deposited Plan ('DP') 701623, Lot 1 in DP 1093052 and Lot 90 in DP 1009692, which covers an area of approximately 8,523 m^2 ('the Investigation Area').

It is understood the client has been engaged by Healthscope to deliver the extension of the existing Nepean Private Hospital, which will comprise of a number of stages. Early stages involving a site strip and re-contouring of the site for construction of a new car park and building, which will involve both early and main earthworks packages. The client has requested EP Risk undertake a site contamination assessment in order to satisfy the requirements of the development application ('DA') conditions.

The summary of the findings of the SCA are as follows:

- Based on a review of available aerial photographs and historical titles, the Site comprised farm land and residential properties in 1943 which was progressively redeveloped to residential properties to circa 1965. A commercial property was built in the centre of the Site circa 1982 which appears to have been owned by the Baptist Union of New South Wales. Circa 1991 to circa 2016, residential dwellings on the Site were gradually demolished and replaced with on grade car parks, resulting in the present configuration of the lot.
- No notable leases were identified during the review of available historical title information.
- The area to the north of the Site was developed into commercial properties circa 1982, this included numerous motor garages and service stations. The Nepean hospital was developed circa 1956 south of the Site and expanded north towards the Site, over predominantly undeveloped land, through to circa 2002. No signs of heavy industrial activities were noted in the aerial photographs on properties immediately surrounding the Site.
- No signs of heavy industrial activity were noted in the aerial photographs on properties immediately surrounding the Site. All identified potentially contaminating sites were considered not to pose a significant off-site risk of contamination due to the proximity to the subject Site and assumed position down and/or cross-hydraulic gradient to the Site.
- The Site falls within the high potential salinity data coverage for the Department of Infrastructure, Planning and Natural Resources map of the Salinity Potential in Western Sydney (2002), EP Risk has referenced the Western Sydney Regional Organisation of Councils Ltd ('WSROC') Western Sydney Salinity Code of Practice (2003, Amended 2004) for appropriate saline soil management strategies for the Site.
- A small portion of the eastern side of the Site is classified as Cumberland Shale Plains Woodland. Due to the nature of past and proposed activities on site it is considered the risk to this ecosystems health due to on-site contamination is low.
- No evidence of UST's were observed at the Site.

- The soil sampling program was designed to allow for a sufficient characterisation including a desktop study of soil conditions across the Site. All soil samples reported metals TRH, BTEX, PAH, OCP, OPP and PCB concentrations to be below applicable human health criteria and/or the laboratory reporting limits. Asbestos was not detected in the soil samples analysed above the limit of reporting.

Overall, results from the SCA would not preclude the Site from the proposed future development of the Site under a commercial / industrial land use. However, bonded (non-friable) asbestos containing materials ('ACM') were observed on the surface the Site. Consequently, EP Risk recommends a surface scrape of the surficial soils (0.0 – 0.1 mBGL) and clearance by a Licenced Asbestos Assessor.

Additionally, it is recommended an Unexpected Finds Procedure is implemented during any excavation activities on the Site. Furthermore, where any Site materials require disposal these should be assessed either in accordance with the NSW EPA *Waste Classification Guidelines Part 1: Classifying Waste* or any current Resource Recovery Orders made under the *Protection of the Environment (Waste) Regulation 2014*.

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1 Introduction

Johnstaff Projects (NSW) Pty Ltd ('the Client') engaged EP Risk Management Pty Ltd ('EP Risk') on behalf of Healthscope Operations Limited ('Healthscope') to undertake a Soil Contamination Assessment ('SCA') of the property located at 1-9 Barber Avenue, Kingswood, NSW, 2747 ('the Site').

The Site is legally described as Lot 100 in Deposited Plan ('DP') 701623, Lot 1in DP 1093052 and Lot 90 DP 1009692, which covers an area of approximately 8,523 m^2 ('the Investigation Area') (**Figure 1 and Figure 2**).

It is understood the client has been engaged by Healthscope to deliver the extension of the existing Nepean Private Hospital Expansion Stage 1. Early stages involving stripping the Site and re-contouring for construction of a new multi-storey car park building.

The client has requested EP Risk undertake a site contamination assessment in order to satisfy the requirements of the development application ('DA') conditions.

1.1 Objectives

The primary objectives of the SCA were to:

- Identify past and present potentially contaminating activities based on a Site history search.
- Identify potential contamination issues based on the potentially contaminating activities.
- Discuss the Site condition based on the above.
- Develop an understanding of the soil contamination status at the Site.
- Assess the laboratory data in accordance with NEPM 2013[1] to preliminarily assess whether the Site is suitable for the proposed commercial / industrial land use.

1.2 Scope of Work

The scope of work completed was performed in general accordance with the EP Risk's fee proposal (ref: EP11790_v1, dated 19 September 2018), which comprised:

- Preliminary Site Investigation Review of the site history based upon:
    - Council and regulatory records;
    - Review of the Council Section 10.7 certificate (former section 149);
    - SafeWork NSW Dangerous Goods Search;
    - Historical and current land title records;
    - Historical aerial photographs; and
    - Geological and hydrogeological information.
- Identification of areas and contaminants of potential concern ('CoPC') for the Site based upon historical land uses.

[1] National Environmental Protection Council (NEPC), National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 (April 2013) (NEPM 2013).

Soil Assessment

It is not possible without undertaking a comprehensive site history study and identification of contaminants of potential concern ('CoPC') to accurately determine the scope of work required to assess the nature and extent of soil and groundwater contamination on the site. In the absence of this information EP Risk proposes the following interim scope of work for the SCA based on minimum sampling requirements for a Site approximately 8,523 m^2 in area:

1. Application for Dial Before You Dig ('DBYD') plans.
2. Preparation of a health and safety plan ('HASP') and safe work method statement ('SWMS') for the works.
3. Undertake underground service location of up to twenty (20) proposed sampling locations in a gridded sampling pattern across accessible locations within the Investigation Area.
4. Advance a minimum of twenty (20) boreholes using a track mounted drill rig and collection of soil samples from 0.15 m, 0.5 m, 1.0 m and every 1.0 m thereafter until a maximum target depth of 4.0 metres below ground level ('mBGL'), 1.0 metres into natural soils or bore refusal (whichever is encountered first). Boreholes will be backfilled with soil cuttings and reinstated to former ground condition, as near as possible. Where visible indications of contamination (stains, odours, anthropogenic materials, etc) are observed boreholes may be extended deeper following approval in writing by Johnstaff.
5. Screening of samples using a photoionisation detector ('PID').
6. Analytical testing of selected soil samples (including QA/QC samples) for the CoPC as identified within Table 2 by a National Association of Testing Authorities ('NATA') accredited laboratory for the required analysis.
7. Preparation of a SCA report in general accordance with OEH 2011 including the PSI component.

1.3 Site Identification

Pertinent Site identification details are presented in **Table 1**.

Table 1 – Site Identification

Item	Description
Address	Nepean Private Hospital Expansion Stage 1, 1-9 Barber Avenue, Kingswood, NSW, 2747
Legal Description	Lot 100 in DP 701623; Lot 1 in DP 1093052; and Lot 90 in DP 1009692.
Approximate Area	8,523 m^2
Municipality	Penrith City Council
Zoning	B4 – Mixed Use

2 Site History Review

The majority of information provided in the following sections was obtained from Lotsearch Environmental Risk and Planning Report (2018)[2]. A copy of the report is attached as **Appendix A.**

2.1 Sources of Information

The Site history sources utilised during the review include:

- Council and regulatory records.
- Historical aerial photography from the years 1943, 1956, 1961, 1965, 1970, 1982, 1991, 2002, 2009, 2016 and 2018.
- Historical certificates of title.

2.2 Council and Regulatory Records

A summary of the information available through publicly available records is summarised below.

Table 2 – Council and Regulatory Records Search

Database	Findings
Topography and Elevation	The approximate elevation of the Site was between 54 and 50 metres Australian Height Datum ('AHD'). The local topography of the Site was a slight grade towards the north-east of the Site.
Geology	According to the NSW Department of Industry, Resources & Energy (Penrith Geological Sheet 9030,1991) 1:100,000 map sheet the Site was underlain by Bringelly Shale (Wianamatta Group - Undifferentiated), Middle Triassic aged medium to coarse grained lithic sandstone, rare coal and tuff.
Soil Landscapes	According to the NSW Office of Environment and Heritage ('OEH'), Soil Landscapes of Penrith 1:100,000 sheet, all soil landscapes within 1 km of the site have been identified as being Luddenham Erosional.
Hydrogeology	Eleven (11) registered groundwater bores were identified within 2 km of the Site none of which were on-site. The closest was 772 m north of the Site. The majority of the groundwater bores were used for private monitoring and local government monitoring purposes. Two (2) monitoring bores were for recreation purposes. Depth of monitoring bores ranged from 2.85 to 210 metres below ground level ('mBGL'). Standing water levels ranged from 6.00 to 69.00 mBGL, where measured. The inferred groundwater flow direction is west based on the topography of the region and the proximity of the site to the Nepean river approximately 2 km to the west.
Acid Sulfate Soils	Topographic Data from the CSIRO's Atlas of Australian Acid Sulfate Soils indicated the Site is located within an area of Class C Acid Sulfate Soil. There is an extremely low (1 - 5%) probability of occurrence of Acid Sulfate Soils onsite.
Mining Subsidence	No Mining Subsidence Districts have been identified within 1 km of the Site.
Coastal Protection Act 1979	The land was not subject to the operation of SEPP 14 or SEPP 71 of the Coastal Protection Act 1979.

[2] Lotsearch Environmental Risk and Planning Report, 1-9 Barber Avenue, Kingswood, NSW 2747 (ref: LS004326 EP).

Table 2 – Council and Regulatory Records Search

Database	Findings
Contaminated Land	The Site was not listed as contaminated under the Contaminated Land Management Act ('CLM Act') 1997. As of 10 October 2018, the Site was not on the NSW Environment Protection Authority ('NSW EPA') database for Contaminated Sites notified to the NSW EPA in accordance with the CLM Act 1997. There was one (1) site notified to the NSW EPA within 1 km of the Site: • 7-Eleven Service Station Penrith, 30 Henry Street, Penrith, 763 m north west of the Site. Regulation under the CLM Act 1997 not required. Based on inferred groundwater flow in a general westerly direction, this property is considered to be down hydraulic gradient to the Site. Due to the distance of this property to the Site and the down gradient location, it is unlikely this site poses a potential soil and/or groundwater contamination off-site source.
State Environmental Planning Policy ('SEPP') Major Developments	There were no records of SEPP Major Developments identified within 1 km of the Site.
SEPP Strategic Land Use Areas	There were no records of SEPP Strategic Land Use Areas identified within 1 km of the Site.
Former Gasworks	There were no records of former gasworks facilities identified within 1 km of the Site.
Waste Management Facilities	There were no records of waste management facilities within 1 km of the Site.
Underground Petroleum Storage System (UPSS) Sensitive Zones	The Site is located in a regulated UPSS Sensitive Zone. The identification of a sensitive zone is based on the proximity of service station UPSS to sensitive land uses such as residential. Any contamination associated with nearby service stations would likely be the responsibility of the service station owner and therefore not a significant risk to the Site.
Licensed Activities Under the POEO Act 1997	Two (2) records of licensed activities under the Protection of the Environment Operations (POEO) Act 1997 were identified within 1 km of the Site: • Sydney Trains operate a railway system 56 m north of the Site. • Lendlease Engineering Pty Ltd are constructing a road 734 m south of the Site. The licensed activities are considered to have a minimal contamination risk due to the distance from the Site and nature of the activities and as such are unlikely to poses an offsite source of contamination.

Table 2 – Council and Regulatory Records Search

Database	Findings
Delicensed Activities Still Regulated by NSW EPA	One (1) delicensed activity still regulated by the NSW EPA was identified on-site: • Healthscope Operations Pty Ltd - Hazardous, Industrial or Group A waste generation or storage. One (1) delicensed activity still regulated by the NSW EPA was identified within 1 km of the Site: • Sydney West Area Health Service, 20 m south of the Site - Hazardous, Industrial or Group A waste generation or storage. These delicensed activities are likely due to the operation of a hospital and storage of medical waste and various chemicals and gasses. The onsite building has since been removed and is not considered to pose a significant contamination risk to the Site based on the nature of the activities.
Former Licensed Activities under the POEO Act 1997, now Surrendered	There were three (3) licensed activities under the POEO Act 1997, identified within 1 km of the Site: • Luhrmann Environmental Management conducted other activities/non-scheduled activity – application of herbicides in various waterways 648 m from the Site. • Robert Orchard conducted other activities/non-scheduled activity – application of herbicides in various waterways 648 m from the Site. • Sydney Weed & Pest Management Pty Ltd conducted other activities/non-scheduled activity – application of herbicides in various waterways 648 m from the Site. The former licensed activities identified surrounding the Site were not considered to pose a significant contamination risk to the Site based on the nature and proximity of the activities to the Site.
Historical Business Directory Records	According to the 1982, 1986 and 1991 Universal Business Directories (UBD) nine (9) motor garages and/or service stations were identified within 1 km of the Site. The nearest businesses to the subject Site were Roberts M. (1982), 119 m to the north east. All sites were located to the east or north east and are considered not to pose a significant off-site risk of contamination due to their proximity to the subject Site and assumed position cross-hydraulic gradient of the Site.
Heritage	There were no state heritage items and fifteen (15) local heritage items identified within 1 km of the Site.
Bushfire Prone Area	The Site is not listed as a bush fire prone area, however two (2) bushfire prone areas were identified 566 m and 666 m north of the Site
Dryland Salinity	There is no dryland salinity national assessment data on-site or within a 1 km radius. However, according to the NSW Office of Environment and Heritage: Dryland Salinity Potential of Western Sydney dataset, the majority of the site has been classified as having a high salinity potential with the north western corner of the site having a moderate salinity potential. Two (2) areas of known salinity were also identified 36 m east and 45 m south east of the Site.
Ecology	According to the NSW Office of Environmental and Heritage, the majority of the site has no ecological constraints comprised of Remnant Vegetation of the Cumberland Plain, with the exception of a small section to the west of the site, listed as Shale Plains Woodland. One (1) groundwater dependant ecosystem was identified 652 m to the north of the site. This ecosystem is also listed as having a high (9-10) likelihood of inflow dependence. No RAMSAR wetlands existed on Site or within 1 km of the Site.

2.3 Saline Soils

The Site falls within the high potential salinity data coverage for the Department of Infrastructure, Planning and Natural Resources map of the Salinity Potential in Western Sydney (2002), EP Risk has referenced the Western Sydney Regional Organisation of Councils Ltd ('WSROC') Western Sydney Salinity Code of Practice (2003, Amended 2004) for appropriate saline soil management strategies for the Site.

Dryland Salinity Hazard / Risk

Due to the high potential for occurrence of saline soils on the Site, the probability land or water salinity may further develop or adversely impact future developments on the Site if certain management practices or land-use changes occur is high. As such, consideration to salinity levels affecting construction or any disturbance of the water table during construction should be made during proposed development works.

In accordance with the WSROC (2004), for multi lot developments the requirement for detailed site-specific investigations are required to provide appropriate management options. The WSROC (2004) recognises there are a number of sites which are slightly larger than a standard single lot, but which are still relatively 'small' developments (such as the subject Site). For such sites, the requirement to undertake full site investigations and to produce a salinity management plan may be onerous. Such sites are better managed by implementing on-site salinity management responses and strategies.

The need for further detailed investigation of the Site may not be considered necessary, provided management strategies outlined in **Section 10** are followed.

2.4 Planning Certificates Under Section 10.7

The Penrith LEP 2010 identifies the land as Zone B4 Mixed Use. A copy of the Section 10.7 certificate for Lot 100 in DP 701623 is provided as **Appendix B** and is considered indicative of the entire Site.

A review of the information provided in the Section 10.7 (18/05347) certificate indicates:

- The land is not significantly contaminated land.
- The land is not within a conservation area and does not include or comprises critical habitat.
- The land does not hold any items of Local or State environmental heritage.
- The land is not reserved for a public purpose.
- The land is not affected by policies adopted by the Council that restricts the development of the land due to the potential for land slip, subsidence, bushfire, flooding or acid sulfate soils.
- The land is not below the adopted flood planning level and as such is generally not subject to flood related development controls; subject to the Councils discretion.
- The land has not been proclaimed to be a mine subsidence district.
- The land is not affected by road widening and/or road realignment.

- The land is not part of Biodiversity Certified Land under Part of the Biodiversity Conservation Act 2016.
- The land is not subject to a biobanking agreement.
- The land has not been identified as bushfire prone land.
- Council has not been notified of an order which has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

The following matters are prescribed by Section 59 (2) of the Contaminated Land Management Act 1997 and indicated that:

- The land is not declared to be significantly contaminated land.
- The land is not subject to a management order or approved voluntary management proposal.
- The land is not the subject of an ongoing maintenance order.
- Council has not identified that a site audit statement has been received.

2.5 Review of Historical Aerial Photos

Aerial photographs of the property from 1943 to 2018 were reviewed, and a summary is provided in **Table 3**. Historical aerial photographs are included as part of the report provided as **Appendix A**.

Table 3 – Historical Aerial Photograph Review

Year	Description
1943	**Property:** The Site comprised a number of semi-rural residential properties with significant areas of cleared land that may have been used for farming. **Surrounds:** Mostly undeveloped cleared land, some residential properties to the west and potential farms to the north. A storage tank was located to the north west, for what appears to be water. Train line to the north.
1956	**Property:** No significant change has occurred. **Surrounds:** A silo or water tower has been developed at the storage site located to the north west. Development of Nepean hospital to the south of the Site.
1961	**Property:** A number of residential buildings have been constructed in the western and southern portions of the site **Surrounds:** A number of residential properties have been developed to the west of the Site. Further development of the hospital to the South. Development of an industrial area to the north.
1965	**Property:** Development of 1 additional residential property on the eastern side of the Site. **Surrounds:** Development of commercial property to the north of the Site.
1970	**Property:** No significant change has occurred. **Surrounds:** Further development of commercial/industrial properties to the north of the Site
1982	**Property:** Development of a commercial property on the centre of the Site. **Surrounds:** Significant development of commercial properties (motor garages and/or service stations) to the north of the site where farmland was previously. Further development of the hospital south of the Site. Storage facility to the north west has been demolished.
1991	**Property:** Residential property demolished, near the centre of the Site **Surrounds:** Further development of the hospital south and east of the Site

Table 3 – Historical Aerial Photograph Review

Year	Description
2002	**Property:** Car park developed near centre of Site and on the eastern side of the Site **Surrounds:** Further development of the hospital south and east of the Site. Increased density of residential housing to the west.
2009	**Property:** Residential properties on the western side of the property have been demolished **Surrounds:** Increased density of residential housing to the west.
2016	**Property:** All remaining properties on the site have been demolished and replaced with car parks. **Surrounds:** Consolidation of some residential property and redevelopment as commercial properties to the west of the Site.
2018	**Property:** No significant change has occurred. **Surrounds:** No significant change has occurred.

The historical aerial photographic review indicated the following:

- The Site comprised of farm land and residential properties in 1943 which was progressively redeveloped to residential properties to circa 1965.
- A commercial property was developed on site circa 1982 which appears to have been owned by the Baptist Union of New South Wales.
- Circa 1991 to circa 2016, properties were gradually demolished and replaced with car parks.
- In 1943 the surrounding area comprised of mostly empty land which was progressively developed with residential properties to the west to circa 1970 including. From 1970 to circa 1982 there was significant development of commercial properties to the north of the site, including motor garages and/or service stations. Circa 1956 the Nepean hospital was developed to the South of the Site and has expanded north towards the Site, over predominantly undeveloped land, through to circa 2002.

2.6 Historical Title Search

A review of historical title information for the Site is summarised below with reference to Lot 100 DP 701623. The historical title search information is attached as **Appendix C.**

- The Site was originally owned by Francis Jenkins Weston, gentleman, from 1989 to 1906.
- The Site was then owned by numerous proprietors between 1906 and 1984, including a butcher, carrier, labourer, a solicitor and the Baptist Union of New South Wales.
- The Baptist Union of New South Wales owned the land from 1984-1999 when it became the Baptist Churches of New South Wales Property Trust and continued to hold the land until 2012.
- Aesthete No. 3 Pty Limited, a hairdressing company, owned the land from 2012-2018.
- Healthscope Operations Pty Limited acquired the land in 2018 and is the current owner.

No notable leases identified during the review of available historical title information.

2.7 Previous Environmental Investigations

At the time of writing, no previous environmental reports were provided for review.

2.8 SafeWork NSW Dangerous Goods Search

At the time of submission of this report a SafeWork NSW Dangerous Goods Search had been submitted pending release of the findings in an addendum version of this report to be issued as soon as made available.

2.9 Site History Summary

Based on a review of available aerial photographs and historical titles, the Site comprised farm land and residential properties in 1943 which was progressively redeveloped to residential properties to circa 1965. A commercial property was built in the centre of the Site circa 1982 which appears to have been owned by the Baptist Union of New South Wales which was likely a former part of the hospital and is not considered to be a likely source of contamination. Circa 1991 to circa 2016, properties were gradually demolished and replaced with car parks, resulting in the present configuration of the lot.

In 1943, the majority of the surrounding land was either undeveloped or farm land. The area west of the Site was continually developed into residential properties from circa 1961 to 2009, increasing in density over time. Much of the area to the north of the Site was developed into commercial properties circa 1982, this included motor garages and/or service stations. Due to the proximity to the subject Site and assumed position cross-hydraulic gradient to the Site, these developments are considered not to pose a significant off-site risk of contamination. the Nepean hospital was developed circa 1956 south of the Site and expanded north towards the Site, over predominantly undeveloped land, through to circa 2002.

No signs of heavy industrial activity were noted in the aerial photographs on properties immediately surrounding the Site.

3 Site Condition and Surrounding Environment

3.1 Site, Parent Property and Surrounding Inspection

On 15 and 16 October 2018 EP Risk field personnel conducted an inspection of the Site and immediate surroundings during intrusive sampling works. The following features were observed:

- The Site comprised of two (2) bitumen covered carparks on the eastern and western sides of the Site and a central area of vacant land containing an old concrete slab surrounded by grassy areas.
- The Site was immediately surrounded by the Great Western Highway to the north with a train line across the road, Parker Street and residential properties to the west, and existing Nepean Hospital buildings to the south and east.
- The Site was suspected to contain imported fill materials underneath the paved carpark as well as in the surficial layer of the grassed area in the northern area. A layer of approximately 0.1 m to 0.5 m thickness of fill materials were observed across the Site.
- Five (5) pieces of bonded (non-friable) asbestos containing materials ('ACM') were observed at the eastern side of the Site on the surface of the assessment area. No bonded ACM was visually observed within the 20 bore holes undertaken during the investigation. No friable (<7 mm in size) or trace (respirable) asbestos was detected within the 20 soil samples collected and analysed.
- Surface cover comprised of concrete hardstand, paved pedestrian footpaths and a grassed area in the central portion of the Site.
- The topography of the Site appeared to be consistent with surrounding properties, dropping in elevation in the western portion of the Site.
- There was no evidence of underground fuel storage infrastructure observed on-site.
- A hazardous chemicals storage container was observed adjacent to the southern side of the Site.
- There was no observed staining, odour, pooled liquid, fly tipping, stressed vegetation or any other visible evidence of contamination at the Site or surrounding area, at the time of inspection.

Site photographs taken during the Site inspection and soil sampling are provided as **Appendix D**.

3.2 Surrounding Land Use

The Site is located on the corner of the Great Western Highway and Parker Street and is predominantly surrounded by residential property to the west, commercial properties and a railway line to the north and Nepean hospital buildings to the south and east.

As of 2 November 2018, land uses surrounding the Site comprised the following:

To the North

- Great Western Highway;
- Railway line; and
- Commercial properties beyond the railway line.

To the South

- Nepean Hospital

To the East

- Residential properties; and
- Some commercial properties.

To the West

- Parker Street; and
- Residential properties, including some high-density residential apartments.

4 Conceptual Site Model

The following conceptual site model ('CSM') identifies potential source-pathway-receptor ('SPR') linkages in consideration of the Site history, Site inspection and current and proposed land uses. A SPR linkage occurs where there is a contamination source, a pathway and a receptor present.

4.1 Potential Sources

Potential on and off-site contaminating activities, contamination sources and CoPC are summarised in **Table 4**.

Table 4 – Potential Contamination Sources

Source	Potential Contaminating Activity	CoPC
On-site	Potential historically imported fill of unknown origin and quality	Metals, TRH, BTEX, PAH, PCB, OCP, OPP and asbestos
	Poor demolition practices of former on-site buildings	Asbestos and Lead (Pb)
	Historical storage of potentially hazardous chemicals associated with operation of hospital	Metals, TRH, BTEX, PAH, PCB, volatile organic compounds ('VOCs') and semi-volatile organic compounds ('SVOCs')
Off-site	Surface water runoff	TRH, BTEX, PAH, heavy metals and VOC.
	Historical storage of potentially hazardous chemicals associated with operation of hospital	Metals, TRH, BTEX, PAH, PCB, volatile organic compounds ('VOCs') and semi-volatile organic compounds ('SVOCs')

4.2 Potential Affected Media

The potential affected media are soil and soil pore vapour.

4.3 Human and Ecological Receptors

Based on the current use of the site, potential receptors and exposure pathways identified comprise:

- On-site receptors:
  - Site visitors.
  - Hospital patients.
  - Commercial and hospital workers.
  - Construction and maintenance workers.
- Off-site receptors:
  - Residents, maintenance workers and visitors at commercial and residential properties, hospital patients.
  - Current and future terrestrial flora and fauna in the nearby areas.

4.4 Potential and Complete Exposure Pathways

Presently there is access to exposed soil however the proposed development would cover the soil with concrete and/or bitumen leaving minimal access to soil on-site.

Therefore, there is a direct dermal, inhalation and ingestion pathway for workers on site during construction however the lack of accessible soil, once construction is complete, eliminates the direct dermal contact, inhalation and ingestion exposure pathway for future Site users.

4.5 CSM Summary

The site was previously used for a number of residential buildings which have been demolished. Building waste and fragments of bonded (non-friable) ACM observed on the soil surface in the north eastern side of the Assessment Area. Therefore, there is a potential human health risk in this area if the ACM is disturbed.

The potential risk to human health during construction from potential soil contamination from surface water run-off from the adjacent Great Western Highway is considered to be low, due to the presence of drainage systems on the northern edge of the site adjacent to the highway and the likely low concentration of contaminants present in the run-off.

5 Data Quality Objectives

To assess whether an appropriate sampling strategy was adopted for the assessment, EP Risk has adopted the data quality objectives ('DQOs') planning process as:

- Recommended in NEPM 2013;
- Required within the NSW Department of Environment and Conservation 2017, *Guidelines for the NSW Site Auditors Scheme* (3rd edition) (NSW EPA, 2017);
- With consideration to technical details outlined in United State Protection Agency: *Guidance on Systematic Planning Using the Data Quality Objectives Process*, ref: EPA QA/G-4 (US EPA, 2006): and
- AS 4482.1 2005, *Guide to the investigation and sampling of sites with potentially contaminated soil – Part 1: Non-volatile and semi-volatile compounds.*

State the Problem

The soil contamination assessment ('SCA') is required to assess the contamination status of the Site prior to construction of the proposed three-storey carpark building and on-grade carpark (commercial land use).

Identify the Decision

To assess the soil conditions at the Site, the following decisions need to be addressed:

- Is there sufficient information to adequately characterise any contamination which may be present?
- Do the findings provide a higher degree of certainty of the source of identified contamination?

Identify Inputs into the Decision

The inputs required to make the decision include the following:

- Site visit;
- Geological data;
- Visual observations of staining, odours; and
- Concentrations of the COPC in soil.

Define the Boundaries of the Study

The spatial boundaries of the assessment comprise Lot 100 in Deposited Plan ('DP') 701623, Lot 1 in DP 1093052 and Lot 90 DP in 1009692 (approximate are of 8,523 m^2), with a maximum proposed depth for the investigation was set at 2.2 mBGL, in natural soil, with the approximate boundaries identified in **Figure 2**.

Develop a Decision Rule to Identify the Decision

The adopted site assessment criteria for the contaminants of concern are outlined in **Section 6** and presented in the attached **Analytical Tables**. These criteria have been adopted to determine whether additional assessment is required and whether the Site is suitable for the proposed land use. The following decision statements for analysis of the results were adopted with respect to the adopted criteria:

Soil Investigation Levels

I. Where the data sets are not sufficiently populated to allow calculation of the 95% upper confidence limit ('UCL_{mean}') then the individual results must be less than the adopted criteria. If all the individual results are below the adopted criteria, then no additional assessment and/or management is required. Where individual results exceed that adopted criteria, then further assessment and/or management is required.

II. In accordance with the ASC NEPM (2013), where 95% UCL_{mean} of the average concentration for each soil analyte can be calculated, then the 95% UCL_{mean} must be below the adopted criteria; no single analyte concentration exceeds 250% of the adopted criteria; the standard deviation of the results must be less than 50% of the adopted criteria; and the normal distribution will only be used where the coefficient of variance is not greater than 1.2. Where 95% UCL_{mean} results exceed the aforementioned criteria, then further assessment and/or management is required.

Specify Acceptable Limits of Decision Errors

The acceptable limits will be as follows:

I. Individual or 95% UCL_{mean} concentrations are below the adopted criteria.

II. 95% of the data will satisfy the Data Quality Indicators (DQIs) which were determined for completeness, representativeness, precision and accuracy of both field and laboratory data. Therefore, the limit on the decision error will be 5% that a conclusive statement may be incorrect.

III. A comprehensive Quality Assurance/Quality Control (QA/QC) program will be undertaken including representative sampling and sampling at an appropriate density for the purpose of the investigation.

The acceptable limit of error for sampling techniques and laboratory analysis is defined by the DQIs as follows:

Data Representativeness

Expresses the accuracy and precision with which sample data represents an environmental condition. Data representativeness is achieved by the collection of samples at an appropriate pattern and density as well as consistent and repeatable sampling techniques and procedures.

Completeness

Refers to, the percentage of data that can be considered valid data. Sufficient data is required to enable an assessment of the Decision Rules.

Comparability

A qualitative comparison of the confidence with which one data set can be compared to another. This is achieved through consistent sampling and analytical testing and reporting techniques.

Precision

Is a measure of the reproducibility of on measurements under a given set of conditions. The relative percent difference (RPD) has been adopted to assess the precision of data between duplicate sample pairs according to the following equation.

$$RPD\% = \frac{[\mathrm{Cp} - \mathrm{Cd}]}{\mathrm{Cp} + \mathrm{Cd}} \times 200$$

Where:
Cp = Primary sample
Cd = Duplicate Sample

An acceptance criterion of ±30% had been adopted for inorganic field duplicates and triplicates and ±50% for organic field duplicates and triplicates. However, it should be noted that exceedances of these criteria are common for heterogeneous soil or fill or for low analyte concentrations.

Accuracy

Is a measure of the bias in the analytical results and can often be attributed to: field contamination; insufficient preservation or sample preparation; or inappropriate analytical techniques. Accuracy of the analytical data is assessed by consideration of laboratory control samples, laboratory spikes and analytical techniques in accordance with appropriate standards.

Optimise the Design for Obtaining Data

A judgemental based sampling pattern was designed based on the results of the desktop investigations. A comprehensive suite of COPC was selectively adopted for assessment to provide characterisation of the status of soil contamination (if any). The adopted sampling approach is consistent with AS4482.1 (2005).

6 Assessment Criteria

To assess the potential risk to human health posed by site conditions, soil analytical results are compared to published investigation and screening level criteria. The NSW and Australian framework against which soil analytical results are compared to is detailed herein.

6.1 Soil Assessment Criteria

For the purposes of assessing the results of analytical testing of soils at the Site, the following guidelines were considered:

- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (Third Edition); and
- National Environment Protection Council (NEPC) 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013) ('ASC NEPM, 2013').

Soil concentrations were compared against the following soil investigation levels ('SILs'):

- **Health-based Criteria for the current and proposed land use**: ASC NEPM (2013) Health Investigation levels ('HILs') for commercial/industrial land use and the Health Screening Levels (HSLs) for Direct Contact ('HSLs').
- **Management Limits**: ASC NEPM (2013) Management Limits for commercial/industrial land use ('Management Limits').

Given the Site is proposed to be re-developed for a multi-level carpark with minimal to no access to soils, reported concentrations will not be compared to the ASC NEPM (2013) Ecological Screening Levels ('ESLs') and Ecological Investigation Levels ('EILs') for commercial/industrial land use.

7 Quality Assurance / Quality Control

7.1 Data Quality Indicators

The data quality objectives, requirements and indicators for the assessment are summarised **Table 5**.

Table 5 – DQO, Requirements and Indicators

QC Element	Frequency	Acceptance Criteria
Precision		
Standard operating procedures appropriate and complied with	The sampling methods comply with industry standards and guidelines	Meet Requirement
Laboratory duplicates	Minimum of 1 per batch per analyte	RPDs < 50%
Intra-laboratory Duplicates	1 per 20 samples	No, see Section 7.3
Inter-laboratory Duplicates	1 per 20 samples	No, see Section 7.3
Accuracy		
Laboratory matrix spikes	1 per batch per volatile / semi volatile analyte	Recoveries 70% to 130%
Laboratory surrogate spikes	1 per volatile / semi-volatile analyte sample (as appropriate)	Recoveries 70% to 130%
Laboratory method blanks	At least 1 per batch per analyte tested for	Result < limit of reporting
Trip blanks	1 per day	Result < limit of reporting
Rinsate blanks	1 per day	No, see Section 7.3
Representativeness		
Sampling methodology	Appropriate for the sample type and analytes	Meet requirement
Samples extracted and analysed within holding times	Specific to each analyte	Meet requirement
Field equipment calibration	All field equipment calibrated and calibration records provided.	Meet Requirement
Comparability		
Sampling approach	Consistent for each sample	Meet requirement
Analysis methodology	Consistent methodology for each sample	Meet requirement
Handling conditions and sampler	Consistent for each sample	Meet requirement
Field observations and analytical results	Field observations to support analytical results	Meet requirement
Consistent laboratory reporting limit	Consistent between primary and secondary laboratories	Meet requirement
Completeness		
Chain-of-custody documentation	Appropriately completed	Meet requirement
Field sampling documentation	Appropriately completed	Meet requirement
Satisfactory QA/QC procedures	In accordance with relevant guidance	Meet requirement

7.2 Quality Assurance

QA measures included:

- Using experienced and consistent field personnel throughout the program.
- Using licenced and experienced subcontractors.
- Using calibrated measuring equipment from qualified equipment rental companies.
- Following internal Standard Operating Procedures to ensure consistent sample handling and preservation techniques.
- Using analytical laboratories accredited for the analysis undertaken and ensuring that the laboratory internal quality checks indicated consistent, nonbiased results.
- Adhering to applicable guidelines, standards and best practice assessment and sampling methods.

7.3 Quality Control

The following QC sampling was completed:

Soil

- Two intra-laboratory blind duplicate samples (DUP_03 and DUP_01) were collected as a check against primary sample TP11_1.5 and TP7_1.2 respectively.
- Two inter-laboratory split duplicate samples (TRIP03 and TRIP01) were collected as an external laboratory check against primary sample TP11_1.5 and TP7_1.2 respectively.
- Two rinsate blank (RIN_01 and RIN_02) samples were collected from deionised water used for decontamination of the equipment used for soil sampling.
- One (1) trip blank (Trip_B) and one (1) trip spike samples (Trip_S) were prepared by the primary laboratory Eurofins prior to commencement of field work and transported with the samples to check for cross-contamination.

RPDs greater than 50% were observed in 3 instances where the duplicate sample reported a higher concentration than the primary sample. The Eurofins report states analysis indicated sample heterogeneity was the likely the cause. The outcome of the comparability assessment is considered not to be materially affected by elevated RPDs.

A trace concentration of TRH was observed in 2 rinsates. These concentrations were attributed to a plastic sampling container used to store the rinsate water. This was considered a minor non-conformance and as these fractions of TRH were not detected in any of the soil samples above the limit of detection it is considered the samples are still representative. As such the representativeness has not been materially affected by this non-conformance.

Laboratory Internal Quality Control

In general, the internal quality controls used by the laboratories indicated appropriate procedures and results, and reliable data.

7.4 Summary

Based on the results of the QA/QC assessment, the data was appropriate for the objectives of the assessment. Given the level of field and laboratory QA measures adhered to, the level of QC analysis conducted was considered to be appropriate and as such the DQIs outlined in **Table 5** are considered to have been met.

8 Site Investigation Works

On 15 and 16 October 2018, the intrusive soil sampling works were undertaken by an experienced EP Risk Environmental Scientist.

The soil sampling program was designed to identify potential contamination in shallow soil. The program consisted of the collection of soil samples from twenty (20) locations across the Site based on a judgemental sampling pattern. Investigation locations are illustrated in attached **Figure 2**.

The NSW EPA (1995) Sampling Design Guidelines recommends twenty (20) sampling points as the minimum number of sampling locations for site characterisation for a site with an approximate area of 8,000 m^2 – 9,000 m^2. The twenty (20) sampling points were considered sufficient to characterise a site with an area of 8,523 m^2, for the purposes of a SCA.

8.1 Sampling Methodology

Soil Sampling

- Appropriate health and safety documentation was prepared prior to initiating work. The documents were reviewed on-site prior to starting works.
- Prior to initiating field work, each location was cleared of underground services using a suitably qualified underground services locator.
- Soil boreholes TP01 – TP20 were advanced using a track mounted drill rig and soil samples were collected from 0.15 m, 0.5 m, 1.0 m and every 1.0 m thereafter until a maximum target depth of 2.2 mBGL.
- Soil was logged at each location in accordance with the Unified Soil Classification System (USCS). Each location and sample were also examined for signs of contamination. Details of the investigation and sample collection intervals are provided in the bore logs as **Appendix E**.
- Soil sampling tools were decontaminated between each location using a solution of Decon90®, and dedicated nitrile gloves were used at each sample location, to prevent cross contamination.
- All samples were screened with a calibrated photoionisation detector ('PID') to identify the presence of Volatile Organic Compounds ('VOC'), which might indicate contamination. The PID calibration form is included as **Appendix F**.
- Samples were placed into laboratory prepared glass sampling jars with Teflon® lined screw-on caps. Sample identification details were added to the label on each jar.
- The sample jars were placed on ice immediately after sampling and transported to a National Association of Testing Authorities ('NATA') accredited laboratory under appropriate chain-of-custody ('CoC') documentation.
- Each borehole was backfilled with soil cuttings and completed at the surface to match the surroundings.

8.2 Analytical Testing Program

Samples were analysed for CoPC by Eurofins MGT Pty Ltd and ALS Pty Ltd, which are both NATA accredited laboratories for the analysis undertaken. **Table 6** summarises the analysis completed.

Table 6 – Soil Investigation Analytical Summary

Analyte	Number of Samples Analysed	
	Primary Samples	QA/QC Samples
Soil		
TRH, BTEX, PAH, Metals	40	4 Duplicates and Triplicates, 2 Rinsate
OCPs, OPPs and PCBs	20	-
Asbestos	20	-
TRH C_6-C_9 and BTEX	-	1 Trip Spike and 1 Trip Blank

Notes: Metals (As – Arsenic, Cd – Cadmium; Cr – Chromium; Cu – Copper; Pb – Lead; Ni – Nickel; Zn – Zinc; Hg – Mercury); TRH – Total Recoverable Hydrocarbons; BTEX – Benzene; Toluene; Ethylbenzene, Xylene; PAH – Polycyclic Aromatic Hydrocarbons; PCB – Polychlorinated Biphenyls; OC – Organochlorine Pesticides and OP - Organophosphate Pesticides.

8.3 Field Observations

Subsurface Conditions – Fill and Natural Geology

Soil lithology encountered during intrusive investigation consisted of a layer of approximately 100 mm to 500 mm thickness of fill materials across the Site. Fill materials extended to a slightly deeper depth (1.2 mBGL) at the north-western side of the Site, as observed in bore hole TP2. The fill materials varied across the Site and comprised of a mixture of dark brown/black silty and gravelly clays of low plasticity and clayed sand, fine and medium grained with gravels. The fill materials encountered across the Site were underlain by natural red, grey, mottled red-orange and red-yellow silty clay of medium to high plasticity and fine-medium grained, brown-yellow silty sands.

VOC Screening

A PID was used to screen for VOC from the head space of each soil sample collected. The results indicate that volatile contaminants were not present within fill materials or natural soil across the Site. Recorded PID readings were all less than 1.0 parts per million ('ppm').

Visual and Olfactory Observations

Hydrocarbon odours were not observed within soil materials at the Site

Two (2) pieces of bonded (non-friable) ACM in good to fair condition was observed at the north-eastern side of the Assessment Area on the soil surface.

There was no visual evidence of contamination and no odours that would be associated with contamination encountered during soil investigation works.

Borehole logs detailing the field observations are provided as **Appendix E**.

Underground Storage Tanks

No evidence of UST's were observed at the Site.

9 Analytical Results

The SCA was conducted to assess the Site in general accordance with the proposed continued commercial / industrial land use. The NATA certified laboratory reports are included as **Appendix G**. Laboratory results are summarised below and in the attached **Analytical Tables**.

9.1 Soil Analytical Results

Metals

All metals concentrations were reported to be below applicable human health criteria and/or the laboratory LOR.

Organic Analytes

All TRH, BTEX and PAH concentrations were reported to be below applicable human health criteria and/or the laboratory LOR.

Pesticides and PCBs

All OCP, OPP and PCB concentrations were reported to be below the applicable human health criteria and/or the laboratory LOR.

Asbestos

Two (2) fibre cement samples collected from the surface of the Assessment Area (refer to **Figure 2**), analysed for asbestos (ASB_FC1 and ASB_FC2) were found to be positive for chrysotile, amosite and crocidolite asbestos. Asbestos was not detected (presence/absence only) in the twenty (20) soil samples collected and analysed.

10 Saline Soil Management Options and Strategy

The relevant guidance to medium sized developments in localities with high or known dryland salinity risk is outlined in the following documents:

- Western Sydney Regional Organisation of Councils Ltd (2003, Amended 2004) Western Sydney Salinity Code of Practice.
- Department of Infrastructure, Planning and Natural Resources (2003): Building in a Saline Environment.
- Department of Infrastructure, Planning and Natural Resources (2003): Roads and Salinity.
- Department of Infrastructure, Planning and Natural Resources (2004): Waterwise Parks and Gardens.
- Department of Land and Water Conservation (2002): Site Investigations for Urban Salinity.
- Penrith City Council: Penrith Development Control Plan ('PDCP') (2014).

With reference to the recommendations of the management of soils with known or high dryland salinity risk from the documents above, it is considered the disturbance of potentially saline soils in the event of future development of the Site would be unavoidable. The management options recommended for future development are outlined herein.

10.1 Earthworks

Care must be taken to avoid the reversing or mixing the soil profile and disturbance of natural drainage patterns during earthworks operations across the Site which may negatively impact on the salinity profile.

Consideration should be given to the requirements of the PDCP (2014) regarding management of salinity issues and discussion with council officers is recommended prior to commencing earthworks. EP Risk considers salinity issues are highly dependent on the nature of the proposed development and prior consent from Council should be sought for the proposed methodology.

10.2 Water Inputs

Underground water carrying pipes (including wastewater) and on-site sewerage systems (if relevant) should be properly installed to eliminate leaks with regular maintenance and/or checking for leaks. Changes to the on-site water balance may have an adverse effect to salinity potential.

According to the PCDP (2014):

a) *"Disturbance to the natural hydrological system shall be minimised by maintaining good drainage and reducing water logging on the site.*

b) *Groundwater recharge shall be minimised by such measures as:*

   i. *Directing runoff from paved areas (roads, car parks, domestic paving, etc) into lined stormwater drains rather than along grassed channels as necessary;*

ii. Lining or locating any water storages/ponds/drainage basins higher in the landscape to avoid recharge where proximity to the water table is likely to create groundwater mounding; and

iii. Encouraging on site detention of roof water runoff.

c) Soil erosion and sediment control measures, in accordance with erosion and sedimentation controls in this section, shall be incorporated into the development during its construction and following its completion. Penrith Development Control Plan 2014 C4 Land Management C4-21 C4 Land Management

d) Construction techniques shall be employed that prevent structural damage to the development as a result of salinity. For example, building footings shall be constructed so as not to impede groundwater movement and building materials that are resistant to salt effects shall be used.

e) The removal of vegetation, particularly native vegetation, on the site shall be minimised.

f) All landscape designs should undertake the following practices:

i. Select salt tolerant plant species (generally native trees and shrubs);

ii. Use mulch in all garden beds;

iii. Minimise the area of lawn as this requires large quantities of water;

iv. Use 'water wise' garden and landscape design (including timers, selection of plants with low water needs, grouping plants of similar water usage together, etc); and

v. Use non-corrosive materials when constructing pipes and channels. g) All works are to conform with the Western Sydney Salinity Code of Practice, June 2003."

10.3 Stormwater and Drainage

The following should be considered in the design of stormwater and drainage systems on-site (if required):

- The design slope of exposed/open concrete slabs and surrounding areas should be designed to minimise ponding and the potential for increased infiltration.
- Slab, foundations and retaining wells designed to allow good drainage / minimise water logging.
- Existing areas of waterlogging and poor drainage should be remedied prior to development construction.
- Design and layout of retaining walls, driveways and service connections reduces cut, minimises impediment of natural groundwater flows and provides for good drainage.
- Guttering and down pipes properly connected and maintained.

10.4 Vegetation

The following should be considered in the design in regards to vegetation on the Site:

- Areas of established vegetation are to be maintained and protected.

- Landscaping plans should adopt principles outlined in the Department of Infrastructure, Planning and Natural Resources (2004): Waterwise Parks and Gardens document.
- Irrigation systems should be properly installed to avoid leakage and 'smart' sprinkler systems considered.
- Re-use non-saline soils sources from the Site or imported into the Site in landscaped gardens where practicable.

10.5 Building Construction and Design

Given the Site is considered to contain soils with known or high potential of dryland salinity risk, there is a requirement to minimise the exposure to these soils to building materials. Where buildings are to be constructed directly on susceptible or exposed areas, then consideration of the following precautions should be adopted in the construction process:

- Install a properly constructed damp proof course beneath buildings, paths and driveways.
- Consideration should be given to the need for salt resistant bricks and construction materials where applicable.
- Susceptible construction materials should be avoided, i.e. porous materials.

The following should be considered in the design of roads and pavement:

- Inclusion of appropriate sub-surface drainage that doesn't divert moisture to road layers.
- Choose road materials that are not susceptible to corrosion.

11 Conclusion

This SCA was undertaken to assess the contamination status of the Nepean Private Hospital Expansion Stage 1 Site prior to construction of the proposed three-storey carpark building and on-grade carpark. The findings of the assessment, which comprised a desktop review of site history, current land uses, site inspection and soil sampling and analysis program, are presented below.

Site History Review

Based on a review of available aerial photographs and historical titles, the Site comprised of semi-rural land and residential properties in 1943 which was progressively redeveloped to residential properties to circa 1965. A commercial property was built in the centre of the Site circa 1982 which appears to have been owned by the Baptist Union of New South Wales which was likely a former part of the hospital and is considered not to be a likely source of contamination. Circa 1991 to circa 2016, properties were gradually demolished and replaced with car parks, resulting in the present configuration of the lot.

The area west of the Site was continually developed into residential properties from circa 1961 to 2009, increasing in density over time. Much of the area to the north of the Site was developed into commercial properties circa 1982, this included motor garages and/or service stations. The Nepean hospital was developed circa 1956 south of the Site and expanded north towards the Site, over predominantly vacant land, through to circa 2002.

No signs of heavy industrial activity were noted in the aerial photographs on properties immediately surrounding the Site. All identified potentially contaminating sites were considered not to pose a significant off-site risk of contamination due to the proximity to the subject Site and assumed position down and/or cross-hydraulic gradient to the Site.

Underground Storage Tanks

No evidence of UST's were observed at the Site.

Intrusive Investigation

Bonded (non-friable) asbestos containing materials ('ACM') were observed at the northern eastern portion of the Site on the surface of the assessment area. No bonded ACM was visually observed within the 20 bore holes undertaken during the investigation. No friable (<7 mm in size) or trace (respirable) asbestos was detected (presence/absence only) within the twenty (20) soil samples collected and analysed. No other visual or olfactory signs of contamination observed at the Site during soil investigation works.

All soil samples reported metals TRH, BTEX, PAH, OCP, OPP and PCB concentrations to be below applicable human health criteria and/or the laboratory reporting limits.

Saline Soil Management

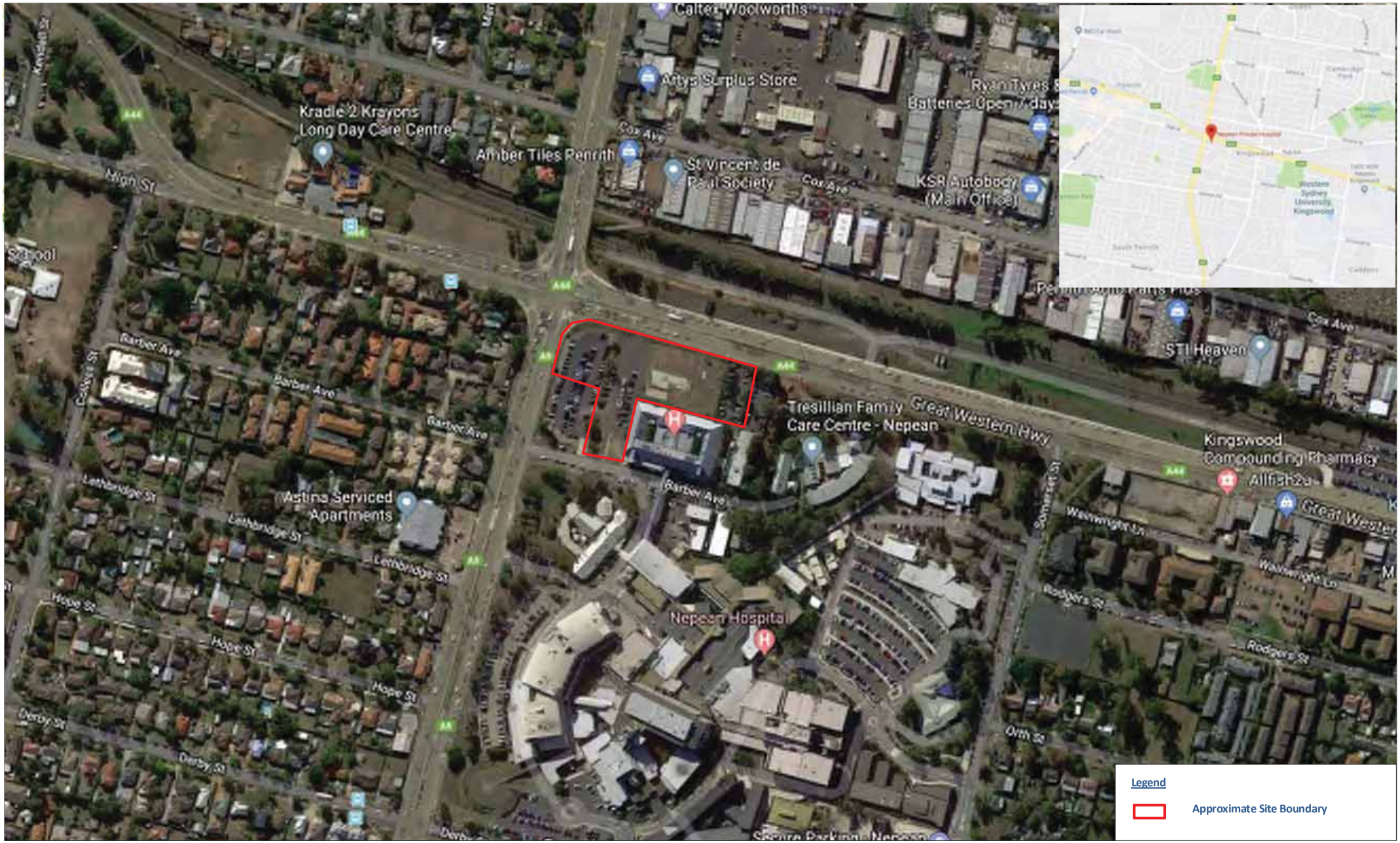
In accordance with the WSROC Western Sydney Salinity Code of Practice (2003, amended 2004), for medium sized developments in high potential or known salinity, it is considered the disturbance of potentially saline soils in the event of future development of the Site would be unavoidable. The management options recommended for future development are outlined within this report.

11.1 Conclusions and Recommendations

Overall, results from the SCA would not preclude the Site from the proposed future development of the Site under a commercial / industrial land use. However, bonded (non-friable) asbestos containing materials ('ACM') were observed on the surface the Site. Consequently, EP Risk recommends a surface scrape of the surficial soils (0.0 – 0.1 mBGL) and clearance by a Licenced Asbestos Assessor.

Additionally, it is recommended an Unexpected Finds Procedure is implemented during any excavation activities on the Site. Furthermore, where any Site materials require disposal these should be assessed either in accordance with the NSW EPA *Waste Classification Guidelines Part 1: Classifying Waste* or any current Resource Recovery Orders made under the *Protection of the Environment (Waste) Regulation 2014*.

Figures



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Soil Contamination Assessment
Nepean Private Hospital Expansion Stage 1, 1-9 Barber Ave, Kingswood, NSW

Figure 1 – Site Location

Job No: EP0991
Date: 20/11/2018
Drawing Ref: EP0991_Fig1_Site Location
Version No: v3

N

40 80 120

Approximate Scale Only (m)

Co-ordinate system: MGA 56
Drawn by: MB Checked by: KG
Source: SixMaps

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Soil Contamination Assessment
Nepean Private Hospital Expansion Stage 1, 1-9 Barber Avenue, Kingswood, NSW, 2747

Figure 2 – Site Layout

Job No: EP0991
Date: 20/11/2018
Drawing Ref: EP0991 Fig1_Site Layout
Version No: v3

N

0 10 20
Approximate Scale Only (m)

Co-ordinate system: MGA 56
Drawn by: PP Checked by: KG
Source: Google Maps

Analytical Tables

EP RISK

				Asbestos		BTEX						TRH							Halogenated Benzenes	Inorganics	Metals							
				Asbestos Detected	Asbestos in Soil	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10	C6-C10 (F1 minus BTEX)	C10-C16	C10-C16 (F2 minus Naphthalene)	C16-C34	C34-C40	C10-C40 (Sum of total)	Hexachlorobenzene	Moisture Content (dried @ 103°C)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.3	0.1	0.1	0.1	0.2	0.1	0.3	20	20	50	50	100	100	100	0.05	1	2	0.4	5	5	5	0.1	5	5
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																			80		3,000	900	3600	240,000	1,500	730	6,000	400,000
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																												
0-1m						4							310															
1-2m						6							480															
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Silt																												
0-1m						4							250															
1-2m						4							360															
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil												800		1,000		5,000	10,000											
Field ID	**Date**	**Sample Type**	**Depth (m)**																									
ASB_FC1	**15/10/2018**	**Fibre Cement**		Yes																								
ASB_FC2	**15/10/2018**	**Fibre Cement**		Yes																								
ASB_FC5	**15/10/2018**	**Fibre Cement**		NO																								
TP1_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	17	6.8	<0.4	11	27	11	<0.1	<5	23
TP1_1.4	**15/10/2018**	**Soil**	**1.4**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		12	5.2	<0.4	18	57	32	<0.1	32	97
TP2_1.0	**15/10/2018**	**Soil**	**1**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	15	11	<0.4	17	35	32	<0.1	20	70
TP2_2.0	**15/10/2018**	**Soil**	**2**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		17	15	<0.4	9.0	59	16	<0.1	11	67
TP3_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	17	14	<0.4	17	36	21	<0.1	10	54
TP3_1.4	**15/10/2018**	**Soil**	**1.4**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		14	19	<0.4	13	58	14	<0.1	13	76
TP4_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	23	12	<0.4	20	44	29	<0.1	22	100
TP4_1.3	**15/10/2018**	**Soil**	**1.3**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		17	9.2	<0.4	12	38	14	<0.1	12	55
TP5_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	13	11	<0.4	15	34	33	<0.1	20	75
TP5_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		8.3	11	<0.4	14	40	19	<0.1	26	110
TP6_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	120	100	220	<0.05	15	6.3	<0.4	19	40	73	<0.1	39	140
TP6_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		19	6.9	<0.4	9.3	23	12	<0.1	<5	38
TP7_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	16	14	<0.4	21	35	33	<0.1	13	100
TP7_1.2	**15/10/2018**	**Soil**	**1.2**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		15	8.0	<0.4	16	27	13	<0.1	7.3	37
TP8_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	19	17	<0.4	16	30	16	<0.1	5.1	27
TP8_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		15	7.8	<0.4	5.4	16	9.9	<0.1	<5	14
TP9_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	16	14	<0.4	21	40	83	<0.1	17	140
TP9_1.6	**15/10/2018**	**Soil**	**1.6**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		14	4.7	<0.4	7.4	20	11	<0.1	<5	17
TP10_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	15	11	<0.4	15	44	39	<0.1	15	79
TP10_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		11	7.1	<0.4	14	73	23	<0.1	30	130
TP11_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	18	11	0.5	18	49	160	<0.1	23	400
TP11_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		18	11	<0.4	13	40	12	0.3	14	58
TP12_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	17	7.9	<0.4	18	42	23	<0.1	22	79
TP12_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		19	11	<0.4	6.6	23	6.7	<0.1	<5	25
TP13_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	17	7.5	<0.4	18	40	140	<0.1	20	160
TP13_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		37	7.0	<0.4	6.6	55	19	<0.1	6.4	41
TP14_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	18	8.3	<0.4	20	31	15	<0.1	11	45
TP14_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		15	5.6	<0.4	5.5	13	6.2	<0.1	<5	14
TP15_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	16	14	<0.4	20	45	16	<0.1	16	65
TP15_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		11	11	<0.4	17	56	18	<0.1	22	110
TP16_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	10	12	<0.4	18	64	21	<0.1	22	97
TP16_1.2	**15/10/2018**	**Soil**	**1.2**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		13	10	<0.4	14	36	13	<0.1	19	84
TP17_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	16	17	<0.4	12	34	18	<0.1	7.3	52
TP17_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		13	15	<0.4	7.2	70	26	<0.1	9.0	45
TP18_0.15	**15/10/2018**	**Soil**	**0.15**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	15	8.0	<0.4	18	41	20	<0.1	10.0	86
TP18_1.3	**15/10/2018**	**Soil**	**1.3**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		13	7.2	<0.4	9.5	34	9.2	<0.1	<5	30
TP19_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	12	7.0	<0.4	12	38	12	<0.1	6.0	41
TP19_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		14	51	<0.4	6.4	28	5.0	<0.1	<5	25
TP20_0.5	**15/10/2018**	**Soil**	**0.5**		<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100	<0.05	14	5.0	<0.4	6.6	32	9.8	<0.1	<5	13
TP20_1.5	**15/10/2018**	**Soil**	**1.5**			<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<100	<100	<100		12	5.2	<0.4	6.4	46	9.4	<0.1	<5	15
Statistics																												
Number of Results				**3**	**20**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**20**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**
Number of Detects				**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**42**	**42**	**1**	**42**	**42**	**42**	**2**	**32**	**42**
Minimum Concentration					**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.2**	**<0.1**	**<0.3**	**<20**	**<20**	**<50**	**<50**	**<100**	**100**	**<100**	**<0.05**	**8.3**	**2.7**	**<0.4**	**5.4**	**13**	**5**	**0.1**	**<5**	**13**
Minimum Detect					**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**120**	**100**	**220**	**ND**	**8.3**	**2.7**	**0.5**	**5.4**	**13**	**5**	**0.1**	**5.1**	**13**
Maximum Concentration					**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.2**	**<0.1**	**<0.3**	**<20**	**<20**	**<50**	**<50**	**120**	**100**	**220**	**<0.05**	**37**	**51**	**0.5**	**21**	**73**	**160**	**0.3**	**39**	**400**
Maximum Detect					**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**120**	**100**	**220**	**ND**	**37**	**51**	**0.5**	**21**	**73**	**160**	**0.3**	**39**	**400**
Average Concentration *					**0.05**	**0.05**	**0.05**	**0.05**	**0.1**	**0.05**	**0.15**	**10**	**10**	**25**	**25**	**52**	**51**	**54**	**0.025**	**16**	**11**	**0.21**	**14**	**40**	**27**	**0.057**	**13**	**72**
Median Concentration *					**0.05**	**0.05**	**0.05**	**0.05**	**0.1**	**0.05**	**0.15**	**10**	**10**	**25**	**25**	**50**	**50**	**50**	**0.025**	**15**	**10**	**0.2**	**14**	**38**	**16**	**0.05**	**11**	**56.5**
Standard Deviation *					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**7.7**	**26**	**0**	**4.4**	**7.4**	**0.046**	**4.9**	**14**	**32**	**0.039**	**9.3**	**64**
95% UCL (Student's-t) *					**0.05**	**0.05**	**0.05**	**0.05**	**0.1**	**0.05**	**0.15**	**10**	**10**	**25**	**25**	**54.47**	**53.19**	**60.86**	**0.025**	**16.84**	**12.76**	**0.219**	**14.91**	**43.08**	**34.81**	**0.0673**	**15.32**	**88.59**

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil

				Organochlorine Pesticides																								
				Organochlorine pesticides EPA Vic	Other organochlorine pesticides EPA Vic	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	chlordane	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Toxaphene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil									45		530				3,600					100				50		2,500	160
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																												
0-1m																												
1-2m																												
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Silt																												
0-1m																												
1-2m																												
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																												
Field ID	**Date**	**Sample Type**	**Depth (m)**																									
ASB_FC1	**15/10/2018**	**Fibre Cement**																										
ASB_FC2	**15/10/2018**	**Fibre Cement**																										
ASB_FC5	**15/10/2018**	**Fibre Cement**																										
TP1_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP1_1.4	**15/10/2018**	**Soil**	**1.4**																									
TP2_1.0	**15/10/2018**	**Soil**	**1**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP2_2.0	**15/10/2018**	**Soil**	**2**																									
TP3_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP3_1.4	**15/10/2018**	**Soil**	**1.4**																									
TP4_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP4_1.3	**15/10/2018**	**Soil**	**1.3**																									
TP5_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP5_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP6_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP6_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP7_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP7_1.2	**15/10/2018**	**Soil**	**1.2**																									
TP8_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP8_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP9_0.15	**15/10/2018**	**Soil**	**0.15**	0.19	<0.1	<0.05	<0.05	<0.05	0.19	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP9_1.6	**15/10/2018**	**Soil**	**1.6**																									
TP10_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP10_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP11_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP11_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP12_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP12_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP13_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP13_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP14_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP14_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP15_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP15_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP16_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP16_1.2	**15/10/2018**	**Soil**	**1.2**																									
TP17_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP17_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP18_0.15	**15/10/2018**	**Soil**	**0.15**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP18_1.3	**15/10/2018**	**Soil**	**1.3**																									
TP19_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP19_1.5	**15/10/2018**	**Soil**	**1.5**																									
TP20_0.5	**15/10/2018**	**Soil**	**0.5**	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1
TP20_1.5	**15/10/2018**	**Soil**	**1.5**																									

Statistics

Number of Results	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Number of Detects	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration	**<0.1**	**<0.1**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.1**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<1**
Minimum Detect	**0.19**	**ND**	**ND**	**ND**	**ND**	**0.19**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.19**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration	**0.19**	**<0.1**	**<0.05**	**<0.05**	**<0.05**	**0.19**	**<0.05**	**<0.1**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**0.19**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<1**
Maximum Detect	**0.19**	**ND**	**ND**	**ND**	**ND**	**0.19**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.19**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *	**0.057**	**0.05**	**0.025**	**0.025**	**0.025**	**0.033**	**0.025**	**0.05**	**0.025**	**0.025**	**0.025**	**0.025**	**0.033**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.5**
Median Concentration *	**0.05**	**0.05**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.05**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.5**
Standard Deviation *	**0.031**	**0**	**0**	**0**	**0**	**0.037**	**0**	**0**	**0**	**0**	**0**	**0**	**0.037**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *	**0.0691**	**0.05**	**0.025**	**0.025**	**0.025**	**0.0475**	**0.025**	**0.05**	**0.025**	**0.025**	**0.025**	**0.025**	**0.0475**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.5**

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil

EP RISK

				Organophosphorous Pesticides																															
				Tokuthion	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	EPN	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil								2,000																											
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																																			
0-1m																																			
1-2m																																			
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Silt																																			
0-1m																																			
1-2m																																			
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																																			
Field ID	**Date**	**Sample Type**	**Depth (m)**																																
ASB_FC1	**15/10/2018**	**Fibre Cement**																																	
ASB_FC2	**15/10/2018**	**Fibre Cement**																																	
ASB_FC5	**15/10/2018**	**Fibre Cement**																																	
TP1_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP1_1.4	**15/10/2018**	**Soil**	**1.4**																																
TP2_1.0	**15/10/2018**	**Soil**	**1**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP2_2.0	**15/10/2018**	**Soil**	**2**																																
TP3_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP3_1.4	**15/10/2018**	**Soil**	**1.4**																																
TP4_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP4_1.3	**15/10/2018**	**Soil**	**1.3**																																
TP5_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP5_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP6_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP6_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP7_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP7_1.2	**15/10/2018**	**Soil**	**1.2**																																
TP8_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP8_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP9_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP9_1.6	**15/10/2018**	**Soil**	**1.6**																																
TP10_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP10_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP11_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP11_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP12_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP12_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP13_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP13_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP14_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP14_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP15_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP15_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP16_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP16_1.2	**15/10/2018**	**Soil**	**1.2**																																
TP17_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP17_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP18_0.15	**15/10/2018**	**Soil**	**0.15**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP18_1.3	**15/10/2018**	**Soil**	**1.3**																																
TP19_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP19_1.5	**15/10/2018**	**Soil**	**1.5**																																
TP20_0.5	**15/10/2018**	**Soil**	**0.5**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TP20_1.5	**15/10/2018**	**Soil**	**1.5**																																
Statistics																																			
Number of Results				**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration				**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<2**	**<0.2**	**<2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration				**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<2**	**<0.2**	**<2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**	**<0.2**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *				**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Median Concentration *				**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Standard Deviation *				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *				**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**1**	**0.1**	**1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil

				PAH																			
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																				40	40	40	4,000
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																							
0-1m																							
1-2m																							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Silt																							
0-1m																							
1-2m																							
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																							
Field ID	**Date**	**Sample Type**	**Depth (m)**																				
ASB_FC1	**15/10/2018**	**Fibre Cement**																					
ASB_FC2	**15/10/2018**	**Fibre Cement**																					
ASB_FC5	**15/10/2018**	**Fibre Cement**																					
TP1_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP1_1.4	**15/10/2018**	**Soil**	**1.4**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP2_1.0	**15/10/2018**	**Soil**	**1**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP2_2.0	**15/10/2018**	**Soil**	**2**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP3_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP3_1.4	**15/10/2018**	**Soil**	**1.4**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP4_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP4_1.3	**15/10/2018**	**Soil**	**1.3**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP5_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP5_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP6_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP6_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP7_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP7_1.2	**15/10/2018**	**Soil**	**1.2**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP8_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP8_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP9_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP9_1.6	**15/10/2018**	**Soil**	**1.6**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP10_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP10_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP11_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP11_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP12_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP12_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP13_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP13_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP14_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP14_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP15_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP15_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP16_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP16_1.2	**15/10/2018**	**Soil**	**1.2**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP17_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP17_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP18_0.15	**15/10/2018**	**Soil**	**0.15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP18_1.3	**15/10/2018**	**Soil**	**1.3**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP19_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP19_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP20_0.5	**15/10/2018**	**Soil**	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
TP20_1.5	**15/10/2018**	**Soil**	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5
Statistics																							
Number of Results				**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**	**42**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**42**	**42**	**0**	**0**
Minimum Concentration				**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**0.6**	**1.2**	**<0.5**	**<0.5**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.6**	**1.2**	**ND**	**ND**
Maximum Concentration				**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**0.6**	**1.2**	**<0.5**	**<0.5**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**0.6**	**1.2**	**ND**	**ND**
Average Concentration *				**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.6**	**1.2**	**0.25**	**0.25**
Median Concentration *				**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.6**	**1.2**	**0.25**	**0.25**
Standard Deviation *				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
95% UCL (Student's-t) *				**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.6**	**1.2**	**0.25**	**0.25**

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil

EP RISK

				PCBs								Pesticides		TPH				
				Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	Parathion	Pirimiphos-methyl	C6-C9	C10-C14	C15-C28	C29-C36	>C10-C36 (Sum of total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	20	20	50	50	50
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil											7							
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay																		
0-1m																		
1-2m																		
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Silt																		
0-1m																		
1-2m																		
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil																		
Field ID	**Date**	**Sample Type**	**Depth (m)**															
ASB_FC1	15/10/2018	Fibre Cement																
ASB_FC2	15/10/2018	Fibre Cement																
ASB_FC5	15/10/2018	Fibre Cement																
TP1_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP1_1.4	15/10/2018	Soil	1.4											<20	<20	<50	<50	<50
TP2_1.0	15/10/2018	Soil	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	61	61
TP2_2.0	15/10/2018	Soil	2											<20	<20	<50	<50	<50
TP3_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP3_1.4	15/10/2018	Soil	1.4											<20	<20	<50	<50	<50
TP4_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	67	67
TP4_1.3	15/10/2018	Soil	1.3											<20	<20	<50	<50	<50
TP5_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	72	72
TP5_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP6_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	120	120
TP6_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP7_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP7_1.2	15/10/2018	Soil	1.2											<20	<20	<50	<50	<50
TP8_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP8_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP9_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP9_1.6	15/10/2018	Soil	1.6											<20	<20	<50	<50	<50
TP10_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP10_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP11_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP11_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP12_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP12_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP13_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP13_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP14_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP14_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP15_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP15_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP16_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP16_1.2	15/10/2018	Soil	1.2											<20	<20	<50	<50	<50
TP17_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP17_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP18_0.15	15/10/2018	Soil	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP18_1.3	15/10/2018	Soil	1.3											<20	<20	<50	<50	<50
TP19_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP19_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
TP20_0.5	15/10/2018	Soil	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
TP20_1.5	15/10/2018	Soil	1.5											<20	<20	<50	<50	<50
Statistics																		
Number of Results				20	20	20	20	20	20	20	20	20	20	42	42	42	42	42
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
Minimum Concentration				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	<50	<50
Minimum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	61	61
Maximum Concentration				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<20	<20	<50	120	120
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	120	120
Average Concentration *				0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	10	10	25	30	30
Median Concentration *				0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	10	10	25	25	25
Standard Deviation *				0	0	0	0	0	0	0	0	0	0	0	0	0	18	18
95% UCL (Student's-t) *				0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	10	10	25	34.89	34.89

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Fine Soil

			BTEX						TRH							Metals							
			Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10	C6-C10 (F1 minus BTEX)	C10-C16	C10-C16 (F2 minus Naphthalene)	C16-C34	C34-C40	C10-C40 (Sum of total)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			1	1	1	2	1	3	20	20	50	50	100	100	100	0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005
Field ID	**Date**	**Matrix**																					
RIN_01	**15/10/2018**	**Water**	<1	<1	<1	<2	<1	<3	**30**	**30**	<50	<50	<100	<100	<100	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
RIN_02	**16/10/2018**	**Water**	<1	<1	<1	<2	<1	<3	**30**	**30**	<50	<50	<100	<100	<100	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
TRIP_B	**15/10/2018**	**Water**	<1	<1	<1	<2	<1	<3	<20	<20													

			PAH																	TPH				
			Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	C6-C9	C10-C14	C15-C28	C29-C36	+C10-C36 (Sum of total)
			µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			1	1	1	1	1	0.001	1	1	1	1	1	1	1	1	1	1	1	20	50	100	100	100
Field ID	**Date**	**Matrix**																						
RIN_01	15/10/2018	Water	<1	<1	<1	<1	<1	<0.001	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	30	<50	<100	<100	<100
RIN_02	16/10/2018	Water	<1	<1	<1	<1	<1	<0.001	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	30	<50	<100	<100	<100
TRIP_B	15/10/2018	Water														<10				<20				

				NA	BTEX							TRH							Metals							
				Moisture Content	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 (F1 minus BTEX)	C10-C16	C10-C16 (F2 minus Naphthalene)	C16-C34	C34-C40	C10-C40 (Sum of total)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.1	0.1	0.1	0.2	0.1	0.3	0.2	10	10	50	50	100	100	50	2	0.4	2	5	5	0.1	2	5
Sample ID	Lab Report Number	Date	Matrix Type																							
TP11_1.5	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	11	<0.4	13	40	12	0.3	14	58
DUP_03	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	10	<0.4	12	38	10	0.1	7.1	35
RPD					0	0	0	0	0	0		0	0	0	0	0	0	0	10	0	8	5	18	100	65	49
TP11_1.5	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	11	<0.4	13	40	12	0.3	14	58
TRIP03	ES1830850	16/10/2018	soil	18.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	16	<1	12	45	17	<0.1	17	70
RPD					0	0	0	0	0	0		0	0	0	0	0	0	0	37	0	8	12	34	100	19	19
TP7_1.2	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	8.0	<0.4	16	27	13	<0.1	7.3	37
DUP_01	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	2.7	<0.4	18	31	10	<0.1	9.8	49
RPD					0	0	0	0	0	0		0	0	0	0	0	0	0	99	0	12	14	26	0	29	28
TP7_1.2	623095	15/10/2018	soil		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3		<20	<20	<50	<50	<100	<100	<100	8.0	<0.4	16	27	13	<0.1	7.3	37
TRIP01	ES1830850	15/10/2018	soil	15.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<50	<100	<100	<50	<5	<1	14	28	10	<0.1	8	40
RPD					0	0	0	0	0	0		0	0	0	0	0	0	0	46	0	13	4	26	0	9	8

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

				PAH																					TPH				
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)	C6-C9	C10-C14	C15-C28	C29-C36	+C10-C36 (Sum of total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	10	20	50	50	50
Sample ID	Lab Report Number	Date	Matrix Type																										
TP11_1.5	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
DUP_03	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TP11_1.5	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
TRIP03	ES1830850	16/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<10	<50	<100	<100	<50
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TP7_1.2	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
DUP_01	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TP7_1.2	623095	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<20	<20	<50	<50	<50
TRIP01	ES1830850	15/10/2018	soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	**1.2**	<0.5	<0.5	<10	<50	<100	<100	<50
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any m

Appendix A

LOTSEARCH ENVIRONMENTAL RISK AND PLANNING REPORT (2018)

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 10 Oct 2018 14:36:32

Reference: LS004326 EP

Address: 1-9 Barber Avenue, Kingswood, NSW 2747

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.

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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 confidence is given under the field heading “LocConf” or “Location Confidence”.

LC Code	Location Confidence
Premise match	Georeferenced to the site location / premise or part of site
General area or suburb match	Georeferenced with the confidence of the general/approximate area
Road match	Georeferenced to the road or rail
Road intersection	Georeferenced to the road intersection
Feature is a buffered point	Feature is a buffered point
Land adjacent to geocoded site	Land adjacent to Georeferenced Site

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Aerial Imagery 2018

1-9 Barber Avenue, Kingswood, NSW 2747

Scale:
0 25 50 100
Meters

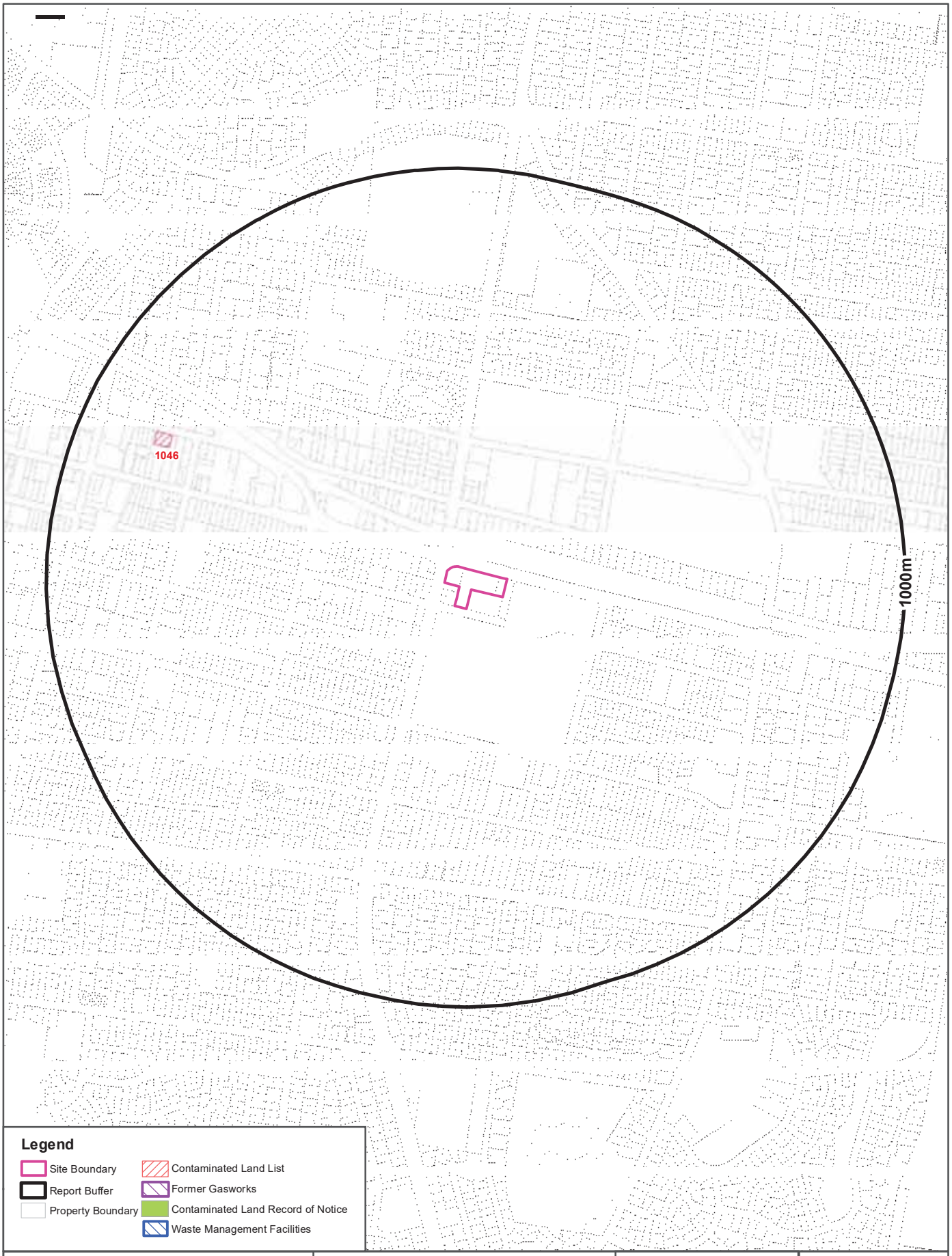
Data Source Aerial Imagery: © 2018 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09 October 2018

Contaminated Land & Waste Management Facilities

1-9 Barber Avenue, Kingswood, NSW 2747



Scale:
0 100 200 400 600
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2018

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

[illegible] Land [illegible] Contaminated

[illegible] Order [illegible] S[illegible] 2[illegible]4[illegible]

List of Sites contaminated [illegible] EPA

Records from the NSW EPA Contaminated Land List within the dataset [illegible]

[illegible]	Site	[illegible]	Suburb	Category	[illegible]	Current EPA List	Location Confidence	[illegible]	Direction
10[illegible]6	[illegible] Service Station Petrol	[illegible]0 Cherry Street	Perth	Service Station	Notification under CL Act not required	Current EPA List	Precise Match	[illegible]6[illegible]	North West

The names within the EPA site classification in the table above are [illegible] more detailed explanations in the table below.

EPA [illegible] Contaminated	Explanation
Notification [illegible] assessed [illegible] the Process [illegible] 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 [illegible] Act [illegible] process [illegible] EPA [illegible] consent as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Notification [illegible] correctly recorded under CL 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 [illegible] Act [illegible] assessment of the contamination is recorded by the EPA under the CL Act. Statutory Notices are available on the EPA's Contaminated Land Public Record of Notices.
Notification [illegible] correctly recorded under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Assessment of the contamination is recorded under the Protection of the Environment Operations Act 1997 [illegible] Act. The EPA's regulatory actions under the POEO Act are available on the POEO [illegible] register.
Notification [illegible] order recorded under the CL Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 [illegible] Act. The contamination has addressed under the CL Act.
Notification [illegible] order recorded under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination has addressed under the Protection of the Environment Operations Act 1997 [illegible] Act.
Notification [illegible] addressed via the Process [illegible] Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination has addressed by the appropriate consent authority via the Environmental Planning and Assessment Act 1979 [illegible] Act.
[illegible] intervention required to manage residual contamination [illegible] Act	The EPA has determined that [illegible] intervention under the Contaminated Land Management Act 1997 [illegible] Act [illegible] required to manage the residual contamination [illegible] regulatory notices under the CL Act are available on the EPA's Contaminated Land Public Record of Notices.
Remediation [illegible] assessed	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 199[illegible]A regulatory approach is [illegible] assessed.
Remediation under the CL Act not required	The EPA has completed an assessment of the contamination and decided that remediation under the Contaminated Land Management Act 199[illegible] is not required.
Under assessment	The contamination is [illegible] assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment or [illegible] the consent to [illegible] activities recorded under the Planning Process or Protection of the Environment Operations Act 199[illegible]After [illegible] the EPA may require information a Notice issued under s[illegible] of the Contaminated Land Management Act 199[illegible] or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

Contaminated Land Notices

Under Section 24

Contaminated Land: Record of Notices

Record of Notices within the dataset buffer

Notice Type	Notice	Address	Suburb	Notice	Area	Location Information	Reference	Description
N/A	No records within buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority
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http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer

Type	Location	Address	Former Info	Location Information	Reference	Description
N/A	No records within buffer					

Former Gasworks Data Source: Environment Protection Authority
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Waste Management Facilities

Sites on the National Waste Management Site Database within the dataset buffer

Site Type	Owner	Address	Suburb	Status	Activities	Licence	Reference	Transfer	Area	Location Info	Reference
N/A	No records within buffer										

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

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EPA PFAS Investigation Program: Environment Protection Authority
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EPA Other Sites with Contamination Issues: Environment Protection Authority
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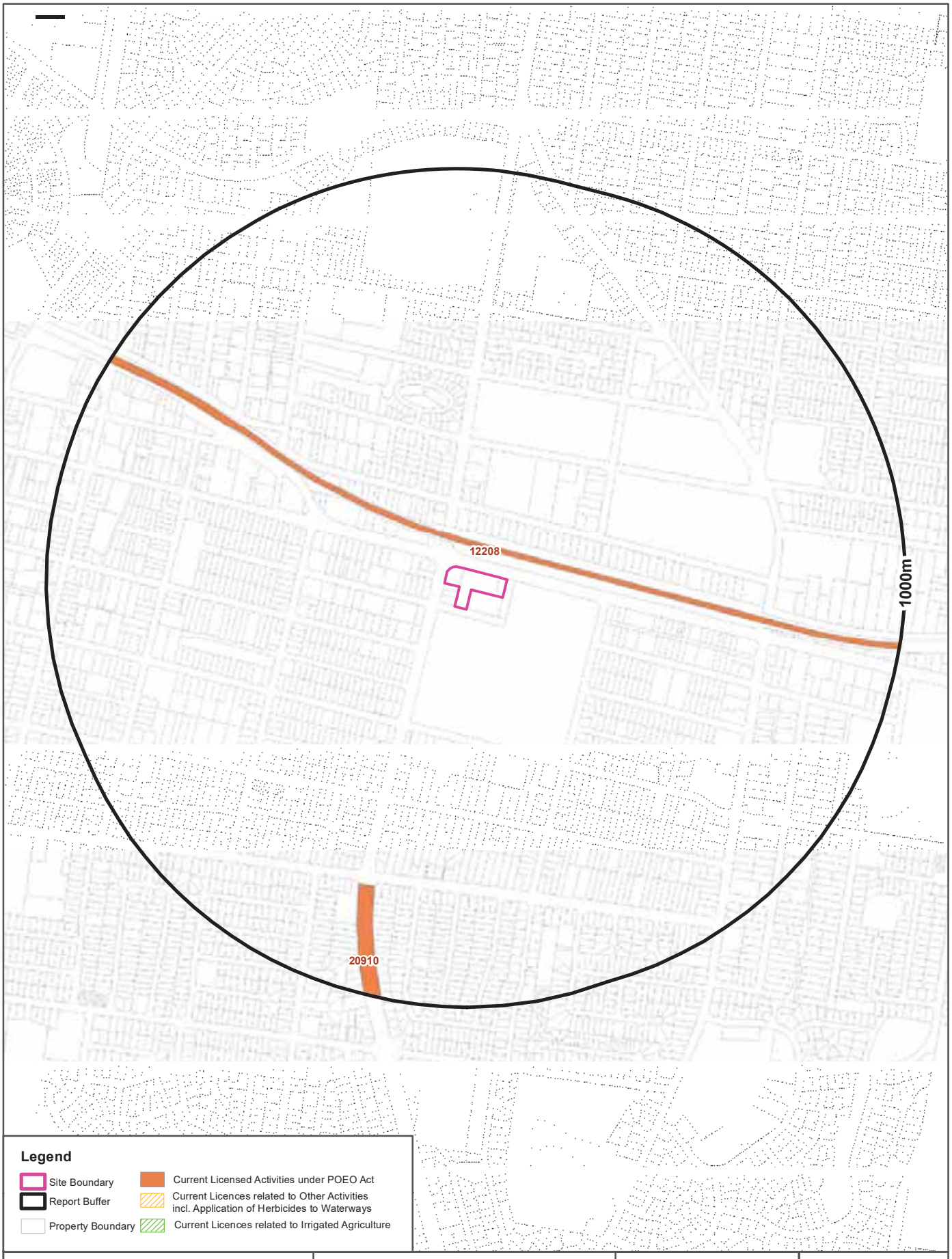
Current EPA Licensed Activities

1-9 Barber Avenue, Kingswood, NSW 2747



Scale:
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Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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POEO Licence Data Source: Environment Protection Authority
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Delicensed & Former Licensed EPA Activities

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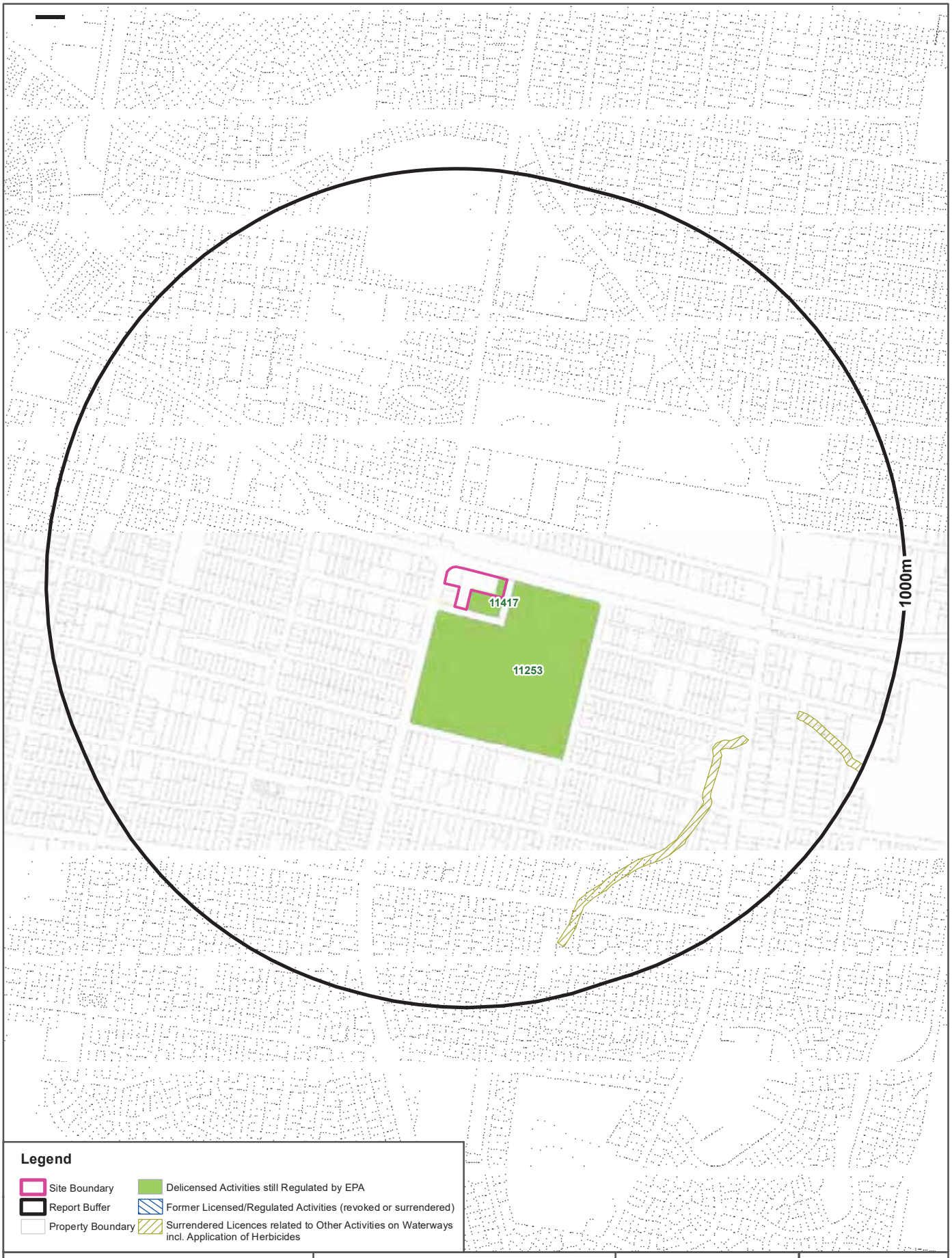

Scale: 0 100 200 400 600 Meters

Property Boundary Data Source:
© Department Finance, Services & Innovation 2018

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

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Delicensed Activities Data Source: Environment Protection Authority
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Former Licensed Activities Data Source: Environment Protection Authority
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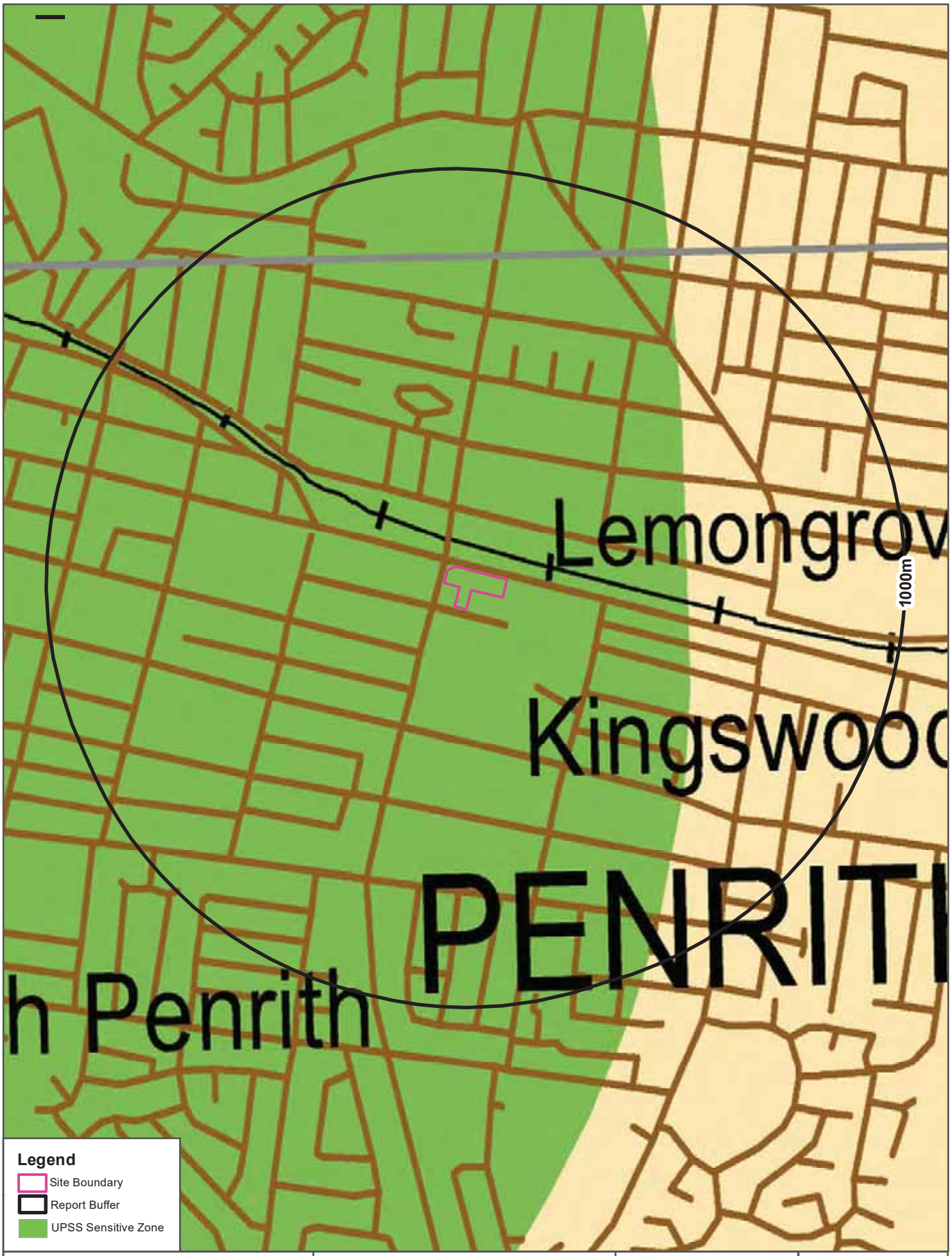
UPSS Sensitive Zones

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 100 200 400 600 Meters

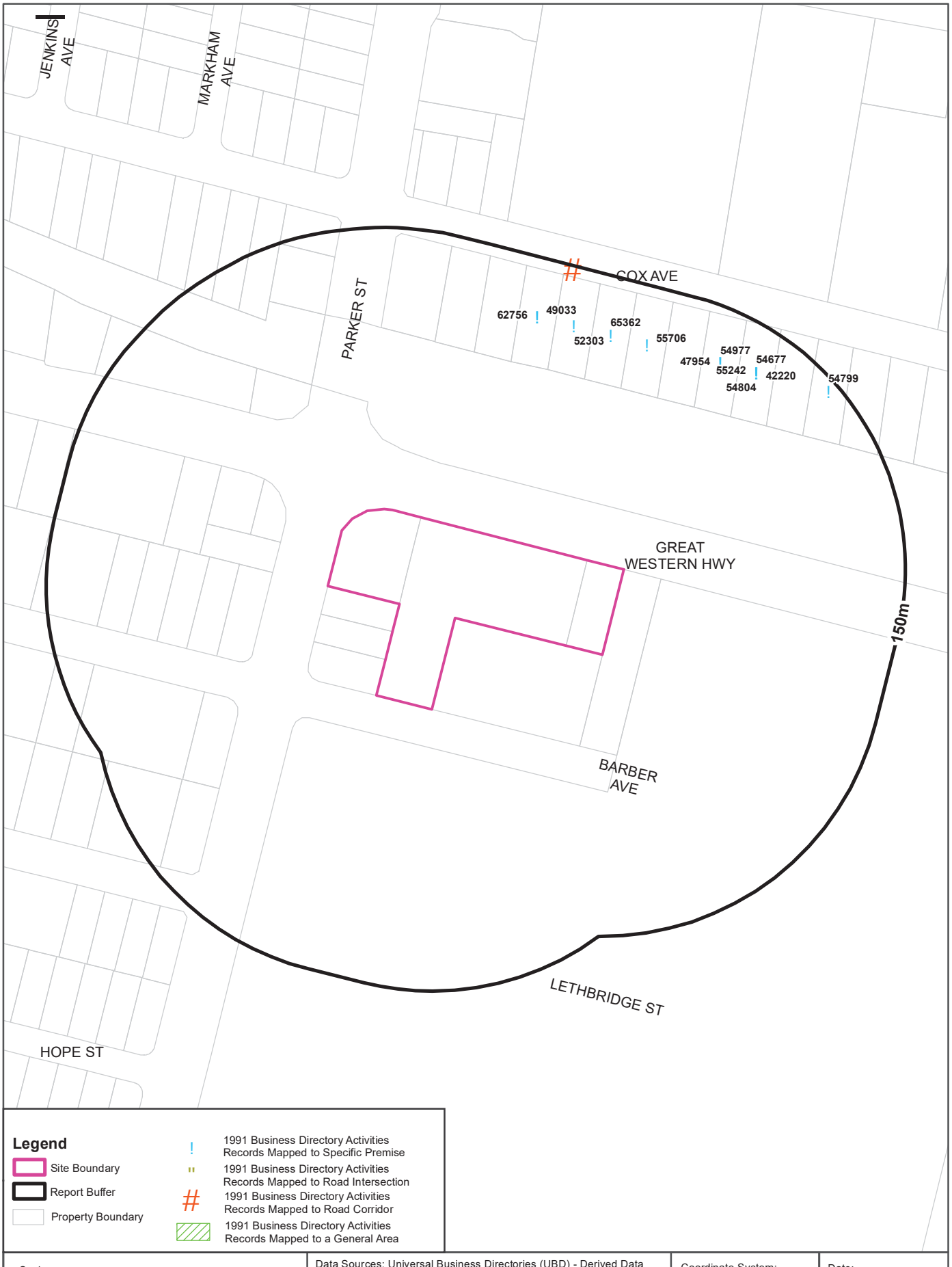
UPSS Data Source: Environment Protection Authority
© Dept of Environment, Climate Change & Water (NSW)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

1991 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- ! 1991 Business Directory Activities Records Mapped to Specific Premise
- " 1991 Business Directory Activities Records Mapped to Road Intersection
- # 1991 Business Directory Activities Records Mapped to Road Corridor
- 1991 Business Directory Activities Records Mapped to a General Area

Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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

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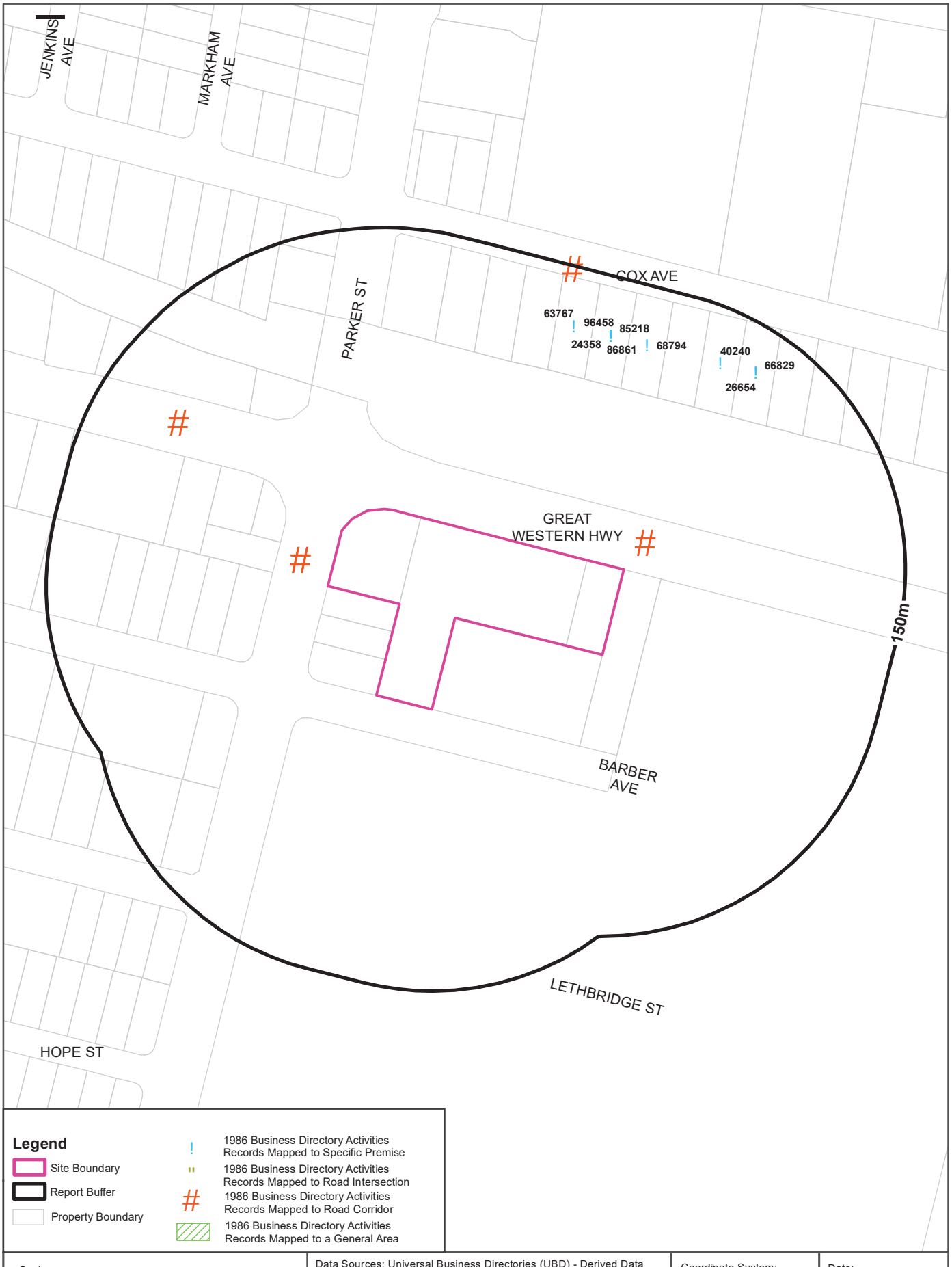
Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1986 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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

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

1982 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747

Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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

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

1970 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747

Legend

- Site Boundary
- Report Buffer
- Property Boundary
- ! 1970 Business Directory Activities Records Mapped to Specific Premise
- " 1970 Business Directory Activities Records Mapped to Road Intersection
- # 1970 Business Directory Activities Records Mapped to Road Corridor
- 1970 Business Directory Activities Records Mapped to a General Area

Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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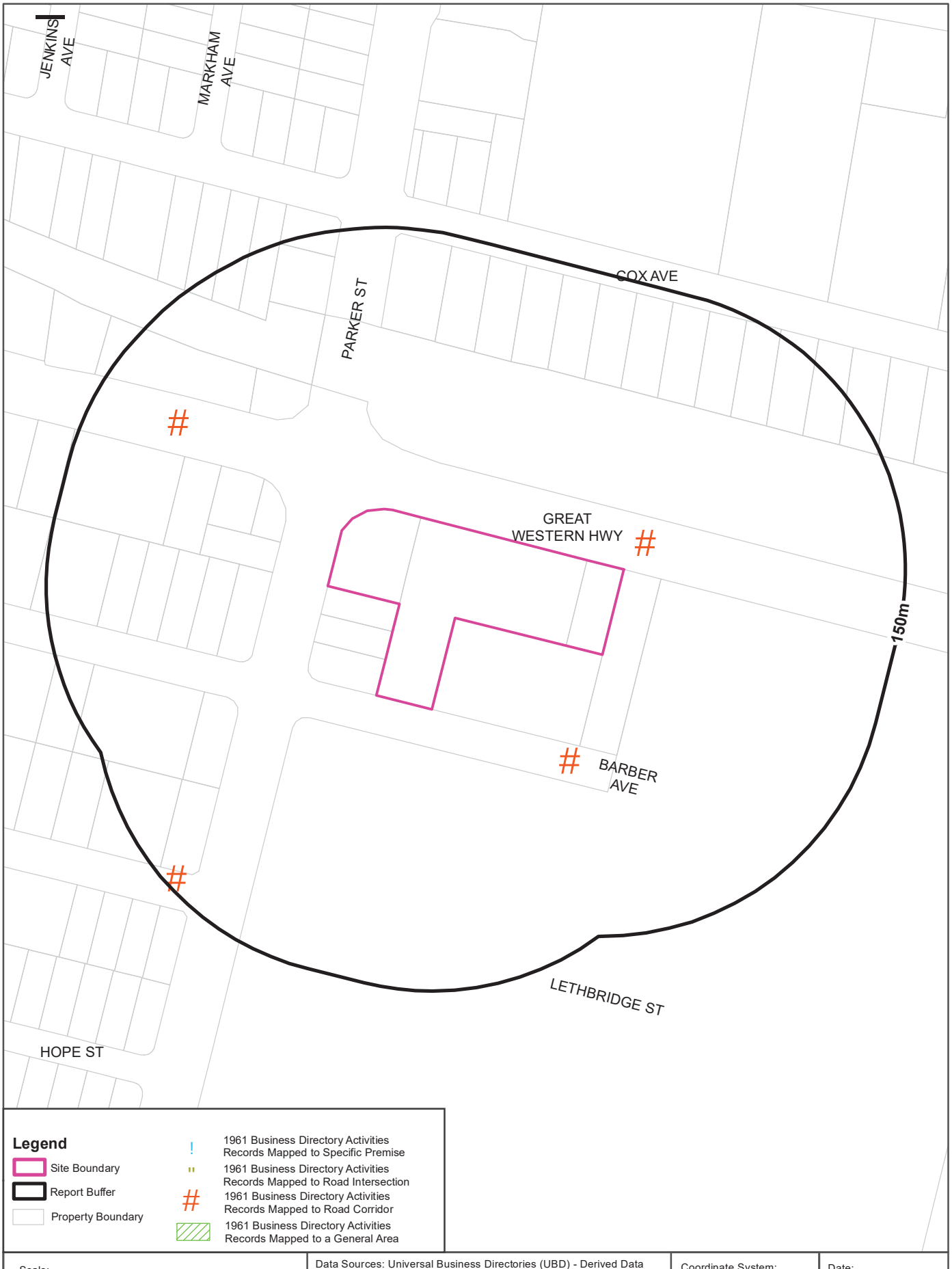
Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1961 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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

1950 Historical Business Directory Records

1-9 Barber Avenue, Kingswood, NSW 2747

Legend

- Site Boundary
- Report Buffer
- Property Boundary
- ! 1950 Business Directory Activities Records Mapped to Specific Premise
- " 1950 Business Directory Activities Records Mapped to Road Intersection
- # 1950 Business Directory Activities Records Mapped to Road Corridor
- 1950 Business Directory Activities Records Mapped to a General Area

Scale: 0 25 50 100 Meters

Data Sources: Universal Business Directories (UBD) - Derived Data Licensed from Hardie Grant.
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Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Aerial Imagery 2016

1-9 Barber Avenue, Kingswood, NSW 2747

Scale: 0 50 100 Meters	Data Sources: Aerial Imagery © Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 October 2018

Aerial Imagery 2009

1-9 Barber Avenue, Kingswood, NSW 2747

Legend

Site Boundary

Buffer 150m

Scale:

0 25 50 100

Meters

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Date: 09 October 2018

Aerial Imagery 2002

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Scale:
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Meters

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Aerial Imagery 1991

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Aerial Imagery 1982

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0 25 50 100 Meters			

Aerial Imagery 1970

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Aerial Imagery 1965

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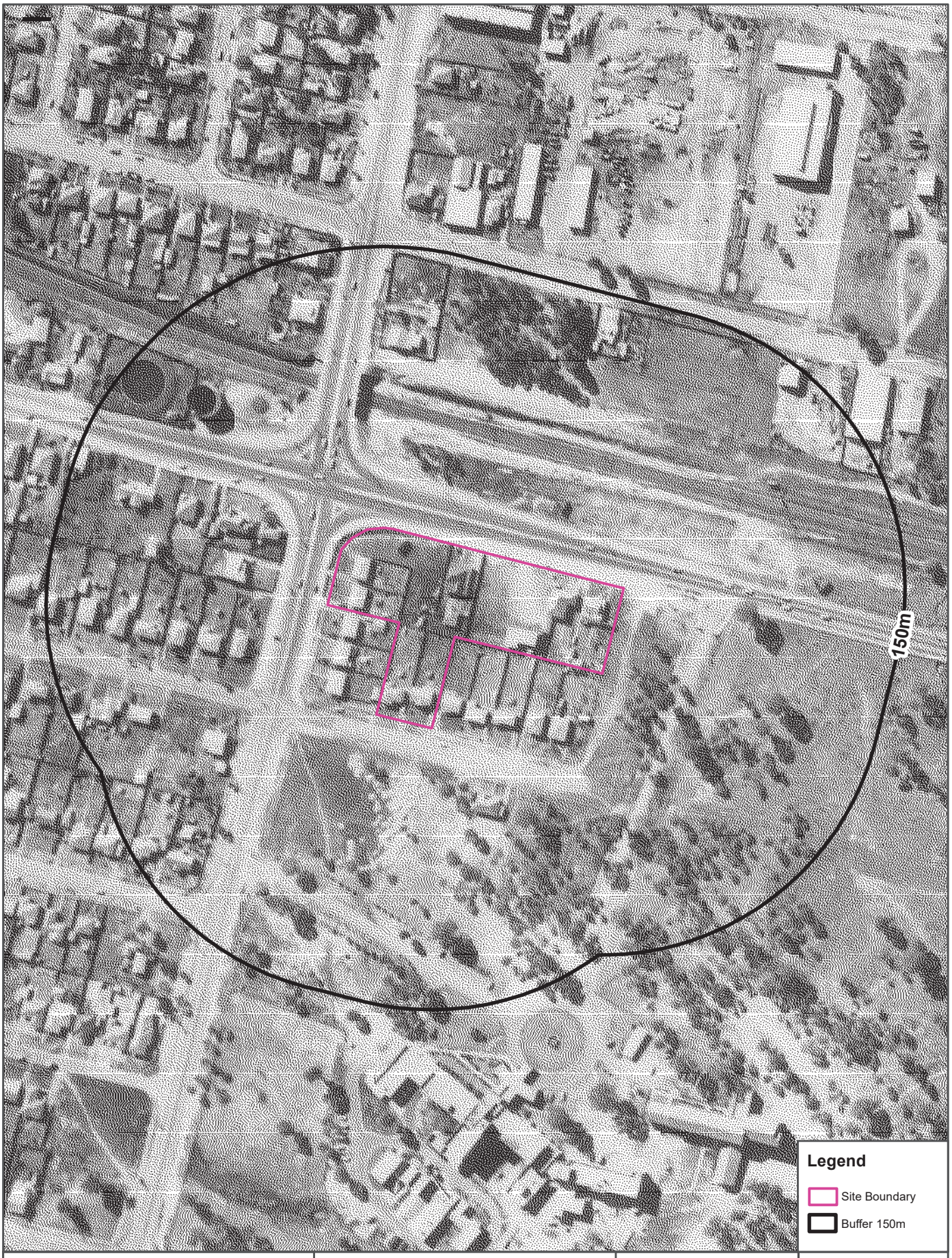

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Aerial Imagery 1956

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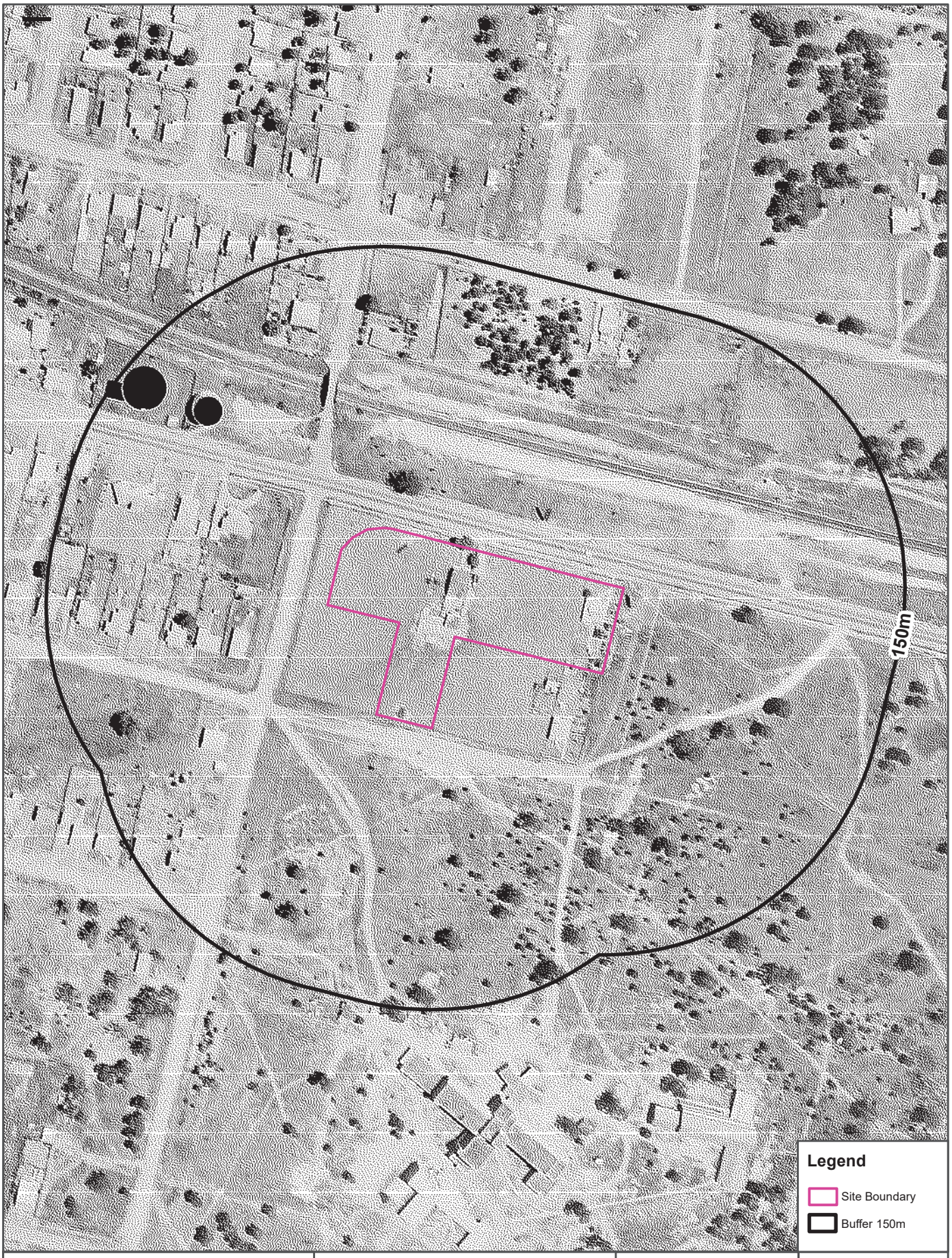

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Date: 09 October 2018

Aerial Imagery 1943

1-9 Barber Avenue, Kingswood, NSW 2747

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Coordinate System:
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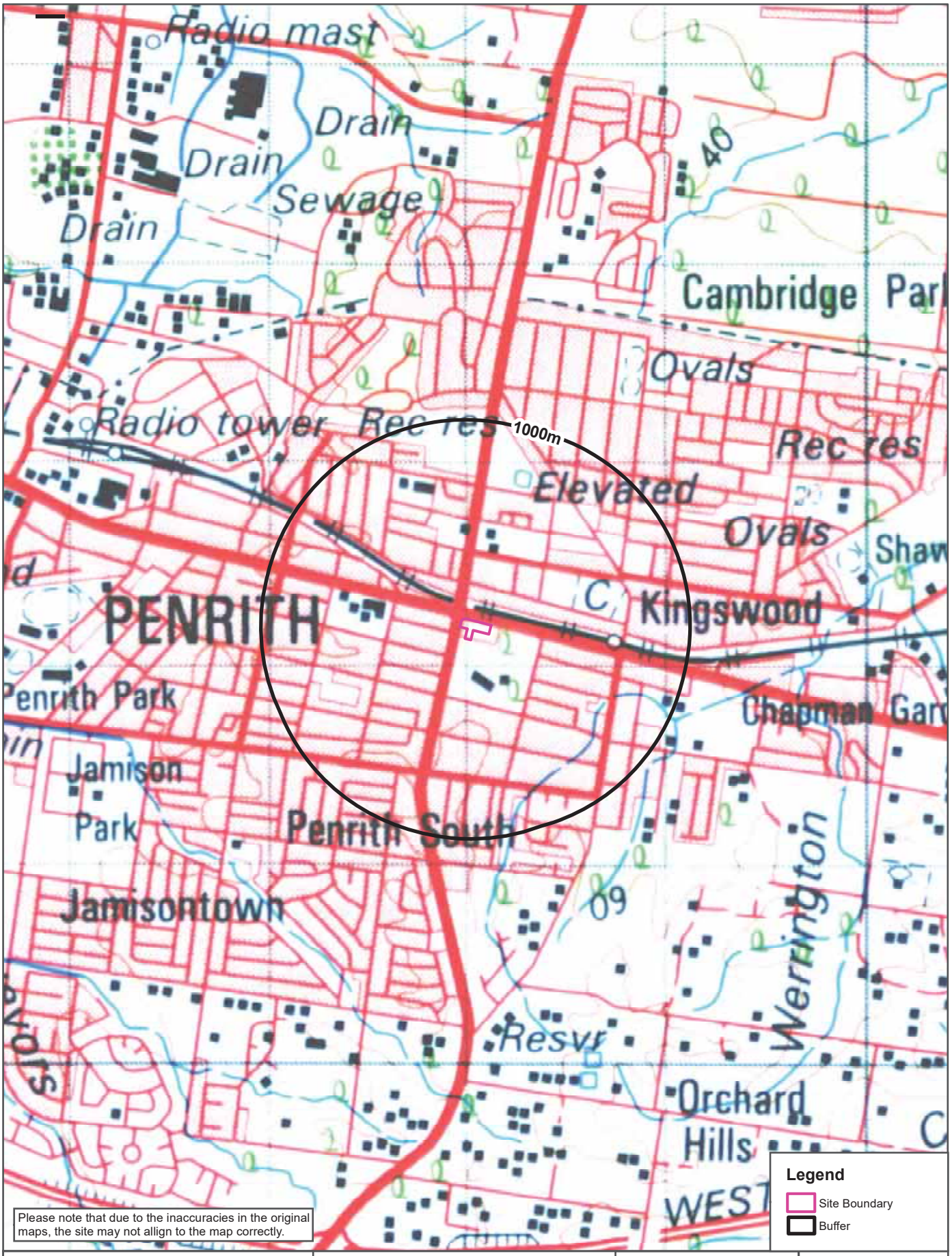
Date: 10 October 2018

Historical Map 1975

1-9 Barber Avenue, Kingswood, NSW 2747



Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale: 0 125 250 500 750 1,000 1,250 Meters

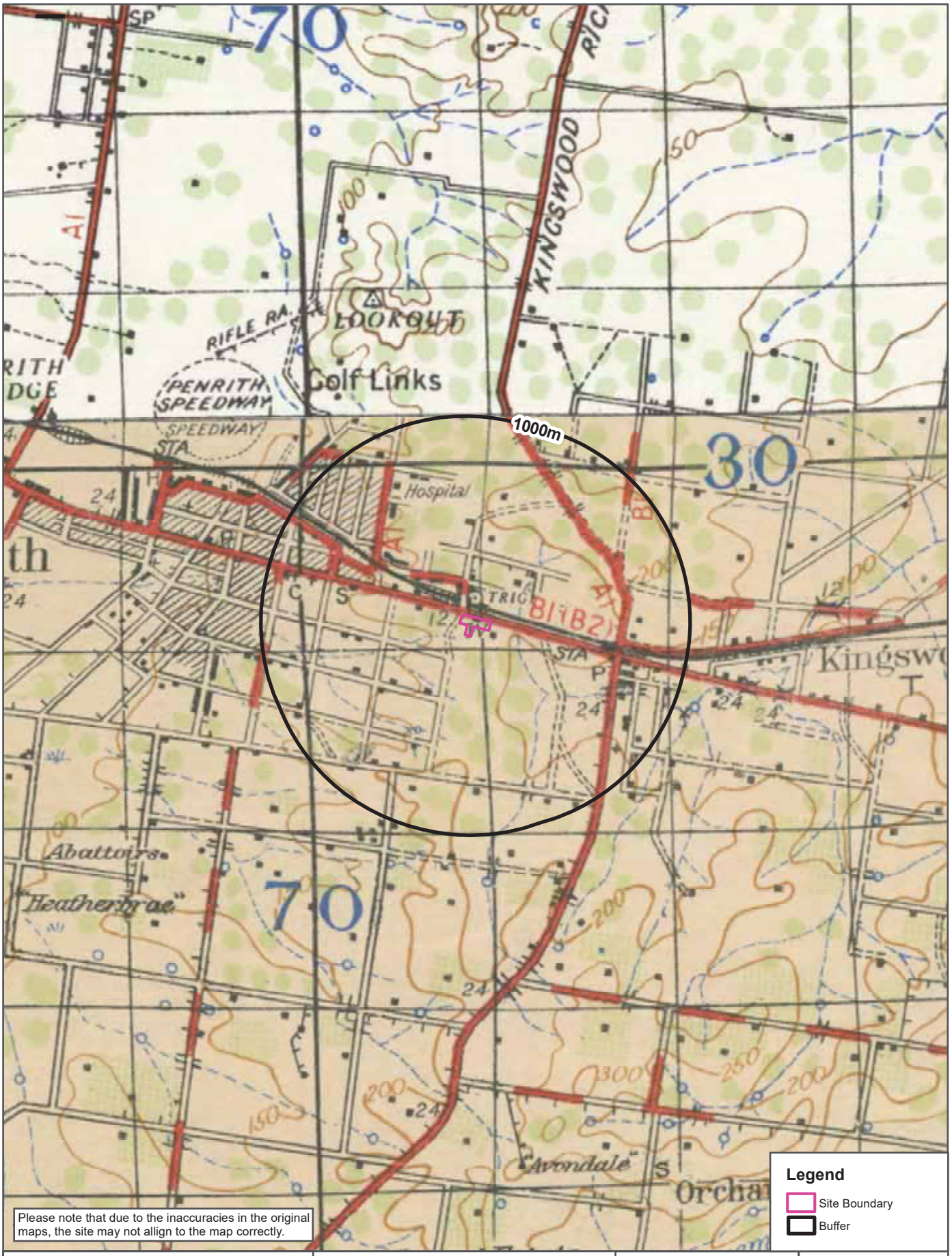
Data Sources: NATMAP 1:100,000
Topographic Maps Geoscience Australia

Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

Historical Map 1942

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 125 250 500 750 1,000 1,250 Meters

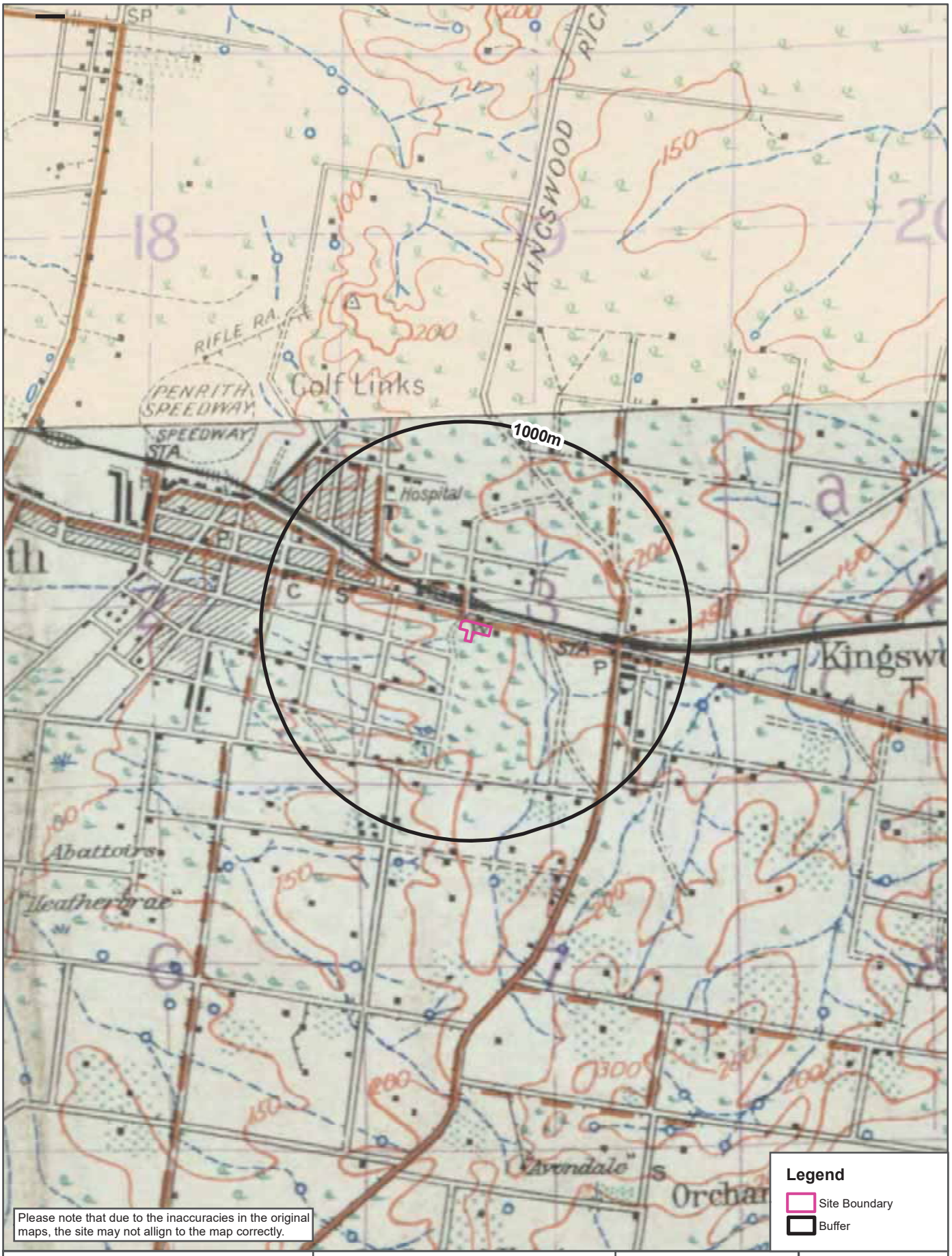
Data Sources: Australia 1:63360, Produced by Australian Section Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

Historical Map 1929

1-9 Barber Avenue, Kingswood, NSW 2747



Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale:	Data Sources: Australia 1:63360, Produced by Australian Section Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 56	Date: 10 October 2018
0 125 250 500 750 1,000 1,250 Meters			

Topographic Features

1-9 Barber Avenue, Kingswood, NSW 2747

Legend

- Place Name
- Points of Interest
- Tank Point
- Site Boundary
- Report Buffer
- Property Boundary
- Crown Land (data supplied 2014-15)
- Easement
- NPWS Reserve
- State Forest
- Tank Area
- Water Area
- Watercourse
- Pipeline
- Major Road
- Road
- Pathway/Track/Lane
- Heavy Rail
- Light Rail
- Underground Rail
- Runway
- Major Electricity Transmission Line

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Topographic Data Source: © Land and Property Information (2015)
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Tanks Data Source: © Land and Property Information (2015)
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State Forest Data Source: © Land and Property Information (2015)
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NPWS Data Source: © Land and Property Information (2015)
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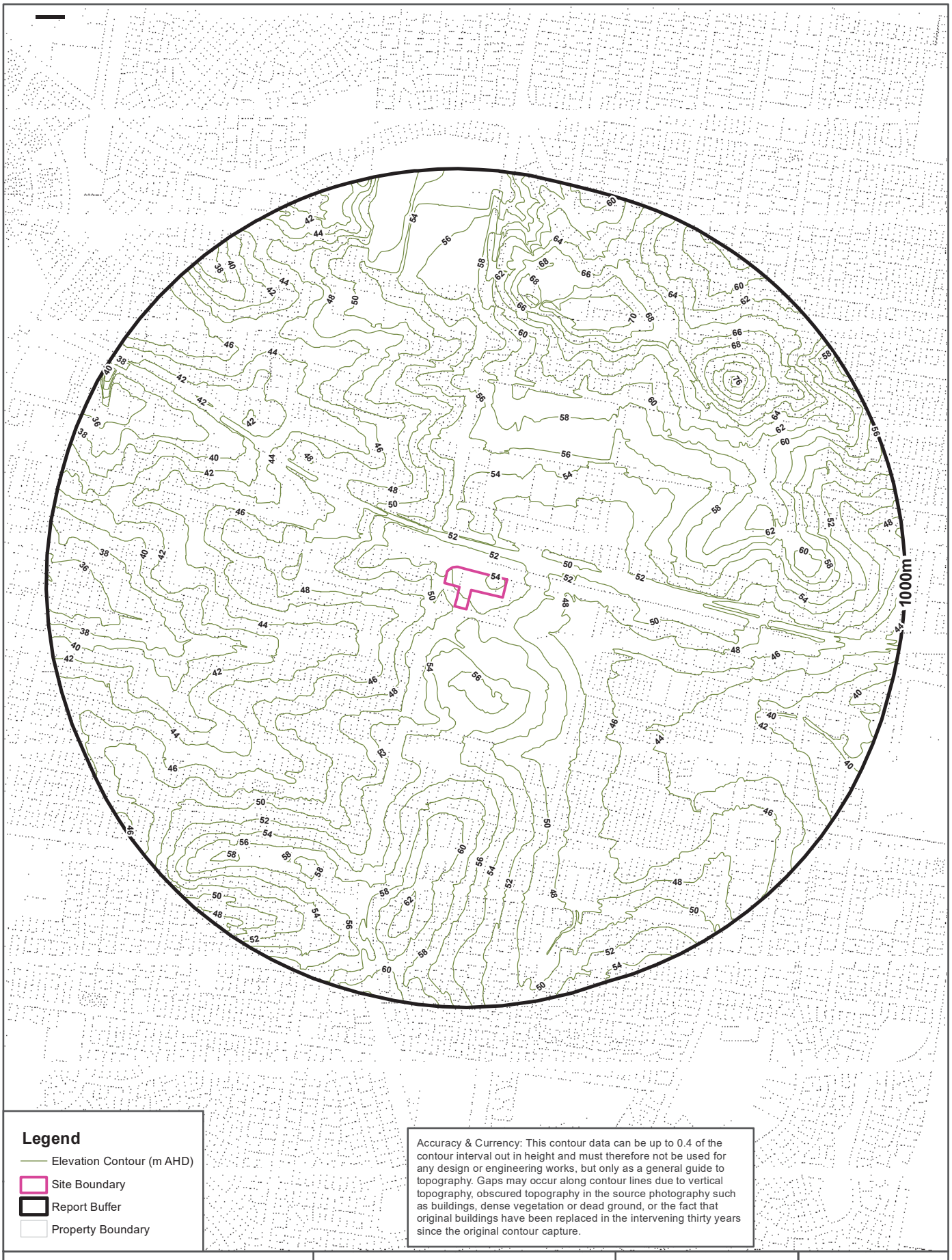
Elevation Contours (m AHD)

1-9 Barber Avenue, Kingswood, NSW 2747



Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)
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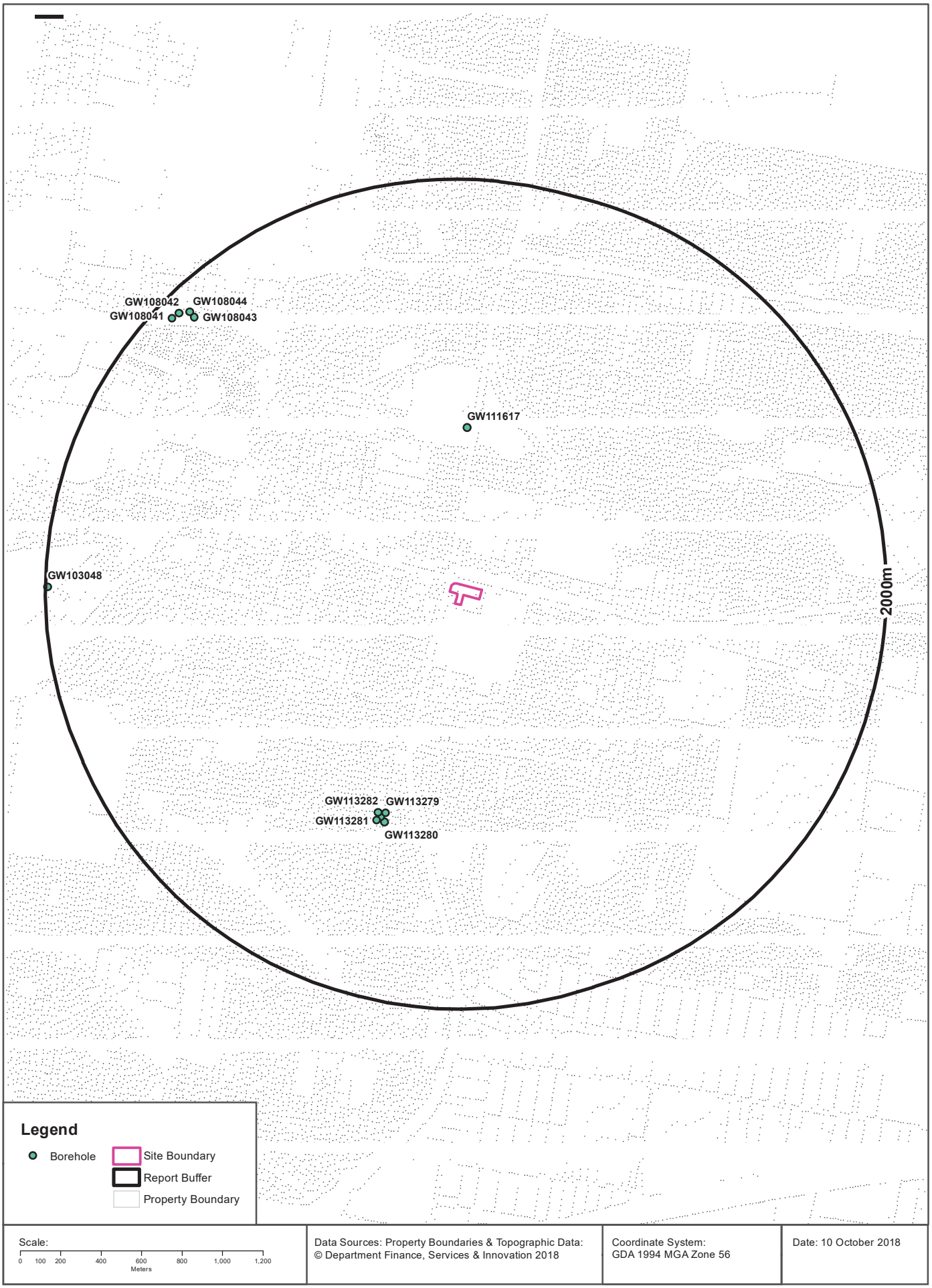
Botany Groundwater Management Zones Data Source : NSW Department of Primary Industries

Groundwater Boreholes

1-9 Barber Avenue, Kingswood, NSW 2747



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Borehole Data Source : NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation for all bores prefixed with GW. All other bores © Commonwealth of Australia (Bureau of Meteorology) 2015. Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

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Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp
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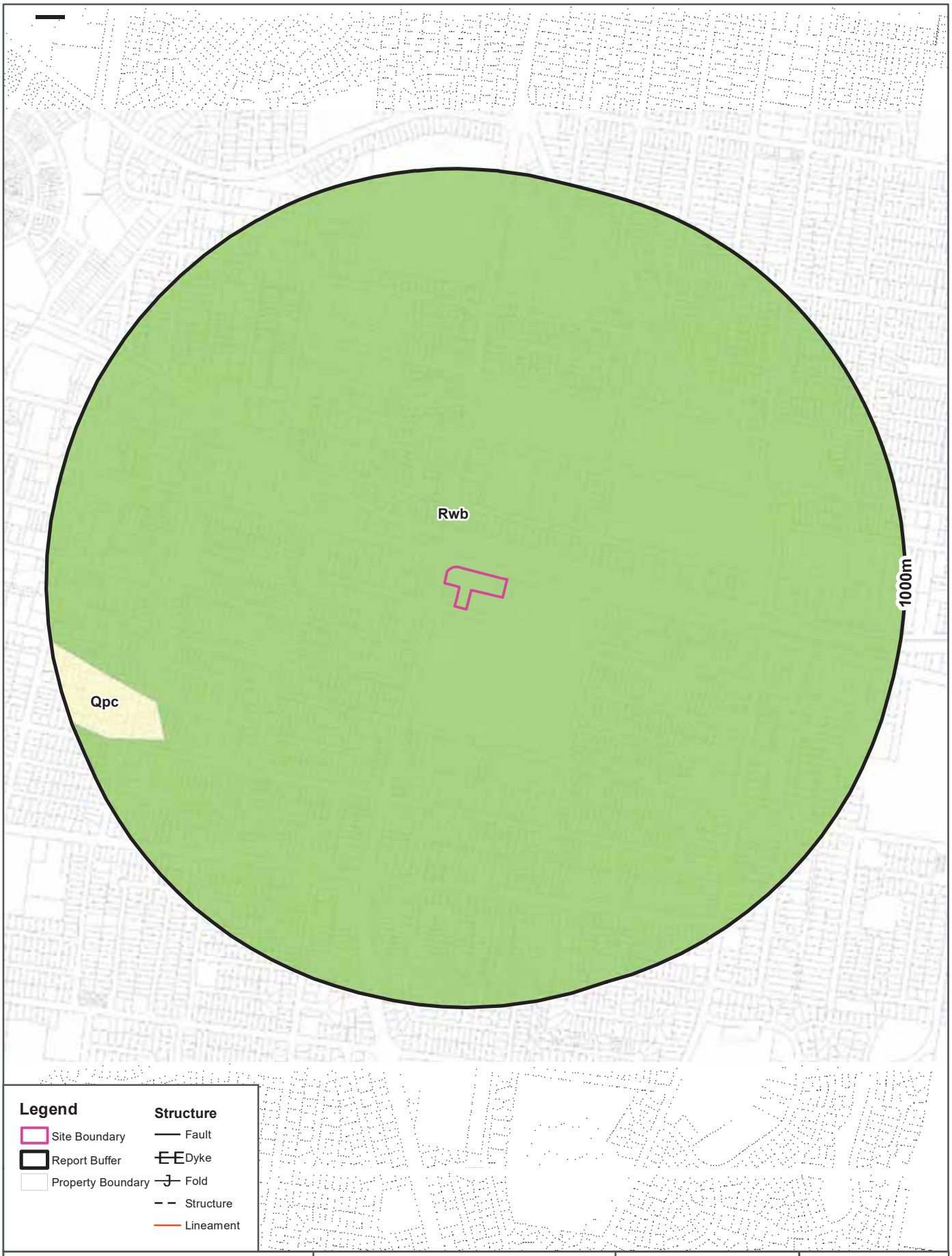
Geology 1:100,000

1-9 Barber Avenue, Kingswood, NSW 2747



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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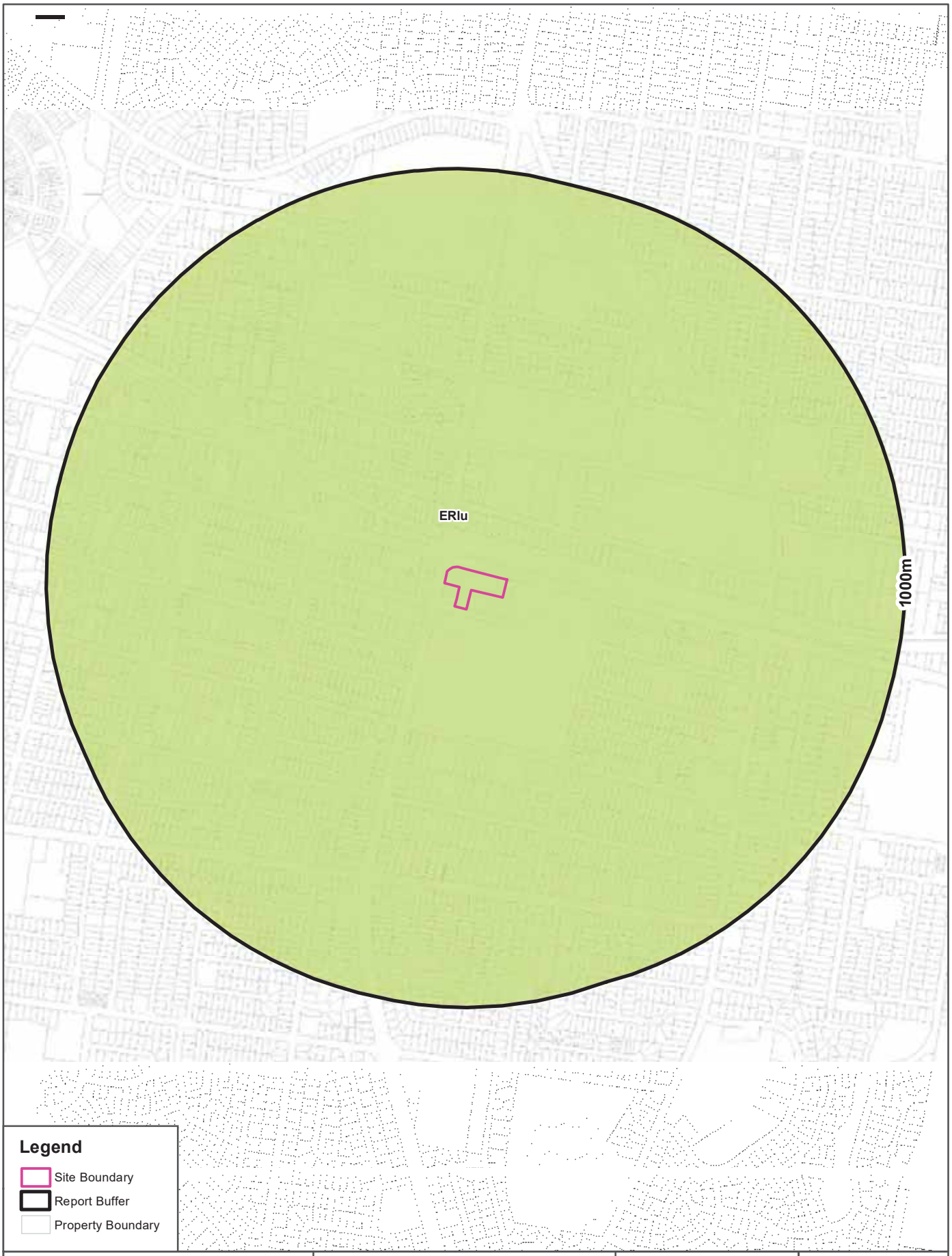
Mining Subsidence District Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Soil Landscapes

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Soils Landscapes Data Source : NSW Office of Environment and Heritage
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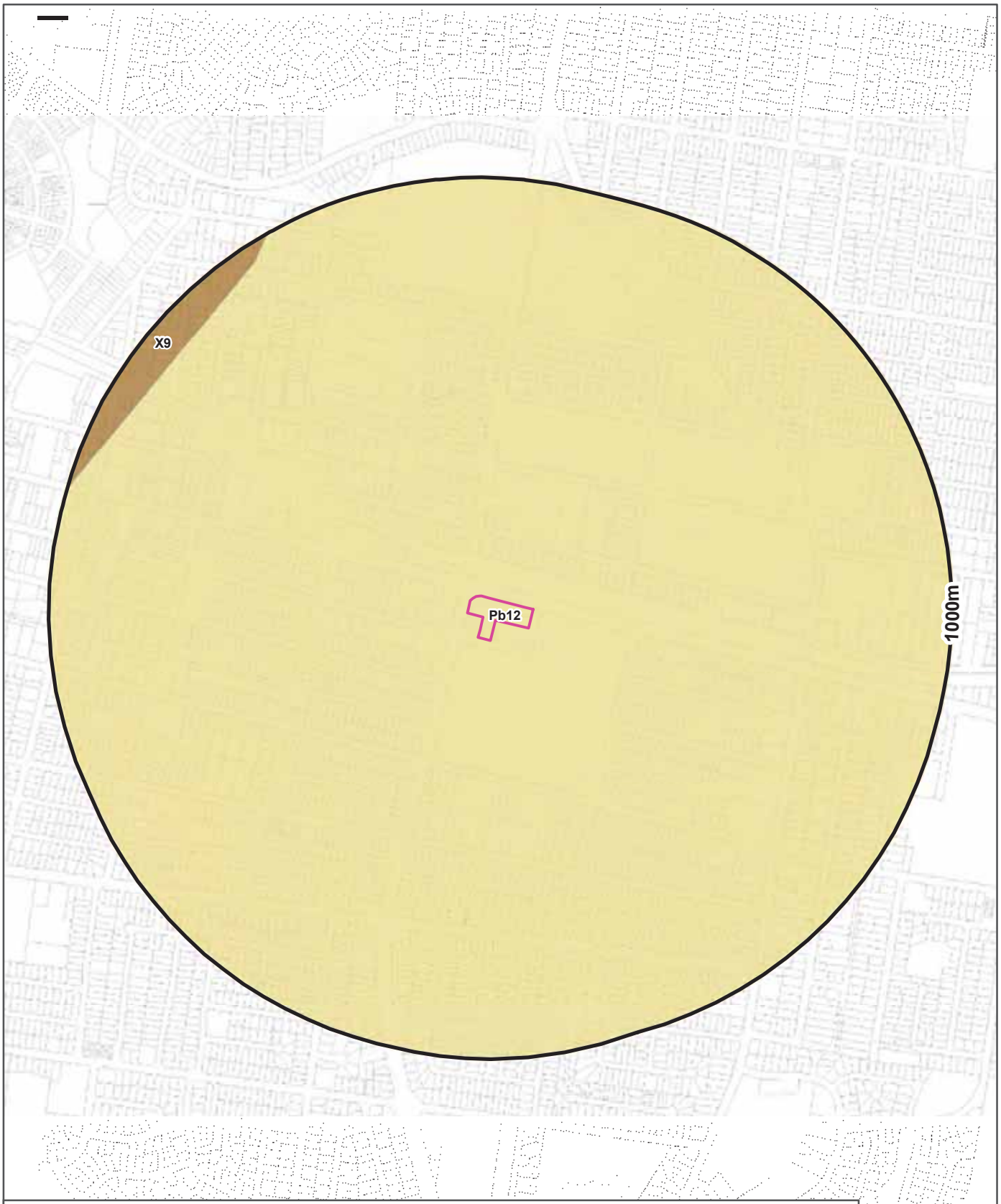
Atlas of Australian Soils

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Australian Soil Classification Orders

Anthroposol	Dermosol	Kandosol	Podosol	Tenosol	No Data
Calcarosol	Ferrosol	Kurosol	Rudosol	Vertosol	
Chromosol	Hydrosol	Organosol	Sodosol	Lake	

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

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Atlas of Australian Soils Data Source: CSIRO
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Acid Sulfate Data Source Accessed 07/10/2016: NSW Crown Copyright - Planning and Environment
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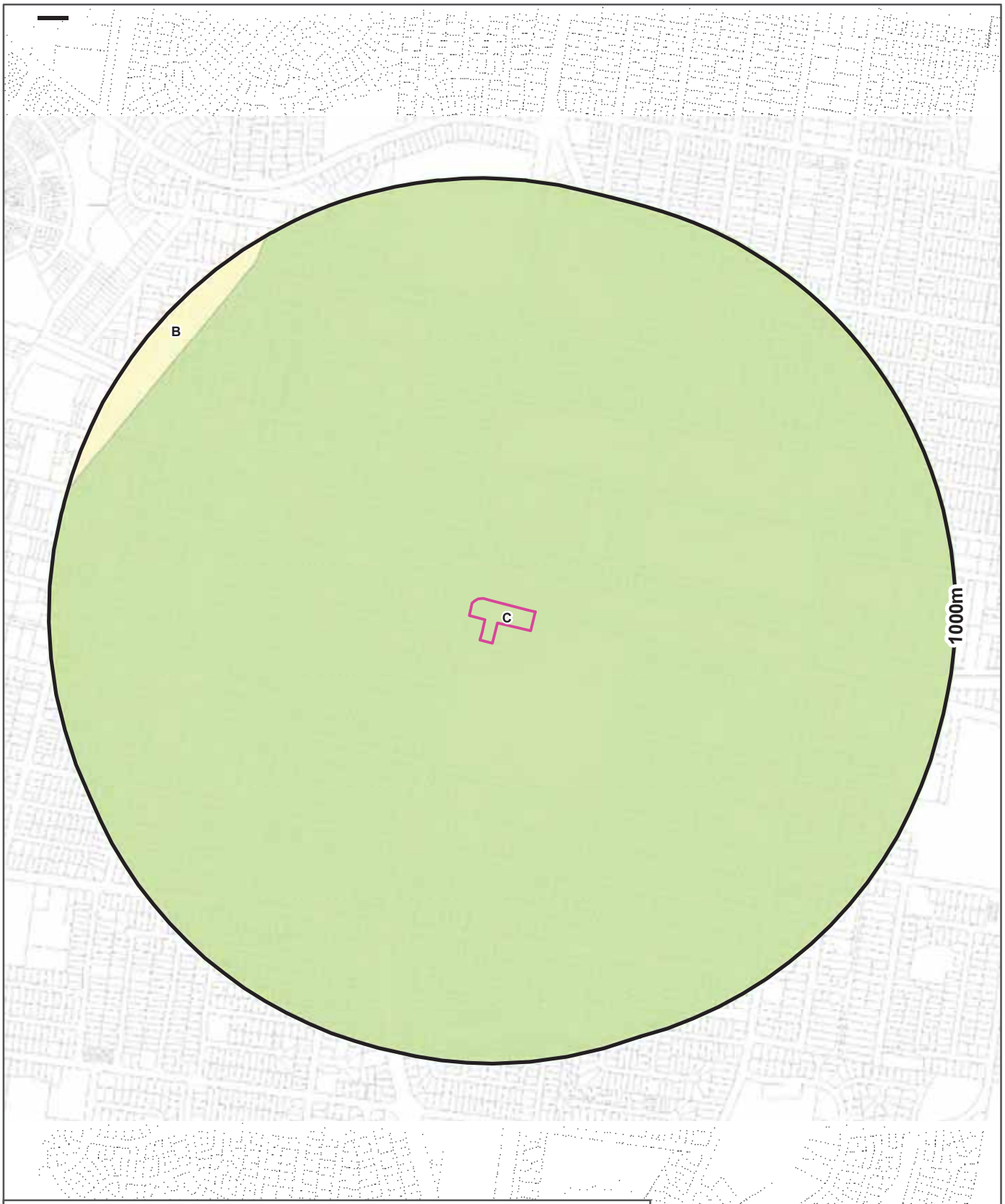
Atlas of Australian Acid Sulfate Soils

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Probability of occurrence of Acid Sulfate Soils

- A. High (>70%)
- B. Low (6-70%)
- C. Extremely Low (1-5%)
- D. No Chance (0%)
- No Data

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10October 2018

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Atlas of Australian Acid Sulfate Soils Data Source: CSIRO
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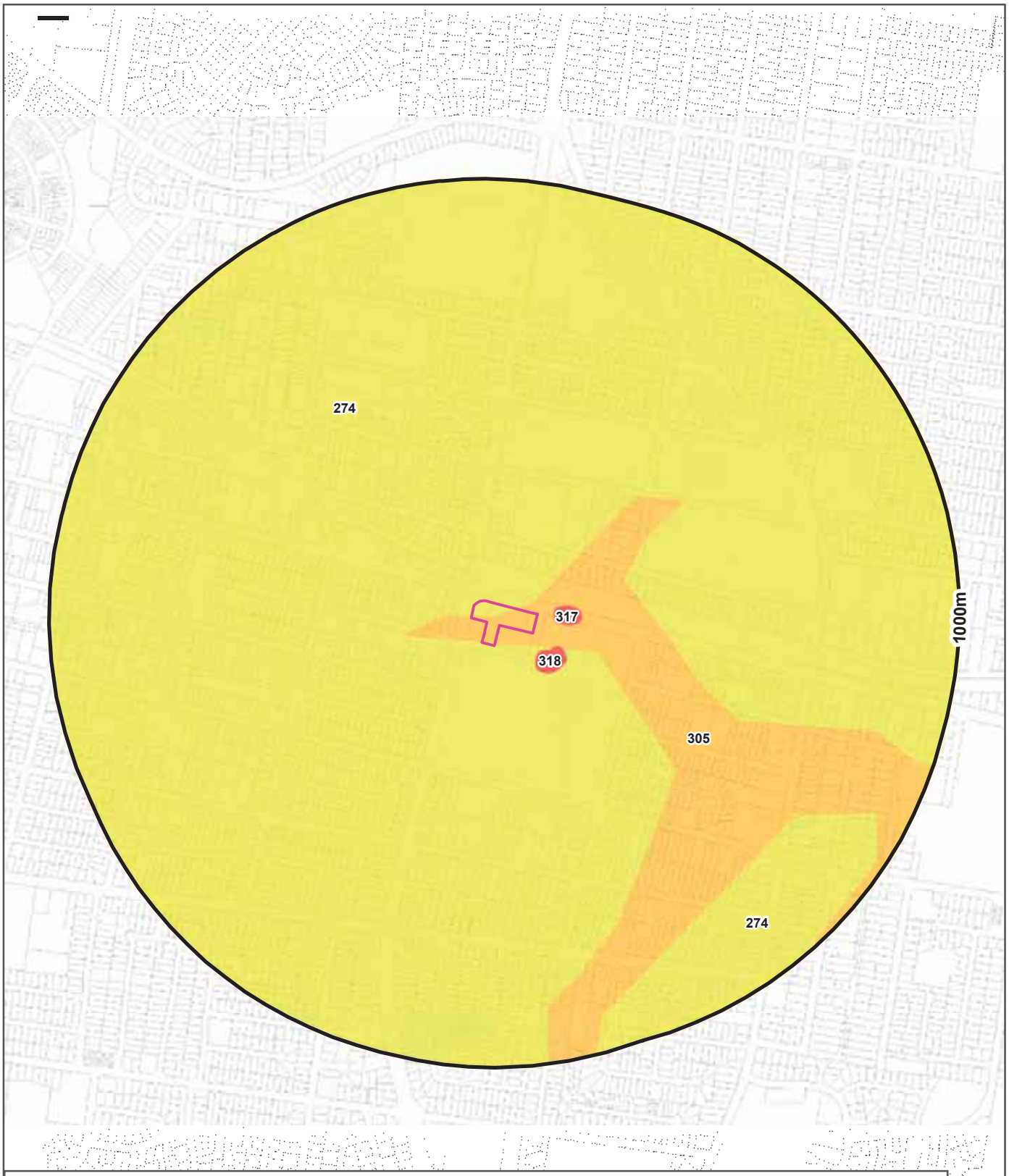
Dryland Salinity

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Dryland Salinity - National Assessment

- Delineated risk area but no high hazard or risk rating for either 2000, 2020, 2050
- High hazard or risk in 2050 only
- High hazard or risk defined for 2050, but no assessment made for 2000 or 2020
- High hazard or risk in 2020 and 2050
- High hazard or risk in 2000 and 2050. 2020 not defined as high hazard
- High hazard or risk defined for all years: 2000, 2020, 2050

Salinity Potential of Western Sydney

- Area of Known Salinity
- Area of High Salinity Potential
- Area of Moderate Salinity Potential
- Area of Very Low Salinity Potential
- Area of Water

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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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.

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Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage
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Mining Subsidence District Data Source: © Land and Property Information (2016)
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SEPP Protected Areas Data Source: NSW Department of Planning & Environment
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SEPP Major Development Data Source: NSW Department of Planning & Environment
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SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment
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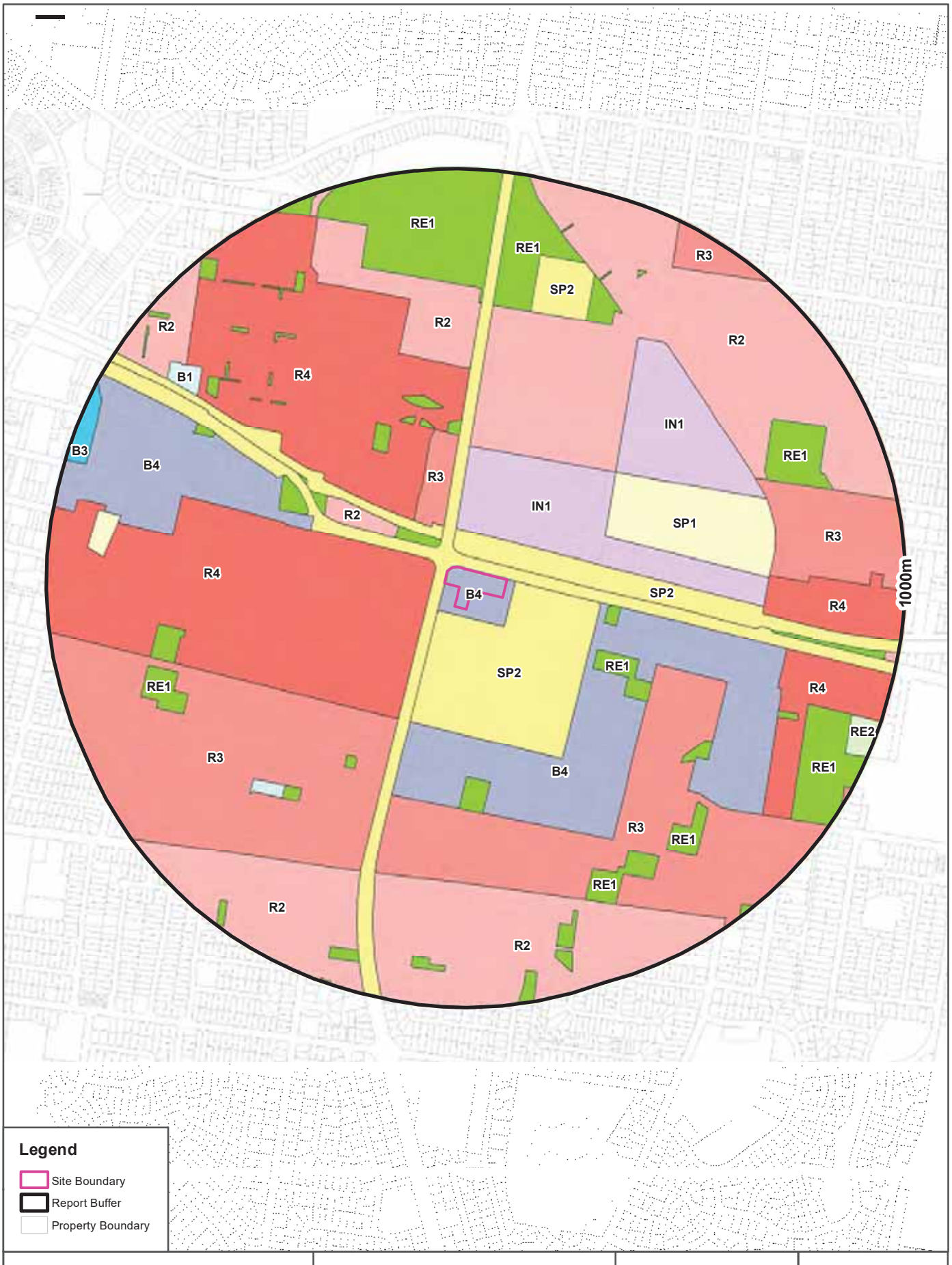
LEP Planning Zones

1-9 Barber Avenue, Kingswood, NSW 2747



Scale:

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Meters

Data Sources: Property Boundaries & Topographic Data:
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Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

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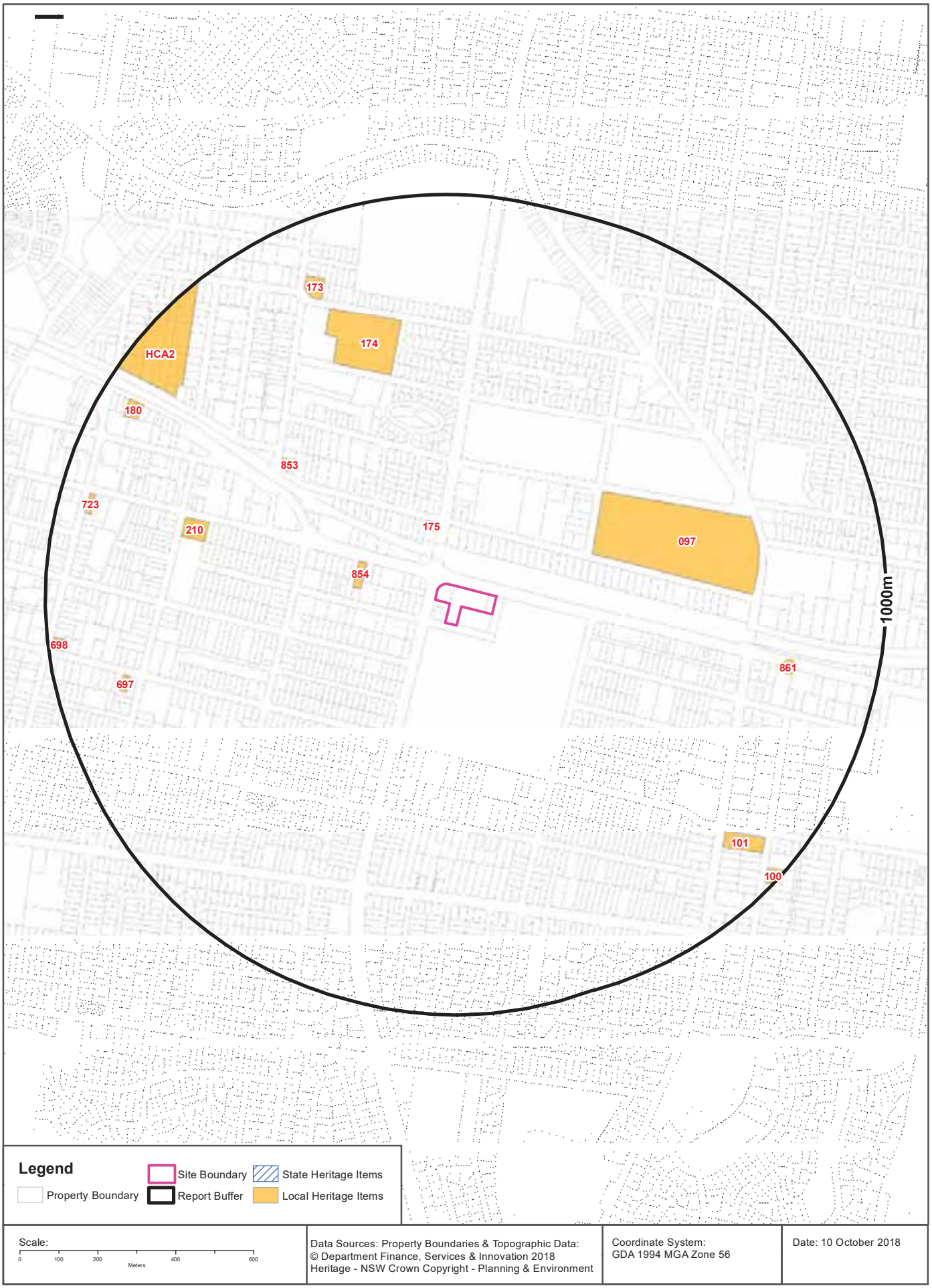
Heritage Items

1-9 Barber Avenue, Kingswood, NSW 2747



Data Sources: Property Boundaries & Topographic Data:
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Coordinate System:
GDA 1994 MGA Zone 56

Date: 10 October 2018

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Heritage Data Source: NSW Crown Copyright - Planning & Environment
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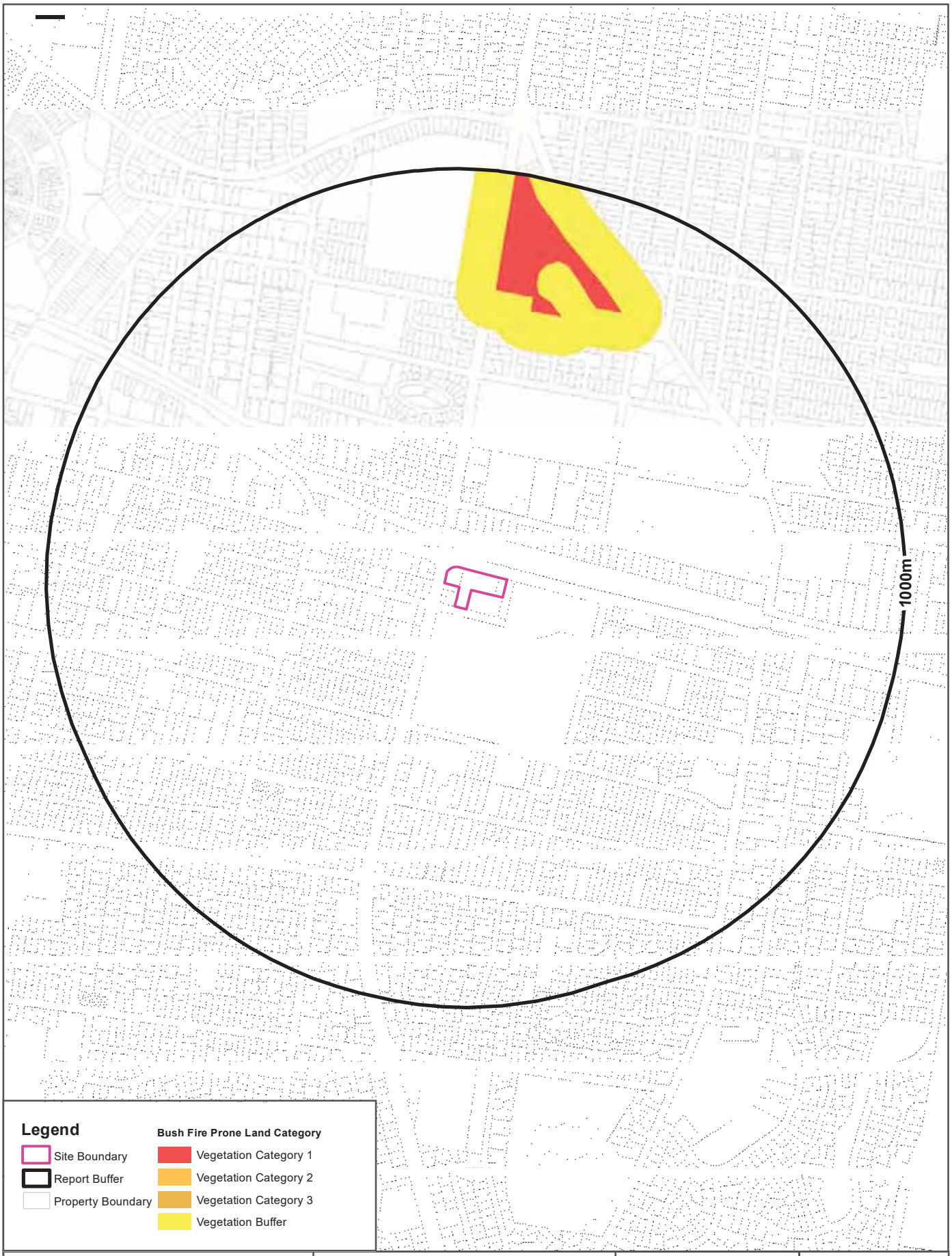
Natural Hazards - Bush Fire Prone Land

1-9 Barber Avenue, Kingswood, NSW 2747



Scale:
0 100 200 400 600
Meters

Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2018. Property Boundaries: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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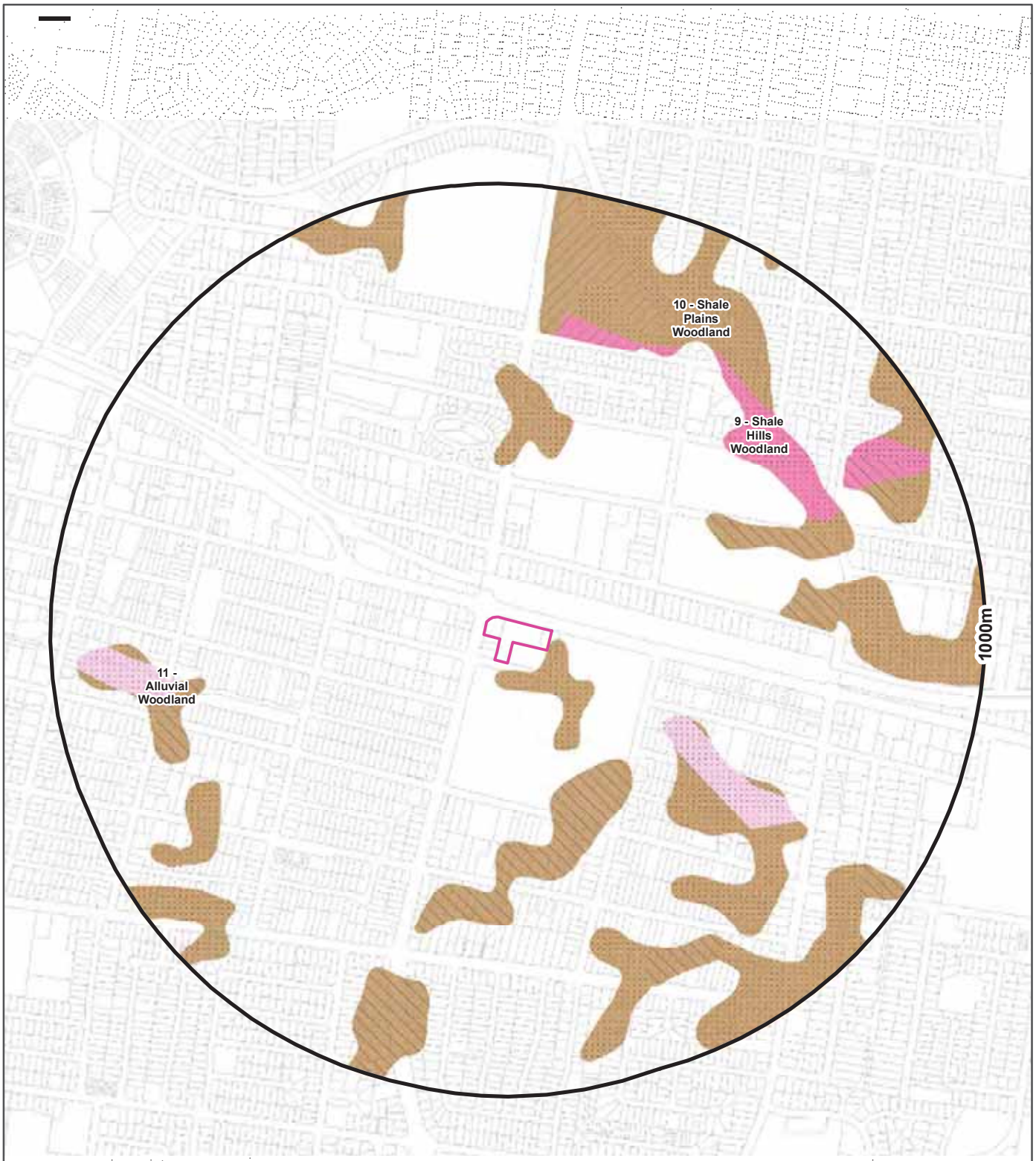
NSW Bush Fire Prone Land - © NSW Rural Fire Service under Creative Commons 4.0 International Licence

Ecological Constraints - Remnant Vegetation of the Cumberland Plain

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- RAMSAR Wetlands

Cumberland Plain Vegetation

- Crown cover greater than 10%
- Crown cover less than 10%
- Crown cover less than 10% (urban areas)

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Remnant Vegetation of the Cumberland Plain : NSW Office of Environment and Heritage
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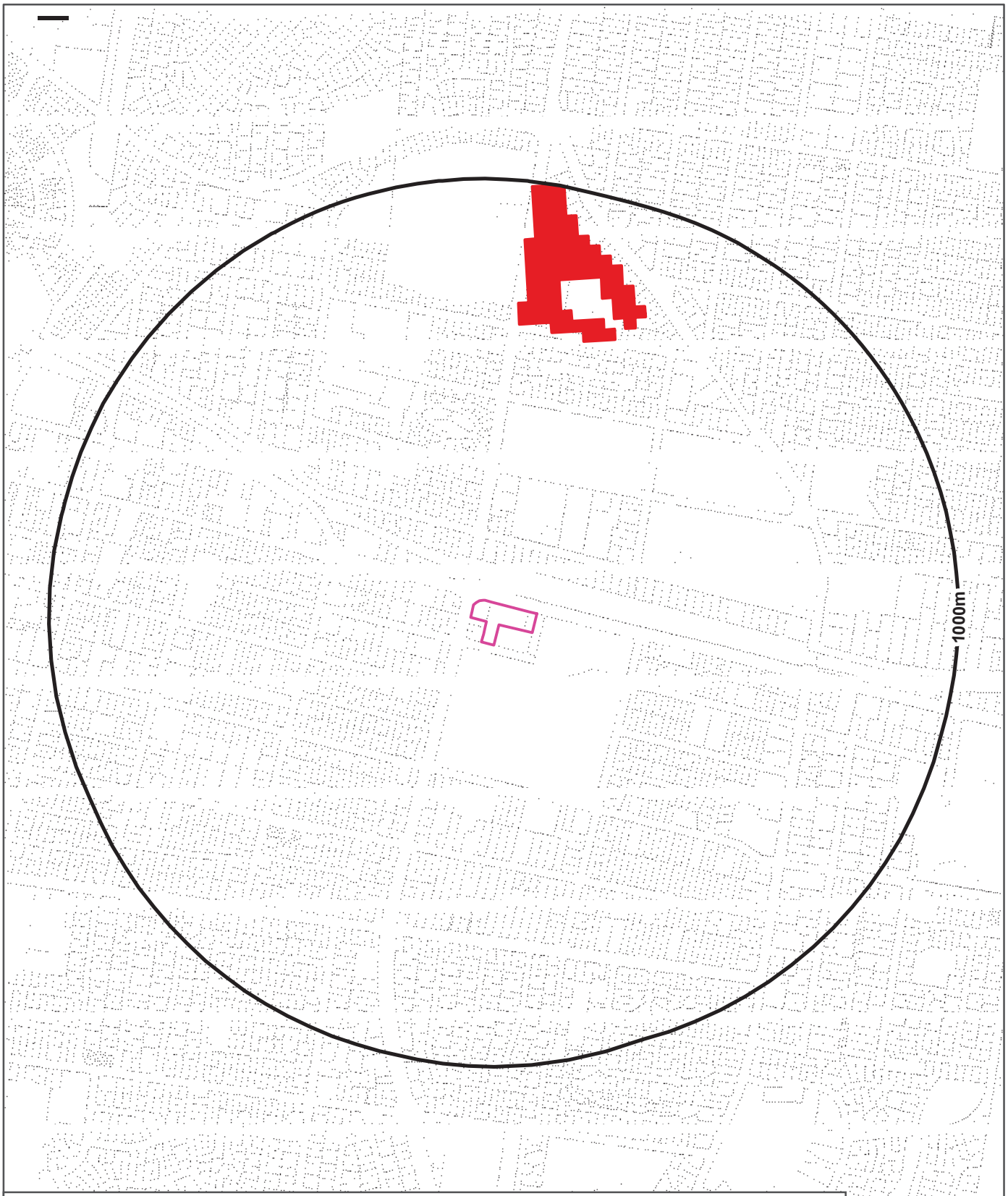
RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

1-9 Barber Avenue, Kingswood, NSW 2747



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- High potential GDE - from national assessment
- High potential GDE - from regional studies
- Moderate potential GDE - from national assessment
- Moderate potential GDE - from regional studies
- Low potential GDE - from national assessment
- Low potential GDE - from regional studies
- Known GDE - from regional studies
- Unclassified potential GDE - from national assessment
- Unclassified potential GDE - from regional studies

Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology
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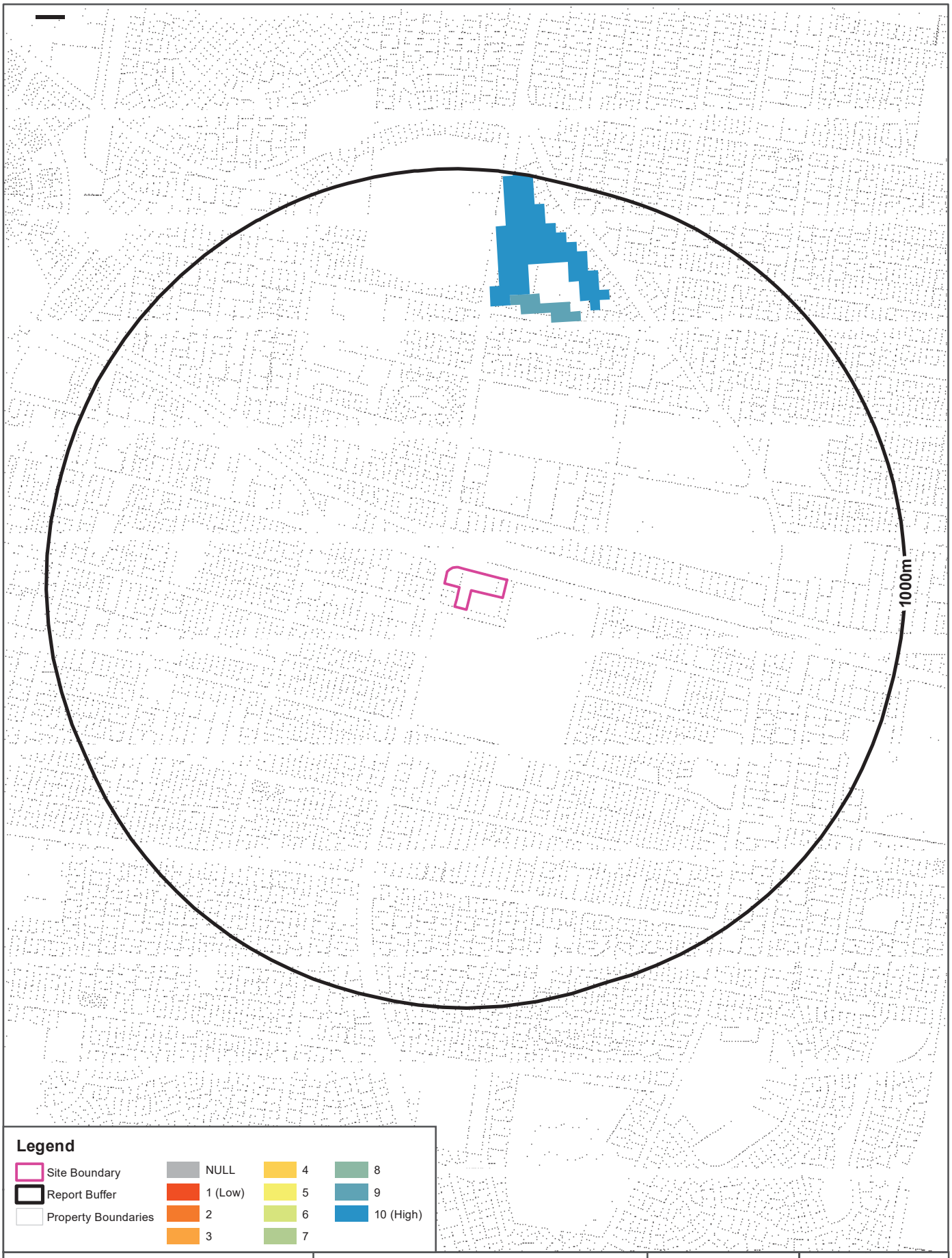
Ecological Constraints - Inflow Dependent Ecosystems Likelihood

1-9 Barber Avenue, Kingswood, NSW 2747



Scale: 0 100 200 400 600 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2018

Coordinate System: GDA 1994 MGA Zone 56

Date: 10 October 2018

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Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology
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Data does not include NSW category 1 sensitive species.

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(c) releases each Third Party Content Supplier from any claim it may have otherwise had in connection with the Report, or the negotiation of, entry into, performance of, or termination of these Terms.

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12. These Terms are subject to New South Wales law.

Appendix B

SECTION 10.7 PLANNING CERTIFICATE

PENRITH CITY COUNCIL

Civic Centre
601 High Street, Penrith

PO Box 60 Penrith NSW 2751

Telephone: 02 4732 7777
Facsimile: 02 4732 7958

Email: pencit@penrithcity.nsw.gov.au

PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Property No: 125812
Your Reference: LS004326
Contact No:

Issue Date: 09 October 2018
Certificate No: 18/05347

Issued to: Lotsearch
3/68 Alfred St
MILSONS POINT NSW 2061

PRECINCT 2010

DESCRIPTION OF LAND

County: CUMBERLAND **Parish: MULGOA**

Location: 11 Barber Avenue KINGSWOOD NSW 2747
Land Description: Lot 100 DP 701623

- PART 1 PRESCRIBED MATTERS –

In accordance with the provisions of Section 10.7(2) of the Act the following information is furnished in respect of the abovementioned land:

1 *NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPs*

1(1) The name of each environmental planning instrument that applies to the carrying out of development on the land:

Penrith Local Environmental Plan 2010, published 22nd September 2010, as amended, applies to the land.

Sydney Regional Environmental Plan No.9 - Extractive Industry (No.2), gazetted 15 September 1995, as amended, applies to the local government area of Penrith.

Sydney Regional Environmental Plan No. 20 - Hawkesbury-Nepean River (No. 2 - 1997), gazetted 7 November 1997, as amended, applies to the local government area of Penrith (except land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies).

The following State environmental planning policies apply to the land (subject to the exclusions noted below):

State Environmental Planning Policy No.1 - Development Standards. (Note: This policy does not apply to the land to which Penrith Local Environmental Plan 2010 or State Environmental Planning Policy (Western Sydney Employment Area) 2009 apply.)
State Environmental Planning Policy No.19 - Bushland in Urban Areas. (Note: This policy does not apply to certain land referred to in the National Parks and Wildlife Act 1974 and the Forestry Act 1916.)
State Environmental Planning Policy No.21 - Caravan Parks.
State Environmental Planning Policy No.30 - Intensive Agriculture.
State Environmental Planning Policy No.33 - Hazardous and Offensive Development.

State Environmental Planning Policy No.50 - Canal Estate Development. (Note: This policy does not apply to the land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies.
State Environmental Planning Policy No.55 - Remediation of Land.
State Environmental Planning Policy No.62 - Sustainable Aquaculture.
State Environmental Planning Policy No.64 - Advertising and Signage.
State Environmental Planning Policy No.65 - Design Quality of Residential Apartment Development.
State Environmental Planning Policy No.70 - Affordable Housing (Revised Schemes).
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 (Note: This policy applies to land within New South Wales that is land zoned primarily for urban purposes or land that adjoins land zoned primarily for urban purposes, but only as detailed in clause 4 of the policy.)
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004.
State Environmental Planning Policy (State Significant Precincts) 2005.
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.
State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007.
State Environmental Planning Policy (Infrastructure) 2007.
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
State Environmental Planning Policy (Affordable Rental Housing) 2009.
State Environmental Planning Policy (State and Regional Development) 2011.
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
State Environmental Planning Policy (Education Establishments and Child Care Centre Facilities) 2017.

1(2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act:

(Information is provided in this section only if a proposed environmental planning instrument that is or has been the subject of community consultation or on public exhibition under the Act will apply to the carrying out of development on the land.)

Draft amendments to Penrith Development Control Plan 2014 for Multi-Dwelling Housing and Boarding Houses applies to the land. (See www.penrithcity.nsw.gov.au for details).

Draft State Environmental Planning Policy (Western Sydney Corridors) may apply to the land. Further information is available here: https://www.transport.nsw.gov.au/corridors.

On 22 June 2018, the NSW Government announced changes to the recommended alignments for the Western Sydney corridors, including continuing with the previously gazetted 1951 corridor for the Bells Line of Road Castlereagh Connection.

Draft State Environmental Planning Policy (Primary Production & Rural Development) applies to the land.

Draft State Environmental Planning Policy (Environment) applies to the land.

Draft State Environmental Planning Policy (Remediation of Land) applies to the land.

1(3) The name of each development control plan that applies to the carrying out of development on the land:

Penrith Development Control Plan 2014 applies to the land.

2 *ZONING AND LAND USE UNDER RELEVANT LEPs*

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

2(a)-(d) the identity of the zone; the purposes that may be carried out without development consent; the purposes that may not be carried out except with development consent; and the purposes that are prohibited within the zone. Any zone(s) applying to the land is/are listed below and/or in annexures.

(Note: If no zoning appears in this section see section 1(1) for zoning and land use details (under the Sydney Regional Environmental Plan or State Environmental Planning Policy that zones this property).)

Zone B4 Mixed Use
(Penrith Local Environmental Plan 2010)

1 Objectives of zone

- To provide a mixture of compatible land uses.
- To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.
- To minimise conflict between land uses within the zone and land uses within adjoining zones.
- To create opportunities to improve public amenity.
- To provide a wide range of retail, business, office, residential, community and other suitable land uses.

2 Permitted without consent

Home occupations

3 Permitted with consent

Amusement centres; Boarding houses; Car parks; Centre-based child care facilities; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Function centres; Home-based child care; Home businesses; Hostels; Hotel or motel accommodation; Information and education facilities; Medical centres; Mortuaries; Multi dwelling housing; Passenger transport facilities; Places of public worship; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Residential accommodation; Residential flat buildings; Respite day care centres; Restricted premises; Roads; Seniors housing; Serviced apartments; Sex services premises; Shop top housing; Signage; Veterinary hospitals.

4 Prohibited

Rural workers' dwellings; Any development not specified in item 2 or 3

Additional information relating to Penrith Local Environmental Plan 2010

Note 1: Under the terms of Clause 2.4 of Penrith Local Environmental Plan 2010 development may be carried out on unzoned land only with development consent.

Note 2: Under the terms of Clause 2.6 of Penrith Local Environmental Plan 2010 land may be subdivided but only with development consent, except for the exclusions detailed in the clause.

Note 3: Under the terms of Clause 2.7 of Penrith Local Environmental Plan 2010 the demolition of a building or work may be carried out only with development consent.

Note 4: A temporary use may be permitted with development consent subject to the requirements of Clause 2.8 of Penrith Local Environmental Plan 2010.

Note 5: Under the terms of Clause 4.1A of Penrith Local Environmental Plan 2010, despite any other provision of this plan, development consent must not be granted for dual occupancy on an internal lot in Zone R2 Low Density Residential.

Note 6: Under the terms of Clause 5.1 of Penrith Local Environmental Plan 2010 development on land acquired by an authority of the State under the owner-initiated acquisition provisions may, before it is used for the purpose for which it is reserved, be carried out, with development consent, for any purpose.

Note 7: Under the terms of Clause 5.3 of Penrith Local Environmental Plan 2010 development consent may be granted to development of certain land for any purpose that may be carried out in an adjoining zone.

Note 8: Clause 5.10 of Penrith Local Environmental Plan 2010 details when development consent is required/not required in relation to heritage conservation.

Note 9: Under the terms of Clause 5.11 of Penrith Local Environmental Plan 2010 bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.

Note 10: Under the terms of Clause 7.1 of Penrith Local Environmental Plan 2010 (PLEP 2010) development consent is required for earthworks unless the work is exempt development under PLEP 2010 or another applicable environmental planning instrument, or the work is ancillary to other development for which development consent has been given.

Note 11: Sex services premises and restricted premises may only be permitted subject to the requirements of Clause 7.23 of Penrith Local Environmental Plan 2010.

2(e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed:

(Information is provided in this section only if any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed.)

2(f) whether the land includes or comprises critical habitat:

(Information is provided in this section only if the land includes or comprises critical habitat.)

2(g) whether the land is in a conservation area (however described):

(Information is provided in this section only if the land is in a conservation area (however described).)

2(h) whether an item of environmental heritage (however described) is situated on the land:

(Information is provided in this section only if an item of environmental heritage (however described) is situated on the land.)

2A ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

(Information is provided in this section only if the land is within any zone under State Environmental Planning Policy (Sydney Region Growth Centres) 2006.)

3 COMPLYING DEVELOPMENT

HOUSING CODE

(The Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

RURAL HOUSING CODE

(The Rural Housing Code only applies if the land is within Zones RU1, RU2, RU3, RU4, RU6 or R5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Rural Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

LOW RISE MEDIUM DENSITY HOUSING CODE

(The Low Rise Medium Density Housing Code only applies if the land is within Zones R1, R2, R3 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Low Rise Medium Density Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

Please note that Council has been deferred from the application of Part 3B of the Low Rise Medium Density Housing Code until 1 July 2019. That Part will not apply to Penrith Local Government Area during this time.

GREENFIELD HOUSING CODE

(The Greenfield Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.)

Complying development under the Greenfield Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.

HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code **may** be carried out on the land.

GENERAL DEVELOPMENT CODE

Complying development under the General Development Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL ALTERATIONS CODE

Complying development under the Commercial and Industrial Alterations Code **may** be carried out on the land.

SUBDIVISIONS CODE

Complying development under the Subdivisions Code **may** be carried out on the land.

DEMOLITION CODE

Complying development under the Demolition Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL (NEW BUILDINGS AND ADDITIONS) CODE

(The Commercial and Industrial (New Buildings and Additions) Code only applies if the land is within Zones B1, B2, B3, B4, B5, B6, B7, B8, IN1, IN2, IN3, IN4 or SP3 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Commercial and Industrial (New Buildings and Alterations) Code **may** be carried out on the land if the land is within one of the abovementioned zones.

FIRE SAFETY CODE

Complying development under the Fire Safety Code **may** be carried out on the land.

(NOTE: (1) Council has relied on Planning and Infrastructure Circulars and Fact Sheets in the preparation of this information. Applicants should seek their own legal advice in relation to this matter with particular reference to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

(2) Penrith Local Environmental Plan 2010 (if it applies to the land) contains additional complying development not specified in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.)

4 COASTAL PROTECTION

The land is not affected by the operation of sections 38 or 39 of the Coastal Protection Act 1979, to the extent that council has been so notified by the Department of Public Works.

5 MINE SUBSIDENCE

The land is not proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

6 ROAD WIDENING AND ROAD REALIGNMENT

The land is not affected by any road widening or road realignment under:
(a) Division 2 of Part 3 of the Roads Act 1993, or
(b) an environmental planning instrument, or
(c) a resolution of council.

7 COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

(a) Council Policies
The land is affected by the Asbestos Policy adopted by Council.
The land is not affected by any other policy adopted by the council that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

(b) Other Public Authority Policies
The Bush Fire Co-ordinating Committee has adopted a Bush Fire Risk Management Plan that covers the local government area of Penrith City Council, and includes public, private and Commonwealth lands.
The land is not affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council, that restricts the development of the land because of the likelihood of land slip, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

7A FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

(1) This land has not been identified as being below the adopted flood planning level (ie. the 1% Annual Exceedance Probability flood level plus 0.5 metre) and as such flood related development controls generally do not apply for dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) if such uses are permissible on the land. Council reserves the right, however, to apply flood related development controls depending on the merits of any particular application. Should future studies change this situation this position may be reviewed.

(2) This land has not been identified as being below the adopted flood planning level (ie. the 1% Annual Exceedance Probability flood level plus 0.5 metre) and as such flood related development controls generally do not apply for any other purpose not referred to in (1) above. Council reserves the right, however, to apply flood related development controls depending on the merits of any particular application. Should future studies change this situation this position may be reviewed.

8 LAND RESERVED FOR ACQUISITION

No environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 3.15 of the Act.

9 CONTRIBUTIONS PLANS

The Cultural Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith.

The Penrith City Local Open Space Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, excluding industrial areas and the release areas identified in Appendix B of the Plan (Penrith Lakes, Cranebrook, Sydney Regional Environmental Plan No. 30 - St Marys, Waterside, Thornton, the WELL Precinct, Glenmore Park and Erskine Park).

The Penrith City District Open Space Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, with the exclusion of industrial lands and the Penrith Lakes development site.

9A BIODIVERSITY CERTIFIED LAND

(Information is provided in this section only if the land is biodiversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*. (Note. biodiversity certified land includes land certified under Part 7AA of the *Threatened Species Conservation Act 1995* that is taken to be certified under Part 8 of the *Biodiversity Conservation Act 2016*.))

10 BIODIVERSITY STEWARDSHIP SITES

(Information is provided in this section only if Council has been notified by the Chief Executive of the Office of Environment and Heritage that the land is land to which a biobanking stewardship agreement under Part 5 of the *Biodiversity Conservation Act 2016* relates. Note. Biodiversity stewardship agreements include biobanking agreements under Part 7A of the *Threatened Species Conservation Act 1995* that are taken to be biodiversity stewardships agreements under Part 5 of the *Biodiversity Conservation Act 2016*)

11 BUSH FIRE PRONE LAND

The land is not identified as bush fire prone land according to Council records.

12 PROPERTY VEGETATION PLANS

(Information is provided in this section only if Council has been notified that the land is land to which a property vegetation plan approved under the *Native Vegetation Act 2003* applies and continues in force.)

13 ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

(Information is provided in this section only if Council has been notified that an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.)

14 DIRECTIONS UNDER PART 3A

(Information is provided in this section only if there is a direction by the Minister in force under section 75P(2)(c1) of the Act (repealed on 1st October 2011) that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect.)

15 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS AFFECTING SENIORS HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (seniors housing), of which the council is aware, issued under State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 18(2) of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.)

16 SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

(Information is provided in this section only if there is a valid site compatibility certificate (infrastructure), of which council is aware, in respect of proposed development on the land.)

17 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (affordable rental housing), of which the council is aware, in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 have been imposed as a condition of consent to a development application in respect of the land.)

18 PAPER SUBDIVISION INFORMATION

(Information is provided in this section only if a development plan adopted by a relevant authority applies to the land or is proposed to be subject to a consent ballot, or a subdivision order applies to the land.)

19 SITE VERIFICATION CERTIFICATES

(Information is provided in this section only if there is a current site verification certificate, of which council is aware, in respect of the land.)

NOTE: The following matters are prescribed by section 59(2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate

(a) (Information is provided in this section only if, as at the date of this certificate, the land (or part of the land) is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997.)

(b) (Information is provided in this section only if, as at the date of this certificate, the land is subject to a management order within the meaning of the Contaminated Land Management Act 1997.)

(c) (Information is provided in this section only if, as at the date of this certificate, the land is the subject of an approved voluntary management proposal within the meaning of the Contaminated Land Management Act 1997.)

(d) (Information is provided in this section only if, at the date of this certificate, the land subject to an ongoing maintenance order within the meaning of the Contaminated Land Management Act 1997.)

(e) (Information is provided in this section only if the land is the subject of a site audit statement within the meaning of the Contaminated Land Management Act 1997 - a copy of which has been provided to Council.)

Note: Section 10.7(5) information for this property may contain additional information regarding contamination issues.

20 LOOSE FILL ASBESTOS INSULATION

(Information is provided in this section only if there is a residential premises listed on the register of residential premises that contain or have contained loose-fill asbestos insulation (as required by Division 1A of Part 8 of the Home Building Act 1989))

21 AFFECTED BUILDING NOTICES AND BUILDING PRODUCT RECTIFICATION ORDERS

(Information is provided in this section only if Council is aware of any “affected building notice” and/or a “building product rectification order” in force for the land).

PENRITH CITY COUNCIL

Civic Centre
601 High Street, Penrith

PO Box 60 Penrith NSW 2751

Telephone: 02 4732 7777
Facsimile: 02 4732 7958

Email: pencit@penrithcity.nsw.gov.au

PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Note: The Environmental Planning and Assessment Amendment Act 2017 commenced operation on the 1 March 2018. As a consequence of this Act the information contained in this certificate needs to be read in conjunction with the provisions of the Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017, and Environmental Planning and Assessment Regulation 2000.

Information is provided only to the extent that Council has been notified by relevant government departments.

10.7(5) Certificate
This Certificate is directed to the following relevant matters affecting the land

When information pursuant to section 10.7(5) is requested the Council is under no obligation to furnish any of the information supplied herein pursuant to that section. Council draws your attention to section 10.7(6) which states that a council shall not incur any liability in respect of any advice provided in good faith pursuant to sub-section (5). The absence of any reference to any matter affecting the land shall not imply that the land is not affected by any matter not referred to in this certificate.

Note:

- Council's 10.7(5) information does not include development consent or easement information. Details of development consents may be obtained by making enquiries with Council's Development Services Department pursuant to section 12 of the Local Government Act 1993 or (for development applications lodged after January 2007) by viewing the Online Services area at www.penrithcity.nsw.gov.au . Details of any easements may be obtained from a Title Search at Land and Property Information New South Wales.
- This certificate does not contain information relating to Complying Development Certificates.
- This certificate may not provide full details of development rights over the land.

* Threatened Species Conservation Act 1995

When considering any development application Council must have regard to the Threatened Species Conservation Act 1995. Please note that this legislation may have application to any land throughout the city. Interested persons should make their own enquiries in regard to the impact that this legislation could have on this land.

* Preservation of Trees and Vegetation

See Chapter C2 of Penrith Development Control Plan 2014 for specific controls relating to the preservation of trees and vegetation.

* Development Control Plan General Information

Penrith Development Control Plan 2014 which applies to the land, sets out requirements for a range of issues that apply across the Penrith Local Government Area, including:

- Site Planning and Design Principles
- Vegetation Management
- Water Management
- Land Management
- Waste Management
- Landscape Design
- Culture and Heritage
- Public Domain
- Advertising and Signage
- Transport, Access and Parking

- Subdivision
- Noise and Vibration, and
- Infrastructure and Services.

The Development Control Plan also specifies requirements relating to various types of land uses including:

- Rural Land Uses
- Residential Development
- Commercial and Retail Development, and
- Industrial Development

as well as for a number of specific activities, including child care centres; health consulting rooms; educational establishments; parent friendly amenities; places of public worship; vehicle repair stations; cemeteries, crematoria and funeral homes; extractive industries; and telecommunication facilities.

The Development Control Plan also details requirements relating to key precincts within the Penrith Local Government Area, including:

- Caddens
- Claremont Meadows Stage 2
- Cranebrook
- Emu Heights
- Emu Plains
- Erskine Business Park
- Glenmore Park
- Kingswood
- Mulgoa Valley
- Orchard Hills
- Penrith
- Penrith Health and Education Precinct
- Riverlink Precinct
- St Clair,
- St Marys / St Marys North, and
- Sydney Science Park.

Penrith Development Control Plan 2014 may be accessed at
https://www.penrithcity.nsw.gov.au/Building-and-Development/Planning-and-Zoning/Planning-Controls/Development-Control-Plans/

* Penrith Health and Education Precinct Controls
See Clause 7.11 of Penrith Local Environmental Plan 2010 and Chapter E12 of Penrith Development Control Plan 2014 for specific controls relating to the Penrith Health and Education Precinct (which includes the subject property).

PENRITH
CITY COUNCIL

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PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Warwick Winn
General Manager

PER

Please note:
Certain amendments to the Environmental Planning and Assessment Act 1979 No 203 (Act) commenced on 1 March 2018.
The Environmental Planning and Assessment (Amendment) Act 2017 No 60 makes structural changes to the Act and, as a consequence, the Act has been renumbered in a decimal format. For example, Section 149 Planning Certificates have become Section 10.7 Certificates. Some of the information in this certificate may refer to the previous version of the Act.
Council is committed to updating all relevant documents in a timely manner. This will include planning instruments, applications, approvals, orders, certificates, forms and other associated documents in both printed and electronic versions. Council is required to implement these changes and regrets any inconvenience caused to the local business, industry and the community.

Appendix C

HISTORICAL TITLE INFORMATION

ADVANCE LEGAL SEARCHERS PTY LTD

(ACN 147 943 842)
ABN 82 147 943 842

18/36 Osborne Road,
Manly NSW 2095

Telephone: +612 9977 6713
Mobile: 0412 169 809
Email: search@alsearchers.com.au

09th October 2018

LOTSEARCH PTY LTD
Level 3, 68 Alfred Street,
MILSONS POINT, NSW 2061

Attention: Rosemary Hulak,

RE: **1 – 9 Barber Avenue,**
Kingswood
Reference: LS004326_EP

Current Search

Folio Identifier 100/701623 (title attached)
DP 701623 (plan attached)
Dated 09th October 2018
Registered Proprietor:
HEALTHSCOPE OPERATIONS PTY LIMITED

Title Tree
Lot 100 DP 701623

Folio Identifier 100/701623

See Notes (a), (b), (c), (d), (e) & (f)

(a)

Auto Consol 8066-13

CTVol 8066 Folio 13

(ai)

CTVol 2364 Folio 139

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Certificate of Title Volume 940 Folio 152

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(aii)

CTVol 4351 Folio 57

CTVol 2378 Folio 37

(b)

CTVol 8099 Folio 30

Certificate of Title Volume 2364 Folio 139

Certificate of Title Volume 940 Folio 152

(c)

CTVol 9002 Folio 26

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(d)

Certificate of Title Volume 10167 Folio 75

(di)

CTVol 3394 Folio 104

CTVol 1951 Folio 221

(dii)

CTVol 2364 Folio 139

CTVol 940 Folio 152

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(e)	(f)	
CTVol 11276 Folio 66	CTVol 11276 Folio 67	
CTVol 7989 Folio 132	CTVol 7989 Folio 132	
CTVol 3394 Folio 104	**(fi)**	**(fii)**
CTVol 1951 Folio 221	CTVol 2364 Folio 139	CTVol 3394 Folio 104
****	CTVol 940 Folio 152	CTVol 1951 Folio 221
	****	****

Summary of proprietor(s)
Lot 100 DP 701623

Year	Proprietor
	(Lot 100 DP 701623)
2018 – todate	Healthscope Operations Pty Limited
2012 – 2018	Aesthete No. 3 Pty Limited
1999 – 2012	Baptist Churches of New South Wales Property Trust *(formerly The Baptist Union of New South Wales)*
1984 – 1999	The Baptist Union of New South Wales

See Notes (a), (b), (c), (d), (e) & (f)

Note (a)

	(Lots 13 & 14 DP 29524 – A/C 8066-13)
1984 – 1984	The Baptist Union of New South Wales
	Lots 13 & 14 DP 29524 – Area 1 Rood 35 ¼ Perches – CTVol 8066 Fol 13)
1960 – 1984	The Baptist Union of New South Wales

See Notes (ai) & (aii)

Note (ai)

	(Lots 4, 5, 36 & 37 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 4 ¼ Perches – CTVol 2364 Fol 139)
1960 – 1960	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1913 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

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Note (aii)

	(Lots 7 & 34 and part Lots 6 & 35 Section 29 DP 1855 – Area 3 Roods 2 ½ Perches – CTVol 4351 Fol 57)
1960 – 1960	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1929 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 7, 8, 33 & 34 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 3 ¾ Perches – CTVol 2378 Fol 37)
1929 – 1929	Alice Yapp, wife of Frank Yapp, labourer
1913 – 1929	Sarah Esgate, wife of Thomas Esgate, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

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Note (b)

	(Lot 15 DP 29524 – CTVol 8099 Fol 30)
1961 – 1984	The Baptist Union of New South Wales
	(Lots 4, 5, 36 & 37 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 4 ¼ Perches – CTVol 2364 Fol 139)
1960 – 1961	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1913 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

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Note (c)

	(Lot 16 DP 29524 – CTVol 9002 Fol 26)
1974 – 1984	The Baptist Union of New South Wales
1961 – 1974	Angela May Asimus
	(Lots 4, 5, 36 & 37 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 4 ¼ Perches – CTVol 2364 Fol 139)
1960 – 1961	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1913 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

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Note (d)

	(Part Lot 17 DP 29524 – CTVol 10167 Fol 75)
1979 – 1984	The Baptist Union of New South Wales
1978 – 1979	Molly Agnes Eagle, company director Michael Frank Eagle, solicitor Vincent Joseph Mansour, company director
1965 – 1978	John Christian Asimus, company director Vincent Joseph Mansour, company director

See Notes (di) & (dii)

Note (di)

	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 – CTVol 3394 Fol 104)
1952 – 1965	Henry Frank Yapp, carrier
1924 – 1952	Alice Yapp, wife of Frank Yapp, labourer
1922 – 1924	Frank Yapp, labourer
	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 and other lands – CTVol 1951 Fol 221)
1909 – 1922	The Permanent Trustee Company of New South Wales

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Note (dii)

	(Lots 4, 5, 36 & 37 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 4 ¼ Perches – CTVol 2364 Fol 139)
1960 – 1965	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1913 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

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Note (e)

	(Lot 7 DP 29524 – CTVol 11276 Fol 66)
1979 – 1984	The Baptist Union of New South Wales
1970 – 1979	The Housing Commission of New South Wales
	(Lots 2 to 12 DP 29524 – Area 1 Acre 3 Roods 25 ½ Perches – CTVol 7989 Fol 132)
1960 – 1970	The Housing Commission of New South Wales
	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 – CTVol 3394 Fol 104)
1952 – 1960	Henry Frank Yapp, carrier
1924 – 1952	Alice Yapp, wife of Frank Yapp, labourer
1922 – 1924	Frank Yapp, labourer
	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 and other lands – CTVol 1951 Fol 221)
1909 – 1922	The Permanent Trustee Company of New South Wales

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Note (f)

	(Lot 8 DP 29524 – CTVol 11276 Fol 67)
1979 – 1984	The Baptist Union of New South Wales
1970 – 1979	The Housing Commission of New South Wales
	(Lots 2 to 12 DP 29524 – Area 1 Acre 3 Roods 25 ½ Perches – CTVol 7989 Fol 132)
1960 – 1970	The Housing Commission of New South Wales

See Notes (fi) & (fii)

Note (fi)

	(Lots 4, 5, 36 & 37 and part Lots 6 & 35 Section 29 DP 1855 – Area 1 Acre 1 Rood 4 ¼ Perches – CTVol 2364 Fol 139)
1960 – 1960	Ernest George Yapp, butcher
1958 – 1960	Henry Frank Yapp, carrier
1913 – 1958	Alice Yapp, wife of Frank Yapp, labourer
	(Lots 4 to 8 & 33 to 37 Section 29 DP 1855 – Area 2 Acres 2 Roods 8 Perches – CTVol 940 Fol 152)
1913 – 1913	Sarah Esgate, wife of Thomas Esgate, labourer
1906 – 1913	Frederick Sydney Gannon, solicitor
1889 – 1906	Francis Jenkins Weston, gentleman

****

Note (fii)

	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 – CTVol 3394 Fol 104)
1952 – 1960	Henry Frank Yapp, carrier
1924 – 1952	Alice Yapp, wife of Frank Yapp, labourer
1922 – 1924	Frank Yapp, labourer
	(Lots 1 to 3 and 38 to 40 Section 29 DP 1855 and other lands – CTVol 1951 Fol 221)
1909 – 1922	The Permanent Trustee Company of New South Wales

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Appendix D

SITE PHOTOGRAPHS

Plate 1 – Western side of assessment area (facing south-east).
Date: 15/10/2018

Plate 2 – Western side of assessment area (facing south).
Date: 15/10/2018

Plate 3 – Western side of assessment area (facing north).
Date: 15/10/2018

Plate 4 – Eastern side of assessment area (facing south-east).
Date: 15/10/2018

Plate 5 – Eastern side of assessment area (facing west).
Date: 15/10/2018

Plate 6 – Asbestos fibre cement debris observed at the north-eastern side of the Site.
Date: 15/10/2018

Plate 7 – Soil materials observed at depth of 0.15 mBGL in bore hole TP3.
Date: 15/10/2018

Plate 8 – Soil materials observed at depth of 0.15 mBGL in bore hole TP9.
Date: 15/10/2018

Plate 9 – Soil materials observed at depth of 0.5 mBGL in bore hole TP17.
Date: 15/10/2018

Plate 10 – Soil materials observed at depth of 0.5 mBGL in bore hole TP10.
Date: 15/10/2018

Plate 11 – Natural soils observed at depth of 1.2 mBGL in bore hole TP7.
Date: 15/10/2018

Plate 12 – Natural soils observed at depth of 1.5 mBGL in bore hole TP15.
Date: 15/10/2018

Plate 13 – Hazardous chemicals storage contained located adjacent to southern side of the Site.
Date: 15/10/2018

Plate 13 – Crushed concrete and debris intermixed with fill materials at eastern side of the Site.
Date: 15/10/2018

Appendix E

BORELOGS

ENVIRONMENTAL BOREHOLE / TESTPIT TP1

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1				FILL: Gravelly sand, medium to course grain, dark grey, slightly moist, loose.	Fill
0.2				CL	Silty CLAY: medium plasticity, dark grey, slightly moist, soft, minor rootlets	NATURAL Light grey/brown mottling and firm with depth
0.3						
0.4						
0.5	0.0	TP1_0.5				
0.6						
0.7						
0.8					Silty CLAY: medium plasticity, brown, dry, hard, shalestone bedrock	NATURAL
0.9						
1						
1.1						
1.2						
1.3						
1.4	0.0	TP1_1.4				
1.5					End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP2

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-2.2	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 2.2	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1					Fill
0.2						
0.3						
0.4						
0.5	0.6					
0.6						
0.7						
0.8						
0.9						
1	0.0	TP2_1.0				
1.1						
1.2				CL	Sandy CLAY: medium plasticity, brown with grey mottling, slightly moist, soft	NATURAL
1.3						
1.4						
1.5						
1.6						
1.7						
1.8						
1.9						
2	0.0	TP2_2.0				
2.1						
2.2					End of BH @ 2.2 mBGL	
2.3						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP3

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.4	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.4	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1				FILL: Gravelly sand, medium to course grain, dark grey/brown, slightly moist, very loose.	Fill
0.2					FILL: Silty clay, medium plasticity, brown mottled orange, slightly moist, soft	
0.3						
0.4				CL	Silty CLAY: medium plasticity, orange mottled grey, slightly moist, firm	NATURAL
0.5	0.0	TP3_0.5				
0.6						
0.7					Gravelly CLAY: low plasticity, brown, slightly moist, stiff with sub-angular gravels	
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4	0.0	TP3_1.4				
					End of BH @ 1.4 mBGL	
1.5						
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP4

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1	TP4_0.15			FILL: Gravelly sand, medium to course grain, grey, slightly moist, very loose.	Fill
0.2						
0.3				CL	Silty CLAY: medium plasticity, brown, slightly moist, firm	NATURAL
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3	0.0	TP4_1.3				
1.4						
1.5					End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP5

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1	TP5_0.15			FILL: Silty Gravelly Clay, low plasticity, light brown, very soft	Fill
0.2					FILL: Silty Sand, fine to medium grain, light brown, very loose	
0.3						
0.4						
0.5				CL	Silty Sandy CLAY: low plasticity, light brown, slightly moist, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP5_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP6

PROJECT NUMBER EP0991	**DRILLING DATE** 16.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1	TP6_0.15			FILL: Silty Gravelly Clay, medium plasticity, dark brown, slightly moist, soft with angular to sub-angular gravels	Fill
0.2						
0.3					FILL: Sandy Clay, medium plasticity, dark brown, slightly moist, soft	
0.4						
0.5				CL	Silty CLAY: low plasticity, red with grey mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP6_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP7

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.1	TP7_0.15			FILL: Silty Gravelly Clay, medium plasticity, dark grey, slightly moist, soft.	Fill
0.2				CL	Silty CLAY: low plasticity, orange mottled grey, slightly moist, firm	NATURAL
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2	0.0	TP7_1.2				
1.3						
1.4						
1.5					End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP8

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.1	TP8_0.15			FILL: Gravelly Sand, medium to coarse grain, dark brown, slightly moist, very loose	Fill
0.2					FILL: Gravelly Sandy Clay, medium plasticity, dark brown mottled grey, slightly moist, very soft	
0.3						
0.4						
0.5				CL	Silty CLAY: low plasticity, orange with grey mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP8_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP9

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.1	TP9_0.15			FILL: Gravelly Sand, medium to coarse grain, dark brown, slightly moist, very loose	Fill
0.2					FILL: Gravelly Sandy Clay, medium plasticity, dark brown mottled grey, slightly moist, very soft	
0.3						
0.4						
0.5				CL	Silty CLAY: low plasticity, orange with grey mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5						
1.6	0.0	TP9_1.6			End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP10

PROJECT NUMBER EP0991	**DRILLING DATE** 16.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0				FILL: Sandy Gravelly Clay, medium plasticity, dark brown, slightly moist, soft	Fill
0.2						
0.3					FILL: Sandy Clay, low plasticity, dark brown, dry, stiff	
0.4						
0.5	0.0	TP10_0.5		CL	Silty CLAY: low plasticity, light brown, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP10_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP11

PROJECT NUMBER EP0991	**DRILLING DATE** 16.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-2.0	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 2.0	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.1				FILL: Gravelly Clayey Sand, medium to coarse grain, grey/brown, dry, very loose	Fill
0.2						
0.3					FILL: Gravelly Sandy Clay, low plasticity, light brown, dry, stiff	
0.4						
0.5	0.0	TP11_0.5		CL	Silty CLAY: low plasticity, light brown with red/grey mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP11_1.5				
1.6						
1.7						
1.8						
1.9						
2					End of BH @ 2.0 mBGL	
2.1						
2.2						
2.3						
2.4						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP12

PROJECT NUMBER EP0991	**DRILLING DATE** 16.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1					FILL: Silty Gravelly Sand, fine to medium grain, light brown, dry, very loose	Fill
0.2	0.0					
0.3						
0.4						
0.5	0.0	TP12_0.5		CL	Silty CLAY: low plasticity, grey with red mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP12_1.5			End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP13

PROJECT NUMBER EP0991	**DRILLING DATE** 16.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.1	TP13_0.15			FILL: Sandy Gravelly Clay, medium plasticity, dark brown, slightly moist, very soft	Fill
0.2						
0.3						
0.4				CL	Silty CLAY: low plasticity, light brown with red mottles, dry, stiff	NATURAL
0.5						
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP13_1.5			End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP14

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0	TP14_0.15			FILL: Silty Clay, low plasticity, brown, slightly moist, soft	Fill
0.2						
0.3						
0.4						
0.5				CL	Silty CLAY: low plasticity, brown with red mottles, dry, hard	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP14_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP15

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0	TP15_0.15			FILL: Silty Sand, fine to medium grain, light brown, dry, very loose	Fill
0.2						
0.3						
0.4						
0.5				CL	Silty Sandy CLAY: low plasticity, brown, dry, hard	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP15_1.5			End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP16

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.4	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.4	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0	TP16_0.15			FILL: Silty Gravelly Sand, fine to medium grain, dark grey, dry, very loose	Fill
0.2				CL	Silty SAND: fine to medium grain, light brown, dry, very loose	NATURAL
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2	0.0	TP16_1.2				
1.3						
1.4					End of BH @ 1.4 mBGL	
1.5						
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP17

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.5	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.5	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0	TP17_0.15			FILL: Sandy Silty Clay, medium plasticity, dark brown/grey, slightly moist, soft	Fill
0.2						
0.3						
0.4						
0.5				CL	Silty Gravelly CLAY: low plasticity, orange with brown mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP17_1.5			End of BH @ 1.5 mBGL	
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP18

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.4	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.4	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0	TP18_0.15			FILL: Silty Sand, fine to medium grain, dark brown, slightly moist, very loose	Fill
0.2						
0.3				CL	Silty CLAY: low plasticity, light brown, slightly moist, stiff	NATURAL
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3	0.0	TP18_1.3				
1.4					End of BH @ 1.4 mBGL	
1.5						
1.6						
1.7						
1.8						
1.9						

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ENVIRONMENTAL BOREHOLE / TESTPIT TP19

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
0.1	0.0				FILL: Silty Clayey Sand, fine to medium grain, light brown, dry, very loose	Fill
0.2						
0.3						
0.4						
0.5	0.0	TP19_0.5		CL	Silty CLAY: low plasticity, grey with red mottles, dry, stiff	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP19_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 06 Nov 2018

ENVIRONMENTAL BOREHOLE / TESTPIT TP20

PROJECT NUMBER EP0991	**DRILLING DATE** 15.10.18	**COORDINATES**
PROJECT NAME Soil Contamination Assessment	**DRILLING COMPANY** Stratacore	**COORD SYS**
CLIENT Johnstaff Projects	**DRILLER**	
ADDRESS 1-9 Barber Avenue, Kingswood, NSW	**DRILLING METHOD** HA - 0.0-1.2; PT - 0.0-1.6	**LOGGED BY** P. Pragasam
	TOTAL DEPTH 1.6	**CHECKED BY** K. Guenther

COMMENTS

Depth (m)	PID	Samples	Graphic Log	USCS	Material Description	Additional Observations
					Bitumen Surface Cover	
0.1	0.0				FILL: Gravelly Sand, fine to medium grain, dry, very loose	
0.2						
0.3						
0.4						
0.5	0.0	TP20_0.5		CL	Silty SAND: fine to medium grain, light brown, dry, loose	NATURAL
0.6						
0.7						
0.8						
0.9						
1						
1.1						
1.2						
1.3						
1.4						
1.5	0.0	TP20_1.5				
1.6					End of BH @ 1.6 mBGL	
1.7						
1.8						
1.9						

Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 06 Nov 2018

Appendix F

CALIBRATION CERTIFICATES

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-108801

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137		96.1ppm

Calibrated by: Sarah Lian

Calibration date: 11/10/2018

Next calibration due: 12/04/2019

Appendix G

LABORATORY ANALYTICAL REPORTS

eurofins | mgt

30 years Testing For Life 1987–2017
Celebrating 30 years Testing and Protecting Human Health

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.

EP Risk Management (NSW)
109/283 Alfred Street
North Sydney
NSW 2060

Attention: **Patrick Pragasam**

Report **623095-S-V2**
Project name NEPEAN HOSPITAL
Project ID EP0991
Received Date Oct 17, 2018

Client Sample ID			**TP1_0.5**	**TP1_1.4**	**TP2_1.0**	**TP2_2.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-Oc21516**	**S18-Oc21517**	**S18-Oc21518**	**S18-Oc21519**
Date Sampled			**Oct 15, 2018**	**Oct 15, 2018**	**Oct 15, 2018**	**Oct 15, 2018**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	61	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	61	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	81	71	66	77
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP1_0.5 Soil S18-Oc21516 Oct 15, 2018	TP1_1.4 Soil S18-Oc21517 Oct 15, 2018	TP2_1.0 Soil S18-Oc21518 Oct 15, 2018	TP2_2.0 Soil S18-Oc21519 Oct 15, 2018
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	94	95	94	96
p-Terphenyl-d14 (surr.)	1	%	107	107	100	102
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4□DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4□DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4□DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epo□ide	0.05	mg/kg	< 0.05	-	< 0.05	-
He□achlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
□ etho□ychlor	0.05	mg/kg	< 0.05	-	< 0.05	-
To□aphene	1	mg/kg	< 1	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	91	-	142	-
Tetrachloro-m-□ylene (surr.)	1	%	88	-	84	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Coumaphos	2	mg/kg	< 2	-	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	-	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	-	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	-	< 0.2	-

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP1_0.5 Soil S18-Oc21516 Oct 15, 2018	TP1_1.4 Soil S18-Oc21517 Oct 15, 2018	TP2_1.0 Soil S18-Oc21518 Oct 15, 2018	TP2_2.0 Soil S18-Oc21519 Oct 15, 2018
Organophosphorus Pesticides						
Dimethoate	0.2	mg/kg	< 0.2	-	< 0.2	-
Disulfoton	0.2	mg/kg	< 0.2	-	< 0.2	-
EPN	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	-	< 0.2	-
□alathion	0.2	mg/kg	< 0.2	-	< 0.2	-
□erphos	0.2	mg/kg	< 0.2	-	< 0.2	-
□ethyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
□evinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
□onocrotophos	2	mg/kg	< 2	-	< 2	-
Naled	0.2	mg/kg	< 0.2	-	< 0.2	-
Omethoate	2	mg/kg	< 2	-	< 2	-
Phorate	0.2	mg/kg	< 0.2	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	-	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	-	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	68	-	69	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1232	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1242	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1248	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1254	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1260	0.1	mg/kg	< 0.1	-	< 0.1	-
Total PCB*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	91	-	142	-
Tetrachloro-m-□ylene (surr.)	1	%	88	-	84	-
Heavy Metals						
Arsenic	2	mg/kg	6.8	5.2	11	15
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	18	17	9.0
Copper	5	mg/kg	27	57	35	59
Lead	5	mg/kg	11	32	32	16
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	32	20	11
□inc	5	mg/kg	23	97	70	67
% □oisture	1	%	17	12	15	17

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP3_0.5 Soil S18-Oc21520 Oct 15, 2018	TP3_1.4 Soil S18-Oc21521 Oct 15, 2018	TP4_1.3 Soil S18-Oc21523 Oct 15, 2018	TP5_0.15 Soil S18-Oc21524 Oct 15, 2018
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	72
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	72
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	62	90	76	74
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	101	102	102	105
p-Terphenyl-d14 (surr.)	1	%	101	103	97	104

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP3_0.5 Soil S18-Oc21520 Oct 15, 2018	TP3_1.4 Soil S18-Oc21521 Oct 15, 2018	TP4_1.3 Soil S18-Oc21523 Oct 15, 2018	TP5_0.15 Soil S18-Oc21524 Oct 15, 2018
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	< 0.1
4.4□DDD	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4□DDE	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4□DDT	0.05	mg/kg	< 0.05	-	-	< 0.05
a-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
b-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
d-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	-	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	< 0.05	-	-	< 0.05
He□achlorobenzene	0.05	mg/kg	< 0.05	-	-	< 0.05
□ etho□ychlor	0.05	mg/kg	< 0.05	-	-	< 0.05
To□aphene	1	mg/kg	< 1	-	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	142	-	-	95
Tetrachloro-m-□ylene (surr.)	1	%	142	-	-	102
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2
Bolstar	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2
Coumaphos	2	mg/kg	< 2	-	-	< 2
Demeton-S	0.2	mg/kg	< 0.2	-	-	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	-	-	< 0.2
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	-	-	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	-	-	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	-	-	< 0.2
EPN	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenthion	0.2	mg/kg	< 0.2	-	-	< 0.2
□alathion	0.2	mg/kg	< 0.2	-	-	< 0.2
□erphos	0.2	mg/kg	< 0.2	-	-	< 0.2

Client Sample ID			TP3_0.5	TP3_1.4	TP4_1.3	TP5_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21520	S18-Oc21521	S18-Oc21523	S18-Oc21524
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
□ethyl parathion	0.2	mg/kg	< 0.2	-	-	< 0.2
□evinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
□onocrotophos	2	mg/kg	< 2	-	-	< 2
Naled	0.2	mg/kg	< 0.2	-	-	< 0.2
Omethoate	2	mg/kg	< 2	-	-	< 2
Phorate	0.2	mg/kg	< 0.2	-	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	-	-	< 0.2
Ronnel	0.2	mg/kg	< 0.2	-	-	< 0.2
Terbufos	0.2	mg/kg	< 0.2	-	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	-	-	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	78	-	-	91
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	-	-	< 0.1
Total PCB*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	142	-	-	95
Tetrachloro-m-□ylene (surr.)	1	%	142	-	-	102
Heavy Metals						
Arsenic	2	mg/kg	14	19	9.2	11
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	13	12	15
Copper	5	mg/kg	36	58	38	34
Lead	5	mg/kg	21	14	14	33
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	10	13	12	20
□inc	5	mg/kg	54	76	55	75
% □oisture	1	%	17	14	17	13

Client Sample ID			TP5_1.5	TP6_0.15	TP6_1.5	TP7_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21525	S18-Oc21526	S18-Oc21527	S18-Oc21528
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	120	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	120	< 50	< 50

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP5_1.5 Soil S18-Oc21525 Oct 15, 2018	TP6_0.15 Soil S18-Oc21526 Oct 15, 2018	TP6_1.5 Soil S18-Oc21527 Oct 15, 2018	TP7_0.15 Soil S18-Oc21528 Oct 15, 2018
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	70	63	69	62
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	120	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	220	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	95	105	127	105
p-Terphenyl-d14 (surr.)	1	%	107	111	139	106
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4-DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4-DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4-DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP5_1.5 Soil S18-Oc21525 Oct 15, 2018	TP6_0.15 Soil S18-Oc21526 Oct 15, 2018	TP6_1.5 Soil S18-Oc21527 Oct 15, 2018	TP7_0.15 Soil S18-Oc21528 Oct 15, 2018
Organochlorine Pesticides						
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	int	-	140
Tetrachloro-m-□ylene (surr.)	1	%	-	67	-	83
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2

Client Sample ID			TP5_1.5	TP6_0.15	TP6_1.5	TP7_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21525	S18-Oc21526	S18-Oc21527	S18-Oc21528
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	85	-	94
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	int	-	140
Tetrachloro-m-□ylene (surr.)	1	%	-	67	-	83
Heavy Metals						
Arsenic	2	mg/kg	11	6.3	6.9	14
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	14	19	9.3	21
Copper	5	mg/kg	40	40	23	35
Lead	5	mg/kg	19	73	12	33
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	26	39	< 5	13
□inc	5	mg/kg	110	140	38	100
% □oisture	1	%	8.3	15	19	16

Client Sample ID			TP7_1.2	TP8_0.5	TP8_1.5	TP9_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21529	S18-Oc21530	S18-Oc21531	S18-Oc21532
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	61	63	63	66

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP7_1.2 Soil S18-Oc21529 Oct 15, 2018	TP8_0.5 Soil S18-Oc21530 Oct 15, 2018	TP8_1.5 Soil S18-Oc21531 Oct 15, 2018	TP9_0.15 Soil S18-Oc21532 Oct 15, 2018
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	96	115	103	130
p-Terphenyl-d14 (surr.)	1	%	100	124	113	133
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4-DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4-DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4-DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	0.19
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP7_1.2 Soil S18-Oc21529 Oct 15, 2018	TP8_0.5 Soil S18-Oc21530 Oct 15, 2018	TP8_1.5 Soil S18-Oc21531 Oct 15, 2018	TP9_0.15 Soil S18-Oc21532 Oct 15, 2018
Organochlorine Pesticides						
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	0.19
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	0.19
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	148	-	148
Tetrachloro-m-□ylene (surr.)	1	%	-	78	-	145
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□ evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	105	-	111

Client Sample ID			TP7_1.2	TP8_0.5	TP8_1.5	TP9_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21529	S18-Oc21530	S18-Oc21531	S18-Oc21532
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	148	-	148
Tetrachloro-m-□ylene (surr.)	1	%	-	78	-	145
Heavy Metals						
Arsenic	2	mg/kg	8.0	17	7.8	14
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	16	16	5.4	21
Copper	5	mg/kg	27	30	16	40
Lead	5	mg/kg	13	16	9.9	83
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	7.3	5.1	< 5	17
□inc	5	mg/kg	37	27	14	140
% □oisture	1	%	15	19	15	16

Client Sample ID			TP9_1.6	TP10_0.5	TP10_1.5	TP11_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21533	S18-Oc21534	S18-Oc21535	S18-Oc21536
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	59	65	72	66
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP9_1.6 Soil S18-Oc21533 Oct 15, 2018	TP10_0.5 Soil S18-Oc21534 Oct 15, 2018	TP10_1.5 Soil S18-Oc21535 Oct 15, 2018	TP11_0.5 Soil S18-Oc21536 Oct 15, 2018
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	106	134	90	106
p-Terphenyl-d14 (surr.)	1	%	113	145	109	105
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP9_1.6 Soil S18-Oc21533 Oct 15, 2018	TP10_0.5 Soil S18-Oc21534 Oct 15, 2018	TP10_1.5 Soil S18-Oc21535 Oct 15, 2018	TP11_0.5 Soil S18-Oc21536 Oct 15, 2018
Organochlorine Pesticides						
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	79	-	int
Tetrachloro-m-□ylene (surr.)	1	%	-	89	-	134
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	123	-	84
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1

Client Sample ID			TP9_1.6	TP10_0.5	TP10_1.5	TP11_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21533	S18-Oc21534	S18-Oc21535	S18-Oc21536
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Dibutylchlorendate (surr.)	1	%	-	79	-	int
Tetrachloro-m-□ylene (surr.)	1	%	-	89	-	134
Heavy Metals						
Arsenic	2	mg/kg	4.7	11	7.1	11
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	0.5
Chromium	5	mg/kg	7.4	15	14	18
Copper	5	mg/kg	20	44	73	49
Lead	5	mg/kg	11	39	23	160
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	15	30	23
□inc	5	mg/kg	17	79	130	400
% □oisture	1	%	14	15	11	18

Client Sample ID			TP11_1.5	TP12_0.5	TP12_1.5	TP13_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21537	S18-Oc21538	S18-Oc21539	S18-Oc21540
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	63	59	62	61
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP11_1.5 Soil S18-Oc21537 Oct 15, 2018	TP12_0.5 Soil S18-Oc21538 Oct 15, 2018	TP12_1.5 Soil S18-Oc21539 Oct 15, 2018	TP13_0.15 Soil S18-Oc21540 Oct 15, 2018
Polycyclic Aromatic Hydrocarbons						
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	108	103	106	86
p-Terphenyl-d14 (surr.)	1	%	97	115	99	89
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	142	-	141
Tetrachloro-m-□ylene (surr.)	1	%	-	87	-	137

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP11_1.5 Soil S18-Oc21537 Oct 15, 2018	TP12_0.5 Soil S18-Oc21538 Oct 15, 2018	TP12_1.5 Soil S18-Oc21539 Oct 15, 2018	TP13_0.15 Soil S18-Oc21540 Oct 15, 2018
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	84	-	70
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	142	-	141
Tetrachloro-m-□ylene (surr.)	1	%	-	87	-	137

Client Sample ID			TP11_1.5	TP12_0.5	TP12_1.5	TP13_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21537	S18-Oc21538	S18-Oc21539	S18-Oc21540
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	11	7.9	11	7.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	13	18	6.6	18
Copper	5	mg/kg	40	42	23	40
Lead	5	mg/kg	12	23	6.7	140
□ercury	0.1	mg/kg	0.3	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	14	22	< 5	20
□inc	5	mg/kg	58	79	25	160
% □oisture	1	%	18	17	19	17

Client Sample ID			TP13_1.5	TP14_0.15	TP14_1.5	TP15_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21541	S18-Oc21542	S18-Oc21543	S18-Oc21544
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	56	66	65	67
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP13_1.5 Soil S18-Oc21541 Oct 15, 2018	TP14_0.15 Soil S18-Oc21542 Oct 15, 2018	TP14_1.5 Soil S18-Oc21543 Oct 15, 2018	TP15_0.15 Soil S18-Oc21544 Oct 15, 2018
Polycyclic Aromatic Hydrocarbons						
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	94	101	97	98
p-Terphenyl-d14 (surr.)	1	%	99	117	91	116
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □DDE □DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	132	-	142
Tetrachloro-m-□ylene (surr.)	1	%	-	60	-	81
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP13_1.5 Soil S18-Oc21541 Oct 15, 2018	TP14_0.15 Soil S18-Oc21542 Oct 15, 2018	TP14_1.5 Soil S18-Oc21543 Oct 15, 2018	TP15_0.15 Soil S18-Oc21544 Oct 15, 2018
Organophosphorus Pesticides						
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	85	-	77
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	132	-	142
Tetrachloro-m-□ylene (surr.)	1	%	-	60	-	81
Heavy Metals						
Arsenic	2	mg/kg	7.0	8.3	5.6	14
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	6.6	20	5.5	20
Copper	5	mg/kg	55	31	13	45
Lead	5	mg/kg	19	15	6.2	16
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	6.4	11	< 5	16
□inc	5	mg/kg	41	45	14	65

Client Sample ID			TP13_1.5	TP14_0.15	TP14_1.5	TP15_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21541	S18-Oc21542	S18-Oc21543	S18-Oc21544
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
% □oisture	1	%	37	18	15	16

Client Sample ID			TP15_1.5	TP16_0.15	TP16_1.2	TP17_0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21545	S18-Oc21546	S18-Oc21547	S18-Oc21548
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	69	66	66	65
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP15_1.5 Soil S18-Oc21545 Oct 15, 2018	TP16_0.15 Soil S18-Oc21546 Oct 15, 2018	TP16_1.2 Soil S18-Oc21547 Oct 15, 2018	TP17_0.15 Soil S18-Oc21548 Oct 15, 2018
Polycyclic Aromatic Hydrocarbons						
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	98	98	121	106
p-Terphenyl-d14 (surr.)	1	%	90	117	137	112
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□de	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	129	-	141
Tetrachloro-m-□ylene (surr.)	1	%	-	64	-	140
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP15_1.5 Soil S18-Oc21545 Oct 15, 2018	TP16_0.15 Soil S18-Oc21546 Oct 15, 2018	TP16_1.2 Soil S18-Oc21547 Oct 15, 2018	TP17_0.15 Soil S18-Oc21548 Oct 15, 2018
Organophosphorus Pesticides						
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□erphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	73	-	95
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	129	-	141
Tetrachloro-m-□ylene (surr.)	1	%	-	64	-	140
Heavy Metals						
Arsenic	2	mg/kg	11	12	10	17
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	18	14	12
Copper	5	mg/kg	56	64	36	34
Lead	5	mg/kg	18	21	13	18
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	22	22	19	7.3
□inc	5	mg/kg	110	97	84	52
% □oisture	1	%	11	10	13	16

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP17_1.5 Soil S18-Oc21549 Oct 15, 2018	TP18_0.15 Soil S18-Oc21550 Oct 15, 2018	TP18_1.3 Soil S18-Oc21551 Oct 15, 2018	TP19_0.5 Soil S18-Oc21552 Oct 15, 2018
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	63	62	64	66
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	105	96	111	104
p-Terphenyl-d14 (surr.)	1	%	105	109	129	115

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP17_1.5 Soil S18-Oc21549 Oct 15, 2018	TP18_0.15 Soil S18-Oc21550 Oct 15, 2018	TP18_1.3 Soil S18-Oc21551 Oct 15, 2018	TP19_0.5 Soil S18-Oc21552 Oct 15, 2018
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	-	< 0.05
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	< 0.05
□etho□ychlor	0.05	mg/kg	-	< 0.05	-	< 0.05
To□aphene	1	mg/kg	-	< 1	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	145	-	134
Tetrachloro-m-□ylene (surr.)	1	%	-	71	-	77
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
□alathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□erphos	0.2	mg/kg	-	< 0.2	-	< 0.2

Client Sample ID			TP17_1.5	TP18_0.15	TP18_1.3	TP19_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21549	S18-Oc21550	S18-Oc21551	S18-Oc21552
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
□ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
□evinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
□onocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	78	-	82
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	145	-	134
Tetrachloro-m-□ylene (surr.)	1	%	-	71	-	77
Heavy Metals						
Arsenic	2	mg/kg	15	8.0	7.2	7.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	7.2	18	9.5	12
Copper	5	mg/kg	70	41	34	38
Lead	5	mg/kg	26	20	9.2	12
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	9.0	10.0	< 5	6.0
□inc	5	mg/kg	45	86	30	41
% □oisture	1	%	13	15	13	12

Client Sample ID			TP19_1.5	TP20_0.5	TP20_1.5	D□P_01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21553	S18-Oc21554	S18-Oc21555	S18-Oc21556
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP19_1.5 Soil S18-Oc21553 Oct 15, 2018	TP20_0.5 Soil S18-Oc21554 Oct 15, 2018	TP20_1.5 Soil S18-Oc21555 Oct 15, 2018	D□P_01 Soil S18-Oc21556 Oct 15, 2018
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	63	65	63	62
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	112	92	97	102
p-Terphenyl-d14 (surr.)	1	%	138	109	92	130
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4□DDD	0.05	mg/kg	-	< 0.05	-	-
4.4□DDE	0.05	mg/kg	-	< 0.05	-	-
4.4□DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP19_1.5 Soil S18-Oc21553 Oct 15, 2018	TP20_0.5 Soil S18-Oc21554 Oct 15, 2018	TP20_1.5 Soil S18-Oc21555 Oct 15, 2018	D□P_01 Soil S18-Oc21556 Oct 15, 2018
Organochlorine Pesticides						
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05	-	-
He□achlorobenzene	0.05	mg/kg	-	< 0.05	-	-
□ etho□ychlor	0.05	mg/kg	-	< 0.05	-	-
To□aphene	1	mg/kg	-	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	-
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	148	-	-
Tetrachloro-m-□ylene (surr.)	1	%	-	74	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Bolstar	0.2	mg/kg	-	< 0.2	-	-
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	-
Coumaphos	2	mg/kg	-	< 2	-	-
Demeton-S	0.2	mg/kg	-	< 0.2	-	-
Demeton-O	0.2	mg/kg	-	< 0.2	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Dichlorvos	0.2	mg/kg	-	< 0.2	-	-
Dimethoate	0.2	mg/kg	-	< 0.2	-	-
Disulfoton	0.2	mg/kg	-	< 0.2	-	-
EPN	0.2	mg/kg	-	< 0.2	-	-
Ethion	0.2	mg/kg	-	< 0.2	-	-
Ethoprop	0.2	mg/kg	-	< 0.2	-	-
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	-
Fenitrothion	0.2	mg/kg	-	< 0.2	-	-
Fensulfothion	0.2	mg/kg	-	< 0.2	-	-
Fenthion	0.2	mg/kg	-	< 0.2	-	-
□ alathion	0.2	mg/kg	-	< 0.2	-	-
□ erphos	0.2	mg/kg	-	< 0.2	-	-
□ ethyl parathion	0.2	mg/kg	-	< 0.2	-	-
□ evinphos	0.2	mg/kg	-	< 0.2	-	-
□ onocrotophos	2	mg/kg	-	< 2	-	-
Naled	0.2	mg/kg	-	< 0.2	-	-
Omethoate	2	mg/kg	-	< 2	-	-
Phorate	0.2	mg/kg	-	< 0.2	-	-
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Pyrazophos	0.2	mg/kg	-	< 0.2	-	-
Ronnel	0.2	mg/kg	-	< 0.2	-	-

Client Sample ID			TP19_1.5	TP20_0.5	TP20_1.5	D□P_01
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21553	S18-Oc21554	S18-Oc21555	S18-Oc21556
Date Sampled			Oct 15, 2018	Oct 15, 2018	Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Terbufos	0.2	mg/kg	-	< 0.2	-	-
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	-
Tokuthion	0.2	mg/kg	-	< 0.2	-	-
Trichloronate	0.2	mg/kg	-	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	-	73	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	148	-	-
Tetrachloro-m-□ylene (surr.)	1	%	-	74	-	-
Heavy Metals						
Arsenic	2	mg/kg	51	5.0	5.2	2.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	6.4	6.6	6.4	18
Copper	5	mg/kg	28	32	46	31
Lead	5	mg/kg	5.0	9.8	9.4	10
□ercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	9.8
□inc	5	mg/kg	25	13	15	49
% □oisture	1	%	14	14	12	14

Client Sample ID			D□P_03	TP4_0.15
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21557	S18-Oc21572
Date Sampled			Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	67
TRH C10-36 (Total)	50	mg/kg	< 50	67
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	56	63

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	D□P_03 Soil S18-Oc21557 Oct 15, 2018	TP4_0.15 Soil S18-Oc21572 Oct 15, 2018
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	114	85
p-Terphenyl-d14 (surr.)	1	%	122	92
Organochlorine Pesticides				
Chlordanes - Total	0.1	mg/kg	-	< 0.1
4.4□DDD	0.05	mg/kg	-	< 0.05
4.4□DDE	0.05	mg/kg	-	< 0.05
4.4□DDT	0.05	mg/kg	-	< 0.05
a-BHC	0.05	mg/kg	-	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05
b-BHC	0.05	mg/kg	-	< 0.05
d-BHC	0.05	mg/kg	-	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05
Endrin	0.05	mg/kg	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	D□P_03 Soil S18-Oc21557 Oct 15, 2018	TP4_0.15 Soil S18-Oc21572 Oct 15, 2018
Organochlorine Pesticides				
Heptachlor epo□ide	0.05	mg/kg	-	< 0.05
He□achlorobenzene	0.05	mg/kg	-	< 0.05
□ etho□ychlor	0.05	mg/kg	-	< 0.05
To□aphene	1	mg/kg	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05
DDT □ DDE □ DDD (Total)*	0.05	mg/kg	-	< 0.05
□ic EPA I□ R□ 621 OCP (Total)*	0.1	mg/kg	-	< 0.1
□ic EPA I□ R□ 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	92
Tetrachloro-m-□ylene (surr.)	1	%	-	146
Organophosphorus Pesticides				
Azinphos-methyl	0.2	mg/kg	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2
Coumaphos	2	mg/kg	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2
□ alathion	0.2	mg/kg	-	< 0.2
□ erphos	0.2	mg/kg	-	< 0.2
□ ethyl parathion	0.2	mg/kg	-	< 0.2
□ evinphos	0.2	mg/kg	-	< 0.2
□ onocrotophos	2	mg/kg	-	< 2
Naled	0.2	mg/kg	-	< 0.2
Omethoate	2	mg/kg	-	< 2
Phorate	0.2	mg/kg	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	58

Client Sample ID			D□P_03	TP4_0.15
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			S18-Oc21557	S18-Oc21572
Date Sampled			Oct 15, 2018	Oct 15, 2018
Test/Reference	LOR	Unit		
Polychlorinated Biphenyls				
Aroclor-1016	0.1	mg/kg	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	92
Tetrachloro-m-□ylene (surr.)	1	%	-	146
Heavy Metals				
Arsenic	2	mg/kg	10	12
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	12	20
Copper	5	mg/kg	38	44
Lead	5	mg/kg	10	29
□ercury	0.1	mg/kg	0.1	< 0.1
Nickel	5	mg/kg	7.1	22
□inc	5	mg/kg	35	100
% □oisture	1	%	19	23

Sample History

□ here samples are submitted/analysed over several days, the last date of e□traction and analysis is reported.
A recent review of our LI□S 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 □uality 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 NEP□ Fractions	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
BTEX	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2150 □OCs in Soils Li□uid and other A□ueous □atrices			
Total Recoverable Hydrocarbons - 2013 NEP□ Fractions	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
Eurofins □mgt Suite B7			
Total Recoverable Hydrocarbons - 2013 NEP□ Fractions	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2130 PAH and Phenols in Soil and □ ater			
□etals □8	□elbourne	Oct 22, 2018	28 Days
- □ethod□LT□-□ET-3040 □etals in □ aters, Soils & Sediments by ICP-□S			
Eurofins □mgt Suite B15			
Organochlorine Pesticides	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2220 OCP & PCB in Soil and □ ater			
Organophosphorus Pesticides	□elbourne	Oct 22, 2018	14 Day
- □ethod□LT□-OR□-2200 Organophosphorus Pesticides by □C-□S			
Polychlorinated Biphenyls	□elbourne	Oct 22, 2018	28 Days
- □ethod□LT□-OR□-2220 OCP & PCB in Soil and □ ater			
% □oisture	□elbourne	Oct 19, 2018	14 Day
- □ethod□LT□-□EN-7080 □oisture			

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Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
External □aboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**□AB ID**									
1	TP1□0.5	Oct 15, 2018		Soil	S18-Oc21516	X					X	X	X	
2	TP1□1.4	Oct 15, 2018		Soil	S18-Oc21517							X	X	
3	TP2□1.0	Oct 15, 2018		Soil	S18-Oc21518	X					X	X	X	
4	TP2□2.0	Oct 15, 2018		Soil	S18-Oc21519							X	X	
5	TP3□0.5	Oct 15, 2018		Soil	S18-Oc21520	X					X	X	X	
6	TP3□1.4	Oct 15, 2018		Soil	S18-Oc21521							X	X	
7	TP4□0.5	Oct 15, 2018		Soil	S18-Oc21522			X						
8	TP4□1.3	Oct 15, 2018		Soil	S18-Oc21523							X	X	
9	TP5□0.15	Oct 15, 2018		Soil	S18-Oc21524	X					X	X	X	

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NATA # 1261
Site # 23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
10	TP5□1.5	Oct 15, 2018		Soil	S18-Oc21525							X	X	
11	TP6□0.15	Oct 15, 2018		Soil	S18-Oc21526	X					X	X	X	
12	TP6□1.5	Oct 15, 2018		Soil	S18-Oc21527							X	X	
13	TP7□0.15	Oct 15, 2018		Soil	S18-Oc21528	X					X	X	X	
14	TP7□1.2	Oct 15, 2018		Soil	S18-Oc21529							X	X	
15	TP8□0.5	Oct 15, 2018		Soil	S18-Oc21530	X					X	X	X	
16	TP8□1.5	Oct 15, 2018		Soil	S18-Oc21531							X	X	
17	TP9□0.15	Oct 15, 2018		Soil	S18-Oc21532	X					X	X	X	
18	TP9□1.6	Oct 15, 2018		Soil	S18-Oc21533							X	X	
19	TP10□0.5	Oct 15, 2018		Soil	S18-Oc21534	X					X	X	X	
20	TP10□1.5	Oct 15, 2018		Soil	S18-Oc21535							X	X	
21	TP11□0.5	Oct 15, 2018		Soil	S18-Oc21536	X					X	X	X	

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
22	TP11□1.5	Oct 15, 2018		Soil	S18-Oc21537							X	X	
23	TP12□0.5	Oct 15, 2018		Soil	S18-Oc21538	X					X	X	X	
24	TP12□1.5	Oct 15, 2018		Soil	S18-Oc21539							X	X	
25	TP13□0.15	Oct 15, 2018		Soil	S18-Oc21540	X					X	X	X	
26	TP13□1.5	Oct 15, 2018		Soil	S18-Oc21541							X	X	
27	TP14□0.15	Oct 15, 2018		Soil	S18-Oc21542	X					X	X	X	
28	TP14□1.5	Oct 15, 2018		Soil	S18-Oc21543							X	X	
29	TP15□0.15	Oct 15, 2018		Soil	S18-Oc21544	X					X	X	X	
30	TP15□1.5	Oct 15, 2018		Soil	S18-Oc21545							X	X	
31	TP16□0.15	Oct 15, 2018		Soil	S18-Oc21546	X					X	X	X	
32	TP16□1.2	Oct 15, 2018		Soil	S18-Oc21547							X	X	
33	TP17□0.15	Oct 15, 2018		Soil	S18-Oc21548	X					X	X	X	

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
34	TP17□1.5	Oct 15, 2018		Soil	S18-Oc21549							X	X	
35	TP18□0.15	Oct 15, 2018		Soil	S18-Oc21550	X					X	X	X	
36	TP18□1.3	Oct 15, 2018		Soil	S18-Oc21551							X	X	
37	TP19□0.5	Oct 15, 2018		Soil	S18-Oc21552	X					X	X	X	
38	TP19□1.5	Oct 15, 2018		Soil	S18-Oc21553							X	X	
39	TP20□0.5	Oct 15, 2018		Soil	S18-Oc21554	X					X	X	X	
40	TP20□1.5	Oct 15, 2018		Soil	S18-Oc21555							X	X	
41	DUP□01	Oct 15, 2018		Soil	S18-Oc21556							X	X	
42	DUP□03	Oct 15, 2018		Soil	S18-Oc21557							X	X	
43	TRIP□B	Oct 16, 2018		□ ater	S18-Oc21558									X
44	TRIP□S	Oct 16, 2018		□ ater	S18-Oc21559									X
45	RIN□01	Oct 15, 2018		□ ater	S18-Oc21560								X	

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
46	RIN□02	Oct 16, 2018		□ ater	S18-Oc21561								X	
47	ASB□FC1	Oct 15, 2018		Building □aterials	S18-Oc21562		X							
48	ASB□FC2	Oct 16, 2018		Building □aterials	S18-Oc21563		X							
49	ASB□FC5	Oct 16, 2018		Building □aterials	S18-Oc21564		X							
50	ASB□FC3	Oct 15, 2018		Building □aterials	S18-Oc21565					X				
51	ASB□FC4	Oct 16, 2018		Building □aterials	S18-Oc21566					X				
52	TP1□0.15	Oct 15, 2018		Soil	S18-Oc21567				X					
53	TP2□0.15	Oct 15, 2018		Soil	S18-Oc21568				X					
54	TP2□0.5	Oct 15, 2018		Soil	S18-Oc21569				X					

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
55	TP2□1.7	Oct 15, 2018		Soil	S18-Oc21570				X					
56	TP3□0.15	Oct 15, 2018		Soil	S18-Oc21571				X					
57	TP4□0.15	Oct 15, 2018		Soil	S18-Oc21572	X					X	X	X	
58	TP5□0.5	Oct 15, 2018		Soil	S18-Oc21573				X					
59	TP6□0.5	Oct 15, 2018		Soil	S18-Oc21574				X					
60	TP8□0.15	Oct 15, 2018		Soil	S18-Oc21575				X					
61	TP9□0.5	Oct 15, 2018		Soil	S18-Oc21576				X					
62	TP10□0.15	Oct 15, 2018		Soil	S18-Oc21577				X					
63	TP11□0.15	Oct 15, 2018		Soil	S18-Oc21578				X					
64	TP12□0.15	Oct 15, 2018		Soil	S18-Oc21579				X					
65	TP13□0.5	Oct 15, 2018		Soil	S18-Oc21580				X					
66	TP15□0.5	Oct 15, 2018		Soil	S18-Oc21581				X					

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
67	TP17□0.5	Oct 15, 2018		Soil	S18-Oc21582				X					
68	TP19□0.15	Oct 15, 2018		Soil	S18-Oc21583				X					
69	TP20□0.15	Oct 15, 2018		Soil	S18-Oc21584				X					
70	DUP□02	Oct 16, 2018		Soil	S18-Oc21585				X					
71	TP14□0.5	Oct 15, 2018		Soil	S18-Oc21726				X					
Test Counts						20	3	1	21	21	20	42	44	2

Internal □uality Control Revie□ and □lossary

□eneral

1. Laboratory QC results for □ethod Blanks, Duplicates, □atri□Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on re□uest.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matri□dependant. Quoted LORs may be raised where sample e□tracts are diluted due to interferences.
5. Results are uncorrected for matri□spikes or surrogate recoveries e□cept for PFAS compounds.
6. S□OC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an □as received□basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to □Sample Preservation and Container □uide□for holding times (QS3001).

For samples received on the last day of holding time, notification of testing re□uirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the re□uired timeframe, and regardless of any other integrity issues, suitably □ualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory□s control.

For □OCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other □OCs such as BTEX or C6-10 TRH then the holding time is 14 days.

□**NOTE:** pH duplicates are reported as a range NOT as RPD

□nits

mg/kg: milligrams per kilogram	**mg/□:** milligrams per litre	**ug/□:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**□:** Percentage
org/100m□: Organisms per 100 millilitres	**NT□:** Nephelometric Turbidity Units	**MPN/100m□:** □ost Probable Number of organisms per 100 millilitres

Terms

Dry	□ here a moisture has been determined on a solid sample the result is e□pressed on a dry basis.
□OR	Limit of Reporting.
SPI□E	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
□CS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference □aterial - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and 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.
□SEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TC□P	To□icity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
□SM	Quality Systems □anual ver 5.1 US Department of Defense
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 se□uence or batch that client samples were analysed within.
TE□	To□ic E□uivalency Quotient

□C - Acceptance Criteria

RPD Duplicates□□lobal RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are e□ually 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

PFAS field samples that contain surrogate recoveries in e□cess of the QC limit designated in QS□ 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

□ A D□ ER (n□10)□PFBA, PFPeA, PFH□A, PFHpA, PFOA, PFBS, PFH□S, PFOS, 6□2 FTSA, 8□2 FTSA

□C Data □eneral Comments

1. □ here a result is reported as a less than (<), higher than the nominated LOR, this is due to either matri□interference, e□tract dilution re□uired 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, To□aphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, To□aphene 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 □atri□Spikes and LCS.
9. For □atri□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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uality Control Results

Test	nits	Result 1			Acceptance imits	Pass imits	ualifying 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	
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							
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							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4-DDD	mg/kg	< 0.05			0.05	Pass	
4.4-DDE	mg/kg	< 0.05			0.05	Pass	
4.4-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epo□ide	mg/kg	< 0.05			0.05	Pass	
He□achlorobenzene	mg/kg	< 0.05			0.05	Pass	
□ etho□ychlor	mg/kg	< 0.05			0.05	Pass	
To□aphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
□alathion	mg/kg	< 0.2			0.2	Pass	
□erphos	mg/kg	< 0.2			0.2	Pass	
□ethyl parathion	mg/kg	< 0.2			0.2	Pass	
□evinphos	mg/kg	< 0.2			0.2	Pass	
□onocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	

Test	nits	Result 1			Acceptance imits	Pass imits	ualifying Code
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	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	
ercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
inc	mg/kg	< 5			5	Pass	
CS - Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	127			70-130	Pass	
TRH C10-C14	%	89			70-130	Pass	
CS - Recovery							
BTEX							
Benzene	%	112			70-130	Pass	
Toluene	%	121			70-130	Pass	
Ethylbenzene	%	126			70-130	Pass	
m&p-Xylenes	%	129			70-130	Pass	
Xylenes - Total	%	129			70-130	Pass	
CS - Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	93			70-130	Pass	
TRH C6-C10	%	123			70-130	Pass	
TRH >C10-C16	%	86			70-130	Pass	
CS - Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	91			70-130	Pass	
Acenaphthylene	%	99			70-130	Pass	
Anthracene	%	101			70-130	Pass	
Benz(a)anthracene	%	73			70-130	Pass	
Benzo(a)pyrene	%	75			70-130	Pass	
Benzo(b&j)fluoranthene	%	85			70-130	Pass	
Benzo(g.h.i)perylene	%	93			70-130	Pass	
Benzo(k)fluoranthene	%	97			70-130	Pass	
Chrysene	%	94			70-130	Pass	
Dibenz(a.h)anthracene	%	82			70-130	Pass	
Fluoranthene	%	91			70-130	Pass	
Fluorene	%	95			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	93			70-130	Pass	
Naphthalene	%	89			70-130	Pass	
Phenanthrene	%	93			70-130	Pass	
Pyrene	%	90			70-130	Pass	
CS - Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	100			70-130	Pass	
4.4-DDD	%	120			70-130	Pass	
4.4-DDE	%	115			70-130	Pass	
4.4-DDT	%	70			70-130	Pass	
a-BHC	%	99			70-130	Pass	
Aldrin	%	107			70-130	Pass	

Test			nits	Result 1			Acceptance imits	Pass imits	ualifying Code
b-BHC			%	97			70-130	Pass	
d-BHC			%	92			70-130	Pass	
Dieldrin			%	106			70-130	Pass	
Endosulfan I			%	106			70-130	Pass	
Endosulfan II			%	91			70-130	Pass	
Endosulfan sulphate			%	101			70-130	Pass	
Endrin			%	112			70-130	Pass	
Endrin aldehyde			%	107			70-130	Pass	
Endrin ketone			%	104			70-130	Pass	
g-BHC (Lindane)			%	98			70-130	Pass	
Heptachlor			%	100			70-130	Pass	
Heptachlor epo ide			%	104			70-130	Pass	
He achlorobenzene			%	96			70-130	Pass	
ethoychlor			%	84			70-130	Pass	
CS - Recovery									
Organophosphorus Pesticides									
Diazinon			%	84			70-130	Pass	
Dimethoate			%	83			70-130	Pass	
Ethion			%	124			70-130	Pass	
Fenitrothion			%	99			70-130	Pass	
ethyl parathion			%	94			70-130	Pass	
evinphos			%	93			70-130	Pass	
CS - Recovery									
Polychlorinated Biphenyls									
Aroclor-1260			%	85			70-130	Pass	
CS - Recovery									
Heavy Metals									
Arsenic			%	101			80-120	Pass	
Cadmium			%	110			80-120	Pass	
Chromium			%	120			80-120	Pass	
Copper			%	108			80-120	Pass	
Lead			%	115			80-120	Pass	
ercury			%	114			75-125	Pass	
Nickel			%	103			80-120	Pass	
inc			%	102			80-120	Pass	
Test	**ab Sample ID**	**A Source**	**nits**	**Result 1**			**Acceptance imits**	**Pass imits**	**ualifying Code**
Spike - Recovery									
Organochlorine Pesticides				Result 1					
4.4 DDD	S18-Oc21516	CP	%	96			70-130	Pass	
4.4 DDE	S18-Oc21516	CP	%	104			70-130	Pass	
4.4 DDT	S18-Oc21516	CP	%	89			70-130	Pass	
a-BHC	S18-Oc21516	CP	%	92			70-130	Pass	
Aldrin	S18-Oc21516	CP	%	106			70-130	Pass	
b-BHC	S18-Oc21516	CP	%	88			70-130	Pass	
d-BHC	S18-Oc21516	CP	%	89			70-130	Pass	
Dieldrin	S18-Oc21516	CP	%	102			70-130	Pass	
Endosulfan I	S18-Oc21516	CP	%	107			70-130	Pass	
Endosulfan II	S18-Oc21516	CP	%	94			70-130	Pass	
Endosulfan sulphate	S18-Oc21516	CP	%	89			70-130	Pass	
Endrin	S18-Oc21516	CP	%	99			70-130	Pass	
Endrin aldehyde	S18-Oc21516	CP	%	94			70-130	Pass	
Endrin ketone	S18-Oc21516	CP	%	95			70-130	Pass	
g-BHC (Lindane)	S18-Oc21516	CP	%	89			70-130	Pass	
Heptachlor	S18-Oc21516	CP	%	99			70-130	Pass	

Test	□ab Sample ID	□A Source	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
Heptachlor epo□ide	S18-Oc21516	CP	%	101			70-130	Pass	
He□achlorobenzene	S18-Oc21516	CP	%	93			70-130	Pass	
□etho□ychlor	S18-Oc21516	CP	%	77			70-130	Pass	
Spike - □ Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S18-Oc21516	CP	%	95			70-130	Pass	
Dimethoate	S18-Oc21516	CP	%	71			70-130	Pass	
Ethion	S18-Oc21516	CP	%	122			70-130	Pass	
Fenitrothion	S18-Oc21516	CP	%	99			70-130	Pass	
□ethyl parathion	S18-Oc21516	CP	%	85			70-130	Pass	
□evinphos	S18-Oc21516	CP	%	78			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-Oc21517	CP	%	117			70-130	Pass	
Spike - □ Recovery									
BTEX				Result 1					
Benzene	S18-Oc21517	CP	%	91			70-130	Pass	
Toluene	S18-Oc21517	CP	%	92			70-130	Pass	
Ethylbenzene	S18-Oc21517	CP	%	107			70-130	Pass	
m&p-Xylenes	S18-Oc21517	CP	%	97			70-130	Pass	
o-Xylene	S18-Oc21517	CP	%	93			70-130	Pass	
Xylenes - Total	S18-Oc21517	CP	%	96			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-Oc21517	CP	%	77			70-130	Pass	
TRH C6-C10	S18-Oc21517	CP	%	110			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S18-Oc21518	CP	%	72			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S18-Oc21518	CP	%	71			70-130	Pass	
Spike - □ Recovery									
Heavy Metals				Result 1					
Arsenic	S18-Oc21524	CP	%	93			75-125	Pass	
Cadmium	S18-Oc21524	CP	%	103			75-125	Pass	
Chromium	S18-Oc21524	CP	%	105			75-125	Pass	
Copper	S18-Oc21524	CP	%	103			75-125	Pass	
Lead	S18-Oc21524	CP	%	122			75-125	Pass	
□ercury	S18-Oc21524	CP	%	104			70-130	Pass	
Nickel	S18-Oc21524	CP	%	97			75-125	Pass	
□inc	S18-Oc21524	CP	%	111			75-125	Pass	
Spike - □ Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S18-Oc21526	CP	%	82			70-130	Pass	
Spike - □ Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S18-Oc21528	CP	%	93			70-130	Pass	
Acenaphthylene	S18-Oc21528	CP	%	98			70-130	Pass	
Anthracene	S18-Oc21528	CP	%	102			70-130	Pass	
Benz(a)anthracene	S18-Oc21528	CP	%	94			70-130	Pass	
Benzo(a)pyrene	S18-Oc21528	CP	%	94			70-130	Pass	
Benzo(b&j)fluoranthene	S18-Oc21528	CP	%	88			70-130	Pass	
Benzo(g.h.i)perylene	S18-Oc21528	CP	%	101			70-130	Pass	

Test	□ab Sample ID	□A Source	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
Benzo(k)fluoranthene	S18-Oc21528	CP	%	93			70-130	Pass	
Chrysene	S18-Oc21528	CP	%	95			70-130	Pass	
Dibenz(a.h)anthracene	S18-Oc21528	CP	%	88			70-130	Pass	
Fluoranthene	S18-Oc21528	CP	%	94			70-130	Pass	
Fluorene	S18-Oc21528	CP	%	96			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21528	CP	%	120			70-130	Pass	
Naphthalene	S18-Oc21528	CP	%	95			70-130	Pass	
Phenanthrene	S18-Oc21528	CP	%	96			70-130	Pass	
Pyrene	S18-Oc21528	CP	%	93			70-130	Pass	
Spike - □ Recovery									
Heavy Metals				Result 1					
Arsenic	S18-Oc21534	CP	%	97			75-125	Pass	
Cadmium	S18-Oc21534	CP	%	107			75-125	Pass	
Chromium	S18-Oc21534	CP	%	111			75-125	Pass	
Copper	S18-Oc21534	CP	%	106			75-125	Pass	
Lead	S18-Oc21534	CP	%	115			75-125	Pass	
□ercury	S18-Oc21534	CP	%	105			70-130	Pass	
Nickel	S18-Oc21534	CP	%	101			75-125	Pass	
□inc	S18-Oc21534	CP	%	120			75-125	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-Oc21538	CP	%	84			70-130	Pass	
Spike - □ Recovery									
BTEX				Result 1					
Benzene	S18-Oc21538	CP	%	80			70-130	Pass	
Toluene	S18-Oc21538	CP	%	75			70-130	Pass	
Ethylbenzene	S18-Oc21538	CP	%	76			70-130	Pass	
m&p-Xylenes	S18-Oc21538	CP	%	75			70-130	Pass	
o-Xylene	S18-Oc21538	CP	%	79			70-130	Pass	
Xylenes - Total	S18-Oc21538	CP	%	76			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-Oc21538	CP	%	81			70-130	Pass	
TRH C6-C10	S18-Oc21538	CP	%	79			70-130	Pass	
Spike - □ Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S18-Oc21538	CP	%	94			70-130	Pass	
Acenaphthylene	S18-Oc21538	CP	%	102			70-130	Pass	
Anthracene	S18-Oc21538	CP	%	101			70-130	Pass	
Benz(a)anthracene	S18-Oc21538	CP	%	86			70-130	Pass	
Benzo(a)pyrene	S18-Oc21538	CP	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	S18-Oc21538	CP	%	75			70-130	Pass	
Benzo(g.h.i)perylene	S18-Oc21538	CP	%	110			70-130	Pass	
Benzo(k)fluoranthene	S18-Oc21538	CP	%	95			70-130	Pass	
Chrysene	S18-Oc21538	CP	%	101			70-130	Pass	
Dibenz(a.h)anthracene	S18-Oc21538	CP	%	95			70-130	Pass	
Fluoranthene	S18-Oc21538	CP	%	89			70-130	Pass	
Fluorene	S18-Oc21538	CP	%	98			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21538	CP	%	111			70-130	Pass	
Naphthalene	S18-Oc21538	CP	%	91			70-130	Pass	
Phenanthrene	S18-Oc21538	CP	%	91			70-130	Pass	
Pyrene	S18-Oc21538	CP	%	85			70-130	Pass	
Spike - □ Recovery									
Organochlorine Pesticides				Result 1					

Test	□ab Sample ID	□A Source	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
4.4□DDD	S18-Oc21538	CP	%	110			70-130	Pass	
4.4□DDE	S18-Oc21538	CP	%	116			70-130	Pass	
4.4□DDT	S18-Oc21538	CP	%	93			70-130	Pass	
a-BHC	S18-Oc21538	CP	%	86			70-130	Pass	
Aldrin	S18-Oc21538	CP	%	114			70-130	Pass	
b-BHC	S18-Oc21538	CP	%	95			70-130	Pass	
d-BHC	S18-Oc21538	CP	%	99			70-130	Pass	
Dieldrin	S18-Oc21538	CP	%	112			70-130	Pass	
Endosulfan I	S18-Oc21538	CP	%	119			70-130	Pass	
Endosulfan II	S18-Oc21538	CP	%	103			70-130	Pass	
Endosulfan sulphate	S18-Oc21538	CP	%	98			70-130	Pass	
Endrin	S18-Oc21538	CP	%	100			70-130	Pass	
Endrin aldehyde	S18-Oc21538	CP	%	107			70-130	Pass	
Endrin ketone	S18-Oc21538	CP	%	110			70-130	Pass	
g-BHC (Lindane)	S18-Oc21538	CP	%	101			70-130	Pass	
Heptachlor	S18-Oc21538	CP	%	112			70-130	Pass	
Heptachlor epo□ide	S18-Oc21538	CP	%	109			70-130	Pass	
He□achlorobenzene	S18-Oc21538	CP	%	85			70-130	Pass	
□etho□ychlor	S18-Oc21538	CP	%	81			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S18-Oc21539	CP	%	88			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S18-Oc21539	CP	%	89			70-130	Pass	
Spike - □ Recovery									
Heavy Metals				Result 1					
Arsenic	S18-Oc21544	CP	%	92			75-125	Pass	
Cadmium	S18-Oc21544	CP	%	105			75-125	Pass	
Chromium	S18-Oc21544	CP	%	100			75-125	Pass	
Copper	S18-Oc21544	CP	%	80			75-125	Pass	
Lead	S18-Oc21544	CP	%	99			75-125	Pass	
□ercury	S18-Oc21544	CP	%	105			70-130	Pass	
Nickel	S18-Oc21544	CP	%	93			75-125	Pass	
□inc	S18-Oc21544	CP	%	73			75-125	Fail	Q08
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-Oc21548	CP	%	96			70-130	Pass	
Spike - □ Recovery									
BTEX				Result 1					
Benzene	S18-Oc21548	CP	%	99			70-130	Pass	
Toluene	S18-Oc21548	CP	%	88			70-130	Pass	
Ethylbenzene	S18-Oc21548	CP	%	83			70-130	Pass	
m&p-Xylenes	S18-Oc21548	CP	%	86			70-130	Pass	
o-Xylene	S18-Oc21548	CP	%	91			70-130	Pass	
Xylenes - Total	S18-Oc21548	CP	%	88			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-Oc21548	CP	%	108			70-130	Pass	
TRH C6-C10	S18-Oc21548	CP	%	90			70-130	Pass	
Spike - □ Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S18-Oc21548	CP	%	95			70-130	Pass	
Acenaphthylene	S18-Oc21548	CP	%	100			70-130	Pass	

Test	□ab Sample ID	□A Source	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
Anthracene	S18-Oc21548	CP	%	102			70-130	Pass	
Benz(a)anthracene	S18-Oc21548	CP	%	94			70-130	Pass	
Benzo(a)pyrene	S18-Oc21548	CP	%	96			70-130	Pass	
Benzo(b&j)fluoranthene	S18-Oc21548	CP	%	90			70-130	Pass	
Benzo(g.h.i)perylene	S18-Oc21548	CP	%	104			70-130	Pass	
Benzo(k)fluoranthene	S18-Oc21548	CP	%	95			70-130	Pass	
Chrysene	S18-Oc21548	CP	%	95			70-130	Pass	
Dibenz(a.h)anthracene	S18-Oc21548	CP	%	88			70-130	Pass	
Fluoranthene	S18-Oc21548	CP	%	96			70-130	Pass	
Fluorene	S18-Oc21548	CP	%	97			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21548	CP	%	85			70-130	Pass	
Naphthalene	S18-Oc21548	CP	%	96			70-130	Pass	
Phenanthrene	S18-Oc21548	CP	%	100			70-130	Pass	
Pyrene	S18-Oc21548	CP	%	96			70-130	Pass	
Test	**□ab Sample ID**	**□A Source**	**□nits**	**Result 1**			**Acceptance □imits**	**Pass □imits**	**□ualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-Oc21516	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-Oc21516	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-Oc21516	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-Oc21516	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-Oc21516	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-Oc21516	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-Oc21516	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-Oc21516	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-Oc21516	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S18-Oc21517	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-Oc21517	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-Oc21517	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S18-Oc21517	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-Oc21517	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-Oc21517	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Indeno(1.2.3-cd)pyrene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-Oc21517	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% □oisture	S18-Oc21518	CP	%	15	15	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21523	CP	mg/kg	9.2	9.4	3.0	30%	Pass	
Cadmium	S18-Oc21523	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21523	CP	mg/kg	12	13	9.0	30%	Pass	
Copper	S18-Oc21523	CP	mg/kg	38	40	6.0	30%	Pass	
Lead	S18-Oc21523	CP	mg/kg	14	14	3.0	30%	Pass	
□ercury	S18-Oc21523	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21523	CP	mg/kg	12	12	5.0	30%	Pass	
□inc	S18-Oc21523	CP	mg/kg	55	53	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21524	CP	mg/kg	11	12	11	30%	Pass	
Cadmium	S18-Oc21524	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21524	CP	mg/kg	15	17	9.0	30%	Pass	
Copper	S18-Oc21524	CP	mg/kg	34	37	10	30%	Pass	
Lead	S18-Oc21524	CP	mg/kg	33	37	10	30%	Pass	
□ercury	S18-Oc21524	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21524	CP	mg/kg	20	22	10	30%	Pass	
□inc	S18-Oc21524	CP	mg/kg	75	82	10	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-Oc21527	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-Oc21527	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-Oc21527	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-Oc21527	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-Oc21527	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-Oc21527	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-Oc21527	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-Oc21527	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Fluoranthene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-Oc21527	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% □oisture	S18-Oc21529	CP	%	15	16	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21533	CP	mg/kg	4.7	4.0	15	30%	Pass	
Cadmium	S18-Oc21533	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21533	CP	mg/kg	7.4	6.2	17	30%	Pass	
Copper	S18-Oc21533	CP	mg/kg	20	18	10	30%	Pass	
Lead	S18-Oc21533	CP	mg/kg	11	9.2	20	30%	Pass	
□ercury	S18-Oc21533	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21533	CP	mg/kg	< 5	< 5	<1	30%	Pass	
□inc	S18-Oc21533	CP	mg/kg	17	17	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21534	CP	mg/kg	11	11	3.0	30%	Pass	
Cadmium	S18-Oc21534	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21534	CP	mg/kg	15	15	1.0	30%	Pass	
Copper	S18-Oc21534	CP	mg/kg	44	45	3.0	30%	Pass	
Lead	S18-Oc21534	CP	mg/kg	39	40	3.0	30%	Pass	
□ercury	S18-Oc21534	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21534	CP	mg/kg	15	15	3.0	30%	Pass	
□inc	S18-Oc21534	CP	mg/kg	79	81	3.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S18-Oc21536	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-Oc21536	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-Oc21536	CP	mg/kg	< 50	96	82	30%	Fail	Q15
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S18-Oc21536	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-Oc21536	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-Oc21536	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Naphthalene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-Oc21536	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4□DDD	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4□DDE	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4□DDT	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epo□ide	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
He□achlorobenzene	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
□etho□ychlor	S18-Oc21536	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
To□aphene	S18-Oc21536	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-Oc21536	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
□alathion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
□erphos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
□ethyl parathion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
□evinphos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
□onocrotophos	S18-Oc21536	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-Oc21536	CP	mg/kg	< 2	< 2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Phorate	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-Oc21536	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	S18-Oc21536	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-Oc21537	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-Oc21537	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-Oc21537	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-Oc21537	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-Oc21537	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-Oc21537	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-Oc21537	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-Oc21537	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-Oc21537	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% □oisture	S18-Oc21539	CP	%	19	18	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21543	CP	mg/kg	5.6	5.0	10	30%	Pass	
Cadmium	S18-Oc21543	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21543	CP	mg/kg	5.5	6.6	17	30%	Pass	
Copper	S18-Oc21543	CP	mg/kg	13	16	17	30%	Pass	
Lead	S18-Oc21543	CP	mg/kg	6.2	7.3	17	30%	Pass	
□ercury	S18-Oc21543	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21543	CP	mg/kg	< 5	< 5	<1	30%	Pass	
□inc	S18-Oc21543	CP	mg/kg	14	14	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21544	CP	mg/kg	14	15	8.0	30%	Pass	
Cadmium	S18-Oc21544	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21544	CP	mg/kg	20	23	10	30%	Pass	
Copper	S18-Oc21544	CP	mg/kg	45	50	11	30%	Pass	
Lead	S18-Oc21544	CP	mg/kg	16	18	9.0	30%	Pass	
□ercury	S18-Oc21544	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Nickel	S18-Oc21544	CP	mg/kg	16	18	9.0	30%	Pass	
□inc	S18-Oc21544	CP	mg/kg	65	73	11	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-Oc21547	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-Oc21547	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-Oc21547	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-Oc21547	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-Oc21547	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-Oc21547	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-Oc21547	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-Oc21547	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-Oc21547	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S18-Oc21548	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-Oc21548	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-Oc21548	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S18-Oc21548	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-Oc21548	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-Oc21548	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% □oisture	S18-Oc21549	CP	%	13	13	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-Oc21553	CP	mg/kg	51	84	48	30%	Fail	Q02
Cadmium	S18-Oc21553	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-Oc21553	CP	mg/kg	6.4	6.4	<1	30%	Pass	
Copper	S18-Oc21553	CP	mg/kg	28	31	8.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S18-Oc21553	CP	mg/kg	5.0	5.4	7.0	30%	Pass	
□ercury	S18-Oc21553	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-Oc21553	CP	mg/kg	< 5	< 5	<1	30%	Pass	
□inc	S18-Oc21553	CP	mg/kg	25	25	1.0	30%	Pass	

Comments

This report has been revised (□2) to amend the sampling dates.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	□es
Sample correctly preserved	□es
Appropriate sample containers have been used	□es
Sample containers for volatile analysis received with minimal headspace	□es
Samples received within HoldingTime	□es
Some samples have been subcontracted	No

□ualifier 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	□ here we have reported both volatile (P&T □C□S) and semivolatile (□C□S) 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 techni□ues 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 □uantitating against a standard of mi□ed 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
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
Q08	The matri□spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matri□ interference
Q15	The RPD reported passes Eurofins □mgt□s QC - Acceptance Criteria as defined in the Internal Quality Control Review and □lossary page of this report.

Authorised By

Nibha □aidya	Analytical Services □anager
Chris Bennett	Senior Analyst-□etal (□IC)
Harry Bacalis	Senior Analyst-□olatile (□IC)
□oseph Edouard	Senior Analyst-Organic (□IC)
Nibha □aidya	Senior Analyst-Asbestos (NS□)

□lenn □ackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Re□uested

* Indicates NATA accreditation does not cover the performance of this service

□easurement uncertainty of test data is available on re□uest or please click here.

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Celebrating 30 years Testing and Protecting Human Health

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.

EP Risk Management (NSW)
109/283 Alfred Street
North Sydney
NSW 2060

Attention: **Patrick Pragasam**

Report **623095-W-V2**
Project name NEPEAN HOSPITAL
Project ID EP0991
Received Date Oct 17, 2018

Client Sample ID **Sample Matrix** **Eurofins | mgt Sample No.** **Date Sampled** Test/Reference	LOR	Unit	**TRIP_B** **Water** **S18-Oc21558** **Oct 16, 2018**	[R20]**TRIP_S** **Water** **S18-Oc21559** **Oct 16, 2018**	**RIN_01** **Water** **S18-Oc21560** **Oct 15, 2018**	**RIN_02** **Water** **S18-Oc21561** **Oct 16, 2018**
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	100	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	79	0.03	0.03
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	-	0.03	0.03
TRH >C10-C16	0.05	mg/L	-	-	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	-	-	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	-	-	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	-	-	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	-	-	< 0.1	< 0.1
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	79	0.03	0.03
TRH C10-C14	0.05	mg/L	-	-	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	-	-	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	-	-	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	-	-	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	100	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	99	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	100	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	100	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	110	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	110	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	116	132	86	109
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	-	-	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	-	-	< 0.001	< 0.001
Anthracene	0.001	mg/L	-	-	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	-	-	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	-	-	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	-	-	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	-	-	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	-	-	< 0.001	< 0.001
Chrysene	0.001	mg/L	-	-	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	-	-	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	-	-	< 0.001	< 0.001
Fluorene	0.001	mg/L	-	-	< 0.001	< 0.001

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TRIP_B Water S18-Oc21558 Oct 16, 2018	R20TRIP_S Water S18-Oc21559 Oct 16, 2018	RIN_01 Water S18-Oc21560 Oct 15, 2018	RIN_02 Water S18-Oc21561 Oct 16, 2018
Polycyclic Aromatic Hydrocarbons						
Indeno(1.2.3-cd)pyrene	0.001	mg/L	-	-	< 0.001	< 0.001
Naphthalene	0.001	mg/L	-	-	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	-	-	< 0.001	< 0.001
Pyrene	0.001	mg/L	-	-	< 0.001	< 0.001
Total PAH*	0.001	mg/L	-	-	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	-	-	68	101
p-Terphenyl-d14 (surr.)	1	%	-	-	70	103
Heavy Metals						
Arsenic	0.001	mg/L	-	-	< 0.001	< 0.001
Cadmium	0.0002	mg/L	-	-	< 0.0002	< 0.0002
Chromium	0.001	mg/L	-	-	< 0.001	< 0.001
Copper	0.001	mg/L	-	-	< 0.001	< 0.001
Lead	0.001	mg/L	-	-	< 0.001	< 0.001
□ercury	0.0001	mg/L	-	-	< 0.0001	< 0.0001
Nickel	0.001	mg/L	-	-	< 0.001	< 0.001
□inc	0.005	mg/L	-	-	< 0.005	< 0.005

Sample History

□ here samples are submitted/analysed over several days, the last date of e□traction and analysis is reported.
A recent review of our LI□S 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 □uality 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 - 2013 NEP□ Fractions	□elbourne	Oct 19, 2018	7 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	□elbourne	Oct 19, 2018	7 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEP□ Fractions	□elbourne	Oct 23, 2018	7 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
BTEX	□elbourne	Oct 19, 2018	14 Day
- □ethod□LT□-OR□-2150 □OCs in Soils Li□uid and other A□ueous □atrices			
Eurofins □mgt Suite B7			
Total Recoverable Hydrocarbons - 2013 NEP□ Fractions	□elbourne	Oct 23, 2018	7 Day
- □ethod□LT□-OR□-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	□elbourne	Oct 23, 2018	7 Day
- □ethod□LT□-OR□-2130 PAH and Phenols in Soil and □ ater			
□etals □8	□elbourne	Oct 19, 2018	28 Days
- □ethod□LT□-□ET-3040 □etals in □ aters, Soils & Sediments by ICP-□S			

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NATA # 1261
Site # 23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
External □aboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**□AB ID**									
1	TP1□0.5	Oct 15, 2018		Soil	S18-Oc21516	X					X	X	X	
2	TP1□1.4	Oct 15, 2018		Soil	S18-Oc21517							X	X	
3	TP2□1.0	Oct 15, 2018		Soil	S18-Oc21518	X					X	X	X	
4	TP2□2.0	Oct 15, 2018		Soil	S18-Oc21519							X	X	
5	TP3□0.5	Oct 15, 2018		Soil	S18-Oc21520	X					X	X	X	
6	TP3□1.4	Oct 15, 2018		Soil	S18-Oc21521							X	X	
7	TP4□0.5	Oct 15, 2018		Soil	S18-Oc21522			X						
8	TP4□1.3	Oct 15, 2018		Soil	S18-Oc21523							X	X	
9	TP5□0.15	Oct 15, 2018		Soil	S18-Oc21524	X					X	X	X	

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Company Name: EP Risk □anagement (NS□)
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NS□ 2060

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Pro□ect ID: EP0991

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Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
10	TP5□1.5	Oct 15, 2018		Soil	S18-Oc21525							X	X	
11	TP6□0.15	Oct 15, 2018		Soil	S18-Oc21526	X					X	X	X	
12	TP6□1.5	Oct 15, 2018		Soil	S18-Oc21527							X	X	
13	TP7□0.15	Oct 15, 2018		Soil	S18-Oc21528	X					X	X	X	
14	TP7□1.2	Oct 15, 2018		Soil	S18-Oc21529							X	X	
15	TP8□0.5	Oct 15, 2018		Soil	S18-Oc21530	X					X	X	X	
16	TP8□1.5	Oct 15, 2018		Soil	S18-Oc21531							X	X	
17	TP9□0.15	Oct 15, 2018		Soil	S18-Oc21532	X					X	X	X	
18	TP9□1.6	Oct 15, 2018		Soil	S18-Oc21533							X	X	
19	TP10□0.5	Oct 15, 2018		Soil	S18-Oc21534	X					X	X	X	
20	TP10□1.5	Oct 15, 2018		Soil	S18-Oc21535							X	X	
21	TP11□0.5	Oct 15, 2018		Soil	S18-Oc21536	X					X	X	X	

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NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
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Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
22	TP11□1.5	Oct 15, 2018		Soil	S18-Oc21537							X	X	
23	TP12□0.5	Oct 15, 2018		Soil	S18-Oc21538	X					X	X	X	
24	TP12□1.5	Oct 15, 2018		Soil	S18-Oc21539							X	X	
25	TP13□0.15	Oct 15, 2018		Soil	S18-Oc21540	X					X	X	X	
26	TP13□1.5	Oct 15, 2018		Soil	S18-Oc21541							X	X	
27	TP14□0.15	Oct 15, 2018		Soil	S18-Oc21542	X					X	X	X	
28	TP14□1.5	Oct 15, 2018		Soil	S18-Oc21543							X	X	
29	TP15□0.15	Oct 15, 2018		Soil	S18-Oc21544	X					X	X	X	
30	TP15□1.5	Oct 15, 2018		Soil	S18-Oc21545							X	X	
31	TP16□0.15	Oct 15, 2018		Soil	S18-Oc21546	X					X	X	X	
32	TP16□1.2	Oct 15, 2018		Soil	S18-Oc21547							X	X	
33	TP17□0.15	Oct 15, 2018		Soil	S18-Oc21548	X					X	X	X	

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Site # 23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
34	TP17□1.5	Oct 15, 2018		Soil	S18-Oc21549							X	X	
35	TP18□0.15	Oct 15, 2018		Soil	S18-Oc21550	X					X	X	X	
36	TP18□1.3	Oct 15, 2018		Soil	S18-Oc21551							X	X	
37	TP19□0.5	Oct 15, 2018		Soil	S18-Oc21552	X					X	X	X	
38	TP19□1.5	Oct 15, 2018		Soil	S18-Oc21553							X	X	
39	TP20□0.5	Oct 15, 2018		Soil	S18-Oc21554	X					X	X	X	
40	TP20□1.5	Oct 15, 2018		Soil	S18-Oc21555							X	X	
41	DUP□01	Oct 15, 2018		Soil	S18-Oc21556							X	X	
42	DUP□03	Oct 15, 2018		Soil	S18-Oc21557							X	X	
43	TRIP□B	Oct 16, 2018		□ ater	S18-Oc21558									X
44	TRIP□S	Oct 16, 2018		□ ater	S18-Oc21559									X
45	RIN□01	Oct 15, 2018		□ ater	S18-Oc21560								X	

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
46	RIN□02	Oct 16, 2018		□ ater	S18-Oc21561								X	
47	ASB□FC1	Oct 15, 2018		Building □aterials	S18-Oc21562		X							
48	ASB□FC2	Oct 16, 2018		Building □aterials	S18-Oc21563		X							
49	ASB□FC5	Oct 16, 2018		Building □aterials	S18-Oc21564		X							
50	ASB□FC3	Oct 15, 2018		Building □aterials	S18-Oc21565					X				
51	ASB□FC4	Oct 16, 2018		Building □aterials	S18-Oc21566					X				
52	TP1□0.15	Oct 15, 2018		Soil	S18-Oc21567				X					
53	TP2□0.15	Oct 15, 2018		Soil	S18-Oc21568				X					
54	TP2□0.5	Oct 15, 2018		Soil	S18-Oc21569				X					

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
55	TP2□1.7	Oct 15, 2018		Soil	S18-Oc21570				X					
56	TP3□0.15	Oct 15, 2018		Soil	S18-Oc21571				X					
57	TP4□0.15	Oct 15, 2018		Soil	S18-Oc21572	X					X	X	X	
58	TP5□0.5	Oct 15, 2018		Soil	S18-Oc21573				X					
59	TP6□0.5	Oct 15, 2018		Soil	S18-Oc21574				X					
60	TP8□0.15	Oct 15, 2018		Soil	S18-Oc21575				X					
61	TP9□0.5	Oct 15, 2018		Soil	S18-Oc21576				X					
62	TP10□0.15	Oct 15, 2018		Soil	S18-Oc21577				X					
63	TP11□0.15	Oct 15, 2018		Soil	S18-Oc21578				X					
64	TP12□0.15	Oct 15, 2018		Soil	S18-Oc21579				X					
65	TP13□0.5	Oct 15, 2018		Soil	S18-Oc21580				X					
66	TP15□0.5	Oct 15, 2018		Soil	S18-Oc21581				X					

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Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
67	TP17□0.5	Oct 15, 2018		Soil	S18-Oc21582				X					
68	TP19□0.15	Oct 15, 2018		Soil	S18-Oc21583				X					
69	TP20□0.15	Oct 15, 2018		Soil	S18-Oc21584				X					
70	DUP□02	Oct 16, 2018		Soil	S18-Oc21585				X					
71	TP14□0.5	Oct 15, 2018		Soil	S18-Oc21726				X					
Test Counts						20	3	1	21	21	20	42	44	2

Internal □uality Control Revie□ and □lossary

□eneral

1. Laboratory QC results for □ethod Blanks, Duplicates, □atri□Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on re□uest.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matri□dependant. Quoted LORs may be raised where sample e□tracts are diluted due to interferences.
5. Results are uncorrected for matri□spikes or surrogate recoveries e□cept for PFAS compounds.
6. S□OC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an □as received□basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to □Sample Preservation and Container □uide□for holding times (QS3001).

For samples received on the last day of holding time, notification of testing re□uirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the re□uired timeframe, and regardless of any other integrity issues, suitably □ualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory□s control.

For □OCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other □OCs such as BTEX or C6-10 TRH then the holding time is 14 days.

□**NOTE:** pH duplicates are reported as a range NOT as RPD

□nits

mg/kg: milligrams per kilogram	**mg/□:** milligrams per litre	**ug/□:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**□ :** Percentage
org/100m□: Organisms per 100 millilitres	**NT□:** Nephelometric Turbidity Units	**MPN/100m□:** □ost Probable Number of organisms per 100 millilitres

Terms

Dry	□ here a moisture has been determined on a solid sample the result is e□pressed on a dry basis.
□OR	Limit of Reporting.
SPI□E	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
□CS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference □aterial - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and 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.
□SEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TC□P	To□icity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
□SM	Quality Systems □anual ver 5.1 US Department of Defense
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 se□uence or batch that client samples were analysed within.
TE□	To□ic E□uivalency Quotient

□C - Acceptance Criteria

RPD Duplicates□□lobal RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are e□ually 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

PFAS field samples that contain surrogate recoveries in e□cess of the QC limit designated in QS□ 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

□ A D□ ER (n□10)□PFBA, PFPeA, PFH□A, PFHpA, PFOA, PFBS, PFH□S, PFOS, 6□2 FTSA, 8□2 FTSA

□C Data □eneral Comments

1. □ here a result is reported as a less than (<), higher than the nominated LOR, this is due to either matri□interference, e□tract dilution re□uired 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, To□aphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, To□aphene 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 □atri□Spikes and LCS.
9. For □atri□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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uality Control Results

Test	nits	Result 1			Acceptance imits	Pass imits	ualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
ercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
inc	mg/L	< 0.005			0.005	Pass	
CS - Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	87			70-130	Pass	

Test			□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
TRH C6-C10			%	119			70-130	Pass	
TRH >C10-C16			%	85			70-130	Pass	
□CS - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9			%	118			70-130	Pass	
TRH C10-C14			%	94			70-130	Pass	
□CS - □ Recovery									
BTEX									
Benzene			%	107			70-130	Pass	
Toluene			%	116			70-130	Pass	
Ethylbenzene			%	94			70-130	Pass	
m&p-Xylenes			%	90			70-130	Pass	
Xylenes - Total			%	96			70-130	Pass	
□CS - □ Recovery									
Polycyclic Aromatic Hydrocarbons									
Acenaphthene			%	130			70-130	Pass	
Acenaphthylene			%	89			70-130	Pass	
Anthracene			%	104			70-130	Pass	
Benz(a)anthracene			%	107			70-130	Pass	
Benzo(a)pyrene			%	87			70-130	Pass	
Benzo(b&j)fluoranthene			%	127			70-130	Pass	
Benzo(g.h.i)perylene			%	92			70-130	Pass	
Benzo(k)fluoranthene			%	93			70-130	Pass	
Chrysene			%	127			70-130	Pass	
Dibenz(a.h)anthracene			%	94			70-130	Pass	
Fluoranthene			%	108			70-130	Pass	
Fluorene			%	94			70-130	Pass	
Indeno(1.2.3-cd)pyrene			%	92			70-130	Pass	
Naphthalene			%	102			70-130	Pass	
Phenanthrene			%	91			70-130	Pass	
Pyrene			%	109			70-130	Pass	
□CS - □ Recovery									
Heavy Metals									
Arsenic			%	95			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Chromium			%	93			80-120	Pass	
Copper			%	92			80-120	Pass	
Lead			%	93			80-120	Pass	
□ercury			%	90			75-125	Pass	
Nickel			%	93			80-120	Pass	
□inc			%	96			80-120	Pass	
Test	**□ab Sample ID**	**□A Source**	**□nits**	**Result 1**			**Acceptance □imits**	**Pass □imits**	**□ualifying Code**
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	□18-Oc19471	NCP	%	84			70-130	Pass	
TRH C6-C10	□18-Oc19471	NCP	%	111			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	□18-Oc19471	NCP	%	112			70-130	Pass	
Spike - □ Recovery									
BTEX				Result 1					
Benzene	□18-Oc19471	NCP	%	116			70-130	Pass	
Toluene	□18-Oc19471	NCP	%	117			70-130	Pass	
Ethylbenzene	□18-Oc19471	NCP	%	106			70-130	Pass	

Test	□ab Sample ID	□A Source	□nits	Result 1			Acceptance □imits	Pass □imits	□ualifying Code
m&p-Xylenes	□18-Oc19471	NCP	%	99			70-130	Pass	
o-Xylene	□18-Oc19471	NCP	%	112			70-130	Pass	
Xylenes - Total	□18-Oc19471	NCP	%	103			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	□18-Oc20818	NCP	%	88			70-130	Pass	
Spike - □ Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	□18-Oc20818	NCP	%	95			70-130	Pass	
Spike - □ Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	□18-Oc21293	NCP	%	116			70-130	Pass	
Acenaphthylene	□18-Oc21293	NCP	%	117			70-130	Pass	
Anthracene	□18-Oc21293	NCP	%	95			70-130	Pass	
Benz(a)anthracene	□18-Oc21293	NCP	%	93			70-130	Pass	
Benzo(a)pyrene	□18-Oc21293	NCP	%	114			70-130	Pass	
Benzo(b&j)fluoranthene	□18-Oc21293	NCP	%	109			70-130	Pass	
Benzo(g.h.i)perylene	□18-Oc21293	NCP	%	80			70-130	Pass	
Benzo(k)fluoranthene	□18-Oc21293	NCP	%	127			70-130	Pass	
Chrysene	□18-Oc21293	NCP	%	109			70-130	Pass	
Dibenz(a.h)anthracene	□18-Oc21293	NCP	%	79			70-130	Pass	
Fluoranthene	□18-Oc21293	NCP	%	89			70-130	Pass	
Fluorene	□18-Oc21293	NCP	%	124			70-130	Pass	
Indeno(1.2.3-cd)pyrene	□18-Oc21293	NCP	%	80			70-130	Pass	
Naphthalene	□18-Oc21293	NCP	%	96			70-130	Pass	
Phenanthrene	□18-Oc21293	NCP	%	120			70-130	Pass	
Pyrene	□18-Oc21293	NCP	%	91			70-130	Pass	
Spike - □ Recovery									
Heavy Metals				Result 1					
Arsenic	□18-Oc23853	NCP	%	99			75-125	Pass	
Cadmium	□18-Oc23853	NCP	%	97			75-125	Pass	
Chromium	□18-Oc23853	NCP	%	96			75-125	Pass	
Copper	□18-Oc23853	NCP	%	97			75-125	Pass	
Lead	□18-Oc23853	NCP	%	97			75-125	Pass	
□ercury	□18-Oc23853	NCP	%	96			70-130	Pass	
Nickel	□18-Oc23853	NCP	%	96			75-125	Pass	
□inc	□18-Oc23853	NCP	%	103			75-125	Pass	
Test	**□ab Sample ID**	**□A Source**	**□nits**	**Result 1**			**Acceptance □imits**	**Pass □imits**	**□ualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	□18-Oc22586	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	□18-Oc22586	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	□18-Oc22586	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	□18-Oc22586	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	□18-Oc22586	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	□18-Oc22586	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	□18-Oc22586	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	□18-Oc22586	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	□18-Oc22586	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	□18-Oc20817	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	□18-Oc20817	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	□18-Oc20817	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	□18-Oc20817	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	□18-Oc20817	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	□18-Oc20817	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	□18-Oc21292	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	□18-Oc23853	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	□18-Oc23853	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	□18-Oc23853	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	□18-Oc23853	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	□18-Oc23853	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
□ercury	□18-Oc23853	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	□18-Oc23853	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
□inc	□18-Oc23853	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

This report has been revised (□2) to amend the sampling dates.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	□es
Sample correctly preserved	□es
Appropriate sample containers have been used	□es
Sample containers for volatile analysis received with minimal headspace	□es
Samples received within HoldingTime	□es
Some samples have been subcontracted	No

□ualifier 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	□ here we have reported both volatile (P&T □C□S) and semivolatile (□C□S) 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 techni□ues 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 □uantitating against a standard of mi□ed 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
R20	This sample is a Trip Spike and therefore all results are reported as a percentage

Authorised By

Nibha □aidya	Analytical Services □anager
Chris Bennett	Senior Analyst-□etal (□IC)
Harry Bacalis	Senior Analyst-□olatile (□IC)
□oseph Edouard	Senior Analyst-Organic (□IC)

□lenn □ackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Re□uested

* Indicates NATA accreditation does not cover the performance of this service

□easurement uncertainty of test data is available on re□uest or please click here.

Eurofins □mgt shall not be liable for loss, cost, damages or e□penses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins □mgt be liable for conse□uential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced e□cept in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

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.

EP Risk Management (NSW)
109/283 Alfred Street
North Sydney
NSW 2060

Attention:	Patrick Pragasam
Report	623095-□2-AID
Pro□ect Name	NEPEAN HOSPITAL
Pro□ect ID	EP0991
Received Date	Oct 17, 2018
Date Reported	Oct 25, 2018

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004□□ ethod for the Qualitative Identification of Asbestos in Bulk Samples and in-house □ethod LT□-ASB-8020 by polarised light microscopy (PL□) and dispersion staining (DS) techni□ues. *NOTE: Positive Trace Anal□sis results indicate the sample contains detectable respirable fibres□*
Unknown □ineral Fibres	□ineral fibres of unknown type, as determined by PL□ with DS, may re□uire another analytical techni□ue, such as Electron □icroscopy, to confirm une□uivocal identity. *NOTE: While Actinolite, Anthoph□llite and Tremolite asbestos ma□be detected b□PLM □ith DS, due to variabilit□in the optical properties of these materials, AS4964 re□uires that these are reported as UMF unless confirmed b□an independent techni□ue□*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than appro□imately 30 to 60g then a sub-sampling routine based on ISO 3082□2009(E) is employed. *NOTE: Depending on the nature and si□e of the soil sample, the sub-2 mm residue material ma□need to be sub-sampled for trace anal□sis, in accordance □ith AS 4964-2004□*
Bonded asbestos-containing material (AC□)	The material is first e□amined and any fibres isolated for identification by PL□ and DS. □here re□uired, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further e□amined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it ma□be difficult to detect the presence of asbestos in some asbestos-containing bul□ materials using PLM and DS□This is due to the lo□ grade or small length or diameter of the asbestos fibres present in the material, or to the fact that ver□fine fibres have been distributed intimatel□throughout the materials□Vin□□asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epo□□resins and some ore samples are e□amples of these t□pes of material, □hich are difficult to anal□se□*
Limit of Reporting	The performance limitation of the AS4964 method for inhomogeneous samples is around 0.1 g/kg (0.01% (w/w)). □here no asbestos is found by PL□ and DS, including Trace Analysis where re□uired, this is considered to be at the nominal reporting limit of 0.01 % (w / w).The e□amination of large sample sizes(500 mL is recommended) may improve the likelihood of identifying AC□ in the > 2mm fraction.The NEP□ screening level of 0.001 % (w / w) asbestos in soil for FA(friable asbestos) and AF(asbestos fines) then applies where they are able to be □uantified by gravimetric procedures.This □uantitative screening is not generally applicable to FF(free fibres) and results of Trace Analysis are referred. *NOTE: NATA Ne□s March 2014, p□□, states in relation to AS4964: □This is a □ualitative method □ith a nominal reporting limit of 0□01□ □and that currentl□in Australia □there is no validated method available for the □uantification of asbestos□□ Accordingl□, NATA Accreditation does not cover the performance of this service □indicated □ith an asteris□□□* *This report is consistent □ith the anal□tical procedures and reporting recommendations in the National Environment Protection □Assessment of Site Contamination□Measure, 2013 □as amended□and the Western Australia □uidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2009, including supporting document Recommended Procedures for Laborator□Anal□sis of Asbestos in Soil, □une 2011□*

Pro□ect Name NEPEAN HOSPITAL
Pro□ect ID EP0991
Date Sampled Oct 15, 2018 to Oct 16, 2018
Report 623095-□2-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP1□0.5	18-Oc21516	Oct 15, 2018	Appro□imate Sample 106g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP2□1.0	18-Oc21518	Oct 15, 2018	Appro□imate Sample 112g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP3□0.5	18-Oc21520	Oct 15, 2018	Appro□imate Sample 137g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP5□0.15	18-Oc21524	Oct 15, 2018	Appro□imate Sample 95g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP6□0.15	18-Oc21526	Oct 15, 2018	Appro□imate Sample 131g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP7□0.15	18-Oc21528	Oct 15, 2018	Appro□imate Sample 117g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP8□0.5	18-Oc21530	Oct 15, 2018	Appro□imate Sample 63g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP9□0.15	18-Oc21532	Oct 15, 2018	Appro□imate Sample 53g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP10□0.5	18-Oc21534	Oct 15, 2018	Appro□imate Sample 121g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP11□0.5	18-Oc21536	Oct 15, 2018	Appro□imate Sample 106g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP12□0.5	18-Oc21538	Oct 15, 2018	Appro□imate Sample 72g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP13□0.15	18-Oc21540	Oct 15, 2018	Appro□imate Sample 72g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP14□0.15	18-Oc21542	Oct 15, 2018	Appro□imate Sample 97g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP15□0.15	18-Oc21544	Oct 15, 2018	Appro□imate Sample 86g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP16□0.15	18-Oc21546	Oct 15, 2018	Appro□imate Sample 73g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP17□0.15	18-Oc21548	Oct 15, 2018	Appro□imate Sample 76g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP18□0.15	18-Oc21550	Oct 15, 2018	Appro□imate Sample 68g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP19□0.5	18-Oc21552	Oct 15, 2018	Appro□imate Sample 72g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP20□0.5	18-Oc21554	Oct 15, 2018	Appro□imate Sample 83g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
ASB□FC1	18-Oc21562	Oct 15, 2018	Appro□imate Sample 14g / 70□30□4mm Sample consisted of□□rey compressed fibre cement fragments	Chrysotile asbestos detected.
ASB□FC2	18-Oc21563	Oct 16, 2018	Appro□imate Sample 17g / 60□30□5mm Sample consisted of□□rey compressed fibre cement fragments	Chrysotile, amosite and crocidolite asbestos detected.
ASB□FC5	18-Oc21564	Oct 16, 2018	Appro□imate Sample 48g / 100□60□5mm Sample consisted of□□rey compressed fibre cement fragments	No asbestos detected. Organic fibre detected. No respirable fibres detected.
TP4□0.15	18-Oc21572	Oct 15, 2018	Appro□imate Sample 105g Sample consisted of□Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Sample History

□ here samples are submitted/analysed over several days, the last date of e□traction and analysis is reported.
A recent review of our LI□S 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 □uality 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
Asbestos - LT□-ASB-8020	Sydney	Oct 19, 2018	Indefinite
Asbestos - LT□-ASB-8020	Sydney	Oct 19, 2018	Indefinite

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NATA □1261 Site □20794

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2/91 Leach Highway
□ewdale □ A 6105
Phone □□61 8 9251 9600
NATA □ 1261
Site □23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
External □aboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**□AB ID**									
1	TP1□0.5	Oct 15, 2018		Soil	S18-Oc21516	X					X	X	X	
2	TP1□1.4	Oct 15, 2018		Soil	S18-Oc21517							X	X	
3	TP2□1.0	Oct 15, 2018		Soil	S18-Oc21518	X					X	X	X	
4	TP2□2.0	Oct 15, 2018		Soil	S18-Oc21519							X	X	
5	TP3□0.5	Oct 15, 2018		Soil	S18-Oc21520	X					X	X	X	
6	TP3□1.4	Oct 15, 2018		Soil	S18-Oc21521							X	X	
7	TP4□0.5	Oct 15, 2018		Soil	S18-Oc21522			X						
8	TP4□1.3	Oct 15, 2018		Soil	S18-Oc21523							X	X	
9	TP5□0.15	Oct 15, 2018		Soil	S18-Oc21524	X					X	X	X	

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Site □ 23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
10	TP5□1.5	Oct 15, 2018		Soil	S18-Oc21525							X	X	
11	TP6□0.15	Oct 15, 2018		Soil	S18-Oc21526	X					X	X	X	
12	TP6□1.5	Oct 15, 2018		Soil	S18-Oc21527							X	X	
13	TP7□0.15	Oct 15, 2018		Soil	S18-Oc21528	X					X	X	X	
14	TP7□1.2	Oct 15, 2018		Soil	S18-Oc21529							X	X	
15	TP8□0.5	Oct 15, 2018		Soil	S18-Oc21530	X					X	X	X	
16	TP8□1.5	Oct 15, 2018		Soil	S18-Oc21531							X	X	
17	TP9□0.15	Oct 15, 2018		Soil	S18-Oc21532	X					X	X	X	
18	TP9□1.6	Oct 15, 2018		Soil	S18-Oc21533							X	X	
19	TP10□0.5	Oct 15, 2018		Soil	S18-Oc21534	X					X	X	X	
20	TP10□1.5	Oct 15, 2018		Soil	S18-Oc21535							X	X	
21	TP11□0.5	Oct 15, 2018		Soil	S18-Oc21536	X					X	X	X	

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Site □ 1254 & 14271

Sydney
Unit F3, Building F
16 □ars Road
Lane Cove □ est NS□ 2066
Phone □□61 2 9900 8400
NATA □ 1261 Site □ 18217

Brisbane
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NATA □ 1261 Site □ 20794

Perth
2/91 Leach Highway
□ewdale □ A 6105
Phone □□61 8 9251 9600
NATA □ 1261
Site □ 23736

Company Name: EP Risk □anagement (NS□)
Address: 109/283 Alfred Street
North Sydney
NS□ 2060

Pro□ect Name: NEPEAN HOSPITAL
Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
22	TP11□1.5	Oct 15, 2018		Soil	S18-Oc21537							X	X	
23	TP12□0.5	Oct 15, 2018		Soil	S18-Oc21538	X					X	X	X	
24	TP12□1.5	Oct 15, 2018		Soil	S18-Oc21539							X	X	
25	TP13□0.15	Oct 15, 2018		Soil	S18-Oc21540	X					X	X	X	
26	TP13□1.5	Oct 15, 2018		Soil	S18-Oc21541							X	X	
27	TP14□0.15	Oct 15, 2018		Soil	S18-Oc21542	X					X	X	X	
28	TP14□1.5	Oct 15, 2018		Soil	S18-Oc21543							X	X	
29	TP15□0.15	Oct 15, 2018		Soil	S18-Oc21544	X					X	X	X	
30	TP15□1.5	Oct 15, 2018		Soil	S18-Oc21545							X	X	
31	TP16□0.15	Oct 15, 2018		Soil	S18-Oc21546	X					X	X	X	
32	TP16□1.2	Oct 15, 2018		Soil	S18-Oc21547							X	X	
33	TP17□0.15	Oct 15, 2018		Soil	S18-Oc21548	X					X	X	X	

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Phone □□61 3 8564 5000
NATA □ 1261
Site □ 1254 & 14271

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Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
34	TP17□1.5	Oct 15, 2018		Soil	S18-Oc21549							X	X	
35	TP18□0.15	Oct 15, 2018		Soil	S18-Oc21550	X					X	X	X	
36	TP18□1.3	Oct 15, 2018		Soil	S18-Oc21551							X	X	
37	TP19□0.5	Oct 15, 2018		Soil	S18-Oc21552	X					X	X	X	
38	TP19□1.5	Oct 15, 2018		Soil	S18-Oc21553							X	X	
39	TP20□0.5	Oct 15, 2018		Soil	S18-Oc21554	X					X	X	X	
40	TP20□1.5	Oct 15, 2018		Soil	S18-Oc21555							X	X	
41	DUP□01	Oct 15, 2018		Soil	S18-Oc21556							X	X	
42	DUP□03	Oct 15, 2018		Soil	S18-Oc21557							X	X	
43	TRIP□B	Oct 16, 2018		□ ater	S18-Oc21558									X
44	TRIP□S	Oct 16, 2018		□ ater	S18-Oc21559									X
45	RIN□01	Oct 15, 2018		□ ater	S18-Oc21560								X	

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Address: 109/283 Alfred Street
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NS□ 2060

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Pro□ect ID: EP0991

Order No.:
Report □: 623095
Phone: 02 99225021
Fax:

Received: Oct 17, 2018 2□19 P□
Due: Oct 24, 2018
Priority: 5 Day
Contact Name: Patrick Pragasam

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins □mgt Suite B15	□oisture Set	Eurofins □mgt Suite B7	BTEXN and □olatile TRH
Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
46	RIN□02	Oct 16, 2018		□ ater	S18-Oc21561								X	
47	ASB□FC1	Oct 15, 2018		Building □aterials	S18-Oc21562		X							
48	ASB□FC2	Oct 16, 2018		Building □aterials	S18-Oc21563		X							
49	ASB□FC5	Oct 16, 2018		Building □aterials	S18-Oc21564		X							
50	ASB□FC3	Oct 15, 2018		Building □aterials	S18-Oc21565					X				
51	ASB□FC4	Oct 16, 2018		Building □aterials	S18-Oc21566					X				
52	TP1□0.15	Oct 15, 2018		Soil	S18-Oc21567				X					
53	TP2□0.15	Oct 15, 2018		Soil	S18-Oc21568				X					
54	TP2□0.5	Oct 15, 2018		Soil	S18-Oc21569				X					

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Melbourne □aboratory - NATA Site □1254 □ 14271									X		X	X	X	X
Sydney □aboratory - NATA Site □18217						X	X	X		X				
Brisbane □aboratory - NATA Site □20794														
Perth □aboratory - NATA Site □23736														
55	TP2□1.7	Oct 15, 2018		Soil	S18-Oc21570				X					
56	TP3□0.15	Oct 15, 2018		Soil	S18-Oc21571				X					
57	TP4□0.15	Oct 15, 2018		Soil	S18-Oc21572	X					X	X	X	
58	TP5□0.5	Oct 15, 2018		Soil	S18-Oc21573				X					
59	TP6□0.5	Oct 15, 2018		Soil	S18-Oc21574				X					
60	TP8□0.15	Oct 15, 2018		Soil	S18-Oc21575				X					
61	TP9□0.5	Oct 15, 2018		Soil	S18-Oc21576				X					
62	TP10□0.15	Oct 15, 2018		Soil	S18-Oc21577				X					
63	TP11□0.15	Oct 15, 2018		Soil	S18-Oc21578				X					
64	TP12□0.15	Oct 15, 2018		Soil	S18-Oc21579				X					
65	TP13□0.5	Oct 15, 2018		Soil	S18-Oc21580				X					
66	TP15□0.5	Oct 15, 2018		Soil	S18-Oc21581				X					

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Pro ect Name: NEPEAN HOSPITAL
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Received: Oct 17, 2018 2 19 P
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Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	CANCELLED	HOLD	HOLD	Eurofins mgt Suite B15	oisture Set	Eurofins mgt Suite B7	BTEXN and olatile TRH
Melbourne aboratory - NATA Site 1254 14271									X		X	X	X	X
Sydney aboratory - NATA Site 18217						X	X	X		X				
Brisbane aboratory - NATA Site 20794														
Perth aboratory - NATA Site 23736														
67	TP17 0.5	Oct 15, 2018		Soil	S18-Oc21582				X					
68	TP19 0.15	Oct 15, 2018		Soil	S18-Oc21583				X					
69	TP20 0.15	Oct 15, 2018		Soil	S18-Oc21584				X					
70	DUP 02	Oct 16, 2018		Soil	S18-Oc21585				X					
71	TP14 0.5	Oct 15, 2018		Soil	S18-Oc21726				X					
Test Counts						20	3	1	21	21	20	42	44	2

Internal □uality Control Revie□ and □lossary

□eneral

1. QC data may be available on re□uest.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an □as received□basis.
4. This report replaces any interim results previously issued.

Holding Times

Please refer to □Sample Preservation and Container □uide□for holding times (QS3001).

For samples received on the last day of holding time, notification of testing re□uirements 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 re□uired timeframe, and regardless of any other integrity issues, suitably □ualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory□s control.

□nits

□ □/□: weight for weight basis	grams per kilogram
Filter loading□	fibres/100 graticule areas
Reported Concentration□	fibres/mL
Flowrate□	L/min

Terms

Dry	Sample is dried by heating prior to analysis
□OR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEP□. □overnment of □estern Australia, □uidelines for the Assessment, Remediation and □anagement of Asbestos-Contaminated Sites in □estern Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) □easure, 2013 (as amended)
ACM	Asbestos Containing □aterials. Asbestos contained within a non-asbestos matri□, typically presented in bonded and/or sound condition. For the purposes of the NEP□, AC□ is generally restricted to those materials that do not pass a 7mm □7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm □7mm sieve. Considered under the NEP□ as e□uivalent to □non-bonded / friable□
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEP□, FA is generally restricted to those materials that do not pass a 7mm □7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEP□, this includes both AF and FA. It is outside of the laboratory□s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matri□

Comments

This report has been revised (□2) to amend the sampling dates.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	□es
Sample correctly preserved	□es
Appropriate sample containers have been used	□es
Sample containers for volatile analysis received with minimal headspace	□es
Samples received within HoldingTime	□es
Some samples have been subcontracted	No

□ualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Authorised by:

Sayeed Abu Senior Analyst-Asbestos (NS□)

□lenn □ackson
National Operations Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Re□uested

* Indicates NATA accreditation does not cover the performance of this service

□easurement uncertainty of test data is available on re□uest or please click here.

Eurofins □mgt shall not be liable for loss, cost, damages or e□penses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins □mgt be liable for conse□uential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced e□cept in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

Company	EP Risk Management Pty Ltd
Address	109/263 Alfred Street, North Sydney NSW 2063
Contact Name	Patrick Pragasam / Mathew Burcher
Phone No	0405 364 639
Special Direction	COC for samples submitted Wed 17/10/2018
Purchase Order	
Quote ID No	

Project No	EP0991
Project Name	MPE
Project sport form	EP0991 Esdat
Relinquished by	Patrick Pragasam
Email for Results	patrick.pragasam@eprisk.com.au / mathew.burcher@eprisk.com.au

Analysis (Note: Please indicate as requested, Please specify "Total" or "Leachable")

Containers: 1L Plastic; 250mL Plastic; 125mL Plastic; 250mL Amber Glass; 40mL Vial; 125mL Amber Glass; Other

Turn Around Requirements: ☐ Overnight (5am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☐ 5 Day ☐ Other

No	Client Sample ID	Date	Matrix	Suite B7	HCID	Asbestos ID	Suite B1	Sample Comments / Hazard Warning	DG
1	TP1_0.15	15/10/18	SOIL		X				
2	TP1_0.5	15/10/18	SOIL	X		X			
3	TP1_1.4	15/10/18	SOIL	X					
4	TP2_0.15	15/10/18	SOIL		X				
5	TP2_0.5	15/10/18	SOIL		X				
6	TP2_1.0	15/10/18	SOIL	X		X			
7	TP2_1.7	15/10/18	SOIL		X				
8	TP2_2.0	15/10/18	SOIL	X					
9	TP3_0.15	15/10/18	SOIL		X				
10	TP3_0.5	15/10/18	SOIL	X		X			
11	TP3_1.4	15/10/18	SOIL	X					
12	TP4_0.15	15/10/18	SOIL		X				
13	TP4_0.5	15/10/18	SOIL	X		X			
14	TP4_1.3	15/10/18	SOIL	X					
15	TP5_0.15	15/10/18	SOIL	X		X			
16	TP5_0.5	15/10/18	SOIL		X				
17	TP5_1.5	15/10/18	SOIL	X					
18	TP6_0.15	15/10/18	SOIL	X		X			
19	TP6_0.5	15/10/18	SOIL		X				
20	TP6_1.5	15/10/18	SOIL	X					
21	TP7_0.15	15/10/18	SOIL	X		X			
22	TP7_1.2	15/10/18	SOIL	X					
24	TP8_0.15	15/10/18	SOIL		X				
25	TP8_0.5	15/10/18	SOIL	X		X			
26	TP8_1.5	15/10/18	SOIL	X					
27	TP9_0.15	15/10/18	SOIL	X		X			
28	TP9_0.5	15/10/18	SOIL		X				
29	TP9_1.6	15/10/18	SOIL	X					
30	TP10_0.15	15/10/18	SOIL		X				
31	TP10_0.5	15/10/18	SOIL	X		X			
32	TP10_1.5	15/10/18	SOIL	X					
33	TP11_0.15	15/10/18	SOIL		X				
34	TP11_0.5	15/10/18	SOIL	X		X			
35	TP11_1.5	15/10/18	SOIL	X					
36	TP12_0.15	15/10/18	SOIL		X				
37	TP12_0.5	15/10/18	SOIL	X		X			
38	TP12_1.5	15/10/18	SOIL	X					
39	TP13_0.15	15/10/18	SOIL	X		X			
40	TP13_0.5	15/10/18	SOIL		X				
41	TP13_1.5	15/10/18	SOIL	X					
42	TP14_0.15	15/10/18	SOIL	X		X			
44	TP14_1.5	15/10/18	SOIL	X					
45	TP15_0.15	15/10/18	SOIL	X		X			
46	TP15_0.5	15/10/18	SOIL		X				
47	TP15_1.5	15/10/18	SOIL	X					

RCVD: RTIMBA
17/10 2:19PM #623095

| | | |

Enviro Sample NSW

From: Patrick Pragasam <Patrick.Pragasam@eprisk.com.au>
Sent: Thursday, 18 October 2018 8:51 PM
To: Enviro Sample NSW
Subject: RE: Eurofins | mgt Sample Receipt Advice - Report 623095 : Site MPE (EP0991)

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Ruvimbo, sorry for the late reply.

Could you please run sample TP4_0.15 instead.

Kind regards,

Patrick Pragasam
Environmental Consultant
EP Risk Management Pty Ltd

t: 02 9922 5021
m: 0405 384 639
e: Patrick.Pragasam@eprisk.com.au
w: *www.eprisk.com.au*

Offices at:

Melbourne	Sydney (Head Office)	Newcastle
Unit 22/1 Ricketts Road	109/283 Alfred Street,	3/19 Bolton Street,
Mount Waverley, Vic, 3149	North Sydney, NSW, 2060	Newcastle, NSW, 2300
Ph: 03 8540 7300	Ph: 02 9922 5021	Ph: 02 4048 2845

From: EnviroSampleNSW@eurofins.com <EnviroSampleNSW@eurofins.com>
Sent: Thursday, 18 October 2018 2:14 PM
To: Patrick Pragasam <Patrick.Pragasam@eprisk.com.au>
Cc: Mathew Burcher <mathew.burcher@eprisk.com.au>
Subject: Eurofins | mgt Sample Receipt Advice - Report 623095 : Site MPE (EP0991)

Dear Valued Client,
Sample TP4_0.5 not received, analysis cancelled. Extra sample received labeled as TP14_0.5 placed on hold.
Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1830850**	Page	: 1 of 6
Client	: **EP Risk Management**	Laboratory	: Environmental Division Sydney
Contact	: MATHEW BURCHER	Contact	: Sepan Mahamad
Address	: 109/283 Alfred St NORTH SYDNEY NSW 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8324 7508	Telephone	: +61 2 8784 8555
Project	: EP0991	Date Samples Received	: 17-Oct-2018 15:00
Order number	: ----	Date Analysis Commenced	: 19-Oct-2018
C-O-C number	: ----	Issue Date	: 24-Oct-2018 16:27
Sampler	: PATRICK PRAGASAM		
Site	: ----		
Quote number	: SYBQ/401/18		
No. of samples received	: 3		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TRIP01	TRIP03	----	----	----
			Client sampling date / time	15-Oct-2018 00:00	16-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1830850-001	ES1830850-002	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**15.0**	**18.9**	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	**16**	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**14**	**12**	----	----	----
Copper	7440-50-8	5	mg/kg	**28**	**45**	----	----	----
Lead	7439-92-1	5	mg/kg	**10**	**17**	----	----	----
Nickel	7440-02-0	2	mg/kg	**8**	**17**	----	----	----
Zinc	7440-66-6	5	mg/kg	**40**	**70**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TRIP01	TRIP03	----	----	----
			Client sampling date / time	15-Oct-2018 00:00	16-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1830850-001	ES1830850-002	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	99.5	94.7	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	96.8	94.2	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	69.2	63.5	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	99.2	98.6	----	----	----
Anthracene-d10	1719-06-8	0.5	%	95.8	95.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	102	101	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	97.2	93.5	----	----	----
Toluene-D8	2037-26-5	0.2	%	97.8	104	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TRIP01	TRIP03	----	----	----
			Client sampling date / time	15-Oct-2018 00:00	16-Oct-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1830850-001	ES1830850-002	--------	--------	--------
				Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	97.1	98.8	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1830850**	Page	: 1 of 7
Client	: **EP Risk Management**	Laboratory	: Environmental Division Sydney
Contact	: MATHEW BURCHER	Contact	: Sepan Mahamad
Address	: 109/283 Alfred St NORTH SYDNEY NSW 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8324 7508	Telephone	: +61 2 8784 8555
Project	: EP0991	Date Samples Received	: 17-Oct-2018
Order number	: ----	Date Analysis Commenced	: 19-Oct-2018
C-O-C number	: ----	Issue Date	: 24-Oct-2018
Sampler	: PATRICK PRAGASAM		
Site	: ----		
Quote number	: SYBQ/401/18		
No. of samples received	: 3		
No. of samples analysed	: 2		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1990678)									
ES1830762-073	Anonymous	EA055: Moisture Content	----	0.1	%	18.4	17.3	6.19	0% - 50%
ES1830850-002	TRIP03	EA055: Moisture Content	----	0.1	%	18.9	16.5	13.4	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1995629)									
ES1830762-050	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	22	35	43.0	No Limit
ES1830762-075	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	18	11	47.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	30	21	33.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	10	13.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	119	100	17.6	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1995630)									
ES1830762-050	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1830762-075	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1990151)									
ES1830850-001	TRIP01	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1990151) - continued									
ES1830850-001	TRIP01	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1830861-005	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1990152)									
ES1830850-001	TRIP01	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1990152) - continued									
ES1830850-001	TRIP01	EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1830861-005	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1990612)									
ES1830846-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1830858-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1990152)									
ES1830850-001	TRIP01	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1830861-005	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1990612)									
ES1830846-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1830858-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1990612)									
ES1830846-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1830858-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1995629)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	94.6	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.3	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	96.0	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	106	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	100.0	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	107	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1995630)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	78.3	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1990151)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	96.9	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	98.5	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.6	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	99.5	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	99.2	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	96.0	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.4	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	90.3	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.7	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.9	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	98.6	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	94.1	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.6	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	91.1	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	93.2	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	89.5	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1990152)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	94.5	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	97.3	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	96.8	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1990612)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	104	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1990152)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1990152) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	104	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	101	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	102	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1990612)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68	128
EP080: BTEXN (QCLot: 1990612)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	104	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	99.9	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	103	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	103	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	106	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.2	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 1995629)							
ES1830762-050	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	105	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	104	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	103	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	105	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	104	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1995630)							
ES1830762-050	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	91.0	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1990151)							
ES1830850-001	TRIP01	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	93.4	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	97.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1990152)							
ES1830850-001	TRIP01	EP071: C10 - C14 Fraction	----	523 mg/kg	90.0	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	116	53	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1990152) - continued							
ES1830850-001	TRIP01	EP071: C29 - C36 Fraction	----	1714 mg/kg	88.3	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1990612)							
ES1830846-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	101	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1990152)							
ES1830850-001	TRIP01	EP071: >C10 - C16 Fraction	----	860 mg/kg	95.5	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	127	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	101	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1990612)							
ES1830846-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	103	70	130
EP080: BTEXN (QCLot: 1990612)							
ES1830846-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	94.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	93.6	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	99.5	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	97.8	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	100	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.1	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1830850**	Page	: 1 of 5
Client	: **EP Risk Management**	Laboratory	: Environmental Division Sydney
Contact	: MATHEW BURCHER	Telephone	: +61 2 8784 8555
Project	: EP0991	Date Samples Received	: 17-Oct-2018
Site	: ----	Issue Date	: 24-Oct-2018
Sampler	: PATRICK PRAGASAM	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) TRIP01	**15-Oct-2018**	**----**	----	----	**19-Oct-2018**	29-Oct-2018	✓
Soil Glass Jar - Unpreserved (EA055) TRIP03	**16-Oct-2018**	**----**	----	----	**19-Oct-2018**	30-Oct-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) TRIP01	**15-Oct-2018**	**23-Oct-2018**	13-Apr-2019	✓	**23-Oct-2018**	13-Apr-2019	✓
Soil Glass Jar - Unpreserved (EG005T) TRIP03	**16-Oct-2018**	**23-Oct-2018**	14-Apr-2019	✓	**23-Oct-2018**	14-Apr-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) TRIP01	**15-Oct-2018**	**23-Oct-2018**	12-Nov-2018	✓	**23-Oct-2018**	12-Nov-2018	✓
Soil Glass Jar - Unpreserved (EG035T) TRIP03	**16-Oct-2018**	**23-Oct-2018**	13-Nov-2018	✓	**23-Oct-2018**	13-Nov-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**19-Oct-2018**	29-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP071) TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP080) TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**19-Oct-2018**	30-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP071) TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**19-Oct-2018**	29-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**19-Oct-2018**	30-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**23-Oct-2018**	28-Nov-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
TRIP01	**15-Oct-2018**	**19-Oct-2018**	29-Oct-2018	✓	**19-Oct-2018**	29-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
TRIP03	**16-Oct-2018**	**19-Oct-2018**	30-Oct-2018	✓	**19-Oct-2018**	30-Oct-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4958 9133 E: samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8456 0500 E: adelaide@alsenviro.com

CLIENT:	EP Risk Management Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	X Standard TAT (List due date): 23.10.18 ☐ Non Standard or urgent TAT (List due date):
OFFICE:	109 / 283 Alfred St N, North Sydney, NSW		
PROJECT:	EP0991	ALS QUOTE NO.:	
ORDER NUMBER:			
PROJECT MANAGER:	Mathew Burcher	CONTACT PH:	
SAMPLER:	Patrick Pragasam	SAMPLER MOBILE: 0405 384 639	
COC emailed to ALS? (YES)		EDD FORMAT (or default):	

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Cooling Method: Ice Gel None
Cooling Agent Present: Yes No
Sample Intact: Yes No
Sample Temp on Receipt: °C
Observations: Yes No

Email Reports to (will default to PM if no other addresses are listed): patrick.pragasam@eprisk.com.au / mathew.burcher@eprisk.com.au

Email Invoice to (will default to PM if no other addresses are listed): patrick.pragasam@eprisk.com.au / mathew.burcher@eprisk.com.au

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
P. Pragasam	[signature]		
DATE/TIME: 16/10/18	DATE/TIME: 17/10/18 15:00	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	S-26 Suite	HOLD						
1	TRIP01	15.10.18	Soil	Glass Jar	1	X							
2	TRIP03	16.10.18	Soil	Glass Jar	1	X							
3	TRIP02	15.10.18	Soil	Glass Jar	1		X						
				TOTAL									

Environmental Division Sydney
Work Order Reference
ES1830850

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Specialion bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

Appendix F.

McKenzie Group Pty Ltd – Site and Building Accessibility Report – dated 05th December 2018

Accessibility Design Review Report

Nepean Private Hospital Expansion Stage 1
1-9 Barber Avenue, Kingswood NSW

Prepared by: Senan Mescall
Prepared for: JohnStaff
Job No: 77354
Date: 5th December 2018
Revision: 1
Phase: Town Planning Submission

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Date	Rev No	No. of Pages	Issue or Description of Amendment	Checked By	Approved By	Date Approved
16/11/18	-	21	DA Submission Issue	SM	AC	20/11/18
05/12/18	1	21	Updated Drawing Review for DA Submission Issue	SM	AC	05/12/18

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Executive Summary

The following report is a review of the Town Planning Submission stage documentation and provides a summary of the compliance strategy of the proposed works highlighting the key principles of accessibility as well as the technical requirements of a building to ensure the public, staff and visitors, have equitable and dignified use.

The report is prepared in relation to the proposed expansion Stage 1 of the existing Nepean Private Hospital.

Compliance Summary

As members of the Access Consultants Association of Australia (ACAA), we have reviewed the Town Planning documents prepared by SKAr (refer appendix A) for compliance with the current building assessment provisions, including (but not limited to) the following:

Disability Discrimination Act (DDA) 1992.

Building Code of Australia 2016 (Amendment 1) and referenced Australian Standards; and

The Disability Access to Premises (Buildings) Standard 2010

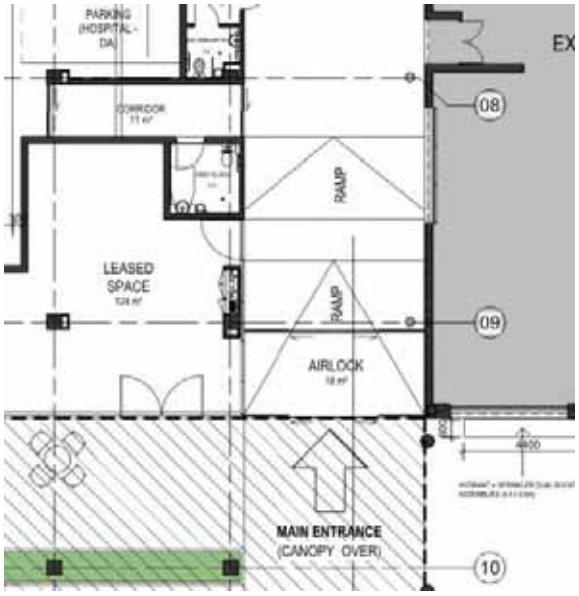
Subject to addressing the actions identified, McKenzie Group Consulting confirm that the project documentation provides appropriate accessibility capable of complying with the BCA & Disability (Access to Premises – Buildings) Standards 2010 and the spirit and intent of the DDA.

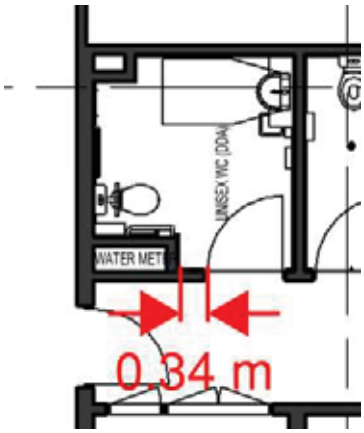
In this regard the following areas in particular require further review as the project develops:

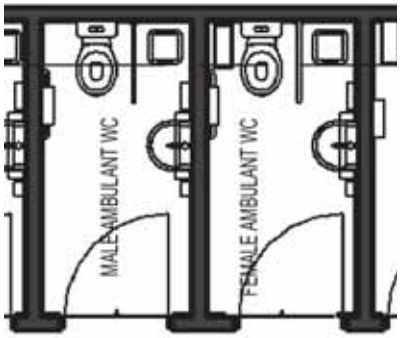
Item	Element	Item for Review	Action Required
BCA Compliance - Mandatory			
1.	Performance Based Solution Items	Please advise if there are any proposed performance based solutions with regard to accessibility matters.	From initial review only a single deviation from the current BCA or Access to Premises Standards that could be addressed through a performance solution. i. Provision of a 1:23 walkway leading from Barber Avenue up to the main entrance foyer, with no landing provision at the airlock doors. It is anticipated that the airlock doors will be automated, negating the requirement for a landing and thus resulting in a technical non-compliance only. Further review will be undertaken as the design develops.
2.	General Access & Exemptions	Access is required to and within all areas of the building normally used by occupants. Initial review of the town planning drawings would indicate equitable access provisions are achieved to all levels from a base build perspective.	By virtue of the use of the building please confirm spaces that may be sought to be considered exempt under D3.4 of the BCA. Further review will be undertaken as the design develops.

3.	Pedestrian Access at Boundary	A continuous accessible path is to be provided to the new building: i. From the main points of a pedestrian entry at the allotment boundary, and ii. From another accessible building connected by a pedestrian link; iii. From any required accessible carparking space on the allotment.	Clarification is required as to the proposed extent of footpath works along Barber Avenue in order to maintain continued access into the main entrance as clouded in the below plan extract. Current detail noted to comprise step access provision only from the Parker Street Direction Clarification is required in regard to the anticipated grade of grade of new car parking provision to the rear of the exist hospital. Additional consideration should be had to relocate the accessible parking provision directly adjacent to the entrance.
4.	External Walkways	External pathways are to meet the provisions of AS1428.1-2009: Walkway Gradients / Length / widths Provisions of Landings Crossfalls Abutment of surfaces	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
5.	Drop- Off Zones & Pedestrian Crossings	Pedestrian crossings and or drop-off areas should be designed in accordance with AS1428.1 & AS1428.4.1: Connection to pedestrian network;	As detailed under Section 4, further clarification is required in regard to the drop off zone design in order to determine compliance with the requirements of AS 1428.1 2009.

		Linemarking; Kerb ramps; TGSIs;	
6.	Car parking	Provide accessible car parking spaces in accordance with D3.5 of the BCA. Number of accessible spaces to conform to Table D3.5. Design of space to AS/NZS 2890.6. Annotate bollard in shared zone.	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
7.	Doors	All doors within accessible spaces shall comply with AS1428.1-2009: clear width (850mm) of active leaf; compliant door circulations spaces; operational force (<20N); 30% Luminance contrast of opening.	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
8.	Lifts	Any lift travelling >12m requires a minimum compartment size of 1400mm wide x 2000mm depth (requires 2000mm depth where stretcher use indicated and travelling >12m). Any lift travelling <12m requires a minimum compartment size of 1100mm wide x 1400mm depth. Fitout must comply with AS1735.12.	From initial review compartment sizes indicate compliance can be achieved. Further review will be undertaken as the design develops.
9.	Stairs - General	All general circulation stairs are to be designed to comply with Clause 11 of AS1428.1-2009: clear width not less than 1m; handrails both sides; Handrail extensions; Provision of TGSIs and nosings.	Design to demonstrate compliance with AS1428.1-2009. Setback stairs from the boundary and internally from the transverse path of travel as currently detailed. Protect handrail extensions from protruding into transverse path of travel as currently detailed.
10.	Fire Isolated Stairs	Any FIS stairs used for general circulation are to be designed to	Confirm any FIS to be used for general circulation. Allow for offset steps to be detailed between flights in

		comply with AS1428.1-2009	the fire isolated stairs in order to negate the provision of non-compliant vertical sections to the handrail being required at landings.
11.	Ramps - General	All general circulation ramps are to be designed to comply with Clause 10 of AS1428.1-2009: clear width not less than 1m, gradient / length provision of landings handrails both sides, Handrail extensions Provision of TGSIs	Design to demonstrate compliance with AS1428.1-2009. As noted under Section 1, it is noted that two ramps are proposed leading from the main entrance up to the foyer, through the two airlock doors with no landing provision. It is considered this technical non-compliance can be addressed through performance solution, recognising that the anticipated design encompasses auto doors that would negate the requirement for a landing provision. As design develops further consideration will be required in regard to the implication of door operation out of hours. It is additionally considered prudent to rationalise the grade of the ramps to create a walkway provision instead. 
12.	TGSIs	TGSIs are required to be installed in accordance with D3.8 and AS1428.4.1, to the top and bottom of every: General circulation stairs General circulation ramps Escalators Pedestrian crossings / shared roadways / car park entrances Vertical hazards (<2m) Kerb ramps	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.

13.	Internal Walkways	Internal walkways / corridors are to be design to comply with D3.3 and AS1428.1 2009: minimum width of 1m A width of 1240mm allows for side approach door circulation (door swinging away from user); Corridor terminations within 2m of end (1540mm min width); Turning spaces every 20m (1540mm min width); Passing bays every 20m where no direct line of sight (1800mm min width); Circulation spaces at directional turns.	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
14.	Unisex Accessible Sanitary facilities (UASF)	UASF to be provided on each level where one or more toilets are provided, Required at 50% of the banks of the toilets on each level Provide an equal distribution of LH & RH toilets / showers – stagger throughout levels Design to comply with Clause 15 AS1428.1-2009: o Combined WC and basin minimum of 1900x2630mm o Combined WC and shower facility: 2300x2630mm o Refer to Figure 50 of AS1428.1 for required compartment size and layout of fixtures and fittings.	From initial review of the UASF's the following non-compliances are noted: i. To all levels, the adjacent water meter riser shaft results in non-compliant door circulation being achieved. Allow to relocate shaft to provide compliant door circulation;  ii. All UASF's are detailed as comprising right hand transfer provision. Allow to redesign the layout to allow one to be a left hand transfer provision. Further review will be undertaken as the design develops.
15.	Ambulant Cubicles	Male and Female Ambulant Cubicles are required on each level where gender facilities are	Annotate male and female ambulant cubicles as required.

		provided in addition to UASF Design to comply with Clause 16 of AS1428.1-2009	It is noted that the current design provides two cubicles with what is detailed to be a fold down rail to the left hand side of the pan. The design results in a technical non-compliance in compartment size. Further assessment is required to ascertain the ability to address the design through a performance based solution. 
16.	Braille & Tactile Signage	BCA D3.6: Mandatory Braille and tactile signage must be provided	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
17.	Hearing Augmentation	Hearing augmentation will be required where inbuilt amplification is provided or an information counter is screened.	From initial review current design is anticipated to be able to attain compliance. Further review will be undertaken as the design develops.
18.	Emergency Evacuation	Consideration early in the design is required regarding the emergency evacuation strategy of guest, residents, visitors and staff who cannot use stairs, i.e.: Stair refuges to be afforded; Fire-isolated lift lobbies and use of fire rated /goods lift.	Note for consideration.
19.	Wayfinding Strategy	Develop a wayfinding strategy for early in design – beneficial for all users.	Note for consideration as part of future fit-out.
20.	Furniture & Fixtures	Future fitout/design of fixtures, furniture and fittings should consider accessible requirements in accordance with AS1428.2: Reception / counters Common kitchens / teapoints Internal / external seating design	Note for consideration as part of future fit-out.

1. Introduction

JohnStaff have engaged the services of McKenzie Group Consulting as Accessibility and DDA consultants to conduct a review of the project documentation to ensure that functional and compliant accessibility has been applied to the design. As members of the Access Consultants Association of Australia (ACAA), McKenzie Group Consulting use expert accessibility knowledge to ensure the project complies with the spirit and intent of the Disability Discrimination Act (DDA), within the project scope.

1.1. Purpose of Report

This report forms part of the Town Planning review. The report is prepared in relation to a proposed works at Barber Avenue, Kingswood NSW 2747

This report provides a compliance overview of the project with respect to achieving compliance with the Building Code of Australia (BCA) and the Disability Discrimination Act (and Disability Standards) (DDA), within the project scope. Detailed Design documentation and compliance assessment will be undertaken as the design develops.

The assessment is provided in two parts, the first relates to areas of compliance that are ***mandatory*** under the BCA with the second part relating to ***Advisory recommendations/enhancements*** that could be adopted to improve building functionality, accessibility and the safety of occupants. Refer to Section 6 of this report.

1.2. Report Objective

A key objective of the access requirements of the Premises Standards and NCC is to provide, as far as is reasonable, all people with safe, equitable and dignified access to a building and the services and facilities within that building.

1.3. Project Description

The proposed works comprises the formation of a new four storey expansion to the existing Nepean Private Hospital, noted as Stage 1 of a masterplan expansion scheme.

The site location has its main frontage to Barber Avenue, adjacent to the existing hospital but with a standalone entrance and independent circulation / sanitary facility provision. Vehicular access to the car parking is currently achieved from existing car park access further along Barber Avenue, with a secondary means of access proposed from Main Road.

The project comprises of the following:

- Ground Floor Level (Level 00) – Consult car park provision; retail tenancy shell space; main entrance foyer;
- Level 01 – IVF Tenancy space; Consulting rooms shell space; Hospital operating and treatment space as well as associated staff base;
- Level 02 – Consulting rooms shell space;
- Level 03 – Consulting rooms shell space;

2. Legislative Requirements

The legislative requirements for this project comprises both Federal and State legislation.

Federal

The Disability Discrimination Act (DDA - 1992) is Federal Government legislation enacted in 1993 that seeks to ensure all new building infrastructure, refurbishments, services and transport projects provide functional and equitable accessibility. The DDA is a complaints based legislation, which is administered by the Australian Human Rights Commission (AHRC). For any built environment the key requirement of the DDA is to ensure functionality, equality and dignity of people with disabilities, their companions, family and care givers.

The DDA utilises statutory instruments known as Disability Standards to provide detailed requirements. The Disability Standards are: Disability (Access to Premises – Buildings) Standards 2010, Disability Standards for Education 2005 and the Disability Standards for Accessible Public Transport 2002. These Disability Standards draw extensively on technical provisions in the AS 1428 series details technical requirements related to design for access and mobility.

State

The Building Code of Australia has adopted key accessibility and DDA legislation into the 2011 and subsequent BCA. In particular adherence to the Access to Premises Standard (2010) (APS); AS1428.1 2009; AS1428.4.1 2009 and AS2890.6 2009 has become mandatory. This means that compliance with the relevant sections of the BCA, ensures compliance with the relevant 'Premises' component of the DDA.
However, compliance with the BCA alone does not necessarily mean compliance with the Disability Discrimination Act if the elements of equality, dignity and functionality remain compromised within an environment. The building owner/occupier should therefore ensure that their policies, practices and procedures promote equality in all employment, education and services provided, within their built environment.

2.1. Referenced Legislation and Standards

The review of the project has been undertaken against the following legislation;

Disability Discrimination Act (DDA) 1992.

Disability (Access to Premises – Buildings) Standards 2010 (DAPS 2010).

Disability Standards for Education 2005

Disability Standards for Accessible Public Transport 2002

Building Code of Australia (BCA) and BCA referenced standards including:

- AS1428.1 2009 Part 1: General Requirements for access – new building work.
- AS1428.2 1992 Part 2: Enhanced and additional requirements – Buildings and facilities.
- AS1428.4.1 2009 Part 4.1: Means to assist the orientation of people with vision impairment – TGSI.
- AS2890.6 2009 Part 6: Off-street parking for people with disabilities.
- AS1735.12 1999 Lift facilities for people with disabilities.

2.2. Council Development Approval / Development Control Plans (DCPs)

A Development Permit will be required from the Local Authority for the development. A copy of the Development Permit conditions and approved drawings will be required to complete Construction Documentation/ Building Approval milestones for that component of works.

The proposed development must not be inconsistent with the endorsed drawings and all relevant conditions will need to be satisfied and accurately reflect the construction issue drawings.

3. Exemptions and Performance Based Solutions

3.1. Exemptions

Based on the use of some areas within a building, it is reasonable to not provide access to some spaces where it is deemed inappropriate because of the required duties to be carried out in the space or if the area poses as a health or safety risk for people with a disability. These areas include:

An area where access would be inappropriate because of the particular purpose for which the area is used.

An area that would pose a health or safety risk for people with a disability.

Any path of travel providing access only to an area exempted by (a) or (b).

Plant including plenums, service routes, equipment rooms for computers or data (including persons with ambulant aids).

Pathways used to gain access exempted plant spaces only.

Cleaner's rooms used only by cleaners.

Rooms used only by central staff associated with linen, waste and supply.

Production parts of the kitchen and servery rooms used only by central kitchen staff.

Store rooms where the door is left open while accessing them- only to have required door clearance on the outside.

4. Compliance Assessment – BCA (Mandatory)

The following compliance assessment is divided into two (2) sections: BCA Mandatory Compliance and DDA (Advisory).

BCA Mandatory Compliance refers to meeting the minimum mandatory compliance of the BCA and the Premises Standard component of the DDA.

DDA Advisory Compliance refers to advisory information for improving the accessibility design outside BCA parameters and the Access to Premises Standards. These DDA recommendations relate to best practice design for accessible environments. These recommendations propose to enhance the design, in conjunction with the owner/occupier's policies, practices and procedures maximizing DDA compliance and meeting the spirit and intent of the DDA.

4.1. General Building Access Requirements (BCA D3.1)

Buildings and parts of buildings must be accessible in accordance with Table 3.1 of the BCA.

A continuous accessible path of travel is to be provided as follows:

Class 5 – Office/Administration;
Class 6 – Retail;
Class 9a – Health care building;
To and within all areas normally used by the occupants

Class 7a – Car parking
To and within any level containing accessible car parking spaces

4.2. External approaches, walkways and kerbs (D3.1, D3.2, D3.3, D3.8 & AS1428.1)

A continuous accessible path is to be provided to the new building:

- From the main points of a pedestrian entry at the allotment boundary, and
- From another accessible building connected by a pedestrian link
- From any required accessible carparking space on the allotment

The crossfall and gradient of the external pathways will not exceed 1:40 and will be constructed of a firm, hardstand surface in accordance with AS1428.1-2009 requirements.

External public paths will achieve a minimum width of 1800mm or where a reduced width is provided (minimum 1200mm) passing bays will be provided every 20m in high trafficable areas to allow two wheelchairs to pass.

Warning Tactile Ground Surface Indicators (TGSIs) and/or provision of bollards shall be provided either side of the car park entry points on Grace Avenue and Forest Way to adequately identify the roadway hazard for pedestrians using the footpath. In addition, TGSIs will be provided at kerb ramps and at pedestrian crossings in accordance with AS1428.4.1 and Council requirements.

Consideration to the provision of a textural and luminance contrast on the lateral border of all pathways and key transition areas will be given in the next phase of design. The provision of tactual clues via either a building/fence line, kerb line etc. along the edging of each walkway will be considered to enable a person with a vision impairment to detect key transition areas. In addition, obstacles abutting the public paths of travel i.e. seating, bins, bike racks or the like, shall possess a minimum of 30% luminance contrast to make these fixtures readily identifiable to a user on the path.

The external paths of travel to the site comprise of the following:

Level access is adequately provided via graded pedestrian walkways providing connecting links from:

- the boundary to the main entrances at ground level, and
- from any accessible car parking space.

4.3. Accessible car parking

Accessible carparking spaces are to be provided as prescribed in Table D3.5 of the BCA which requires 1 space per 50.

The redevelopment includes a total of 176 carparking spaces. Of these spaces a minimum of 4 accessible car parking spaces shall be designated which meets with the minimum requirements of the BCA.

Consideration shall be given to the provision/allocation of accessible carparking space dedicated for staff use and/or developing a building management plan to ensure dedicated accessible carparking spaces are available for staff use as the need arises.

The proposed accessible spaces shall be located near the main entrances of the buildings and lift lobbies and shall be designed in accordance with AS2890.6-2009. The accessible car spaces and shared zones will have a minimum size of 2400m x 5400mm and a bollard located centrally within the shared zone approximately 800mm from roadway edge.

A continuous accessible path of travel shall be provided from the accessible spaces to the main entrances of the buildings and/or lift lobbies. The spaces shall be directly connected to a dedicated pedestrian walkway, inclusive of linemarking, which minimises travel via the roadway. In addition, the vertical clearance above the accessible spaces and shared zone will achieve a minimum of 2500mm.

Wheelstops shall be provided to any carparking space abutting a pedestrian walkway to minimise vehicle overhang and obstruction.

4.4. Pedestrian Crossings, Transport / Pedestrian Drop-off Zones

A dedicated taxi / pedestrian set-down area is provided on Barber Avenue, positioned near the main entrance.

A continuous accessible path of travel will be achieved linking the set-down areas and the main entrances via provision of kerb ramps and TGSIs in accordance with the requirements of AS1428.1 and AS1428.4.1.

Tactile Ground Surface Indicators (TGSIs)

Provide warning TGSIs and kerb ramps at Pedestrian Crossings in accordance with AS1428.4.1 and as follows:

- Where pedestrian walkways and vehicular routes are at grade, hazard warning required.
- Warning TGSIs are to be provided, located 300mm from the hazard of the roadway
- Where bollards are provided, ensure they are positioned either side of the dedicated walkway, maintain a clear width of 1200mm
- Position hazard TGSIs in accordance with AS1428.4.1

4.5. Building/Tenancy Entrances

The main entrance to the Stage 1 Expansion comprise of automated sliding doors which provide compliant access for people with a disability. The unobstructed clear width of these doors will achieve the required minimum of 850mm (920mm leaf required).

Any door control or “after-hours” swipe card access will be located on a level landing in an accessible location in accordance with Clause 13.5 of AS1428.1.

Limited detail is provided at this stage of design regarding the entrances to specialty food and retail tenancies. To comply, the tenancies will require compliant access to and within via a single leaf door as a minimum achieving the required unobstructed clear width of 850mm. Access to the tenancies will be further reviewed as the design progresses.

A level transition shall be provided to all entrances and external areas which will be achieved via provision of threshold ramps where required in accordance with AS1428.1-2009 requirements.

All doors shall have light operational forces (less than 20 N) and shall have lever action door hardware selected and installed in accordance with AS1428.1 requirements.

Any shopfront glazing or glazed doors shall be clearly marked with a contrasting band not less than 75mm wide for full width of the door with lowest edge at 900-1000mm FFL.

4.6. Internal Paths of Travel

An accessible path of travel is required to all accessible areas within accessible buildings, normally used by occupants. Internal walkways should be designed with the following features:

- Minimum width of 1000mm to be provided
- Suitable circulation spaces to enable turning into adjacent doorways / around fixtures and furniture (1240mm min width),
- Adequate passing spaces (1800mm width), and
- Turning spaces along corridor or terminations (1540mm min width).

A continuous path of travel will be provided to and within the centre comprising of a minimum width of 1800mm in high trafficable areas. Where a reduced width is provided (minimum 1200mm) passing bays will be provided every 20m in high trafficable areas to allow two wheelchairs to pass.

Finishes will be selected to ensure wall, floor and door finishes comply with AS1428.1-2009 requirements including changes in surfaces having abutment vertical rises of 3mm or less; or 5mm or less where rounded or bevelled edges and a minimum 30 % luminance contrast provided to all doorways in accordance with the requirements of Clause 13.1 of AS1428.1.

Any shopfront glazing or glazed doors shall be clearly marked with a contrasting band not less than 75mm wide for full width of the door with lowest edge at 900-1000mm FFL.

Internal accessible paths of travel will be further reviewed as the design progresses.

4.7. General Circulation Stairs/Ramps

An accessible path of travel is required to all accessible areas within accessible buildings, normally used by occupants.

All public circulations stairs and ramps (excluding fire-isolated stairs/ramps) must be provided with handrails/kerb rails to both sides, handrail extensions & turndowns, nosing strips (Stairs) and Tactile Ground Surface Indicators (TGSIs).

Circulation stairs and ramps will be required to be set-back from transverse paths of travel so that handrail extensions do not protrude into corridor paths of travel.

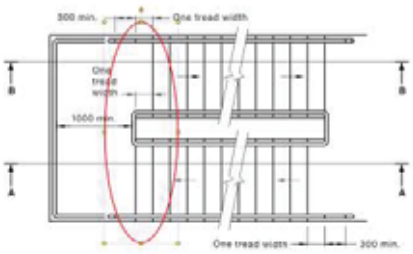
Offsetting the stair at the mid landing will allow a continuous single handrail which will not require vertical sections.

General circulation stairs/ramps will be further reviewed as the design progresses.

Fire-isolated Stairs (FIS)

All FIS stairs shall be designed and constructed in accordance with Clause 11(f), (g) and Clause 12.

Offsetting the stair at the mid landing will allow a continuous single handrail which will not require vertical sections.



4.8. Lifts / Escalators (D3.1, E3.6, AS1428.1 & AS1735.12)

Passenger lifts are provided, co-located with general circulation stairs.

Any lift travelling greater than 12m requires a minimum compartment size of 1400mm wide x 2000mm depth (requires 2000mm depth where stretcher use indicated and travelling >12m).

Any lift travelling less than 12m requires a minimum compartment size of 1100mm wide x 1400mm depth.

The fitout of the lifts shall comply with AS1735.12, providing a minimum doorway clearance of 900mm.

Fitout out of lifts to include: Handrail 600mm (min) length; at height between 850-950mm, Tactile and Braille symbols on control buttons and panels, Automatic auditory information detailing lift stops. Control buttons set back from corner.

4.9. Internal Doorways

An accessible path of travel is required to all accessible areas within accessible buildings normally used by occupants. Doors on accessible paths of travel require the following (in accordance with AS1428.1-2009):

- Unobstructed clear opening widths to be a minimum of 850mm (- a 920mm door leaf is required).
- Door control or “after-hours” swipe card access to be located on a level landing, in an accessible location, in accordance with Clause 13.5 of AS1428.1-2009.
- Door circulation clearances;
- All doors shall have light operational forces (less than 20 N) and shall have lever action door hardware selected and installed in accordance with AS1428.1 requirements.

Any shopfront glazing or glazed doors shall be clearly marked with a contrasting band not less than 75mm wide for full width of the door with lowest edge at 900-1000mm FFL.

Doors on accessible paths of travel will be further reviewed as the design progresses.

4.10. Sanitary Facilities

Amenities are proposed in the central core on Levels 1-3.

The new amenities blocks are noted to comprise unisex toilet cubicles and unisex accessible sanitary facilities.

The male and female shall include an ambulant cubicle within each bank. The layout and fitout of the compartments shall be designed to comply with Clause 16 of AS1428.1-2009.

The internal dimensions and layout of the unisex accessible sanitary facility will be need to be altered to ensure required circulations spaces to the pan, shower and basin as specified in Clause 15 of AS1428.1-2009. The minimum compartment size shall achieve 2630mm x 2300mm.

An equal distribution of right handed and left handed unisex accessible sanitary facilities will need to be provided within the centre to cater for all users and preferences.

4.11. Signage

A review of the door signage is to take place when the signage package becomes available.

Accessible way finding should highlight the pathway from entrance to lifts or amenities and to the key components of the facility.

Where a pedestrian entrance is not accessible, directional signage incorporating the international symbol of access, in accordance with AS 1428.1 must be provided to direct a person to the location of the nearest accessible pedestrian entrance. This type of signage is required at the stair access points directing the visitor to the location of the ramp/walkway entrance.

Signage will be provided at exit doors on each level and at common use accessible toilets in accordance with AS 1428.1.

Signage to accessible sanitary facilities requires identification with the international symbol of access, raised tactile and Braille signage and letters RH or LH to indicate side of transfer to the WC pan.

4.12. Hearing Augmentation

Hearing Augmentation Listening Systems are an essential assistive device for people who use hearing aids and are mandatory at screened reception counters, lifts and areas with public announcement systems.

As the design progresses requirements for hearing augmentation will be clarified and confirmed.

5. Compliance Assessment - DDA (Advisory)

The following recommendations for design enhancement are provided for areas in which potential compliance risks have been identified with respect to the DDA or where improved outcomes with respect to accessibility, functionality and safely have been identified.

5.1. Emergency Evacuation

The emergency evacuation strategy for the facility should address the operational solution of evacuating people with disabilities and should detail the following:

- Stair refuges, or
- Fire-isolated lift lobbies and use of lifts in emergency

Fire evacuation plans should include provision of management plans to assist individuals with disabilities or access requirements. Individuals with accessible requirements should be provided with a “fire buddy” to escort them to pre-determined areas of refuge.

The current best practice is detailed in the 'AS 3745 - 2010 Planning for emergencies in facilities' and should be used as a guideline to assist in the implementation of the Emergency Plan.

Further clarification will be required as the design develops to understand the existing emergency evacuation plan for the hospital and implementation within the new extension.

5.2. Acoustic / Lighting Design

Good acoustics creates a good environment for all users.

- Acoustic design to seek to minimise reverberation noise.

Lighting design to confirm that minimum illumination levels achieved.

- Minimum levels of maintenance illumination to be provided; e.g. – entrances 150 lux, toilet 200 lux, counters 250 lux.

5.3. Rest Seating / Rest Point / Seating

Rest seating should be provided adjacent entrances, at taxi drop off points and along external pedestrian paths of travel.

- Seating should be provided along external paths, located a minimum of every 60m, to provide a resting point for users
- A range of seating to accommodate all users should be provided i.e. some with backrest, some with armrests and at various seat heights etc.
- Seating should be designed in accordance with AS1428.2 and set back 500mm from the walkway.

5.4. Reception Counters, Other Furniture & Fixtures

The layout of Reception / Furniture Fit-out and joinery - in accessible / common use areas, is recommended to be designed with consideration to accessibility requirements.

Future design should consider accessible requirements teapoint, parent rooms, vending machines, drinking fountains, telephones, controls etc.

- Future fitout/design of fixtures, furniture and fittings should consider accessible requirements in accordance with AS1428.2
- Items shall be a minimum of 500mm away from the path of travel.

Further review is to be undertaken in the next phase of design.

5.5. Changing Facilities

Parent Rooms / Baby Change

Where parent rooms are provided, the toilet within the parent's room is recommended to be configured as a unisex accessible sanitary facility. Alternatively, the provision of a baby change table within the accessible sanitary facility in the same location will be detailed.

Ensure parent rooms consider accessible requirements:

Future fitout/design of fixtures, furniture and fittings should consider accessible requirements in accordance with AS1428.1-2009 and AS1428.2-1992:

- Provide a baby change table in accordance with Clause 15.28.8.2 of AS1428.1-2009
- Provide a floor circulation space to accommodate stretcher access adjacent to any bed or plinth within the room. 2000mm x 1450mm recommended
- 1450mm circulation space in front of the bench,
- Bench to be a max height of 900mm FFL.
- Sink to be 150mm maximum depth and taps/spout to be 300mm from front edge (can be via side location or extended handles).

Changing Places Facility

The provision of a Changing Places Facility shall be considered in the next phase of design.

Changing Places Facilities are designed to meet the changing needs for people with severe and profound disabilities. The facilities are to incorporate full size change table and hoist within the accessible amenities.

Each Changing Places toilet should include:

- A height adjustable adult sized changing bench
- A constant charging ceiling track hoist system
- A centrally located peninsula toilet
- Circulation spaces as defined in the design guideline
- Automatic door with a clear opening of 950mm
- Additional fixtures and fittings as defined in the design guideline.

Note: Changing places toilets are to be provided in addition to and separate from standard unisex accessible facilities.

Refer to specifications outlined in the *Changing Places Information Guide & Technical Standard* issued June 2017

6. Compliance Summary

As members of the Access Consultants Association of Australia (ACAA), we have reviewed the Town Planning design documents prepared by SKAr (refer appendix A) for compliance with the current building assessment provisions, including (but not limited to) the following:

Disability Discrimination Act (DDA) 1992.

Building Code of Australia 2016 (Amendment 1) and referenced Australian Standards; and

The Disability Access to Premises (Buildings) Standard 2010

This report provides a compliance overview of the project with respect to achieving compliance with the above legislation. In the next phase of the design process it is anticipated that as additional detail is provided - particularly floor plans, dimensions and features- the accessibility of this development can be further detailed.

Subject to addressing the actions identified, McKenzie Group Consulting confirm that the project documentation provides appropriate accessibility capable of complying with the BCA & Disability (Access to Premises – Buildings) Standards 2010 and the spirit and intent of the DDA.

Assessed by:	**Approved by:**
Senan Mescall Senior Associate / Access Consultant **McKenzie Group Consulting (Qld) Pty Ltd** **ACN 140 159 486**	**Angela Chambers** Access Consultant Accredited Member - ACAA Membership No 406 **McKenzie Group Consulting (Qld) Pty Ltd** **ACN 140 159 486**

7. Appendix A – Document List

SKAr project number: 18-008

Drawing No.	Rev	Title
DA2001	R1	Level 00 Ground Floor Plan
DA2002	R1	Level 01
DA2003	R1	Level 02
DA2004	R1	Level 03
DA2005	R1	Level 04 (Future Development)

Appendix G.

Metro Building Consultancy – Building Code Compliance Report – dated 04th December 2018

Metro Building Consultancy Pty Ltd

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18234-Nph Bca Report 041218

NEPEAN PRIVATE HOSPITAL EXPANSION STAGE 1

PRELIMINARY BUILDING CODE OF AUSTRALIA 2016 REPORT

NOVEMBER 2018

Report prepared for	Healthscope Operations Ltd
	Attention: Tom Bitmead / Nikki Duff
Report prepared by	Metro Building Consultancy Suite 211, 25 Berry Street, North Sydney NSW 2060
	Consultant: Seb Howe
Report reference	18325-R06
Job number	18325
Date	4th December 2018

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1.0	Executive Summary
2.0	Introduction
3.0	Methodology
4.0	BCA classification and building characteristics.
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7.0	Services and Equipment
8.0	Health and Amenity
9.0	Energy Efficiency
10.0	Conclusion
Appendix A	Drawings Reviewed
Appendix B	BCA Type A Construction Requirements

DOCUMENT ACCEPTANCE

Company	Name	Signed	Date
Metro Building Consultancy	Seb Howe		13/11/18

REVISION HISTORY

Description	Prepared by	Revision No.	Date
DA Lodgement	Seb Howe	06	04/12/18
DA Lodgement	Seb Howe	05	27/11/18
DA Lodgement	Seb Howe	04	13/11/18
DA Lodgement	Seb Howe	03	31/10/18
DA Lodgement	Seb Howe	02	25/10/18
DA Lodgement	Seb Howe	01	12/10/18

1.0 Executive Summary

The version of the BCA applicable to the development is the version that is in place at the time of the application to the Certifying authority for the Construction Certificate.

The assessment of the design documentation has revealed that the following areas are required to be assessed against the relevant performance requirements of the BCA. The submission for Construction Certificate will need to include verification from a suitably accredited fire engineer: -

DTS Clause	Description of Non-Compliance	Performance Requirement
C2.7	**Separation by Fire Walls (Roofs)** The 120/120/120 fire wall that is required to separate the new building and the existing building will terminate at the roof of the lower existing building. As a Deemed-to-Satisfy solution the fire wall can terminate at the lower roof provided the covering is non-combustible and the existing building is fitted with a sprinkler system. The existing building is not fitted with a sprinkler system so a Fire Engineer is required to address Performance Requirement CP2 through provision of a Performance Solution.	CP2
C2.7	**Separation by Fire Walls (Internal Openings)** There are window openings in the firewall at ground and Level 1 separating the existing building and the new building. Window openings in a firewall with drencher protection is not a Deemed-to-Satisfy solution and is required to be addressed as a Performance Solution from a Fire Engineer addressing Performance Requirement CP2.	CP2
C3.2	**Protection of Openings in External Walls** Window openings along the eastern elevation of the new building are between 3-6m of the existing building and are therefore exposed to the existing building. The existing building is also exposed to the new building. Any openings within 6m (in the existing and new buildings) are therefore required to be protected in accordance BCA C3.4. Alternatively, a Fire Engineer can provide a Performance Solution by addressing Performance Requirements CP2.	CP2
C3.3	**Separation of External Walls in Different Fire Compartments** Where the foyer areas adjoin the existing building on each level, the foyer walls and the walls of the existing building (within 3m) are required to have an FRL of 60/60/60 or protected in accordance with BCA C3.4This is because the walls are at 90 degrees to the neighbouring fire compartment. Alternatively, a Performance Solution could be developed by a C10 Accredited Fire Engineer to address Performance Requirement CP1 and CP2.	CP1 & CP2
D1.4, D1.5	**Extended Travel Distance** The travel distance to and distance between exits have been assessed to exceed the deemed-to-satisfy provisions of the BCA in the following areas: <u>Class 5 areas</u> • Travel distance to a point of choice is 30m in lieu of 20m on Levels 1-3. • Travel distance to an exit of 45m in lieu of 40m	DP4 & EP2.2

	Class 9a area – Endoscopy Level 1 • Travel distance to an exit of 42m in lieu of 30m • Travel distance between exits of 60m in lieu of 45m Extended distances are required to be addressed as part of the fire engineering by a Performance Solution prepared by an accredited fire engineer against the Performance Requirements of the BCA.	
D1.7, E4.4, E4.5	**Extended Discharge Distance** The southern fire isolated stair discharges into the ground floor car park and not directly to open space. The travel distance from the stair to open space is greater than 20m (37m to an exit in lieu of 20m). A Performance Solution should be developed from a Fire Engineer to address the relevant Performance Requirements.	DP4, DP5, EP2.2 & EP4.2
E4.9	**Operating Theatre Occupant Warning** Visual warning devices and signage are proposed in the Level 1 operating theatres in lieu of providing SSISEP. A Performance Solution should be developed from a Fire Engineer to address the relevant Performance Requirements.	EP4.3
E1.3	**Hydrant Booster** The fire hydrant booster will not be protected by a compliant shield wall. The hydrant booster shall be protected by an internal drencher system installed to AS2118.2-2010 and drencher protected glazing. A Performance Solution should be developed from a Fire Engineer to address the relevant Performance Requirement EP1.3.	EP1.3

The fire engineered solution relating to EP2.2 & EP1.3 will need to be approved after consultation with the FRNSW as part of the Construction Certificate process.

The application for Construction Certificate shall be assessed under the relevant provisions of the Environmental Planning & Assessment Act 1979 (As Amended) and the Environmental Planning & Assessment Regulation 2000.

2.0 Introduction

Healthscope Operations Limited have requested Metro Building Consultancy to carry out a Building Code of Australia 2016 (Amendment 1) review of the design drawings for the proposed Nepean Private Hospital Expansion Stage 1, 1-9 Barber Avenue, Kingswood NSW 2747 and to prepare a Building Code of Australia Report commenting upon the compliance of the design. This report has been prepared as part of the Development Application submission.

The information submitted to date has been reviewed for compliance with the Deemed-to-Satisfy provisions of the Building Code of Australia 2016 excluding Section B structure, Part G5 bushfire and Section J energy efficiency. This report is for the exclusive use of Healthscope Operations Limited and cannot be used for any other purpose without the prior permission of Metro Building Consultancy. The report is only valid in its entire form.

3.0 Methodology

The methodology is principally the review of the drawings provided by SKAr as listed in Appendix A.

It has been verified that the proposed expansion will be fire separated from the existing building so that it can be treated as a completely independent building.

4.0 BCA classification and building characteristics

Building Classification:

Level	Use	Classification	Approximate floor area (m^2)	Approximate volume (m^3)
Ground Level	Car parking, leased space	7a & 6	2,497	10,487
Level 1	Endoscopy, IVF, consultation rooms, amenities	Class 5 & 9a	1,941	8,152
Level 2	Consultation rooms, amenities	Class 5	1,738	7,300
Level 3	Consultation rooms, amenities	Class 5	1,741	7,312
Total			**Approx. 6,176**	

*the class 6 element at ground floor level is less than 10% of the storey and is therefore deemed to be class 7a.

Rise in Storeys & Effective Height:

The building has a rise in storeys of 4. The effective height of the building is <25m.

Type of Construction:

The building is a class 5, 9b and 7a building with a rise in storeys of 4 and is required to comply with the BCA Type A requirements. Please refer to Appendix A for Type A construction requirements.

Fire Compartment Size:

The maximum compartment size for a class 5 Type A building is 8000m^2 and 48,000m^3. The proposed fire compartments do not exceed this.

Exposure to fire source features

The external walls of the building are proposed to be located 3m or more from the side and rear boundaries.

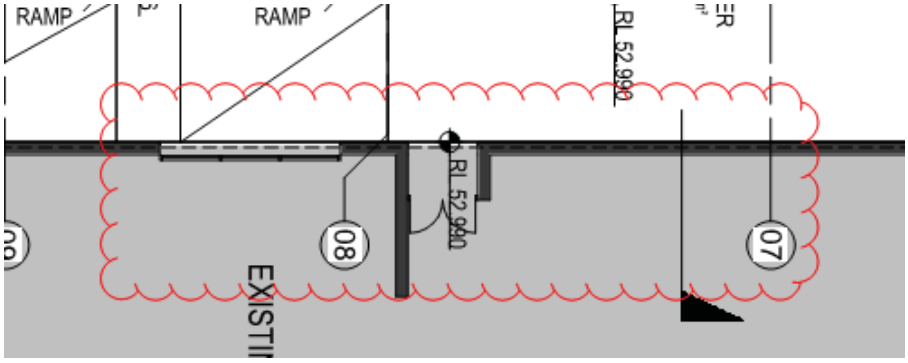
As the building is to be provided with fire separation between the existing building and the new expansion (so that it can be treated as an independent building) the new building is less than 6m (between 3-4m on each floor) from the existing building on the east elevation.

Any loadbearing parts of the external walls, including columns within the external wall (existing and proposed building) are required to achieve an FRL of 120/60/30. Confirmation is required from the structural engineer that these FRL's can be achieved. The loadbearing elements of the walls of the existing building are also required to meet this FRL.

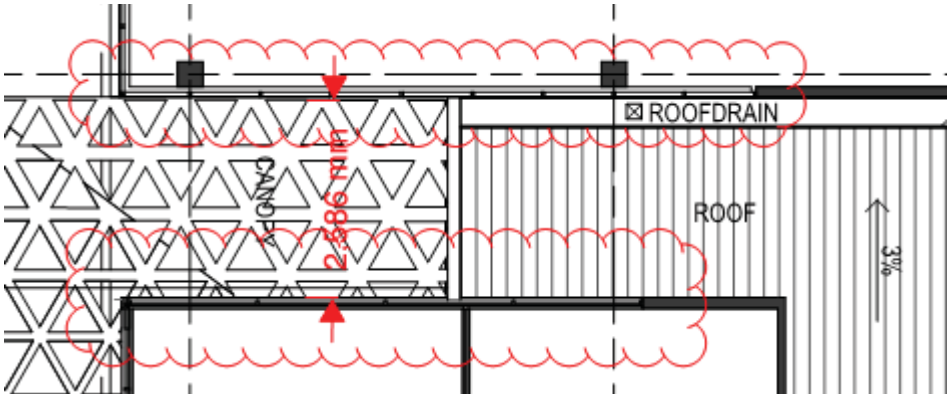
Protection of Openings in External Walls

Any openings in the eastern external elevation that are exposed to the existing building must be protected in accordance with BCA C3.4. Openings in the existing building that are exposed to the new building are also required to be protected in accordance with BCA C3.4. Alternatively, a Performance Solution could be offered by a C10 Accredited Fire Engineer addressing Performance Requirement CP1 and CP2.

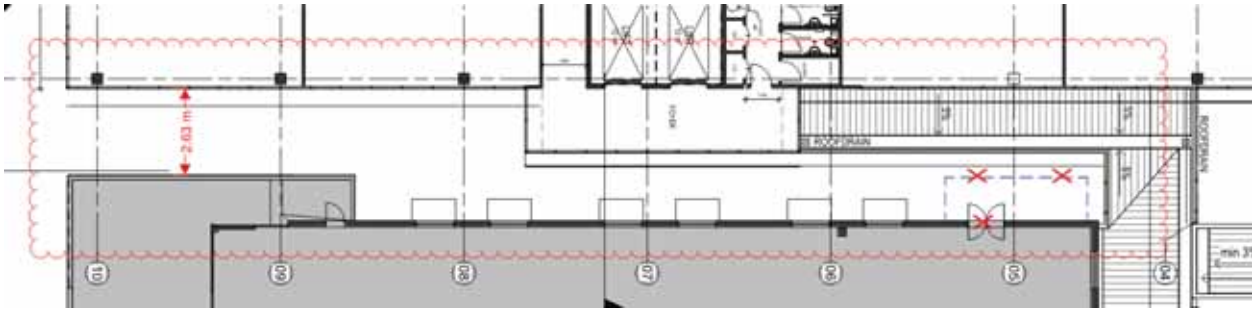
Ground Floor



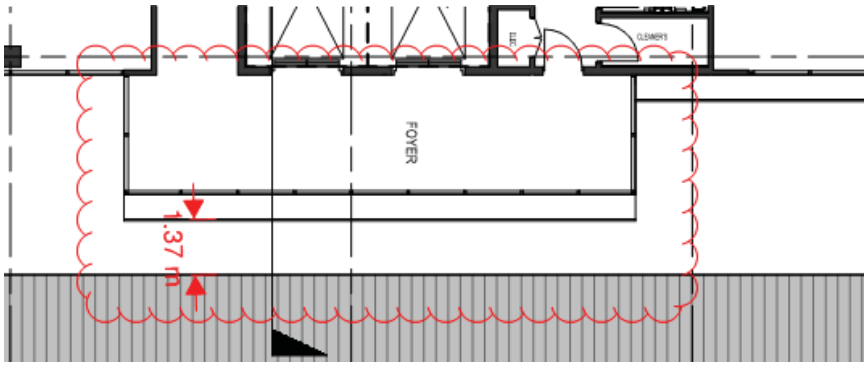
Level 1



Level 2



Level 3



Separation of External Walls in Different Fire Compartments

Where the foyer areas adjoin the existing building on each level, the foyer walls and the walls of the existing building (within 3m) are required to have an FRL of 60/60/60 or protected in accordance with BCA C3.4. This is because the walls are at 90 degrees to the neighbouring fire compartment. Alternatively, a Performance Solution could be developed by a C10 Accredited Fire Engineer to address Performance Requirement CP1 and CP2.

Fire hazard properties:

The floor, wall and ceiling linings are to comply with the requirements of Clause C1.10 and Specification C1.10 of the Building Code of Australia 2016 (Amendment 1).

The laboratory test results for the various floor, wall and ceiling linings should be obtained and assessed for compliance prior to completion of the design.

Firewall

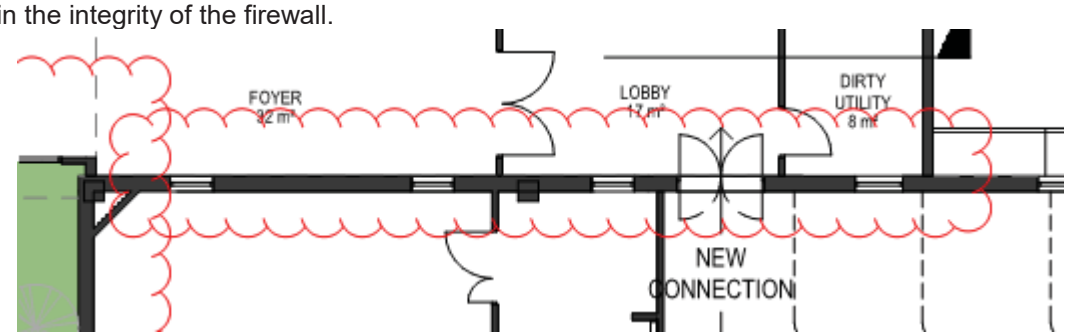
The new building is required to be separated from existing building with firewalls that have an FRL of 120/120/120. Any door openings in the firewall are required to have an FRL of -/120/30. Please provide drawings showing lines of compartmentation/firewalls. Confirmation is required from the structural engineer regarding the FRL of the external walls of the existing building

As the firewall will only extend to the underside of the lower roof (of the existing building), the firewall does not comply with BCA C2.7(b)(iii)(C) as the existing building is not fitted with a sprinkler system. A Fire Engineer will be required to address Performance Requirements CP2 and CP4 through a Performance Solution.

The firewall between the existing building and the new wall contains window openings. The window openings are not permitted to reduce the FRL of the firewall which is required to be 120/120/120. The windows could be replaced with fire rated glazing but this will be very expensive. A Fire Engineer will be

required to address this as a Performance Requirement CP1 through provision of a Performance Solution.

The opening between the new and existing buildings at Level 1 must have a fire door or fire shutter to maintain the integrity of the firewall.



Smoke Wall

The wall separating the Endoscopy area and the rest of the floor on Level 1 is required to be constructed as a smoke wall in accordance with Specification C2.5 of the BCA.

Ductwork penetrations through the wall are required to be fitted with smoke dampers.

Smoke doors should be installed in the corridor to maintain the line of the smoke wall and subdivide the endoscopy treatment area to less than 1000m^2.

Smoke Proof Walls

The required smoke walls must comply with the following requirements:

- be non-combustible and extend to the underside of the floor above.
- not incorporate any glazed areas unless the glass is safety glass as defined in AS 1288.
- only have doorways which are fitted with smoke doors complying with Specification C3.4.
- have all openings around penetrations and the junctions of the smoke-proof wall and the remainder of the building stopped with non-combustible material to prevent the free passage of smoke.
- incorporate smoke dampers where air-handling ducts penetrate the wall unless the duct forms part of a smoke hazard management system required to continue air movement through the duct during a fire.

Smoke Doors

If the building is not provided with a zone smoke control system the smoke doors must provide a smoke reservoir by not extending within 400mm of the underside of:

- a roof covering; or
- the floor above; or
- an imperforate false ceiling that will prevent the free passage of smoke.

Smoke doors must be constructed so that smoke will not pass from one side of the doorway to the other and, if they are glazed, there is minimal danger of a person being injured by accidentally walking into them

Smoke doors are required to swing in the direction of egress or in both directions.

Smoke doors are required to have leaves that are capable of resisting smoke at 200°C for 30 minutes and are required to be fitted with smoke seals.

Smoke doors are required to be normally in the closed position or they are required to close automatically with the automatic closing operation initiated by smoke detectors, installed in accordance with the relevant

provisions of AS 1670.1 2015 located on each side of the doorway not more than 1.5m horizontal distance from the doorway and in the event of power failure to the door, the leaves fail-safe in the closed position.

Smoke doors are required to return to the fully closed position after each manual opening and any glazing incorporated in the door is required to comply with AS 1288.

Fire protection for a support of another part

Where a part of a building *required* to have an FRL depends upon direct vertical or lateral support from another part to maintain its FRL, that supporting part must have an FRL not less than that *required* by the BCA.

Attachments to fire rated building elements

Ancillary elements can be fixed, installed or attached to internal parts or external face of the external walls provided they are listed in BCA C1.14.

If an ancillary element is proposed to be used that is not listed in BCA C1.14 then the Verification method CV3 or a Fire Engineered Performance Solution is required to be used to demonstrate compliance with the Performance Requirements.

Enclosure of shafts

Shafts required to have an FRL must be enclosed at the top and bottom by construction having an FRL not less than that required for the walls of a non-loadbearing shaft in the same building, except that these provisions need not apply to:

- the top of a shaft extending beyond the roof covering, other than one enclosing a fire-isolated stairway or ramp; or
- the bottom of a shaft if it is non-combustible and laid directly on the ground

This applies to fire stair shafts, lift shaft and any services shafts eg mechanical services shafts, they must be enclosed at the top with the same FRL as the walls of the shaft.

External walls

The external walls of the building are required to comply with BCA Clause C1.9(a) and are required to be non-combustible ie be constructed of a material that is not deemed combustible by AS1530.1 1994 or have a CodeMark Certificate of Conformity confirming compliance to BCA CP2 and CP4.

Spandrels

It is understood that sprinkler protection will be offered throughout the building in accordance with BCA Spec E1.5 and therefore, spandrel protection is not required.

Roof

Provided that the building has a sprinkler system installed throughout in accordance with Spec E1.5 and the roof is non-combustible then the roof is not required to have an FRL.

Floors

Floors in the building are required to achieve an FRL of 120/120/120.

Lift shaft

The lift shaft in the building must be separated from the remainder of the building by enclosure in a shaft with an FRL of at least 2 hours.

Car Park

The ground floor car park may be considered to be an 'open-deck' car park. The Mechanical Engineer is required to make calculations and provide a Design Statement determining if the car park is sufficiently cross ventilated in accordance with the BCA.

If the car park is 'open-deck' then mechanical ventilation is not required in accordance with AS1668.2.

Boilers

Any rooms that contain proposed boilers must be fire separated from the remainder of the building by construction that achieves an FRL of at least 2 hours.

> **Boiler** means a vessel or an arrangement of vessels and interconnecting parts, wherein steam or other vapour is generated, or water or other liquid is heated at a pressure above that of the atmosphere, by the application of fire, the products of combustion, electrical power, or similar high temperature means, and—
> (a) includes superheaters, reheaters, economisers, *boiler* piping, supports, mountings, valves, gauges, fittings, controls, the *boiler* settings and directly associated equipment; but
> (b) excludes a fully flooded or pressurised system where water or other liquid is heated to a temperature lower than the normal atmospheric boiling temperature of the liquid.

Separation of equipment

If batteries are stored in the building that have a voltage exceeding 24 volts and a capacity exceeding 10 ampere hours (eg UPS) they are required to be separated from any other part of the building by construction having an FRL of not less than 120/120/120.

The main switchboard located within the building which sustains emergency equipment operating in the emergency mode must be separated from any other part of the building by construction having an FRL of not less than 120/120/120. Emergency equipment includes but is not limited to control and indicating equipment i.e. a fire indicator panel.

Fire stair doors

Doorways that open to fire stairs must be protected by –/60/30 fire doors that are self-closing, or automatic-closing.

The automatic-closing operation must be initiated by the activation of a smoke detector located not more than 1.5 m horizontal distance from the approach side of the doorway.

A window in an external wall of a fire stair must be protected if it is within 6m of, and exposed to, a window or other opening in a wall of the same building, other than in the same fire-isolated enclosure.

The protection required to a window in a fire stair that is exposed to another opening in the wall of the building must comply with one of the following requirements:

- internal or external wall-wetting sprinklers as appropriate used with windows that are automatic closing or permanently fixed in the closed position
- –/60/– fire windows that are automatic closing or permanently fixed in the closed position
- –/60/– automatic closing fire shutters.

Further reviews of this requirement will take place as the design is being developed.

Service penetrations in fire-isolated exits

Fire-isolated exits must not be penetrated by any services other than:

- Electrical wiring for a lighting, detection, or pressurisation system serving the exit; or
- Electrical wiring for a security, surveillance or management system serving the exit; or
- Electrical wiring for the monitoring of hydrant or sprinkler isolating valves; or
- □ ater supply pipes for fire services

□penings in fire-isolated lift shafts

The entrance doorway to the lift shafts must be protected by –/60/– fire doors that comply with AS 1□35.11 1□□6 and are set to remain closed except when discharging or receiving passengers, goods or vehicles.

A lift call panel, indicator panel or other panel in the wall of a fire-isolated lift shaft must be backed by construction having an FRL of not less than –/60/60 if it exceeds 35 000 mm2 in area.

□penings for service installations

All services penetrations within fire rated construction are to be treated in accordance with □lause □3.15 of the □uilding □ode of Australia 2016.

5.0 Egress

Principles

The buildings should comply with the following principles:

- The maximum distance of travel to a point from which travel in different directions to two exits is 20m, and the maximum distance to one of those exits must not be more than 40m from the starting point.
- The maximum distance of travel to a point from which travel in different directions to two exits in the class □a area is 12m, and the distance to one of those exits must not be more than 30m from the starting point.
- The distance between alternate exits through the point of choice is not to exceed 60m.
- Exits that are required as alternative means of egress must be distributed as uniformly as practicable within or around the storey served and must be not less than □m apart.
- Exits that are required as alternative means of egress must be located so that alternative paths of travel do not converge such that they become less than 6m apart.
- The unobstructed height throughout an exit must be not less than 2m except for doorways which may be reduced to not less than 1□□0mm.
- All paths of travel are to be a minimum of 1m in clear width.
- The unobstructed width of a doorway must be not less than □50mm, (□50mm for disabled access, see section 5.0 of this report).
- Electricity meters, distribution boards and central telecommunications distribution boards or equipment installed in any corridor, hallway, lobby or the like leading to a required exit must be enclosed in non-combustible construction or a fire protective covering and have doorways or openings suitably sealed against smoke spreading from the enclosure.
- All doors should be free passage from the side that a person is seeking egress.

Comments

Travel distances

□lass 5 areas

- Travel distance to a point of choice is 30m in lieu of 20m on Levels 1-3.
- Travel distance to an exit of 45m in lieu of 40m

□lass □a area – Endoscopy Level 1

- Travel distance to an exit of 42m in lieu of 30m
- Travel distance to an exit of 60m in lieu of 45m

The extended travel distances will be required to be assessed as part of the fire engineering by a Performance Solution prepared against Performance Requirements DP4 □ EP2.2 of the □□A and will be required to be developed in consultation with Fire and Rescue □S□ .

Dimension of exits

All paths of travel are required to have a minimum clear width of 1m. Please ensure that the final design drawings indicate a minimum 1m clear path of travel to all parts of the buildings including between pieces of equipment.

The □□A states that if the storey accommodates more than 200 persons the aggregate unobstructed width, except for doorways, must be not less than:

- 2m plus 500mm for every 60 persons (or part) in excess of 200 persons if egress involves a change in floor level by a stairway; or
- in any other case, 2 m plus 500 mm for every □5 persons (or part) in excess of 200;

Discharge of Exits

The southern fire isolated stair discharges into the ground floor car park and not directly to open space. The travel distance from the stair to open space is greater than 20m (3□m to an exit in lieu of 20m).
A Performance Solution should be developed from a Fire Engineer to address Performance Requirement.

Services □upboards

Electricity meters, distribution boards and central telecommunications distribution boards or equipment installed in any corridor, hallway, lobby or the like leading to a required exit must be enclosed in non-combustible construction or a fire protective covering and have doorways or openings suitably sealed against smoke spreading from the enclosure.

□andrails

□andrails must be provided along at least one side of every passageway or corridor used by patients, and must be fixed not less than 50 mm clear of the wall and where practicable, continuous for their full length.

Stairs

The proposed stairs are required to be provided with handrails and risers and goings that have a constant dimension throughout the flight and with a handrail with a height of □65mm. The handrail must be to at least one side of the fire stair and also be continuous between stair flight and landings with no obstructions that can break the hand-hold.

The treads or nosing strips of any external stairs must have a slip-resistance classification not less than P4 when tested in accordance with AS 45□6 2013.

The treads or nosing strips of any internal stairs must have a slip-resistance classification not less than P3 then tested in accordance with AS 45□6 2013.

The treads or nosing strips of any internal stairs must have a slip-resistance classification not less than P3 then tested in accordance with AS 45□6 2013.
Landings

The landings in both of the stairs serving the class □a element must be sized to accommodate a stretcher. The landings must be 1600mm in width and 2600mm in length.

□alustrade

A balustrade with a minimum height of 1m is required to be provided to all drops with a height greater than 1m.

□alustrading to a height of 1000mm with a maximum opening of 125mm is required to be provided in any direction ad□acent to landings, corridors etc where located ad□acent to a change in level exceeding 1000mm.

Door thresholds

The threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf unless it is provided with a threshold ramp or step ramp in accordance with AS142□.1 200□.

Door hardware

The door hardware to all proposed swing and sliding doors must be readily openable without a key from the side that faces a person seeking egress by:

- a single hand downward action on a single device which is located between □00 mm and 1.1 m from the floor and be such that the hand of a person who cannot grip will not slip from the handle during the operation of the latch and have a clearance between the handle and the back plate or door face at the centre grip section of the handle of not less than 35 mm and not more than 45mm or
- a single hand pushing action on a single device which is located between □00 mm and 1.2 m from the floor.

Fire door signs

Fire doors to fire stairs that are not held open are required to be provided with a sign stating:

“FIRE SAFET□ D□□R
D□ □□T □□STRU□T
D□ □□T □EEP □PE□”

Fire doors to fire stairs that are held open are required to be provided with a sign stating:
“FIRE SAFET□ D□□R—D□ □□T □□STRU□T”

Doors from a fire stairs to the outside are required to be provided with a sign stating:
“FIRE SAFET□ D□□R—D□ □□T □□STRU□T”.

The signs must be in capital letters not less than 20 mm high in a colour contrasting with the background.

□.0 □□□ess□□□□t□

The building is required to be accessible and to comply with the requirements of Part D3 of □uilding □ode of Australia 2016 and the relevant parts of AS142□.1 200□, these include:

- Disabled access is required to be provided from the main points of a pedestrian entry at the allotment boundary to the main entry door.
- Disabled access is required to be provided from the accessible carspaces to the main entry doors.
- All doors should be a minimum of □50mm clear width.
- At least one leaf of all double doors must have a clear width of □50mm.
- All doors should have adequate circulation spaces as per the requirements of figure 31 of AS142□.1 200□.

- □oth sides of all doorways that are required to be accessible are required to have a luminous contrast of at least 30□ to the ad□acent surface as per clause 13.1 of AS142□.1 200□and as stated on the finishes schedule.
- All switches, card readers etc should be placed at a height of between □00-1100mm from floor level and not less than 500mm from any internal corner.
- All floors are required to have a slip resistant surface.
- The accessible carspace is required to be constructed and line marked in accordance with the requirements of AS/□□S 2□□0.6 200□.
- □raille and tactile signage is required to be provided to the accessible, male and female toilets and to the exit doors as per the requirements of □□A □lause D3.6.

Comments

Access to the building

An accessway is required to be provided to the building:

(i) from the main points of a pedestrian entry at the allotment boundary; and
(ii) from another accessible building connected by a pedestrian link; and
(ii) from any required accessible carparking space on the allotment.

The provision of disabled access from the surrounding roads and the accessible carspaces to the buildings are required to comply with the requirements of AS142□.1 200□i.e. a fully compliant walkway and stairs.

Provide further details for review ie grades, edge protection for walkways, handrails, nosing strips and tactiles for stairs etc.

The access to the building is by way of six seperate entrances. Three of those entrances are accessible entrances which means that compliance is achieved. □owever, the non-accessible entrances to the building are greater than 50m from the accessible entrances. A Performance Solution will be required to be developed bn an Access □onsultant.

Slip Resistance

A continuous accessible path of travel and any circulation spaces is required to have a slip-resistant surface including the vinyl, the epoxy resin coating to the concrete floors and the timber deck.

□ote that not all timber decking complies with the slip resistance requirements for commercial application and it should be confirmed that the chosen product has a slip resistance of at least P4 or R11 prior to final selection of the product.

□ alkways

□ alkways are required to be provided with landings at all changes in direction and at every doorway, gate, or similar opening.

Landings are required to have a minimum length of 1200mm where there is no change in direction and a minimum length of 1500mm where there is a change of direction not exceeding □0□ In addition, the internal corner shall be truncated for a minimum of 500mm in both directions for landings provided where there is a change in direction.

Landings provided for walkways with a change in direction of 1□0□are required to have a minimum length of 1540mm.

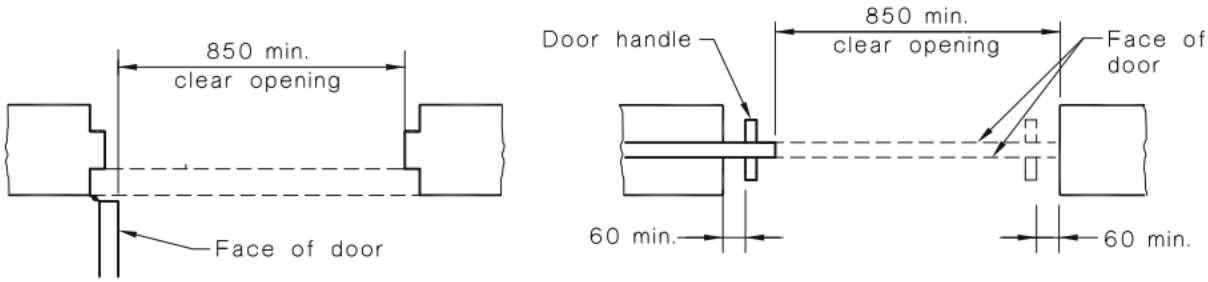
Doorways

Doorways are required to be provided with a minimum luminance contrast of 30□ between:

- door leaf and door □amb;
- door leaf and ad□acent wall;
- architrave and wall;
- door leaf and architrave; or
- door □amb and ad□acent wall.

The minimum width of the area of luminance is required to be 50mm. □ote that frameless glazed doors will not comply with this requirement and should not be specified.

Doorways are required to be provided with a minimum clear opening width of □50mm and where sliding doors are provided the clear opening width must allow for a minimum 60mm gap between the door handle and the door frame when the door is open and closed.



(a) Swing door (b) Cavity sliding door

At least one leaf of all double doors is required to have a minimum clear width of □50mm.

□irculation spaces are required to be provided at every doorway, gate, or similar entry way, on a continuous accessible path of travel. The circulation space required will depend on the type of door ie swing or sliding and the angle of approach ie side or front on etc.

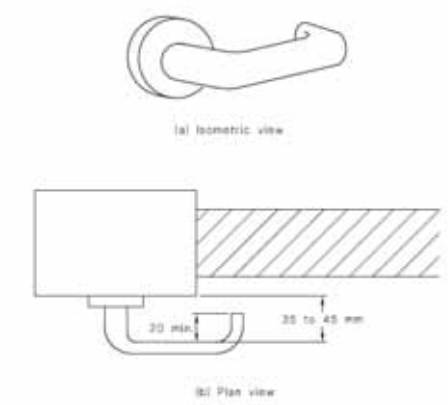
It was noted on the drawings that some doors on accessible paths of travel do not have compliant circulation space in accordance with AS142□.1-200□. Internal doors that do not comply will need to be amended to comply.

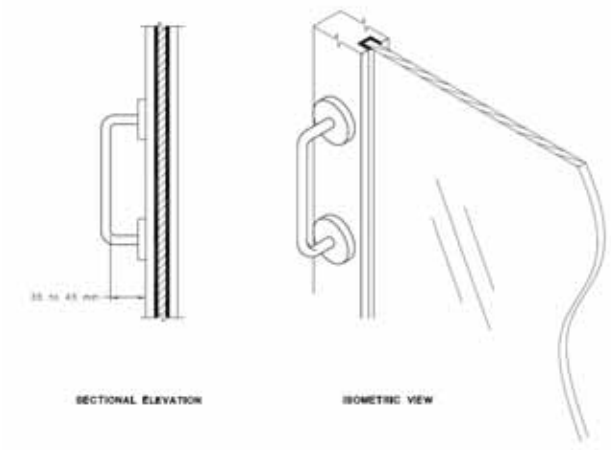
□ here possible the required circulation space should be provided with a construction tolerance and the required dimension of any latch side wall should be stated on the drawings.
Door handles and related hardware are required to be of the type that allows the door to be unlocked and opened with one hand. The handle is required to be such that the hand of a person who cannot grip will not slip from the handle during the operation of the latch. 'D' type handles shall be provided on sliding doors. The clearance between the handle and the back plate or door face at the centre grip section of the handle is required to be not less than 35mm and not more than 45mm.

□ here snibs are installed, they shall have a lever handle of a minimum length of 45mm from the centre of the spindle.

For doors other than fire doors where a door closer is fitted, the force required at the door handle to operate the door shall not exceed 20□.

□ here an outward opening door is not self-closing, a horizontal handrail or pull bar is required to be fixed on the closing face of a side-hung door.





Switches □ □ontrols

All switches and controls on an accessible path of travel, other than general purpose outlets, are required to be located not less than □00 mm nor more than 1100mm above the plane of the finished floor and not less than 500mm from internal corners.

This applies to light switches, intercoms, card readers etc and this requirement should be stated on the architectural and services drawings.

Exemptions

The following areas are not required to be accessible:

- An area where access would be inappropriate because of the particular purpose for which the area is used.
- An area that would pose a health or safety risk for people with a disability.
- Any path of travel providing access only to an area exempted by (a) or (b).

This generally applies to plant rooms and other areas used occasionally by maintenance personnel..

Accessible carparking

□ne accessible carspace is required to be provided for every 100 carparking spaces or part thereof provided on site. A reasonable approach is to provide one accessible car parking space ad□acent to each main entry of each warehouse.

The accessible carspace is required to comply with the requirements of AS/□□S 2□□0.6 200□ which includes the following requirements:

- A minimum width of 2.4m and minimum length of 5.4m to the carspace;
- A minimum width of 2.4m and minimum length of 5.4m to the shared space;
- The dedicated space and the shared area are required to be at the same level;
- A bollard is required to be provided in the shared space □50-□50mm from the front of the shared space and along the centre line;
- The accessible carspace and related walking and wheelchair unloading areas are required to comprise a firm plane surface with a fall not exceeding 1:40 in any direction (1:33 if the surface is a bituminous seal and the parking space is out of doors). These areas shall have a slip-resistant surface.
- □ here kerb ramps are to be provided they are required to be placed at a front or rear corner of the parking space;

- Each dedicated space shall be identified by means of a white symbol of access between □00mm and 1000mm high placed on a blue rectangle with no side more than 1200mm, placed as a pavement marking in the centre of the space between 500mm and 600mm from its entry point.
- Dedicated parking spaces shall be outlined with unbroken non slip yellow lines □0-100mm wide on all sides excepting any side delineated by a kerb, barrier or wall;
- Shared areas shall be outlined with unbroken non slip yellow lines □0-100 mm wide on all sides excepting any side delineated by a kerb, barrier or wall, and marked with diagonal stripes 150-200 mm wide with spaces 200-300mm between stripes. The stripes shall be at an angle of 45 □10 degrees to the side of the space.

The accessible car parking bays on ground floor should be designated on the drawings and shown with bollards and shared zone. The gradient of the car parking bays should be not greater than 1:40.

Signage

□raille and tactile signage complying with the requirements of □□A Specification D3.6 is required to be provided to:

- The doorway to the male and female toilets;
- The doors to the male and female ambulant cubicles;
- The doorway to the accessible toilets;

The sign to the doorway of the accessible toilet must identify if the facility is suitable for left or right handed use.

□raille and tactile signage complying with the requirements of □□A Specification D3.6 is required to be provided to the exit doors. The sign is required to state 'Exit Ground Level'.

□raille and tactile signage complying with the requirements of □□A Specification D3.6 is required to be provided to a room provided with hearing augmentation.

The signage is required to include the international symbol for deafness and must identify:

- the type of hearing augmentation; and
- the area covered within the room; and
- if receivers are being used and where the receivers can be obtained.

□ here a pedestrian entrance is not accessible directional signage incorporating the international symbol of access must be provided to direct a person to the location of the nearest accessible pedestrian entrance.

□ here a bank of toilets is not provided with an accessible toilet, directional signage incorporating the international symbol of access must be provided to direct a person to the location of the nearest accessible toilet.

□lazing on an accessways

All frameless or fully glazed doors, sidelights, including any glazing capable of being mistaken for a doorway or opening, shall be clearly marked for their full width with a solid and non-transparent contrasting line.

The contrasting line shall be not less than □5 mm wide and shall extend across the full width of the glazing panel. The lower edge of the contrasting line shall be located between □00 mm and 1000 mm above the plane of the finished floor level.

Any contrasting line on the glazing shall provide a minimum of 30□ luminance contrast when viewed against the floor surface or surfaces within 2 m of the glazing on the opposite side.

□.0 □er□□□es □n□ E□□□□ment

Fire □ydrants

Fire hydrant coverage is required to be provided as the building has a floor area exceeding 500m^2. This system is required to comply with the requirements of □□A □lause E1.3 and AS241□.1 2005.

A booster assembly will be required to be provided as part of the fire hydrant system requirements. The booster is required to be located within the site of the main entry of the building. If remote from the building at the main vehicle entry or within sight of the main entry of the building within 20m of a hardstand area.

The fire hydrant at ground floor must be provided inside the southern fire isolated stair.

The fire hydrant booster will not be provided with a compliant heat shield in accordance with AS241□.1-2005. The hydrant booster shall be protected by an internal drencher system installed to AS211□.2-2010 and drencher protected glazing.
A Performance Solution should be developed from a Fire Engineer to address the relevant Performance Requirement EP1.3.

Fire □ose-Reels

Fire hose reel coverage is required to be provided as the building has a floor area exceeding 500m^2. This system is required to comply with the requirements of □□A □lause E1.4 and AS 2441-2005.

Fire hose reels are to be located within 4m of exits and provide coverage within the building based on a 36m hose length.

The fire hose reel at ground floor must be within 4m of the fire isolated stair exit.

Fire Sprinklers

It is noted that an Automatic Fire Suppression System is to be provided to Specification E1.5 and AS211□.1-1□□□. An occupant warning system that is triggered upon activation of the sprinkler system is required to be provided in accordance with □□A Specification E1.5.

Please note that the sprinkler standard AS211□.1 will change from 2005 to 201□ on 11th □arch 201□. The Australian Standard that will be applicable is the one which is in force at the time of the application for □onstruction □ertificate. The new provisions of the standard require the sprinkler pump to be situated ad□acent to the fire hydrant booster. If the sprinkler pump is not proposed to be situated ad□acent to the hydrant booster, a Performance Solution will be required to be provided to address Performance Requirement EP1.4.

□one Smoke □ontrol

As sprinkler protection is proposed throughout the building, zone smoke control is not required in the □lass □a Endoscopy □ ard.

Portable Fire Extinguishers

Portable Fire Extinguishers must be provided to the building in accordance with the □uilding □ode of Australia and AS2444 2001.

Emergency lighting and exit signs

The building must be provided with exit signs and emergency lighting in accordance with the □uilding □ode of Australia and AS22□3.1 2005.

Smoke □azard □anagement

Smoke hazard management shall be provided throughout the building by means of the following systems:

- Automatic Smoke Detection and Alarm System in accordance with the requirements of □□A Spec E2.2a and AS 16□0.1-2015.
- Stair pressurisation is required in both fire isolated stairs in accordance with AS166□.1 and Table E2.2a of the □□A.
- Automatic shutdown of any air handling system which does not form part of a zone smoke control system (other than individual room units with a capacity of not more than 1000L/s, systems serving critical treatment areas and miscellaneous exhaust air systems installed in accordance with Sections 5 and 6 of AS166□.1).

Photoelectric type smoke detectors must be installed in the Endoscopy □ ard and in paths of a travel to exits from the ward. □anual call points must be installed in evacuation routes so that no point on a floor is more than 30m from a manual call point.

SSISEP

A sound system and intercom system for emergency purposes must be installed in accordance with □□A E4.□ and AS 16□0.4 throughout all areas of the building.

□ arning signs

The lift call buttons must be provided with warning signage stating D□ □□T USE LIFT IF T□ERE IS A FIRE.

Accessible Lifts

The passenger lifts are required to be accessible lifts complying with □□A □lause E3.6. This includes the requirement that the lift floor has a dimension of not less than 1100 mm wide x 1400 mm deep and that they contain emergency hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received.
An electric passenger lift installation and an electrohydraulic passenger lift installation must comply with □□A Specification E3.1.
hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received.
Emergency Lift

□oth of the lifts shown on the drawings are required to be emergency lifts in accordance with □□A E3.4. The lift must have minimum dimensions as specified in □□A Table E3.4. The lifts must also be connected to a standby power system.

□.0 □e□t□ □n□ □men□t□

Damp □ weatherproofing

The external walls of the proposed building are required to comply with □□A Performance Requirement FP1.4.

□ here a cladding system is proposed, it should have a □ode□ ark □ertificate of □onformity confirming compliance to □□A FP1.4.

Stormwater drainage

The stormwater drainage must comply with AS/□□S 3500.3 2015.

Roof coverings

The metal sheet roofing must comply with AS 1562.1 1□□2.

□ aterproofing of wet areas

□uilding elements in bathroom or shower room, a sink compartment, a laundry or sanitary compartment must—
(i) be □□*er re□i*□□□□or □□*er□roo*□in accordance with □□A Table F1.□; and
(ii) comply with AS 3□40 2010.

□ here a wall hung urinal is installed—
(i) the wall must be surfaced with impervious material extending from the floor to not less than 50 mm above the top of the urinal and not less than 225 mm on each side of the urinal.
(ii) the floor must be surfaced with impervious material and graded to a floor waste

In a room with timber or steel framed walls and containing a urinal—
(i) the wall must be surfaced with an impervious material extending from the floor to not less than 100 mm above the floor surface; and
(ii) the □unction of the floor surface and the wall surface must be impervious.

Damp-proofing

□oisture from the ground must be prevented from reaching—
(i) the lowest floor timbers and the walls above the lowest floor □oists; and
(ii) the walls above the damp-proof course; and
(iii) the underside of a suspended floor constructed of a material other than timber, and the supporting beams or girders.

□ here a damp-proof course is provided, it must consist of—
(i) a material that complies with AS/□□S 2□04 1□□5; or
(ii) impervious sheet material in accordance with AS 3660.1 2000 or 2014.
Damp-proofing of floors on the ground

If a floor of a room is laid on the ground or on fill, moisture from the ground must be prevented from reaching the upper surface of the floor and ad□acent walls by the insertion of a vapour barrier in accordance with AS 2□□0 2011, except damp-proofing need not be provided if—
(a) weatherproofing is not *re□□ire□*; or
(b) the floor is the base of a stair, lift or similar □□□□which is adequately drained by gravitation or mechanical means.

Subfloor ventilation

Subfloor spaces must be provided with openings in *e□er□□/ □□ll□*and internal subfloor walls in accordance with □□A Table F1.12 for the climatic zones given in □□A Figure F1.12 and have clearance between the ground surface and the underside of the lowest horizontal member in the subfloor in accordance with □□A Table F1.12.

□lazed assemblies

The following glazed assemblies in an external wall, must comply with AS 204□2014 requirements for resistance to water penetration:

- □ indows.
- Sliding and swinging glazed doors with a frame, including french and bi-fold doors with a frame.
- Ad□ustable louvres.
- □ indow walls with one piece framing

Sanitary facilities

A □lass □a health-care building must be provided with one shower for each □patients or part thereof.

It is noted that unisex toilets are to be provided in both the □lass 5 and □a areas. Unisex facilities are not permitted in the □□A and a Performance Solution is required is required to address the Performance Requirement FP2.1. The client must also provide a letter to state that they agree with the Performance Solution.

Please see calculations below to show maximum numbers of occupants given the sanitary facilities provided:

Area	Population □o.		Provided		
			□ □	Urinals	□asins
LE□EL 1 (□lass □a)	□ale	32	4	-	4
	Female	32	4	-	4
	Accessible	Inc Above			
LE□EL 1 (□lass 5)	□ale	40	2	2	3
	Female	40	3	-	3
	Accessible	Inc Above			
LE□EL 2 (□lass 5)	□ale	40	2	2	3
	Female	40	3	-	3
	Accessible	Inc Above			
LE□EL 3 (□lass 5)	□ale	40	2	2	3
	Female	40	3	-	3
	Accessible	Inc Above			

□n the ground floor 1 accessible sanitary facility is sufficient for up to 10 members of staff in the leased space if the leased space is a shop/chemist.

If the unit becomes a caf□, 1 accessible sanitary facility can serve up to 20 patrons / staff members. If a greater number of patrons / staff is proposed then additional male and female facilities are required.

Accessible sanitary facilitates

The accessible toilets are required to be provided with the minimum circulation spaces and requirement stated in AS142□.1 200□which includes:

- A minimum width of 1□00mm and minimum length of 2300mm for toilet pans;
- The basin is not to encroach by more than 100mm into the required circulation space;
- A toilet pan with a seat height of 460-4□0mm, set out 450-460mm from the side wall to the centre line and located □□0-□10mm from the back wall to the front of the pan;
- A toilet seat with a minimum 30□ luminous contrast to the floor finish;
- □rabrails at a height of □□0-□10mm and able to withstand a force of 1100 □ applied at any position and in any direction without deformation or loosening or rotation of the fastenings or fittings;
- □ackrests that have a height, at the lower edge of backrest to the top of the seat, of 120mm to 150mm, that have a vertical height of 150–200mm and a width of 350–400mm and that are capable of withstanding a force in any direction of 1100□;
- □ ashbasins that have a height of □00-□30mm to the front edge;
- Ancillary fixtures and fittings eg toilet paper holder, shelves, mirrors, hooks etc and any accessible shower set out as per the requirement of As142□.1 200□.

An accessible toilet facility is required to be provided at each bank of toilets in the building.

Ambulant □ubicles

The ambulant cubicles are required to be provided with the minimum circulation spaces and requirement stated in AS142□.1 200□ which includes:

- A width of □00-□20mm and a clear width of not less than □00mm from the front of the pan to the cubicle door;
- A toilet pan with a seat height of 460-4□0mm and set out along the centre line of the cubicle;
- □rabrails at a height of □□0-□10mm and able to withstand a force of 1100 □ applied at any position and in any direction without deformation or loosening or rotation of the fastenings or fittings;
- Doorways with a minimum clear width of □00mm;
- A □00x□00mm circulation space to both sides of the cubicle doors and entry doors;
- Toilet paper holder and hooks set out as per the requirement of As142□.1 200□.

As unisex toilet facilities are proposed on each floor, at least one of the unisex facilities is required to be an ambulant accessible toilet facility.

□eiling □eights

The treatment rooms, clinics, waiting rooms, staff stations, meeting room, passageways, corridors, or the like are required to have a minimum ceiling height of 2.4m

Toilets and storerooms are required to have a minimum height of 2.1m.

Light

Artificial lighting must be provided to all rooms that are frequently occupied, all spaces required to be accessible, all corridors, lobbies, other circulation spaces and paths of egress. The artificial lighting system must comply with AS/□□S 16□0.0 200□.

It is noted that some windows in the rooms in the existing building are being covered over through construction of the new building. It is unclear if these rooms in the existing hospital building are used for sleeping purposes. If any rooms are used for sleeping purposes, then an assessment should be made of the natural light offered to these rooms. □orrowed light may be required to be provided from corridor areas in accordance with □□A F4.3.

□entilation

□atural or mechanical ventilation must be provided to any room occupied by a person for any purpose.

All areas of the buildings, except the store rooms, must be provided with natural ventilation complying with □□A □lause F4.6 or mechanical ventilation complying with AS 166□.2 2012.

Restriction on location of sanitary compartments

Rooms containing toilet pans or urinals must not open directly into a workplace normally occupied by more than one person.

If a room containing toilet pans or urinals is prohibited from opening directly to another room access must be by an airlock, hallway or other room with a floor area of not less than 1.1 m2 and fitted with self-closing doors at all access doorways or the sanitary compartment must be provided with mechanical exhaust ventilation and the doorway to the room adequately screened from view.

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□.0 Energ□ E□□□□en□□

□uilding Fabric

The envelope of the conditioned space must comply with the building fabric requirements of Part □1 of the □uilding □ode of Australia 2016 (Amendment 1).

External □lazing

The glazing in the envelope of the conditioned space must comply with the glazing requirements of Part □2 of the □uilding □ode of Australia 2016 (Amendment 1).

□uilding Sealing

Any openings in the envelope of the conditioned space must have seals specified to the external doors and operable windows and must have self closing devices specified to the swing doors all as per the requirements of Part □3 of the □uilding □ode of Australia 2016 (Amendment 1).

□entilation Systems, Artificial Lighting, □ot □ ater Supply

The design stage services consultants design certificates are to confirm that the services comply with the requirements of □□A Section □.

□0.0 Con□□□s□on

The drawings provided to date have been assessed in respect to the deemed to satisfy provisions of the □uilding □ode of Australia 2016 Parts □, D, E and F. The design is at a point where the design be developed

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DA0000	□over Page	26/11/1□	R1
DA0001	Aerial □iew	26/11/1□	R1
DA1000	Site Location □ Photographs	26/11/1□	R1
DA1002	Existing Survey Plan	26/11/1□	R1
DA1003	Existing Survey Plan – Satellite Image □verlay	26/11/1□	R1
DA1004	Site Analysis	26/11/1□	R1
DA1501	Site Plan (Roof)	26/11/1□	R1
DA1502-A	Site Plan (□verall Parking / Traffic □ption A)	26/11/1□	R1
DA1502-□	Site Plan (□verall Parking / Traffic □ption □)	26/11/1□	R1
DA1503	Site Plan (Existing Tree Plan)	26/11/1□	R1
DA2001	Level 00 – □round Floor Plan	26/11/1□	R1
DA2002	Level 01 – Plan	26/11/1□	R1
DA2003	Level 02 – Plan	26/11/1□	R1
DA2004	Level 03 – Plan	26/11/1□	R1
DA2005	Level 04 – Plan (Future Development)	26/11/1□	R1
DA2006	Roof – Plan	26/11/1□	R1
DA200□	External Service □uilding	26/11/1□	R1
DA3000	Elevations	26/11/1□	R1
DA3001	Elevations	26/11/1□	R1
DA4001	Sections	26/11/1□	R1
DA□000	Shadow Diagram	26/11/1□	R1
DA□001	□aterial □oard – Fa□ade	26/11/1□	R1
DA□002	□aterial □oard – Fa□ade	26/11/1□	R1
DA□100	Landscape 1	26/11/1□	R1
DA□101	Landscape 2	26/11/1□	R1
DA□102	Landscape 3	26/11/1□	R1
DA□200	□FA □alculation	26/11/1□	R1

□□□E□□□□ □ – □□□E □ C□□□□□□C□□□□ □E□□□□E□E□□□

The following table lists the fire resistance levels required for the new work.

□uilding Element	Fire Resistance Level in minutes Structural adequacy/Integrity/Insulation Required for □lass □a
E□tern□□□ □□□(including any column and other building element incorporated therein) or other external building element, where the distance from any fire source feature to which it is exposed is -	
For *lo□□be□ri□□* parts	
Less than 1.5m	120/120/120
1.5 to less than 3m	120/□0/□0
3m or more	120/60/30
For *□o□□lo□□be□ri□□* parts	
Less than 1.5m	-/120/120
1.5 to less than 3m	-/□0/□0
3m or more	-/-/-
E□tern□□□o□□mn not incorporated in an external wall -	
For loadbearing columns	120/-/-
For non-loadbearing columns	-/-/-
Common □ □□□□n□ □re □ □□s	120/120/120
□ntern□□□ □□s	
Fire resisting lift and stair shafts	
□o□□be□ri□□	120/120/120
□o□□lo□□be□ri□□	-/120/120
□ounding *□□bli□ □orri□or□*, public lobbies and the like	
□o□□be□ri□□	120/-/-
□o□□lo□□be□ri□□	-/-/-
□etween or bounding *□ole□o□□□□□□□□ □□i□□*	
□o□□be□ri□□	120/-/-
□o□□lo□□be□ri□□	-/-/-
□entilation, pipe, garbage, and like shafts not used for the discharge of hot products of combustion	
□o□□be□ri□□	120/□0/□0
□o□□lo□□be□ri□□	-/□0/□0
□t□er □o□□□e□r□ng □ntern□□□ □□s□ntern□□□e□ms□□r□sses □n□ □o□□mns	120/-/-
□□oors	120/120/120
□oo□s	120/60/30

Appendix H.

TreeIQ – Arboricultural Impact Assessment – dated 03rd December 2018

Project No: NEP/PRI/18 Report No: NEP/PRI/AIA/D

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION

Nepean Private Hospital Expansion Stage 1
1-9 Barber Avenue
Kingswood

Prepared for: HEALTHSCOPE OPERATIONS

3rd December 2018
Revision D

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1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for Johnstaff Projects, on behalf of the Healthscope Operations, in relation to the proposed Nepean Private Hospital Expansion Stage 1. The purpose of this Report is to undertake a Visual Tree Assessment[1] (VTA), determine the impact of the proposed works on the trees, and where appropriate, recommend the use of sensitive construction methods to minimise adverse impacts.

1.1.2 In preparing this Report, the author has considered the objectives of Penrith City Council's *Development Control Plan 2010 (C2 Vegetation Management), State Environmental Planning Policy Vegetation in Non-Rural Areas (2017)*, *Australian Standard 4970 Protection of Trees on Development Sites (2009), Australian Standard 4373 Pruning of Amenity Trees (2007), Australian Standard 2303 Tree Stock for Landscape Use (2015)* and *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Refer to Methodology **(Appendix 1)**

1.1.3 This impact assessment is based on an assessment of the following supplied documentation/plans only:

- Site Plan - Existing Tree Plan (Rev A, 26.11.18) – prepared by SKAr
- Aerial View (Rev A, not dated) – prepared by SKAr
- Site Plan – Roof (Rev A, not dated) – prepared by SKAr
- Level 01 – Plan (Rev A, not dated) – prepared by SKAr

Refer to Plans **(Appendix 2)**

2.0 RESULTS

2.1 The Site

2.1.1 The site is a roughly T-shaped area of land within the Nepean Private Hospital grounds, located to the north and west of the main hospital building.

2.1.2 The site is generally level and comprises of a mix of on-grade car parking, garden beds, and grassed, open space areas. The site is partitioned into three (3) sections by a chain link and a timber fence which run roughly north/south through the site.

2.2 The Proposal

2.2.1 The proposal includes the extension of the existing Nepean Private Hospital. The extension will sit on an adjacent lot to the north-west of the existing hospital and includes:

[1]Mattheck & Breloer (2003)

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Stage 1a:

- Site stripping and contouring of vacant site for construction of an on-grade carpark
- Ground floor main reception entry and undercroft car parking
- Level 1
- Level 2

2.2.2 Note Stage 1a is to be designed so that future floors can be built above without the need for back propping or disruption to the completed levels below.

Stage 1b:

- Level 3

2.2.3 Note Stage 1b is the continuation of building constructed as Stage 1a.

Refer to Plans **(Appendix 2)**

2.3 The Trees

2.3.1 Twenty-three (23) trees were assessed using the Visual Tree Assessment[2] (VTA) criteria and notes, and contain a mix of locally indigenous and Australian native species such as *Corymbia maculata* (Spotted Gum), *Lophostemon confertus* (Brush Box) and *Eucalyptus botryoides* (Bangalay). A range of exotic species are also present at the site including *Lagerstroemia indica* (Crepe Myrtle), *Jacaranda mimosifolia* (Jacaranda) and *Plumeria acutifolia* (Frangipani). In general, the trees are of low quality and value, with no trees of high or very high Landscape Significance or allocated a Retention Value of *Priority for Retention*.

2.3.2 Tree 2 *Ailanthus altissima* (Tree of Heaven) and Trees 4 and 5 *Ligustrum lucidum* (large Leaf Privet) are listed as exempt species within the *Penrith City Council Tree Preservation Order*.[3] None of the trees are listed in the *Penrith City Council* Council's Register of Significant Trees & Vegetation.[4]

2.3.3 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in October 2018. No individual threatened tree species listed within this database for the area were identified during the current field investigations of the site.[5] The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this report.

2.3.4 As required by Clause 2.3.2 of *Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970)*, each tree assessed has been allocated a Retention Value. The Retention Value is based on the tree's Useful Life Expectancy and Landscape Significance with consideration to its health, structural condition and site suitability. The Retention Values do not take into account any proposed development works and are not a schedule for tree retention or removal. The trees have been allocated one of the following Retention Values:

- Priority for Retention
- Consider for Retention
- Consider for Removal
- Priority for Removal

Refer to Tree Assessment Schedule **(Appendix 3)**

[2] Mattheck & Breloer (2003)
[3] Penrith City Council (2018)
[4] Penrith City Council (2006)
[5] NSW Office of Environment and Heritage (2011)

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3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

3.1.1 The supplied plans show that eighteen (18) trees will need to be removed to accommodate the proposed development. This includes eight (8) trees with a Retention Value of *Consider for Retention,* five (5) trees with a Retention Value of *Consider for Removal* and five (5) tree with a Retention Value of *Priority for Removal*.

3.1.2 Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
	3, 10, 11, 12, 13, 14, 15 & 17	1, 6, 7, 8 & 9	2, 4, 5, 16 & 22

3.1.3 It should be noted that Tree 22 listed above is not impacted by the proposed works. However, it has been allocated a Retention Value of *Priority for Removal* and its recommended for removal irrespective of future development works.

3.2 Trees to be retained

3.2.1 The supplied plans show that Trees 18-21 and 23 can be retained as part of the proposed development. These trees have been allocated Retention Values of *Consider for Retention*. No works are proposed within their Tree Protection Zone (TPZ) areas as defined by *Australian Standard 4970-2009 Protection of Trees on Development Sites* (AS-4970).

3.2.2 If the existing carpark surface is to be replaced or resheeted, the following tree sensitive design and construction methods should be used to minimise adverse impacts:

- No excavation should be undertaken into the existing sub base and soil profile or behind the kerb into the existing garden beds.
- The new pavement surface should be installed at or above existing grade (including sub-base layers and kerbs) and designed as to eliminate the need for high levels of compaction.
- Roots (>25mmø) should be retained, and surfaces and sub-base materials should be modified as required with appropriate root protection installed. Root pruning should be undertaken by the Project Arborist only.

3.2.3 Underground Services

Underground services should be located outside of the TPZ areas. Where this is not possible, services should be installed using tree sensitive excavation (hand/hydrovac etc) methods with the services located around/below roots (>25mmø) as deemed necessary by the Project Arborist. Excavation using compact machinery fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmø).

3.2.4 Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1000mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmø) as deemed necessary by the Project Arborist. OSD tanks (where required) should be located outside of the TPZ areas.

3.2.5 Landscape Planting

The installation of plants within TPZ areas should be undertaken using hand tools and roots (>25mmø) should be protected.

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3.3 Replacement Planting

3.3.1 The proposed development should include the provision of new tree planting across the site. This tree planting would help to off-set the loss of canopy cover and amenity resultant from the tree removal.

3.3.2 Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

4.0 CONCLUSION

4.1 Twenty-three (23) trees were assessed using the VTA[6] criteria and notes. In general, the trees are of low quality and value, with no trees of high or very high Landscape Significance or allocated a Retention Value of *Priority for Retention*. Trees 2, 4 and 5 are listed as exempt species within the *Penrith City Council Tree Preservation Order*.[7]

4.2 The proposal includes the extension of the existing Nepean Private Hospital. The extension will sit on an adjacent lot to the north-west of the existing hospital.

4.3 The supplied plans show that eighteen (18) trees will need to be removed to accommodate the proposed development, including Trees 1-17. Tree 22 is not impacted by the proposed works. However, it has been allocated a Retention Value of *Priority for Removal* and its recommended for removal irrespective of future development works.

4.4 The supplied plans show that Trees 18-21 and 23 can be retained as part of the proposed development. No works are proposed within their TPZ areas. If the existing carpark surface is to be replaced or resheeted, tree sensitive design and construction methods (as outlined in Section 3.2.3) should be used to minimise adverse impacts. The trees to be retained should be protected in accordance with the Tree Protection Specification **(Appendix 5)**.

4.5 The proposed development should include the provision of new tree planting across the site. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use*.

[6] Mattheck & Breloer (2003)
[7] Penrith City Council (2018)

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5.0 LIMITATIONS & DISCLAIMER

TreeiQ takes care to obtain information from reliable sources. However, TreeiQ can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Report are visual aids only and are not necessarily to scale. This Report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction/ecological/heritage etc issues.

This Report has been prepared for exclusive use by the client. This Report shall not be used by others or for any other reason outside its intended target or without the prior written consent of TreeiQ. Unauthorised alteration or separate use of any section of the Report invalidates the Report.

Many factors may contribute to tree failure and cannot always be predicted. TreeiQ takes care to accurately assess tree health and structural condition. However, a tree's internal structural condition may not always correlate to visible external indicators. There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the trees or site may not arise in the future. Information contained in this report covers only the trees assessed and reflects the condition of the trees at the time of inspection. Additional information regarding the methodology used in the preparation of this Report is attached as Appendix 1. A comprehensive tree risk assessment and management plan for the trees is beyond the scope of this Report.

Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this Report are subject to approval from the relevant Consent Authority.

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7.0 APPENDICES

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Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site during October 2018. The comments and recommendations in this report are based on findings from this site inspection.

1.2 **Visual Tree Assessment (VTA)**: The subject tree(s) was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis.*[8] The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.

1.3 **Tree Dimensions**: The dimensions of the subject tree(s) are approximate only.

1.4 **Tree Locations:** The location of the subject tree(s) was determined from the supplied plans. Trees not shown on the supplied plans have been plotted in their approximate location only.

1.5 **Trees & Development**: Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

1.6 **Tree Health**: The health of the subject tree(s) was determined by assessing:

I. Foliage size and colour
II. Pest and disease infestation
III. Extension growth
IV. Crown density
V. Deadwood size and volume
VI. Presence of epicormic growth

1.7 **Tree Structural Condition**: The structural condition of the subject tree(s) was assessed by:

I. Assessment of branching structure
(i.e co-dominant/bark inclusions, crossing branches, branch taper, terminal loading, previous branch failures)
II. Visible evidence of structural defects or instability
(i.e root plate movement, wounds, decay, cavities, fungal brackets, adaptive growth)
III. Evidence of previous pruning or physical damage
(root severance/damage, lopping, flush-cutting, lions tailing, mechanical damage)

1.8 **Useful Life Expectancy (ULE)**: The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):

I. 40 years +
II. 15-40 years
III. 5-15 years
IV. Less than 5 years

[8] Mattheck & Breloer (2003)

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1.9 **Landscape Significance**: Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or is considered to meet the criteria for significance assessment of trees and/or landscapes by a suitably qualified professional. The criteria are based on general principles outlines in the Burra Charter and on criteria from the Register of the National Estate.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community associated with the site, as defined under the provisions of the NSW *Biodiversity Conservation Act (2016)* or the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (1999).
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Management Controls
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
	The subject tree is a recognised environmental weed species for the area.

1.10 **Retention Value**: Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

I. Priority for Retention
II. Consider for Retention
III. Consider for Removal
IV. Priority for Removal

<table>
<tr><th>ULE</th><th></th><th colspan="4">Landscape Significance</th></tr>
<tr><th></th><th>Very High</th><th>High</th><th>Moderate</th><th>Low</th><th>Insignificant</th></tr>
<tr><td>40 years +</td><td rowspan="3">Priority for Retention</td><td colspan="2">Priority for Retention</td><td rowspan="3">Consider for Removal</td><td rowspan="3">Priority for Removal</td></tr>
<tr><td>15-40 years</td><td>Priority for Retention</td><td>Consider for Retention</td></tr>
<tr><td>5-15 years</td><td colspan="2">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="4">Priority for Removal</td></tr>
</table>

The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

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Appendix 2: Plans

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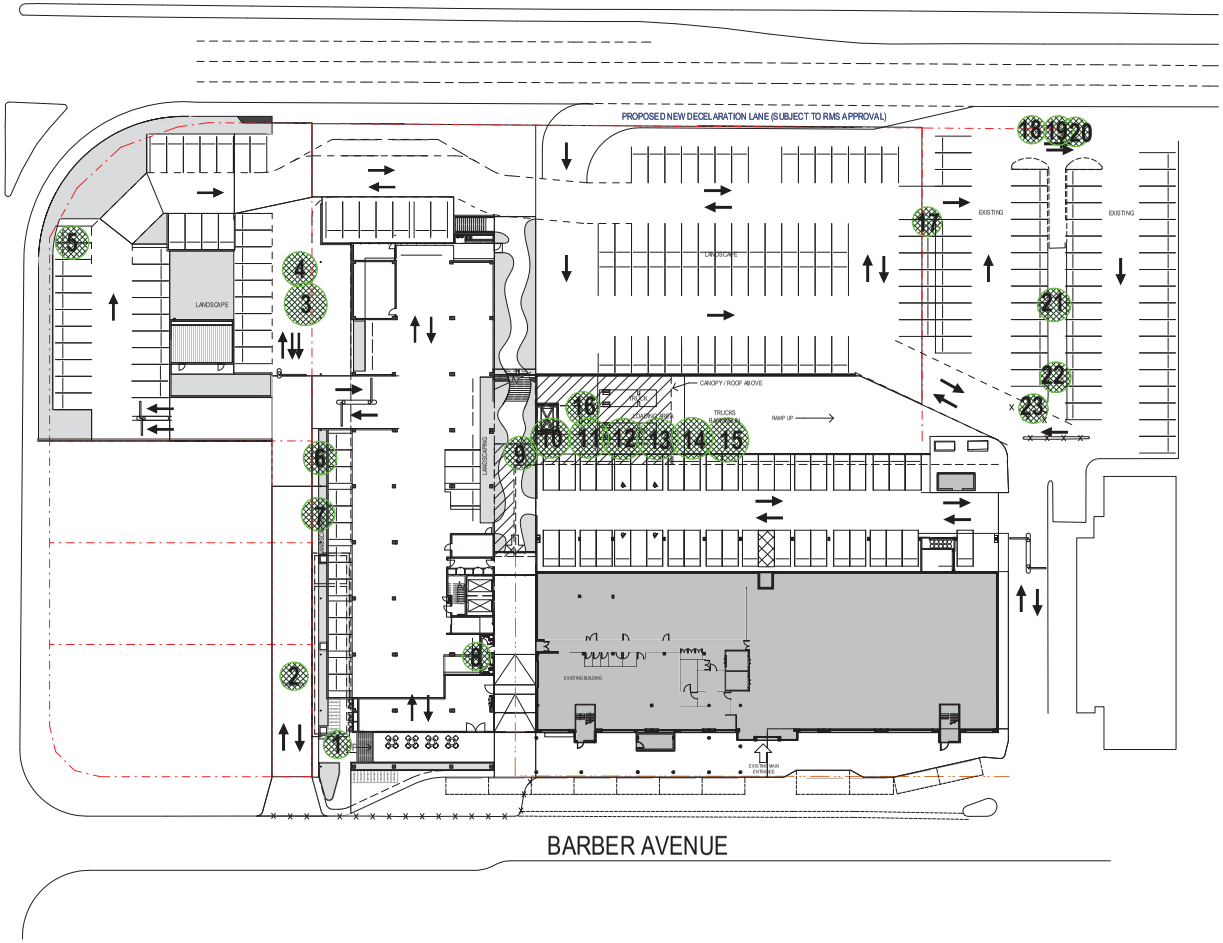
ISSUE	REVISION	DATE
R1	DA SUBMISSION	26/11/18



1 A3000 SITE PLAN (EXISTING TREE PLAN)
SCALE 1 : 400

SCHEDULE OF EXISTING TREES

Tree Number	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	SULE Class(s)	Lifespan/Years	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
1	[illegible]	[illegible]	8	5	Good	Good	[illegible]	[illegible]	[illegible]	Consider for Removal	4.8	2.3	
2	[illegible]	[illegible]	10	5	Fair	Good	[illegible]	1	[illegible]	Priority for Removal	5.3	2.5	[illegible]
3	[illegible]	[illegible]	5	3	Good	Fair	[illegible]	3-2	[illegible]	Consider for Retention	3.0	2.0	
4	[illegible]	[illegible]	6	4	Good	Good	[illegible]	2	Long	Priority for Removal	3.6	2	[illegible]
5	[illegible]	[illegible]	7	3	Good	Good	[illegible]	2-3	[illegible]	Consider for Retention	3.6	2.3	
6	[illegible]	[illegible]	8	4	Good	Good	[illegible]	2-3	[illegible]	Consider for Retention	4.8	2.3	
7	[illegible]	[illegible]	8	4	Good	Good	[illegible]	2-3	[illegible]	Consider for Retention	4.8	2.3	
8	[illegible]	[illegible]	6	3	Good	Good	[illegible]	2-3	[illegible]	Consider for Retention	3	2.3	
9	[illegible]	[illegible]	6	3	Good	Good	[illegible]	2-3	[illegible]	Consider for Retention	3	2.3	
10	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
11	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
12	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
13	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
14	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
15	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
16	[illegible]	[illegible]	7	5	Good	Good	[illegible]	1	Long	Priority for Removal	3	2.3	[illegible]
17	[illegible]	[illegible]	10	7	Good	Good	[illegible]	2-3	Medium	Consider for Retention	3.6	2.3	
18	[illegible]	[illegible]	10	5	Good	Good	[illegible]	2-3	Medium	Consider for Retention	3	2.3	
19	[illegible]	[illegible]	12	6	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2	
20	[illegible]	[illegible]	12	6	Fair	Good	[illegible]	3-2	Medium	Consider for Retention	3.6	2	
21	[illegible]	[illegible]	10	7	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.8	2.3	
22	[illegible]	[illegible]	10	6	Fair	Poor	[illegible]	1	Medium	Priority for Removal	3.6	2	[illegible]
23	[illegible]	[illegible]	10	7	Good	Good	[illegible]	2-3	Medium	Consider for Retention	4.2	2.3	

Summary of trees to be removed to accommodate the propsed development*

Priority for retention	Consider for Retention	Consider for Removal	Priority for Removal
N/A	3, 10, 11, 12, 13, 14, 15 & 17	1, 6, 7, 8 & 9	2, 4, 5, 16 & 22

* Information extracted from:

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION
(Project No: NEP/PRI/18 Report No: NEP/PRI/AIA/A)

Nepean Private Hospital
1-9 Barber Avenue
Kingswood

Prepared for: HEALTHSCOPE OPERATIONS
7th November 2018
Revision A

prepared by:

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NOTE:

ALL PROVIDED AREAS AND DIMENSIONS ARE INDICATIVE ONLY AND MAY CHANGE DURING THE DESIGN PROCESS.
FINAL AREAS AND DIMENSIONS TO BE VARYFIED ON SITE BY A QUALIFIED BUILDING SURVEYOR.

CONSULTANTS:

MASTER PLANNING
ARCHITECTURE
INTERIOR DESIGN

BRISBANE
SYDNEY
MELBOURNE
PERTH
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DEVELOPMENT APPROVAL

REASON FOR ISSUE
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- FOR ALL SERVICES CATEGORY IFRAE THE VARIOUS CONSULTANT PACKAGES TAKE PRECEDENCE OVER THE RLE & RED PACKAGES.

PROJECT:
Nepean Private Hospital Expansion Stage 1

PROJECT ADDRESS:
1-9 Barber Avenue, Kingswood N.S.W. 2747

CLIENT:
Healthscope

DRAWING TITLE:

SITE PLAN (EXISTING TREE PLAN)

PROJECT No.:
18-008

NORTH:

SCALE:
1 : 400 @ A1

PROJECT DATE:
26/11/2018

DRAWING No.:
DA1503

REVISION:
R1

Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
1	*Lagerstroemia indica* (Crepe Myrtle)	400 @grade	6	3	Good	Good	Lopped with resultant epicormic growth.	15-40	Low	Consider for Removal	4.8	2.3	Remove. Development works.
2	*Ailanthus altissima* (Tree of Heaven)	250x2 200 150	10	5	Fair	Good	Extensive sucker growth from root system. Small (<25mm) & large (>75mm) diameter deadwood in low volumes.	<5	Low	Priority for Removal	5.3	2.4	Remove. Tree not considered worthy of retention.
3	*Eucalyptus botryoides* (Bangalay)	450 200 100x2	9	5	Good	Fair	Small (<25mm) & medium (25-75mm) epicormic growth in moderate volumes. Wound/s, advanced stages of decay. Previous branch failure/s.	5-15	Moderate	Consider for Retention	6.2	2.6	Remove. Development works.
4	*Ligustrum lucidum* (large Leaf Privet)	300 @grade	5	3	Good	Good	Weed species.	<5	Insignificant	Priority for Removal	3.6	2	Remove. Tree not considered worthy of retention.
5	*Ligustrum lucidum* (large Leaf Privet)	500 @ grade	5	2	Good	Fair	Coppice regrowth from stump. Weed species.	<5	Insignificant	Priority for Removal	6	2.5	Remove. Tree not considered worthy of retention.
6	*Lagerstroemia indica* (Crepe Myrtle)	75x3	4	2	Good	Good	Branches growing through chain link fence.	15-40	Low	Consider for Removal	2	1.5	Remove. Development works.
7	*Lagerstroemia indica* (Crepe Myrtle)	75x4	4	2	Good	Good	Branches growing through chain link fence.	15-40	Low	Consider for Removal	2	1.5	Remove. Development works.
8	*Plumeria acutifolia* (Frangipani)	150 75	5	2	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Broken branches in lower crown. Wound/s, early stages of decay.	15-40	Low	Consider for Removal	2	1.5	Remove. Development works.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
9	*Grevillea* 'Moonlight' (Grevillea cvs)	150	6	3	Good	Good	Trunk lean, moderate. No signs of rootplate instability. Pushing over adjacent timber fence.	5-15	Low	Consider for Removal	2	1.5	Remove. Development works.
10	*Lophostemon confertus* (Brush Box)	250	12	3	Good	Good	Limited building clearance.	15-40	Moderate	Consider for Retention	3	1.9	Remove. Development works.
11	*Lophostemon confertus* (Brush Box)	200	12	3	Good	Good	Small (<25mm) diameter deadwood in low volumes. Limited building clearance. Partially suppressed.	15-40	Moderate	Consider for Retention	2.4	1.7	Remove. Development works.
12	*Lophostemon confertus* (Brush Box)	250	12	4	Good	Good	Partially suppressed. Limited building clearance.	15-40	Moderate	Consider for Retention	3	1.9	Remove. Development works.
13	*Lophostemon confertus* (Brush Box)	200	12	4	Good	Good	Limited building clearance.	15-40	Moderate	Consider for Retention	2.4	1.7	Remove. Development works.
14	*Lophostemon confertus* (Brush Box)	200	12	3	Good	Good	Limited building clearance.	15-40	Moderate	Consider for Retention	2.4	1.7	Remove. Development works.
15	*Lophostemon confertus* (Brush Box)	300	14	3	Good	Good	Limited building clearance.	15-40	Moderate	Consider for Retention	3.6	2	Remove. Development works.
16	*Jacaranda mimosifolia* (Jacaranda)	100	7	3	Good	Good	Heavily suppressed.	<5	Low	Priority for Removal	2	1.5	Remove. Tree not considered worthy of retention.
17	*Corymbia maculata* (Spotted Gum)	200	13	3	Good	Good	Crown density 75-100%. Foliage slightly chlorotic.	15-40	Moderate	Consider for Retention	2.4	1.7	Remove. Development works.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
18	*Corymbia maculata* (Spotted Gum)	250	12	3	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	3	1.9	Retain. No works within TPZ.
19	*Lophostemon confertus* (Brush Box)	300	13	3	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	3.6	2	Retain. No works within TPZ.
20	*Lophostemon confertus* (Brush Box)	300	13	3	Fair	Good	Bark splits with kino exudate. Partially suppressed.	5-15	Moderate	Consider for Retention	3.6	2	Retain. No works within TPZ.
21	*Corymbia maculata* (Spotted Gum)	350	14	3	Good	Good		15-40	Moderate	Consider for Retention	4.2	2.2	Retain. No works within TPZ.
22	*Corymbia maculata* (Spotted Gum)	250 150	14	3	Fair	Poor	Crown density 50-75%. Longitudinal trunk wound 0-5m, encompassing 50% of trunk circumference. Wound face showing early stages of decay.	<5	Moderate	Priority for Removal	3.6	2	Remove. Tree not considered worthy of retention.
23	*Corymbia maculata* (Spotted Gum)	350	14	3	Good	Good		15-40	Moderate	Consider for Retention	4.2	2.2	Retain. No works within TPZ.

Appendix 4: Plates

Plate 1: Showing Tree 1

Plate 2: Showing Tree 3

Plate 3: Showing Tree 8

Plate 4: Showing Tree 9

Plate 5: Showing Trees 10-15

Plate 6: Showing Trees 21-23

Appendix 5: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

The Project Arborist shall undertake regular site inspections and certify that the works are being undertaken in accordance with this specification.

Compliance Documentation shall be prepared by the Project Arborist following each site inspection. The Compliance Documentation shall include documentary evidence of compliance with the tree protection measures and methods as outlined within this Specification. Upon the completion of the works, a final assessment of the trees shall be undertaken by the Project Arborist and future recommended management strategies implemented as required.

1.2 Tree & Vegetation Removal

The trees to be removed shall be removed prior to the establishment of the tree protection measures. Tree removal works shall be undertaken in accordance with the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Tree and vegetation removal shall not damage the trees to be retained.

1.3 Tree Protection Zone

The trees to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:

- Modification of existing soil levels, excavations, trenching or movement or rock
- Mechanical removal of vegetation
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.4 Tree Protection Fencing

TPZ fencing shall be installed at the perimeter of the TPZ **(Appendix 3)**. Fencing set back distances may be reduced for demolition/construction access with approval from the Project Arborist and where ground protection is installed to the unfenced areas of the TPZ. The exact location of the fencing shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works.

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As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) **(Appendix 6)**.

1.5 Site Management

Materials, waste storage, and temporary services shall not be located within the TPZ.

1.6 Scaffolding

Where possible, scaffolding shall not be located within the TPZ. Scaffolding shall not be in contact with the tree. As necessary, this shall be achieved by erecting scaffolding around branches. Branches shall be tied back and protected as deemed necessary by the Project Arborist. Refer to Typical Tree Protection Details (5) **(Appendix 6)**.

1.7 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorised by the determining authority. **These works shall be supervised by the Project Arborist**. When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mmø) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mmø) where deemed necessary by the Project Arborist.

1.8 Ground Protection

Where deemed necessary by the Project Arborist, machinery movements shall be restricted to areas of existing pavement or from areas of temporary ground protection such as ground mats or steel road plates. Refer to Typical Tree Protection Details (3) **(Appendix 6).**

1.9 Trunk Protection

Trunk protection shall be installed as deemed necessary by the Project Arborist. Trunk protection shall be installed by wrapping padding (either carpet underlay or 10mm thick jute geotextile mat) around the trunk and first order branches to a minimum height of 2m. Timber battens (90 x 45mm) spaced at 150mm centres shall be strapped together and placed over the padding. Timber battens must not be fixed to the trees. Refer to Typical Tree Protection Details (3) **(Appendix 6)**.

Branch protection shall be installed as deemed necessary by the Project Arborist.

1.10 Structure & Pavement Demolition

Demolition of existing structures/pavement within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.8). Machinery should not contact the tree's roots, trunk, branches and crown.

The existing pavement shall be carefully lifted to minimise damage to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material shall remain in-situ. Machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of pavement at all times.

Structures below grade shall be retained to minimise disturbance to the tree's roots. Where this is not possible structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker. Where the Project Arborist determines that the tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these structures shall be left in-situ.

If roots (>25mmø) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute geotextile fabric. The geotextile fabric shall be kept in a damp condition at all times.

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1.11 Pavement Installation

New pavements (including sub-base materials) within TPZ areas shall be installed above or at existing grade. Pavement sub-base layers shall either be thinned or finished pavement levels modified as required to enable the retention of roots (>25mmø) as deemed necessary by the Project Arborist.

1.12 Underground Services

Underground service installation within the TPZ shall be supervised by the Project Arborist.

The installation of underground services shall be located outside of the TPZ. Where this is not possible, they shall be installed using tree sensitive excavation methods (hand/hydrovac/airspade) with the services installed around/below roots (>25mmø, or as determined by the Project Arborist). Excavation using compact machinery (<3.5t) fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmø).

Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1000mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmø) as deemed necessary by the Project Arborist. OSD tanks (where required) should be located outside of the TPZ areas.

1.13 Excavations, Root Protection & Root Pruning

All excavation works (including root investigations) within TPZ areas shall supervised by the Project Arborist and utilise tree sensitive methods (hand/hydrovac/airspade). Excavation using compact machinery (<3.5t) fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmø).

Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat, followed by a layer of plastic membrane. Coverings shall be weighted to secure them in place. The mat shall be kept in a damp condition at all times.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist. Tree sensitive excavation and root pruning shall be undertaken along the excavation line prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots from excavation equipment.

Roots (>25mmø) shall be pruned by the Project Arborist only. Roots (<25mmø) may be pruned by the Principal Contractor. Root pruning shall be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears. Damaged roots shall be pruned behind the damaged tissues with the final cut made to an undamaged part of the root.

1.14 Plant Installation

Plant installation within the TPZ shall be undertaken using hand tools and roots (>25mmø) shall be protected. Mechanical augers shall not be used. No mechanical cultivation/ripping of soils shall be undertaken within the TPZ.

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Appendix 6: Typical Tree Protection Details

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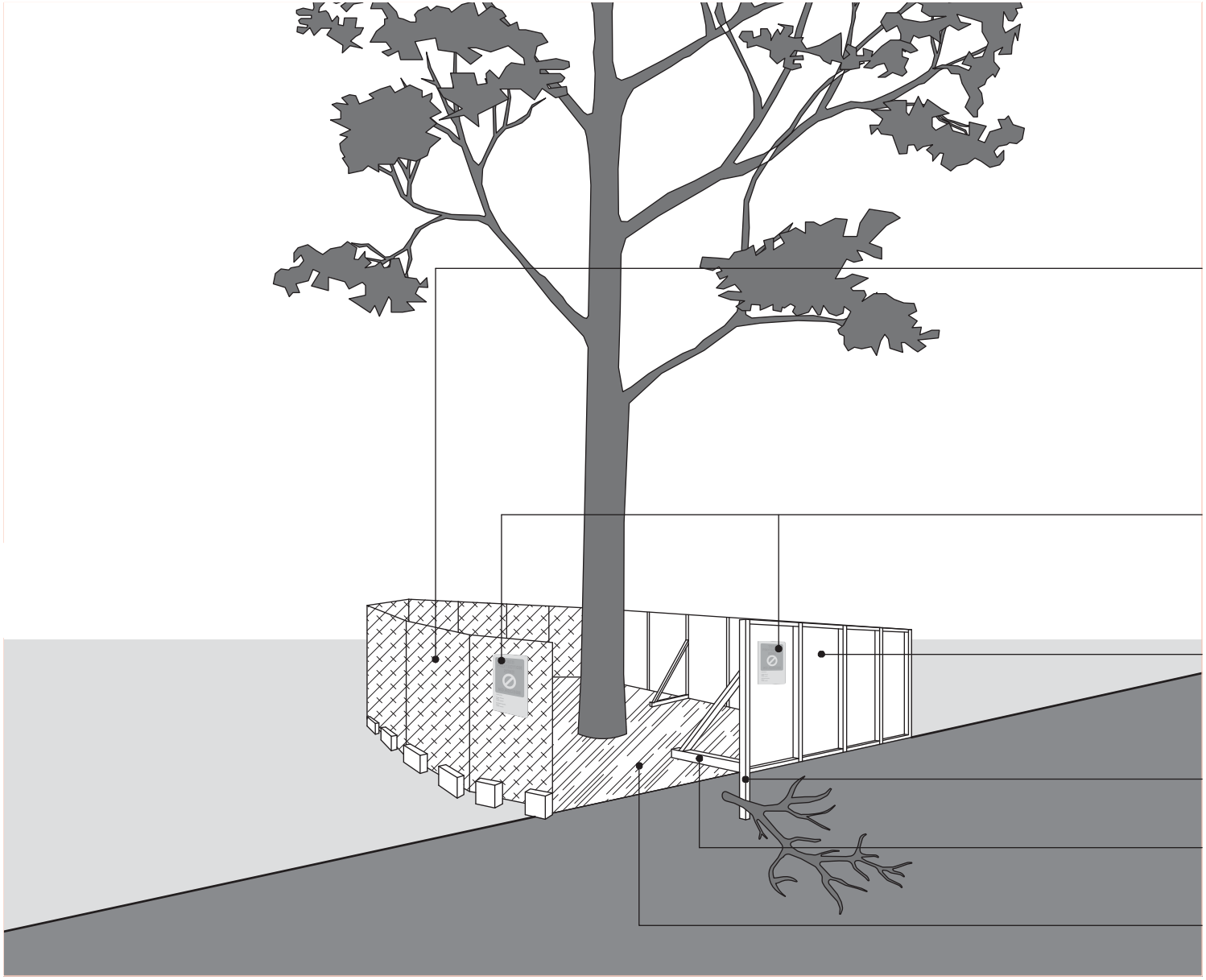


□ote□
□o excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TP□.

□ □t□on □ □□en□□ng
1.□m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection □one (TP□) sign

□ □t□on □ □□en□□ng
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TP□.

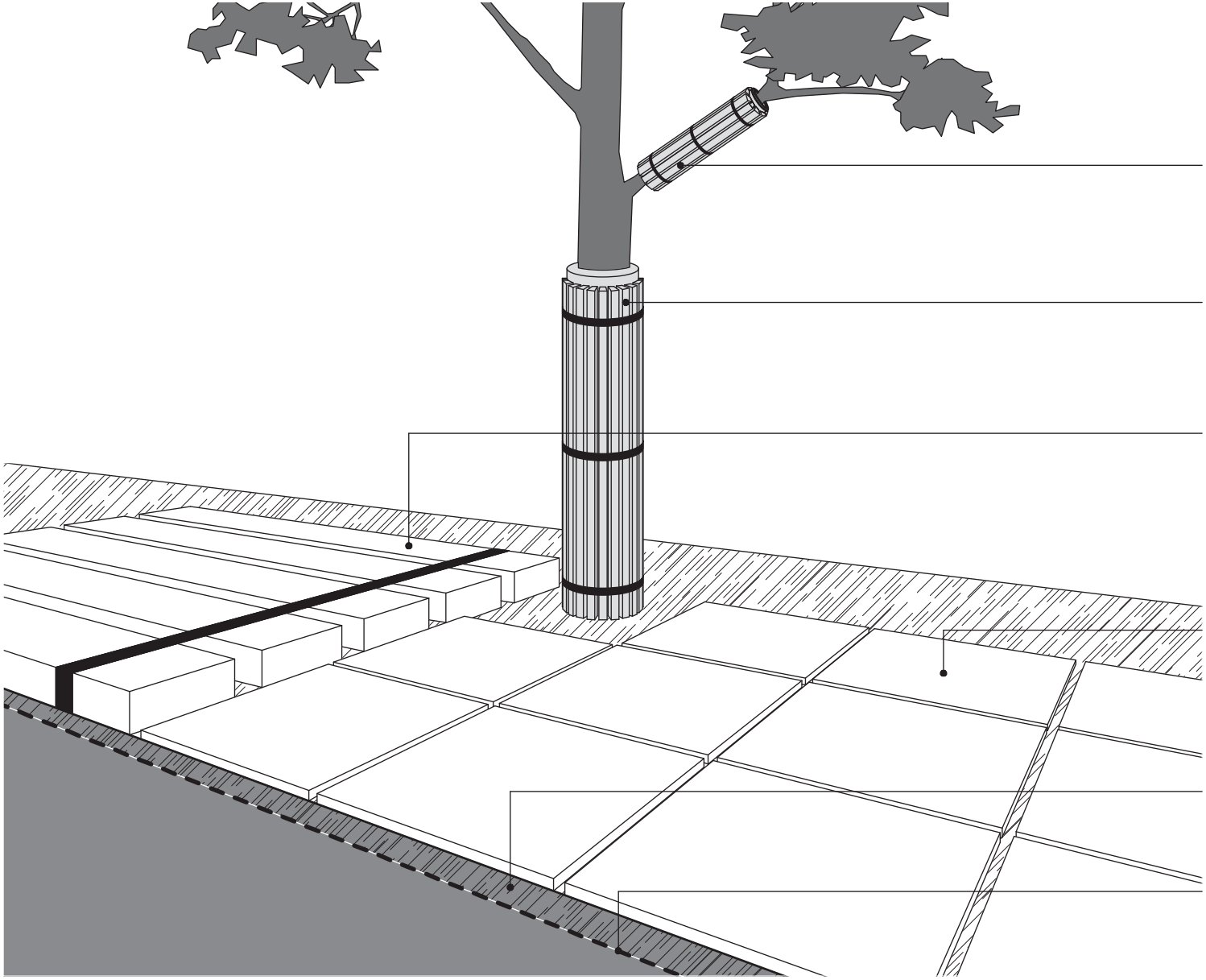
Installation of supports should avoid damaging roots.

□racing is permissible within the TP□.

□aximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TP□.

03 Tree Protection Fencing

□ot to Scale



□r□n□□ □rote□t□on - use boards and padding to prevent damage to bark on branch. □oards are to be strapped, not screwed or nailed to the branch.

□r□n□ □rote□t□on - use boards and padding to prevent damage to bark (minimum 2m). □oards are to be strapped, not screwed or nailed to the trunk.

□ro□n□ □rote□t□on - use device strapped over mulch or aggregate layer. □round protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

□aximum 100mm and minimum 50mm depth mulch or aggregate layer.

□eotextile fabric underneath mulch or aggregate layer.

04 Examples of □ranch, Trunk and □round Protection

□ot to Scale

□ranches may require pruning to erect scaffolding. Pruning may be sub□ect to local regulations. Flexible branches should be tied back in preference to pruning.

□inimum 1.□m high hoarding. Temporary fencing may be incorporated into scaffolding as either containment screening or as hoarding.

□**ote**□
If excavation is required for installation of support post for fencing, the Pro□ect Arborist should assess any pruning of roots greater than 20mm diameter.

Scaffold planks

□oards or plywood to be installed over mulch or aggregate layer for any areas requiring access within the TP□.

Soleplate over geotextile. □o excavation for soleplate within TP□.

□aximum 100mm and minimum 50mm depth mulch or aggregate layer within TP□.

□eotextile fabric

05 Indicative Scaffolding within a Tree Protection □one (TP□) □ot to Scale

Appendix I.

Northrop Pty Ltd – Stormwater & Civil Design Statement – dated 04th December 2018

Northrop Pty Ltd – Green Star Rating Scorecard – dated 04th December 2018

NORTHROP

DEVELOPMENT APPLICATION

Nepean Private Hospital Expansion Stage 1

CIVIL ENGINEERING STORMWATER MANAGEMENT REPORT

NORTHROP

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Disclaimer

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Document Control

Prepared for

Project Name	1-9 Barber Avenue, Kingswood
File Reference	182350
Date	04/12/18

Document Control

S182350-CR01–A Stormwater Management Report

Rev	Description	Prepared by	Reviewed by	Issue Date	Client App	Approval Date
A	Draft Issue	NN	JG	28/11/18		
B	Development Application	NN	JG	04/12/18		

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1. Introduction

Northrop Consulting Engineers Pty Ltd (Northrop) have been engaged by Johnstaff to prepare civil engineering design and documentation in support of a Development Application (DA) submission to Penrith City Council for the works at Nepean Private Hospital Expansion Stage 1.

This report covers the proposed earthworks and stormwater drainage strategy including:

- Erosion and Sediment control;
- Stormwater Detention; and
- Water Sensitive Urban Design.

2. Related Reports and Documents

This report is to be read in conjunction with the following reports and documents:

a. Development Application Documentation prepared by Northrop (refer Appendix A):

- 182350_DAC101.01 COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
- 182350_DAC101.11 SPECIFICATION NOTES
- 182350_DAC101.21 GENERAL ARRANGEMENT PLAN
- 182350_DAC102.01 CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN- SHEET 01
- 182350_DAC102.02 CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN- SHEET 02
- 182350_DAC102.11 SEDIMENT AND SOIL EROSION CONTROL DETAILS
- 182350_DAC103.01 BULK EARTHWORKS PLAN - SHEET 01
- 182350_DAC103.02 BULK EARTHWORKS PLAN - SHEET 02
- 182350_DAC104.01 SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01
- 182350_DAC104.02 SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02
- 182350_DAC104.31 STORMWATER MANAGEMENT DEVICES
- 182350_DAC107.01 DETAILS SHEET
- 182350_DAC108.01 CATCHMENT PLAN

b. Penrith City Council's EH 003 Water Sensitive Urban Design (WSUD) Policy 2013
c. Penrith City Council's ES 002 Stormwater Drainage Guidelines for Building Developments 2016

3. The Development Site

3.1. Site Description

1-9 Barber Avenue is situated on the southern side of Great Western Highway. The subject site consists of 78-82 Parker Street & 11 Barber Avenue which is within Penrith City Council local government area.

The site is approximately 0.76 hectares and is situated:

- South of Great Western Highway;
- Entry from Barber Ave

Figure 1 - Site Locality (Six Maps)

3.2. Proposed Works

The proposed development will involve the construction of a new medical facility accompanied with refurbished carparking spaces and landscaped areas.

Refer to the architectural drawings prepared by SKAr and Northrop's civil drawing package for more detailed site description.

The site falls towards the south and south west of the subject site. The catchment area is 0.76 ha (which is equal to the site area) and will be directed to the southern boundary of the site via internal pit and pipe stormwater drainage network. The development will comprise of roof catchments, hardstand catchments (car parking & footpaths) and landscaped areas.

Other pre-treatment strategies include uses of surface trash traps at each surface inlet pit. All surface runoff will be treated by a proprietary filtration system which is located within the on-site detention tank located adjacent the proposed medical facility before discharging to Council's existing kerb inlet pit.

On-site stormwater detention is provided within the site, in accordance with Penrith Council's requirements for the site. Stormwater water quality control is provided and is located within the on-site detention tank.

4. Erosion and Sediment Control

The objectives of the erosion and sediment control for the development site are to ensure:

- Adequate erosion and sediment control measures are applied prior to the commencement of construction and are maintained throughout construction; and
- Construction site runoff is appropriately treated in accordance with the requirements of Penrith City Council.

As part of the works, the erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Department of Housing Manual, “Managing Urban Stormwater Soil & Construction” 2004 prior to any earthworks commencing on site. The Concept Sediment and erosion control measures are documented in Northrop’s Development Application drawing 172490-DA00-C03.11.

4.1. Sediment Basin

A concept sediment basin has been designed to capture site runoff during construction and have been located towards the eastern part of the site, in the lowest practical point. The construction of the basins will be done in stages to enable maximum runoff capture assisted by the diversion of swales to capture and direct runoff to the basins.

Calculations to determine concept design basin sizes have been based on available geotechnical information regarding soil types and through the use of the Soils and Construction Volume 1 Manual.

To ensure the sediment basins are working effectively they are to be maintained throughout the construction works. Maintenance includes water to be removed by pumping to reach the minimum storage volume at the lower level of the settling zone. The settling zone will be identified by pegs to clearly show the level at which design storage capacity is available.

The pumped water from the sediment basins will be reused to irrigate areas of hydromulch and for dust control during construction.

Overflow weirs are to be provided to control overland flows for rainfall events in excess of the design criteria which is to cater for a storm event up to and including the 100 year ARI storm event.

Below is a summarised concept sediment basin sizing table.

Table 1 - Concept Sediment Basin Volumes

Basin	Catchment Area (Ha)	Volume Required (m^3)	Volume Provided (m^3)
A	0.76	174.92	175

4.2. Construction Measures

Construction measures prior to any earthworks commencing on site have been implemented generally in accordance to the Detailed Design Certificate drawings. The measures shown on the drawings are intended to be a minimum treatment only as the contractor will be required to modify the erosion and sedimentation control measures to suit the construction program, sequencing and techniques. These measures will include:

- A site fence is to be temporarily constructed around the site with a security fence surrounding the site office area and the proposed sediment basins as required;
- Sediment fencing downstream and surrounding disturbed areas, including any topsoil stockpiles;
- Installation for silt arrestors to collect site runoff and retain suspended particles;
- Dust control measures which includes covering stockpiles, maintain site fences and watering exposed areas;
- Placement of hay bales or mesh and gravel filters around and along proposed catch drains and around stormwater inlets pits; and
- The construction of temporary sediment basins as noted above in Section 4.1

5. Stormwater Management Objectives and Controls

5.1 Development Control Plan Objectives

The stormwater strategy for the Nepean Private Hospital has been developed in accordance with ES002- Stormwater Drainage Guidelines for Building Developments and Water Sensitive Urban Design (WSUD) Technical Guidelines, supplied by Penrith City Council.

Penrith Council's Stormwater Drainage Guidelines for Building Development states the following objectives:

- Minimise any adverse impacts and prevent damage to the built and natural environment as a result of stormwater runoff from building developments;
- Manage the quantity of stormwater runoff generated by building developments;
- Protect the existing public stormwater drainage assets;
- Minimise the impacts of flooding (mainstream and local) to the built and natural environment;
- Manage risk to lives and property from the impacts of stormwater and flooding;
- Ensure the design and construction of the stormwater drainage systems for building developments can be economically maintained;
- Provide uniform specification and technical requirements in design and construction of stormwater drainage systems for building developments within the Penrith City Council
- Local Government Area (LGA); and
- Have uniform approach and ensure consistency in the assessment of stormwater drainage systems for building developments.

5.2 Stormwater Management Controls

The proposed stormwater management strategy implements the use of an on-site detention to minimise the site discharge. The peak 100 year ARI post development discharges are restricted to 5 year ARI pre development discharges. Each storm event has also been assessed to ensure that the post developed flows are below the pre-development flows.

A water quality treatment strategy proposed for Nepean Private Hospital has been designed to achieve the objectives (stated above) and controls as outlined below:

Controls are as follows:

- Proprietary Enviropod units on each stormwater discharge points;
- Water quality cartridges installed during building construction

6. Stormwater Management

6.1 Existing Catchment

The existing catchment for the Nepean Private Hospital is approximately 0.76ha in size. The area generally drains towards the western and eastern boundaries of the site, with the site low point located in the lower south western boundary.

High level site investigation has concluded that the site drainage connects to the existing drainage network on Barber Ave via an existing 375 RCP.

Figure 2 below shows the pre-development catchment plan for the subject site.

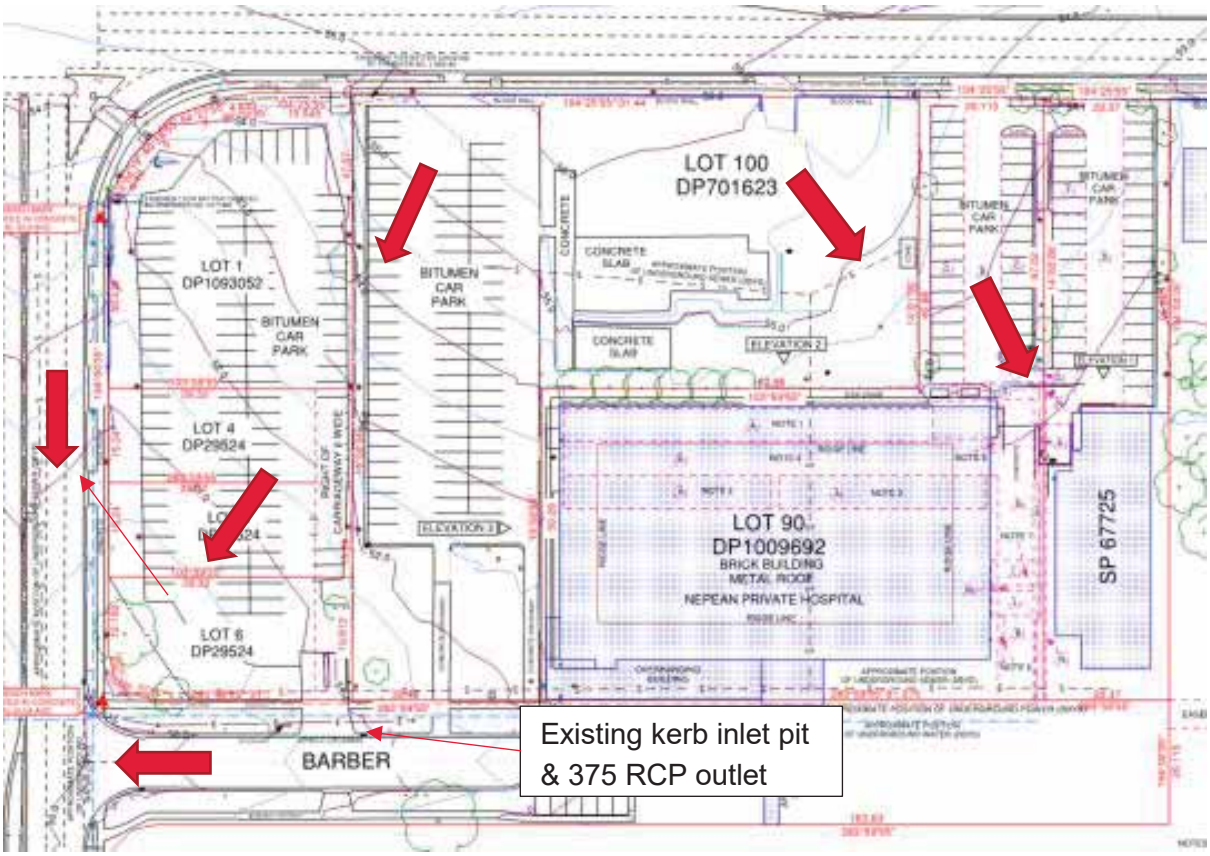

Figure 2 - Pre-Development Catchment Plan

6.2 Stormwater Management Strategy – Discussion

Clause 4.1 & Appendix D "On-site detention Area- Kingswood & Orchard Hills" from Penrith Council's Stormwater Drainage Guidelines for Building Developments indicates that the subject site is NOT within the mandatory on-site stormwater detention zone. Refer to Figure 3.

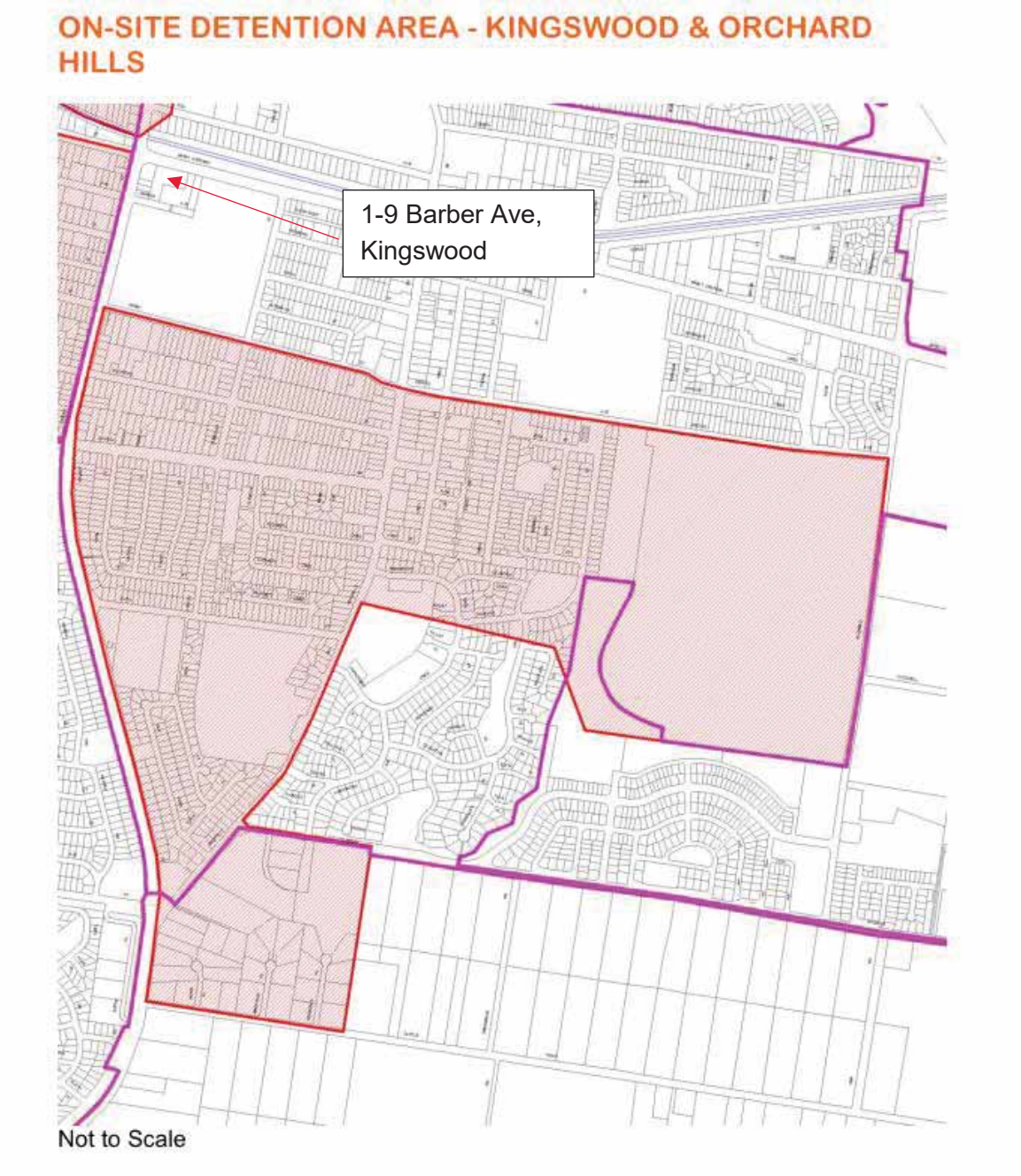

Figure 3 – Mandatory OSD Area Map

There is further guidance indicates that Onsite Stormwater Detention is generally required for all types of developments except for certain scenarios. Refer to Figure 4.

OSD is generally required for all types of developments in these areas except the following:

- Single dwelling development, including outbuildings, alterations and additions;
- Dual occupancy, secondary dwelling and granny flat development;
- Development in rural area where the size of impervious areas is less than 1000m^2;
- Subdivision of any existing development in which OSD has already been provided;
- Boundary adjustment and consolidation of allotments where no additional lots are created;
- Change of use where there is no increase of impervious area.
- New development in subdivisions where OSD / detention basin / retarding basin has already been provided for the entire subdivision
- Grassed playing field and vegetated area of public sports and recreational facilities
- One-off minor development, including alterations and additions, where the proposed area of development is less than 100 m^2 (subsequent minor developments or additions shall require OSD).

Figure 4 – OSD Exception Scenarios

With consideration to the above, it is apparent that the guidance provided within the same clause is not definitive / or is open to interpretation in its direction for provision of Onsite Stormwater Detention as a mandatory requirement for this development.

This matter has been further discussed with the broader design team. An allowance for Onsite Stormwater Detention has been considered for this development however will be subject to further discussion with Council during the Development Application phase to confirm if it is required.

6.3 Hydrological Modelling

We have included a provisional on-site detention tank to collect roof and surface drainage within the site. The stormwater management strategy has been designed so that the run off from the catchments will discharge to the stormwater drainage network where it will discharge into the detention tank. Approx. 136m^3 in volume. The by-pass is approx. 171m^2 which comprises of the landscape and hardstand area downstream of the OSD tank. Refer to Figure 5-9 for the Pre-& Post development DRAINS model nodes.

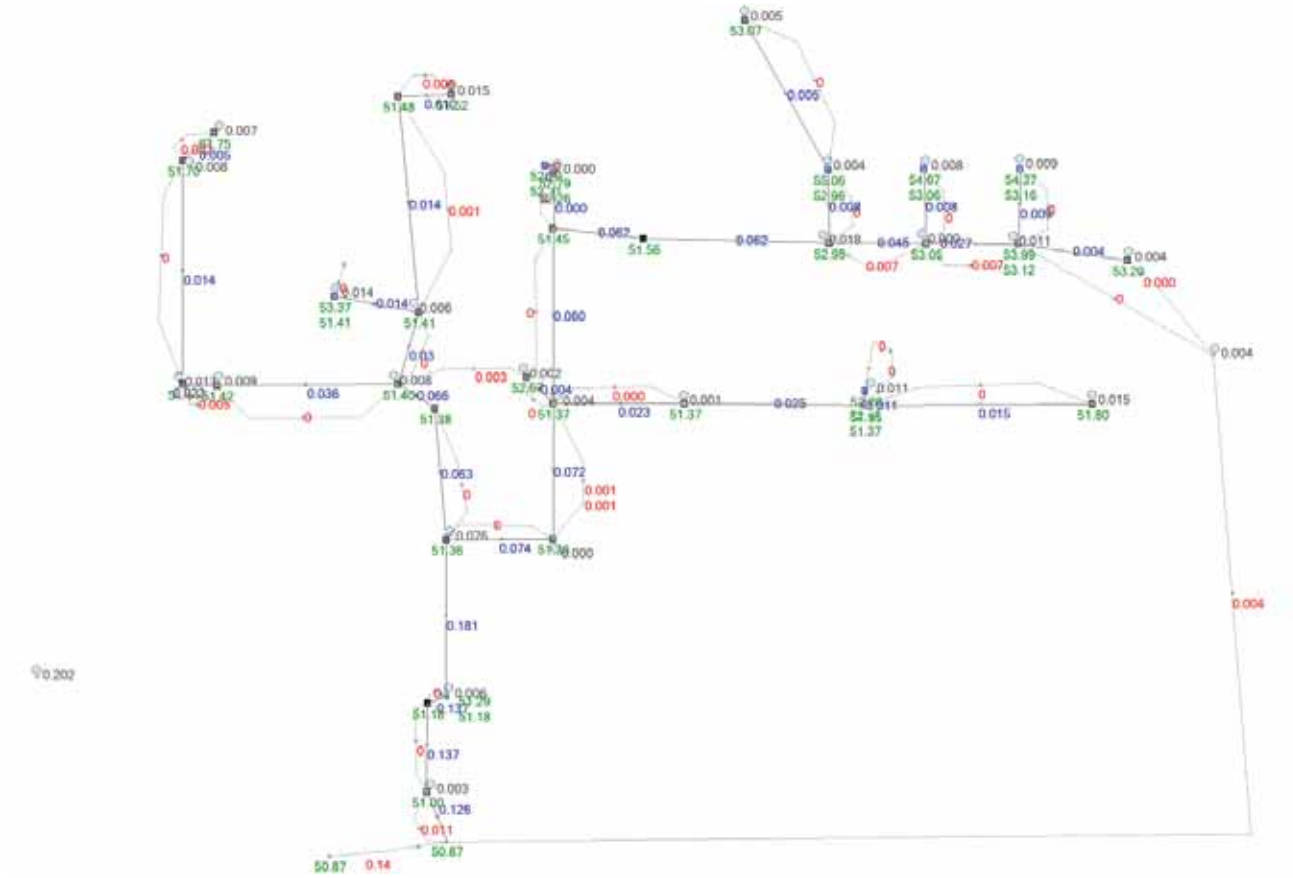

Figure 4 – DRAINS Model- Pre-& Post- Development – 5-year AEP

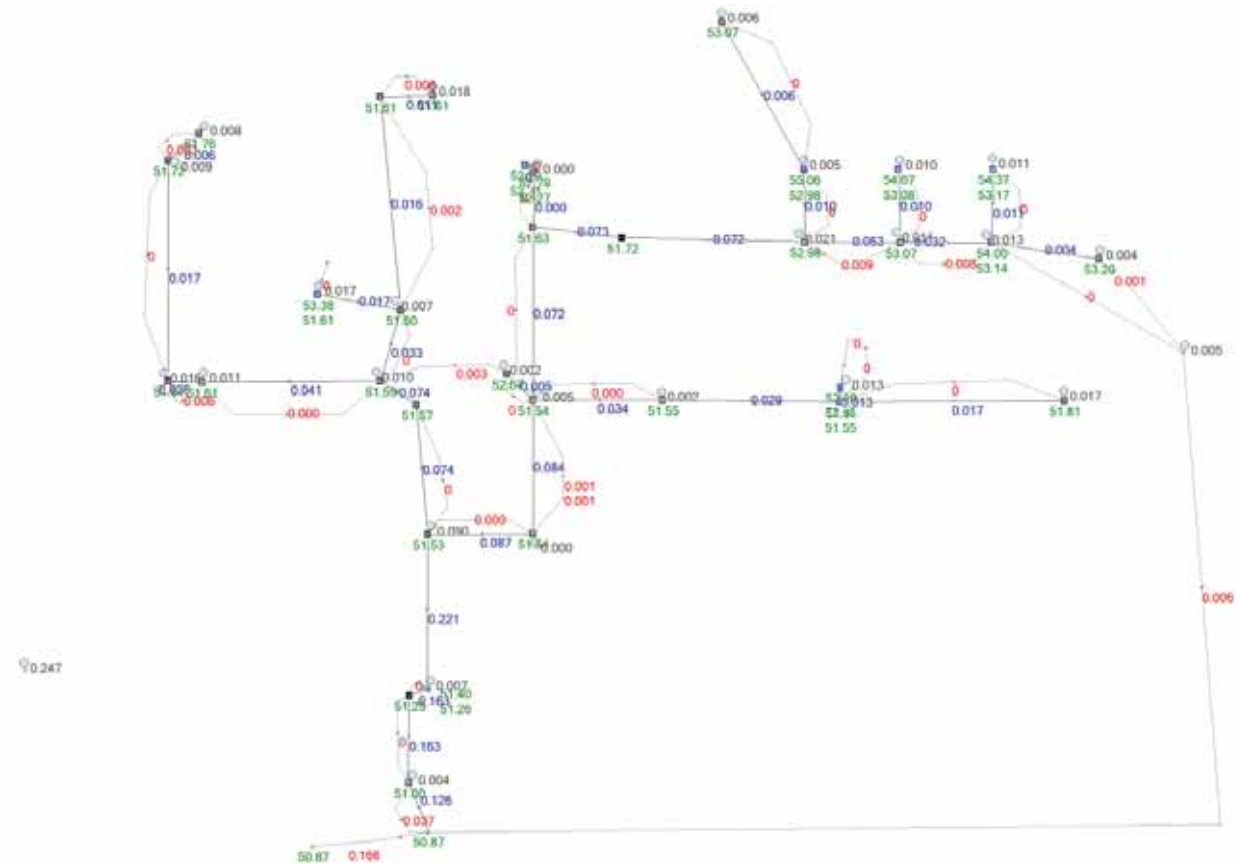

Figure 5 – DRAINS Model- Pre-& Post- Development – 10-year AEP

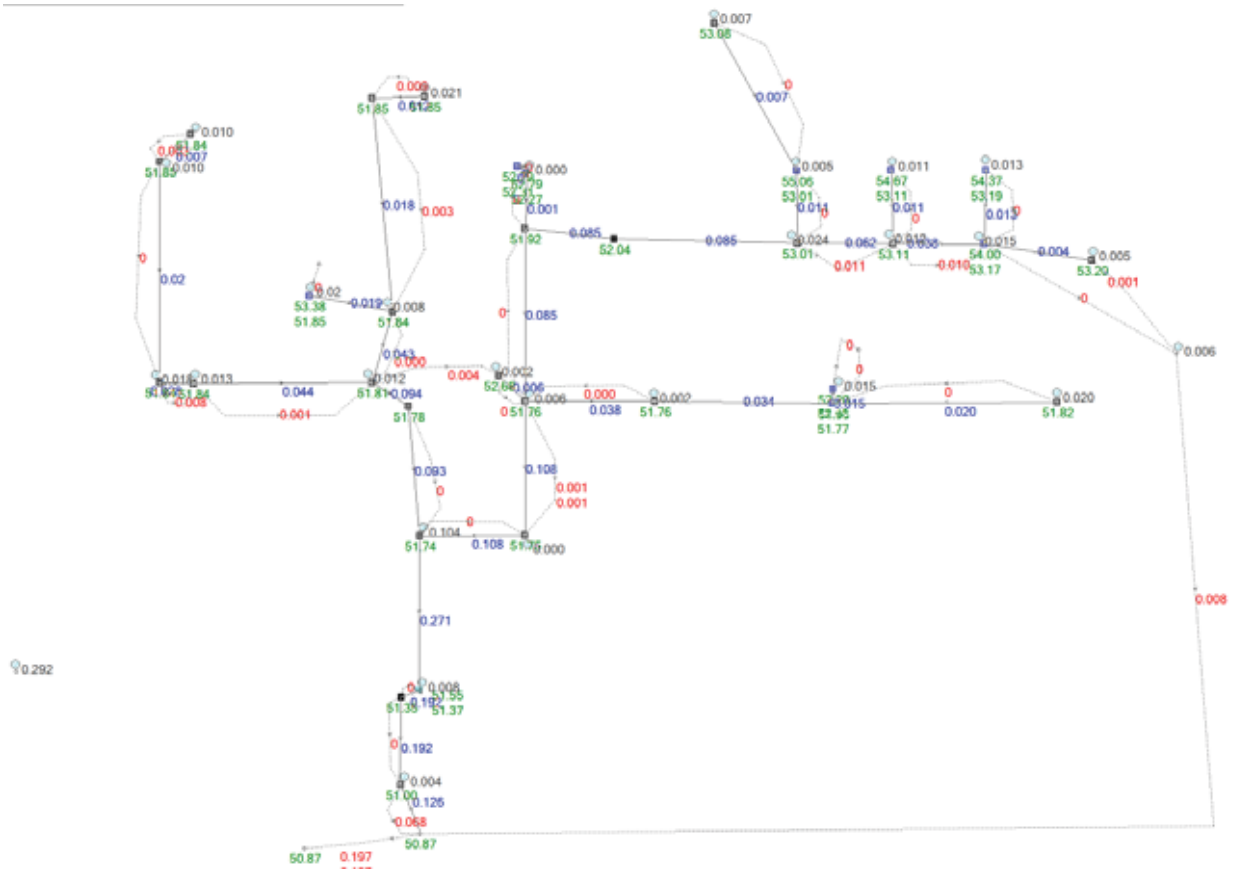

Figure 6 – DRAINS Model- Pre-& Post- Development – 20-year AEP

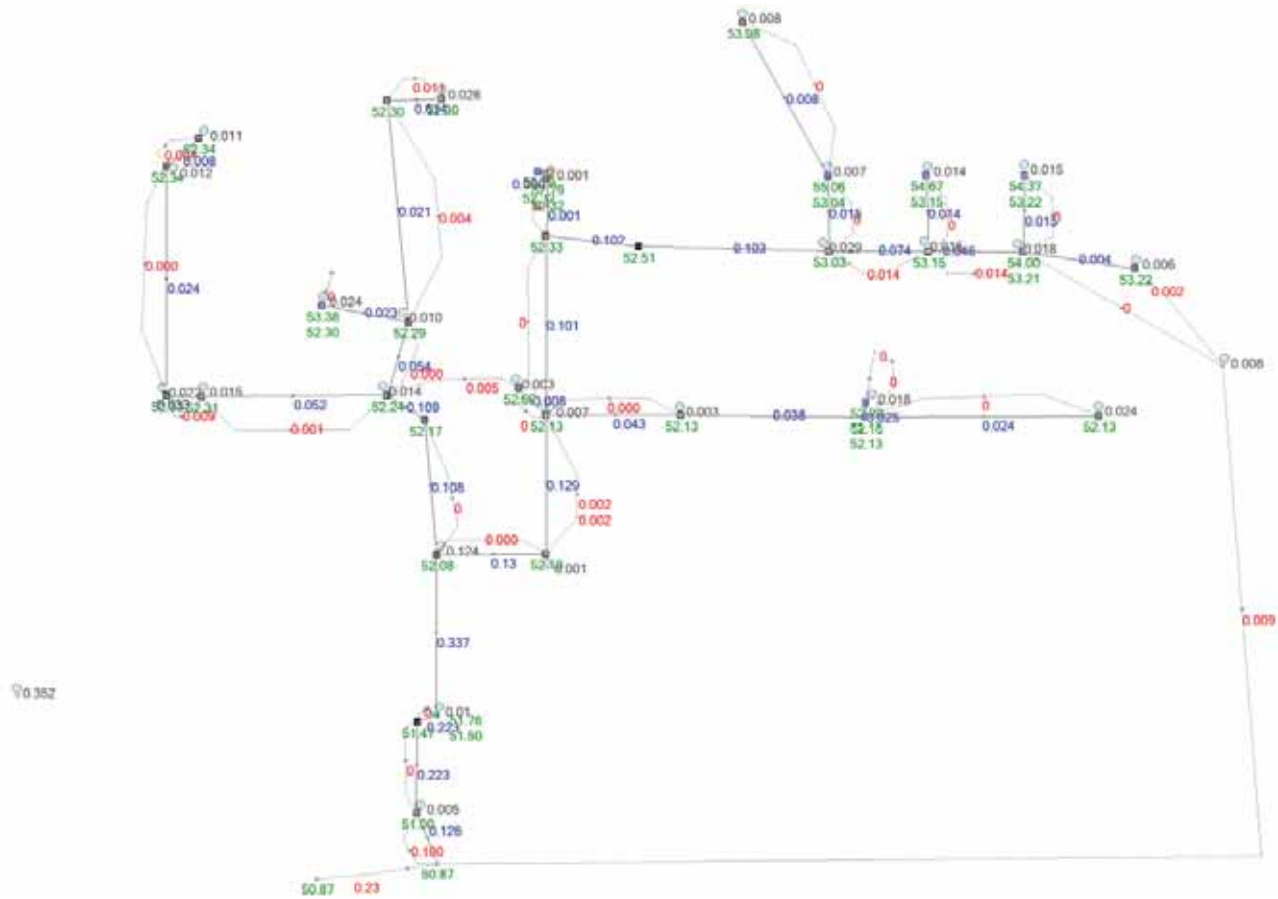

Figure 7 – DRAINS Model- Pre-& Post- Development – 50-year AEP

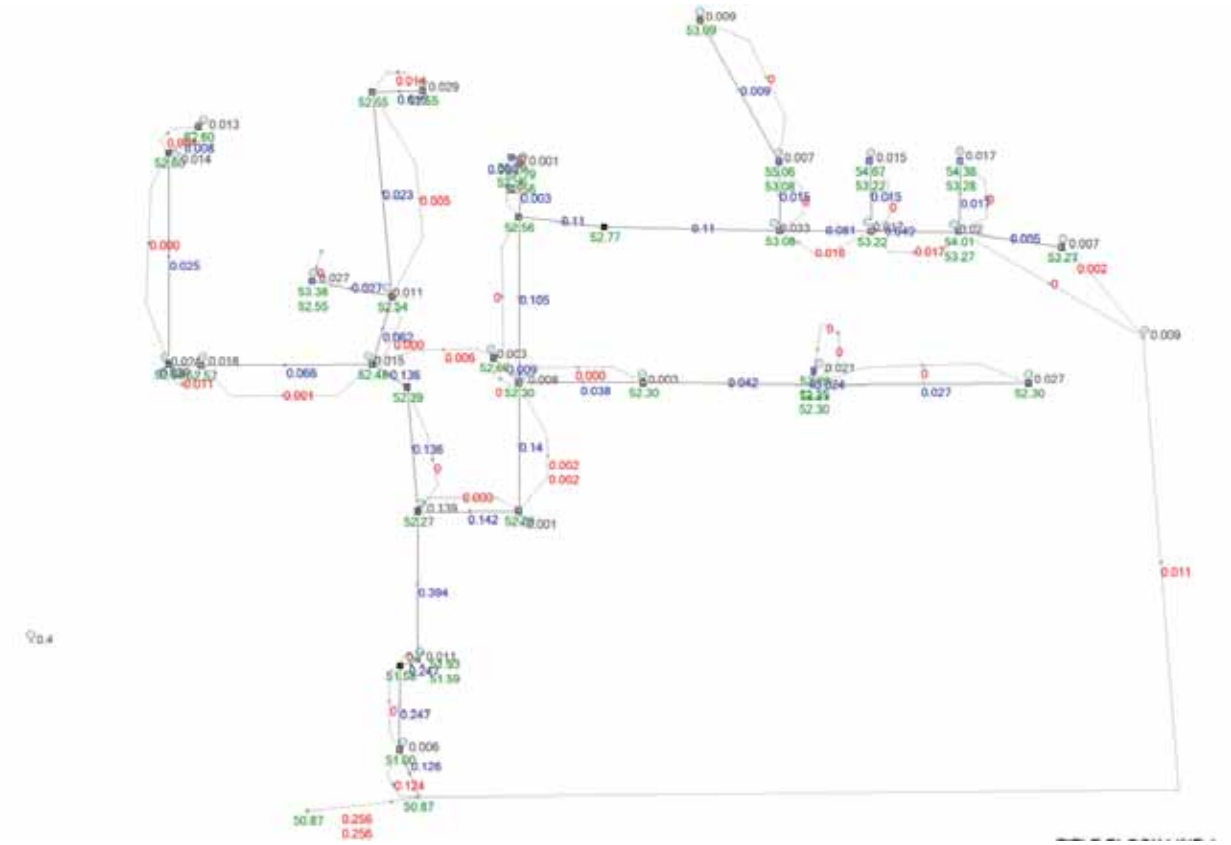

Figure 8 – DRAINS Model- Pre-& Post- Development – 100-year AEP

6.4 Adopted Water Quality Objectives

The main objectives for stormwater quality are indicated in Penrith Council's WSUD Technical Guideline 2015 and are presented in Table 2 below:

Table 2 - Water Quality Targets

Pollutant	% Reduction Post-Development Average Annual Load Reduction
Gross Pollutants	90
Total Suspended Solids (TSS)	85
Total Phosphorous (TP)	60
Total Nitrogen (TN)	45

6.5 Stormwater Quality Management Scheme

The stormwater treatment train has two stages of treatment; pit inlet filter baskets (trash baskets) that will provide pre-treatment by capturing gross pollutants and the coarser suspended solids. The primary treatments are provided by proprietary filter cartridge in the downstream catchment that will remove nutrients such as nitrogen and phosphorous.

6.6 Rainfall Data

For the analysis of the MUSIC modelling, historical rainfall records were obtained from the Bureau of Meteorology for Station No. 67113 Penrith Lakes. The MUSIC analysis was undertaken using a 6 min time step for year 1991 to 2008.

The evapotranspiration values have been entered from the default data provided by the MUSIC software for the Sydney area.

METHODOLOGY

The water quality modelling software MUSIC v6 was used to analyse the performance of the treatment train. *Figure 10* below shows the MUSIC node and link diagram used to describe the proposed treatment train. The model has been built to assess the adequacy of the Stormwater treatment measure proposed and to ensure that the quality of stormwater meets the objectives prior to stormwater runoff leaving the site.

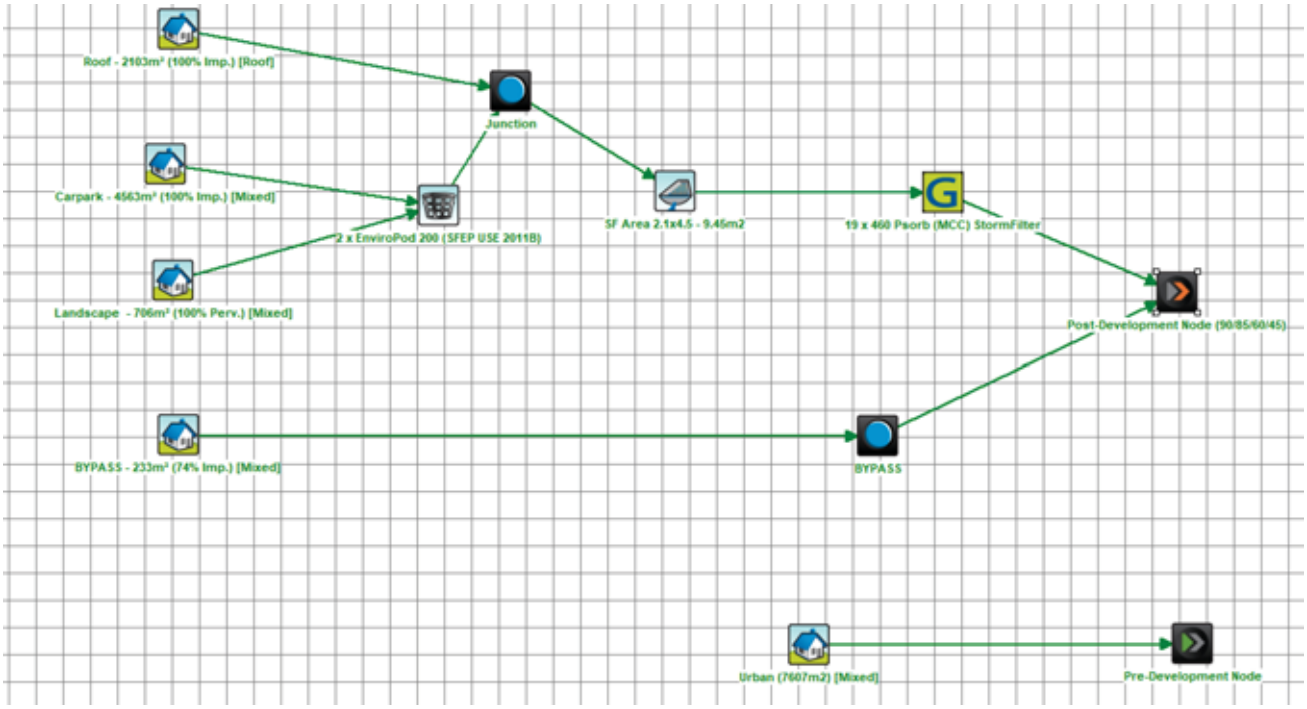

Figure 9 - MUSIC Link and Node Diagram

The following rainfall and runoff parameters shown in Table have been utilised.

Table 3 - Rainfall Runoff Parameters

Parameter	Recommended Values
Rainfall Threshold (mm/day)	1.4
Soil Storage Capacity (mm)	105
Initial Storage (% of Capacity)	30
Field Capacity (mm)	70
Infiltration Capacity Coefficient – a	150
Infiltration Capacity Exponent – b	3.5
Initial Depth (mm)	10
Daily Recharge Rate (%)	25
Daily Baseflow Rate (%)	10
Daily Deep Seepage Rate (%)	0

The pollutant concentration parameters used in the model were based on information provided in “Penrith City Council’s EH 003 Water Sensitive Urban Design (WSUD) Policy 2013. The parameters are listed in below:

6.7 Model Results

The results of the analysis showed the treatment train will achieve the water quality targets set out in Council's DCP. Table 5 below display the effectiveness of the treatment train for the primary and secondary treatment.

The water quality model created using MUSIC software provides an indication of the pollutant removal rates expected when a treatment train of water quality measures is applied to the proposed layout of the development.

Table 4 - MUSIC Model Results

Pollutant	Before Treatment	After Treatment	% Reduction	% Objective	Compliance
Total Suspended Solids (kg/yr)	599	1090	86.5	85	OK
Total Phosphorus (kg/yr)	0.983	1.95	66.5	60	OK
Total Nitrogen (kg/yr)	7.38	9.7	45.8	45	OK
Gross Pollutants (kg/yr)	106	113	97.1	90	OK

6.8 Proposed Stormwater Treatment Train

In order to achieve the reduction targets the following treatment devices are required as part of the treatment train:

- Stormwater360 Enviropod 200 Inserts

Enviropod 200 inserts will be used as a pre-treatment for stormwater runoff to capture litter and coarse sediment surface flows on the site. Enviropod inserts are to be installed on all surface inlet pits across the site. The following capture rates have been adopted for the MUSIC model, based on information provided by Stormwater360:

- TSS 54%
- TN 21%
- TP 30%
- Litter 100%

- 460mm PSorb

Stormfilter cartridges will be used as a primary-treatment for stormwater runoff to capture fine sediment from surface flows on the site. Stormfilters are to be installed within the water quality chamber in the on-site detention tank. The following capture rates have been adopted for the MUSIC model, based on information provided by Stormwater360:

- TSS 93.4%
- TN 55.9%
- TP 86.1%

Refer to **Appendix A** for the location and size of the proposed located systems and information relating to the proposed WSUD products.

7 Conclusion

Based on preliminary investigations, analyses and designs, it is anticipated that there will be no significant issues associated with 1-9 Barber Ave, Kingswood.

The Stormwater Management Plan herein, proposes a series of individual elements arranged in a treatment train consisting of on-lot treatment and street level treatment measures. Suggested structural elements for the development include:

- Stormwater pit filter inserts
- Proprietary filter cartridge systems downstream
- Below-ground detention tank

The stormwater assessment report has been prepared and conform to the requirements of the Penrith City Council's Development Control Plan (DCP) 2014 and Stormwater Drainage Guidelines for Building Developments 2016.

Appendix A – Civil Engineering Plans

NEPEAN PRIVATE HOSPITAL EXPANSION - STAGE 01

CIVIL ENGINEERING WORKS
DEVELOPMENT APPLICATION

SOURCE : NEARMAP.COM.AU (©2018)

LOCALITY PLAN

DRAWING SCHEDULE	
DRG No.	DRAWING TITLE
DAC101.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
DAC101.11	SPECIFICATION NOTES
DAC101.21	GENERAL ARRANGEMENT PLAN
DAC102.01	SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 01
DAC102.02	SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 02
DAC102.11	SEDIMENT AND SOIL EROSION CONTROL DETAILS
DAC103.01	BULK EARTHWORKS PLAN - SHEET 01
DAC103.02	BULK EARTHWORKS PLAN - SHEET 02
DAC104.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01
DAC104.02	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02
DAC104.31	STORMWATER MANAGEMENT DEVICES
DAC107.01	DETAILS SHEET
DAC108.01	CATCHMENT PLAN

DRAWN: J O DESIGNED: N. NAICKER JOB MANAGER: N. NAICKER VERIFIER:

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN

JOB NUMBER: 182350
DRAWING NUMBER: DAC101.01
REVISION: 1
DRAWING SHEET SIZE = A1

NOTE: ALL CIVIL ENGINEERING CONSTRUCTION WORKS TO BE CARRIED OUT IN ACCORDANCE WITH PENRITH CITY COUNCIL DEVELOPMENT GUIDELINES .THE AFOREMENTIONED GUIDELINES INCLUSIVE OF ALL SPECIFICATIONS TAKE PRECEDENCE OVER NOTES PROVIDED BELOW.

STORMWATER DRAINAGE

1. ALL DRAINAGE LINES SHALL BE UPVC (CLASS SN4) SEWER GRADE DRAINAGE PIPE, U.N.O.
2. ALL DRAINAGE LINES SHALL BE LAID AT 1% MIN. FALL, UNO.
3. ALL LEVELS ARE AUSTRALIAN HEIGHT DATUM (AHD).
4. ALL DOWNPIPES GUTTERS TO BE DESIGNED IN ACCORDANCE WITH AS/NZS 3500.3.2 – 2003 'STORMWATER' DRAINAGE.
5. THE STORMWATER DRAINAGE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH AS/NZS 3500.3.2-2003 'STORMWATER' DRAINAGE.
6. ANY VARIATIONS TO THE NOMINATED LEVELS SHALL BE REFERRED TO ENGINEER IMMEDIATELY.
7. SUBSOIL DRAINAGE SHALL BE PROVIDED TO ALL RETAINING WALLS & EMBANKMENTS, WITH THE LINES FEEDING INTO THE STORMWATER DRAINAGE SYSTEM.
8. ALL GRATES TO BE GALVANISED STEEL WITH HINGES AND CHILD PROOF LOCK.
9. ALL GRATES TO BE HEEL SAFE WITHIN AGED CARE DEVELOPMENTS.
10. THE STORMWATER DRAINAGE IS DESIGNED IN ACCORDANCE WITH COUNCILS STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENT.

RAINWATER RE-USE

1. PROVIDE RAINWATER RE-USE SYSTEM TO SUPPLY WATER FOR TOILET FLUSHING.
2. GUTTER GUARD TO BE INSTALLED ON ALL EAVES GUTTERS.
3. A PERMANENT SIGN IS TO BE LOCATED IN THE VICINITY OF THE TANK STATING THE WATER IS "NON POTABLE WATER" WITH APPROPRIATE HAZARD IDENTIFICATION.
4. PIPEWORK USED FOR RAINWATER SERVICES SHALL BE COLOURED LILAC IN ACCORDANCE WITH AS1345.
5. ALL VALVES AND APERTURES SHALL BE CLEARLY AND PERMANENTLY LABELLED WITH SAFETY SIGNS TO COMPLY WITH AS1319.
6. RAINWATER TANK RETICULATION SYSTEM AND MAINS WATER BYPASS ARRANGEMENT TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3500.1.2-2003 AND THE NSW CODE OF PRACTICE : PLUMBING AND DRAINING.
7. A FIRST FLUSH FILTRATION DEVICE IS TO BE PROVIDED AT RAINWATER TANK.

GENERAL NOTES

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH OTHER SUCH WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DIMENSIONS ARE IN MILLIMETRES & ALL LEVELS ARE IN METRES, UNO (UNLESS NOTED OTHERWISE).

NO DIMENSION SHALL BE OBTAINED BY SCALING THE DRAWINGS.

ALL LEVELS AND SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF THE WORK.

DETAIL SURVEY DATA WAS SUPPLIED BY 'MATTHEW FREEBURN – LAND ENGINEERING & MINING SURVEYOR, DRAWING DATED 13.03.2018.

EXISTING SERVICES WHERE SHOWN HAVE BEEN PLOTTED FROM SUPPLIED DATA AND SUCH THEIR ACCURACY CAN NOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF WORK.

ON COMPLETION OF STORMWATER INSTALLATION, ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS, UNLESS DIRECTED OTHERWISE.

ALL STORMWATER MANAGEMENT MEASURES SHOWN ON THIS DRAWING HAVE BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES TO DEMONSTRATE FEASIBILITY. ALL MEASURES WILL BE SUBJECT TO DETAIL DESIGN AT THE CONSTRUCTION CERTIFICATE STAGE AND MAY BE SUBJECT TO VARIATION PROVIDED THAT THE DESIGN INTENT IS MAINTAINED.

DESIGN SUMMARY

CATCHMENT CALCULATIONS:

	PRE-DEVELOPMENT	POST-DEVELOPMENT
TOTAL AREA	7605m²	7605m²
IMPERVIOUS AREA	5345m² (70.3%)	6826m² (89.8%)
PERVIOUS AREA	2260m² (29.7%)	779m² (10.2%)

SITE DISCHARGE CALCULATIONS:

EVENT	PRE-DEVELOPMENT (m³/s)	POST-DEVELOPMENT (m³/s)
20%	0.201	0.145
30%	0.247	0.174
5%	0.29	0.203
2%	0.353	0.239
1%	0.402	0.267
1 EY	0.123	0.145

ON-SITE DETENTION:

DESIGN BASIS:
•• PRE TO POST DEVELOPMENT CONDITIONS

BYPASS AREA/PERCENTAGE = 233m²
ON-SITE DETENTION STORAGE PROVIDED = 95m³

THEREFORE PERMITTED SITE DISCHARGE = 40ZL/s

ON-SITE DETENTION SUMMARY:
•• BELOW GROUND TANK

TOP WATER LEVEL = RL51.95
OVERFLOW LEVEL = RL52.99
OUTLET PIPE CENTERLINE = RL50.80
OUTLET PIPE DIAMETER = Ø375mm

STORMWATER MANAGEMENT REQUIREMENTS HAVE BEEN CALCULATED IN ACCORDANCE WITH PENRITH COUNCIL'S STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENT 2016.

WATER QUALITY:

MUSIC MODEL SUMMARY (REFER NORTHROP REPORT FOR FURTHER DETAILS <IF REPORT PROVIDED).

MUSIC MODEL SUMMARY:

SOURCE NODE	CATCHMENT	AREA
URBAN	ROOF AREA	2103m²
URBAN	CARPARK	4563m²
URBAN	LANDSCAPE	706m²
URBAN	BY-PASS	233m²
		TOTAL 7605m²

TREATMENT NODES:

•• ON-SITE DETENTION TANK
•• STORMWATER 360 'STORMFILTER' CARTRIDGE
•• STORMWATER ENVIROPODS

TREATMENT STANDARDS:

POLLUTANT	REDUCTION STANDARDS	REDUCTION ACHIEVED
GROSS POLLUTANTS	90%	97.1%
TOTAL SUSPENDED SOLIDS	85%	86.5%
TOTAL PHOSPHORUS	60%	66.5%
TOTAL NITROGEN	45%	45.8%

MUSIC MODEL PARAMETERS IN ACCORDANCE WITH PENRITH CITY COUNCIL'S EH003 WATER SENSITIVE URBAN DESIGN (WSUD) POLICY 2013.

H01 POTENTIAL PONDING NOTED ON LOADING DOCK LEVEL IN 100 YEAR STORM EVENT

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
SPECIFICATION NOTES

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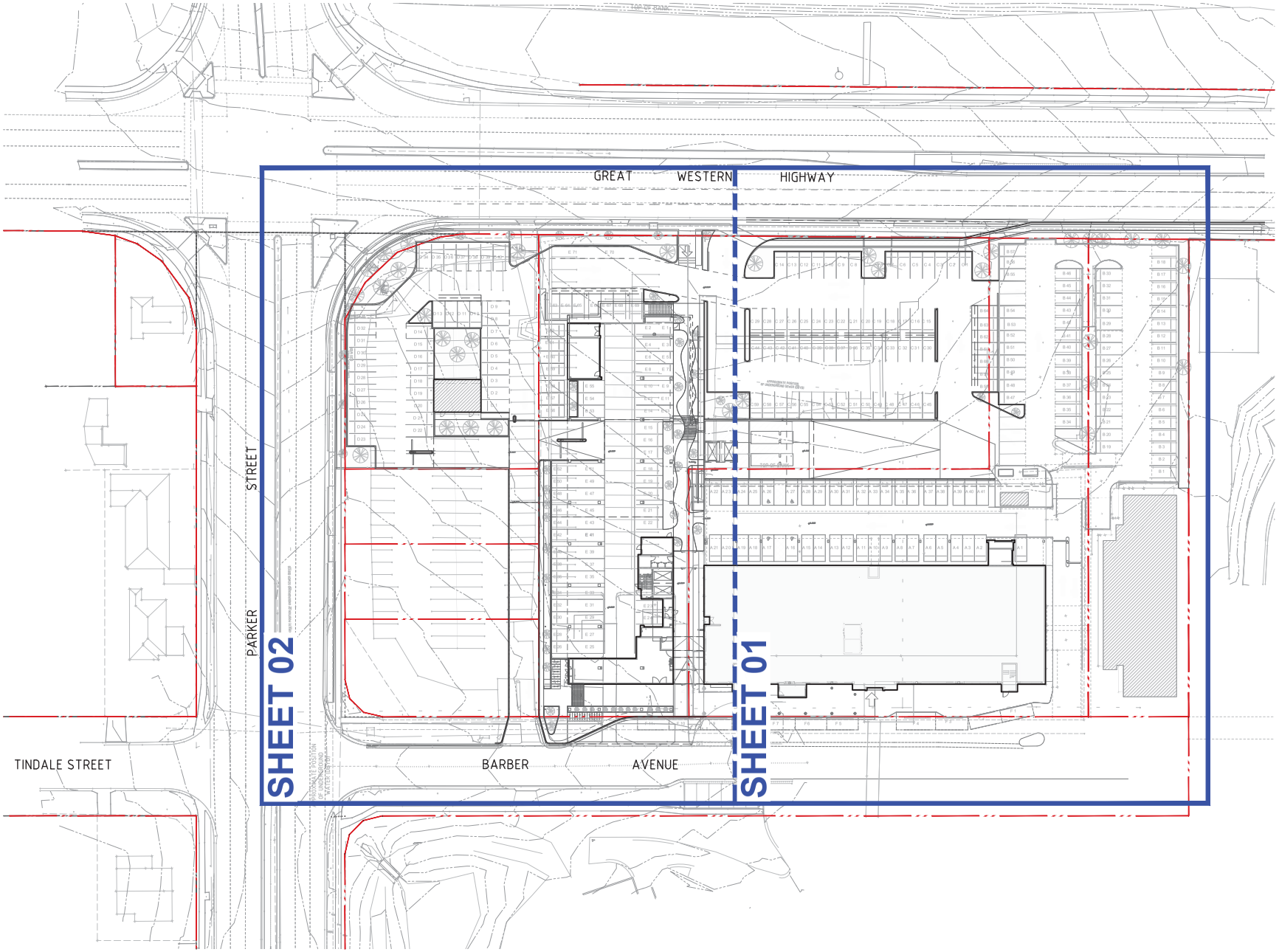
DRAWING NUMBER: DAC101.11
REVISION: 1
DRAWING SHEET SIZE = A1



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Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT
NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE
CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
GENERAL ARRANGEMENT PLAN

JOB NUMBER 182350
DRAWING NUMBER DAC101.21
REVISION 1
DRAWING SHEET SIZE = A1

FOR CONTINUATION REFER TO SHEET DAC102.02

LEGEND

- BOUNDARY LINES
- EASEMENT LINE
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- WIRE MESH AND GRAVEL SEDIMENT FILTER
- DROP INLET SEDIMENT TRAP
- DIVERSION DRAIN (DIRTY)
- STABILISED SITE ACCESS
- STOCKPILE
- SEDIMENT BASIN
- TREES TO BE REMOVED

SEDIMENT BASIN CALCULATIONS:

PARAMATER	ADOPTED VALUE
TOTAL AREA (ha)	0.76
SOIL TEXTURE GROUP	D or F
DESIGN RAINFALL DEPTH (DAYS)	5
DESIGN RAINFALL DEPTH (PERCENTILE)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	27.400
Cv	0.560
SETTLING ZONE VOLUME (m^3)	116.614
SEDIMENT STORAGE VOLUME (m^3)	58.307
TOTAL BASIN VOLUME (m^3)	174.922

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF
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ARCHITECT: SKAr
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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

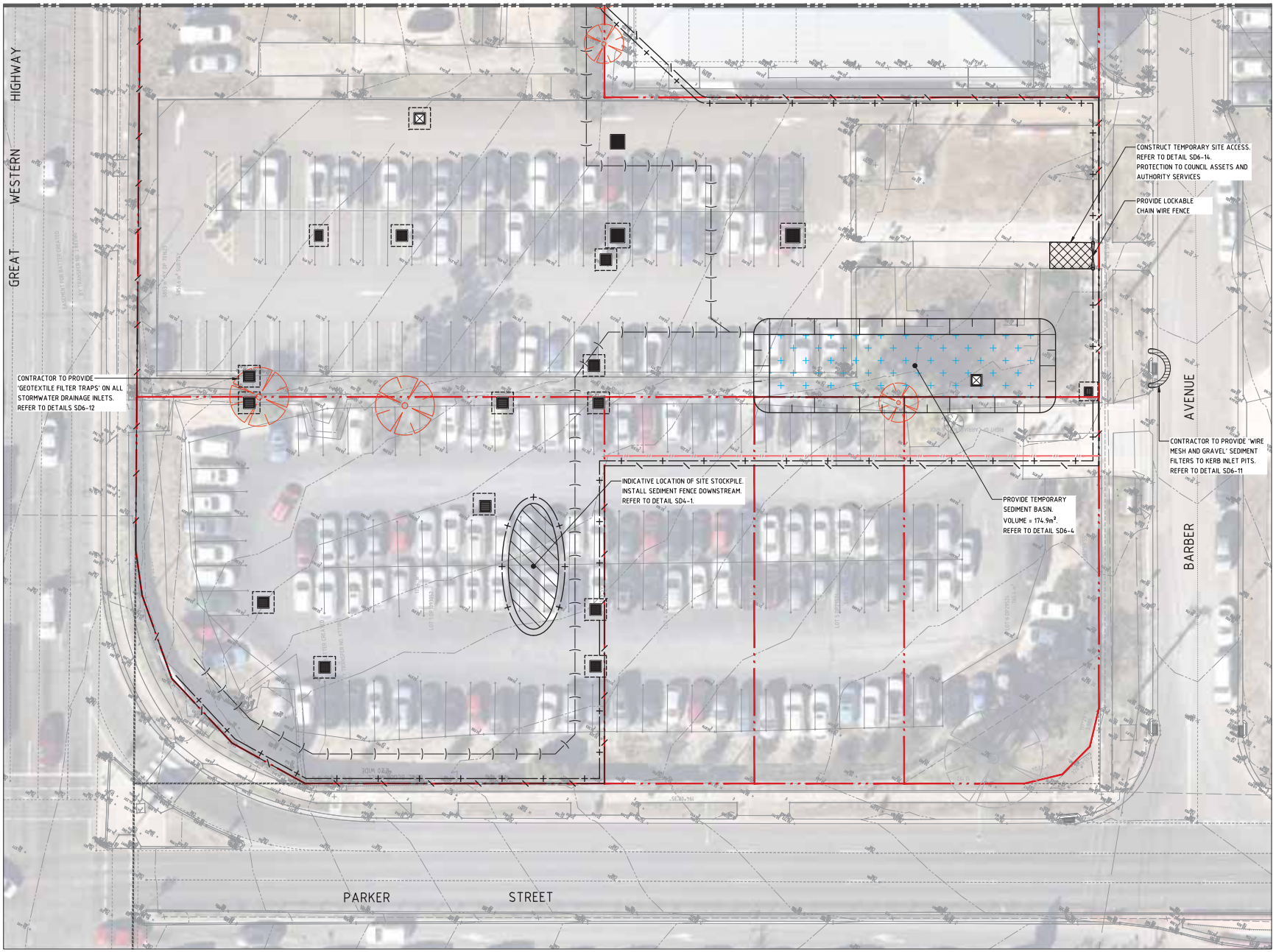
DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 01

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.01
REVISION: 1
DRAWING SHEET SIZE = A1

DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
VERIFIER:

Plotted By : JOHN O
Date : 19.02.2019 11:34 AM
Found : \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawings\3-Northrop\C-CIVIL\3-CADD\CAD FILES\1-DA\1-STAGE 01\182350_DAC102.01.dwg

FOR CONTINUATION REFER TO SHEET DAC102.01



LEGEND

- BOUNDARY LINES
- EASEMENT LINE
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- WIRE MESH AND GRAVEL SEDIMENT FILTER
- DROP INLET SEDIMENT TRAP
- DIVERSION DRAIN (DIRTY)
- STABILISED SITE ACCESS
- STOCKPILE
- SEDIMENT BASIN
- TREES TO BE REMOVED

SEDIMENT BASIN CALCULATIONS:

PARAMATER	ADOPTED VALUE
TOTAL AREA (ha)	0.76
SOIL TEXTURE GROUP	D or F
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NOT FOR CONSTRUCTION

DRAWN: J O DESIGNED: N NAICKER JOB MANAGER: N NAICKER VERIFIER:

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1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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ARCHITECT: SKAr
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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 02

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.02
REVISION: 1
DRAWING SHEET SIZE = A1

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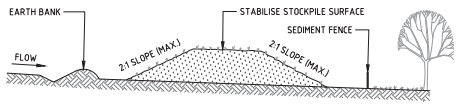
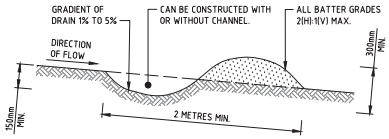
Plotted By : JOHN O
Date : 19.02.2019 11:24 AM



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

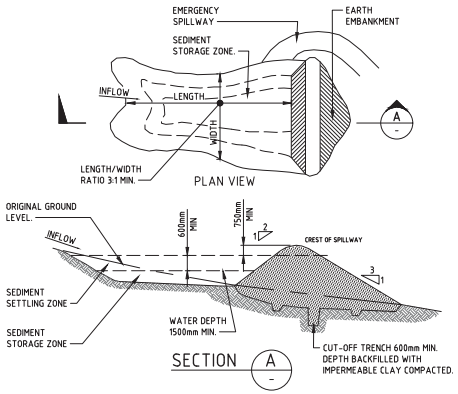


CONSTRUCTION NOTES

1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

NOTE: ONLY TO BE USED AS TEMPORARY BANK
WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

DRAINAGE SWALE - LOW FLOW (SD 5-5)

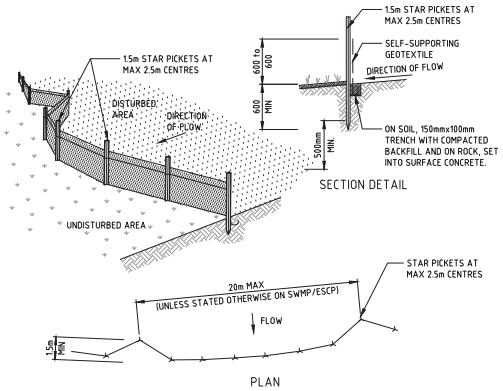


CONSTRUCTION NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95 PER CENT STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

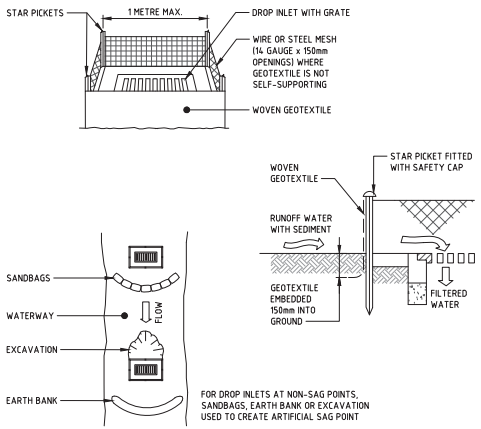
EARTH BASIN - WET (SD 6-4)



CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

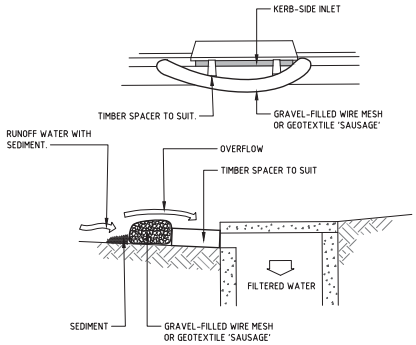
SEDIMENT FENCE (SD 6-8)



CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

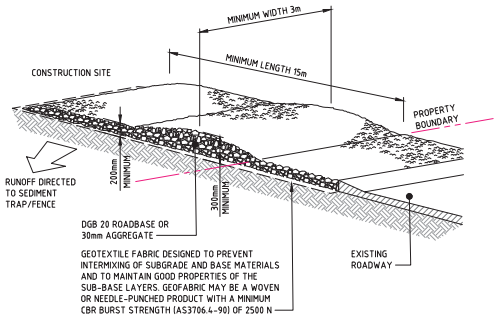
GEOTEXTILE INLET FILTER (SD 6-12)



CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL INLET FILTER (SD 6-11)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)

NOT FOR CONSTRUCTION

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1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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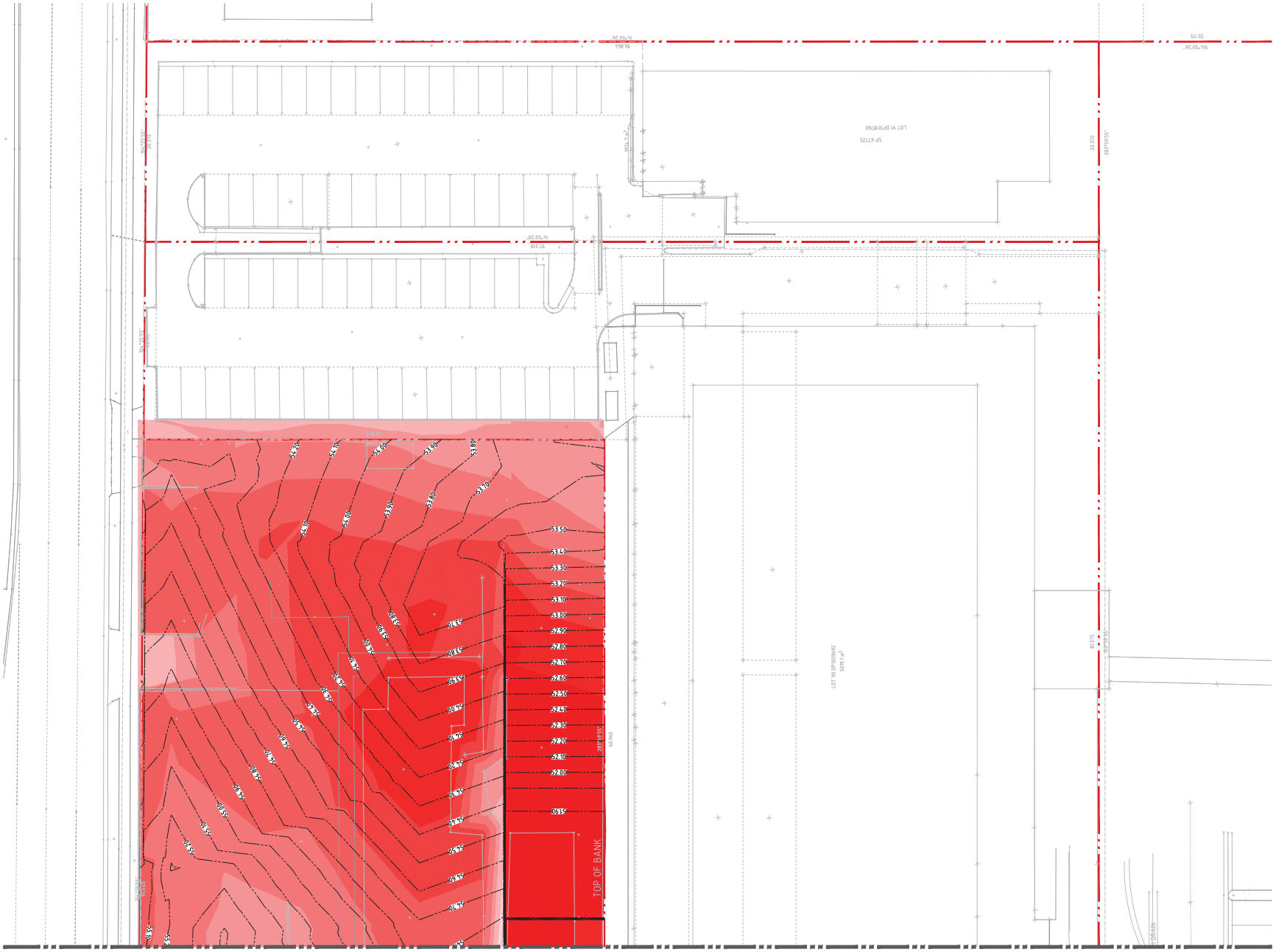
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
SEDIMENT AND SOIL EROSION CONTROL DETAILS

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.11
REVISION: 1
DRAWING SHEET SIZE = A1

DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
VERIFIER:

Plotted By: JOHN O
Date: 19.02.2019 11:34 AM
Found: \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\0-Drawing\0-Northrop\C-CIVIL\2-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC102.11.dwg



FOR CONTINUATION REFER TO SHEET DAC103.02

LEGEND

BOUNDARY LINES

- -999m TO -15.0m
- -15.0m TO -10.0m
- -10.0m TO -5.0m
- -5.0m TO -2.0m
- -2.0m TO -1.0m
- -1.0m TO -0.5m
- -0.5m TO -0.25m
- -0.25m TO -0.0m
- 0.0m TO 0.25m
- 0.25m TO 0.5m
- 0.5m TO 1.0m
- 1.0m TO 2.0m
- 2.0m TO 5.0m
- 5.0m TO 10.0m
- 10.0m TO 15.0m
- 15.0m TO 999m

EARTHWORKS NOTES:

1. REFER SPECIFICATIONS NOTES FOR EARTHWORKS GENERAL REQUIREMENTS.
2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
3. CAD FILES / DTM FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).
4. STRIP EXISTING TOPSOIL IN CONSULTATION WITH THE GEOTECHNICAL ENGINEER / REPORT. NO ALLOWANCE HAS BEEN MADE FOR TOPSOIL/EXISTING PAVEMENT DEMOLITION.
5. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
6. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS AND THE LIKE.
7. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
8. BULK EARTHWORKS VOLUMES ARE BASED ON FINISHED SURFACE LEVELS TRANSLATED DOWN 300mm.
9. APPROXIMATE BULK EARTHWORK VALUES AS FOLLOWS;
   - 9.1. CUT 5,720 cu.m
   - 9.2. FILL 1,845 cu.m
   - 9.3. BALANCE 3,875 cu.m
10. TEMPORARY BATTER SLOPES FOR EXCAVATIONS TO BE IN ACCORDANCE WITH GEOTECHNICAL ENGINEERS ADVICE AND RECOMMENDATIONS. CONTRACTOR TO CONFIRM ADEQUACY WITH GEOTECHNICAL ENGINEER.

GENERAL NOTES:

CUT/FILL SHOWN ON PLAN ARE INDICATIVE ONLY. LEVELS AND VOLUMES ARE TO BE REVIEWED AND REVISED AT 'DETAIL DESIGN' STAGE.

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DRAWN: J O DESIGNED: N. NAICKER JOB MANAGER: N. NAICKER VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
BULK EARTHWORKS PLAN - SHEET 01

JOB NUMBER: 182350

DRAWING NUMBER: DAC103.01 REVISION: 1

DRAWING SHEET SIZE = A1

Date : 19.02.2019 11:34 AM Plotted By : JOHN O Found : \\nt-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawings\D-Northrop\C-CIVIL\C-CADD\C-CAD FILES\1-DAC-STAGE 01\182350_DAC103.01.dwg

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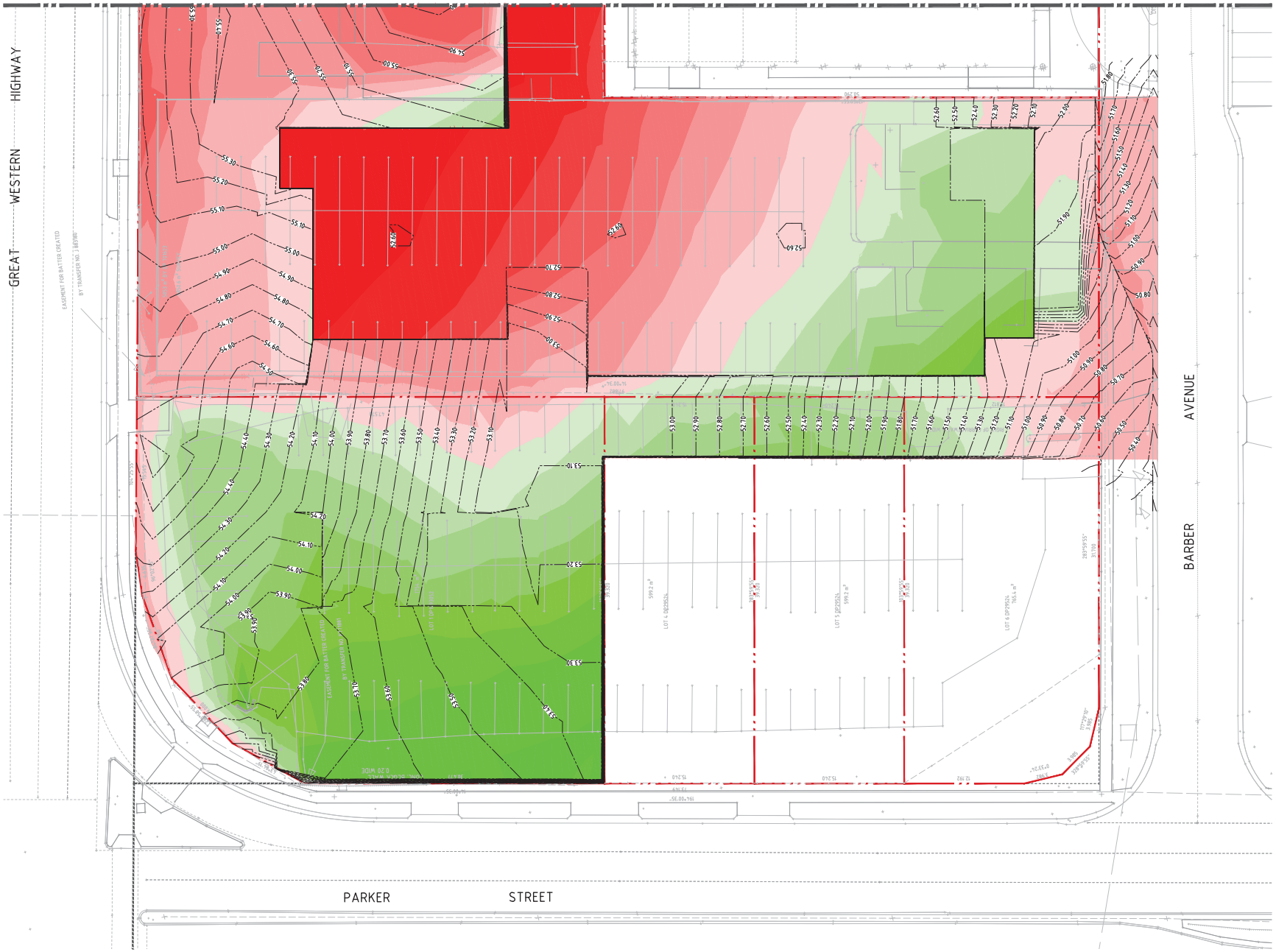

LEGEND

BOUNDARY LINES

- - 999m TO - 15.0m
- - 15.0m TO - 10.0m
- - 10.0m TO - 5.0m
- - 5.0m TO - 2.0m
- - 2.0m TO - 1.0m
- - 1.0m TO - 0.5m
- - 0.5m TO - 0.25m
- - 0.25m TO - 0.0m
- 0.0m TO 0.25m
- 0.25m TO 0.5m
- 0.5m TO 1.0m
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- 10.0m TO 15.0m
- 15.0m TO 999m

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5. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
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8. BULK EARTHWORKS VOLUMES ARE BASED ON FINISHED SURFACE LEVELS TRANSLATED DOWN 300mm.
9. APPROXIMATE BULK EARTHWORK VALUES AS FOLLOWS;
   - 9.1. CUT 5,720 cu.m
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10. TEMPORARY BATTER SLOPES FOR EXCAVATIONS TO BE IN ACCORDANCE WITH GEOTECHNICAL ENGINEERS ADVICE AND RECOMMENDATIONS. CONTRACTOR TO CONFIRM ADEQUACY WITH GEOTECHNICAL ENGINEER.

GENERAL NOTES:

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DRAWN: J O | DESIGNED: N NAICKER | JOB MANAGER: N NAICKER | VERIFIER:

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STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
BULK EARTHWORKS PLAN - SHEET 02

JOB NUMBER: 182350
DRAWING NUMBER: DAC103.02
REVISION: 1
DRAWING SHEET SIZE = A1

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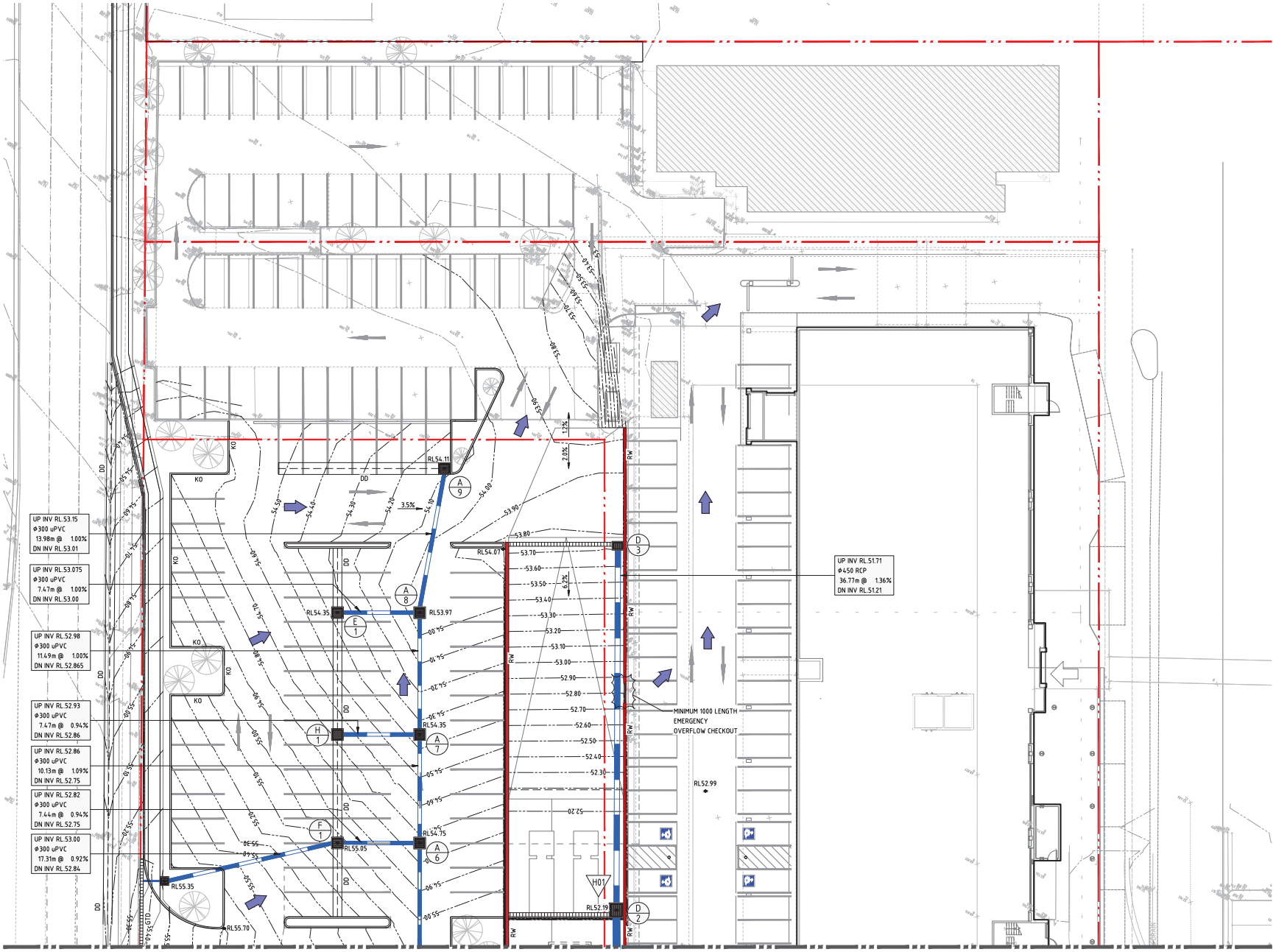
Plotted By : JOHN O
Date : 15.02.2019 11:24 AM



FOR CONTINUATION REFER TO SHEET DAC104.02

LEGEND

- BOUNDARY LINE
- PROPOSED KERB
- EXISTING KERB
- SAWCUT AND PAVEMENT INFILL
- eXX — EXISTING KERB 'TYPE AS BELOW'
- KO — KERB ONLY
- KG — KERB AND GUTTER
- DD — DISH DRAIN
- VC — VEHICULAR CROSSING
- XX.XX — CONTOURS
- EXISTING CONTOURS
- RW — RETAINING WALL
- EXISTING DRAINAGE STRUCTURE
- NEW DRAINAGE STRUCTURE
- STORMWATER PIPE
- WC / OSD — WATER QUALITY CHAMBER / ON-SITE DETENTION TANK
- OVERLAND FLOW PATH

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF

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SCALE 1:200@ A1 (0 2 4 6 8 10m)

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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01

JOB NUMBER: 182350

DRAWING NUMBER: DAC104.01 REVISION: 1

DRAWING SHEET SIZE = A1

DRAWN: J O DESIGNED: N NAICKER JOB MANAGER: N. NAICKER VERIFIER:

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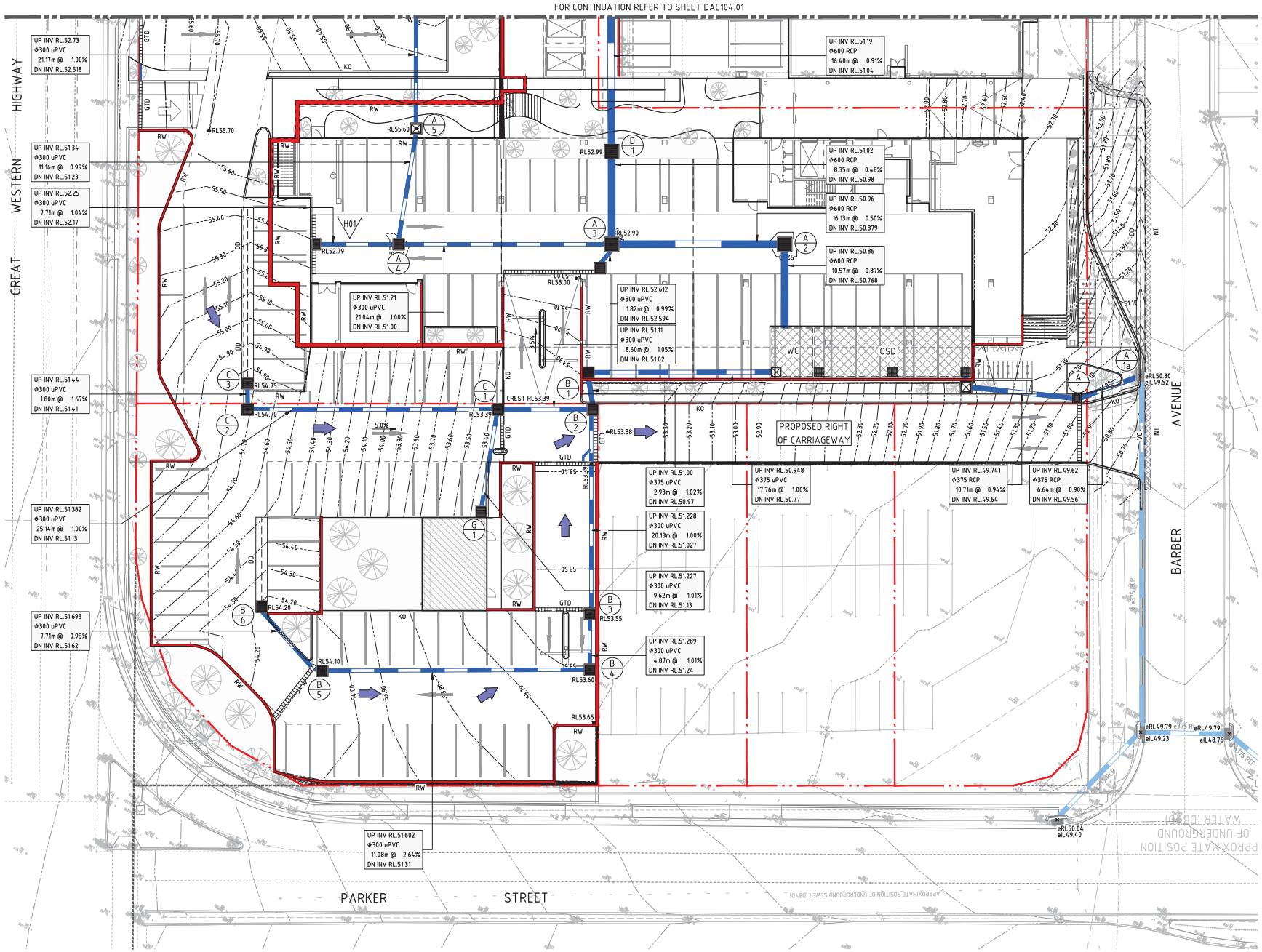
Plotted By : JOHN O

Date : 19.02.2019 11:34 AM



LEGEND

- BOUNDARY LINE
- PROPOSED KERB
- EXISTING KERB
- SAWCUT AND PAVEMENT INFILL
- eXX — EXISTING KERB 'TYPE AS BELOW'
- KO — KERB ONLY
- KG — KERB AND GUTTER
- DD — DISH DRAIN
- VC — VEHICULAR CROSSING
- CONTOURS
- EXISTING CONTOURS
- RW — RETAINING WALL
- EXISTING DRAINAGE STRUCTURE
- NEW DRAINAGE STRUCTURE
- STORMWATER PIPE
- WC / OSD — WATER QUALITY CHAMBER / ON-SITE DETENTION TANK
- OVERLAND FLOW PATH

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02

JOB NUMBER: 182350

DRAWING NUMBER: DAC104.02 — REVISION: 1

DRAWING SHEET SIZE = A1

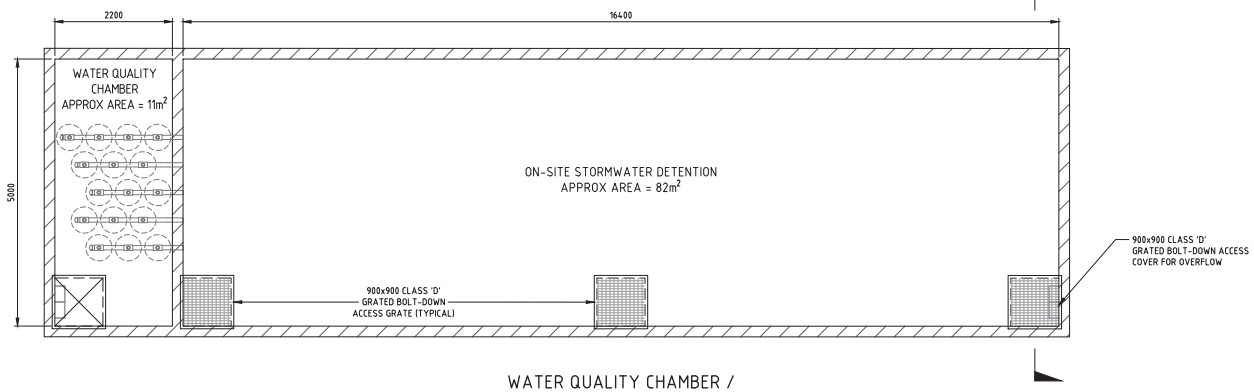
DRAWN: J O — DESIGNED: N NAICKER — JOB MANAGER: N NAICKER — VERIFIER:

Found : /nas-files/Projects/2018 Jobs/182350 - Nepean Private Hospital - Expansion Stage 1\0-Drawing\0-Northrop\C-CIVIL\2-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC104.01.dwg

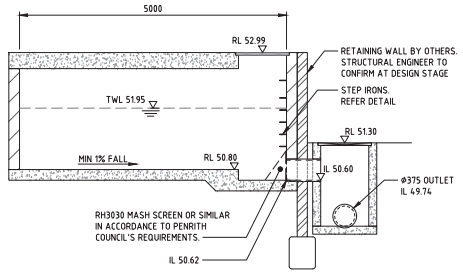
Plotted By : JOHN O

Date : 15.02.2019 11:34 AM

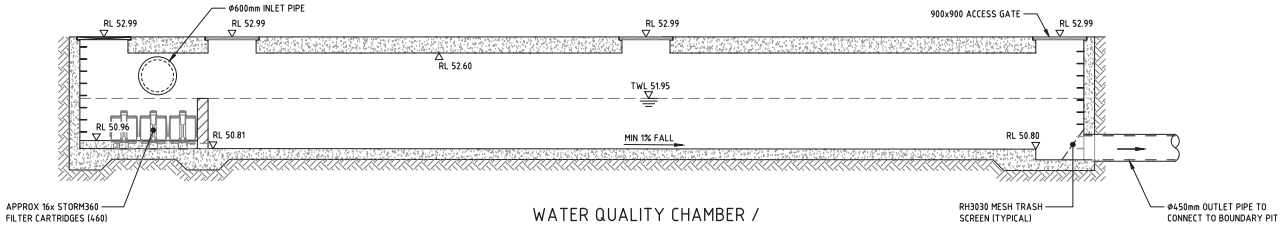
STRUCTURAL ENGINEERS DRAWING FOR OSD/WATER QUALITY CHAMBER TO BE CONFIRMED AT 'DETAILED DESIGN' STAGE



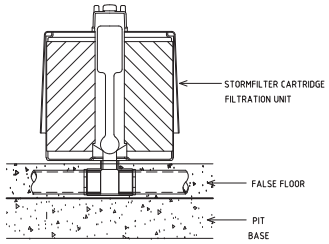
WATER QUALITY CHAMBER / OSD TANK ROOF PLAN



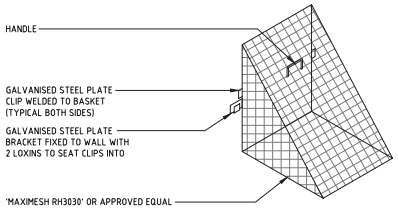
SECTION A
SCALE 1:50



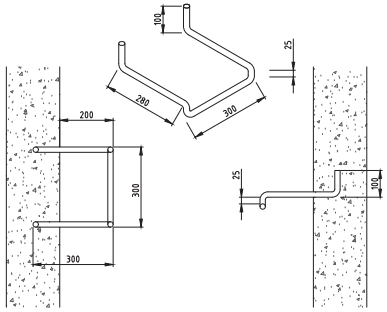
WATER QUALITY CHAMBER / OSD TANK ELEVATION



STORMFILTER CARTRIDGE DETAIL



TRASH SCREEN DETAIL



STEP IRON DETAIL

STEP IRON OF 20mm GALVANISED STEEL MADE TO SHAPE AND DIMENSIONS AS SHOWN, PLACED AT 300 CENTRES AND STAGGERED HORIZONTALLY FOR ALL PITS DEEPER THAN 1.0m. THE USE OF PROPRIETARY STEP IRONS ARE ACCEPTABLE PROVIDED THE PRODUCT IS IN ACCORDANCE WITH AUSTRALIAN STANDARDS

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
STORMWATER MANAGEMENT DEVICES

JOB NUMBER: 182350
DRAWING NUMBER: DAC104.31
REVISION: 1
DRAWING SHEET SIZE = A1

DRAWN: J O
DESIGNED: N NAICKER
JOB MANAGER: N NAICKER
VERIFIER:

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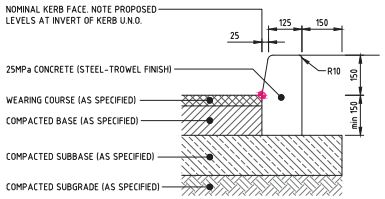
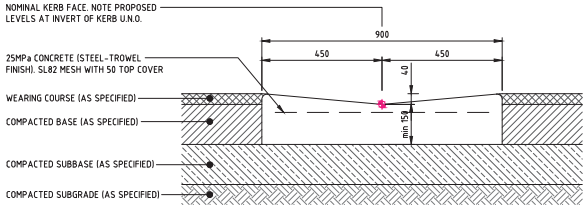
Plotted By : JOHN O
Date : 15.02.2019 11:24 AM



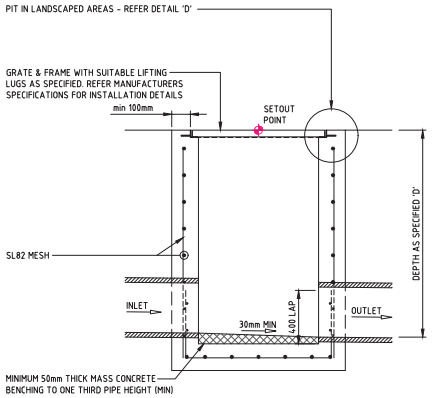
KERB ONLY 'KO'

EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
ALL RADII TO BE 20mm U.N.O.

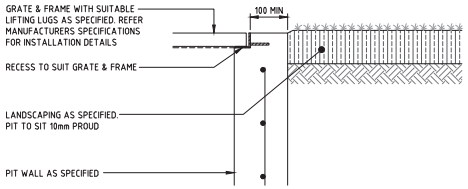


DISH DRAIN - 900 WIDE 'DD'

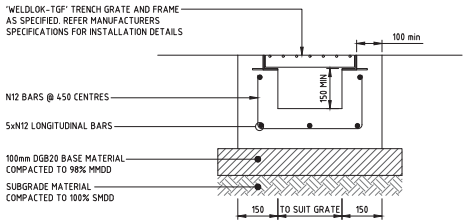
EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
ALL RADII TO BE 20mm U.N.O.



SECTION 1 / -

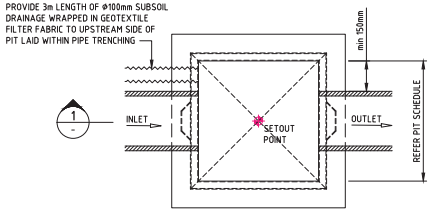


PIT INTERFACE - DETAIL 'D'



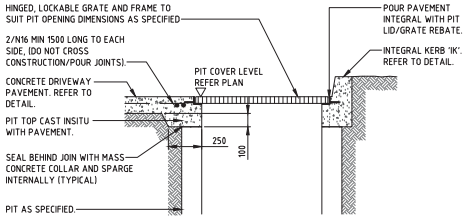
GRATED TRENCH DRAIN 'GTD'

GRATED TRENCH DRAIN TO HAVE MINIMUM 150mm CLEARANCE AND 1% LONGITUDINAL FALL.
GRATE CLASS TO BE CLASS 'B' HEELSAFE IN PEDESTRIAN AREAS AND CLASS 'D' IN TRAFFICKED AREAS UNLESS NOTED OTHERWISE ON PLAN



PLAN
SURFACE INLET 'SIP' / JUNCTION PIT 'JP'

PIT STRUCTURE TO BE 200mm THICK UNLESS SHOWN OTHERWISE. DRILL AND EPOXY PLASTIC PROPRIETARY STEP IRONS IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND MANUFACTURERS SPECIFICATIONS (PITS < 1000mm DEPTH).
REFER PIT INTERFACE DETAIL 'F' FOR CORNER REINFORCEMENT



GRATE AND FRAME
(PIT IN VEHICULAR PAVEMENT)

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DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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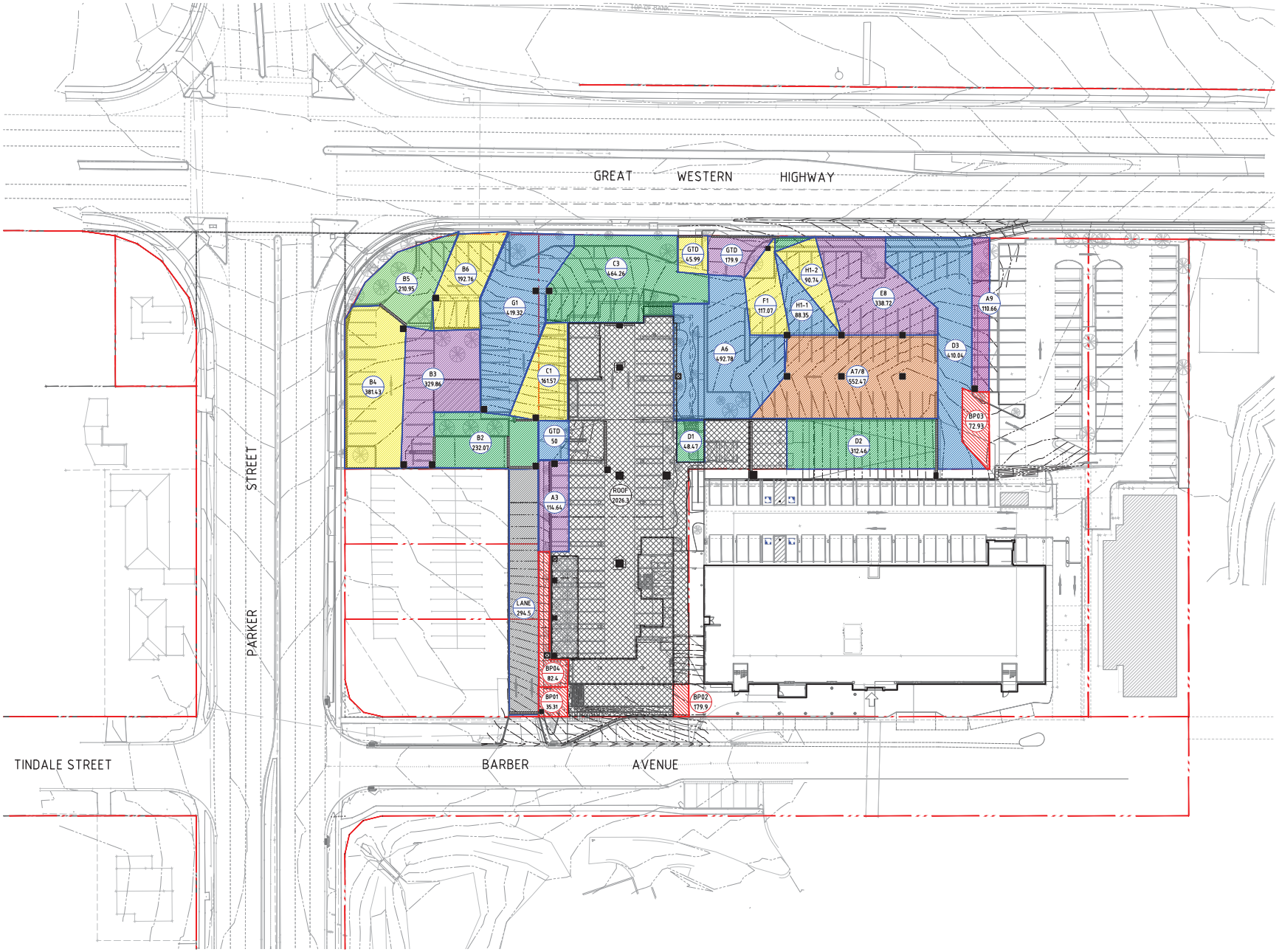
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
DETAILS SHEET

JOB NUMBER: 182350
DRAWING NUMBER: DAC107.01
REVISION: 1
DRAWING SHEET SIZE = A1

Plotted By: JOHN O
Date: 19.02.2019 11:34 AM
Found: \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawing\D-Northrop\C-CIVIL\C-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC107.01.dwg



LEGEND

- PROPOSED BOUNDARY LINE
- CATCHMENT AREA
- PROPOSED ROOF AREA = 2103.026m²
- BYPASS AREA
- 1 / X.XX — STORMWATER PIT TAG / CATCHMENT AREA (m²)

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF

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ARCHITECT: SKAr

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SCALE 1:400@ A1 — 0 4 8 12 16 20m

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — CATCHMENT PLAN

JOB NUMBER: 182350

DRAWING NUMBER: DAC108.01 — REVISION: 1

DRAWING SHEET SIZE = A1

DRAWN: J O — DESIGNED: N. NAICKER — JOB MANAGER: N. NAICKER — VERIFIER:

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Plotted By : JOHN O — Date : 19.02.2019 11:34 AM

Appendix B – Penrith Council MUSIC Link

PENRITH CITY COUNCIL

music link

MUSIC-*link* Report

Project Details		Company Details	
Project:	Nepean Private Hospital Expansion Stage 1	**Company:**	Northrop Consulting Engineers Pty Ltd
Report Export Date:	12/4/2018	**Contact:**	Neville Naicker
Catchment Name:	11555 - Nepean Hospital Expansion CSSD (Preliminary Design) v3	**Address:**	L2 3 Horwood Place Parramatta NSW 2150
Catchment Area:	0.759ha	**Phone:**	02 9156 3030
Impervious Area*:	89.98%	**Email:**	NNaicker@northrop.com.au
Rainfall Station:	67113 PENRITH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	691mm		
Evapotranspiration:	1158mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.31		
Study Area:	Penrith		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Post-Development Node (90/85/60/45)	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	-0.000178%	Sedimentation Basin Node	4	Urban Source Node	5
TSS	86.5%	GPT Node	1		
TP	67%	Generic Node	5		
TN	45.6%				
GP	97.1%				

Comments

- Roof node base flow values are as per the MUSIC modelling guidelines which indicate base flow has no effect for impervious areas and therefore no value is needed.
- The 'SF Chamber' detention node (sedimentation basin) has been modified to represent a tank to hold volume for use with the Stormwater360 filter. k values has been set to 1 to prevent the tank from "treating" the flow as it would within a grassed above ground OSD.

PENRITH
CITY COUNCIL

music link

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	2 x EnviroPod 200 (SFEP USE 2011B)	Hi-flow bypass rate (cum/sec)	None	99	0.04
Post	Post-Development Node (90/85/60/45)	% Load Reduction	None	None	-0.00
Post	Post-Development Node (90/85/60/45)	GP % Load Reduction	90	None	97.1
Post	Post-Development Node (90/85/60/45)	TN % Load Reduction	45	None	45.6
Post	Post-Development Node (90/85/60/45)	TP % Load Reduction	60	None	67
Post	Post-Development Node (90/85/60/45)	TSS % Load Reduction	85	None	86.5
Pre	Pre-Development Node	% Load Reduction	None	None	0
Sedimentation	SF Area 2.1x4.5 - 4.5m2	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Area 2.1x4.5 - 9.45m2	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Area 2.1x4.5 - 9.45m2	High Flow Bypass Out (ML/yr)	None	None	0
Sedimentation	SF Area 2.1x4.5 - 9.45m2	High Flow Bypass Out (ML/yr)	None	None	0
Urban	BYPASS - 233m^2 (74% Imp.)	Area Impervious (ha)	None	None	0.017
Urban	BYPASS - 233m^2 (74% Imp.)	Area Pervious (ha)	None	None	0.005
Urban	BYPASS - 233m^2 (74% Imp.)	Total Area (ha)	None	None	0.023
Urban	Carpark - 4563m^2 (100% Imp.)	Area Impervious (ha)	None	None	0.456
Urban	Carpark - 4563m^2 (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Carpark - 4563m^2 (100% Imp.)	Total Area (ha)	None	None	0.456
Urban	Landscape - 706m^2 (100% Perv.)	Area Impervious (ha)	None	None	0
Urban	Landscape - 706m^2 (100% Perv.)	Area Pervious (ha)	None	None	0.07
Urban	Landscape - 706m^2 (100% Perv.)	Total Area (ha)	None	None	0.07
Urban	Roof - 2103m^2 (100% Imp.)	Area Impervious (ha)	None	None	0.21
Urban	Roof - 2103m^2 (100% Imp.)	Area Pervious (ha)	None	None	0
Urban	Roof - 2103m^2 (100% Imp.)	Total Area (ha)	None	None	0.21
Urban	Urban (7607m2)	Area Impervious (ha)	None	None	0.532
Urban	Urban (7607m2)	Area Pervious (ha)	None	None	0.229
Urban	Urban (7607m2)	Total Area (ha)	None	None	0.762

Only certain parameters are reported when they pass validation

PENRITH
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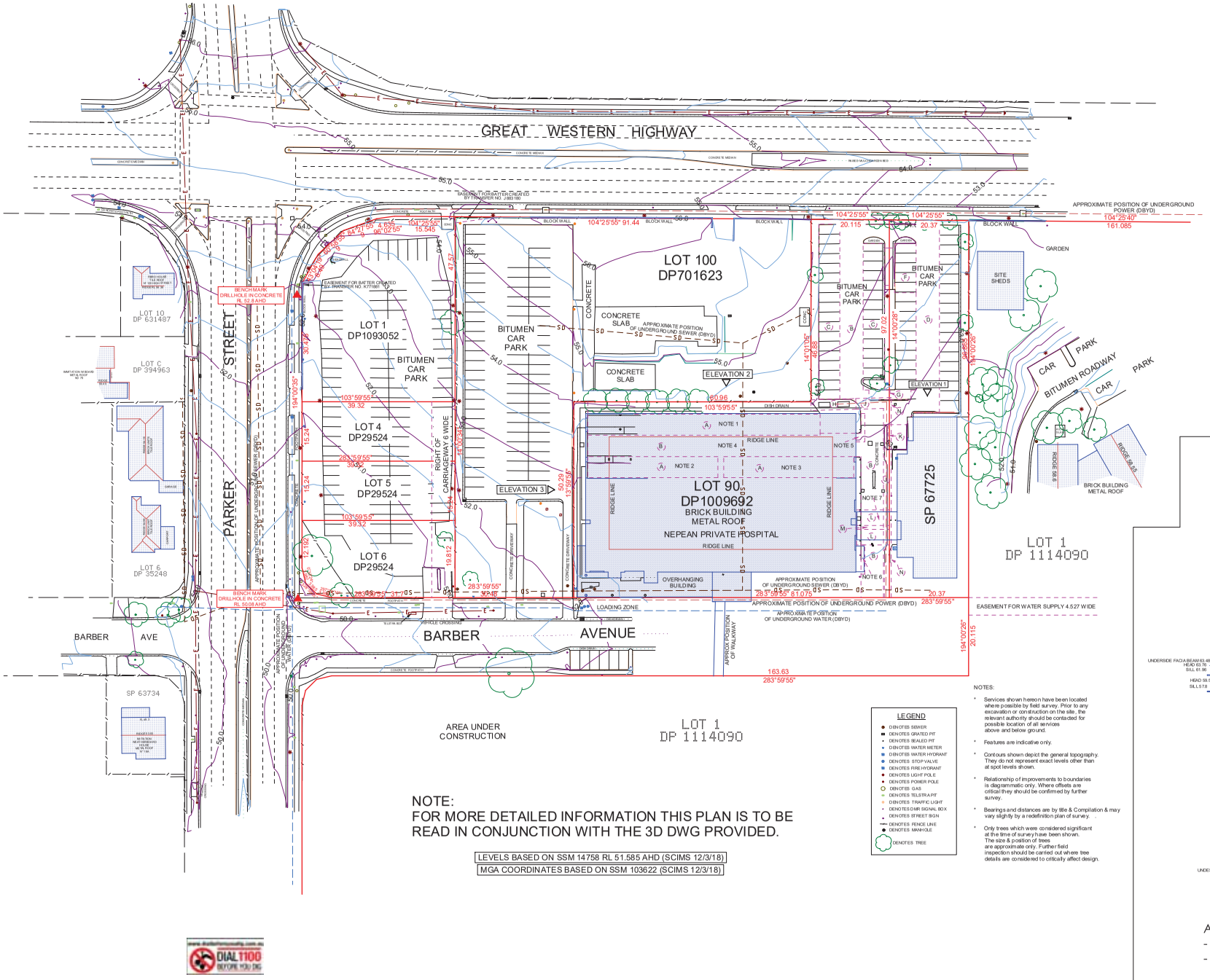
music link

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Pre	Pre-Development Node	GP % Load Reduction	90	None	0
Pre	Pre-Development Node	TN % Load Reduction	45	None	0
Pre	Pre-Development Node	TP % Load Reduction	60	None	0
Pre	Pre-Development Node	TSS % Load Reduction	85	None	0
Sedimentation	SF Area 2.1x4.5 - 4.5m2	Notional Detention Time (hrs)	8	12	0.133
Sedimentation	SF Area 2.1x4.5 - 4.5m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 4.5m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 4.5m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Notional Detention Time (hrs)	8	12	0.115
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Notional Detention Time (hrs)	8	12	0.104
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Notional Detention Time (hrs)	8	12	0.095
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Sedimentation	SF Area 2.1x4.5 - 9.45m2	Total Suspended Solids - k (m/yr)	8000	8000	1
Urban	Roof - 2103m^2 (100% Imp.)	Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.11
Urban	Roof - 2103m^2 (100% Imp.)	Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.85

Only certain parameters are reported when they pass validation

Appendix C – Site Survey Plan



SEE DP 1032826 FOR EASEMENTS

(A) RIGHT OF PARKING 5.4 WIDE

(B) RIGHT OF CARRIAGEWAY 5.5, 6 & VARIABLE WIDTH

(C) RIGHT OF PARKING 5.4 WIDE & VARIABLE

(D) RIGHT OF CARRIAGEWAY 6 WIDE & VARIABLE

(H) EASEMENT FOR PADMOUNT SUBSTATION 2.75 WIDE

(G) RIGHT OF PARKING 0.16 WIDE

(J) EASEMENT FOR UNDERGROUND CABLES 1.5 & 2.75 WIDE

(F) RIGHT OF PARKING 5.55 WIDE

(N) EASEMENT FOR UNDERGROUND CABLES 1 WIDE

(M) EASEMENT FOR GAS MAINS 1 WIDE

(L) EASEMENT FOR OVERHANGING CANOPY 9 WIDE

NOTE 1 THIS PART OF (A) LIES BETWEEN HORIZONTAL PLANES AT RL 52.8 & RL 55.4 AHD

NOTE 2 THIS PART OF (A) LIES BETWEEN HORIZONTAL PLANES AT RL 52.8 & RL 55.4 AHD

NOTE 3 THIS PART OF (A) LIES BETWEEN HORIZONTAL PLANES AT RL 52.8 & RL 55.2 AHD

NOTE 4 THIS PART OF (B) LIES BETWEEN HORIZONTAL PLANES AT RL 52.8 & RL 56.2 AHD

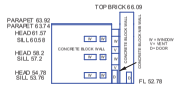
NOTE 5 THIS PART OF (B) EXTENDS IN HEIGHT TO A HORIZONTAL PLANE AT RL 56.7 AHD & IS UNLIMITED IN DEPTH

NOTE 6 THIS PART OF (B) EXTENDS IN HEIGHT TO A HORIZONTAL PLANE AT RL 56.7 AHD & IS UNLIMITED IN DEPTH

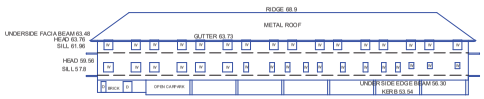
NOTE 7 THIS PART OF (B) EXTENDS IN HEIGHT TO A HORIZONTAL PLANE AT RL 56.5 AHD & IS UNLIMITED IN DEPTH

ELEVATIONS

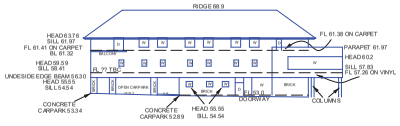
ELEVATION 1



ELEVATION 2



ELEVATION 3



NOTES:

- Services shown hereon have been located where possible by field survey. Prior to any excavation or construction on the site, the relevant authority should be contacted for possible location of all services above and below ground.
- Features are indicative only.
- Contours shown depict the general topography. They do not represent exact levels other than at spot levels shown.
- Relationship of improvements to boundaries is diagrammatic only. Where offsets are critical they should be confirmed by further survey.
- Bearings and distances are by title & Compilation & may vary slightly by a redefinition plan of survey.
- Only trees which were considered significant at the time of survey have been shown. The size & position of trees are approximate only. Further field inspection should be carried out where tree details are considered to critically affect design.

LEGEND

- DENOTES SEWER
- DENOTES GRATED PIT
- DENOTES SEALED PIT
- DENOTES WATER METER
- DENOTES WATER HYDRANT
- DENOTES STOP VALVE
- DENOTES FIRE HYDRANT
- DENOTES LIGHT POLE
- DENOTES POWER POLE
- DENOTES GAS
- DENOTES TELSTRA PIT
- DENOTES TRAFFIC LIGHT
- DENOTES CMR SIGNAL BOX
- DENOTES STREET SIGN
- DENOTES FENCE LINE
- DENOTES MANHOLE
- DENOTES TREE

NOTE:
FOR MORE DETAILED INFORMATION THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE 3D DWG PROVIDED.

LEVELS BASED ON SSM 14758 RL 51.585 AHD (SCIMS 12/3/18)

MGA COORDINATES BASED ON SSM 103622 (SCIMS 12/3/18)

AMENDMENTS
- SURVEY UPDATED 13/3/2018
- SURVEY UPDATED 23/11/2018

Client: HEALTHSCOPE	Project: PLAN SHOWING DETAIL, LEVELS & CONTOURS OVER VARIOUS LOTS AT THE CORNER OF THE GWH AND PARKER STREET (NEPEAN PRIVATE HOSPITAL) KINGSWOOD-PENRITH	FREEBURN SURVEYING	MATTHEW FREEBURN LAND, ENGINEERING & MINING SURVEYOR SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE" 2 CASTLEREAGH STREET PENRITH 2750	Telephone 02 4721 2289 Fax 02 4721 5646 email matthew@freeburnsurveyors.com	Date: 19/11/2009 · Ref: 36331 · Sheet 1 of 1 Scale 1: 500 · Datum: AHD · Contour: 0.5 INT Surveyor: RW/TB · Drawn By: RW/TB · Checked: MF DATA - 36331 · A1 SHEET

Appendix D – Maintenance Schedule

On-site Detention (OSD)

Generally

Commercial/Industrial/Mixed Developments:

- Inspect system every 3 months and after heavy rainfall;
- Clean system as required, generally at least once every 6 months.

Maintenance Action	Frequency	Responsibility	Procedure
Discharge Control Pit (DCP)			
Inspect & remove any blockage of orifice	6 monthly	Owner	Remove grate/cover and screen to inspect orifice. See plan for location of DCP.
Check attachment of orifice plate to wall of pit (gaps less than 5 mm)	Annually	Contractor	Remove grate/cover and screen. Ensure plate mounted securely, tighten fixings if required. Seal gaps as required.
Check orifice diameter correct and retains sharp edge	5 yearly	Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Inspect screen and clean	6 monthly	Owner	Remove grate/cover and screen if required to clean it.
Check attachment of screen to wall of pit	Annually	Contractor	Remove grate/cover and screen. Ensure screen fixings secure. Repair as required.
Check screen for corrosion	Annually	Contractor	Remove grate/cover and examine screen for rust or corrosion, especially at corners or welds.
Where applicable: Inspect flap valve & remove any blockage	6 monthly	Owner	Remove grate/cover. Ensure flap valve moves freely and remove any blockages or debris.
Where applicable: Check attachment of flap valve to wall of pit	Annually	Contractor	Remove grate/cover. Ensure fixings of valve are secure.
Where applicable: Check flap valve seals against wall of pit	Annually	Contractor	Remove grate/cover. Fill pit with water and check that flap seals against side of pit with minimal leakage.

Where applicable: Check any hinges of flap valve move freely	6 monthly	Contractor	Remove grate/cover. Test valve hinge by moving flap to full extent.
Inspect overflow weir/pipe & remove any blockage	6 monthly	Contractor	Remove grate/cover. Ventilate underground storage if present. Ensure weir/pipe clear of blockages.
Empty basket at overflow weir (if present)	6 monthly	Contractor	Remove grate/cover. Ventilate underground storage if present. Empty basket, check fixings secure and not corroded.
Inspect DCP walls (internal and external, if appropriate) for cracks or spalling	Annually	Contractor	Remove grate/cover to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect DCP sump (if present) & remove any sediment/sludge	6 monthly	Owner	Remove grate/cover and screen. Remove sediment/sludge build-up and check orifice and flap valve (where applicable) clear.
Inspect grate/cover for damage or blockage	6 monthly	Owner	Check both sides of grate for corrosion, (especially corners and welds) damage or blockage. Check cover for damage where applicable.
Where applicable: Inspect return pipe from storage & remove any blockage	6 monthly	Owner	Remove grate/cover and screen. Ventilate underground storage if present. Open flap valve and remove any blockages in return line. Check for sludge/debris on upstream side of return line.
Inspect outlet pipe & remove any blockage	6 monthly	Contractor	Remove grate/cover and screen. Ventilate underground storage if present. Check orifice and remove any blockages in outlet pipe. Flush outlet pipe to confirm it drains freely. Check for sludge/debris on upstream side of return line where applicable.
Where applicable: Check step irons for corrosion	Annually	Contractor	Remove grate/cover. Examine step irons and repair any corrosion or damage.
Where applicable: Check fixing of step irons is secure	6 monthly	Contractor	Remove grate/cover and ensure fixings secure prior to placing weight on step iron.

Storage			
Inspect & remove any sediment/sludge in pit	6 monthly	Owner	Remove grate/cover and screen. Remove sediment/sludge build-up.
Inspect internal walls (and external, if appropriate) for cracks or spalling	Annually	Contractor	Remove grate/cover to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect & remove any debris/litter/mulch etc blocking further grates	6 monthly	Owner	Remove blockages from grate and check if pit blocked.
Inspect storage areas & remove debris/mulch/litter etc likely to block screens/grates	6 monthly	Owner	Remove debris and floatable material likely to be carried to grates.
Compare storage volume to volume approved. (Rectify if loss > 5%)	Annually	Contractor	Compare actual storage available with Work-as Executed plans. If volume loss is greater than 5%, arrange for reconstruction to replace the volume lost. Council to be notified of the proposal.
Inspect storages for subsidence near pits	Annually	Contractor	Check along drainage lines and at pits for subsidence likely to indicate leakages.

References:

(1) *On-site Stormwater Detention Handbook, Upper Parramatta River Catchment Trust, Third Edition.*

Water Quality Treatment

EnviroPod Pit Inserts

Maintenance Action	Frequency	Responsibility	Procedure
Inspection	Monthly and after Major Storms	Owner	Follow procedure set out in the EnviroPod Operations Manual
Major Maintenance	4 months or as required	Maintenance Contractor	Follow procedure set out in the EnviroPod Operations Manual
Emergency Maintenance	As required	Maintenance Contractor	Follow procedure set out in the EnviroPod Operations Manual

StormFilter

Maintenance Action	Frequency	Responsibility	Procedure
Inspection – Minor Maintenance	12 monthly and after major storms	Maintenance Contractor	Follow procedure set out in StormFilter Operations Manual
Inspection – Major Maintenance	12 monthly and after major storms	Maintenance Contractor	Follow procedure set out in StormFilter Operations Manual
Major Maintenance Sediment Removal	12 months or as required	Maintenance Contractor	Follow procedure set out in StormFilter Operations Manual
Major Maintenance Cartridge Replacement	12 months or as required	Maintenance Contractor	Follow procedure set out in StormFilter Operations Manual

References:

(1) *Stormwater 360 Operations and Maintenance Procedures.*

Appendix E – Stormwater 360 Product Information

Filtration

StormFilter® | Jellyfish Filter® | Filterra®

Stormwater360
AUSTRALIA

www.stormwater360.com.au

Stormwater Filtration	1
Selecting an appropriate filtration system	2
The Stormwater Management StormFilter	4
Jellyfish Filter	9
Filterra	12
Next Steps	15

> For almost two decades the Stormwater Management StormFilter has helped meet the most stringent stormwater requirements. The system has been continually tested and refined to ensure maximum reliability and performance.

Stormwater Filtration

The right stormwater solution for every site

The Stormwater360 UrbanGreen Staircase simplifies the process of integrating a water sensitive urban design (WSUD) that achieves your runoff goals. Its aims are to manage stormwater runoff close to the source and to replicate the site's pre-development hydrology, as much as possible.

The first step in the design process is to select the runoff management practices that best suit your site, such as infiltration and harvesting. Particular attention also needs to be given to pre-treatment needs. If the entire design storm cannot be retained through runoff reduction methods, a best management practice (BMP) is required to manage the balance. Finally, a detention system is selected to address any outstanding downstream erosion.

Highly effective pollutant removal

Meeting pollutant reduction goals for stormwater runoff typically requires a technology that is highly effective at removing solids and associated pollutants. In most cases, the technology must also be capable of removing dissolved pollutants such as metals, nitrogen and phosphorus.

By combining a variety of media and filtration systems, Stormwater360 can help you meet these pollutant removal objectives through products such as the Stormwater Management StormFilter, which has helped meet the most stringent stormwater requirements of hundreds of sites in urbanised areas of countries such as Australia, New Zealand and the United States of America.

Selecting an appropriate filtration system

The performance and longevity of media filtration systems is governed by a number of variables that must be carefully considered when evaluating systems. These variables include the type of media used and its gradation as well as its hydraulic loading rate. Understanding these variables requires careful testing and the development of performance and longevity data to support proper filter design.

Media surface area

Filtration flow rates are typically expressed as a surface area specific operating rate such as L/s/m^2 of surface area. Lower specific operating rates translate to better performance and longer maintenance cycles. Specific operating rates higher than 2 L/s/m^2 of media surface area negatively impact performance and longevity.

Surface versus radial cartridge filtration

When assessing filtration systems, it is important to consider whether filtration occurs primarily at the media surface or throughout a bed of media, such as with radial-cartridge filters. All else equal, radial-cartridge filters are longer lasting, since pollutants are captured and stored throughout the bed, as opposed to predominantly on the media surface. Radial cartridge filters capture more mass of pollutants per unit area of filter surface. Surface filters, such as sand or flat bed media filters, are prone to rapid failure through clogging. Pollutants are prone to occluding the media surface, which will then require frequent back washing or more costly and intensive maintenance.

> Understanding the hydraulics of the media selected is a key factor in determining the effectiveness of the filtration system in achieving site-specific pollutant removal objectives.

Media hydraulic conductivity and flow control

Filtration media is able to pass more flow per unit of media when it is new than when it has been in operation for a while. With time, pollutants accumulate in the media bed and reduce its hydraulic capacity. It is critical that filtration devices are designed with excess hydraulic capacity to account for this loss. Also, while finer media gradations remove finer particles, they have a lower hydraulic capacity and occlude more rapidly. High performance and superior longevity can be achieved by controlling the flow through a more coarse media bed.

Performance: Laboratory testing

While laboratory testing provides a means to generate hydraulic and basic performance data, it should also be complemented with long-term field data. Laboratory performance trials should be executed with a fine sediment gradation such as Sil-Co-Sil 106, which has a median particle size of 22 microns. Testing with coarser gradations is not likely to be representative of field conditions.

Performance: Field testing

Long-term field evaluations should be conducted on all filtration devices. As a minimum, field studies should generally comply with the Technology Acceptance Reciprocity Partnership (TARP) or the Technology Assessment Protocol – Ecology (TAPE) in the USA, as no recognised protocols exist within Australia. To be considered valid, all field monitoring programs should replicate local pollutant concentrations including soluble fractions together with rainfall, and should be peer reviewed by a reputable third-party.

Stormwater360 has undertaken such field testing in Kuranda, Australia, with the assistance of Queensland University of Technology and James Cook University.

Longevity

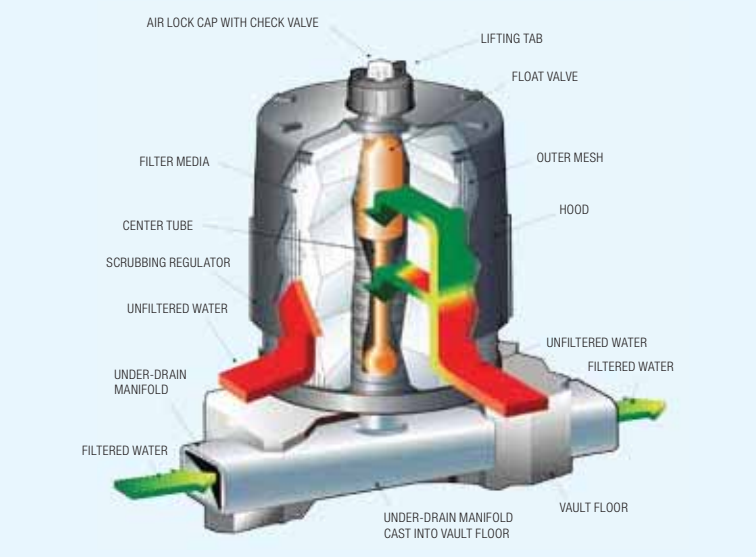
It is essential that loading trials be conducted to evaluate the longevity of a media filter. These trials must be executed with “real” stormwater solids and not silica particles. Reliance on silica particles to assess longevity grossly overstates the loading capacity of the media and the results of such trials should not be relied on. Knowing how much mass a media filter can capture before failure allows it to be sized for a desired maintenance interval by estimating the pollutant load that will be delivered to the filter.

Maintenance

The primary purpose of the media filtration system is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, these pollutants must be periodically removed to restore the system to its full efficiency and effectiveness. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. Similarly, the system should be inspected after major storm events.

Stormwater360 offers a number of suitable maintenance plans for all our stormwater products. Visit www.stormwater360.com.au or call us on 1300 354 722 to discuss the most suitable plan for your system.

The Stormwater Management StormFilter



Removing the most challenging target pollutants

The Stormwater Management StormFilter is a best management practice (BMP) designed to meet stringent regulatory requirements. It removes the most challenging target pollutants – including fine solids, soluble heavy metals, oil, and total nutrients (inc. soluble) – using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and through product enhancements the design continues to be refined for ease of use.

Why StormFilter is the best filter available

Superior hydraulics

- External bypass – protects treatment chamber from high flows and ensures captured pollutants are not lost during low frequency, high intensity storm events
- Multiple cartridge heights – minimises head loss to fit within the hydraulic grade line and shrink system size, reducing installation costs
- Multiple StormFilter configurations in use across the country

Reliable longevity

- One-of-a-kind self-cleaning hood – prevents surface blinding, ensures use of all media, and prolongs cartridge life
- Customised maintenance cycles – fewer maintenance events compared to similar products, which reduces costs over the lifetime of the system
- 12 years of maintenance experience – predictable long-term performance comes standard

Proven performance

- Only filter on the Australian market tested within Australia achieving best practice guidelines, for TSS, TP and TN
- Qualifies for a minimum 2 EMI 5 Green star credits
- Achieve water quality goals with confidence – easy approval speeds development assessment process
- 8th generation product – design refined and perfected over two decades of research and experience

Maximising your land use and development profitability

StormFilter systems are utilised in below ground systems. The advantages this offers over above ground systems includes:

- Land space saving that enable an increase in development density and reduce sprawl
- The potential to add car parking, increase building size, and develop out parcels

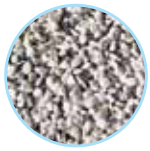
In addition, StormFilter's compact design reduces construction and installation costs by limiting excavation.

Media options

Our filtration products can be customised using different filter media to target site-specific pollutants. A combination of media is often recommended to maximise pollutant removal effectiveness.

PhosphoSorb™ is a lightweight media built from a Perlite-base that removes total phosphorus (TP) by adsorbing dissolved-P and filtering particulate-P simultaneously.

Perlite is naturally occurring puffed volcanic ash. Effective for removing TSS, oil and grease.



Zeolite is a naturally occurring mineral used to remove soluble metals, ammonium and some organics.

GAC (Granular Activated Carbon) has a micro-porous structure with an extensive surface area to provide high levels of adsorption. It is primarily used to remove oil and grease and organics such as PAHs and phthalates.

	PhosphoSorb	Perlite	ZPG	Zeolite	GAC
Sediments	•	•	•		
Oil and Grease	•	•	•		
Soluble Metals	•		•	•	
Organics			•	•	•
Nutrients	•	•	•	•	•
Total Phosphorus	•		•		

Note: Indicated media are most effective for associated pollutant type. Other media may treat pollutants, but to a lesser degree.

ZPG™ media, a proprietary blend of zeolite, perlite, and GAC.

Cartridge options

With multiple cartridge heights available, you now have a choice when fitting a StormFilter system onto your site.

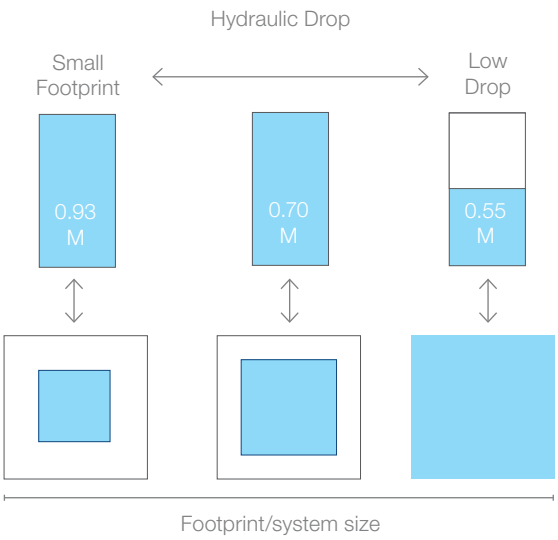
The 69cm cartridge provides 50% more treatment than the previously standard 46cm cartridge, which enables you to meet the same treatment standards with fewer cartridges, and via a smaller system.

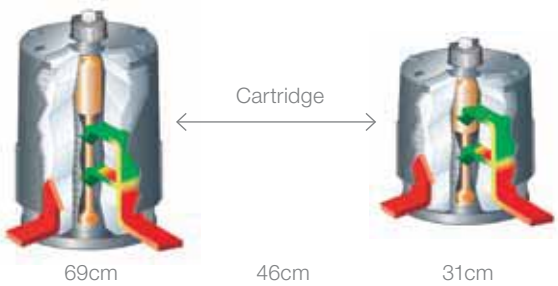
If you are limited by hydraulic constraints, the low drop cartridge provides filtration treatment with only 0.55m of headloss.

Cartridge flow rates

Cartridge Type	Hydraulic Drop	Treatment Capacity (l/sec)	
		0.7 l/s/m²	1.4 l/s/m²
StormFilter 69cm	0.93 m	0.71	1.42
StormFilter 46cm	0.70 m	0.47	0.95
StormFilter Low Drop	0.55 m	0.32	0.63

Selecting cartridge height





Configurations and applications

The StormFilter technology can be configured to meet your unique site requirements. Here are a few of the most common configurations, however many other configurations are available. A Stormwater360 engineer can assist you evaluate the best options for your site or you can find out more by downloading the StormFilter Configuration Guide from www.stormwater360.com.au

Upstream treatment configurations

The following suite of StormFilter configurations are easily incorporated on sites where WSUD is recommended. These low-cost, low-drop, point-of-entry systems also work well when you have a compact drainage area.

GullyPit StormFilter

Combines a gullypit, a high flow bypass device, and a StormFilter cartridge in one shallow structure.

- Treats sheet flow
- Uses drop from the inlet grate to the conveyance pipe to drive the passive filtration cartridge
- No confined space required for maintenance

Gully inlet

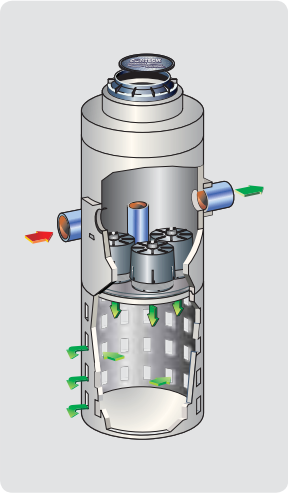
- Accommodates kerb inlet openings from 900 to 3000mm long
- Uses drop from the kerb inlet to the conveyance pipe to drive the passive filtration cartridges

Linear grate

- Can be designed to meet volume based sizing requirements
- Can be installed in place of and similar to a typical gullypit
- No confined space entry required for maintenance
- Accommodates up to 29 StormFilter cartridges

Infiltration/retrofit configuration infiltration

- Provides treatment and infiltration in one structure
- Available for new construction and retrofit applications
- Easy to install
- Re-charge groundwater and reduces run-off



Appendix J.

Northrop Pty Ltd – Civil Design Statement – dated 04th December 2018

Northrop Pty Ltd – Green Star Rating Scorecard – dated 04th December 2018

NEPEAN PRIVATE HOSPITAL EXPANSION - STAGE 01

CIVIL ENGINEERING WORKS
DEVELOPMENT APPLICATION

SOURCE : NEARMAP.COM.AU (©2018)

LOCALITY PLAN

DRAWING SCHEDULE	
DRG No.	DRAWING TITLE
DAC101.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
DAC101.11	SPECIFICATION NOTES
DAC101.21	GENERAL ARRANGEMENT PLAN
DAC102.01	SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 01
DAC102.02	SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 02
DAC102.11	SEDIMENT AND SOIL EROSION CONTROL DETAILS
DAC103.01	BULK EARTHWORKS PLAN - SHEET 01
DAC103.02	BULK EARTHWORKS PLAN - SHEET 02
DAC104.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01
DAC104.02	SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02
DAC104.31	STORMWATER MANAGEMENT DEVICES
DAC107.01	DETAILS SHEET
DAC108.01	CATCHMENT PLAN

DRAWN: J O DESIGNED: N. NAICKER JOB MANAGER: N. NAICKER VERIFIER:

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF
DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: SKAr
THE COPYRIGHT OF THIS DRAWING REMAINS WITH NORTHROP CONSULTING ENGINEERS PTY LTD

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SCALE 1:1250 @ A1 0 10 20 30 40 50 60m

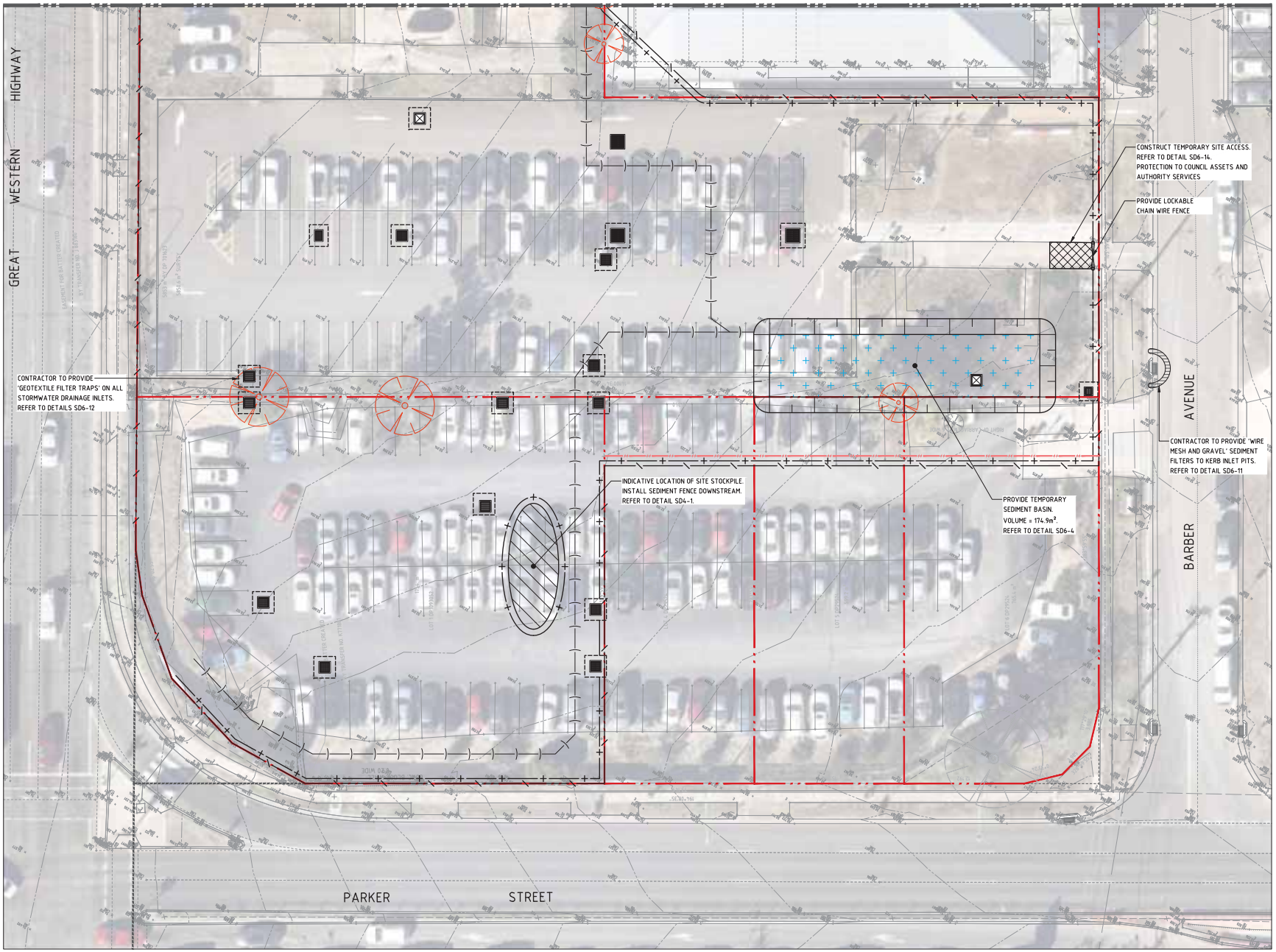
NORTHROP
Sydney
Level 11 345 George Street, Sydney NSW 2000
Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN

JOB NUMBER: 182350
DRAWING NUMBER: DAC101.01
REVISION: 1
DRAWING SHEET SIZE = A1

FOR CONTINUATION REFER TO SHEET DAC102.01



LEGEND

- BOUNDARY LINES
- EASEMENT LINE
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- WIRE MESH AND GRAVEL SEDIMENT FILTER
- DROP INLET SEDIMENT TRAP
- DIVERSION DRAIN (DIRTY)
- STABILISED SITE ACCESS
- STOCKPILE
- SEDIMENT BASIN
- TREES TO BE REMOVED

SEDIMENT BASIN CALCULATIONS:

PARAMATER	ADOPTED VALUE
TOTAL AREA (ha)	0.76
SOIL TEXTURE GROUP	D or F
DESIGN RAINFALL DEPTH (DAYS)	5
DESIGN RAINFALL DEPTH (PERCENTILE)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	27.400
Cv	0.560
SETTLING ZONE VOLUME (m^3)	116.614
SEDIMENT STORAGE VOLUME (m^3)	58.307
TOTAL BASIN VOLUME (m^3)	174.922

NOT FOR CONSTRUCTION

DRAWN: J O DESIGNED: N NAICKER JOB MANAGER: N NAICKER VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF
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ARCHITECT: SKAr
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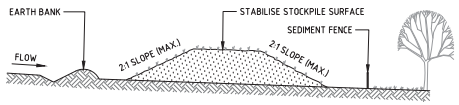
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 02

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.02
REVISION: 1
DRAWING SHEET SIZE = A1

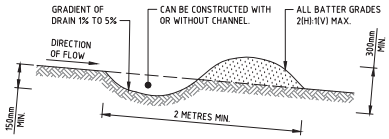
Found : /nw-files/Projects/2018 Jobs/182350 - Nepean Private Hospital - Expansion Stage 1/0-Drawing/0-Northrop/C-CIVIL/2-CADD/2-CAD FILES/1-DA1-STAGE 01/182350_DAC102.01.dwg
Plotted By : JOHN O
Date : 19.02.2019 11:24 AM



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

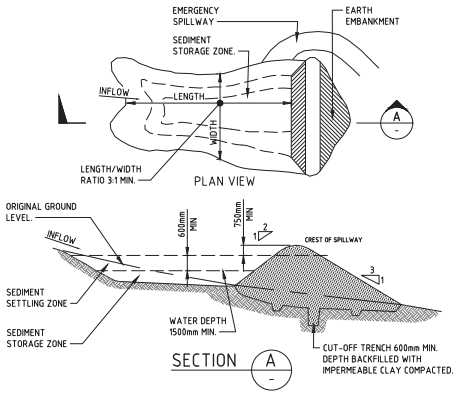


CONSTRUCTION NOTES

1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

NOTE: ONLY TO BE USED AS TEMPORARY BANK
WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

DRAINAGE SWALE - LOW FLOW (SD 5-5)

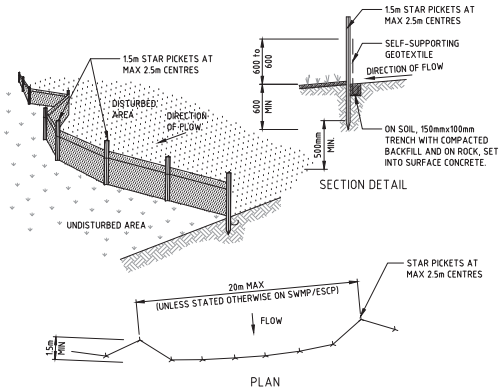


CONSTRUCTION NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95 PER CENT STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

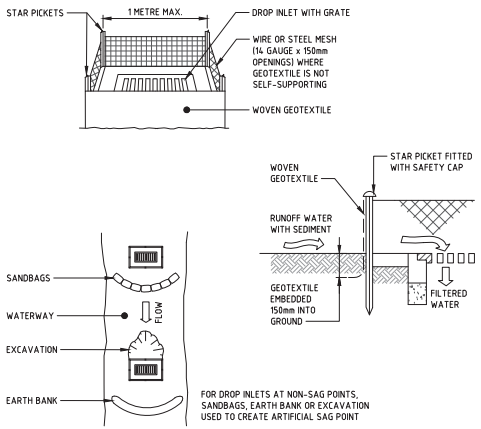
EARTH BASIN - WET (SD 6-4)



CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

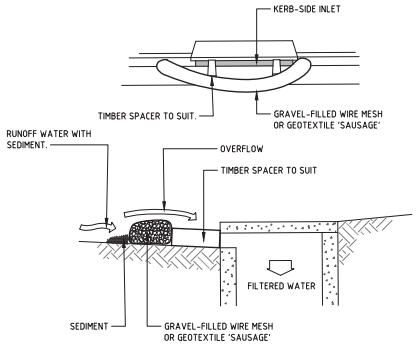
SEDIMENT FENCE (SD 6-8)



CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

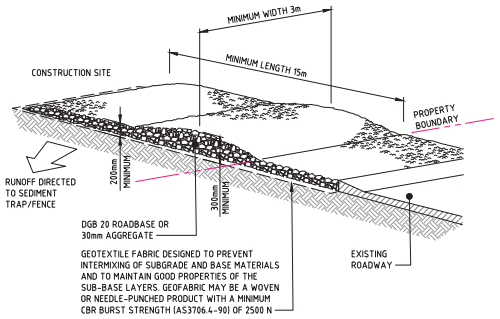
GEOTEXTILE INLET FILTER (SD 6-12)



CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL INLET FILTER (SD 6-11)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)

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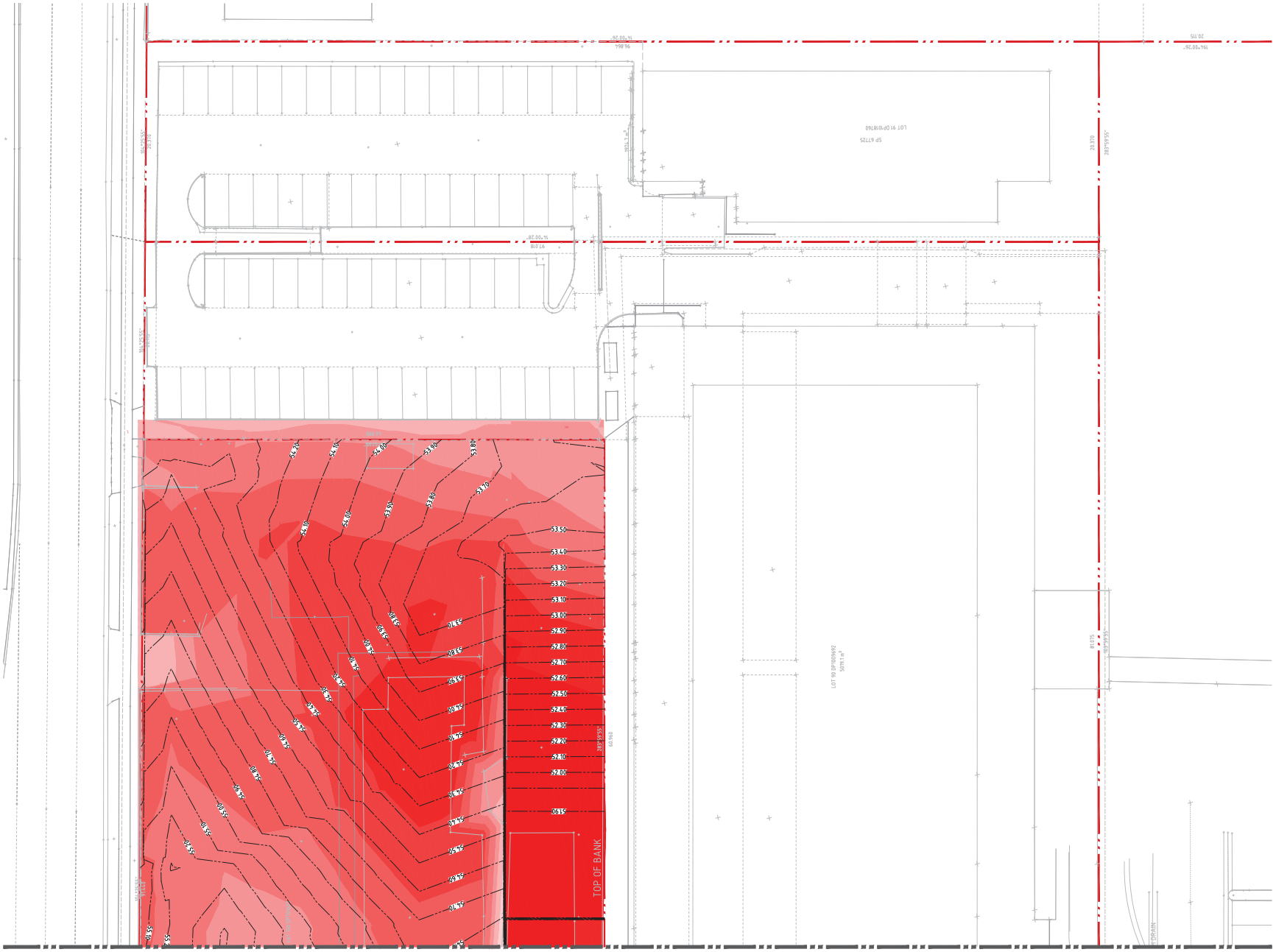
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
SEDIMENT AND SOIL EROSION CONTROL DETAILS

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.11
REVISION: 1
DRAWING SHEET SIZE = A1

DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
VERIFIER:

Plotted By: JOHN O
Date: 19.02.2019 11:34 AM
Found: \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\0-Drawing\0-Northrop\C-CIVIL\2-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC102.11.dwg



FOR CONTINUATION REFER TO SHEET DAC103.02

LEGEND

BOUNDARY LINES

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- -15.0m TO -10.0m
- -10.0m TO -5.0m
- -5.0m TO -2.0m
- -2.0m TO -1.0m
- -1.0m TO -0.5m
- -0.5m TO -0.25m
- -0.25m TO -0.0m
- 0.0m TO 0.25m
- 0.25m TO 0.5m
- 0.5m TO 1.0m
- 1.0m TO 2.0m
- 2.0m TO 5.0m
- 5.0m TO 10.0m
- 10.0m TO 15.0m
- 15.0m TO 999m

EARTHWORKS NOTES:

1. REFER SPECIFICATIONS NOTES FOR EARTHWORKS GENERAL REQUIREMENTS.
2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
3. CAD FILES / DTM FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).
4. STRIP EXISTING TOPSOIL IN CONSULTATION WITH THE GEOTECHNICAL ENGINEER / REPORT. NO ALLOWANCE HAS BEEN MADE FOR TOPSOIL/EXISTING PAVEMENT DEMOLITION.
5. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
6. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS AND THE LIKE.
7. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
8. BULK EARTHWORKS VOLUMES ARE BASED ON FINISHED SURFACE LEVELS TRANSLATED DOWN 300mm.
9. APPROXIMATE BULK EARTHWORK VALUES AS FOLLOWS;
   - 9.1. CUT 5,720 cu.m
   - 9.2. FILL 1,845 cu.m
   - 9.3. BALANCE 3,875 cu.m
10. TEMPORARY BATTER SLOPES FOR EXCAVATIONS TO BE IN ACCORDANCE WITH GEOTECHNICAL ENGINEERS ADVICE AND RECOMMENDATIONS. CONTRACTOR TO CONFIRM ADEQUACY WITH GEOTECHNICAL ENGINEER.

GENERAL NOTES:

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DRAWN: J O DESIGNED: N. NAICKER JOB MANAGER: N. NAICKER VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
BULK EARTHWORKS PLAN - SHEET 01

JOB NUMBER: 182350

DRAWING NUMBER: DAC103.01 REVISION: 1

DRAWING SHEET SIZE = A1

Date : 19.02.2019 11:34 AM Plotted By : JOHN O Found : \\nt-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawings\D-Northrop\C-CIVIL\C-CADD\C-CAD FILES\1-DAC-STAGE 01\182350_DAC103.01.dwg

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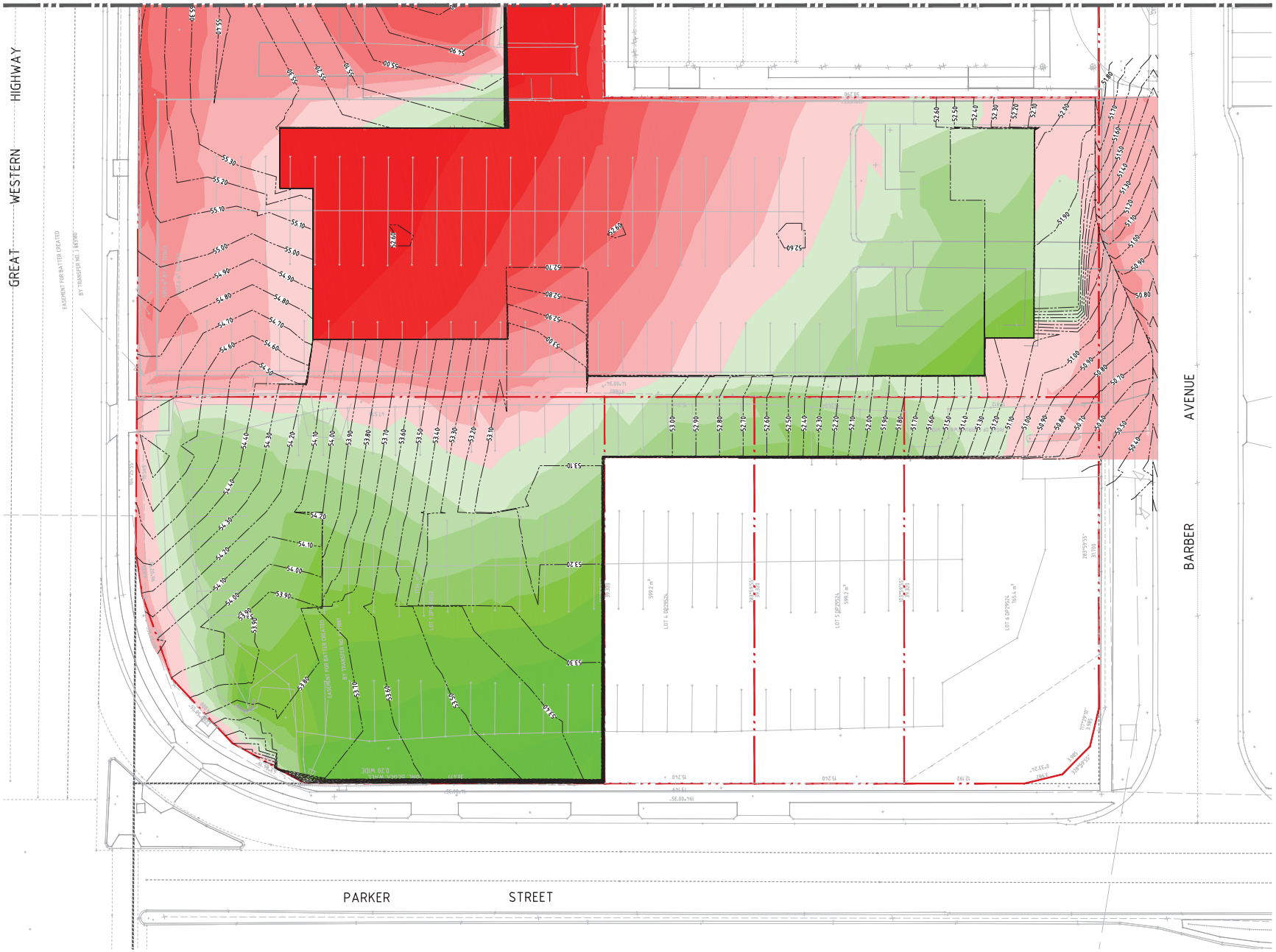

LEGEND

BOUNDARY LINES

- - 999m TO - 15.0m
- - 15.0m TO - 10.0m
- - 10.0m TO - 5.0m
- - 5.0m TO - 2.0m
- - 2.0m TO - 1.0m
- - 1.0m TO - 0.5m
- - 0.5m TO - 0.25m
- - 0.25m TO - 0.0m
- 0.0m TO 0.25m
- 0.25m TO 0.5m
- 0.5m TO 1.0m
- 1.0m TO 2.0m
- 2.0m TO 5.0m
- 5.0m TO 10.0m
- 10.0m TO 15.0m
- 15.0m TO 999m

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
BULK EARTHWORKS PLAN - SHEET 02

JOB NUMBER: 182350
DRAWING NUMBER: DAC103.02
REVISION: 1
DRAWING SHEET SIZE = A1

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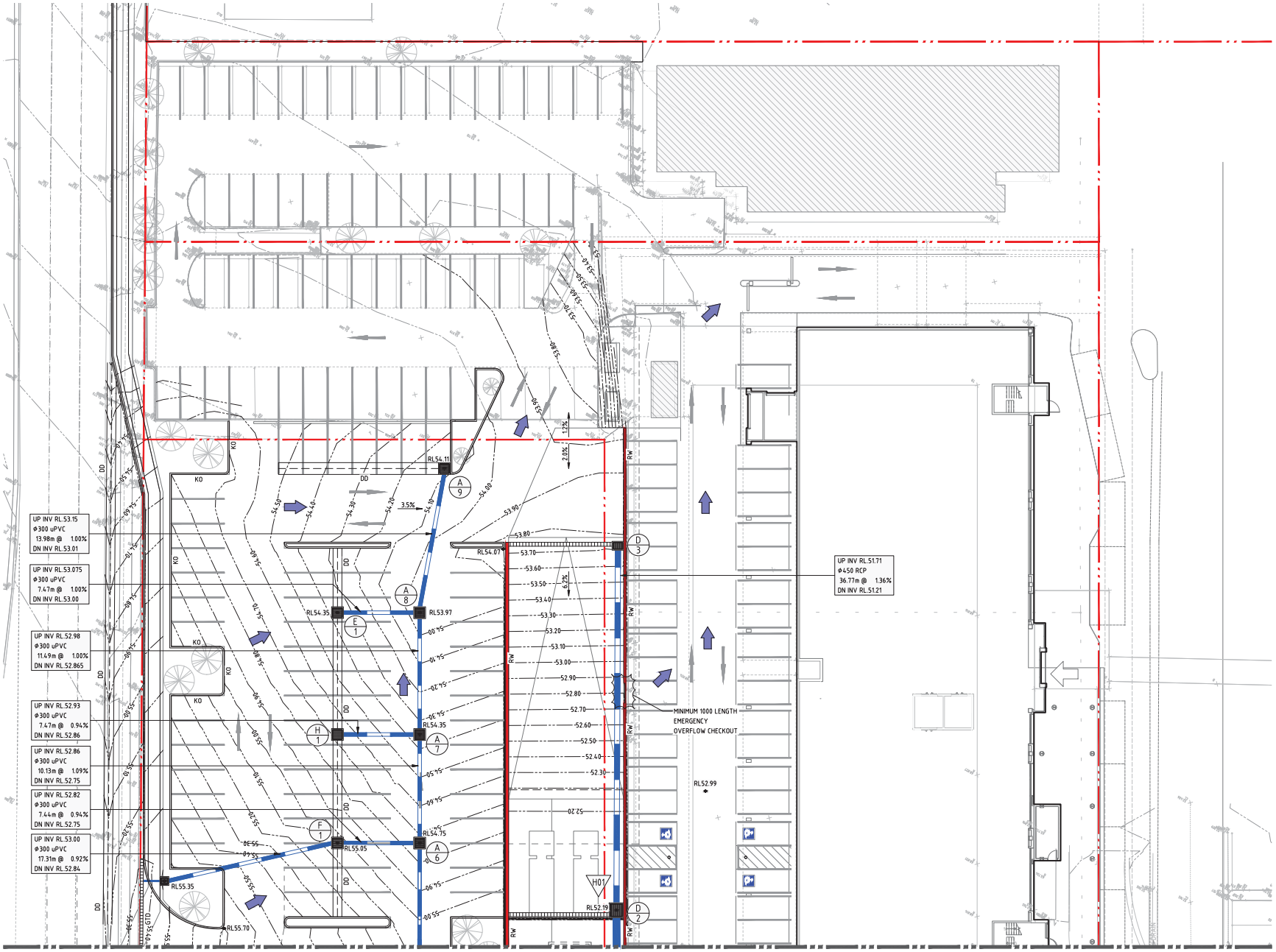

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LEGEND

- BOUNDARY LINE
- PROPOSED KERB
- EXISTING KERB
- SAWCUT AND PAVEMENT INFILL
- eXX — EXISTING KERB 'TYPE AS BELOW'
- KO — KERB ONLY
- KG — KERB AND GUTTER
- DD — DISH DRAIN
- VC — VEHICULAR CROSSING
- XX.XX — CONTOURS
- EXISTING CONTOURS
- RW — RETAINING WALL
- EXISTING DRAINAGE STRUCTURE
- NEW DRAINAGE STRUCTURE
- STORMWATER PIPE
- WC / OSD — WATER QUALITY CHAMBER / ON-SITE DETENTION TANK
- OVERLAND FLOW PATH

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01

JOB NUMBER: 182350

DRAWING NUMBER: DAC104.01 REVISION: 1

DRAWING SHEET SIZE = A1

DRAWN: J O DESIGNED: N NAICKER JOB MANAGER: N. NAICKER VERIFIER:

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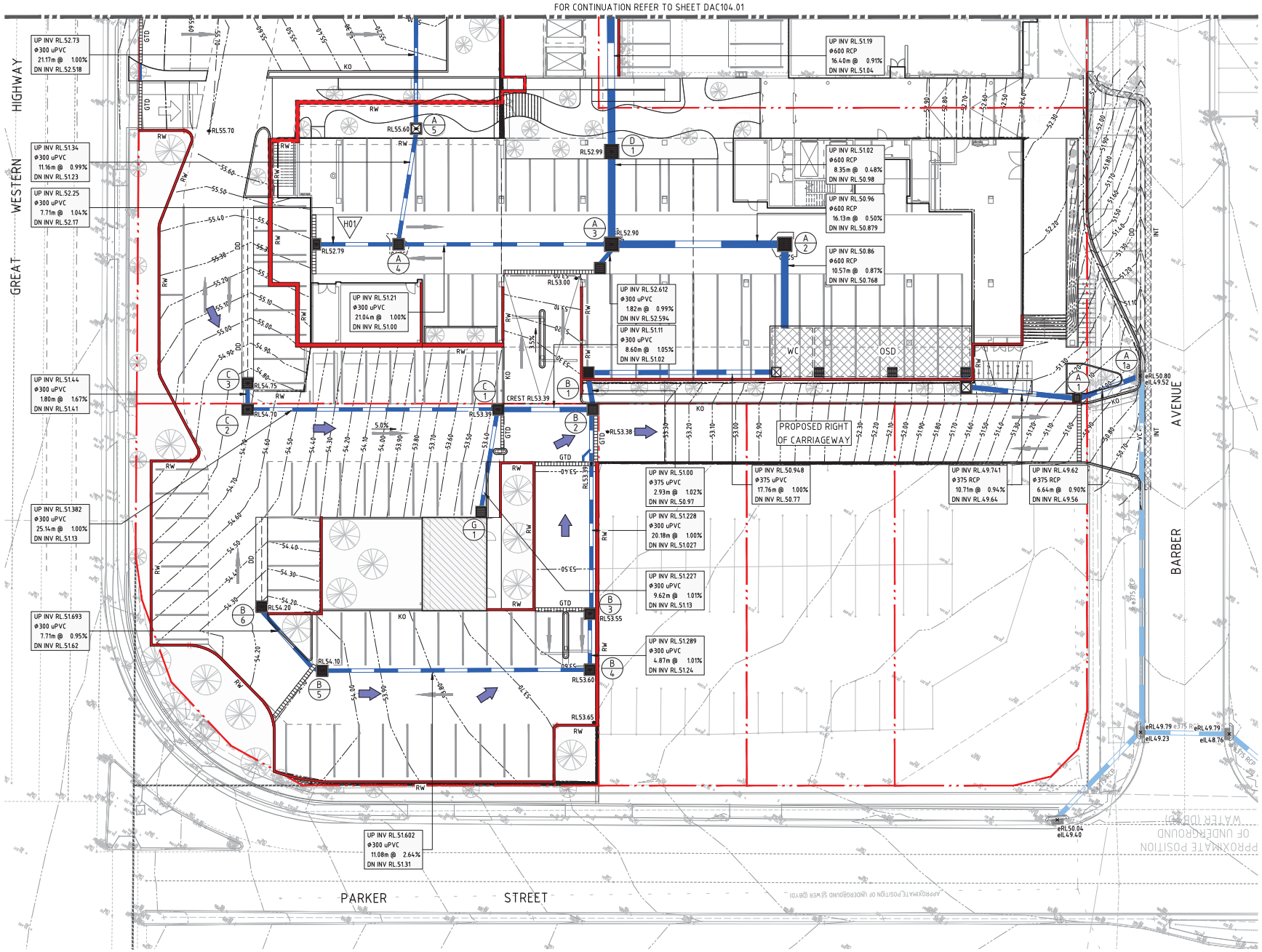

LEGEND

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- OVERLAND FLOW PATH

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

CLIENT: JOHNSTAFF

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Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — SITEWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02

JOB NUMBER: 182350

DRAWING NUMBER: DAC104.02 — REVISION: 1

DRAWING SHEET SIZE = A1

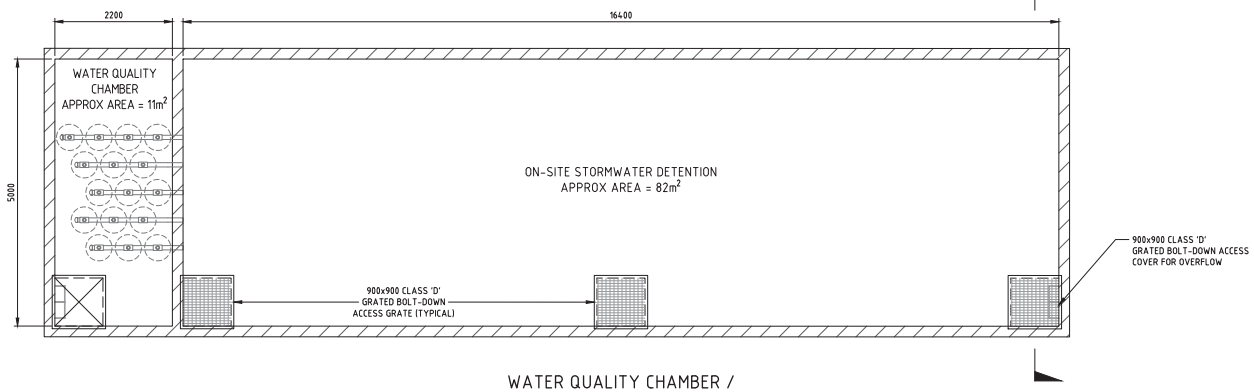
DRAWN: J O — DESIGNED: N NAICKER — JOB MANAGER: N NAICKER — VERIFIER:

Found : /nas-files/Projects/2018 Jobs/182350 - Nepean Private Hospital - Expansion Stage 1\0-Drawing\0-Northrop\C-CIVIL\2-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC104.01.dwg

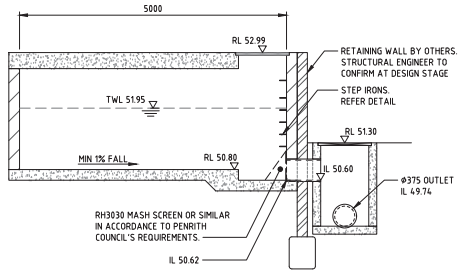
Plotted By : JOHN O

Date : 15.02.2019 11:34 AM

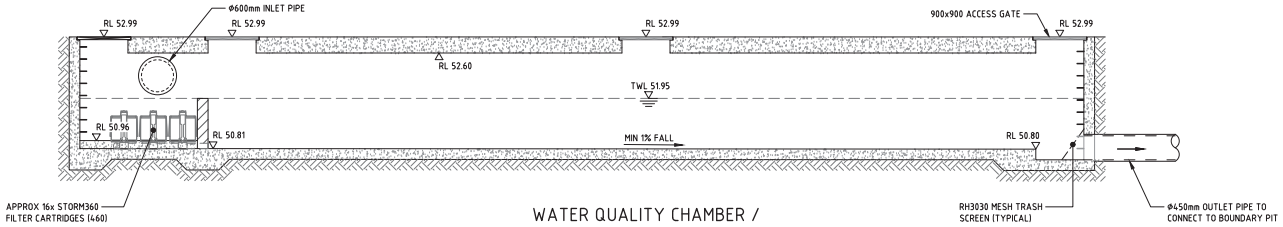
STRUCTURAL ENGINEERS DRAWING FOR OSD/WATER QUALITY CHAMBER TO BE CONFIRMED AT 'DETAILED DESIGN' STAGE



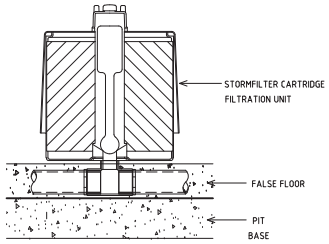
WATER QUALITY CHAMBER / OSD TANK ROOF PLAN



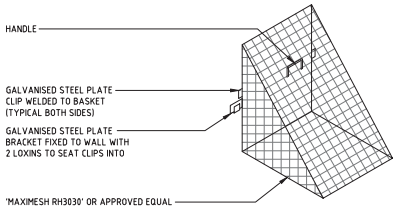
SECTION A
SCALE 1:50



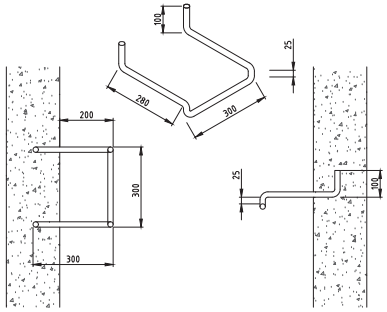
WATER QUALITY CHAMBER / OSD TANK ELEVATION



STORMFILTER CARTRIDGE DETAIL



TRASH SCREEN DETAIL



STEP IRON DETAIL

STEP IRON OF 20mm GALVANISED STEEL MADE TO SHAPE AND DIMENSIONS AS SHOWN, PLACED AT 300 CENTRES AND STAGGERED HORIZONTALLY FOR ALL PITS DEEPER THAN 1.0m. THE USE OF PROPRIETARY STEP IRONS ARE ACCEPTABLE PROVIDED THE PRODUCT IS IN ACCORDANCE WITH AUSTRALIAN STANDARDS

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1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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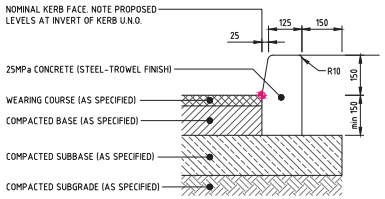
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
STORMWATER MANAGEMENT DEVICES

JOB NUMBER: 182350
DRAWING NUMBER: DAC104.31
REVISION: 1
DRAWING SHEET SIZE = A1

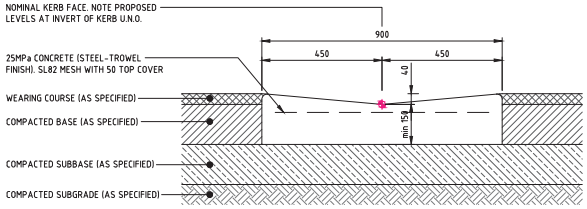
DRAWN: J O
DESIGNED: N NAICKER
JOB MANAGER: N NAICKER
VERIFIER:

Found : /nas-files/Projects/2018 Jobs/182350 - Nepean Private Hospital - Expansion Stage 1/3-Drawing/3-Northrop/C-CIVIL/3-CADD/CAD FILES/1-DA1-STAGE 01/182350_DAC104.31.dwg
Plotted By : JOHN O
Date : 15.02.2019 11:24 AM



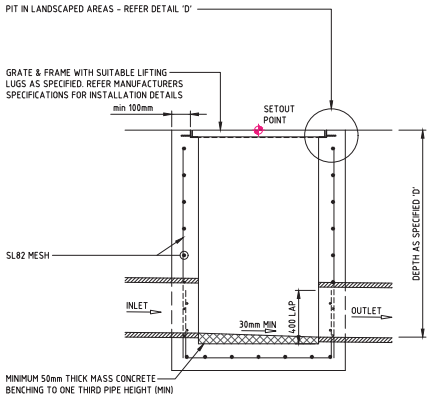
KERB ONLY 'KO'

EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
ALL RADII TO BE 20mm U.N.O.

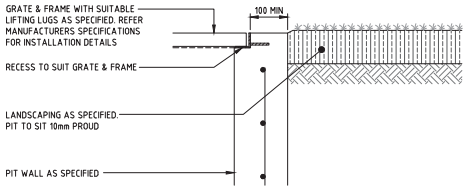


DISH DRAIN - 900 WIDE 'DD'

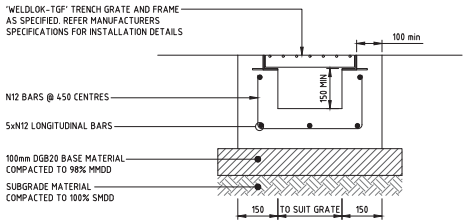
EXPANSION JOINTS @ MAX 12m CTRS / TOOL JOINTS @ MAX 3m CTRS
ALL RADII TO BE 20mm U.N.O.



SECTION 1 / -

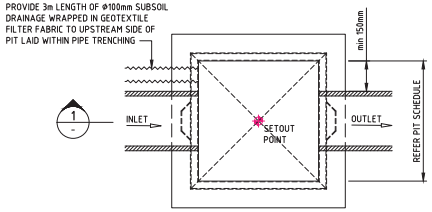


PIT INTERFACE - DETAIL 'D'



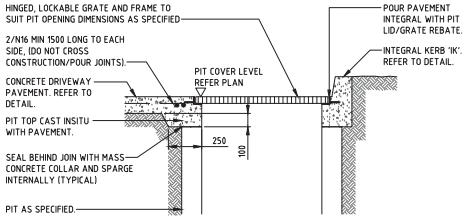
GRATED TRENCH DRAIN 'GTD'

GRATED TRENCH DRAIN TO HAVE MINIMUM 150mm CLEARANCE AND 1% LONGITUDINAL FALL.
GRATE CLASS TO BE CLASS 'B' HEELSAFE IN PEDESTRIAN AREAS AND CLASS 'D' IN TRAFFICKED AREAS UNLESS NOTED OTHERWISE ON PLAN



PLAN
SURFACE INLET 'SIP' / JUNCTION PIT 'JP'

PIT STRUCTURE TO BE 200mm THICK UNLESS SHOWN OTHERWISE. DRILL AND EPOXY PLASTIC PROPRIETARY STEP IRONS IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND MANUFACTURERS SPECIFICATIONS (PITS < 1000mm DEPTH).
REFER PIT INTERFACE DETAIL 'F' FOR CORNER REINFORCEMENT



GRATE AND FRAME
(PIT IN VEHICULAR PAVEMENT)

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DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
VERIFIER:

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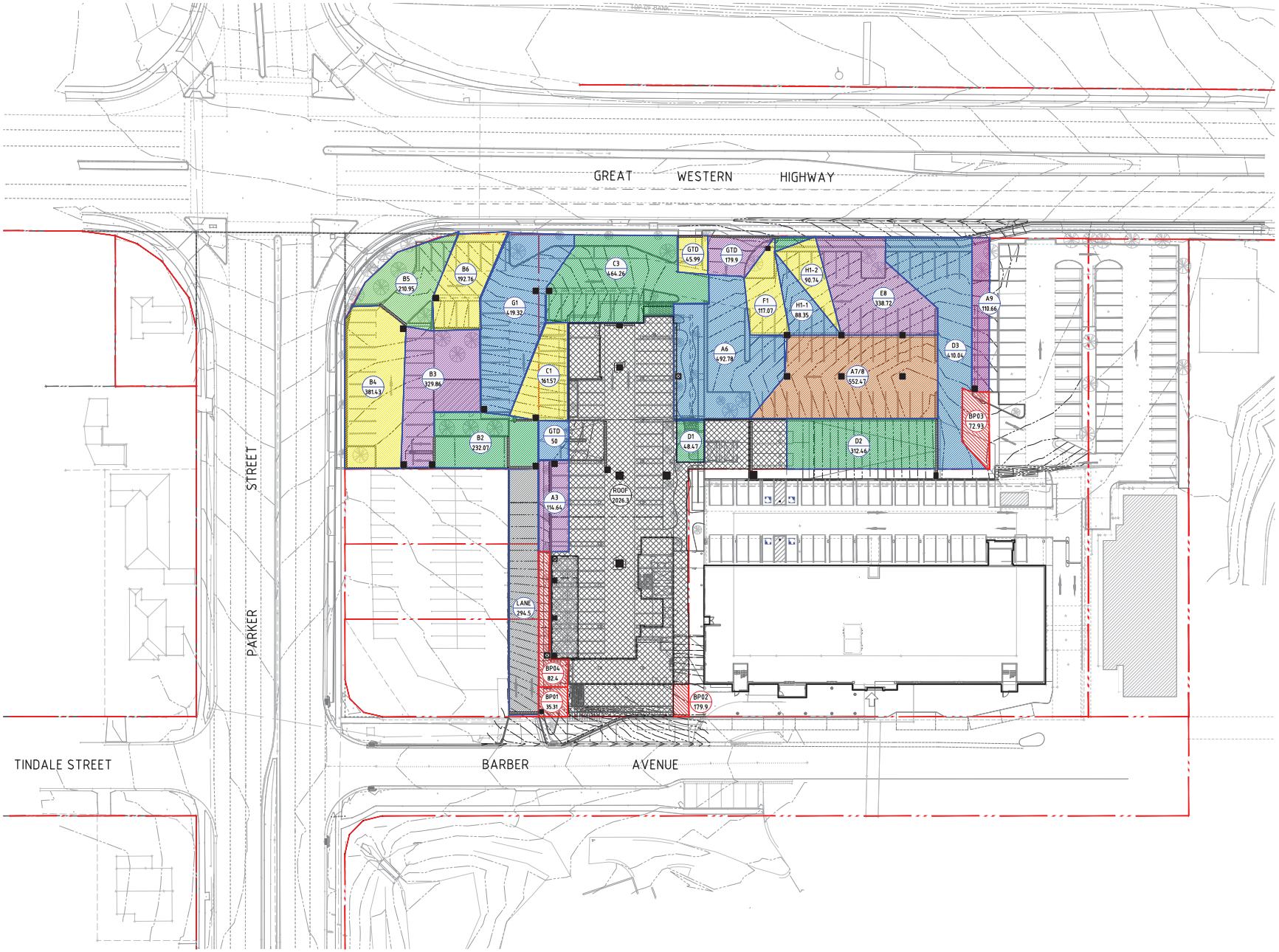
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
DETAILS SHEET

JOB NUMBER: 182350
DRAWING NUMBER: DAC107.01
REVISION: 1
DRAWING SHEET SIZE = A1

Plotted By: JOHN O
Date: 19.02.2019 11:34 AM
Found: \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawing\D-Northrop\C-CIVIL\C-CADD-CAD FILES\1-DA1-STAGE 01\182350_DAC107.01.dwg



LEGEND

- PROPOSED BOUNDARY LINE
- CATCHMENT AREA
- PROPOSED ROOF AREA = 2103.026m²
- BYPASS AREA
- 1 / X.XX — STORMWATER PIT TAG / CATCHMENT AREA (m²)

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SCALE 1:400@ A1 — 0 4 8 12 16 20m

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION — STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION — CATCHMENT PLAN

JOB NUMBER: 182350

DRAWING NUMBER: DAC108.01 — REVISION: 1

DRAWING SHEET SIZE = A1

DRAWN: J O — DESIGNED: N. NAICKER — JOB MANAGER: N. NAICKER — VERIFIER:

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Plotted By : JOHN O — Date : 19.02.2019 11:34 AM

NOTE: ALL CIVIL ENGINEERING CONSTRUCTION WORKS TO BE CARRIED OUT IN ACCORDANCE WITH PENRITH CITY COUNCIL DEVELOPMENT GUIDELINES .THE AFOREMENTIONED GUIDELINES INCLUSIVE OF ALL SPECIFICATIONS TAKE PRECEDENCE OVER NOTES PROVIDED BELOW.

STORMWATER DRAINAGE

1. ALL DRAINAGE LINES SHALL BE UPVC (CLASS SN4) SEWER GRADE DRAINAGE PIPE, U.N.O.
2. ALL DRAINAGE LINES SHALL BE LAID AT 1% MIN. FALL, UNO.
3. ALL LEVELS ARE AUSTRALIAN HEIGHT DATUM (AHD).
4. ALL DOWNPIPES GUTTERS TO BE DESIGNED IN ACCORDANCE WITH AS/NZS 3500.3.2 – 2003 'STORMWATER' DRAINAGE.
5. THE STORMWATER DRAINAGE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH AS/NZS 3500.3.2-2003 'STORMWATER' DRAINAGE.
6. ANY VARIATIONS TO THE NOMINATED LEVELS SHALL BE REFERRED TO ENGINEER IMMEDIATELY.
7. SUBSOIL DRAINAGE SHALL BE PROVIDED TO ALL RETAINING WALLS & EMBANKMENTS, WITH THE LINES FEEDING INTO THE STORMWATER DRAINAGE SYSTEM.
8. ALL GRATES TO BE GALVANISED STEEL WITH HINGES AND CHILD PROOF LOCK.
9. ALL GRATES TO BE HEEL SAFE WITHIN AGED CARE DEVELOPMENTS.
10. THE STORMWATER DRAINAGE IS DESIGNED IN ACCORDANCE WITH COUNCILS STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENT.

RAINWATER RE-USE

1. PROVIDE RAINWATER RE-USE SYSTEM TO SUPPLY WATER FOR TOILET FLUSHING.
2. GUTTER GUARD TO BE INSTALLED ON ALL EAVES GUTTERS.
3. A PERMANENT SIGN IS TO BE LOCATED IN THE VICINITY OF THE TANK STATING THE WATER IS "NON POTABLE WATER" WITH APPROPRIATE HAZARD IDENTIFICATION.
4. PIPEWORK USED FOR RAINWATER SERVICES SHALL BE COLOURED LILAC IN ACCORDANCE WITH AS1345.
5. ALL VALVES AND APERTURES SHALL BE CLEARLY AND PERMANENTLY LABELLED WITH SAFETY SIGNS TO COMPLY WITH AS1319.
6. RAINWATER TANK RETICULATION SYSTEM AND MAINS WATER BYPASS ARRANGEMENT TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3500.1.2-2003 AND THE NSW CODE OF PRACTICE : PLUMBING AND DRAINING.
7. A FIRST FLUSH FILTRATION DEVICE IS TO BE PROVIDED AT RAINWATER TANK.

GENERAL NOTES

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH OTHER SUCH WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DIMENSIONS ARE IN MILLIMETRES & ALL LEVELS ARE IN METRES, UNO (UNLESS NOTED OTHERWISE).

NO DIMENSION SHALL BE OBTAINED BY SCALING THE DRAWINGS.

ALL LEVELS AND SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF THE WORK.

DETAIL SURVEY DATA WAS SUPPLIED BY 'MATTHEW FREEBURN – LAND ENGINEERING & MINING SURVEYOR, DRAWING DATED 13.03.2018.

EXISTING SERVICES WHERE SHOWN HAVE BEEN PLOTTED FROM SUPPLIED DATA AND SUCH THEIR ACCURACY CAN NOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF WORK.

ON COMPLETION OF STORMWATER INSTALLATION, ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS, UNLESS DIRECTED OTHERWISE.

ALL STORMWATER MANAGEMENT MEASURES SHOWN ON THIS DRAWING HAVE BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES TO DEMONSTRATE FEASIBILITY. ALL MEASURES WILL BE SUBJECT TO DETAIL DESIGN AT THE CONSTRUCTION CERTIFICATE STAGE AND MAY BE SUBJECT TO VARIATION PROVIDED THAT THE DESIGN INTENT IS MAINTAINED.

DESIGN SUMMARY

CATCHMENT CALCULATIONS:

	PRE-DEVELOPMENT	POST-DEVELOPMENT
TOTAL AREA	7605m²	7605m²
IMPERVIOUS AREA	5345m² (70.3%)	6826m² (89.8%)
PERVIOUS AREA	2260m² (29.7%)	779m² (10.2%)

SITE DISCHARGE CALCULATIONS:

EVENT	PRE-DEVELOPMENT (m³/s)	POST-DEVELOPMENT (m³/s)
20%	0.201	0.145
30%	0.247	0.174
5%	0.29	0.203
2%	0.353	0.239
1%	0.402	0.267
1 EY	0.123	0.145

ON-SITE DETENTION:

DESIGN BASIS:
•• PRE TO POST DEVELOPMENT CONDITIONS

BYPASS AREA/PERCENTAGE = 233m²
ON-SITE DETENTION STORAGE PROVIDED = 95m³

THEREFORE PERMITTED SITE DISCHARGE = 40ZL/s

ON-SITE DETENTION SUMMARY:
•• BELOW GROUND TANK

TOP WATER LEVEL = RL51.95
OVERFLOW LEVEL = RL52.99
OUTLET PIPE CENTERLINE = RL50.80
OUTLET PIPE DIAMETER = Ø375mm

STORMWATER MANAGEMENT REQUIREMENTS HAVE BEEN CALCULATED IN ACCORDANCE WITH PENRITH COUNCIL'S STORMWATER DRAINAGE GUIDELINES FOR BUILDING DEVELOPMENT 2016.

WATER QUALITY:

MUSIC MODEL SUMMARY (REFER NORTHROP REPORT FOR FURTHER DETAILS <IF REPORT PROVIDED).

MUSIC MODEL SUMMARY:

SOURCE NODE	CATCHMENT	AREA
URBAN	ROOF AREA	2103m²
URBAN	CARPARK	4563m²
URBAN	LANDSCAPE	706m²
URBAN	BY-PASS	233m²
		TOTAL 7605m²

TREATMENT NODES:

•• ON-SITE DETENTION TANK
•• STORMWATER 360 'STORMFILTER' CARTRIDGE
•• STORMWATER ENVIROPODS

TREATMENT STANDARDS:

POLLUTANT	REDUCTION STANDARDS	REDUCTION ACHIEVED
GROSS POLLUTANTS	90%	97.1%
TOTAL SUSPENDED SOLIDS	85%	86.5%
TOTAL PHOSPHORUS	60%	66.5%
TOTAL NITROGEN	45%	45.8%

MUSIC MODEL PARAMETERS IN ACCORDANCE WITH PENRITH CITY COUNCIL'S EH003 WATER SENSITIVE URBAN DESIGN (WSUD) POLICY 2013.

H01 POTENTIAL PONDING NOTED ON LOADING DOCK LEVEL IN 100 YEAR STORM EVENT

DRAWN: J O DESIGNED: N NAICKER JOB MANAGER: N NAICKER VERIFIER:

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION	JO	JG	NN	04.12.18

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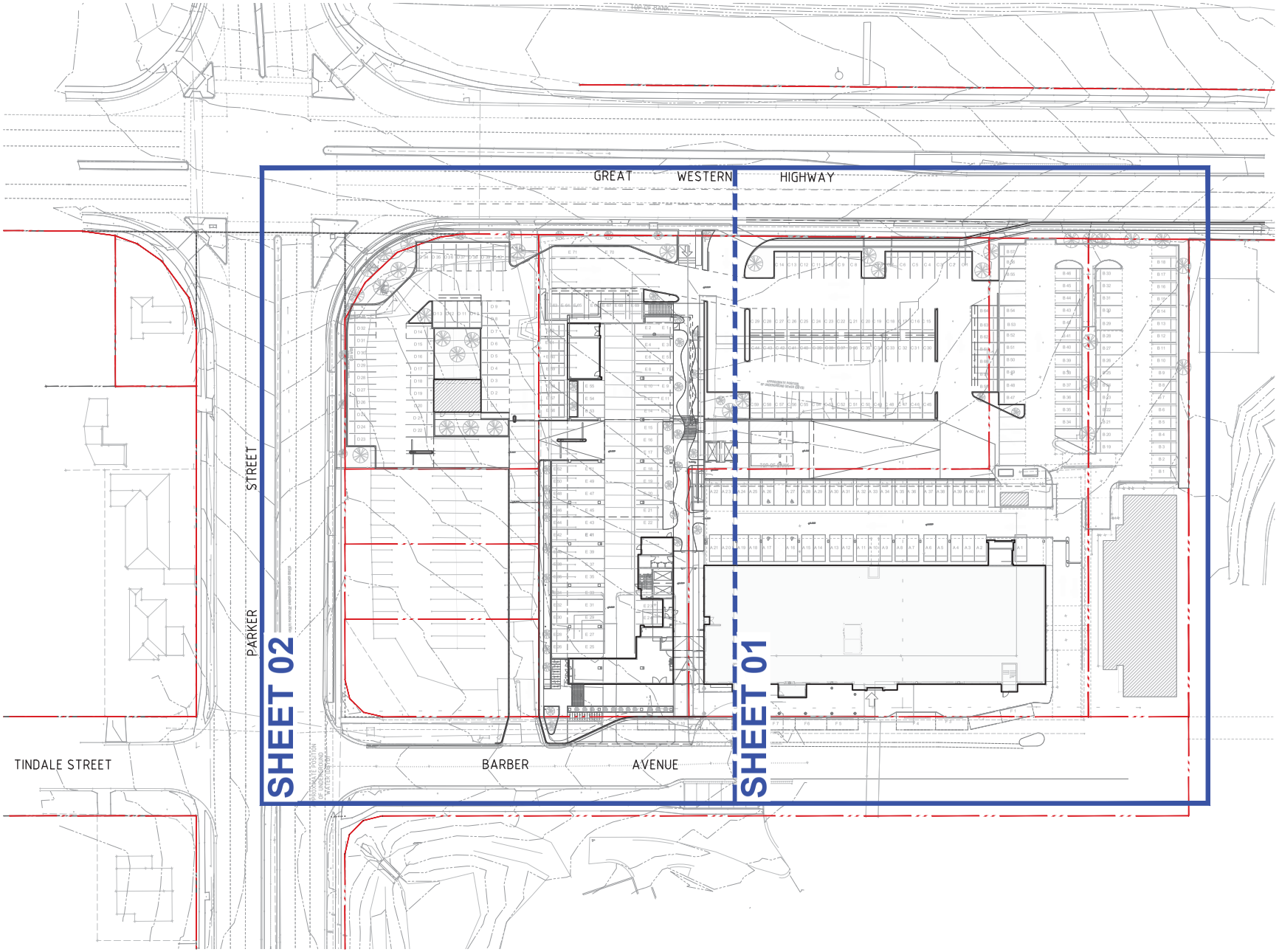
PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
SPECIFICATION NOTES

JOB NUMBER: 182350
DRAWING NUMBER: DAC101.11
REVISION: 1
DRAWING SHEET SIZE = A1



DRAWN: J O
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JOB MANAGER: N. NAICKER
VERIFIER:

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SCALE 1:400@A1 0 4 8 12 16 20m

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PROJECT
NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE
CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
GENERAL ARRANGEMENT PLAN

JOB NUMBER 182350
DRAWING NUMBER DAC101.21
REVISION 1
DRAWING SHEET SIZE = A1

FOR CONTINUATION REFER TO SHEET DAC102.02

LEGEND

- BOUNDARY LINES
- EASEMENT LINE
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- WIRE MESH AND GRAVEL SEDIMENT FILTER
- DROP INLET SEDIMENT TRAP
- DIVERSION DRAIN (DIRTY)
- STABILISED SITE ACCESS
- STOCKPILE
- SEDIMENT BASIN
- TREES TO BE REMOVED

SEDIMENT BASIN CALCULATIONS:

PARAMATER	ADOPTED VALUE
TOTAL AREA (ha)	0.76
SOIL TEXTURE GROUP	D or F
DESIGN RAINFALL DEPTH (DAYS)	5
DESIGN RAINFALL DEPTH (PERCENTILE)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	27.400
Cv	0.560
SETTLING ZONE VOLUME (m^3)	116.614
SEDIMENT STORAGE VOLUME (m^3)	58.307
TOTAL BASIN VOLUME (m^3)	174.922

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PROJECT: NEPEAN PRIVATE HOSPITAL EXPANSION
STAGE 01

DRAWING TITLE: CIVIL ENGINEERING WORKS DEVELOPMENT APPLICATION
CONCEPT SEDIMENT AND SOIL EROSION CONTROL PLAN - SHEET 01

JOB NUMBER: 182350
DRAWING NUMBER: DAC102.01
REVISION: 1
DRAWING SHEET SIZE = A1

DRAWN: J O
DESIGNED: N. NAICKER
JOB MANAGER: N. NAICKER
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Plotted By : JOHN O
Date : 19.02.2019 11:34 AM
Found : \\nw-files\Projects\2018 Jobs\182350 - Nepean Private Hospital - Expansion Stage 1\3-Drawings\3-Northrop\C-CIVIL\3-CADD\CAD FILES\1-DA\1-STAGE 01\182350_DAC102.01.dwg

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04.12.2018

Ref: SY182350-00-SEL01-B

Johnstaff Projects Pty Ltd
Level 5
9 Castlereagh Street
Sydney NSW 2000

Dear Tom Bitmead,

Re: Nepean Private Hospital Expansion Stage 1 - Draft Green Star Rating Scorecard

Northrop Consulting Engineers have been engaged by Johnstaff Projects Pty Ltd to benchmark against self-assessed Green Star Design & As-Built rating requirements for the Nepean Private Hospital Expansion Stage 1, located at 1-9 Barber Avenue, Kingswood NSW 2747.

This letter demonstrates, with the attached Responsibilities Matrix, that the building expansion is capable of achieving a 4 Star Green Star Design & As-Built rating. The level of environmental performance associated with this rating is considered 'Australian best practice' by the Green Building Council of Australia (GBCA) and demonstrates the project's strong commitment to social, financial and ecological sustainability.

Yours faithfully,

Matheus Santos
Sustainability Consultant

Date	Rev	Issue	Author	Verifier
04.12.2018	A	Development Application	M. Santos	A. Girgis
06.12.2018	B	Development Application	M. Santos	A. Girgis

Structural Civil Hydraulic Mechanical Electrical Sustainability Façades Environmental

Green Star - Design & As Built Scorecard

Project:	Nepean Private Hospital
Targeted Rating:	4 Star - Best Practice

Core Points Available	Total Score Targeted
98	48.2

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CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED	Consultant Role/Responsibility: Architect	Mechanical	Electrical	Hydraulics / Fire	Waste	Acoustic	Landscape Archi	Civil / Structural	Sustainability	Head Contactor /	Developer	ASSESSMENT COMMENTS
Management				**14**													
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	1									X			Green Star Accredited Professional – Design & As Built (GSAP), has been contractually engaged. Northrop fulfils this roll.
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies		X	X	X					X			The Project must set targets for the environmental performance of the project. This can be documented through the production of a design intent report or an owner's project requirements to be prepared by the design team at the design phase stage and outline at least the following items: • Description of the basic functions, operations, and maintenance of the nominated building systems • The targets for the project energy and water consumption and energy and water budgets for all nominated building systems. • Description of how energy, water, and aspects of indoor environment quality are metered and monitored. Including a meter diagram that illustrates how energy and water budgets are confirmed in operation Will need to include energy and water targets within documentation.
		2.1	Services and Maintainability Review	1	1	X	X	X	X					X	X	X	A maintainability design review must occur pre tender and preconstruction that seeks input from the design team, the facilities manager and operations staff (if known), and any relevant suppliers and subcontractors (if engaged) for a design review. The review must address the following aspects for all nominated building systems: • Commissionability; • Controllability; • Maintainability; • Operability, including 'Fitness for Purpose'; and • Safety
		2.2	Building Commissioning	1													Air permeability testing is required to meet the building commissioning credit. There is cost involved with this.
		2.3	Building Systems Tuning	1	1		X	X	X								Formal commitment to a tuning process for all nominated building systems. At a minimum, the commitment must include quarterly adjustments and measurement for the first 12 months after occupation and a review of building system manufacturer warranties. Commitment must include: • O&M manuals • building tuning plan • building tuning team • Owner has engaged parties to tune the system
		2.4	Independent Commissioning Agent	1													
Adaptation and Resilience	To encourage and recognize projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	2									X			Circa 10k cost for reporting, required additional capacity in mechanical and electrical system. Enacts a climate adaption and planning strategy for the site with the building design incorporating adaptions to address high and extreme risks.
Building Information	To recognize the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1		X	X	X						X	X	Demonstrate that comprehensive building operation and maintenance information is available to the facilities management team. O&M manuals and Building Log Book required
Commitment to Performance	To recognize practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1										X	X	Monitoring system and reporting needed.
		5.2	End of Life Waste Performance	1													

Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	Complies		✗	✗	✗							Metering shall be provided to allow for monitoring of the relevant areas or functions of the project. In most cases floor by floor metering will suffice if the entire floor has a single use. Where a load for a single item exceeds 5% of the total energy use for the building, or 100kW, it must be independently metered.
		6.1	Monitoring Systems	1	1		✗	✗	✗							The monitoring strategy must be developed in accordance with a recognised standard, such as CIBSE TM39 Building Energy Metering. The same principles described in the standard shall be used for developing water metering and monitoring strategies.
Responsible Building Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies									✗		A project-specific best practice EMP must be developed and implemented, to assist the Principal/Head Contractor and its service providers manage environmental performance, conditions, and impacts arising from excavation, demolition and construction.
		7.1	Formalised Environmental Management System	1	1									✗		Demonstrate that a formalised systematic and methodical approach to planning, implementing and auditing is in place during construction, to ensure compliance with the EMP Contractor to require ISO14001 Certification
		7.2	High Quality Staff Support	1												
Operational Waste	Prescriptive Pathway	8A	Performance Pathway - Specialist Plan	-												
		8B	Prescriptive Pathway - Facilities	1	1	✗				✗				✗		At least 4 different waste streams, with best practice area provision and access. Facilities are in place to collect and separate distinct waste streams within facilities that meet best practice requirements for collection by the relevant waste contractor.
Total				**14**	**10**											
Indoor Environment Quality				**17**												
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1												
		9.2	Provision of Outdoor Air	2												
		9.3	Exhaust or Elimination of Pollutants	1	1		✗									A dedicated exhaust riser must be provided for photocopy rooms, kitchens and cooking equipment, and carpark exhausts. These exhausts bust not recirculate air through spaces and must exhaust to outside.
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1						✗					Internal ambient noise levels, in the nominated area, are no more than 5dB(A) above the "satisfactory" sound levels provided in Table 1 of AS/NZS 2107:2016.
		10.2	Reverberation	1	1						✗					Reverberation time in the nominated area must be below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZ 2107:2016"
		10.3	Acoustic Separation	1	1						✗					The partition between the spaces should be constructed to achieve a weighted sound reduction index (Rw) of at least 45.
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies			✗								Flicker-free lighting refers to luminaires that have either: • A minimum Class A1 & A2 ballast; • High frequency ballasts for all fluorescent lamps, or • Electronic ballasts in High Intensity Discharge (HID) lighting.
		11.1	General Illuminance and Glare Reduction	1	1			✗								Best practice lighting levels for each task within each space type is defined as lighting with a maintained illuminance that meets the levels recommended in the relevant Standard. The recommended maintained illuminance values are not specified in the submission guidelines, the values to be used must relate to the closest type of task as defined in AS/NZS 1680.1:2006 table 3.1 AND All bare light sources must be fitted with baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants, including looking directly upwards.
		11.2	Surface Illuminance	0												
		11.3	Localised Lighting Control	1	1			✗								In the nominated area, occupants have the ability to control the lighting in their immediate environment. This includes turning the lights on and off and adjusting their light levels.
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	✗										Glare in the nominated area from sunlight through all viewing façades is reduced through a combination of blinds, screens, fixed devices, or other means.
		12.1	Daylight	2	1	✗								✗		40% (1 point) or 80% (2 Points) of the nominated area receives high levels of daylight during 80% of the nominated occupied hours.
		12.2	Views	1												
Indoor Pollutants	To recognise projects that safeguard occupant health	13.1	Paints, Adhesives, Sealants and Carpets	1	1	✗	✗	✗	✗					✗	✗	At least 95% of all internally applied paints, adhesives, sealants and carpets meet stipulated 'Total VOC Limits', or, where no paints, adhesives, sealants or carpets are used in the building.

Indoor Pollutants	through the reduction in internal air pollutant levels.	13.2	Engineered Wood Products	1	1	✗	✗	✗	✗					✗	✗		At least 95% of all engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building.
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1													
		14.2	Advanced Thermal Comfort	1													
Total				**16**	**9**												

Energy				**22**													
Greenhouse Gas Emissions	E. Modelled Performance Pathway	15A.0	Conditional Requirement: Prescriptive Pathway	-													
		15A.1	Building Envelope	-													
		15A.2	Glazing	-													
		15A.3	Lighting	-													
		15A.4	Ventilation and Air-conditioning	-													
		15A.5	Domestic Hot Water Systems	-													
		15A.6	Accredited Green Power	-													
		15B.0	Conditional Requirement: NatHERS Pathway	-													
		15B.1	NatHERS Pathway	-													
		15C.0	Conditional Requirement: BASIX Pathway	-													
		15C.1	BASIX Pathway	-													
		15D.0	Conditional Requirement: NABERS Pathway	-													
		15D.1	NABERS Energy Commitment Agreement Pathway	-													
		15E.0	Conditional Requirement: Reference Building Pathway	-	Complies												The Proposed Building greenhouse gas (GHG) emissions are less than those of the equivalent Benchmark Building.
		15E.1	Comparison to a Reference Building Pathway	20	6	✗	✗	✗	✗					✗	✗		Improving on the building's fabric and systems against a Reference Building (4 points), and for reducing emissions against the Benchmark Building (16 points). The more points the more costs associated with energy improvements or the purchase of long term contracts for green power. 30% improvement over benchmark targeted
Peak Electricity Demand Reduction	Performance Pathway	16A	Prescriptive Pathway - On-site Energy Generation														
		16B	Performance Pathway - Reference Building	2													
Total				**22**	**6**												

Transport				**10**													
		17A.1	Performance Pathway	0													
		17B.1	Access by Public Transport	3													
		17B.2	Reduced Car Parking Provision	1													would require minimum allowable parking

Sustainable Transport	Prescriptive Pathway	17B.3	Low Emission Vehicle Infrastructure	1	1	✕											To be confirmed. GoGet, Electric and small vehicles. "The low-emission vehicle infrastructure must meet one of the following benchmarks: * 15% of parking is for fuel-efficient vehicles (with a maximum of 5% for motorcycle parking); * 5% of parking is for electric vehicles and charging infrastructure is provided for each space;
		17B.4	Active Transport Facilities	1	1	✕											Secure bicycle parking for regular occupants is provided for 7.5% of total regular occupants, with associated end-of-trip facilities.
		17B.5	Walkable Neighborhoods	1													
Total				**7**	**2**												
Water				**12**													
Potable Water	Performance Pathway	18A.1	Potable Water - Performance Pathway	12	4												Up to 35% reduction in potable water consumption in comparison to a reference building.
		18B.1	Sanitary Fixture Efficiency	0													
		18B.2	Rainwater Reuse	0													
		18B.3	Heat Rejection	0													
		18B.4	Landscape Irrigation	0													
		18B.5	Fire System Test Water	0													
Total				**12**	**4**												
Materials				**14**													
Life Cycle Impacts	Prescriptive Pathway - Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment	0													
		19A.2	Additional Life Cycle Impact Reporting	4													
		19B.1	Concrete	3	1								✕		✕		30% reduction in Portland cement content
		19B.2	Steel	1	1								✕		✕		High strength steel; or at least 5% reduction in mass of steel used when compared to a suitable reference building.
		19B.3	Building Reuse	4													
		19B.4	Structural Timber	4													
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	1	✕									✕	✕	At least 95% of the building's steel is sourced from a Responsible Steel Maker.
		20.2	Timber Products	1		✕		✕	✕						✕		
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	✕	✕	✕	✕					✕	✕		At least 90% (by cost) of all permanent formwork, cables, pipes, flooring and blinds in a project is sources from a manufacturer that meet Best Practice Guidelines for PVC production or does not contain PVC (and have an Environmental Product Declaration).
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3													
Construction and Demolition Waste	Percentage Benchmark	22A	Fixed Benchmark	-													
		22B	Percentage Benchmark	1	1	✕				✕					✕		90% of the waste generated during construction and demolition has been diverted from landfill.
Total				**12**	**5**												

Land Use & Ecology				**5**													
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies								✕				✕
		23.1	Ecological Value	3													
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies												✕
		24.1	Reuse of Land	1	1												✕
		24.2	Contamination and Hazardous Materials	0		✕										✕	✕
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	1	✕							✕			✕	
Total				**5**	**2**												

The project must demonstrate that no critically endangered, endangered, or vulnerable species, or ecological communities were present on the site at time of purchase.
At the date of site purchase or date of option contract, the project site did not include old growth fores, prime agricultural land or wetland of 'High National Importance', or did not impact on 'Matters of National Significance'.
75% of the site was Previously Developed Land
At least 75% of the whole site area comprises of one or combination of vegetation; green roofs; light coloured roof SRI >64.

Emissions				**5**													
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1									✕			
		26.2	Stormwater Pollution Targets	1	1									✕			
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighboring Bodies	-	Complies			✕									
		27.1	Light Pollution to Night Sky	1	1			✕									
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1												
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1													
Total				**5**	**4**												

The post-development peak event discharge from the site does not exceed the pre-development event discharge using the local Council ARI requirements
The Stormwater discharge from the site meets the required pollution targets within the Green Star Technical Manual.
Demonstrate that all outdoor lighting on the project complies with AS 4282:1997.
Demonstrated that one of the following specified reductions in light pollution has been achieved; The direct illuminance from external luminaires on the project produces a maximum initial point illuminance value no greater than : • 0.5 lux to the site boundary and • 0.1 lux to 4.5 meters beyond the site into the night sky, when modelled using a calculation plane set at the highest point of the building. Calculations should be in accordance with AS 4282:1997

Innovation				**10**													
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10													
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	30B	Market Transformation		1	✕									✕	✕	✕
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		1	✕								✕			
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		2		✕	✕	✕						✕	✕	✕
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of	30E	Global Sustainability														
Total				**10**	**4**												

Sustainable Procurement Strategy
Exceeding Green Star Benchmarks – Stormwater Pollution Targets Up to two additional points may be awarded where projects can demonstrate achieving Pollution Reduction Targets from column B (1 point) or C (2 points) as stated in Table 26.1.
Financial Transparency & Extra Low VOC Paints

TOTALS	AVAILABLE	
CORE POINTS	98	42.0
CATEGORY PERCENTAGE SCORE		44.2
INNOVATION POINTS	10	4.0
TOTAL SCORE TARGETED		48.2