2 Macpherson Street, Warriewood
Lot 251 on DP 1245613
Subdivision DA Report

CLIENT/ Karimbla Construction Services (NSW) Pty Ltd

DATE/ JULY 2019

CODE/ 18-580

Commercial in Confidence

Document Registration

Document Title	2 Macpherson Street, Warriewood – Subdivsion DA Report
Document File Name	18-580-R003-02-Lot 251 on DP1245613. docx
Section	AT&L Pty Ltd - Engineering Division
Document Author	Glen James

Issue	Description	Date	Author	Checked	Approved
001	Issue for Comment	15/07/19	Glen James	☒	☒
002	DA Submission	18/07/19	Glen James	☒	☒
003	DA Submission	23/07/19	Glen James	☒	☒
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Contents

APPENDIX

1. Introduction

This Civil Development Application Report supports the subdivision of 2 Macpherson Street, Warriewood in conjunction with the recently approved Early Works development application for this site, DA No. N0398/17 (Early Works DA). Refer to Figure 1 for location of the proposed subdivision.

AT&L have been engaged by Karimbla Construction Services (NSW) to prepare a Civil Development Application Report on the civil and servicing requirements for the subdivision DA for the proposed development.

The aim of this report is to assess the remaining civil, servicing and subdivision works following the recent approval of the Early Works DA.

This report has been prepared in accordance with the:

- Pittwater Council 21 DCP 2014;
- Warriewood Valley Urban Land Release Water Management Specification February 2001; and
- Managing Urban Stormwater – Soils and Construction (2004).

The proposed development is located within the 'Warriewood Valley Urban Land Release' area.

1.1. Existing Site

The site is located on Lot 251 on DP1245613 Warriewood and is located within the Northern Beaches Council LGA (formerly Pittwater Council). The site is approximately 2.1 Ha in area. Refer to Figure 1, for site location. Existing access to the site is via existing driveways off Macpherson Street to the south. It is proposed that the development maintain the two crossovers as permanent points of access for the development.

The existing site has recently been cleared with much of the historic fill removed, and is bound by:

- Macpherson Street to the south (which has been upgraded by Northern Beaches Council 2017);
- 29-31 Warriewood Road to the north (which is under construction by Colonial Credits); and
- 23-27 Warriewood Road to the east (which is under construction by ArCare); and
- Low-density residential lot and Narrabeen Creek overflow Channel to the west.

Figure 1 - Site Map (Courtesy of Nearmaps)

The site generally slopes down from the north western boundary (RL approx. 2.50) to the south eastern corner (RL 1.21) following the existing alignment of Narrabeen Creek. There is an existing earthworks pad within the centre of the site, which is generally flat. It is proposed to modify this pad to suit the proposed development.

There is an existing stormwater overflow channel located along the western boundary running north-south which will be maintained as part of the development works.

Refer to the Survey drawings within Appendix A for all features on site along with existing contour levels.

The development was formerly located within Pittwater City Council, which was recently amalgamated to form Northern Beaches Council.

The report assumes the works proposed as per the approved Early Works DA which includes all associated earthworks, stormwater and road construction for the development have been completed.

1.2. Project Description

The proposed development is located at Lot 251 on DP1245613.

The Early Works DA involves the construction of

- 1x earthworks pad of 6,383m^2 in area;
- Regrading and rehabilitation of Narrabeen Creek; and
- 1 road type.

This subdivision DA involves;

- The subdivision of the site into:
  - Open Space and road reserve dedicated to council;
  - 22 proposed residential lots ranging in size from 240m^2 to 534m^2;
  - One private road lot.
- Servicing of the proposed new subdivision.

The subdivision layout plan is shown below in Figure 2 below.

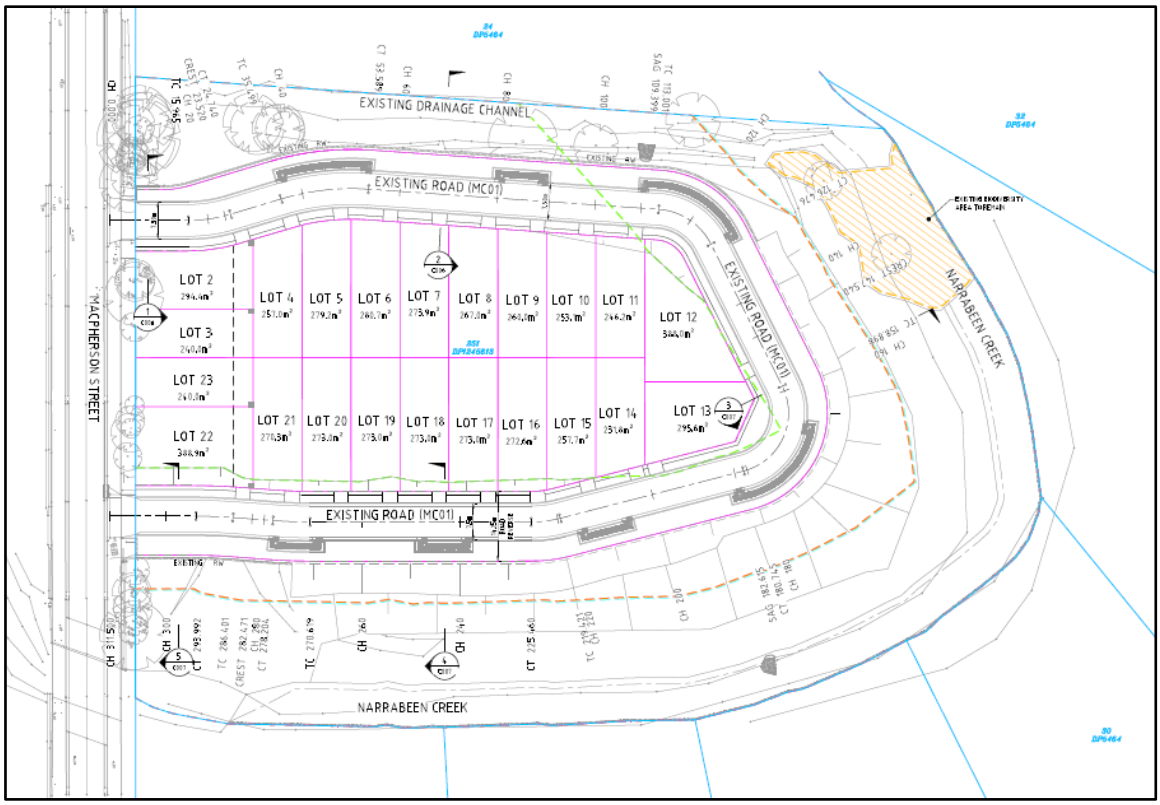

Figure 2: Proposed Development Layout (C005)

1.3. Scope of Report

The report assumes the site is complete as per the Early Works DA which includes all associated earthworks, stormwater and road construction for the development.

This report describes the remaining civil works associated with the subdivision of the development. In particular, this report:

- Identifies all existing utility infrastructure that currently service the site and the requirements for

supplying utility services to the proposed development;
- Describes the remaining verge works following the installation of the services; and
- Outlines the proposed Subdivision Layout.

This report should be read in conjunction with the associated AT&L Civil Documentation drawings 18-580 drawings dated July 2019 and the AT&L Civil Early Works Package relating to DA No. N00398/17. Refer to Appendix B for Civil Documentation and Appendix C for the Early Works Report.

This report has been prepared to satisfy the requirements and conditions of the following documents:
- Pittwater Council 21 DCP 2014;
- Warriewood Valley Urban Land Release Water Management Specification February 2001; and
- Managing Urban Stormwater – Soils and Construction (2004).

2. Sedimentation and Erosion Control (Staging)

As previously mentioned in Section 2 of this report, a thorough assessment of the site's Sediment and Erosion Control has been undertaken within *AT&L's Early Works DA Report*. Further to this, the staging of the subdivision and development of the individual lots need to be considered.

As the catchments draining to the proposed sediment basins consist of individual lots channeled by a common sediment catch drain, any disturbance or decommissioning of the swale to facilitate on lot development will impact the upstream properties. In the event the sections of sediment catch drains are disturbed or decommissioned by lot sales and developments, the Erosion and Sediment control measures will need to be revised to suit.

2.1. Sedimentation and Erosion Control (Construction)

A Soil and Water Management Plan (SWMP) has been prepared in accordance with the NSW Department of Housing Publication titled: Managing Urban Stormwater – Soils and Construction (2004) for the whole site.
The key objective of the SWMP are:

- Acknowledging the activities on a construction site which may contribute to erosion, sedimentation and water quality impacts;
- The implementation of industry best management practices to minimise adverse water quality and sedimentation impacts brought about through construction activities on waterbodies surrounding the work; and
- Establishment of processes that effectively manage erosion, sedimentation and water quality practices during the life of the project.

2.1.1. Sources of Pollution

The activities and aspects of the works that have potential to lead to erosion, sediment transport, siltation and contamination of natural waters include:

- Earthworks undertaken immediately prior to rainfall periods;
- Work areas that have not been stabilised;
- Extraction of construction water from waterways during low rainfall periods;
- Clearing of vegetation and the methods adopted, particularly in advance of construction works;
- Stripping of topsoil, particularly in advance of construction works;
- Bulk earthworks and construction of pavements;
- Works within drainage paths, including depressions and waterways;
- Stockpiling of excavated materials;
- Storage and transfer of oils, fuels, fertilisers and chemicals;
- Maintenance of plant and equipment;
- Ineffective implementation of erosion and sediment control measures;
- Inadequate maintenance of environmental control measures; and
- Time taken for the rehabilitation / revegetation of disturbed areas.

2.1.2. Potential Impacts

The major potential impacts on the riparian environment relate to erosion of distributed areas or stockpiles and sediment transportation. Potential adverse impacts from erosion and sediment transportation can include:

- Loss of topsoil;
- Increased water turbidity;
- Decreased levels of dissolved oxygen;
- Changed salinity levels;
- Changed pH levels;
- Smothering of stream beds and aquatic vegetation;
- Reduction in aquatic habitat diversity;
- Increased maintenance costs; and
- Decrease in waterway capacity leading to increased flood levels and durations;

2.2. RUSLE Analysis

Prior to the design of the SWMP, a Revised Universal Soil Loss Equation (RUSLE) has been undertaken in accordance with the "Blue Book". This analysis has been undertaken to predict the long term, average and annual soil loss from sheet and rill flow from the site under specified management conditions.

Estimating soil loss for a proposed development has four important applications to soil and water management. These are to:

1. Assess the erosion risk at a site;
2. Identify suitable measures to overcome the erosion risk;
3. Estimate the required capacity of sediment retarding basins; and
4. Compare the effectiveness of various erosion control measured.

Refer to

Table 1 below for the RUSLE analysis undertaken for this site.
It should be noted the following parameters/assumptions were used for the analysis of this site:

- Rainfall Erosivity Factor (R) = 3,960 from (Equation 2, Appendix A2 Blue Book)
- Soil Erodibility Factor (K) = 0.038 (from Appendix C, Table C20 of Blue Book)
- Slope Length (LS): Is assumed to not exceed 80m immediately before forecast rainfall or during shutdown periods and a maximum grade of 5%;
- Erosion Control Factor (P): Is the ratio of soil loss with a nominated surface condition ploughed up and down the slope (from Appendix A5, Blue Book); and

Parameter	Item (Blue Book Reference)
Rainfall Erosivity Factor, R	3,960

Soil Erodibility Factor, K (Table C20, Blue Book)- Narrabeen	0.007
Slope Length/Gradient Factor, LS	1.19
Erosion Control Practice Factor, P	1.20
Ground Cover and Management Factor, C	1
Computed Soil Loss (tonnes/ha/year), A	**39.58**
Soil Loss Class	**1 (Table 4.2)**

- Cover Factor (C): Is the ratio of soil loss from land under specified crop or mulch conditions to the corresponding loss from continuously tilled, bare soil. With the proposed ESC measures being installed post bulk earthworks, it is assumed that all soil is recently disturbed, thus a C factor of 1 is chosen.

Table 1: RUSLE Analysis

The erosion hazard potential of the site is considered very low, due to the calculated soil loss lying in the range of 0 to 150 tonnes/ha/year as per Table 4.2 of the Blue Book. Refer to Figure 4 for details.

Table 4.2 The Soil Loss Classes (adapted from Morse and Rosewell, 1996)

Soil Loss Class	Calculated soil loss (tonnes/ha/yr)	Erosion hazard
1	0 to 150	very low
2	151 to 225	low
3	226 to 350	low-moderate
4	351 to 500	moderate
5	501 to 750	high
6	751 to 1,500	very high
7	>1,500	extremely high

Figure 3: Table 4.2 from the Blue Book

2.3. Soil and Water Management Plan

2.3.1. Overall Strategy

The following construction methodology will be followed to minimise the impact of sedimentation due to construction works:

- Diversion of "clean" water away from the disturbed areas and discharge via suitable scour protection;
- Diversion of "clean" upstream Narrabeen Creek flow away from disturbed areas, in-line with construction staging (in accordance with flooding advice), during Narrabeen Creek works. Once the works within the creek are finished this diversion is to be removed to allow flows to access the new Creek section;
- Provision of hay bale type flow diverters to catch drainage and divert to "clean" water drains;
- Diversion of sediment-laden water into temporary sediment control basins to capture the design storm volume and undertake flocculation (if required);
- Provision of construction traffic shaker grids and wash-down to prevent vehicles carrying soils beyond the site;
- Provision of catch drains to carry sediment-laden water to sediment basins;
- Provision of silt fences to filter and retain sediments at source;
- Rapid stabilisation of disturbed and exposed ground surfaces with hydro-seeding areas where future construction and building works are not currently proposed;
- Erosion and sediment control measures within Narrabeen Creek are to be constructed in Accordance with the Blue Book to suit the staging requirements of the works;
- Raingarden basins are to be utilised as temporary sediment control basins. The raingardens shall not be converted into the final/ultimate basins until such time as all building and construction works within the relevant stage has been completed and 90% of the site is stabilised.

Refer to AT&L Drawings DAC080 to DAC080 for Erosion and Sediment Control Plans, for all proposed control

and protection measures across the site.

2.3.2. Design of Sediment and Erosion Control Measures

Suitable erosion and sediment controls shall be provided by the Contractor and maintained throughout all stages of works, including at completion of the bulk earthworks.
All design, documentation, installation and maintenance of sediment and erosion controls will be in accordance with the requirements of:

- Protection of the Environment Operations Act;
- Pittwater Council Warriewood valley Urban Land Release Water Management Specification February 2001; and
- Office of Environment and Heritage's 'Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) (The "Blue Book") Volume 1 and Volume 2.

Ultimately, the final temporary sediment basin locations and sizes will be provided to suit development staging requirements and will be sized and maintained in accordance with the requirements of the above-mentioned authority documents.

With the proposed site being larger than 2,500m^2 in disturbed area, a sediment basin is required. The following temporary sediment basins are to be in-place at the commencement of demolition/remediation works. Refer to drawings in Appendix B and 'Earth Basin Dry' SD6-3 for details.

Parameter	Item (Blue Book Reference)
Soil Type	Type C (Appendix C, Table C20, Blue Book)
Design Rainfall Depth (Days)	5
Design Rainfall Depth (Percentile)	85
x-day, y-percentile rainfall event	44.0 (Table 6.3a)
Rainfall Intensity: 2 year, 6-hour storm	13.50
Rainfall Erosivity (R-factor)	**3,960**

Table 2: Site Data

Parameter	Basin 1	Basin 2	Basin 3	Basin 4	Basin 5
Volumetric Runoff Coefficient, C_v (Appendix F3, Blue Book)	0.50	0.50	0.50	0.50	0.50
Contributing Area, A (ha)	0.31	0.33	0.19	0.22	0.86
$R_{(85\ \%ile,\ 5\ day)}$	44.0	44.0	44.0	44.0	44.0
Settling Zone Volume, (m^3)	47	50	30	26	99
Sediment Storage Zone Volume, (m^3)	2	2	1	1	4
Total Sediment Basin Volume, (m^3)	**49**	**52**	**31**	**27**	**103**

Table 3: Temporary Sediment Basins

Note, at the completion of the road construction under the Early Works DA:

- Sediment Basins 3 and 4 will be converted to raingardens and will not operate as sediment basins;

and

- Sediment Basin 5 will be decommissioned upon completion of creek works.

Therefore, works associated with this subdivision have been designed to only contribute to Sediment Basins 1 and 2.

2.4. Site Inspection and Maintenance

The inspection and maintenance requirements outlined in this section must be carried out while either earthworks is being conducted, and all areas re-established.

The Contractor will be required to inspect the site after every rainfall event and at least weekly, and will:

- Inspect and assess the effectiveness of the SWMP and identify any inadequacies that may arise during normal work activities or from a revised construction methodology;
- Construct additional erosion and sediment control works as necessary to ensure the desired protection is given to downstream lands and waterways;
- Ensure that drains operate properly and to affect any repairs;
- Remove spilled sand or other materials from hazard areas, including lands closer than 5 metres from areas of likely concentrated or high velocity flows especially waterways and paved areas;
- Remove trapped sediment whenever less than design capacity remains within the structure;
- Ensure rehabilitated lands have affectively reduced the erosion hazard and to initiate upgrading or repair as appropriate;
- Maintain erosion and sediment control measures in a fully functioning condition until all construction activity is completed and the site has been rehabilitated;
- Remove temporary soil conservation structures as the last activity in the rehabilitation.
- Inspect the sediment basin during the following periods:
    - During construction to determine whether machinery, falling trees, or construction activity has damaged and components of the sediment basin. If damage has occurred, repair it;
    - After each runoff event, inspect the erosion damage at flow entry and exit points. If damage has occurred, make the necessary repairs;
    - At least weekly during the nominated wet season (if any), otherwise at least fortnightly; and
    - Prior to, and immediately after, periods of 'stop work' or site shutdown.
- Clean out accumulated sediment when it reaches the marker board/post, and restore the original volume. Place sediment in a disposal area or, if appropriate, mix with dry soil on the site;
- Do not dispose of sediment in a manner that will create an erosion or pollution hazard;
- Check all visible pipe connections for leaks, and repair as necessary;
- Check all embankments for excessive settlement, slumping of the slopes or piping between the conduit and the embankment, make all necessary repairs;
- Remove the trash and other debris from the basin and riser; and
- Submerged inflow pipes must be inspected and de-silted (as required) after each inflow event.

2.4.1. Sediment Basin Maintenance

As stated in Section 3.2, the proposed development site contains 'Type C' soils (refer to Geotechnical Report by Coffey dated 6th December 2018 for details), or soils which are predominately coarse-grained (less than 33 percent finer than 0.02mm) and will settle relatively quickly in a sediment retention basin, and thus does not require fluctuation.

2.5. Conclusion

The erosion control measures proposed for the site will comply with the requirements of Pittwater Council Warriewood Valley Urban Land Release Water Management Specification. and The Department of Environment, Climate Change and Water (DECC).
The proposed SWMP will ensure that the best management practice is applied to the development site in controlling and minimising the negative impacts of soil erosion.

3. Road Design

A thorough assessment of the site's Road Design has been undertaken within AT&L's Early Works DA Report. However, the design of the road reserve verges fronting residential lots were not included and will be discussed within this report.

3.1. General Design Principles

The roads verges have been generally designed in accordance with:

- Pittwater Council Local Environment Plan 2014 Clause 7.10;
- Pittwater Council Local Environment Plan 2014 Clause 6.4 (The Road System and pedestrian and Cyclist Network); and
- Austroads Guide to Road Design Part 3: Road Design.

As part of the early works package, the following kerbs were nominated:

- for kerbs fronting residential lots – Roll kerbs; and;
- for kerbs fronting lands to be dedicated to council – kerb and gutter.

3.2. Road Verges

- Typical road verge fronting residential lots consists of 2.5m wide verge comprising:
  - 0.2m wide roll kerb (existing);
  - 1.5m wide concrete footpath at 2.5% crossfall; and
  - 0.8m wide landscaped area at 2.5% crossfall.

  Refer figure 4 below:

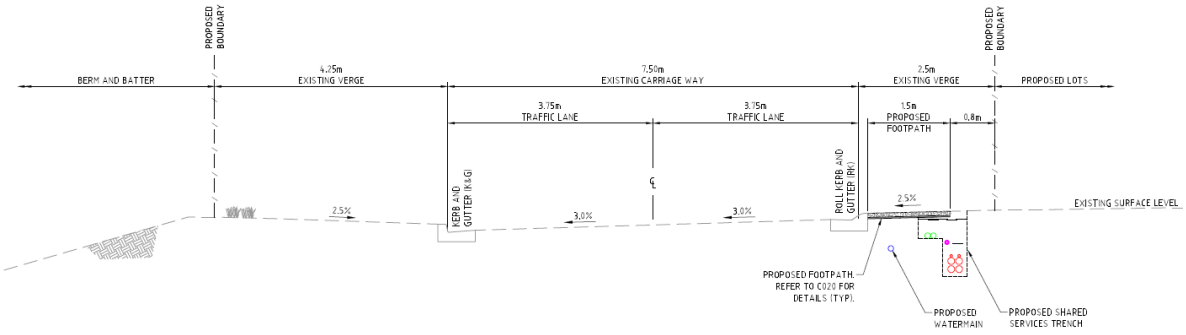

Figure 4 - Road verge (Typical)

- Typical verges with vehicular driveways fronting residential lots consists of 2.5m wide verge comprising:
  - 0.2m wide roll kerb (existing); and
  - 2.3m wide vehicular crossing at 2.5% crossfall.

  Refer figure 5 below:

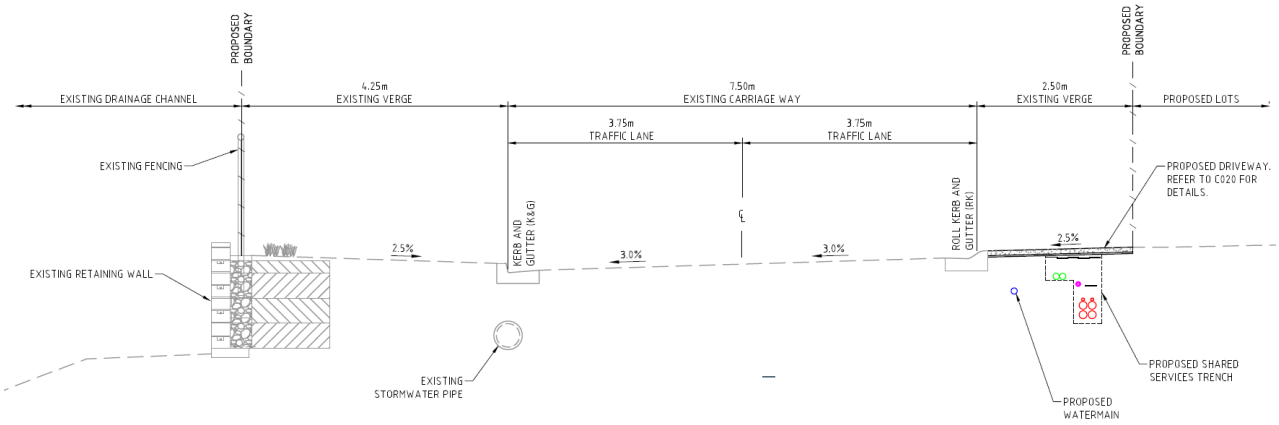

Figure 4 – Road Verge (Vehicular Crossing)

5. Water Sensitive Urban Design (WSUD)

As previously mentioned in Section 2, a thorough assessment of the site's WSUD has been undertaken within *AT&L's Early Works DA Report*. The WSUD encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management.

A WSUD strategy for the site was prepared within the approved Early Works DA dated March 2019. This takes the ultimate, subdivided scenario into consideration and comprises of the internal lot catchments discharging via kerb outlets into the gutter to be collected via stormwater inlet pits containing Stormwater360 Enviropods (or approved equivalent) and then drain into the proposed Bio-retention/raingardens. This allows the water to be treated and discharged at rates acceptable to Northern Beaches Council.

For more information relating to the WSUD and MUSIC modelling for the site refer to *AT&L's Early Works DA Report.*

6. Services

To investigate future servicing requirements for this development, services due diligence was undertaken to ensure the site has the capability of being serviced by utility providers. Due to the recently constructed upgrade of Macpherson Street, Dial Before you Dig (DBYD) is currently being updated.

The Macpherson Street (MSNBC) drawing packages received from Northern Beaches Council has assisted with the services investigation. This information will be confirmed during the Construction Certificate stage of the development.

This development will incorporate full servicing for the proposed subdivision.

6.1. Sydney Water

6.1.1. Water Supply

From Dial Before You Dig (DBYD) information obtained there is an existing 100mm diameter CICL (Cast Iron Cement Lined) potable water main owned by Sydney Water within the northern verge of Macpherson Street. There is an existing 200 CICL and 300mm diameter uPVC potable water mains within the southern verge of Macpherson Street.

It is proposed to connect into the existing 100mm main within Macpherson Street and reticulate around the proposed developments, subject to pressure testing and approval from Sydney Water.

Final approval will need to be sought from Sydney Water prior to connecting into this main and design documentation.

Refer to DBYD records within Appendix D and Services and Utilities Coordination Plan dwg. C070 within Appendix B.

6.1.2. Sewerage

From Dial Before You Dig (DBYD) information there is an existing 400mm diameter RC (Reinforced Concrete) sewer main which is located within 6 Macpherson Street.

Given the depth of this sewer is approximately 8m it is anticipated that a connection be made to this main subject to Sydney Water Approval.

A 150mm diameter sewer pipe will be extended from the existing manhole located in the south-east corner of 6 Macpherson Street to our development site, subject to the necessary approval process and permission to enter requirements.

The proposed lots generally drain to the rear, as such it is proposed to reticulate the sewer main through the centre of the pad allowing all lots to connect to that main.

Final approval will need to be sought from Sydney Water prior to connecting into the existing sewer main.

Refer to DBYD records within Appendix D and Services and Utilities Coordination Plan dwg. C070 within Appendix B.

6.2. Communications

From Dial Before You Dig (DBYD) and MSNBC information, there are existing Telstra assets which are located within the northern verge of Macpherson Street.

It is proposed to connect to the Telstra Asset within Macpherson Street and reticulate around the proposed developments. In addition, an existing Telstra asset located in the south east corner of the site is proposed to be decommissioned and removed from the site.

Confirmation will need to be sought with the telecommunications authorities for all connections.

Refer to DBYD records within Appendix D and Services and Utilities Coordination Plan dwg. C070 within Appendix B.

6.3. Gas

From Dial Before You Dig (DBYD) information, there is a 100mm diameter PE gas main located within the northern verge of Macpheron Street to the south of the site.

It is proposed to connect into the main within Macpherson Street and construct a 50mm nylon reticulation network constructed to service individual lots.

Approval will need to be sought by Jemena as owners of these gas mains within the area for all connections into their network.

Refer to DBYD records within Appendix D and Services and Utilities Coordination Plan dwg. C070 within Appendix B.

6.4. Electrical

As part of the MSNBC works an electrical branch line was installed to cater for the proposed development site within the northern verge.

It is proposed to connect into this asset within Macpherson Street and install a low-voltage internal reticulation network and street lights within the proposed roads. These works are subject to Ausgrid as the asset owner and confirmation from a Level 3 ASP designer.

An application for supply will need to be made to Ausgrid for this development.

Refer to DBYD records within Appendix D and Services and Utilities Coordination Plan dwg. C070 within Appendix B.

6.5. Conclusion

This section demonstrates that services including sewer, water, power, telecommunications and gas can be made available to the site. Internal reticulation will be coordinated at the Construction Certificate (CC) stage of works and applications to the relevant authorities made.

7. Conclusion

As highlighted within this report, and in conjunction with *AT&L's Early Works DA Report* dated March 2019, all civil/stormwater infrastructure for the proposed development has been designed in accordance with the Warriewood Valley Water Management Specification and Pittwater Council DCP.

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