



Eden Gardens

307 Lane Cove Road, Macquarie Park

Development Application

Water Sensitive Urban Design Strategy Plan

FOR / Civil Engineering Services

CLIENT / Thunderbirds Are Go Pty Ltd atf The Gardeners Trust

DOCUMENT NO / S18349-RPT-A-001 REV / 1 DATE / 26/02/2021

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Document Control

Revision	Date	Description	Prepared	Reviewed	Approved
1	26/02/21	Issued for Development Application	BG&E	BG&E	BG&E

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1 INTRODUCTION

1.1 Background

Thunderbirds Are Go Pty Ltd aft The Gardeners Trust is proposing to re-develop Eden Gardens, an integrated horticultural development, with alterations and additions of the existing garden centre buildings/facilities, landscape works (including terraces and relocation of the Eden Tree), relocation of offices, additional service areas and additional underground parking. BG&E have been commissioned to undertake the stormwater management and water quality strategy for the Eden Gardens Redevelopment.

1.2 Stormwater Policies & Objectives

An integrated stormwater management and water sensitive urban design concept has been prepared for the development. The strategy has been developed to meet the following objectives and comply with:

- Council's stormwater objectives as set out in Ryde Council's DCP 2014 (RDCP 2014):
 - o Stormwater and Floodplain Management Technical Manual
 - o Part 8.2 Stormwater and Floodplain Management
 - o Submission Details – Stormwater Drainage Plans
- National Parks and Wildlife Service – Developments adjacent to National Parks and Wildlife Service lands – Guidelines for consent and planning authorities
- PLR NO 2020/43 Urban Design Review Panel & PreLodgement Advice – 307 Lane Cove Road 26 November 2020

1.3 Relevant Documentation

The following documentation have been used as reference in preparation of this report and the stormwater concept plans:

- Eden Gardens Stormwater Re-use and Drainage by Perrens Consultants September 2002
- Realm (Landscape Architect) Development Application Package February 2021
- DKO Architecture Development Application Package February 2021
- Detailed Survey of Stormwater from Chadwick Cheng February 2021

2 EXISTING SITE CONDITIONS

2.1 Site Location and Topography

The site area of Eden Gardens is approximately 2.47 hectares comprising a retail garden centre, display gardens, service areas, including a café restaurant, function hire centre and underground and street level car parking.

The site is bounded by Lane Cove Road to the west, Lane Cove National Park to the north and east and the M2 Motorway to the south.

The upper portion of the site including access driveway and nursery areas are relatively flat, with slopes of less than 1% fall in any direction. The lower portion of the site starting from the Upper Garden, falls to the Lower Bush Garden with slopes of approximately 8-9% in the south-easterly direction.

2.2 Drainage System Features and Site Stormwater

The site has a complex series of drainage patterns. Towards the higher end of the site is the nursery/upper courtyard which comprises of a series of constructed gully grassed pits branching into a centralised wetland channel running north-east down south-west. This wetland channel (see **Figure 6** for image) conveys collected stormwater to two storage tanks (approximately 180 m³ effective storage in total) located under the nursery, adjacent to the channel and retaining wall bounding the nursery to the south. The primary storage tank is used to pump stormwater through a slow sand filter for pathogen and fungal control before being held in the secondary tank.

The nursery area is bounded to the south by a retaining wall and steps down to the Upper Display Garden Area. The Upper Garden generally falls in a south-easterly direction with a myriad of terraced gardens, ponds garden features. Formalised stormwater drainage and overland flow directs runoff in this area towards a reconstructed creek runs from the south-west part of the garden in an easterly direction before discharging to the main detention tank (approximately 750 m³ effective storage) in the south-east portion of the site (See **Figure 3** for image).

Water is pumped back from the detention tank reservoir up to the rainwater/irrigation storage tank in the upper courtyard/nursery. Refer to the hydraulic engineers for details on this system.

In excess of the underground system of the nursery and capacity of the main detention basin; the combined excess overland flow will be conveyed off-site to a dispersion channel on the northern side of the boundary wall between the site and the M2 motorway. The flow will be dispersed evenly over approximately 35m of length.

The south-eastern corner of the site has a bush garden (see **Figure 4** for image) which is situated downstream of the main detention basin. Stormwater runoff in this area will flow directly off site via dispersion drain and flow towards the M2 stormwater pollution control pond and greater ancillary drainage system. Further details on this system are covered in Section 2.7.

At the north-eastern boundary of the site; the catchment is made up of mainly the service area and stormwater runoff is conveyed through kerb breakouts before being collected by a drainage swale and dispersed into the Lane Cove National Park.

At the western boundary of the site fronting Lane Cove Road; a roadside garden at the top of embankment drains directly to Lane Cove Road to be captured by a series of kerb inlet pits to ultimately discharge towards the M2 (see **Figure 2** for image).

The main building catchments are reticulated to basement carpark levels by the hydraulic network before being captured, treated by gross pollutant trap (see **Figure 5** for image) and discharged to the reconstructed creek and ultimately the main detention tank.

In minor events, the existing drainage configuration is intended to optimize capture and re-use of stormwater to meet on-site irrigation needs. Pollution control facilities within the site have also been installed to ensure that the stormwater quality is appropriate for re-use.

In major events where excess stormwater needs to discharge from the site; an existing treatment train ensures that all site stormwater discharged has been treated to minimise pollutants e.g. sediments, plant nutrients, pathogens and seeds.

The current stormwater facilities have been designed to discharge at flow rates no greater than the pre-developed “greenfield” condition of the site (Perrens Consultants, 2002).

2.3 Existing Catchments

The existing development comprises of seven sub-catchment areas as summarised in **Table 1** and illustrated in **Figure 1**.

Catchment	Area (m ²)	Impervious %
1 Retail Building and Plantings	2,570	53%
2 Access Driveway and Paving	3,220	100%
3 Upper Garden	8,155	15%
4 Lower Bush Garden	2,255	0%
5 Nursery / Upper Courtyard	6,255	50%
6 Lane Cove Roadside Garden	965	0%
7 Service Area and Small Buildings	1,260	100%
Total	24,680	

Table 1: Updated Catchment Areas

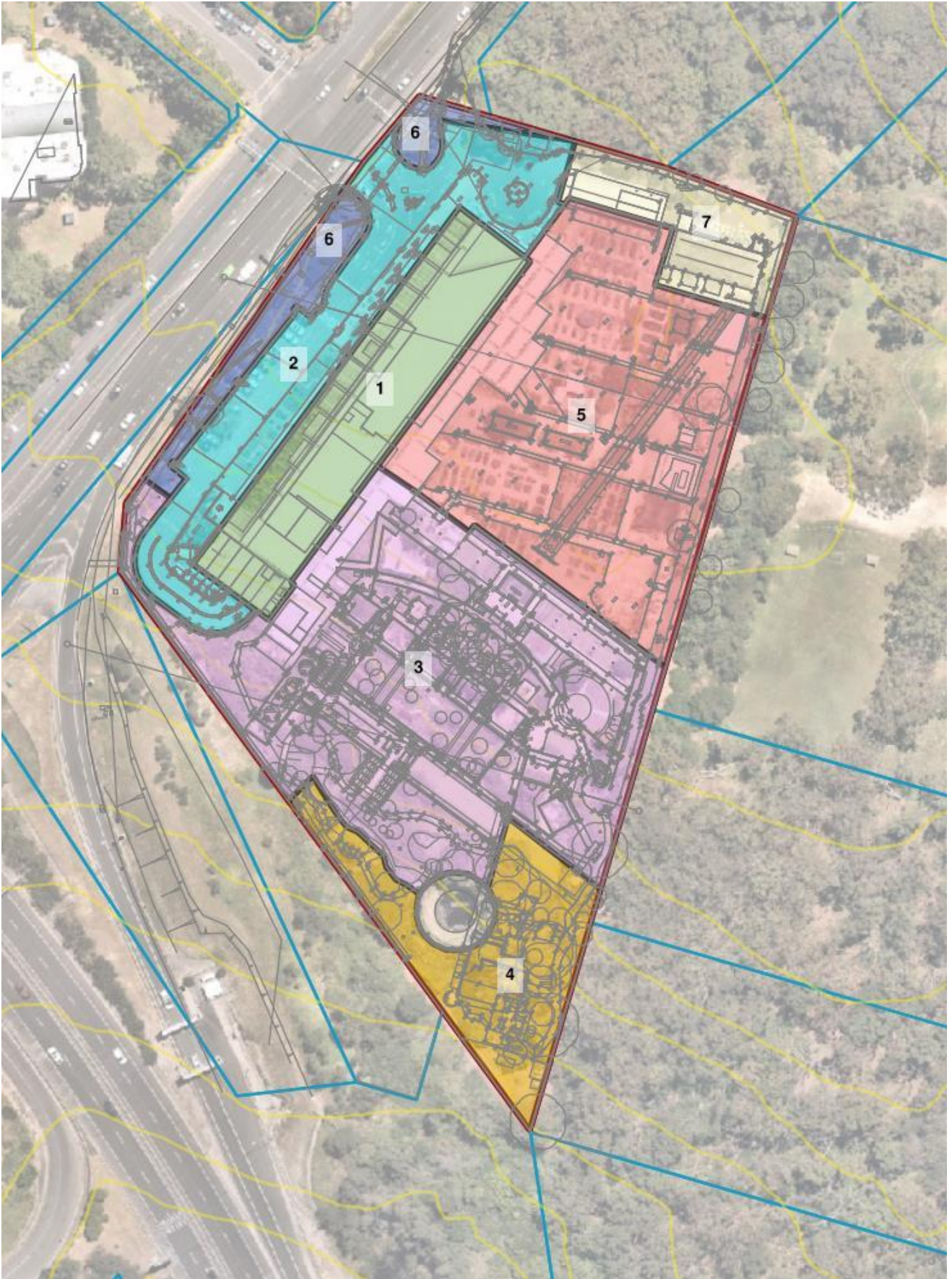


Figure 1: Existing Catchment Areas

2.4 Discharge Points

The existing development generally has the following points of discharge:

- Discharge Point A drains north-east towards Lane Cove National Park via overland flow through breaks in the kerb towards Lane Cove National Park;
- Discharge Point B drains to the south-east of the site towards the pollution control pond and spillway structure upstream of the M2 Motorway;
- Discharge Point C drains towards Lane Cove Road;

2.5 Pre-Development Scenario Peak Discharge

The peak discharge for the pre-development scenario was adopted from the Stormwater Re-use and Drainage Report (Perrens Consultants, 2002). These rates have been estimated based on the greenfield scenario of the site and form the basis of the flow rates to which the proposed development shall be limited to.

Discharge Location	Pre-Development Peak Discharge (m ³ /s)		
	Perrens (2002)		
	A	B	C
5 year	0.17	0.34	0.016
20 year	0.25	0.60	0.023
100 year	0.31	0.83	0.034

Table 2: Pre-Development (Greenfield) Peak Discharges (Perrens Consultants, 2002)



Figure 2: Batter from site to Lane Cove Road and series of road kerb inlet pits



Figure 3: Existing Detention Basin in the south-eastern part of the site



Figure 4: Above ground view looking over the Lower Garden in South-East direction



Figure 5: Internal Access Ramp from Ground Level Carpark to Basement Carpark (Humceptor lid at left of image)



Figure 6: Existing wetland channel within Garden Centre / Nursery

2.6 On-Site Detention Facilities and Performance

The water retention basin located upstream of the Lower Bush Garden has an active storage capacity of 500 m³ with an additional 250 m³ for flow rate control of discharge from the site. A stormwater outlet pit downstream of the basin with an internal weir appears to be the discharge control. The main storage has been configured as a “first flush” storage to ensure it provides maximum pollution reduction for any runoff that is discharged from the site. In addition to the 750 m³ of effective storage, the storage will have a “dead storage” zone of about 150 m³ that will provide a source of water via reticulation through the creek in times where there is insufficient supply from runoff.

2.7 M2 Receiving Drainage System

Constructed drainage systems associated with the M2 Motorway are immediately down-slope of the site on the south-western side. The main features of the system are:

- An earth bank and an unlined interception drain run along the top of the road batter directing and runoff from the site in a south-easterly direction towards a ponding area behind a spillway structure located about 170 m from Lane Cove Road;
- The drainage arrangements downstream of the pollution control pond are unclear. Flow appears to discharge via the surcharge pit structure into a concrete lined drain that runs along the road batter into an area heavily vegetated by trees;
- The concrete line drain upstream of the pollution control pond ensures discharge from the subject site is intercepted before it runs off into the Motorway. The flows are conveyed into the pollution control pond;

- Outflow from the pollution control pond is conveyed via a concrete lined channel into an inlet pit forming part of the Council's piped drainage system that drains to Porters Creek and subsequently to Lane Cove River (Perrens, 2002).

Figure 7 illustrates the M2 receiving system downstream of the subject site discharge point along the south-eastern boundary.



Figure 7: Downstream of Site - M2 Ancillary Drainage Structures

3 PROPOSED STORMWATER MANAGEMENT

3.1 Overview

Stormwater management plans have been proposed in accordance with Ryde Council's DCP Part 8.2 Stormwater & Floodplain Management and Stormwater Technical Manual and can be viewed in **Appendix B**.

The strategy appreciates the vision of the landscape architect for maximum rainwater harvesting, capture and re-use within the upper courtyard hardstand areas.

The general approach is for the hardstand areas of the upper courtyard and commercial areas to fall to a series of recessed wicking planters for tree growth optimization with stormwater to be collected in the retained irrigation storage tanks as per **Section 2.2**. Runoff from the proposed landscaped portion of the upper courtyard will be filtered through a series of bio-gardens for water quality. In excess of the underground system capacity; a passive irrigation swale to the east of the hardstand area is proposed to replicate the displaced planted wetland channel and collect runoff. An upgraded drainage network will then formally convey this runoff through the display garden before discharging to the main detention basin.

The southern garden areas, internal road access and building roof catchment will generally emulate the current drainage pattern with runoff conveyed to the reconstructed creek downstream of the lawn and garden display areas. The reconstructed creek also discharges to the main detention basin. Downstream of the basin is the lower bush garden. In the case of emergency overflow; the outflows will runoff through this garden into a dispersion channel to spread the flow over approximately 35m before draining to the M2 pollution control pond and receiving network.

Drainage of roof areas and hardstand areas over areas of proposed basement construction shall be designed and coordinated by the hydraulic consultant.

The treatment strategy incorporates drainage bio-gardens, continued use of the existing Humeceptor, water re-use from collected rainwater in detention areas and aeration in the reconstructed creek. Water captured in the main reservoir will be pumped back and recirculated to courtyard for usage.

Flows have been determined by use of the ILSAX modelling method. For further details on the catchment breakdown and modelling methodology, refer to **Sections 3.2 & 3.4** respectively.

3.2 Proposed Catchments

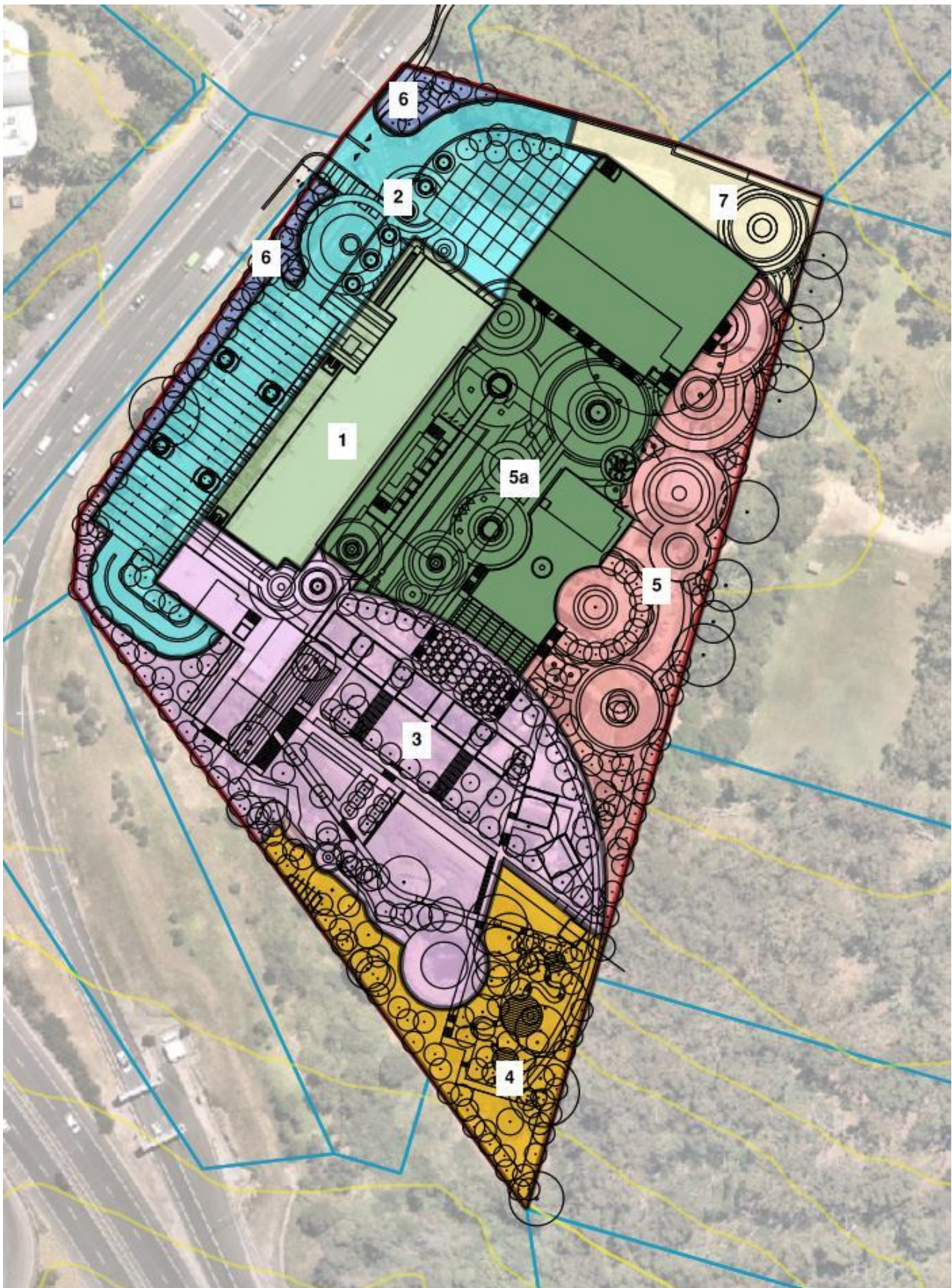


Figure 8: Proposed Catchment Areas

Catchment		Area (m ²)	Impervious %
1	Retail Building and Plantings	2,010	100
2	Access Driveway and Paving	4,060	100
3	Upper Garden	6,450	0
4	Lower Bush Garden	2,240	0
5a	Nursery to Storage Tanks	5,380	100
5	Nursery through Bio-gardens	3,050	15
6	Lane Cove Roadside Garden	620	0
7	Service Area and Small Buildings	870	100
Total		24,680	

Table 3: Proposed Catchment Areas Summary

3.3 Proposed On-Site Detention

A performance assessment of the existing on-site detention has been undertaken with the proposed development scenario to demonstrate that the receiving system can accommodate the additional runoff from the 100-year ARI event without detriment to the downstream environment.

An existing weir located downstream of the main detention basin appears to provide additional capacity for stormwater re-use in periods of high rainfall and added flow rate control at higher storage volumes. Due to the increased runoff from the development, it is proposed to remove or lower this weir to ensure flows can be released from the basin at earlier storage levels and lower hydraulic head.

Discharge Location	Detention Basin	Storage Tanks	Passive Irrigation Swale	Bushland Garden	Roadside Garden	Service Area
Contributing Catchments	1-3	5a	5	4	6	7
Total Area (m ²)	12,520	5,380	3,050	2,240	620	870
Impervious (%)	42%	100%	15%	0%	0%	100%
Detention Volume Provided (m ³)	750	180 (Storage Tank)	N/A	N/A	N/A	N/A
Discharge / Outlet Configuration	Ø450mm Outlet	Ø300mm Outlet	Detention Basin	Dispersion Channel	Overland Flow	Drainage Swale

Table 4 – On-Site Detention System

3.4 Peak Flows and Off-Site Discharge

Table 5 summarises the post-developed scenario flows from the site. These flows are compared to the pre-development or greenfield scenario flows outlined in **Table 2**.

Discharge Location	Post-Development Peak Discharge (m ³ /s)		
	A	B	C
5 year	0.036	0.34	0.019
20 year	0.046	0.46	0.028
100 year	0.057	0.59	0.035

Table 5: Post-Developed Scenario Peak Discharge Rates

The modelling results estimate post-developed flows are limited to pre-development levels at **Location A**. This is due to a portion of this service area catchment being converted to additional roof over building catchment with runoff being collected by proposed drainage within the nursery and ultimately diverted to the south-western boundary instead.

At **Location B**, the modelling results demonstrate that the estimated post-development peak discharges are less than the pre-development (greenfield scenario) for events between the 5 year and 100 year ARI.

The model demonstrates that utilizing the existing on-site detention facilities (i.e. both irrigation storage tanks and the main detention basin) for the development should provide the attenuation to ensure no adverse impacts to the M2 Motorway receiving network and subsequently downstream waterways i.e. Porters Creek. Another advantage to the configuration is that although the post-development peak flows at this location are less than the pre-development scenario; they are still of similar magnitude such that the existing treatment facilities e.g. pollution control pond and M2 drainage network downstream will still be fit for purpose without requiring modifications.

The catchment runoff rates from the Lane Cove Roadside Garden (**Location C**) are similar in magnitude in both the pre-developed and post-developed scenario (difference of less than 1L/s estimated in the major storm).

In summary, the proposed stormwater management strategy satisfies the on-site detention and discharge requirements as outlined in RDCP 2014 Part 8.2 Stormwater and Floodplain Management, Stormwater Technical Manual - OSD Design Detailed Method, and PLR NO 2020/43 Urban Design Review Panel & PreLodgement Advice - 2.6 Stormwater Management.

3.5 ILSAX Modelling Parameters

The catchment and rainfall parameters adopted are in accordance with RDCP 2014 Technical Manual – Appendix 4: DRAINS, RAFTS and XPSTORM Input Parameters. A soil type of 2.5 and an Antecedent Moisture Content of 3 has been used in the DRAINS ILSAX modelling assessment.

The design rainfall patterns from Bureau of Meteorology (BOM) Australian Rainfall and Runoff (AR&R 2016) Intensity-Frequency-Duration (IFD) for the Macquarie Park region with storms of recurrence intervals 5, 20 and 100 year ARIs with durations between 5 minutes and 180 minutes have been used for the stormwater assessment.

For the purposes of this assessment, the trunk drainage and direct outlet configurations have been modelled. Drainage network within the site will be further developed in the detailed design phase.

4 WATER SENSITIVE URBAN DESIGN STRATEGY

4.1 WSUD Objectives

Section 3.3 *WSUD Controls* of the DCP (2014) 8.2 Stormwater Management outlines the stormwater quality performance reduction targets that the water sensitive urban design measures must satisfy:

- 90% Gross Pollutant Reduction
- 85% Total Suspended Solids
- 60% Total Phosphorus
- 45% Total Nitrogen

Further to this; the National Park guidelines recommend for development proposals adjacent to NPWS land should incorporate stormwater detention and water quality systems within the development site. Water sensitive urban design should be applied to developments in catchments upstream from wetlands.

Given the potential for pollutants to significantly impact park values, NPWS recommends that developments proximate to parks should not result in any net increase in pollutant levels discharged to NPWS land.

4.2 Proposed Treatment Train

The proposed treatment train will incorporate:

- A rainwater re-use tank with effective storage of 180 m³ located under the proposed upper courtyard;
- A series of drainage bio-gardens featuring nutrient uptake with planting in coordination with the landscape architect;
- A series of tree pits embedded within the proposed ground-level carpark design;
- Retention and use of the existing gross pollutant trap, Humeceptor;
- Reconstructed creek as a low-level swale upstream of the main detention basin. The main detention basin will also have re-use functions.

It is important to note that the site has an abundance of planters, gardens, ponds, vegetated areas, streams and even filters with which the water quality treatment benefits are not quantified into the MUSIC modelling. For example, the reconstructed creek provides aeration to the runoff as it is conveyed to the tank; or the pathogen and fungal treatment provided within the existing storage tank. It is of the opinion that the site would very likely provide higher pollutant reduction rates far greater the resultant MUSIC output and RDCP 2014 reduction targets.

For details and calculations on re-use rates, pumping, recirculation, recirculation and irrigation design; refer to the hydraulic consultant.

Table 6 provides a summary and breakdown of the proposed catchment split and associated treatment measures.

Discharge Location	Detention Basin	Internal Access Road and Driveway	New Nursery
Contributing Catchments	1-3	2	5
Total Area (m ²)	12,250	2,240	8,430
Proposed Treatment Train	Reconstructed Creek (Swale) Rainwater Re-use Aeration*	Embedded Tree Pits for nutrient uptake and infiltration (Filter) Gross Pollutant Trap – Existing Humeceptor	Drainage Bio-Gardens 180 m ³ Rainwater Tank for re-use Pathogen and Fungal Filter*

*Quantitative benefit not included in modelling

Table 6: WSUD Catchment Summary and Proposed Treatment Train Measures

4.3 Water Quality Modelling

The following methodology follows the use of MUSIC in accordance with Ryde Council's requirements:

- Pluviograph data from the Sydney Airport AMO 066037 (1988-1998) with a 6-minute interval;
- Average Potential Evapotranspiration data for the Sydney Region was input into the model;

Water quality treatment typically requires collection of runoff to a treatment system and concentrating flows to a single point of discharge. The following two small catchment areas drain directly off-site as uncoordinated flow and without formal drainage infrastructure and were subsequently excluded from the MUSIC modelling:

- A small grassed garden area immediately west of the carpark that drains directly to Lane Cove Road captured by a series of kerb inlet pits within the road (See Figure 3 for location image);
- The north-eastern corner of the site including service area, storage facilities and part internal access road which drains directly to Lane Cove National Park through discharge via a series of kerb breakouts.

The water quality catchments and treatment nodes were estimated based on the proposed architectural drawings in coordination with the architect, landscape and hydraulic consultants.

4.4 MUSIC Model Results

The pollutant reduction results for the proposed treatment train is illustrated in **Table 2**.

Pollutant	Water Quality Objective (%)	Pollutant Loading Prior Treatment (kg/yr)	Pollutant Loading Post Treatment (kg/yr)	Percentage Reduction Achieved (%)
Gross Pollutants (GP)	90	369	0	100
Total Suspended Solids (TSS)	85	3160	301	90.5
Total Phosphorus (TP)	60	5.6	1.67	70.2
Total Nitrogen (TN)	45	36.6	18.9	48.3

Table 7 – Summary MUSIC Model Results

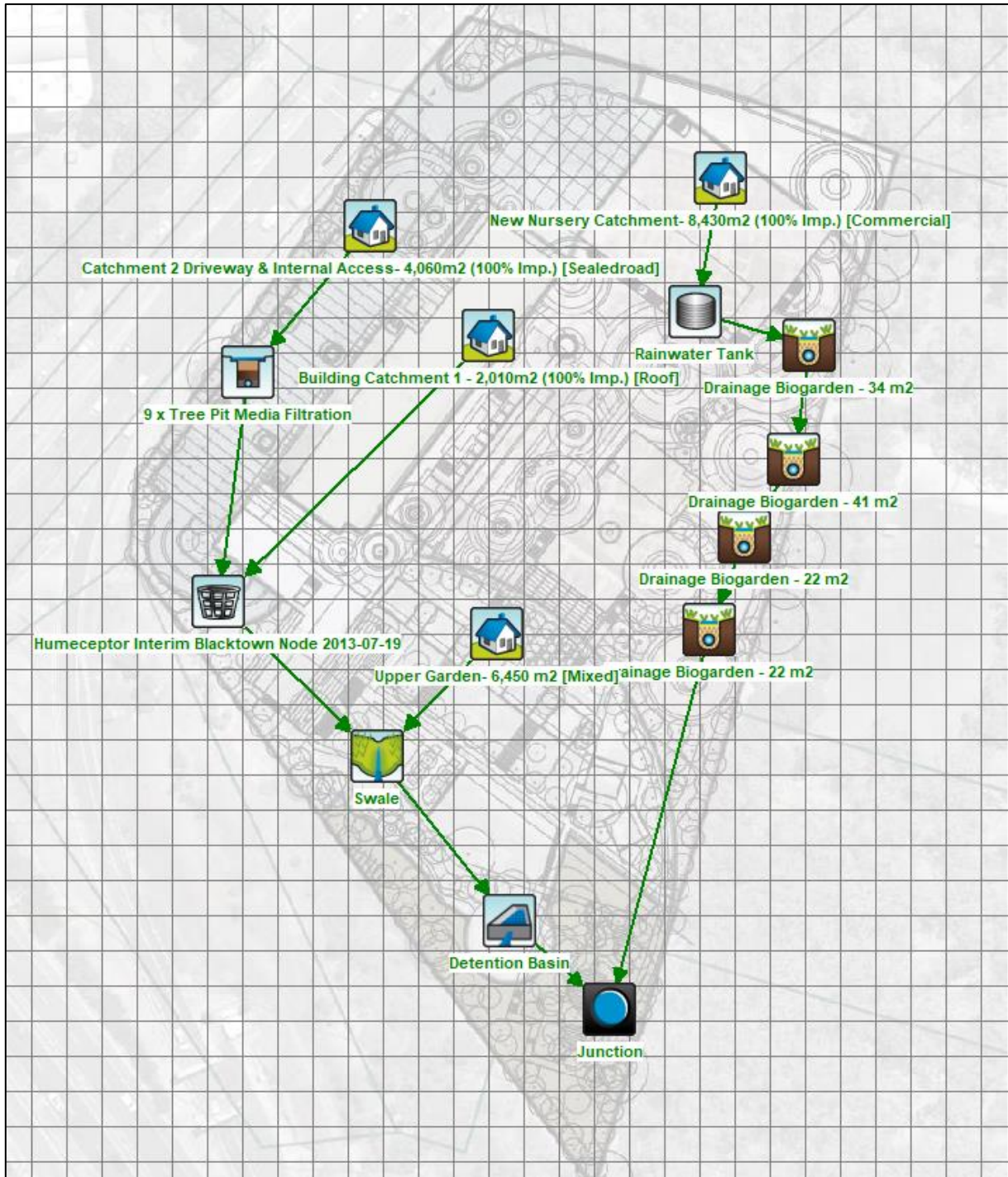


Figure 9 – MUSIC Model Schematic

4.5 Water Re-Use Parameters

For details on re-use calculations, refer to the hydraulic consultant documentation. Coordination with the hydraulic consultant has been undertaken to ensure parameters are consistent and valid for the water quality assessment.

The hydraulic consultant provided estimates of water re-use for the low rise and ground floor amenities which would equate to around 6kL/day. This has been incorporated into the MUSIC modelling assessment.

5 CONCLUSION

5.1 Summary

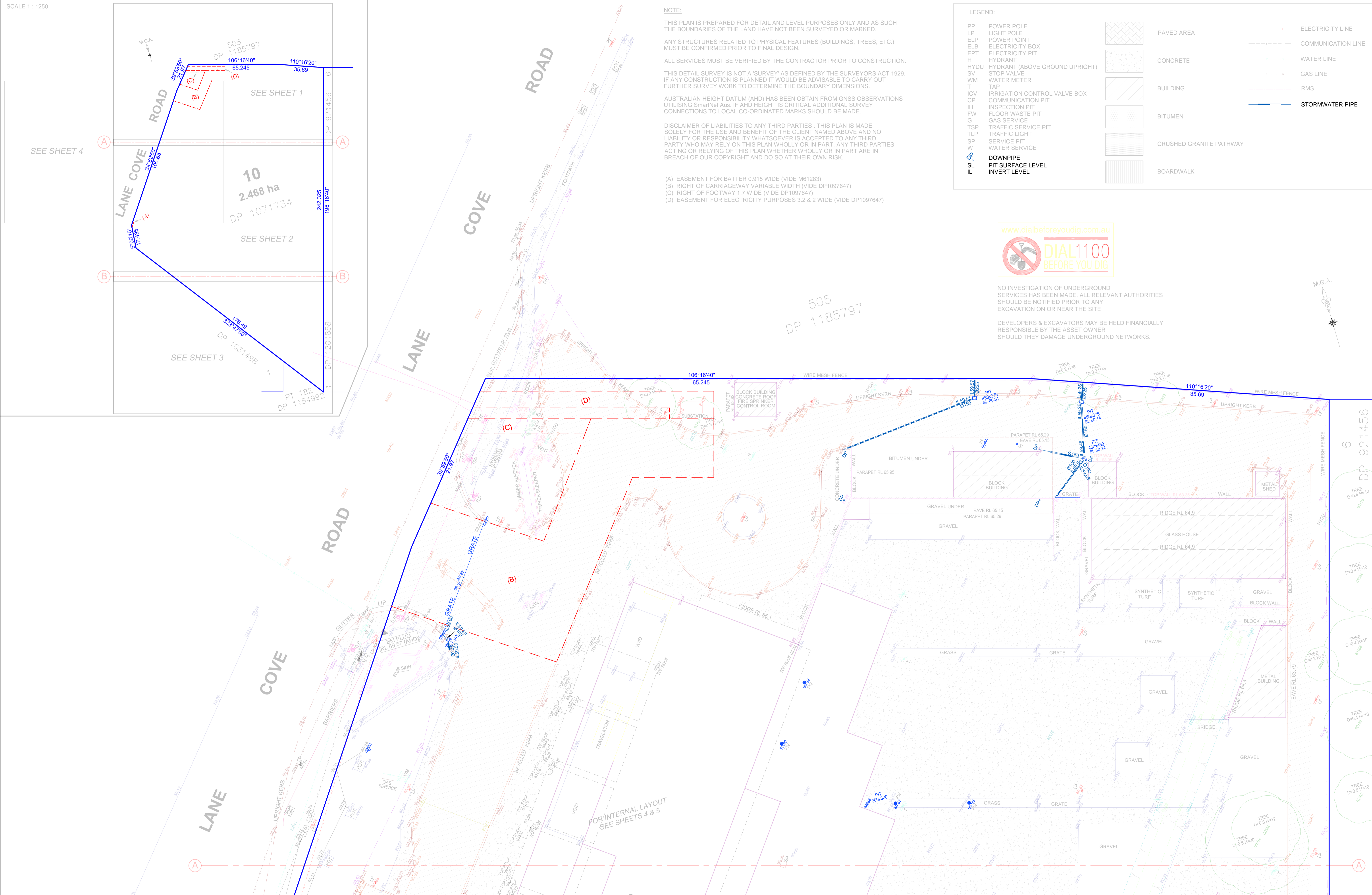
This Stormwater Management Plan and WSUD Strategy for the development satisfies Council's DCP requirements for Part 8.2 Stormwater & Flood Management, Stormwater Technical Manual, WSUD Guidelines, and addresses Pre-Lodgement Commentary. The plan:

- Demonstrates that the available on-site detention facilities for the proposed development provide the level of attenuation required to limit the post-development peak discharges to less than the pre-development (greenfield scenario) for events between the 5 year and 100 year ARI;
- Demonstrates that as a result of the above, the downstream receiving drainage configuration, notably the M2 Motorway pollution control pond and drainage network will be able to cater for the resultant flows. Furthermore, the flows are lower but of similar magnitude providing the benefit of not requiring modifications to the existing network;
- Demonstrates that water quantity and quality as a result of the development will not impact receiving waterways, in particular Porters Creek and Lane Cove River downstream of the M2 Motorway drainage network;
- Satisfies the requirements of the WSUD management plan and pollutant reduction targets in accordance with Council's WSUD Guidelines and Stormwater Management Guidelines.

Further design development will be undertaken in future stages to provide details of the pit and pipe network and water quality device installation.

APPENDIX A

Site Survey



NOTE:
 THIS PLAN IS PREPARED FOR DETAIL AND LEVEL PURPOSES ONLY AND AS SUCH THE BOUNDARIES OF THE LAND HAVE NOT BEEN SURVEYED OR MARKED.
 ANY STRUCTURES RELATED TO PHYSICAL FEATURES (BUILDINGS, TREES, ETC.) MUST BE CONFIRMED PRIOR TO FINAL DESIGN.
 ALL SERVICES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
 THIS DETAIL SURVEY IS NOT A 'SURVEY' AS DEFINED BY THE SURVEYORS ACT 1929. IF ANY CONSTRUCTION IS PLANNED IT WOULD BE ADVISABLE TO CARRY OUT FURTHER SURVEY WORK TO DETERMINE THE BOUNDARY DIMENSIONS.
 AUSTRALIAN HEIGHT DATUM (AHD) HAS BEEN OBTAIN FROM GNSS OBSERVATIONS UTILISING SmartNet Aus. IF AHD HEIGHT IS CRITICAL ADDITIONAL SURVEY CONNECTIONS TO LOCAL CO-ORDINATED MARKS SHOULD BE MADE.
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(A) EASEMENT FOR BATTER 0.915 WIDE (VIDE M61283)
 (B) RIGHT OF CARRIAGEWAY VARIABLE WIDTH (VIDE DP1097647)
 (C) RIGHT OF FOOTWAY 1.7 WIDE (VIDE DP1097647)
 (D) EASEMENT FOR ELECTRICITY PURPOSES 3.2 & 2 WIDE (VIDE DP1097647)

LEGEND:					
PP	POWER POLE	[Symbol]	PAVED AREA	[Symbol]	ELECTRICITY LINE
LP	LIGHT POLE	[Symbol]	CONCRETE	[Symbol]	COMMUNICATION LINE
ELP	POWER POINT	[Symbol]	BUILDING	[Symbol]	WATER LINE
ELB	ELECTRICITY BOX	[Symbol]	BITUMEN	[Symbol]	GAS LINE
EPT	ELECTRICITY PIT	[Symbol]	CRUSHED GRANITE PATHWAY	[Symbol]	RMS
H	HYDRANT	[Symbol]	BOARDWALK	[Symbol]	STORMWATER PIPE
HYDU	HYDRANT (ABOVE GROUND UPRIGHT)	[Symbol]			
SV	STOP VALVE				
WM	WATER METER				
T	TAP				
ICV	IRRIGATION CONTROL VALVE BOX				
CP	COMMUNICATION PIT				
IH	INSPECTION PIT				
FW	FLOOR WASTE PIT				
G	GAS SERVICE				
TSP	TRAFFIC SERVICE PIT				
TLP	TRAFFIC LIGHT				
SP	SERVICE PIT				
W	WATER SERVICE				
⊙	DOWNPIPE				
SL	PIT SURFACE LEVEL				
IL	INVERT LEVEL				



NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS.

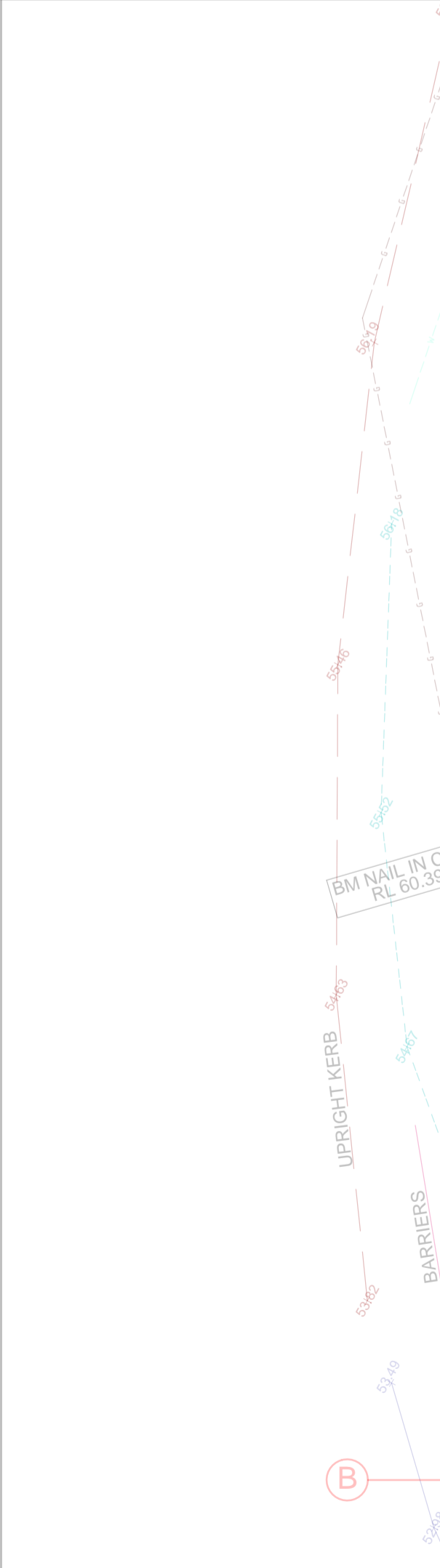
- 09.05.2018 INTERNAL LAYOUT
- 14.10.2020 ADDITIONAL LEVELS & COLUMNS
- 24.11.2020 3D POINTS
- 09.02.2021 STORMWATER UPDATED

	PLAN SHOWING DETAILS & LEVELS OVER LOT 10 IN DP1071734 AT No 307 LANE COVE ROAD, MACQUARIE PARK		SHEET 1 OF 5 SHEETS
	suite 317 / 5 celebration drive norwest business park nsw 2153 po box 7979 baukham hills business centre nsw 2153	DATE: 19.23.27.29.03.2018 3.5.6.9.10.04.2018	DATUM: AHD RATIO: 1 : 200 (A1)

LEGEND:

- PP POWER POLE
- LP LIGHT POLE
- ELP POWER POINT
- ELB ELECTRICITY BOX
- EPT ELECTRICITY PIT
- H HYDRANT
- HYDU HYDRANT (ABOVE GROUND UPRIGHT)
- SV STOP VALVE
- WM WATER METER
- T TAP
- ICV IRRIGATION CONTROL VALVE BOX
- CP COMMUNICATION PIT
- IH INSPECTION PIT
- FW FLOOR WASTE PIT
- G GAS SERVICE
- TSP TRAFFIC SERVICE PIT
- TLP TRAFFIC LIGHT
- SP SERVICE PIT
- W WATER SERVICE
- SL PIT SURFACE LEVEL
- IL INVERT LEVEL

- [Pattern] PAVED AREA
- [Pattern] CONCRETE
- [Pattern] BUILDING
- [Pattern] BITUMEN
- [Pattern] CRUSHED GRANITE PATHWAY
- [Pattern] BOARDWALK
- [Line] ELECTRICITY LINE
- [Line] COMMUNICATION LINE
- [Line] WATER LINE
- [Line] GAS LINE
- [Line] RMS
- [Line] STORMWATER PIPE



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NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
 DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS.

chadwickcheng
 consulting surveyors
 suite 317 / 5 collaboration drive norwest business park nsw 2153
 po box 7979 baulkham hills business centre nsw 2153
 p: 88832622 f: 88832633 e: admin@cca.net.au

DATE: 09.02.2021
 RATIO: 1 : 200 (A1)
 PRINCIPAL: MSK ARCHITECTS

1) 09.05.2018 INTERNAL LAYOUT
 2) 14.10.2020 ADDITIONAL LEVELS & COLUMNS
 3) 24.11.2020 3D POINTS
 4) 09.02.2021 STORMWATER UPDATED

PLAN SHOWING DETAILS & LEVELS OVER SHEET 2 OF 5
 LOT 10 IN DP1071734 AT NO 307 LANE COVE ROAD, MACQUARIE PARK
 REFERENCE: 37174 / D3-MGA-3d



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NOTE:

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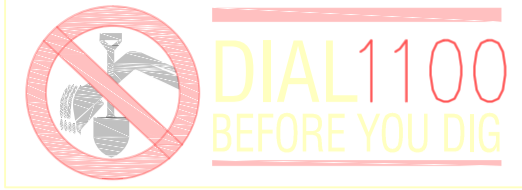
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LEGEND:					
PP	POWER POLE		PAVED AREA		ELECTRICITY LINE
LP	LIGHT POLE		CONCRETE		COMMUNICATION LINE
ELB	POWER POINT		BUILDING		WATER LINE
ELEB	ELECTRICITY BOX		BITUMEN		GAS LINE
EPT	ELECTRICITY PIT		CRUSHED GRANITE PATHWAY		RMS
H	HYDRANT		BOARDWALK		STORMWATER PIPE
HYDU	HYDRANT (ABOVE GROUND UPRIGHT)				
SV	STOP VALVE				
WM	WATER METER				
T	TAP				
ICV	IRRIGATION CONTROL VALVE BOX				
CP	COMMUNICATION PIT				
IH	INSPECTION PIT				
FW	FLOOR WASTE PIT				
G	GAS SERVICE				
TSP	TRAFFIC SERVICE PIT				
TLP	TRAFFIC LIGHT				
SP	SERVICE PIT				
W	WATER SERVICE				
SL	PIT SURFACE LEVEL				
IL	INVERT LEVEL				

- 09.05.2018 INTERNAL LAYOUT
- 14.10.2020 ADDITIONAL LEVELS & COLUMNS
- 24.11.2020 3D POINTS
- 09.02.2021 STORMWATER UPDATED

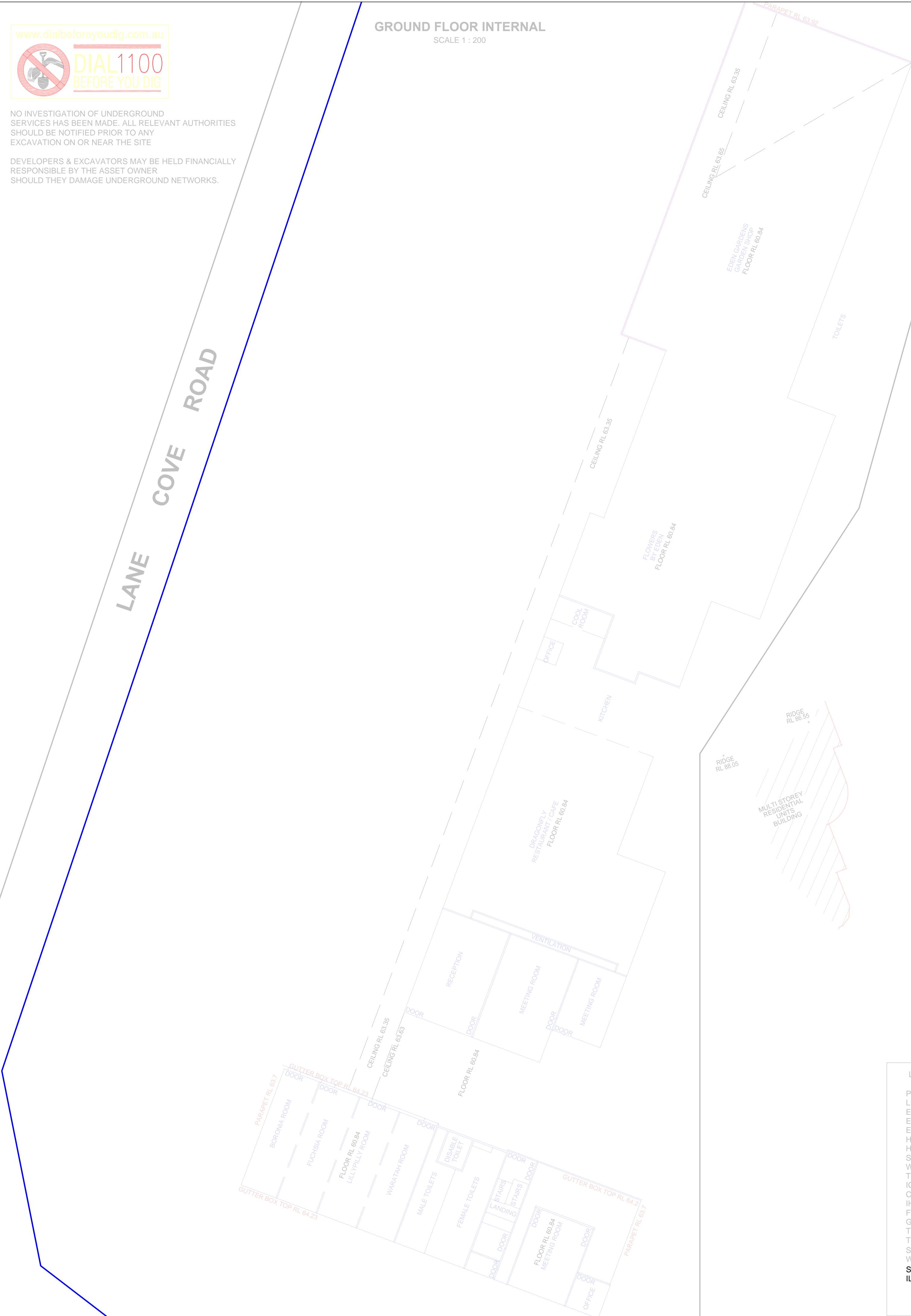
	PLAN SHOWING DETAILS & LEVELS OVER	SHEET	3
	LOT 10 IN DP1071734 AT No 307 LANE COVE ROAD, MACQUARIE PARK	OF	5 SHEETS
suite 317 / 5 celebration drive norwest business park nsw 2153 po box 7979 baulkham hills business centre nsw 2153	DATUM: AHD	RATIO: 1 : 200 (A1)	REFERENCE
p: 88832622 f: 88832633 e: admin@cca.net.au	19.23.27.29.03.2018 3.5.6.9.10.04.2018	MSK ARCHITECTS PRINCIPAL	37174 / D3- MGA-3d



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GROUND FLOOR INTERNAL
SCALE 1 : 200



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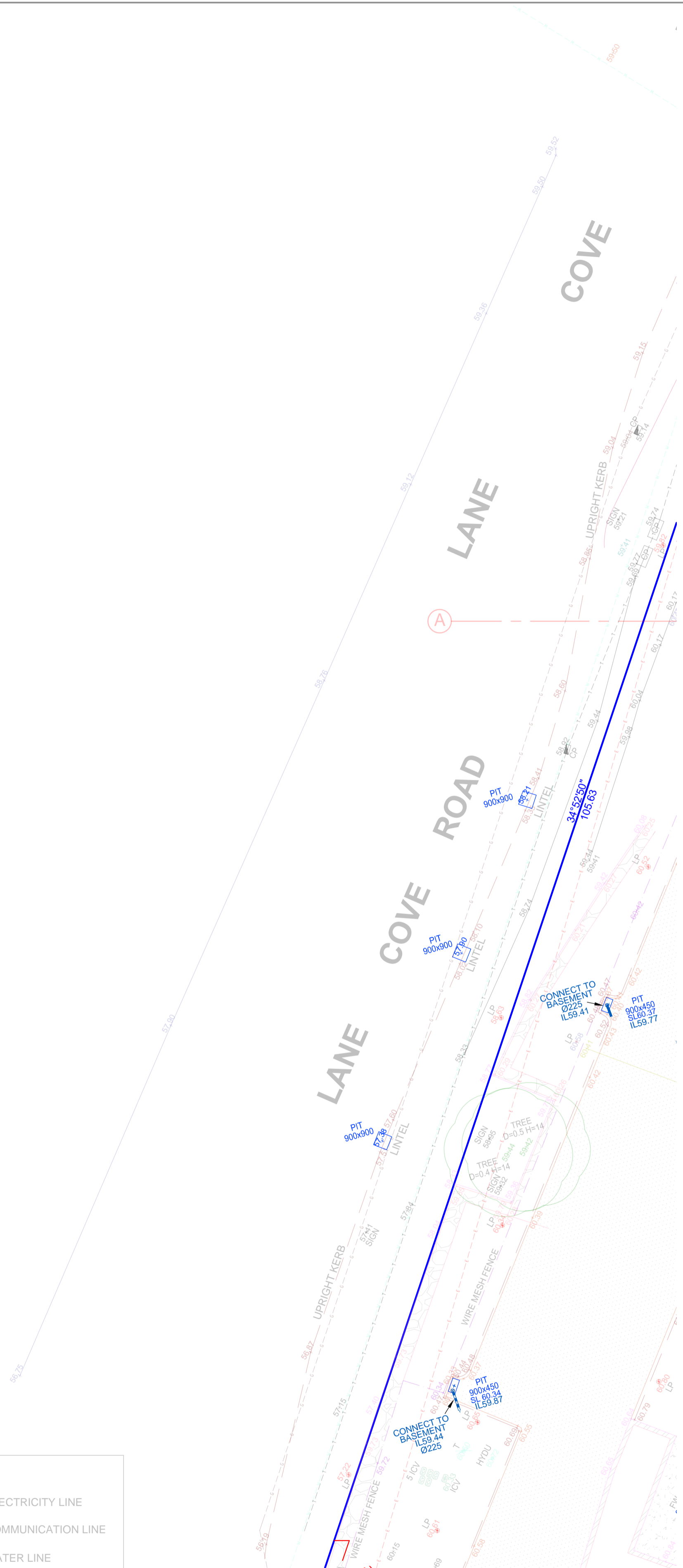
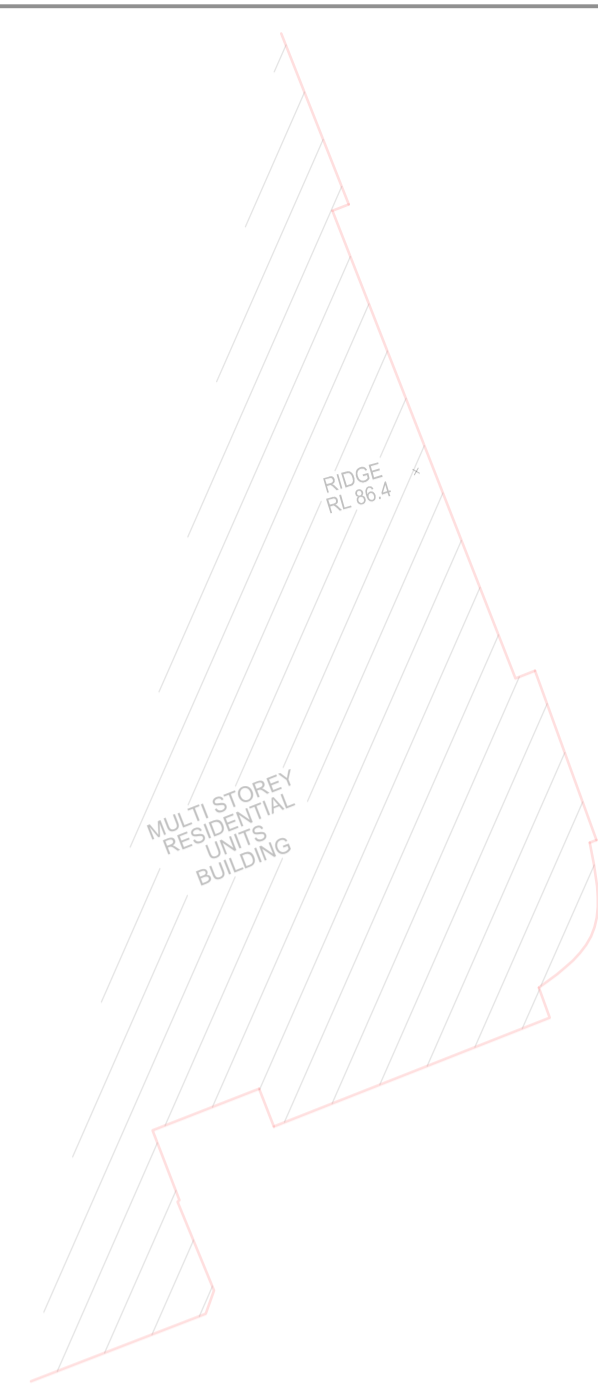
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LEGEND:

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LP	LIGHT POLE		CONCRETE		COMMUNICATION LINE
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H	HYDRANT				STORMWATER PIPE
HYDU	HYDRANT (ABOVE GROUND UPRIGHT)				
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SL	PIT SURFACE LEVEL				
IL	INVERT LEVEL				



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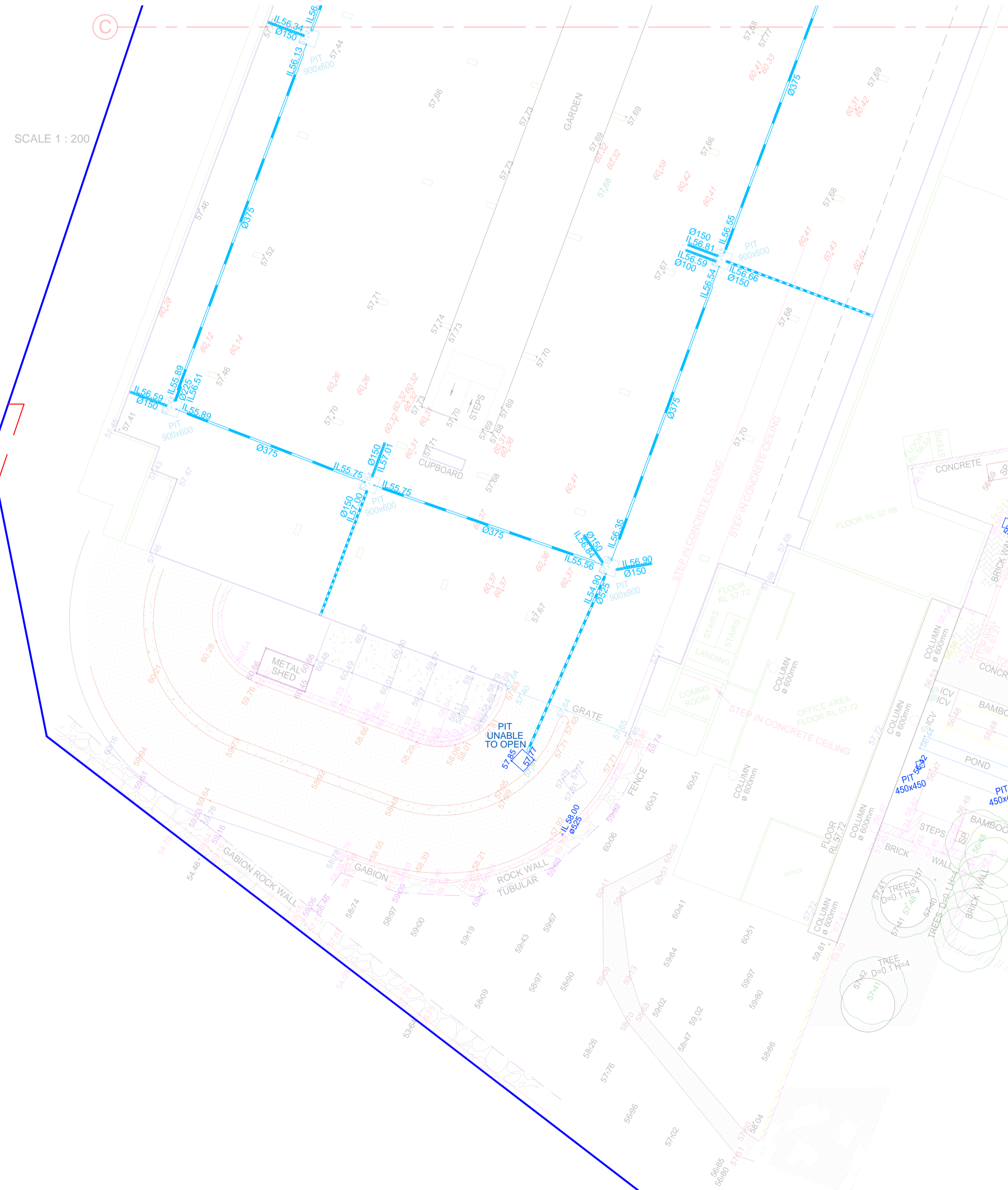
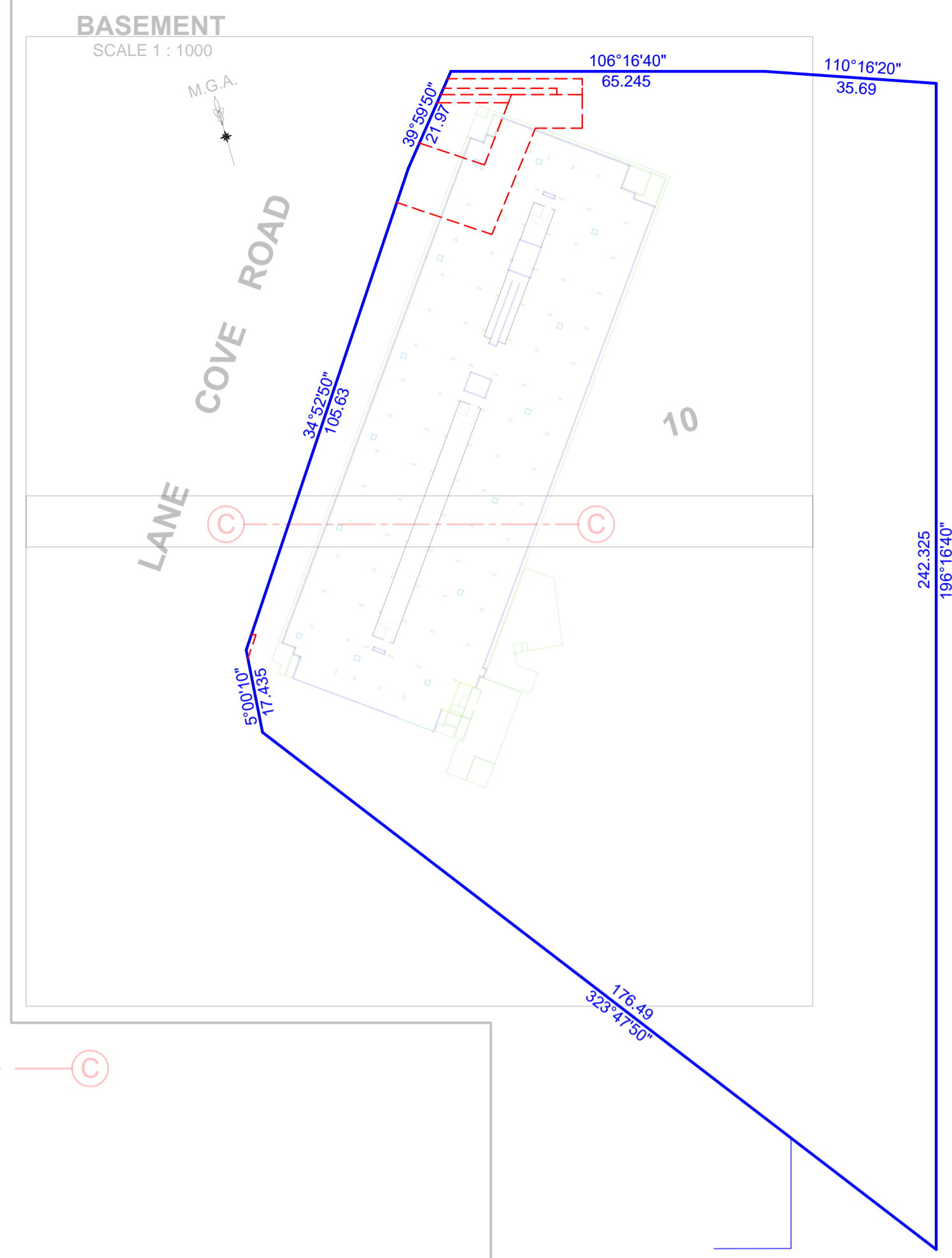
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LEGEND:

SL	PIT SURFACE LEVEL
IL	INVERT LEVEL
	STORMWATER PIPE
	COLUMN

LEVELS ABOVE RL 59.00 ARE CEILING LEVELS



- 1) 09.05.2018 INTERNAL LAYOUT
- 2) 14.10.2020 ADDITIONAL LEVELS & COLUMNS
- 3) 24.11.2020 3D POINTS
- 4) 09.02.2021 STORMWATER UPDATED

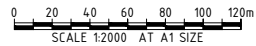
	PLAN SHOWING DETAILS & LEVELS OVER LOT 10 IN DP1071734 AT No 307 LANE COVE ROAD, MACQUARIE PARK		SHEET 5 OF 5 SHEETS
	suite 317 / 5 celebration drive northwest business park nsw 2153 po box 7979 baulkham hills business centre nsw 2153 p: 88832622 f: 88832633 e: admin@cca.net.au	DATUM: AHD DATE: 19.23.27.29.03.2018 3.5.5.9.10.04.2018	RATIO: 1 : 200 (A1) MSK ARCHITECTS PRINCIPAL

APPENDIX B

Stormwater Management Plans

EDEN GARDENS, 307 LANE COVE ROAD MACQUARIE PARK NSW 2113

LGA RYDE CITY COUNCIL
LOT 10 DP 1071734
FOR DEVELOPMENT APPLICATION



LOCALITY PLAN
SCALE 1:2000

SOURCE: NEARMAP

DRAWING INDEX

DRAWING No.	DESCRIPTION
C-0000	LOCALITY PLAN AND DRAWING INDEX
C-0200	STORMWATER MANAGEMENT PLAN SHEET 1 OF 2
C-0201	STORMWATER MANAGEMENT PLAN SHEET 2 OF 2
C-0700	EROSION AND SEDIMENT CONTROL PLAN SHEET 1 OF 2
C-0701	EROSION AND SEDIMENT CONTROL PLAN SHEET 2 OF 2
C-0710	EROSION AND SEDIMENT DETAILS

REV	DATE	DESCRIPTION	REVISIONS
A	26.02.2021	ISSUED FOR DEVELOPMENT APPLICATION	PS

CLIENT	CLIENT

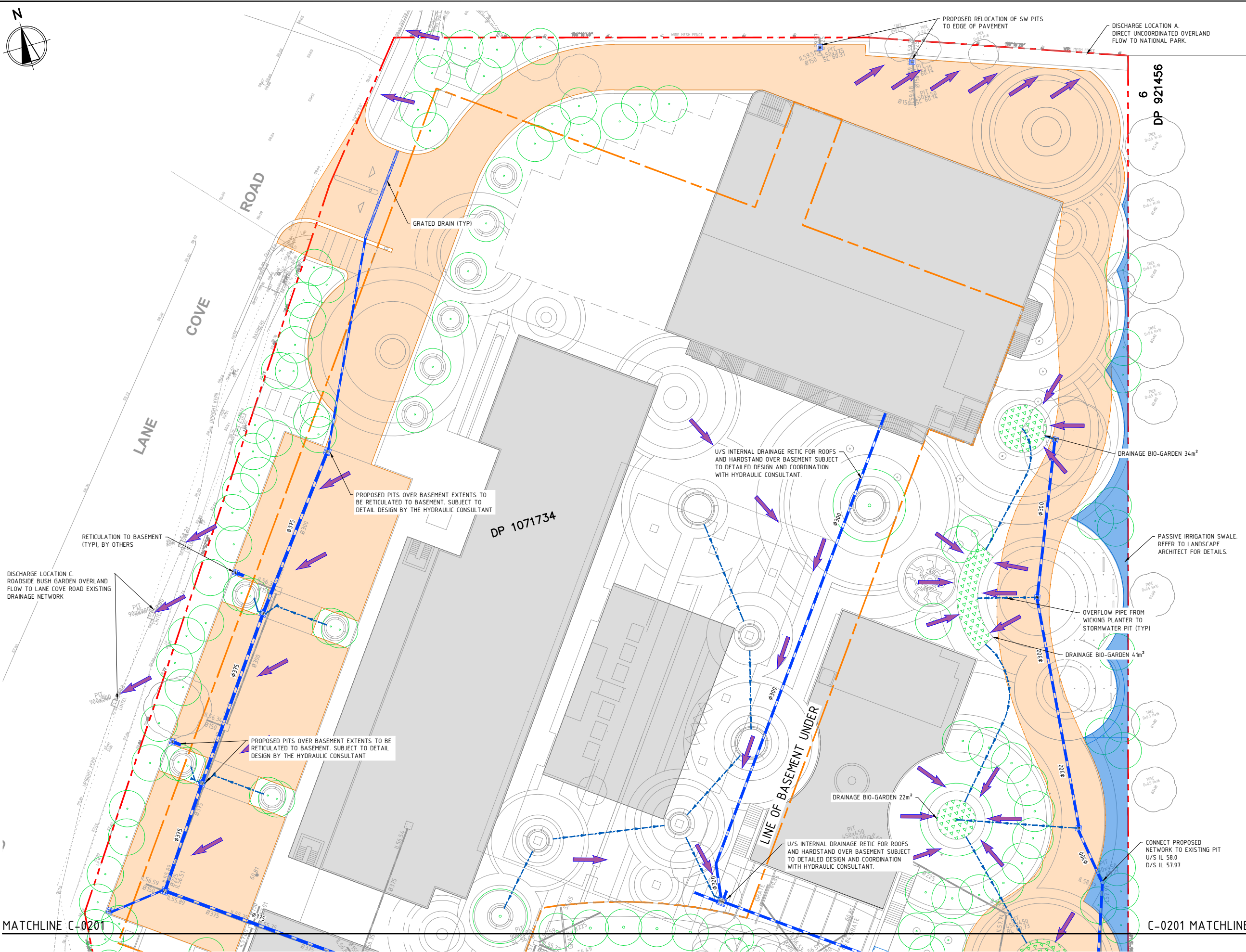
PROJECT	PROJECT
EDEN GARDENS 307 LANE COVE ROAD MACQUARIE PARK	

Sydney Office —
L2, 8 Windmill St
Sydney NSW 2000
P / +61 2 9770 3300 E / info@bgeeng.com
bgeeng.com

STATUS	STATUS
ISSUED FOR INFORMATION NOT TO BE USED FOR CONSTRUCTION	

DRAWN	DESIGNED	CHECKED	APPROVED
TEJ	BO	ML	PS

TITLE	TITLE
LOCALITY PLAN AND DRAWING INDEX	



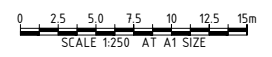
LEGEND

- SITE BOUNDARY
- EXTENT OF BASEMENT
- PROPOSED DRAINAGE PIT
- PROPOSED DRAINAGE PIPE
- EXISTING DRAINAGE PIT
- EXISTING DRAINAGE PIPE
- PROPOSED DRAINAGE BIOGARDEN
- PROPOSED SWALE/STREAM
- EXISTING DETENTION BASIN
- PROPOSED ACCESS ROAD (BY OTHERS)
- PROPOSED BUILDINGS (BY OTHERS)
- ➔ INDICATIVE OVERLAND FLOW DIRECTION
- EXISTING TREES
- PROPOSED TREES (BY OTHERS)

- NOTES:**
- REFER TO BG&E WATER SENSITIVE URBAN DESIGN STRATEGY PLAN REPORT FOR DETAILS ON CATCHMENTS, SITE DISCHARGE CALCULATIONS, OSD FACILITIES AND PROPOSED TREATMENT TRAIN
 - DRAINAGE RETICULATION FOR THE ROOFS OF BUILDINGS AND HARDSTAND AREAS OVER BASEMENT ARE SUBJECT TO FURTHER DESIGN DEVELOPMENT WITH THE HYDRAULIC CONSULTANT.
 - FOR LOCATION OF ALL SURVEYED EXISTING PIPES, REFER TO DETAILED SURVEY BY CHADWICK CHENG.

MATCHLINE C-0201

C-0201 MATCHLINE



REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION
A	26.02.2021	ISSUED FOR DEVELOPMENT APPLICATION	PS		
REVISIONS					

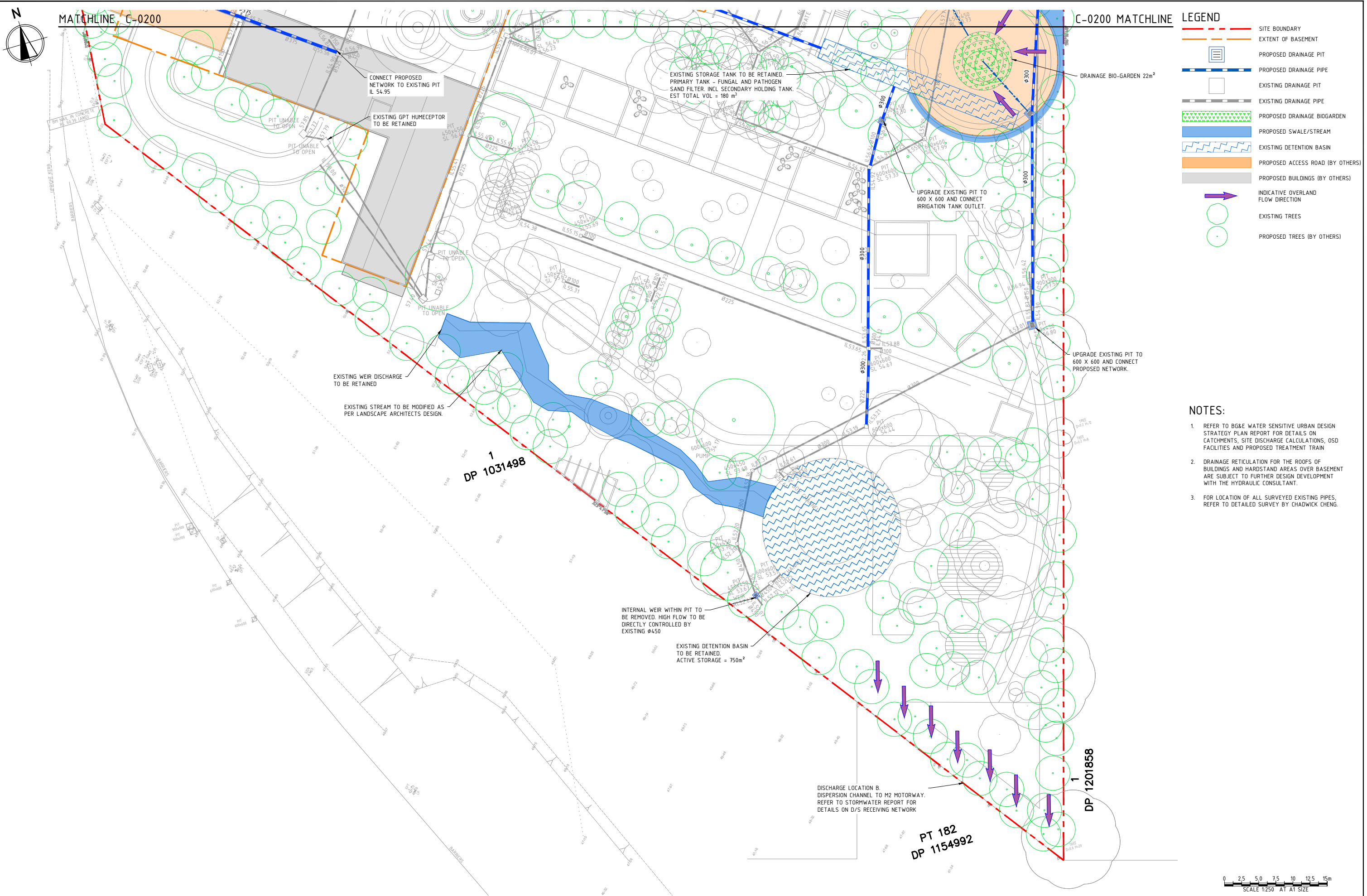
CLIENT
THUNDERBIRDS ARE GO PTY LTD ATF THE GARDENERS TRUST

PROJECT
**EDEN GARDENS
 MACQUARIE PARK, NSW 2113**

Sydney Office—
 L2, 8 Windmill St
 Sydney NSW 2000
 P / +61 2 9770 3300 E / info@bgeeng.com
 bgeeng.com—

STATUS	ISSUED FOR INFORMATION			
	NOT TO BE USED FOR CONSTRUCTION			
DRAWN	DESIGNED	CHECKED	APPROVED	
TEJ	BO	ML	PS	
DATUM	GRID	SCALE		
AHD	MGA56	1:250		

TITLE	STORMWATER MANAGEMENT PLAN SHEET 1 OF 2		
PROJECT No.	DRAWING No.	REV	
S18349	C-0200	A	



LEGEND

	SITE BOUNDARY
	EXTENT OF BASEMENT
	PROPOSED DRAINAGE PIT
	PROPOSED DRAINAGE PIPE
	EXISTING DRAINAGE PIT
	EXISTING DRAINAGE PIPE
	PROPOSED DRAINAGE BIOGARDEN
	PROPOSED SWALE/STREAM
	EXISTING DETENTION BASIN
	PROPOSED ACCESS ROAD (BY OTHERS)
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REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION
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 bgeeng.com—



STATUS
ISSUED FOR INFORMATION
 NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
TEJ	BO	ML	PS

DATUM: AHD GRID: MGA56 SCALE: 1:250 AT: A1 9/21

TITLE
**STORMWATER MANAGEMENT
 PLAN
 SHEET 2 OF 2**

PROJECT No.	DRAWING No.	REV
S18349	C-0200	A

26/02/2021 10:09:54 AM

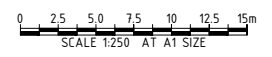
© BG&E Pty Limited



LEGEND

	EXISTING BOUNDARY
	EXISTING CONTOURS
	PROPOSED CONTOURS
	EXTENT OF BASEMENT
	STABILISED SITE ACCESS
	SEDIMENT FENCE
	GEOTEXTILE INLET FILTER TYPE A
	PROPOSED STORMWATER PIT

- NOTES:**
- FOR DETAILS OF EROSION AND SEDIMENT CONTROL DEVICES REFER TO DRAWING C-0710.
 - FOR BASEMENT EXCAVATION EXTENTS, REFER TO ARCHITECTURAL DRAWINGS



REV	DATE	DESCRIPTION	REVISIONS
A	26.02.2021	ISSUED FOR DEVELOPMENT APPLICATION	PS

CLIENT
THUNDERBIRDS ARE GO PTY LTD AT THE GARDENERS TRUST

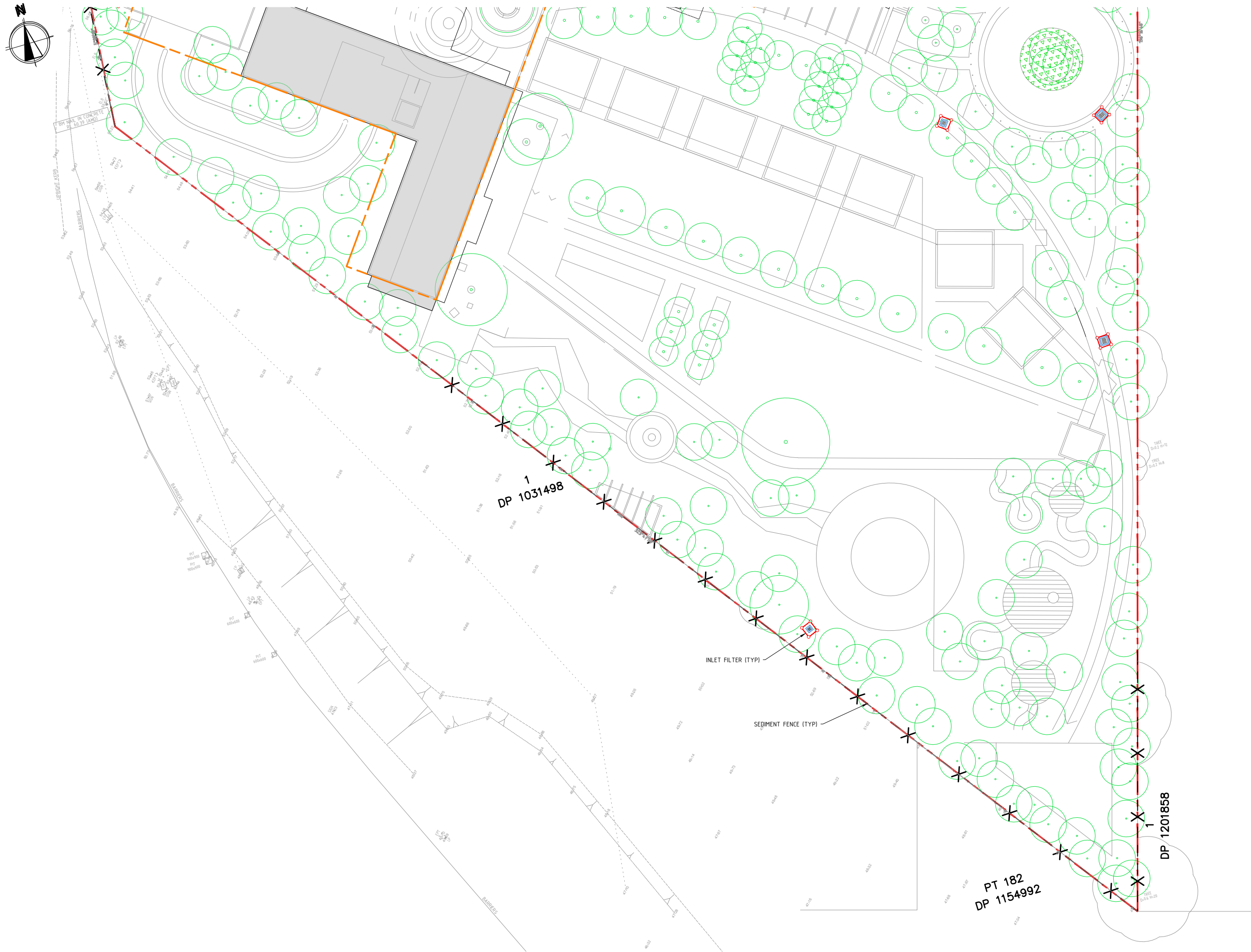
PROJECT
**EDEN GARDENS
 MACQUARIE PARK, NSW 2113**

Sydney Office—
 L2, 8 Windmill St
 Sydney NSW 2000
 P / +61 2 9770 3300 E / info@bgeeng.com
 bgeeng.com—

STATUS
ISSUED FOR INFORMATION
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DRAWN	DESIGNED	CHECKED	APPROVED
TEJ	BO	ML	PS
DATUM	GRID	SCALE	
AHD	MGA56	1:250	

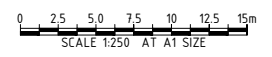
TITLE	PROJECT No.	DRAWING No.	REV
EROSION AND SEDIMENT CONTROL PLAN SHEET 1	S18349	C-0700	A



LEGEND

	EXISTING BOUNDARY
	EXISTING CONTOURS
	PROPOSED CONTOURS
	EXTENT OF BASEMENT
	STABILISED SITE ACCESS
	SEDIMENT FENCE
	GEOTEXTILE INLET FILTER TYPE A
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REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION
A	26.01.2021	ISSUED FOR DEVELOPMENT APPLICATION	PS		
REVISIONS					

CLIENT
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PROJECT
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STATUS
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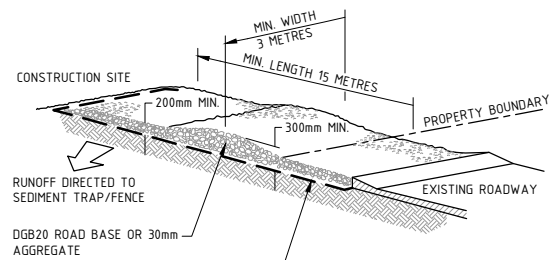
DRAWN	DESIGNED	CHECKED	APPROVED
TEJ	BO	ML	PS

DATUM: AHD GRID: MGA56 SCALE: 1:250 AT: A1 9021

TITLE
EROSION AND SEDIMENT CONTROL PLAN SHEET 2

PROJECT No.	DRAWING No.	REV
S18349	C-0700	A

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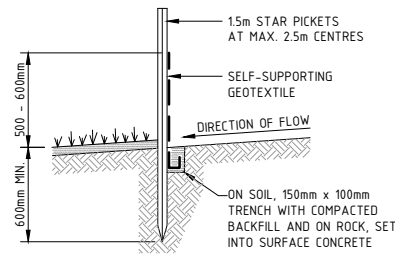
GEOTEXTILE FABRIC DESIGNED TO PREVENT INTERMIXING OF SUBGRADE AND BASE MATERIALS AND TO MAINTAIN GOOD PROPERTIES OF THE SUBBASE LAYERS.

GEOTEXTILE MAY BE A WOVEN OR NEEDLE-PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N.

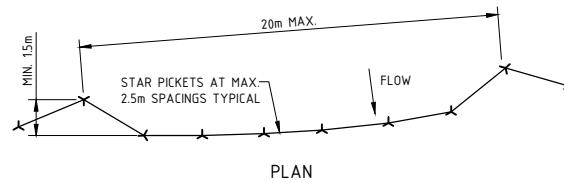
STABILISED SITE ACCESS CONSTRUCTION NOTES:

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.

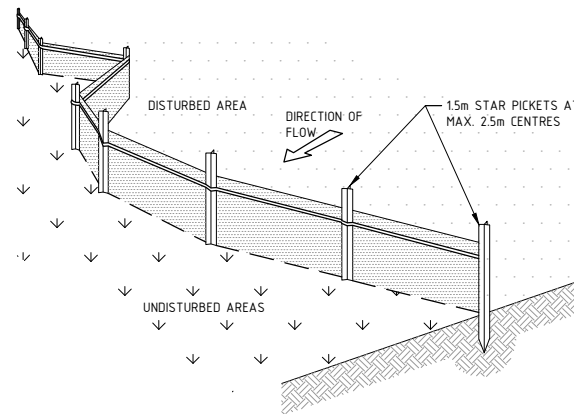
STABILISED SITE ACCESS
SCALE N.T.S



SECTION DETAIL



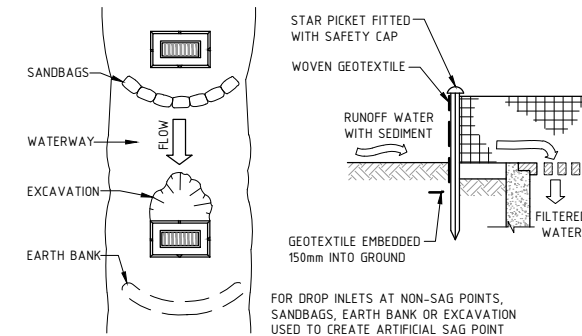
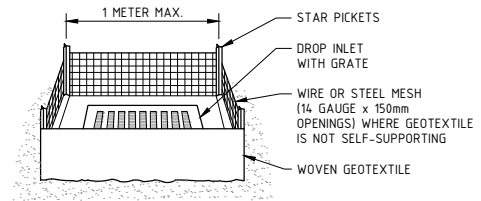
PLAN



SEDIMENT FENCE 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 1.5m LONG STAR PICKETS INTO GROUND AT 2.5m 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
SCALE N.T.S



GEOTEXTILE INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. PICKET SPACING TO BE A MAXIMUM 1.0m 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 GEOTEXTILES UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER
SCALE N.T.S



REV	DATE	DESCRIPTION	REVISED BY	DATE	DESCRIPTION
A	26.02.2021	ISSUED FOR DEVELOPMENT APPLICATION	PS		

CLIENT
THUNDERBIRDS ARE GO PTY LTD ATF THE GARDENERS TRUST

PROJECT
**EDEN GARDENS
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STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
TEJ	BO	ML	PS

TITLE
EROSION AND SEDIMENT DETAILS